HABITAT CONSERVATION STRATEGY for POLAR BEARS in ALASKA

Prepared by

U.S. Fish and Wildlife Service Alaska Region 1011 East Tudor Road Anchorage, Alaska

August 14, 1995

QL 737 .C274 H33 1995

Į

ſ

HABITAT CONSERVATION STRATEGY for POLAR BEARS in ALASKA

ſ

prepared by

U.S. Fish and Wildlife Service Alaska Region 1011 E. Tudor Road Anchorage, Alaska

August 14, 1995

ARLIS

737

.C274

H33

1995

Alaska Resources Library & Information Services Anchorage Alaska

TABLE OF CONTENTS

4.55%

man

Arres 1

(6:31

(1548

cmpa

	LIST OF TABLES v									
	LIST OF FIGURES									
LIST OF ACRONYMS										
	ACKNOWLEDGMENTS vii									
	PREF	ACE	· · · · · · · · · · · · · · · · · · ·							
	EXECUTIVE SUMMARY									
	I.	INTRODUCTION								
	II.	OBJECTIVES								
	III.	POLAR BEAR BIOLOGYA.Species DescriptionB.DistributionC.ReproductionD.Natural Mortality and SurvivalE.Population Status and Trends								
	IV.	ALASKA ARCTIC ENVIRONMENT A. Marine Environment 1. Pack Ice 2. Shore-Fast Ice 3. Transition Zone 4. Polynyas and Leads 5. Coastal Environment 1. Mainland Habitat 2. Coastal Habitat/Beaches								
	V.	 Coastal Habitat/Barrier Islands POLAR BEAR HABITAT USE A. Feeding 1. Food Sources 2. Hunting Strategies 3. Bear Distribution Relative to S 4. Feeding Habitat by Season 	16 							
		 B. Maternity Denning 1. Land Denning Habitat 2. Shore-fast Ice Denning Habitat 3. Pack Ice Denning Habitat 	22 27 28 29							
		C.BreedingStreedingD.Migration PatternsStreeding								

		1. Movements of Chukchi Sea Bears
		2. Movements of Beaufort Sea Bears
		3. Activity Levels
		4. Population Boundaries
VI.	NATIV	YE KNOWLEDGE OF POLAR BEAR HABITAT USE
VII.	THRE	ATS TO POLAR BEARS AND THEIR HABITAT
	А.	Oil Industry Activity in Polar Bear Habitat
		1. Exploration Activities
		2. Development and Production Activities
		3. Future Exploration, Development, and Production Activities 42
		4. State of Alaska Oil and Gas Lease Sales
		5. Outer Continental Shelf Lease Sales
		6. Oil Industry Measures to Protect Polar Bears
	В.	Shipping
		1. Domestic Shipping 47
		2. International Shipping 47
	C.	Coal Mining
	D.	Contaminants
	2.	1. Organochlorines
		2 Mercury 51
		3 Cadmium and Other Heavy Metals 51
		4 Radionuclides 52
	F	Global Warming and Depletion of the Ozone 53
	E.	Human Population Growth within Polar Bear Habitat
	1.	1 North Slope Borough 54
		2 Northwest Arctic Borough 54
		3 Bering Strait Coastal Resource Service Area 54
		4 Potential Effects of Increased Subsistence Hunting 55
	G	Fffects of Industrial Development on Polar Bears 57
	О.	1 Disturbances to Maternity Dens 57
		2 Displacement of Binged Seels 57
		2. Displacement of Kingeu Seals
		J. Dignlagement of Bears
		$4. Displacement of Dears \dots 50$
		$5. \text{Old Spins} \qquad \qquad 59$
		6. Illegal Hunting 60
VIII.	LAND	OWNERSHIP OF HABITAT 60
IX.	EXIST	ING HABITAT PROTECTION MEASURES. TREATIES LAWS
	AGRE	EMENTS
	Α.	Agreement on the Conservation of Polar Bears (Polar Bear Agreement)
		47
	B.	Marine Mammal Protection Act of 1972 (MMPA) as Amended 62
	C.	Outer Continental Shelf Lands Act (OCSLA) as Amended 62
	<u>.</u>	

£т;

1

pre-

	D.	Coastal Zone Management Act (CZMA) 63
	E.	Alaska National Interest Lands Conservation Act (ANILCA) 63
	F.	Marine Protection, Research and Sanctuaries Act
X.	STRA	TEGY IMPLEMENTATION
	A.	Measures for the Conservation of Important Polar Bear Feeding Habitat
		····· · · · · · · · · · · · · · · · ·
		1. Recurring Leads and Polynyas 65
		2. Carcass Feeding Areas
	B.	Measures for the Conservation of Important Polar Bear Maternity Denning
		Habitat
	C.	Measures to Further the Goals of the Agreement on the Conservation of
		Polar Bears
		1. Village Communication Plan 69
		2. Polar Bear Advisory Council
		3. Important Maternity Denning Areas in the Arctic National Wildlife
		Refuge
		4. International Conservation Initiatives
	D.	Research Needs
		1. Terrestrial Habitats
		2. Ice Habitats
		3. Effects of Contaminants on Polar Bears
		4. Detection and Deterrent Techniques
XI.	CONS	SULTATION AND COORDINATION
	A.	Process
	В.	Public Comment
		1. Process of Development of the Draft Habitat Conservation Strategy
		2. Compliance with the 1973 international Agreement on the
		Conservation of Polar Bears
		3. Status of polar bear populations
		4. Important Habitat Areas 80
		5. Incidental Take
		6. Letters of Authorization (LOA's)
		7. Designating the Coastal Plain of the Arctic National Wildlife Refuge
		as a Polar Bear Denning Reserve
		8. Threats
		9. Traditional Knowledge 97
		10. Polar Bear Advisory Council (Council)
		11. Village Communication Plans 99
		12. Research Needs
		13. Environmental Assessment (EA) 100
XII.	BIBLIC	OGRAPHY

17233

- Per-

. .

iii

Appendix A.	Native Knowledge of Polar Bear Habitat Use A - 1
Appendix B.	Agreement on the Conservation of Polar Bears B - 1
Appendix C.	Polar Bear Stock Assessment C - 1
Appendix D.	Federal Register Notice for the Beaufort Sea Incidental Take Final Rule. D - 1
Appendix E.	Protocol of Intentions Between the Indigenous Peoples of Chukotka and Alaska
Appendix F.	Federal Register Notice of Intent to Prepare a Polar Bear Habitat Protection Strategy, Conduct Public Meetings, and Request for Information
Appendix G.	Environmental Assessment and Finding of No Significant Impact Dated 4/26/93, Beaufort Sea Incidental Take Final Rule
Appendix H.	Inuvialuit Game Council and North Slope Borough Management Agreement for Polar Bears of the Southern Beaufort Sea
Appendix I.	Protocol U.S./Russia Bilateral Agreement
Appendix J.	Options Considered to Conserve Polar Bear Habitat J - 1

LIST OF TABLES

Table 1.	Relative importance of habitat types.	10
Table 2.	Seal kills and lairs found by habitat type	19
Table 3.	Size of annual activity areas of Beaufort Sea polar bears	32

LIST OF FIGURES

Figure 1.	Generalized distribution of polar bears in the Beaufort, Chukchi and Bering
•	seas
Figure 2.	Circulation pattern of surface current within the range of polar bears in Alaska.
	Ice in the Beaufort, Chukchi and Bering seas typically moves with the
	prevailing surface currents
Figure 3.	Transition of habitat types as related to ice zones
Figure 4.	Generalized location of shore-fast ice, pack ice, and drifting ice in northern
-	Alaska in spring and fall 12
Figure 5.	General location of recurring leads and polynyas in the Beaufort, Chukchi, and
-	Bering seas. Adapted from Stringer and Groves (1991) and Smith and Rigby
	(1981)
Figure 6a.	Location and habitat type of confirmed and known polar bear maternity dens
	located by radio-telemetry, 1981 - 1991. Confirmed polar bear dens were
	verified by consistent temperature and activity output from satellite transmitters
	(PTT), repeated radio tracking and visual observations, or both. Unconfirmed
	locations were classified as known dens. Research was conducted primarily in
	the Beaufort Sea. Shaded areas represent denning areas located within in
	Russia
Figure 6b.	Location and habitat type of confirmed and known polar bear maternity dens
	located along the coastal area from Point Hope to Cape Halkett, Alaska 1981 -
	1991. Confirmed polar bear dens were verified by consistent temperature and
	activity output from satellite transmitters (PTT), repeated radio tracking and
	visual observations, or both. Unconfirmed locations were classified as known
	dens. Research was conducted primarily in the Beaufort Sea 24
Figure 6c.	Location and habitat type of confirmed and knows polar bear maternity dens
	located along the coastal area from Colville River, Alaska to Cape Bathurst,
	Canada, 1981 - 1991. Confirmed polar bear dens were verified by consistent
	temperature and activity output from satellite transmitters (PTT), repeated radio
	tracking and visual observations, or both. Unconfirmed locations were
	classified as known dens. Research was conducted primarily in the Beaufort
	Sea
Figure 7.	Movements of pelagic polar bear maternity dens, 1981 to 1991. Research was
	conducted primarily in the Beaufort Sea. Chukchi from the Beaufort Sea,
T	causing all but one female to abandon (Amstrup and Gardner 1994) 30
Figure 8.	Movements of temale polar bears in the three months following den emergence,
T. 0	1981 to 1991. Kesearch was conducted primarily in the Beaufort Sea 33
Figure 9.	General location for collection of Native knowledge

5°25

v

Figure 10.	Developed oil fields on the Alaska North Slope	9
Figure 11.	Undeveloped oil fields on the Alaska North Slope 4	1
Figure 12.	United States/Russia proposed simultaneous leasing in the Chukchi Sea/Hope	
	Basin	4
Figure 13.	Proposed lease sale 144 in the Beaufort Sea 4	-5
Figure 14.	Alaska land status	1
Figure 15.	General location of important terrestrial and nearshore maternity denning areas	s
-	in Alaska	8

LIST OF ACRONYMS

(72)

(These

ACMP Alaska Coastal Management Program ADF&G Alaska Department of Fish and Game AEPS Arctic Environmental Protection Strategy ANC Alaska Nanuuq Commission Alaska National Interest Lands Conservation Act ANILCA AOGA Alaska Oil & Gas Association APA Administrative Procedures Act ARCO Atlantic Richfield Company Arctic National Wildlife Refuge Arctic NWR Advanced Very High Resolution Radiometer AVHRR British Petroleum Exploration BP Exploration Conservation of Arctic Flora and Fauna CAFF CRSA Coastal Resource Service Area CZMA Coastal Zone Management Act HCS Polar Bear Habitat Conservation Strategy IHA Important Habitat Area **INSROP** International Northern Sea Route Program Indian Reorganization Act IRA International Union for Conservation of Nature & Natural **IUCN** Resources LOA Letter of Authorization MMM Marine Mammals Management MMPA Marine Mammal Protection Act Minerals Management Service MMS NAB Northwest Arctic Borough NANA Northwest Arctic Native Association **NSB** North Slope Borough NBS National Biological Service NSB/IGC North Slope Borough Inuvialiut Game Council Agreement NSR Northern Sea Route OSP **Optimum Sustainable Population** Agreement on Conservation of Polar Bears Polar Bear Agreement PBR Potential Biological Removal RurAL CAP Rural Alaska Community Action Program

Service U. S. Fish and Wildlife Service

vii

ACKNOWLEDGMENTS

The U.S. Fish and Wildlife Service (Service) is grateful for the review and comments provided by: Mr. Steven Amstrup, National Biological Service (NBS); Mr. Donald Barry (Service); Mr. Charles D.N. Brower, Alaska Nanuuq Commission; Mr. Harry Brower Jr., North Slope Borough Department of Wildlife Management (NSB); Ms. Dorothy Childers, Greenpeace; Mr. David Cline, Audubon Society; Ms. Michelle Davis, Native American Fish and Wildlife Society; Mr. Robert Dewey, Defenders of Wildlife; Dr. Gerald Garner, (NBS); Mr. Phil Garrett, (Service); Ms. Michelle Gilders, BP Exploration; Mr. Michael Gosliner, Marine Mammal Commission (MMC); Mr. Nelson Green, Inuvialuit Game Council, Northwest Canada Territories; Mr. Bob Griffeth, ARCO, Alaska; Mr. Donald Hansen, U.S. Minerals Management Service (MMS); Mr. Jeffrey Horwath (Service); Mr. Mike Jovce. ARCO, Alaska; Ms. Erica Keen, Department of State; Mr. Jim Kurth, (Service); Mr. Jack Lentfer, (MMC); Mr. Llovd Lowry, Alaska Department of Fish and Game (ADF&G); Mr. Warren Matumeak, (NSB); Ms. Pam Miller, Wilderness Society; Mr. James Schwarber, Native American Fish and Wildlife Society; Mr. Richard Shideler, Alaska Department of Fish and Game (ADF&G); and Mr. Lindsey Staples, Wildlife Management Advisory Council, Yukon Territories, Canada, and; Mr. Michael Young, U.S. Department of Interior, Solicitor's Office.

The Service thanks the following individuals for their review of and participation in efforts to collect Native knowledge: Mrs. Helen Armstrong, (Service); Mr. Ronald Batie, (Service); Mr. Taylor Brelsford, (Service); Mr. Charles D.N. Brower, (NSB);Mr. Carl Hild, RurAL CAP; Dr. Henry Huntington Inuit Circumpolar Conference (ICC); Mr. Charles H. Johnson, Kawerak; Mr. Sverre Pedersen, (ADF&G); Mr. Caleb Pungowiyi, (ICC); Mr. Walter Sampson, Northwest Arctic Native Association; Mr. Wells Stephensen, (Service).

The (Service) extends a special thanks to polar bear hunters who participated in the collection of Native knowledge, and the following village council members: Mr. Arnold Brower, Jr. and Charles Brower (Barrow); Mr. Gerald Soonagrook (Gambell); Mr. Archie Brower, Mr. Fenton Rexford and Honorable Mayor George Tagarook (Kaktovik); Ms. Colleen Koneig (Kivalina); Mr. Pete Schaeffer (Kotzebue); Mr. Eric Iyapana, Mr. Melvin Kayouktuk, and Mr. Chuck Menadelook (Little Diomede); Mr. Thomas Napageak (Nuiqsut); Mr. Jakie Koonuk and Mr. Jack Schaefer (Point Hope); Ms. Lily Anniskett and Ms. Annie Stocker (Point Lay); Mr. Kenneth Kingeekuk (Savoonga); Mrs. Luci Eningowuk (Shishmaref); Honorable Mayor Enoch Oktollik (Wainwright); Mr. Kelly Anungazuk and Mr. Luther Komonaseak (Wales).

Thanks to Mr. Scott Armstrong, GEO Works, North; Mr. Steve Colligen, GEO Works, North; Ms. Terri Edwards, (Service); Mr. Donald Hansen, (MMS); Mr. Chris Herlugson, BP Exploration; Ms. Darlene Hurlbert, Arctic Slope Regional Corporation (ASRC); Ms. Jennifer Loporcaro, BP Exploration; and Mr. Bill Thomas, (ASRC), who provided maps and information for figures. Mr. Garry Remsberg, (Service), digitized maps for Native knowledge, and Mr. Douglas Burn, (Service), designed and finalized maps, figures, tables and the cover of the Strategy. Mr. Thomas Evans, Ms. Susanne Kalxdorff, Ms. Lori Quakenbush, Mr. Scott Schliebe and Dr. Stephen Stringham (Service) wrote and prepared several previous draft versions of the Strategy, as well as the Final Draft.

Ms. Gloria Maschmeyer, Mr. David McGillivary, Mr. Stephen Wilson, Dr. Janet Hohn, and Mr. David Allen, reviewed and edited draft versions. Ms. Peggy Dorio and Ms. Kathryn Bevan provided secretarial support for the production of this document.

ix

gas A

PREFACE

In 1973, the governments of Canada, Denmark, Norway, the Union of Soviet Socialist Republics, and the United States entered into an "Agreement on the Conservation of Polar Bears" (also called the "Polar Bear Treaty"). Under Article II of this agreement, each contracting party agreed to take appropriate action to protect the ecosystems of which polar bears are a part, with particular attention to be given to **denning** and **feeding sites**, and **migration patterns**.

On November 16, 1993, the U.S. Fish and Wildlife Service issued regulations under provisions of the Marine Mammal Protection Act of 1972, as amended, which authorize and govern the incidental, but not intentional, take of small numbers of polar bears and walruses by U.S. citizens engaged in oil and gas exploration, development and production activities in the Beaufort Sea and adjacent northern coast of Alaska. These regulations were issued subsequent to a finding that such taking would have negligible impact on populations of polar bears and walruses and their availability for subsistence use by Alaska natives. Incidental taking is permitted only by holders of a Letter of Authorization from the Regional Director of the Alaska Region.

In issuing the "take" regulations, the Secretary of the Interior directed the Service to develop and begin implementing a Polar Bear Habitat Conservation Strategy (Strategy) in furtherance of the goals of Article II of the 1973 international Agreement on the Conservation of Polar Bears. Whereas the "take" regulations are restricted to the Beaufort Sea and adjacent northern coast of Alaska, the Strategy applies to the Beaufort, Chukchi, and Bering seas and adjacent coasts and islands.

The "take" regulations are effective for 18 months beginning on December 16, 1993. By June 16, 1995, the "take" regulations may be extended for the full five-year term authorized by the Act, contingent upon the Service developing and beginning to implement the Strategy, review of monitoring reports submitted by holders of the Letters of Authorization, and an affirmative finding by the Secretary of the Interior, and pursuant to notice and opportunity for public comment.

The following Strategy identifies and designates important polar bear habitats for conservation and proposes additional measures for polar bear habitat conservation in furtherance of the Agreement on the Conservation of Polar Bears.

EXECUTIVE SUMMARY

I. Introduction

The Marine Mammal Protection Act of 1972 (MMPA)¹ vested authority for management and conservation of polar bears in the U.S. Fish and Wildlife Service (Service). The Service consults with other federal, state, and local organizations, including Alaska Native organizations, industry, and the public on polar bear conservation and management issues. The 1981, 1986, and 1994 MMPA amendments further authorized the Service to regulate the incidental (unintentional) take of small numbers of polar bears by industries operating in polar bear habitat. "Take" is defined as "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal."

On December 17, 1991, oil companies operating in Alaska requested the Service to develop regulations to allow for incidental, unintentional disturbance (or take) of small numbers of polar bears during oil and gas activities. Regulations concerning the incidental take of polar bears were published on November 16, 1993 [58 FR 60402], and became effective on December 16, 1993.

The final rulemaking also directed the Service to "...develop and begin implementing a strategy for the identification and protection of important polar bear habitats" within 18 months. The purpose of the Polar Bear Habitat Conservation Strategy (Strategy) is to more fully meet the intent of the 1973 international Agreement on Conservation of Polar Bears² and to insure oil and gas activities are conducted in a manner that minimizes adverse impacts on polar bear, their habitat and on their availability for subsistence uses.

²Article II states: "...each contracting party shall take appropriate action to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as **denning** and **feeding sites** and **migration patterns**, and shall manage polar bear populations in accordance with sound conservation practices based on the best scientific data." The Polar Bear Agreement is not self-implementing and does not in itself provide for national conservation programs; each of the five signatory nations has implemented a conservation program to protect polar bears and their environment.

¹The MMPA, as amended, made the Service responsible for the conservation of polar bears (and walrus and sea otter) in Alaska. In addition to transferring management authority to the Federal government, the MMPA implemented a general moratorium on all taking of marine mammals. However, certain types of take are authorized under certain conditions. Alaska Natives may harvest in a non-wasteful manner for subsistence purposes and for purposes of creating and selling authentic native articles of handicrafts and clothing. Other types of allowable take include those for scientific research, public display, incidental takes of small numbers, such as for oil and gas exploration or development, and takes by federal, state, or local officials in support of public welfare or welfare of the animal. The taking moratorium may be waived for other activities if the Secretary determines, through formal rulemaking, that the affected species or stock is at optimum sustainable population.

The Strategy contains measures for conservation of polar bear habitat in Alaska which would enable the United States to improve its implementation of the ecosystem protection provisions of the MMPA and the Polar Bear Agreement.

II. Objectives

The objectives of the Strategy are to develop and begin implementing measures to identify and conserve important polar bear habitat thereby advancing the conservation of the species and ensuring the availability of polar bears for subsistence and other appropriate uses. The ultimate goal of the Strategy is to maintain the integrity of the ecosystem upon which polar bears depend and to maintain polar bear populations at optimum sustainable levels. This Strategy is consistent with the provisions of the MMPA and specifically is not intended to alter the Native exemption of the Act.

The following sections provide the basis to develop and begin implementing a strategy to identify and conserve polar bear habitat in Alaska.

III. Polar Bear Biology

Polar bears are circumpolar in distribution, inhabiting most ice-covered seas of the Northern Hemisphere: Canada, Norway (Svalsbard), Denmark (Greenland), the United States and Russia. They are most abundant around the perimeter of the polar basin, within a zone 120 to 180 miles offshore from land masses.

Polar bears are long-lived, late-maturing carnivores that have relatively low rates of reproduction and natural mortality. Their populations are susceptible to disturbance from human activities, such as exploration and development of mineral resources or hunting. Polar bears have few natural enemies other than humans. Disease does not appear to be a significant cause of mortality in polar bears.

Polar bears are helpless at birth and weigh about 1.3 pounds. Adult males grow to a weight of 550 to 1,700 pounds and measure eight to ten feet from the tip of their nose to their tail. Adult females weigh much less from 200 to 700 pounds and have a body length of six to eight feet.

The breeding season extends from late March through May. Most females produce young after five or six years. Cubs remain with their mothers until they are about 2.5 years old. A female polar bear is thought to be able to produce a maximum of five litters in her lifetime. The polar bears' reproductive rate is one of the slowest of any mammal.

Studies indicate that polar bear densities off the Alaska coast have increased slowly since the early 1970s. The Alaskan population is estimated between 3,000 to 5,000 bears.

IV. Alaska Arctic Environment

A. Marine Environment

Pack ice is the essential habitat of polar bears in the Bering, Chukchi and Beaufort seas in Alaska. When the ice advances in the autumn, bears that have summered on drifting ice begin to move south. The northern polar pack ice advances hundreds of miles in the Chukchi Sea through the Bering Strait and into the Bering Sea.

The Chukchi and Beaufort seas are completely ice covered in the winter. The Bering Sea is fifty percent ice covered. Nine months of the year, the Chukchi Sea remains ice covered. The Beaufort Sea is cold and deep and is never completely ice free.

Pack ice consists of annual ice and heavier multi-year ice that is in constant motion. Shore-fast ice (ice that freezes to shore) is more stable. Drifting ice floes consist of annual and multi-year ice that is loosely or tightly packed.

Drifting pack ice creates linear and nonlinear openings between ice floes. Openings occur throughout the winter, but their precise locations are unpredictable. However, in some instances the location of some polynyas and leads may be generally predictable and are called recurring polynyas and leads.

B. Coastal Environment

Coastal lands abutting the Bering, Chukchi and Beaufort seas are relatively flat, covered in tundra, and underlain by permafrost. In northeast Alaska, the Brooks Range is near the coast and creates a diverse landscape of beaches, barrier islands, bluffs, hills, and lake and river cutbanks. In the Chukchi Sea region of western Alaska topographic relief increases. In some places, cliffs or bluffs line the coast. Polar bears use these land areas seasonally for feeding, denning and migrating.

- V. Polar Bear Habitat
 - A. Feeding

Polar bear's primary prey is ringed seals, followed by bearded seals. Seasonal distribution and abundance of seals affects the distribution and movements of polar bears. Sea ice conditions, currents, water depth, and weather all play an important role in seal and polar bear distribution.

An adult bear generally consumes one seal every six to seven days. Polar bears also eat beluga whales, walrus, other marine mammals, birds, vegetation and kelp. According to Alaska Native hunters, the carcasses of whales and walrus are a significant part of polar bears diets during fall and early winter.

Bears stranded on land when the pack ice recedes must rely on a variety of food items or their body's fat reserves to carry them through the summer months. During periods when food is scarce, polar bears lower their activity level to conserve energy and rely on stored fat. This is an important survival adaptation.

B. Maternity Denning

An estimated 140 female bears from the Beaufort Sea population den each year. The number of denning females from the Chukchi Sea population is not known. More than 200 females are thought to den annually on Wrangel and Herald Islands and the northern mainland and on the barrier islands of Chukotka in Russia.

Polar bears construct maternity dens in drifted snow found on land, on shorefast and on pack ice. Pregnant bears enter their dens in late October or in November and their cubs are born in late December or early January. Family groups remain in the den until late March or early April. Upon emergence, family groups may spend 5 to 10 days acclimatizing to outside conditions prior to leaving the den site.

In some populations, pregnant females return to denning areas where they were born or where they reared cubs. In the Alaska Beaufort Sea, however, polar bears appear to select dens according to habitat, such as land or pack ice.

Alaska polar bears spend most of their time on pack ice with little time spent on land, other than for brief periods to feed on carrion or for longer periods to den. The highest occurrence of land denning in Alaska occurs along the coast of the eastern Beaufort Sea within the Arctic National Wildlife Refuge (Arctic NWR). Other areas include: barrier islands (Pingok, Cottle, Thetis, and Flaxman), river drainages, lagoons and deltas (Colville and Kuk), and some inland areas.

In the Beaufort Sea, about 53 percent of the dens are located on pack ice. Due to the dynamic nature of pack ice, dens on the surface may move into the Chukchi Sea from the Beaufort Sea. Unstable ice conditions caused by shifting ice may cause abandonment of dens. Some denning occurs in snow drifts formed in the lee of pressure ridges on stable, shore-fast ice located between shore and barrier islands. Dens on land account for the remaining 47 percent of total dens.

C. Migration Patterns

Satellite telemetry was first successfully used to track female polar bears in Alaska in the early 1980s, and is still in use today. Early attempts to place collars on males in the 1970s were largely unsuccessful and involved a much larger transmitter than used today. This transmitter was attached by a shoulder harness mechanism. Today, locations are transmitted from neck collars placed on female bears. Since male bears have necks that are larger in diameter than their heads, only females can be collared.

Tracking studies conclude that polar bears belong to semi-discrete groups or subpopulations, between which exchanges are limited. The studies also reveal that polar bears in the Chukchi Sea make extensive north to south migrations into and out of the Bering Sea from the edge of the pack ice. Bears in the Beaufort Sea also move north to south in relation to the southern ice edge, but make more extensive east to west movements as well.

Land masses restrict ice movements and consequently influence polar bear movements. Points of land or peninsulas create open water areas on their leeward sides. Constrictions such as the Bering Strait tend to funnel movements of both ice and bears. Generally, polar bears make long migrations over ice with occasional over land movements.

VI. Native Knowledge of Polar Bear Habitat Use

The Service, in cooperation with the Alaska Nanuuq Commission, regional Native corporations and village councils, visited 12 villages in northern and northwestern coastal Alaska to speak with Native hunters about polar bear habitat use. A total of 61 hunters participated in discussions. Oral information was recorded in writing; spatial information was recorded on maps. Follow-up visits to each village were conducted to verify information presented on maps.

- VII. Threats to Polar Bears and Their Habitat
 - A. Oil Industry Activity in Polar Bear Habitat

The oil and gas industry has conducted exploration and development activities in Arctic Alaska for more than 20 years. Drilling for oil at sea is limited by ice conditions and water depth. Support activities may involve use of helicopters, tracked vehicles, rollagons, hovercraft, tractor trains and sleds, and snow machines and the construction of ice landing strips for fixed-wing aircraft and permanent roads or winter ice roads. Although exploration, development, and production activities have the potential to disrupt polar bears and/or adversely affect polar bear habitat, industry has been careful to avoid disturbing sensitive habitats of polar bear and other marine mammals as well as terrestrial birds and mammals. Geoseismic surveys for oil result in considerable airborne and underwater noise. The noise and physical movement of equipment have the potential of causing female bears to emerge from their dens early and to disrupt bears feeding on land, nearshore, or in shore-fast ice. Seismic work usually occurs on land or shore-fast ice during the winter, and in open water during the summer.

Currently, seven of nine oil fields along the shore of the Beaufort Sea are in production. Prudhoe Bay, the largest oil field, covers 350 square miles and contains more than 1,000 wells.

Development activity within polar bear habitat may increase. Five lease sales along the Beaufort Sea coast are pending. Recently, a joint United States/Russia lease sale in the Chukchi Sea/Hope Basin was announced and then canceled. The area encompassed most of the Chukchi Sea, and included essential denning areas for polar bears on Herald Island, Russia, and areas immediately adjacent to Wrangel Island, Russia.

B. Shipping

Arctic and subarctic coastal villages require barge shipment of fuel and many other supplies. Barge traffic generally occurs during summer months and does not pose a direct threat to polar bears. However, a significant oil spill from an oil tanker could greatly impact marine mammals.

The Northern Sea Route (NSR), which extends from Murmansk across the Russian high Arctic to the Chukchi Peninsula, is being explored as a possible route for international shipment of coal, fish, timber and minerals.

Development of the NSR could increase the number of ships and icebreakers passing through the Bering and Chukchi seas in the fall, winter, and spring. Use of open water between ice floes as shipping corridors could disturb seals and bears. There would also be an increased potential for fuel spills in Arctic waters. Currently, the Norwegian Polar Institute is conducting an assessment of the NSR's potential effects.

C. Contaminants

Pesticides, heavy metals, radioactive wastes and other pollutants are found in Arctic snow, ice, water and air. Cold temperatures and reduced sunlight slow the degradation of these contaminants, increasing threats to polar bears. In the winter, contaminants are carried by air currents blowing over the pole from the industrialized east, in particular Europe and Asia. Seventy percent of the fresh water entering the Arctic Ocean flows from Russian rivers which are also known to carry contaminants. The effects of current levels, or how combinations of contaminants affect polar bears are also unknown. If manufacture and use of these substances ended immediately, many would persist in the environment for years. Pollution of the Arctic environment may be a serious threat to polar bears and their habitat.

D. Global Warming and Depletion of the Ozone

With climatic warming predicted by some scientists over the next 50 to 100 years, a rise in temperature could result in a melting of sea ice, which provides essential habitat for polar bears and ringed seals. Any result of habitat lost due to global warming, would subject polar bears to nutritional stress and lower reproductive and survival rates.

E. Human Population Growth within Polar Bear Habitat

The North Slope Borough and Northwest Arctic Borough encompass 129,000 square miles with a total population of about 12,000 people, mainly Inupiaq Eskimo, living in 19 villages. Villages populations are increasing, but their growth is unlikely to have a direct impact on polar bear habitat, since polar bears spend most of their time at sea. Maternity dens on land are generally not located near villages. The greatest potential impact from an increasing human population is an increase in subsistence take of polar bears. However, to date, self-regulation has resulted in fewer animals being taken than are replaced.

F. Effects of Human Activities on Polar Bears

The effects of human activities near polar bear maternity dens are variable. An increase in activity may cause the female to leave the den. However, timing of a disturbance may be a factor in whether or not a den is abandoned. Females appear to be more easily disturbed in the fall when they are searching for or excavating a den than when they are near birthing or post-partum.

Oil and gas activities which displace seals, disturb denning bears and attract bears during the winter months, pose a significant threat to bears.

Human activity itself attracts polar bears. Bears are naturally curious and because of their propensity to investigate novel objects, noises, and smells, are attracted to areas of human activity. Subadults in search of food are more likely to be attracted to camps and villages, since their hunting skills are not as fully developed as the adults.

Another potential hazard to polar bears is oil spills. Oil spills have occurred in the Alaska Arctic, but no field studies were conducted to determine the effects of oil on polar bears. A laboratory test of the effects of oiling on polar bears concluded that extensive oiling results in death. Seasonal movement of bears increase the likelihood that bears would encounter spilled oil.

VIII. Land Ownership of Habitats

Land ownership and land leasing status influence conservation and protection of polar bear habitat. Primary landowners are federal and state governments and Alaska Natives.

The marine environment is under state and federal jurisdiction. State jurisdiction extends from the mean high tide level seaward three miles, and includes offshore barrier islands. Federal jurisdiction extends beyond the three mile limit. Areas of ambiguity regarding jurisdictional claims exist in some instances, and several cases in litigation are pending.

Although not a landowner, industry leases land for mineral rights under federal and state lands and waters.

IX. Existing Habitat Protection Measures, Treaties, Laws, Agreements

The principal Acts and Treaties providing the legal basis by which the Service can protect polar bear habitat are: Marine Mammal Protection Act; Outer Continental Shelf Lands Act; Coastal Zone Management Act; Alaska National Interest Lands Conservation Act; and National Wildlife Refuge System Administration Act.

Agreements which provide for conservation and protection of polar bear include: 1973 Agreement on Conservation of Polar Bears; Management Agreement for Polar Bear of the Southern Beaufort Sea between the Inuvialuit Game Council and the North Slope Borough; Protocol of Intent for Conservation of Polar Bears in the Chukchi Sea region between the U.S. and Russia and the Protocol of Intent for Conservation of Polar Bears in the Chukchi Sea region between the Native Peoples of Alaska and Chukotka.

X. Strategy Implementation

This section proposes implementing a strategy for conservation and protection of feeding and denning habitats, through the designation of important habitat areas, pursuant to the regulations governing incidental take. Important habitat areas were delineated as documented based upon scientific and/or local knowledge of past or recent predictable use of the general geographic area. Although polar bears are widely dispersed and generally occur at low densities, these areas stand out for their more frequent use. Despite inter-annual variation in use patterns these denning and feeding habitat areas were selected because of their long term values in maintaining the welfare of the polar bear population. The Strategy also proposes additional measures beyond the designation of IHAs for polar bear habitat conservation in furtherance of the goals of the international Agreement on Conservation of Polar Bears. These consist of a proposed Native Village Communication Plan, a Polar Bear Advisory Council, and development of International Conservation Initiatives. The

strategy implementation section concludes with research needs related to habitat use and relative importance of habitat types, and effects of contaminants and industrial activities on polar bears.

XI. Consultation and Coordination

Public meetings were held in Anchorage and Barrow on January 20 and 25, 1994, by the Service to develop the Strategy, and to provide background information and a proposed plan for development of a Strategy. The formal public comment period on the notice of intent to develop a Strategy, closed on February 11, 1994. Additional meetings were held within coastal communities and discussions were conducted with Alaska Native hunters to collect knowledge on polar bear habitat use. On February 28, 1995, at 60 FR 10868 the Service announced the availability of the Draft Strategy and sought review and comment on it. The original 60 day comment period would have expired on May 1, 1995; however, on May 8, 1995, the Service announced (60 FR 22584) that it had extended the comment period 15 additional days in response to specific requests for an extension. Public comment on the Strategy was extensive and polarized on opposite ends of the conservation spectrum. The Service on June 14, 1995, extended the final regulations that authorize and govern the incidental, unintentional take of small numbers of polar bear and walrus during year around oil and gas industry operations in the Beaufort Sea and adjacent north coast of Alaska for an additional 60 days through August 15, 1995. The additional time allowed the regulations to continue in effect while the Service completed its evaluation of public comments and finalized the Strategy.

This page intentionally blank

<u>ал.</u>---

ć

direⁿ

125

, A

GS-.

(B):-

I. INTRODUCTION

The Marine Mammal Protection Act of 1972 (MMPA) vested authority for management and conservation of polar bears in the U.S. Fish and Wildlife Service (Service). The Service is directed, when appropriate, to consult with federal, state and local agencies and other entities, including Alaska organizations, industry, conservation organizations, academia and other members of the public on issues concerning polar bear conservation and management.

The MMPA placed a general moratorium on the taking of any marine mammal. An exemption was provided for Indians, Aleuts, and Eskimos that reside in Alaska to allow harvest for subsistence purposes or for the creating and selling of authentic Native articles of handicrafts and clothing, if the harvest is not done in a wasteful manner.

The MMPA was amended in 1981 and 1986, to give the Secretary of the Interior authority to allow, on request by U.S. citizens, the incidental, but not intentional, take of small numbers of marine mammals in a specified activity (other than commercial fishing) within a specified geographical area. Amendments of 1994 authorized, through an annual permittype system, the unintentional harassment of small numbers of marine mammals incidental to activities other than commercial fishing.

"Take", as defined by the MMPA, means to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal. "Harass" is defined to mean any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild; or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

To allow take other than harassment regulations must be published that include permissible methods of taking and other means to ensure the least possible adverse impact on the species and its habitat and on the availability of the species for subsistence uses. These regulations must include requirements for monitoring and reporting. After final regulations are established, Letters of Authorization (LOA's) may be issued, upon request, to individual entities to conduct activities pursuant to the regulations.

Oil and gas exploration, development and production activities conducted in marine mammal habitat risk violating the moratorium on the taking of marine mammals and therefore violating the MMPA. Although there is no legal requirement for the oil and gas industry to obtain incidental take authority, they have chosen to seek authorization to avoid potential conflicts between their activities and the possible violation of the MMPA.

In Alaska, the first incidental take regulations for polar bears were developed on June 14, 1991 (56 FR 27443). These allowed the take of small numbers of polar bears during open water exploration for oil and gas in the Chukchi Sea adjacent to the coast of Alaska for a five-year period. Then, on December 17, 1991, BP Exploration (Alaska), Inc., for itself and on behalf of 14 other oil companies, petitioned the Service to promulgate regulations that would allow incidental, but not intentional, take of small numbers of polar bear (*Ursus*

maritimus) and Pacific walrus (Odobenus rosmarus divergens) in the event that such taking occurs in the course of oil and gas activities in the Beaufort Sea and other waters adjacent to the northern coast of Alaska.

In response to industry's petition, the Service promulgated regulations in a final rulemaking published in the Federal Register on November 16, 1993 [58FR60402]. The regulations became effective on December 16, 1993. The regulations, along with LOA's issued pursuant to the regulations, allow industry to operate within the law in the event an incidental take occurs during the course of normal operations.

Under this final rulemaking and within 18 months of its effective date (June 16, 1995), the Service has been directed by the Secretary of the Interior to develop and begin implementing a strategy for the identification and protection of important polar bear habitats, to more fully meet the intent of the 1973 Agreement on the Conservation of Polar Bears (Polar Bear Agreement). The final rulemaking required that oil and gas exploration activities be conducted in a manner that minimizes to the greatest extent practicable, adverse impacts on polar bears, their habitat and on their availability for subsistence uses.

Under the Polar Bear Agreement (Appendix B), Article II requires that, "Each contracting party shall take appropriate action to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns..."

As required by the rulemaking, and pursuant to section 115 of the MMPA this Strategy was developed as part of the Service's conservation planning process.

II. OBJECTIVES

The objective of this Strategy is to develop and begin implementing, within 18 months of the effective date of the final rulemaking, "...a strategy for: 1) the identification, and; 2) protection of important polar bear habitats and may identify and designate special considerations or closures of any polar bear habitat components to be further protected." The Strategy also is to provide for the availability of polar bear for subsistence uses.

The Strategy is to further the goals of the Polar Bear Agreement and will reflect cooperative input from "signatories to the Polar Bear Agreement, the Department of State, the State of Alaska, Alaska Natives, Industry, conservation organizations, and academia."

The Strategy is comprised of actions which are achievable and designed "...to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns...", in accordance with the Polar Bear Agreement.

The Strategy goal is to provide for the conservation of polar bear habitat by maintaining the functional integrity of the Arctic ecosystem. By maintaining the health and stability of the habitats upon which polar bears depend, populations should remain or recover to levels determined to be within the range of Optimum Sustainable Population (OSP)³ as required by the MMPA. The Strategy is consistent with all other provisions of the MMPA, and specifically is not intended to alter the Native exemption of the Act.

III. POLAR BEAR BIOLOGY

A. Species Description

To more fully understand the ecosystem of which the polar bear is part, it is important to understand the species itself. The polar bear (Ursus maritimus) is one of three North American species of the Order Carnivora, Family Ursidae. The genus also includes the North American black bear (U. americans) and the brown bear (U. arctos). No subspecies of U. maritimus has been identified (Kurten 1964; Manning 1971; Wilson 1976). Polar bears are believed to have evolved from the Siberian population of brown bears, which were isolated by glacial advances during the mid-Pleistocene (Kurten 1964).

The polar bear has an elongated neck and a comparatively smaller head than other ursids. The body is stocky and lacks a shoulder hump. Polar bear pelage consists of a thick layer of underfur and an abundance of guard hairs. It's color varies seasonally from pure white after molt to a yellowish shade resulting from solar oxidation or staining by oil from seal blubber. At other times the fur is gray or brownish. The skin, nose, and lips are black.

At birth polar bears weigh approximately 600 grams or 1.3 pounds. Adult male polar bears tip the scales at 250 to 800 kilograms or 550 to 1,700 pounds. They measure 250 to 300 centimeters (eight to ten feet) from tip of nose to tail. Adult females are comparably smaller weighing 100 to 300 kilograms or 200 to 700 pounds and measure 180 to 250 centimeters or six to eight feet in length. Polar bears vary in size geographically with a gradient of increasing skull size from the Franz Josef Land-Spitsbergen area to the Chukchi Sea region, where the largest bears are located (Manning 1971).

B. Distribution

Polar bears inhabit most ice-covered seas of the Northern Hemisphere throughout the circumpolar region. They concentrate around the perimeter of

³Optimum Sustainable Population is defined as "...with respect to any population stock, the number of animals which result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element."

the polar basin for a distance of 200 to 300 kilometers (120 to 180 miles) offshore (Lentfer 1982; Amstrup and DeMaster 1988) and have been recorded as far north as 88° north latitude (Stefansson 1921; Papanin 1939).

Off Alaska, they range south to the Bering Strait. In winter, bears may range south of St. Lawrence Island in the northern Bering Sea or occasionally remain on St. Lawrence Island. Occasionally a few venture as far south as St. Matthew Island and on to the mainland on the Yukon-Kuskokwim Delta (Figure 1).

Six distinct populations occur in the Arctic polar basin. They are: 1) the Chukchi Sea population on Wrangel Island and western Alaska, 2) northern and northwestern Alaska and northwestern Canada (the Beaufort Sea population) (Figure 1), 3) the Canadian Arctic archipelago, 4) Greenland, 5) Spitsbergen-Franz Josef Land, and 6) central Siberia (Parovschikov 1964, 1968; Uspenskii 1965; Lentfer 1974a, 1983; Stirling and Smith 1975). Discrete subpopulations exist within the Canadian Arctic archipelago and James and Hudson Bays.

Polar bears migrate seasonally with changes in the ice pack in the Chukchi Sea; polar bears move extensively between the United States and Russian territories. In the Beaufort Sea, they travel extensively between the United States and Canada. As the climate changes the distribution of polar bears change in accordance with the annual formation and retreat of sea ice.

C. Reproduction

Males actively locate estrous females by scent and by following the females' tracks (Lentfer 1982). Polar bears typically mate on sea ice from late March through May (Lønø 1970), although implantation does not occur until September (Stirling et al. 1984). Pregnant females locate out denning sites in drifting snow during late October and November (Harington 1968; Jonkel et al. 1972; Lentfer and Hensel 1980). Cubs are born in December and January

(Lentfer 1982) and remain with their mother for about 2.5 years. The minimum breeding age for females in Alaska ranges from four to eight years, with an average of 6.4 years (Lentfer et al. 1980). The oldest known female reported with cubs in Alaska was 18 years old. Reproductive senescence is believed not to occur before 20 years of age and some may remain productive longer (Ramsay and Stirling 1988). Female polar bears can produce five litters in their lifetime which is one of the slowest reproductive rates of any mammal (Amstrup 1986).

D. Natural Mortality and Survival

Polar bears have few natural enemies. They occasionally kill each other (Jonkel 1970, Russell 1975, Lunn and Stenhouse 1985, Taylor et al. 1985), and there is limited evidence which reveals that walrus occasionally kill polar bears (Kiliaan



least.

Sources!

a constant

1975

Critical I

2

Sectors'

land 1

N.S.S.

Figure 1. Generalized distribution of polar bears in the Beaufort, Chukchi, and Bering seas.

1

pre-cs

.

and a

0.002

(Accessing to the second

4

1

S

(ISING)

and Stirling 1978). Disease does not appear to be a significant cause of mortality in polar bears. Humans, however, are the bears greatest enemy.

Estimates of age-specific survival of polar bears are not available. Amstrup 1995 calculates survival rates of satellite collared adult females polar bears at 0.97/year. A mean survival rate for Alaskan Beaufort Sea bears one year and older is estimated at 0.88 (range=0.87 to 0.89) (Amstrup 1986 et al. 1986). This is close to estimates of the survival rate for bears in the western Canadian Arctic and central Canadian Arctic. The estimated mortality rate, 0.12, includes both natural and hunting-related mortality. Survival rates for polar bears of the Chukchi Sea region are not available.

Survival estimates for yearlings, based on the difference in litter size between yearlings and 2-year-olds, range between 0.70 and 0.75 (DeMaster and Stirling 1983). Data was gathered from Alaska, western Canadian Arctic, central Canadian Arctic, and Baffin Island.

Other vital rates of importance as detected in the Beaufort Sea are: average age of sexual maturity (females) was 6 years; average cub litter size was 1.67; average production interval was 3.68 years; and annual average mortality varies by age class (Amstrup 1995).

E. Population Status and Trends

Today, polar bears are believed to be distributed throughout their historical range. Estimated bear densities off the Alaskan coast have increased slowly since the early 1970s (Amstrup et al. in prep.). Previously, the Bering Sea, north of St. Lawrence Island, the Chukchi Sea, east of 170° west longitude and south of 72° north latitude, and a strip approximately 100 nautical miles wide along the north coast from Barrow to Canada was estimated to contain a minimum of 3,000 and possibly a maximum of 5,000 bears.

The number of polar bears in Alaska in 1956 and 1984 were though to be similar (Amstrup et al. 1986). However, the population declined in the late 1960s and early 1970s in response to excessive harvest rates supported by hunting with the use of aircraft. Populations are believed to have recovered by the late 1970s and have since remained stable. The Beaufort Sea stock from Icy Cape, Alaska, to Cape Bathurst, Canada, is estimated at approximately 1,717 animals (Appendix C). An accurate population estimate for the Chukchi/Bering Seas stock is unavailable.

IV. ALASKA ARCTIC ENVIRONMENT

A. Marine Environment

The primary habitats used by polar bears in Alaska occur in the Beaufort, Chukchi and Bering seas which surround the northern and northwestern Alaska parts of the state.

The Beaufort Sea is located off the north coast of Alaska, extending from Point Barrow to beyond the Canadian border. The Beaufort Sea is cold and deep, and is never completely ice free. Wind and surface currents (Beaufort Gyre) cause the polar ice pack to circulate in a clock-wise direction from east to west along the Alaska coast (Figure 2). The combined effect of a narrow continental shelf and a stratified water column reduces the productivity of the Beaufort Sea.

In the spring, phytoplankton blooms in the Beaufort, Chukchi and Bering seas on the underside of the sea ice (eponic algae) (Hood and Kelly 1974). The Arctic food web is simple and fragile. Eponic algae is eaten by zooplankton, which is eaten by fish, mostly arctic cod (*Boreogadus saida*). Arctic cod are eaten by seals, and seals by polar bears. Baleen whales eat zooplankton, beluga whales eat fish, and humans eat whales, fish, seals, and polar bears. The nearshore benthic community is limited due to ice scouring. The offshore benthic community consists of mollusc and benthic amphipods that support walrus and grey whales, respectively. Polar bears often feed on walrus and whale carcasses. The Chukchi Sea lies north of Bering Strait, between the northwest coast of Alaska and the northeast coast of the Russian far east, and extends north to the Arctic Ocean (Figure 1). The Chukchi Sea is a wide and shallow continentalshelf sea that ranges from 600-800 kilometers wide and has a mean depth of 50 meters.

The dominant factor in the physical and biological oceanography of the Chukchi Sea is the formation, persistence, and retreat of sea ice. Sea ice begins forming over the northern portion of the Chukchi Sea by late September or early October. By early November, the southern extent of the ice has usually covered the Chukchi Sea and entered the Bering Sea. The Chukchi Sea remains ice covered until early July with the maximum retreat occurring in September. In effect, sea ice covers the Chukchi Sea for nine months for the year (LaBelle et al. 1983).

Strong northern currents, driven by the difference in sea level between the north Pacific and Arctic oceans, bring two water masses into the Chukchi Sea through the Bering Strait. The Bering Sea water is colder and more saline and flows through the western Bering Strait, while the Alaska coastal water is warmer, less saline and flows through the eastern Bering Strait. The Alaska coastal water flows in a band parallel to the northwest coast of Alaska. Some



Figure 2. Circulation pattern of surface currents within the range of polar bears in Alaska. Ice in the Beaufort, Chukchi, and Bering seas typically moves with the prevailing surface currents.

and y

1000

Contra-

1947

States.

Sec.

100 million

Ą

1000

100

2

AND IN

 $\overline{}$

all and a second

事門

 ∞

64

and the

polynyas important for bears and seals occur within this band. Tides are small (<1 meter) and probably not significant to this system (Pitman 1984).

The Bering Sea lies south of the Bering Strait and north of the Pacific Ocean and receives water from the north Pacific through the Aleutian Island chain (Figure 1). In winter, almost half of the Bering Sea is ice covered; in summer it is ice free, although surface temperatures remain cold ($< 8^{\circ}$ Celsius). Recurring polynyas occur south of St. Lawrence Island in the Bering Sea, and north and south of Point Hope, and between the Seward and Point Hope peninsulas in the Chukchi Sea (LaBelle et al. 1983, Stringer 1990). Recurring leads and polynyas in the Beaufort Sea are less dependable but usually occur parallel to the coast in winter.

The Bering Strait is a physical constriction separating the Bering and Chukchi seas that is used by bears traveling to and from the Bering Sea. Polar bears use the Bering Strait as a movement corridor in the late fall and winter when the ice moves south, and in the spring as the ice retreats. This habitat is not used in summer and fall when no ice is present.

Polar bears use both marine and terrestrial habitats for feeding, denning, breeding, and seasonal movements. The terrestrial environments (i.e. barrier islands, mainland) are stable and predictable, and are used primarily for denning, feeding on carcasses, and movements. The marine habitats (shore-fast ice, pack ice, transition zone, leads and polynyas) are less stable and may change depending on the wind, current, and temperature. Polar bear use of these different habitat types varies seasonally. For example, recurring leads and polynyas are important feeding areas during winter and spring. Open water areas between ice flows which occur during the formation and breakup of ice are important feeding areas during fall, winter, and spring. Mainland areas, high bluffs along the beaches and barrier islands are important denning areas during the fall, winter, and spring. Barrier islands are important polar bear feeding areas where marine mammal carcasses collect during the fall (Table 1).

1. Pack Ice

1320

Pack ice habitat is used by polar bears for movement, feeding and denning, and it is the sole summer habitat for Alaska bears. Pack ice moves in response to winds and ocean currents and expands in winter and shrinks in summer.

The polar pack ice consists of annual ice and multi-year ice that is in constant motion. The prevailing direction of its movement is clockwise in the Beaufort Sea; however, variations in wind and current may cause deviation. Pack ice is a general term for moving, floating ice that may consist of consolidated floes, immense rubble fields, or loosely aggregated floes of annual or multi-year ice (Figures 3 and 4).

Habitat Type	Habitat Use	Predictability of Locating Habitat Type	Predictability of Habitat Use	Importance of Habitat by Season	Threats to Habitat or Habitat Use	Effects of Activity on Bears	Possible Protection Measures
Fast Ice	Feeding on seal pups, denning	High	Low	Fall - Low Winter - Low Spring - Moderate Summer - N/A	On-ice seismic, ice roads to exploration and development sites.	Displacement of seals, abandonment of pups not likely to affect bears if local. Disturbance to dens may result in cub mortality	Timing restrictions to begin activities before pupping avoids abandonment.
Pack Ice	Feeding, denning, summer	Low	Low	Fall - Moderate Winter - Moderate Spring - Moderate Summer - High.	Possibly ice breaker traffic for shipping.	Disturbance to dens may result in cub mortality, displacement from summer feeding areas	Prohibit icebreaker traffic during denning season Nov-Apr.
Recurring Leads and Polynyas	Feeding esp. winter-early spring, possibly breeding area	Medium	High	Fall - Moderate Winter - High Spring - High Summer - N/A	Vessel traffic and oil and gas activity	Displacement from imp. feeding and possible breeding area during a difficult time of year	Prohibit activity in known recurring polynyas during winter and spring
Ephemeral Leads and Polynyas	Feeding	Very Low	High	Fall - High Winter - High Spring - High Summer - Moderate	Possible vessel traffic	Displacement from imp. feeding area. Low level traffic in local area not likely to affect bears	Develop regs. to limit activity in leads and polynyas found during travel
Transition Zone	Feeding, breeding	Medium	High	Fall - N/A Winter - Moderate Spring - High Summer - N/A	Possible vessel traffic	Displacement from imp. feeding and breeding area. Low level traffic in local area not likely to affect bears	Develop regs. to limit activity in transition zone
Beaches	Feeding on beachcast carcasses	High	Med	Fall - High Winter - unknown Spring - Low Summer - Low	Disturbance by village traffic, beachcombing aircraft, and oil and gas activities on the coast	Certain age and sex classes may be dependent upon carrion to survive winter	Identify coastlines where highest bear use of carcasses occurs and implement timing restrictions on activities
Barrier Islands	Denning Feeding on carcasses	High	Medium	Fall - High Winter - High Spring - High Summer - Low	On-ice seismic, winter exploration, production, and ice roads to facilities	Possible displacement and abandonment of cubs in dens	Timing or area restrictions or prohibitions during denning season or pre-activity survey to assure no dens in area
Non-beach Mainland	Denning	Medium	Low	Fall - High Winter - High Spring - High Summer - Low	On-ice seismic, winter exploration, production, and tundra travel, incl. cat trains	Possible displacement and abandonment of cubs in dens	Timing or area restrictions or prohibitions during denning season or avoid likely denning habitat
Bering Strait	Movements	High	High	Fall - Low Winter - High Spring - High Summer - N/A	Vessel (icebreaker) traffic	Disturbance due to displacement from movement corridor	Timing restrictions on ships

AND IN COMPANY

Test in the second

調明

B

朝日

3

N.

THE OWNER OF

1000

10----

ţ

Table 1. Relative importance of habitat types.

「「「「」」

r r

12222



.

where the second se

COLOR D

Figure 3. Transition of habitat types as related to ice zones.

小石製製

SIT CEP



Figure 4. Generalized location of shore-fast ice, pack ice, and drifting ice in northern Alaska in spring and fall.

ALC: N

No.

Res.

BEE.

2

ADD:

B

, N

1000

開催し

No.

Ice that forms in one winter is referred to as annual ice, or first-year ice. Ice that does not melt completely during the summer becomes second-year or multi-year ice the following winter. Salt brine is released as the ice partially melts in the summer, resulting in a harder, bluer, and fresher ice. Ice that survives melting during its second summer or beyond becomes increasingly harder, bluer, and fresher and is called multi-year ice.

2. Shore-Fast Ice

Shore-fast ice, also know as land-fast ice or grounded ice, is sea ice that extends as a sheet from shore while grounded to the bottom near shore. When wind and currents push the pack ice toward shore, the lighter, stationary shore-fast ice becomes ridged as the pack ice pushes in into broken piles of ice called pressure ridges (Figure 3). Depending upon the momentum and thickness of the pack ice, high ridges may be formed. Shore-fast ice is relatively stable and somewhat protected from assaults by the pack ice. The zone seaward of pressure ridges is called the transition zone (also called the shear or flaw zone). This is a zone where leads open and close in response to wind and currents.

3. Transition Zone

While the shore-fast ice is relatively stable throughout the winter, the ice seaward of the transition zone is dynamic, at times quick and violent, and other times so slow that movement is imperceptible. The dynamic nature of the drifting pack creates openings between ice floes. Active ice is a general term that refers to the transition zone and the drifting pack ice.

The transition zone is important for polar bears in winter and spring. The transition zone occurs parallel to the coast. This active ice zone is used most in the spring when bears travel and hunt along it. Bears moving to the north in the spring on the Bering and Chukchi Sea often follow the transition zone. The main shore lead opens along the transition zone in spring and is used by Inupiat whalers for hunting bowhead whales. Hunters in the whaling camps will also kill polar bears using this habitat during the whaling season.

4. Polynyas and Leads

Nonlinear areas of open water that are surrounded by ice are called polynyas, linear openings are called leads. Leads and polynyas may occur throughout the winter, and their locations are generally unpredictable from year to year. However, in some instances location of polynyas and associated lead systems that are predictable are called recurring polynyas (Figure 5). Twenty-two persistent and ephemeral polynyas have been identified in the Bering and Chukchi seas using AVHRR visible and



Figure 5. General location of recurring leads and polynyas in the Beaufort, Chukchi, and Bering Seas. Adapted from Stringer and Groves (1991) and Smith and Rigby (1981).

and the second se

ALC: NO

1000

8

110.

1000

100

1

ANT A

201

H87

1207

- College
thermal imagery and Landsat imagery (Stringer and Groves 1991). The important polynya adjacent to Cape Bathurst was studied by Smith and Rigby (1981). The location and relative importance of these polynyas and leads have also been identified by native hunters. The Chukchi Polynya is a recurring polynya and lead system that consistently provides open water habitat in March and April along the west coast of Alaska. Migrating marine mammals and birds concentrate along this polynya in the spring and follow the lead system as it progresses northward.

Recurring leads and polynyas provide feeding habitat, especially in winter and early spring. These leads and polynyas occur in certain areas where wind, ocean currents, and land formations combine to create areas of open water. The shape, size, and exact location of the polynya and lead system varies, but the general location of the system under the right conditions is predictable. The open water attracts seals and other marine mammals, especially in winter, providing a prime winter/early spring hunting area.

Ephemeral leads and polynyas provide feeding habitat in every season except summer. These leads and polynyas are not at all predictable but appear and disappear throughout the ice season. Polar bears are extremely capable of finding and using this dynamic habitat type. Wherever this habitat occurs, it is highly likely polar bears are using it.

B. Coastal Environment

1. Mainland Habitat

The Arctic coastal plain north of the Brooks Range in northern Alaska is characterized by flat, tundra covered terrain that slopes gradually north to the Beaufort Sea from the Brooks Range. The landscape features wetlands with numerous shallow lakes, drained lake basins, small ponds and streams. The top layer of ground thaws as much as 12 inches during the summer, while the underlying ground remains permanently frozen(permafrost). The freeze-thaw cycle contributes to the polygonal patterns that are ubiquitous in the arctic tundra (Walker et al. 1980).

Overall the North Slope provides little topographic relief except for bluffs along beaches and cut banks along rivers. These geographical features provide denning habitat for parturient females which make their dens in drifted snow. The Chukchi coast while similar to the Arctic Coastal Plain is marked by greater relief. Many cliffs or bluffs line the coast. The highest cliffs which rise 246 meters above sea level occur at Cape Lisburne.

Mainland habitat, which is non-beach, is used from the fall to spring when females den. Although the habitat is a predictable and stable environment relative to ice habitats, snow conditions still determine den site locations. Determining where these exact sites might occur is difficult due to variability in snow conditions.

2. Coastal Habitat/Beaches

Beach habitat is important to bears in the fall when marine mammal carcasses wash up on island and mainland beaches. Beaches where marine mammals haulout or adjacent to where subsistence hunting takes place also attract polar bears. Carcasses are particularly important to the diet of subadult bears or females with cubs at certain times of the year.

3. Coastal Habitat/Barrier Islands

Barrier islands also provide a predictable and stable environment for polar bears to den and feed on carcasses. Several islands in the Beaufort Sea have been used with some regularity for maternity dens, however it is not predictable which islands will support dens in any given year.

V. POLAR BEAR HABITAT USE

A. Feeding

1. Food Sources

The polar bear's main food source is ringed seals (*Phoca hispida*) followed by bearded seals (*Erignathus barbatus*) the next most common prey item (Stirling and Archibald 1977, Smith 1980). Other food sources include walrus (*Odobenus rosmarus*), beluga whales (*Delphinapterus leucas*) other marine mammals, birds, vegetation, and kelp (Lønø 1970, Freeman 1973, Russell 1975, Stirling and Smith 1975, Heyland and Hay 1976, Stirling and Archibald 1977, Derocher et al. 1993). Walrus are not an important component of the polar bear diet according to Kiliaan and Stirling (1978), Fay (1982), or Eley (unpubl. data). Pacific walrus however, may be important to bears spending the summer in the Chukchi Sea (S.E. Belikov, unpubl. data) [in Garner et al., in press]. Polar bears infrequently kill beluga whales (Degerbol and Freuchen 1935, Kleinenberg et al. 1964, Freeman 1973, Heyland and Hay 1976). However, Lowry et al. (1987) suggests belugas may be of local importance to polar bears.

In Alaska, polar bears also feed on bowhead whale carcasses (See Appendix A, Wainwright, Nuiqsut, Kaktovik, <u>Feeding</u>, Shideler, 1993). Bears scavenge villages and investigate oilfield dumpsters and landfills. Natives on St. Lawrence Island have observed bears eating crabs, clams, ground squirrels (*Spermophilus parryii*), oldsquaw ducks (*Clangula hyemalis*), and kelp (See Appendix A, St. Lawrence Island, <u>Feeding</u>).

The polar bears do not discriminate between food and non-food items. They willingly eat parts of lead/acid batteries, plastic, and Styrofoam (Lunn and Stirling 1985). One female polar bear died on an island in the Beaufort Sea from eating a combination of ethylene glycol (antifreeze) and the dye, rhodamine B. The source of the toxic solution was not found but was probably an improperly stored barrel or small spill (Amstrup et al. 1989). Hydraulic fluids and lubricating oils have also been ingested by polar bears (Russell 1975, Stirling 1990). Bears have also been observed scavenging at dumps located at coastal villages and remote sites (Schideler, 1993).

Ringed and bearded seals (ice seals) are well adapted to living on and under sea ice. These seals maintain breathing holes by scratching forming ice with their sharp, strong claws. As the ice freezes, seals keep the holes open by returning the same locations to breathe.

Breathing holes sometimes are covered by drifting snow. When seals excavate the drifts to expose the holes, they create subnivean caves called lairs. Seals use lairs for resting (resting lairs) and females use them to whelp and suckle pups (birth lairs) in late March and early April (Smith and Stirling 1975, Kelly and Quakenbush 1990). Bearded seal pups are born at on top of the snow and not in lairs about the same time (Kelly 1988).

2. Hunting Strategies

174932

Polar bears hunt seals using various techniques depending on ice type and a seal's activity. "Still hunt" occurs at a seal's breathing hole. (Stirling 1974, Stirling and Archibald 1977). The bear lies or stands waiting for the seal to return. Detecting a seal lair by smell, the bear runs and jumps on a lair to collapse it and trap an adult or pup (Stirling and Latour 1978).

In spring, seals haul out on the ice to molt. Polar bears use an "aquatic stalk," swimming between and under ice floes to hunt seals hauled out (Stirling 1974). Leads (linear areas of open water) and polynyas (nonlinear areas of open water) which occur from the moving pack ice and along the transition zone (Stirling 1980) are favored hunting habitats for bears (Stirling 1980, Stirling et al. 1993).

Polar bears also hunt in open water. One bear was observed catching a seal in open water by lying still on the surface, possibly mimicking an ice floe. When the seal dove, the bear remained still until the seal surfaced, the bear then swam rapidly toward the seal to within 0.5 meters. The bear then killed the seal by biting into its back (Furnell and Oolooyuk 1980).

It is unknown whether bears prefer certain ice types for hunting. Bears are most successful where seal densities are high regardless of ice type. Where seal density is low, certain ice types make a difference in success rates.

3. Bear Distribution Relative to Seal Distribution

Sea ice conditions influence the distribution and concentration of seals, as determined by currents and water depth (Smith and Stirling 1978, Stirling et al. 1982, Kingsley et al. 1985). Weather, primarily wind direction, is a major influence on ice conditions and flow. Because of the dynamic nature of sea ice, polar bears range and forage over large areas (Taylor 1982, Lentfer 1983). These areas have been found to be greater than 250,000 square kilometers for Alaska bears (Amstrup and Gardner 1991). The unpredictability of sea ice conditions and its movement have restricted studies of polar bear feeding habitat.

Of the studies conducted, Martin and Jonkel (1983) observed polar bears on shore-fast ice in Barrow Strait and Lancaster Sound, Canada and found that rough ice and open lead habitats were used in greater proportion to smooth ice. Stirling et al. (1993) studied bear use of sea ice habitats during late winter and early spring in the western Canadian Arctic. Surveying from a helicopter, they found that all ages of males and females, except those with cubs-of-the-year, were located in the transition zone and on moving ice habitats two and one-half to four times more often than other ice types (Stirling et al. 1993). Females with cubs-of-the-year used stable flat ice areas with pressure ridging habitat providing seal lairs. They may have selected flat ice areas to avoid other bears and the avoid risk of predation on cubs.

A back-tracking study conducted on the pack ice in the Alaska Beaufort Sea on bears of known sex and age showed a significant difference between the number of kills/kilometer made by males and females. Three adult females attempted an average of 0.97 kills/kilometer, while two adult males attempted an average 0.39 kills/kilometer (Kelly et al. 1987).

By spending an equal amount of time in each habitat type in March and April, another Alaska study compared the number of kills per habitat and found that more than half of the kills occurred in the transition zone even though no seal lairs were found there (Eley, unpubl. data) (Table 2).

Habitat Type	Percent of Kills $(n = 71)$	Percent of Lairs (n = 107)
Transition Zone	56	0
Moving Pack	24	44
Shore-fast Ice	20	56

Table 2. Seal kills and lairs found by habitat type.

Studies have shown conflicting results regarding the importance of seal pups to polar bears during the ringed seal pupping season in March and April. In an Alaska study, 56 percent of the kills were adult seals older than six years, 39 percent were juveniles, and 5 percent were pups (n=65) (T. Eley, unpubl. data). In the Canadian arctic, polar bears killed predominantly more seal pups than adults in shore-fast ice habitats, and few pups in pack ice or transition zone habitats (Stirling and Archibald 1977). During the pupping season in Barrow Strait, Canada, bears appeared to direct their hunting efforts toward capturing pups and 75 to 100 percent of the seals killed were pups. Bears captured pups at birth lairs with 11.3 percent success (Hammill and Smith 1991). In the western Canadian Arctic 80 percent of ringed seals killed by polar bears were younger than two years, but newborn pups were often killed and not eaten (Stirling and McEwan 1975), implying that they were not an important source of food.

Polar bears on pack ice in Alaska also hunt seal pups. Kills occurred at 75 percent of 12 birth lairs, 10.3 percent of 29 breathing holes, and 6.2 percent of 16 resting lairs (Kelly et al. 1987).

There is evidence from following bear tracks with dogs trained to find seal structures (Kelly et al. 1987), that bears pass by some seal structures without attempting to hunt there (Hammill and Smith 1991, L. Quakenbush, pers. comm.). In some cases the structures were under ice or deep snow, preventing easy access (Ramsay and Stirling 1988). Or the lair may not have been occupied. In some cases, structures the bears ignored smelled of a rutting male seal (Hammill and Smith 1991, B.P. Kelly, pers. comm.).

Sexually mature male ringed seals emit a strong odor during the breeding season. It can be detected on their breath and at the breathing holes and lairs they use (Smith 1980, Kelly and Quakenbush 1990). Very few rutting male seal structures were depredated (Hammill and Smith 1991, B. Kelly unpubl. data), suggesting that male ringed seals in breeding condition may be less palatable to polar bears (Smith 1980). The Inupiat of Alaska do not eat rutting male ringed seals because of their smell and taste (C. Brower, pers. comm.).

Once a seal is caught, it is pulled away from the water and the bear begins feeding immediately by pulling off the skin and blubber, often leaving the meat (Stirling 1974). The remaining carcass is used by younger less experienced bears and arctic foxes. Females with cubs consume more of their kills than single adults do, especially single males (Stirling and McEwen 1975). Polar bears do not cache meat or remain with a kill until it is consumed as grizzly bears do (Stirling and McEwan 1975).

4. Feeding Habitat by Season

In northern Alaska, polar bears are seen feeding along the beaches on marine mammal carcasses during fall and winter. In the fall of 1992, the remains of fall harvested bowhead whales attracted as many as 30 to 40 polar bears to Barrow (J.C. George, North Slope Borough, Department of Wildlife, pers. comm.). Polar bears feed on carcasses of harvested bowhead whales on Cross Island (Appendix A, Nuiqsut, Feeding) and at Kaktovik (Appendix A, Kaktovik, Feeding) as well. Polar bears are known for their ability to find whale carcasses and many Inupiat hunters tell of floating or beached bowhead carcasses attracting 30 or more polar bears (C. Brower, North Slope Borough, Department of Wildlife, pers. comm.). On St. Lawrence Island, carcasses of whales and walrus may be a significant part of the diet during the fall freeze-up period (M. Iya, pers. comm.).

In a study done on marine mammal mortality in the Bering Sea, Fay (1977) determined that approximately six percent of the marine mammal population die each year, which results in a mean rate of 0.05 to 0.10 carcasses per kilometer of beach per year. Areas adjacent to large haulouts and major subsistence hunting areas in the Bering Sea exhibited a carcass deposition rate ten times greater than other areas (Fay 1977). Native hunters have observed bears feeding on walrus and whale carcasses on the Punuk Islands, near St. Lawrence Island, in the fall and winter (See Appendix A, St. Lawrence Island, <u>Feeding</u>). Even though certain areas are more prone to concentrate marine mammal carcasses, there is inter-annual variability in the locations and numbers of carcasses deposited.

During a 1988 survey of the coastline from Wales to Barrow in northwest Alaska, 418 walrus carcasses were observed (National Biological Service, unpubl. report). In 1989, a similar survey recorded 228 walrus, 13 gray whale (*Eschrichtius robustus*), and 15 seal carcasses (Schliebe 1989). The gray whale population has fully recovered from commercial whaling and has been removed from the endangered species list. The increasing gray whale population is likely to result in more carcasses as a result of natural mortality on the beaches of the Bering and Chukchi seas that will be available to scavenging polar bears.

Several studies indicate that marine mammal carcasses, representing tons of potential food, are available to scavenging bears. While no studies have been conducted to determine the extent to which these carcasses are used by polar bears, it is a widely accepted fact, as reported by Native hunters, that these food sources play a seasonally important role in polar bear energetics. It is equally unclear whether polar bears return to specific areas each year to feed on carcasses. Grizzly bears also feed on marine mammal carcasses on Bering and Chukchi sea beaches.

The winter feeding habits of polar bears are largely unknown, however, bears are probably dependent upon hunting ringed seals at breathing holes and feeding on carrion (Nelson 1969) to make it through the winter. Areas of open water attract seals and permit easy access to prey (Stirling 1988). Leads and polynyas are important winter habitats for many marine mammals and are areas where bears concentrate (Stirling 1980, Stirling et al. 1981). While leads and polynyas occur year-round, they are more abundant in late winter or early spring. Polynyas may be found in most years south of St. Lawrence Island, and Point Hope (LaBelle et al. 1983). The presence of leads was shown to strongly influence the winter distribution of polar bears during aerial surveys in March 1983, in the Canadian Arctic. A 2,500 kilometer area of sea ice, devoid of leads, was surveyed and six bears were observed. Strong winds opened up a lead about 150 kilometers from shore within this area, and 90 bears were seen in a 3,850 kilometer area. Bear tracks were concentrated within one kilometer of either side of the lead (D. Andriashek, unpubl. data. cited in Stirling 1990).

Polar bears are known to have the ability to store fat and lower their activity level to conserve energy; however, pregnant females are the only bears that regularly den during the winter. Bears that summer on the shore of Hudson Bay where little food and no ringed seals are available are known to conserve energy and deplete fat reserves while waiting for the ice to return (Stirling and McEwan 1975, Ramsay and Stirling 1988). There is some evidence that nonpregnant females have entered dens, and presumed pregnant females have entered dens several months early, possibly to conserve energy during the winter months when hunting seals is less productive (Messier et al. 1992). Lowering activity levels during the winter and depending on fat reserves may be necessary for some bears to get through the winter. Bears are thought to experience greater nutritional stress during the winter than at other times of year as indicated by lighter body weights of both males and females in March than in July (Stirling 1990).

In the late winter and early spring leads open parallel to the coast and bears move along them to hunt seals. In the Beaufort Sea, bears may move several hundred kilometers along these leads (Amstrup 1986). Ringed seal pups are born in March and April and in some areas bears were observed to exploit the annual pup production (Ramsay and Stirling 1988, Stirling and McEwan 1975). On warm, calm days from May until breakup, many ringed seals can be seen basking on top of the ice while they molt (McLaren 1958). Seals must elevate their skin temperatures in order to grow new skin and hair (Feltz and Fay 1966). It is much more efficient, energetically speaking, for seals to elevate their skin temperatures in air than in the water. Polar bears stalk basking seals during this time of year with varying success (Stirling 1974). Ringed seals wary of polar bears usually bask in open areas of flat ice and orient themselves so they are very near and facing the breathing hole. They also look up frequently, presumably to watch for predators (Stirling 1974). Spring whaling makes the remains of harvested bowhead whales available to polar bears for feeding in May and June.

Alaska polar bears tend to stay with the ice pack during the summer months (Lentfer 1972), although they can be found on shore at any time of year, especially when the pack is in the vicinity of shore (Nelson 1969). When the pack ice moves out again bears can be left on shore and must rely on a variety of food items or fat reserves. In the summer of 1993, ice in the Beaufort Sea was well offshore until November. More polar bears were reported on shore (approximately 20) in the central Beaufort region that year than in recent years (D. Shideler, Alaska Dept. Fish and Game, pers. comm.).

B. Maternity Denning

Pregnant polar bears, in the vicinity of Alaska, enter maternity dens in November in order to give birth by late December or early January. The family group remains in the den until late March or early April (Amstrup and Gardner 1994). Maternity dens are constructed in drifted snow and found on land, (including the mainland, barrier islands, and other islands), on shore-fast ice, and on pack ice (Figures 6a, 6b, 6c).

It is estimated that 140 female polar bears from the Beaufort Sea population den each year (Amstrup et al. 1986). It is not precisely known how many females from the Chukchi population den each year (G. Garner, National Biological Survey, pers. comm.). Fewer dens have been found along the Alaska Chukchi coast than along the Beaufort coast, which may be an artifact of less polar bear research activity (Garner and Knick 1991) or some deficiency in availability of, or access to, coastal denning habitats because of ice conditions.



Control of

6.000

(carea

Enclosed State

- Com

Figure 6a. Location and habitat type of confirmed and known polar bear maternity dens located by radio telemetry, 1981-1991. Confirmed polar bear dens were verified by consistent temperature and activity output from satellite transmitters (PTT), repeated radio tracking and visual observations, or both. Unconfirmed locations were classified as known dens. Research was conducted primarily in the Beaufort Sea. Shaded areas represent denning areas located within Russia.

23

CT.



Figure 6b. Location and habitat type of confirmed and known polar bear maternity dens located along the coastal area from Point Hope to Cape Halkett, Alaska, 1981-1991. Confirmed polar bear dens were verified by consistent temperature and activity output from satellite transmitters (PTT), repeated radio tracking and visual observations, or both. Unconfirmed locations were classified as known dens. Research was conducted primarily in the Beaufort Sea.

Solution

3

100 C

周に

100

1000

100

夏

<u>1</u>

Q2.779

EST.

380

昇

200

and a

Real Property





Figure 6c. Location and habitat type of confirmed and known polar bear maternity dens located along the coastal area from Colville River, Alaska to Cape Bathurst, Canada, 1981-1991. Confirmed polar bear dens were verified by consistent temperature and activity output from satellite transmitters (PTT), repeated radio tracking and visual observations, or both. Unconfirmed locations were classified as known dens. Research was conducted primarily in the Beaufort

Only two female polar bears collared in the Chukchi or northern Bering seas have denned in Alaska, one between Cape Lisburne and Point Hope and the other approximately 40 kilometers east of Barrow (G. Garner, National Biological Survey, pers. comm.). Twenty-four family groups were captured during the spring between 1986 to 1988 in the eastern Chukchi Sea, and none of the cubs in these groups were cubs of the year (Garner and Knick 1991).

Two females collared in the Chukchi Sea denned on or near Wrangel Island in 1987, one denned near Cape Netan on the Siberian coast, and another denned on drifting ice in the Northern Chukchi Sea (Garner et al. 1990). In the spring of 1989, tracks of family groups with cubs-of-the-year were seen north of Point Lay, between Point Hope and Cape Lisburne, and 10 to 15 miles inland from Cape Lisburne, indicating their den sites were in western Alaska (G.W. Garner, National Biological Survey, pers. comm.).

There is no evidence from radio-collared bears that denning occurs south of Point Hope (G.W. Garner, National Biological Survey pers. comm.), however, Native hunters report several dens near Lopp Lagoon in the vicinity of Wales, (See Appendix A, Wales, Denning). At least one maternity den has been reported by Native hunters of the Chukchi Sea on St. Lawrence Island (See Appendix A, St. Lawrence Island, Denning). Approximately seven dens have been found by local hunters between the Kukpowruk River and Cape Beaufort, from 1930 to the present, mostly on lake shores and coastal bluffs, and barrier islands (See Appendix A, Point Lay, Denning).

Several dens have been reported for Little Diomede Island, mostly on the island but at least one was on the pack ice (Appendix A, Little Diomede Island, Denning). Approximately 17 dens have been reported by Native hunters and elders of Wainwright. The majority of these have been recent (1990's) and located in cut banks of rivers and coastal bluffs (See Appendix A, Wainwright, Denning). It is unknown if the dens in the vicinity of Wainwright belong to females that are part of the Beaufort Sea or Chukchi Sea subpopulation. The number of dens observed on the Alaska Chukchi coast by local hunters indicates that regular denning does occur there. Only two collared bears have denned in Alaska, indicating possibly that the number of females collared in this region is too low to address the level of denning on the Alaska side of the Chukchi Sea.

It has been hypothesized that females are faithful to denning areas and return, when pregnant, to areas where they previously reared cubs (Larsen 1985, Stirling et al. 1975, Uspenski and Kistchinski 1972). In the Alaska Beaufort Sea, however, polar bears appear to be faithful to a denning habitat type, and not denning locations.

Consecutive den locations of 27 individual females captured in the Alaska Beaufort Sea indicated that the mean distance between consecutive dens was 308 kilometers (Amstrup and Gardner 1994). The closest distance between any two consecutive dens was 20 kilometers (Amstrup and Gardner 1994). Females that denned on land were more likely to den on land again in subsequent years, and likewise those denning on pack ice were more likely to return to pack ice to den again (Amstrup and Gardner 1994).

1. Land Denning Habitat

Alaska's polar bears are linked to the sea ice by their major prey, the ringed seal. Bears generally stay with the ice when it retreats in the summer (Lentfer 1972). This behavior contrasts with that of polar bears in Canada, which summer on land when the ice retreats in Hudson Bay (Derocher and Stirling 1990). Other than feeding on beached carrion, and giving birth and caring for young in land-based maternity dens, Alaska polar bears spend little time on land.

Polar bears excavate their maternity dens in deep compacted snow drifts adjacent to bluffs, barrier islands and other areas of topographic relief (Amstrup and DeMaster 1988). Barrier islands occur in shallow water along the northern and western coasts of Alaska and provide maternity denning habitat. They are long, narrow sand and gravel bars that parallel the coastline. Sea ice on the shoreward side of these islands is extremely stable, often being attached to shore (shore-fast ice). Flaxmen, Pingok, Cross, Cottle, Thetis and other barrier islands in the Beaufort Sea are known to support maternity dens. Between 1981 and 1991, of the 90 dens found in the Beaufort Sea, 38 (42 percent) were on land, barrier islands, or fast ice (Amstrup and Gardner 1994). The largest known concentrations of polar bear maternity dens are found on large islands in the Arctic Ocean. The highest density occurs on Wrangel Island in the western Chukchi Sea, where as many as 200 females enter dens each year (Uspenski and Kistchinski 1972). Other important areas include the northern coast of Chukotka (Stishov 1991).

The highest density of land dens in Alaska occurs along the coast of the eastern Beaufort Sea within the Arctic National Wildlife Refuge (Arctic NWR) (Figures 6a, 6b, and 6c). Forty-four dens were located by radio-telemetry on or near the mainland of the coast of Alaska and Canada between 1981 and 1992. Twenty (45 percent) were found within the boundaries of Arctic NWR, and 15 (35 percent) were within the coastal plain 1002 area (Amstrup 1993).

More dens have been located in Arctic NWR and the 1002 area than would be expected if bears denned uniformly along the coast (Amstrup 1993). Den density is significantly greater along the northeastern coast of Alaska (Amstrup and Gardner 1994) for unknown reasons. Possible reasons include: 1) shore-fast ice formation and/or ice movements

passively concentrate bears here; 2) bears prefer the quality of the denning habitat; 3) proximity to favorable hunting habitat upon emergence from dens, and; 4) past human hunting behavior and pressure along the coast.

Bears may be passively deposited in the east during fall by ice movements, or they may actively select the area for the quality of the denning habitat. The topographic relief to the east is greater than that to the west, which was thought to be important for the creation of deep drifts for den construction (Lentfer and Hensel 1980). However, 7 of 14 dens examined on the ground, and many others seen from the air by Amstrup and Gardner (1994), were found in microhabitats within areas believed to have inadequate topographic relief.

Other reasons for what seems to be preferential denning in Arctic NWR may be proximity to favorable hunting habitat (S. Amstrup, National Biological Survey, pers. comm.). Areas where hunting success is greatest, however, have been shown to be unpredictable, both seasonally and annually (Ramsey and Stirling 1986). For example, in the winter of 1993-1994 several land dens were found near Barrow. These dens appeared to be were located near to where pregnant females were feeding on whale carcasses until late in the fall possibly influencing their den locations (R. Suydam, North Slope Borough, pers. comm.). These den locations demonstrate that some component of den selection may be opportunism.

Human activities along the coast of Alaska may have influenced the density of dens in recent years. Low density of dens along the Canadian Beaufort Sea coast may be due to Yankee whalers and Natives hunting that area with firearms for more than 80 years (Stirling and Andriashek 1992). For the last 20 years, polar bears in dens on mainland Canada have been protected and the number of dens in this region are increasing (Stirling and Adriashek 1992).

Land dens are not limited to the immediate coastline. Some have occurred inland approximately 48 kilometers from shore.

2. Shore-fast Ice Denning Habitat

Shore-fast ice, also known as land-fast ice or fast ice, is a floating sheet of ice which is grounded to the bottom near shore. When shore-fast ice is continuous between shore and barrier islands, it tends to be very stable (Stringer et al. 1980). The width of the shore-fast ice varies but tends to be widest in protected bays and narrowest around capes. The shore-fast ice zone is wider in the Beaufort Sea than it is in the Chukchi Sea. Between 1981 and 1991, four dens were found on shore-fast ice. (Amstrup and Gardner 1994).

3. Pack Ice Denning Habitat

General movement of the pack ice in the Beaufort Sea occurs in a clockwise direction, moving ice from east to west across the north coast of Alaska. Early researchers found more land dens than pack ice dens, which suggested to them that pack ice was too unstable, and the location of the den at emergence too unpredictable to be preferred habitat (Harington 1968, Lønø 1970, Lentfer 1975, Lentfer and Hensel 1980). Substantial movement of dens on pack ice have been demonstrated (Figure 7). In 1986, abnormal ice movements transported eight pack ice dens into the Chukchi Sea from the Beaufort Sea, causing all but one female to abandon the den (Amstrup and Gardner 1994).

Even though pack-ice denning involves some risks, many females den on pack ice (Amstrup and Gardner 1994). Of the 90 dens found between 1981 and 1991, 48 (53 percent) were on pack ice (Figure 6a). The number of dens on land and pack ice varied among years. Risks are associated with both land and pack-ice dens. Bears denning on pack-ice dens may encounter unstable ice conditions, while risks to bears on land dens may include hunting and other human activities.

C. Breeding

625km

Much of what is known about polar bear breeding behavior and habitat has been pieced together from incidental observations during studies designed to address other objectives (Ramsay and Stirling in press, Lentfer 1974). The breeding season has not been well defined, but from observations of females accompanied by males, it is thought to occur from March through May (Lentfer 1974, Lønø 1970).

Cubs usually remain with females until they are two and one-half years old, dictating that the breeding interval for most females is every three years (Lentfer 1976b, Lentfer et al. 1980). Of 26 adult females captured in Canada, five (19 percent) bred more frequently than every third year, probably because they lost their cubs before they became independent (Ramsay and Stirling in press). Because of a long interval between pregnancies, available males probably outnumber available females in each breeding season and create competition between males for available females. Adult males captured with adult females during the breeding season were significantly older than solitary adult males captured during the same time period (Ramsay and Stirling 1988).

Since local conditions are unpredictable within and between seasons, female distribution is also unpredictable. Certain habitat types appear to attract available females during the breeding season, but the location of those habitats may not be predictable from year to year.



Figure 7. Movements of pelagic polar bear maternity dens, 1981-1991. Research was conducted primarily in the Beaufort Sea.

ŕ

Here,

1997

and the second se

Ŋ.,

610

>

願心

107.1

<u>s</u>

:

P

69 V

It is known that if cubs-of-the-year are lost, those females can breed in the next breeding season. While most breeding females have been seen with a single male, some have been seen with multiple males, and others with two different single males in the same breeding season. Although the opportunity for polyandry appears to exist, there are no observations of females mating with more than one male.

D. Migration Patterns

,07:00

In the early 1900s, polar bears were thought to be wanderers of the Arctic. Mark-recapture studies in the 1960s and 1970s, however, suggested that most bears restricted their ranges within certain areas (Demaster and Stirling 1981, Lentfer 1983). The development of satellite telemetry provided the technology needed to track bears and was first used successfully in 1985 for polar bears (Garner et al. 1989). Radio and satellite transmitters are placed in neck collars that can only be fitted on female bears (male polar bears have necks that are larger in diameter than their heads). Therefore, most of the movement data has been gathered from females.

1. Movements of Chukchi Sea Bears

Seasonal movements of adult females in the Chukchi and Bering seas were studied by locations of satellite collars placed on 10 females in the Chukchi Sea in 1986, and 10 placed on females in the Bering Sea in 1987 (Garner et al. 1990). Movements of these bears were analyzed for April and May from 1986 to 1988. The bears moved northward from the northern Bering Sea into the southern Chukchi Sea and then followed an eastern route into the northeastern Chukchi Sea or western Beaufort Sea, or a western route into the western Chukchi Sea and eastern Siberian seas. A few of the bears moved north through the central Chukchi Sea as well. Movements were more restricted during summer and occurred in two general areas corresponding to the routes seen during the spring movements.

Fall movements paralleled the Chukchi Peninsula and bears entered the Bering Sea through the Bering Strait. During the winter months, collared bears moved into the southern Chukchi Sea and into the Bering Sea around Saint Lawrence Island. Two females denned near Wrangel Island, a third denned on the Russian mainland, and a fourth on the pack ice more than 300 kilometers from shore.

2. Movements of Beaufort Sea Bears

From 37,277 locations of 153 adult female polar bears wearing satellite radio-collars between 1985 and 1993, Amstrup and Durner (in prep.)

analyzed activities, movements, and distribution of polar bears in the Beaufort Sea.

Bears were more likely to move in a northerly direction from May through August, and more likely to move south in October. November movements were greater in easterly and westerly directions. Movements in other months did not exhibit a directional preference. Bears moved greater distances in December than in other months and total monthly movements of single females were higher than those of females with cubs. Movements of female polar bears with cubs-of-the-year during the first three months following den emergence appear to be toward the nearshore lead system (Figure 8). Total annual movements of Beaufort Sea bears ranged from 2,114 to 5,281 kilometers, but no differences among the reproductive classes of females.

3. Activity Levels

Activity levels did not always correspond to movement rates, which implies that activity sensors were detecting movements that do not translate into distance traveled, but may reflect hunting behavior or caring for young.

Annual activity areas for Beaufort Sea polar bears were large and variable (Table 3). Schweinsberg and Lee (1982) proposed that the size of the area used by polar bears should reflect the habitat richness of the area. Since the largest polar bears come from the Chukchi Sea region (Manning 1971) probably live in a highly productive area where nutritional needs are met without traveling great distances, then Chukchi bear should exhibit the smallest annual activity area.

Reproductive Class	Area (Square Kilometers)
Females with cubs	100,812
Females with yearlings	148,572
Single females	162,772
Females that denned	35,042

Table 3. Size of annual activity areas of Beaufort Sea polar bears.



Links .

IT STAT

.

filling a

New York

्रिय्यम

1.000

ALC: NO.

the second s

100748

and a

) 1

Alexandre

Figure 8. Movements of female polar bears in the three months following den emergence, 1981-1991. Research was conducted primarily in the Beaufort Sea.

 $\mathcal{L}_{\mathcal{L}}^{\mathcal{L}}$

STREET SL

The mobility of polar bears is currently believed to be tied to the variability of their ice environment and not differences in habitat richness (Amstrup and Durner, in prep.). The sea ice of the Chukchi Sea is the most dynamic, moving 1,400 kilometers from its maximum to its minimum in an average year. The Beaufort Sea, while not as dynamic as the Chukchi (receding 100 to 150 kilometers from shore) is more dynamic than the Canadian Arctic Archipelago.

During radio-telemetry studies off the west and north coast of Alaska, Lentfer (1983) found polar bears were most commonly recaptured in late winter and early spring in the same areas they were captured in previous spring seasons. Amstrup and Durner (in prep.) found that while fidelity was higher in late winter and early spring than in mid-winter, maximum fidelity was exhibited in summer. Polar bear site fidelity is a relative concept, as consecutive centers of monthly activity are separated by more than 200 kilometers.

As ice melts and retreats, available summer habitat is reduced at the same time Beaufort bears exhibit their greatest fidelity to any area. Therefore, fidelity to summer habitat may be driven more by the physical factors that control sea ice than any preference or habitat requirement of polar bears (Amstrup and Durner, in prep.). While information regarding movement patterns and areas of activity is now available throughout the year from bears with satellite transmitters, habitat types within those areas are not yet available.

4. Population Boundaries

Several studies have concluded that polar bears belong to somewhat discrete groups or subpopulations between which exchanges are limited. Some exchange between the western Canadian Arctic and the Alaska mainland coast was documented by Stirling et al. (1981), but no exchanges were found between Banks Island, Canada and Barrow, Alaska.

While polar bears captured in the vicinity of the mainland Beaufort Sea coast of northern Alaska and northwestern Canada were found to travel throughout the Beaufort Sea and into the Chukchi Sea, they were rarely relocated east of the eastern boundary of the Beaufort Sea or west of the nearshore areas adjacent to northwestern Alaska (Amstrup and Durner, in prep.). Bears captured in the western portion of the Beaufort Sea spent about 25 percent of their time in the northeast Chukchi Sea, but returned to the Beaufort in summer. Some bears captured in the central or eastern Beaufort also traveled to the Chukchi, but returned to the Beaufort Sea in summer. Polar bears captured in the eastern Beaufort tended to move west and those captured in the western Beaufort tended to move east. Even though bears captured in the Beaufort moved into the Chukchi, bears captured in the Chukchi rarely moved into the Beaufort (Amstrup and Durner, in prep.), further substantiating the conclusions of studies conducted by Lentfer (1983) and Garner et al. (1990).

Even though limited movements occur between subpopulations, the Beaufort Sea subpopulation remains separate enough from adjacent ones to be a useful management unit (Figure 1).

VI. NATIVE KNOWLEDGE OF POLAR BEAR HABITAT USE

The Service sought local knowledge of polar bear habitat use to ensure that recommendations set forth in this strategy were based on the best information available. Recognizing and using local knowledge to manage fish and wildlife is in keeping with the Service's Native American Policy to seek partnership with Natives and keep Native governments involved from initiation to completion of Service activities.

The primary objective of the Native knowledge survey was to identify polar bear habitat use areas within hunter habitat use areas for each village (Figure 9). Villages were selected for the consistency of harvest patterns and their location within polar bear habitat.

Service staff lead discussions with Native hunters who were selected by their village council on the basis of their knowledge of local polar bear ecology and habitat. A total of 61 hunters voluntarily participated. Oral information was recorded in writing; spatial information was recorded on maps.

Map information was digitized into a Geographic Information System (GIS) using ARC/INFO software. Maps illustrate polar bear seasonal movements, denning and feeding areas that occur in the Bering, Chukchi and Beaufort seas (Appendix A).

Shaded areas on maps are approximations of habitat type, rather than definitive locations. Polar bear habitat is highly variable because ice is directly affected by wind and ocean currents. When wind direction changes, lead systems and ice edges change dramatically altering the accessibility and desirability of an area. Denning locations, which are relative to snow depth and deposition, vary annually. Hunter responses often reflected this variability through statements such as "Bears den wherever there are high enough snowdrifts" or "This lead is present when the wind blows from the south".

The information gathered reflects polar bear habitat use areas where hunters spend most of their time, and does not reflect habitat use in areas that are inaccessible or unused by hunters. For example, denning areas are most often observed along coastlines or river drainages, which also represent hunters' travel corridors, particularly between villages and camps. Responses from hunters varied according to their hunting ranges and experience. Shaded areas on maps represent combined hunter information.



biti o

3

1

Ċ,

25

間の

1

Figure 9. General location for collection of Native knowledge.

100

36

and the

100

600710

調い

VII. THREATS TO POLAR BEARS AND THEIR HABITAT

A. Oil Industry Activity in Polar Bear Habitat

The oil and gas industry has conducted exploration and development activities in Arctic Alaska for more than 20 years. Drilling for oil at sea is limited by ice conditions and water depth. Support activities may involve use of helicopters and construction of ice landing strips for fixed-wing aircraft and roads. Although exploration, development, and production activities have the potential to disrupt polar bears and/or adversely affect polar bear habitat, industry has been careful to avoid disturbing sensitive habitats of polar bear and other marine mammals as well as terrestrial birds and mammals.

1. Exploration Activities

10.500

Seismic: Oil companies rely upon information acquired by geoseismic surveys to find the most promising oil bearing formations and to identify hazards that may be encountered during exploration. In the arctic environment, seismic work can be conducted from land or shore-fast ice during the winter, or from open water during the summer.

The summer marine surveys are less likely to encounter polar bears, as they require relatively ice-free waters to tow arrays of hydrophones that receive the sound waves from air or water guns. The winter surveys cover large blocks of fast-ice with parallel lines. The amount of equipment used depends upon the topography of the ice and the snow depth. In general, a bulldozer levels a trail, then a truck with a power auger determines if the ice is of sufficient thickness and strength to support heavy vehicles.

A survey crew with one or two vehicles marks where the seismic energy will be focused, then four or five vibroseis vehicles vibrate the ice to send sound waves through the ice, water, and bottom. The sounds return and are received by four or five vehicles carrying recording equipment. The sound information provides profiles of the rock formations below the ocean bottom. In addition, a fuel truck, a moveable camp with kitchen, incinerator and sleeping accommodations are also present in the convoy. In general, a seismic crew works continuously for 16 to 18 hours and covers 6 to 8 kilometers each day. This activity produces considerable airborne and underwater noise in addition to physical movements of humans and equipment (Shideler 1993). The noise and physical movement of equipment has the potential to cause female bears to emerge from their dens and disrupt bears and seals feeding in the area. In recent years there has been an increasing use of "3D" seismic exploration, which allows greater resolution of the subsurface geology. However, the source and receiver lines are much more closely spaced (only a few hundred yards)

compared with "2D" exploration, thus increasing the potential to disturb denning bears encountered.

Drilling: Drilling for oil at sea during winter occurs from bottomfounded structures, artificial ice islands, natural barrier islands, and artificial gravel islands. Winter operations usually require the construction of an ice road for access to the drill site and for delivery of the drill rig and other equipment.

In addition to the structures used in winter, summer drilling is conducted from drillships and other floating drilling units. When used in deeper water, these units require the assistance of icebreakers, even during summer drilling operations to ensure that heavy ice does not bump the rig during drilling. Icebreaker activity depends upon the nature of the ice. Large and fairly consolidated floes of annual ice may be broken into smaller pieces that will float harmlessly by the rig. Thicker and denser ice may require as many as four ice breakers to operate simultaneously.

Helicopters transport supplies and personnel during summer exploration activities. Drillships and some icebreakers are equipped with heliports. In winter, ice landing strips may be constructed for fixed-wing aircraft access, helicopters and regular vehicles are used where ice roads exist. Noise from air and vehicles poses a potential threat to polar bears.

In the event of an oil spill, the industry has developed response plans that include on-site equipment and trained personnel. Also an oil industry sponsored, not-for-profit organization provides spill response support. This organization provides an extensive supply of containment and cleanup equipment, trained staff, and a control center to organize a cleanup.

2. Development and Production Activities

Alaska's North Slope oilfields are located along the shores of the central Beaufort Sea. This area includes nine oilfields of which seven are in production. New fields are expected to be brought into production in the near future (Figures 10 and 11).

Prudhoe Bay: The Prudhoe Bay field encompasses approximately 350 square miles. Over 1,000 wells, including gas and water injection wells have been drilled here. Production facilities include six separation centers, and electric power plant, a central gas facility, and a central compression plant to prepare the crude oil for travel down the Trans-Alaska Pipeline System. Support industries are located at the town of Deadhorse. These include landfills, public and private airports, road systems, and maintenance facilities. May of the facilities were constructed in the 1970s



and a second

1

(Lower of

Figure 10. Developed oil fields on the Alaska North Slope.

patipates

, and the second se

) 1

and 1980s before measure to minimize polar bear/human interactions were adopted. Because of the era of construction, a number of "retrofits" of structures or operations have occurred to minimize encounters. These have resulted form site visits and recommendations from the Department of Fish and Game, Service, and oil field safety and environmental compliance departments of industry. Measures include enhance lighting of facilities, full-time security personnel trained in deterrence techniques, and building modifications to enhance visibility and physical protection of personnel entering or leaving buildings.

Kuparuk: The Kuparuk field is located 30 miles west of Prudhoe Bay. Covering 266 square miles, it is the second largest field in the United States. Production facilities include three separation centers and a seawater treatment plant. The seawater treatment plant, located at Oliktok Point, treats seawater for injection into the reservoir to enhance oil recovery.

Endicott: The Endicott field is located offshore in the Beaufort Sea about 10 miles northeast of Prudhoe Bay. Endicott is the first continuous, offshore production field in the Arctic. Endicott consists of two artificial gravel islands; a 55-acre Main Production Island and a 16-acre Satellite Drilling Island. The two islands are connected to the to the Prudhoe Bay field by a five-mile breached causeway.

Lisburne: The Lisburne reservoir lies under the Prudhoe Bay reservoir. The field facilities include five well pads and a production center that separates gas, water, and oil.

Milne Point: The Milne Point field is located to the northeast of the Kuparuk field. Since work began in 1985, 11 production pads, housing a total of 51 wells have been developed. A proposed pad could add 40 more wells to this field in the near future. An artificial island built in Simpson Lagoon in the Milne Point Unit has the potential to expand this field's operations farther offshore. Currently the operation plan is to use directional drilling from the proposed pad and there is no activity on the island.

Point McIntyre: The Point McIntyre field is located along the coast west of Prudhoe Bay. One drill pad was built at the base of the West Dock causeway and another along the coast for the production of this field. The Lisburne production center will process the oil from this field as well.

Production Wastes: Most wastes generated from oil production are considered non-hazardous. These wastes include drilling muds and cuttings. Drilling mud is designed to prevent the uncontrolled release of oil or gas from the well. Much of the muds and cuttings are recycled. Reserve pits used for surface disposal of muds and cuttings have been



(HARD)

Figure 11. Undeveloped oil fields and prospects on the Alaska North Slope.

virtually eliminated by technology that grinds cuttings fine enough to inject the waste down a well into a confining geologic layer.

Approximately 250 reserve pits were developed before this technology was available. A plan is currently being developed to close out the old surface reserve pits by grinding and injecting the waste.

Other wastes include tank-bottom sludges and pigging wastes. The liquid wastes are injected into approved disposal wells and the solids are placed in lined surface impoundments. Industry is currently planning and designing a waste management facility that will eliminate the requirement for surface storage. The facility will handle all North Slope oil fields and third-party contractor generated non-hazardous and exempt oily wastes. The small amounts of hazardous waste generated by the production area facilities are managed in accordance with current Federal regulations.

3. Future Exploration, Development, and Production Activities

Badami: The Badami field, located beneath Mikkelsen Bay, will be an unstaffed production pad connected to Prudhoe Bay facilities by a 59 kilometer pipeline. Planned on-site facilities include a dock, a road, and an airstrip. No permanent road from Prudhoe is planned.

Construction during the winter of 1994-95 include drilling two appraisal wells, construction of a gravel well pad, an airstrip, a solid-fill dock, and connecting roads. Activity between 1995 and 1997 would include 10 additional production wells and winter construction of the pipeline. The pipeline will parallel the coastline at least 1.6 kilometers inland, and be elevated at least 1.5 meters above the tundra to allow for wildlife to pass under it.

4. State of Alaska Oil and Gas Lease Sales

The proposed state of Alaska Five-Year (1995 to 1999) Oil and Gas Leasing Program contains four lease sales that impact polar bear habitat along the Beaufort Sea coast. Offshore state leases include state waters in the nearshore areas that do not extend beyond three miles from shore or from barrier islands where they are present. Much of the 3.8 million acres that are proposed in the Five-Year Program are overlapping and will be offered for lease multiple times. Most of the acreage being offered has been offered before. This means that industry has passed up most of these leases before and is likely to do so again.

5. Outer Continental Shelf Lease Sales

Lease Sale 148 (Chukchi Sea) was proposed to lease approximately 25.6 million acres of the Chukchi Sea and was scheduled for 1994 (Figure 12). This sale was reconfigured and considered as a U.S./Russia simultaneous lease offering. This new sale would have included the eastern and western Chukchi Sea and the Hope Basin in the southeastern Chukchi Sea. The proposed lease sale area on the Russian side came to within 10 kilometers of Wrangel Island where the highest known density of polar bear maternity dens in the world occurs (Uspenski and Kistchinski 1972). The lease offering has been canceled due to a lack of interest by industry and concerns for the environment voiced by conservation organizations.

Two lease sales are being planned for the Outer Continental Shelf (OCS) of the Beaufort and Chukchi seas. OCS lease sales include offshore tracts from three miles off the coast or barrier islands to international boundaries. Proposed Sale 144 (Beaufort Sea) includes approximately 29.5 million acres of the Beaufort and Chukchi seas within the Beaufort Sea planning area, and is scheduled for 1996 (Figure 13).

6. Oil Industry Measures to Protect Polar Bears

A number of substantial measures have been developed and implemented to protect polar bears and reduce the chances of human/bear interactions including the development of the reference manual, "Guidelines for Oil and Gas Development in Polar Bear Habitat," edited by J.C. Truett, under contract to the U.S. Minerals Management Service. Since 1988 measures to protect polar bear and reduce chances of bear/human interactions have been recommended to industry by the State of Alaska under the authority of Alaska Coastal Management Program (ACMP), which reviews projects for consistency with the ACMP. Promulgation of regulations by the Service authorize LOAs to be issued by the Regional Director, Alaska Region, that would authorize the incidental, unintentional take of small numbers of polar bear during oil and gas industry operations under the MMPA. The first regulations went into effect in 1990 for the Chukchi Sea region during exploratory activities which occurred in the open water season. Later, in 1993, the Service at the request of industry developed incidental take regulations for the Beaufort Sea region during exploratory, development, and production oil and gas activities. Industry excluded the Arctic NWR from its petition to take.

Activities in polar bear habitats, especially during winter months under terms of LOAs require that industry contact the Service or Alaska Department of Fish and Game to compare the locations of known active



Pata-

ala da

RS C

Figure 12. United States/Russia proposed simultaneous leasing in the Chukchi Sea/Hope Basin.



'iustry

Figure 13. Proposed lease sale 144 in the Beaufort Sea.

5

15.00

and a

polar bear dens with industry activities. Also under terms of LOAs and recommendations of the State through their consistency finding, industry is required to avoid known dens by one mile, withdraw immediately from any new dens, report new dens to the Service, and subsequently avoid them by one mile. Industry also is required to develop an approved Polar Bear Interaction Plan, conduct environmental orientation training for all on-site personnel, and report all sightings of polar bears.

A Polar Bear Interaction Plan includes: 1) a site description and relative location to polar bear habitats; 2) a site layout; 3) a list of potential attractants; 4) determination of high risk and safe areas; 5) treatment of kitchen waste; 6) bear detection and alarm equipment and methods, including trip wire detection systems which have been successfully used; 7) deterrence equipment and methods (if authorized); 8) contingencies if deterrence fails; 9) procedures if personnel are working off-site; and 10) reporting procedures (Tremaine 1993).

Additionally oil spill response capabilities have been required. Industry has established and staffed the Alaska Clean Sea organization in Prudhoe Bay that are responsible for the following: responding directly to spill and coordinating the training of additional unit operators and contract response personnel; acquiring spill response equipment; conducting spill preparedness drills; assessing further training needs; and developing specific measures to protect polar bears from spill including training in hazing techniques to keep bears from oiled areas, removal of oiled carcasses to prevent secondary oiling, and development of procedures for transport, stabilization, and treatment of oiled bears.

Orientation Training: Industry is required to provide environmental orientation training for all personnel that will be on a site in polar bear habitat. Topics include polar bear life history, regulatory provisions of the MMPA, precautions to minimize encounters between bears and project personnel, and potential impacts and possible mitigation of the project on polar bears.

8855-5-

The 1994 amendments to the MMPA, section 101(a)(4)(A) now allow a person to deter a bear from damaging public or private property or endangering personal safety as long as such measures do not result in the death or serious injury of the bear. Authorized individuals are trained in deterrent equipment and techniques and have included Service biologists, state Fish and Game biologists, North Slope Borough Department of Wildlife Management and Public Safety personnel, and security personnel in the oilfields. Section 101(c), also amended in 1994, now allows lethal take of marine mammals in self-defense.

Some oil companies have added additional measures to avoid human/bear conflicts. In addition to a Polar Bear Interaction Plan, Conoco used a tripwire system to aid in detecting polar bears during two winter exploration projects (Northwest Milne and Badami #2). The system allowed for early detection of polar bears so that personnel could leave an area to avoid a human/bear encounter.

B. Shipping

1. Domestic Shipping

Due to the isolation of Arctic and subarctic coastal villages, supplies arrive by barge. Houses, building supplies, cars, dry goods, and fuel arrive by barge as they are too large, heavy, or expensive to be transported by air. Most barges come from Seattle via the Bering Sea and Bering Strait, but occasionally the Prudhoe Bay oilfield receives equipment or modules from Canada via the MacKenzie River and the Beaufort Sea.

The amount (tons) of freight delivered to the North Slope Borough villages by barge is variable depending upon public works projects and other development. For instance, in 1986, 110 thousand tons of freight was shipped for the construction of an elementary school and utilidor project in Barrow, however, from 1988 to 1991 the range was from 4 to 20 thousand tons (Harcharek 1993). The amount in 1994 was within that range, but it is expected to increase in 1995 with the construction of the Native Cultural Center in Barrow (R. Harcharek, NSB, Planning Department, pers. comm.). Fuel transported by barge ranged from 4,997 to 6,311 thousand gallons between 1986 and 1991 (Harcharek 1993).

Barge traffic is restricted to the summer months and usually arrives in Barrow in August.

2. International Shipping

Russia supplies their Arctic coast with icebreakers (nine of which are nuclear powered), ice strengthened ships, and regular hulled cargo ships that travel the Northern Sea Route (NSR). The NSR follows the northern coast of Russia from Murmansk in the west to the Chukchi Peninsula in the east, where it ties into the Arctic Great Circle Trade Route through Bering Strait and the Bering Sea to Dutch Harbor.

In 1987, the NSR was opened for commercial international shipping. This invitation was followed in 1989 by the renegotiation of the U.S./U.S.S.R. bilateral maritime treaty, which identified 42 American ports as ports of call for Russian vessels, including several Alaska ports (Fuhs 1992).

Current politics support the development of polar sea shipping routes and governments of the Arctic have organized under the Northern Forum to promote the expansion of the NSR for commercial international shipping. The Northern Forum's Resolution of Support, dated November 8, 1991, states that, "creating a maritime transportation route which is safe, has as long of a sailing season as possible, and is operated with proper concern for the environment." This resolution was signed by leaders of United States (Alaska), Norway, Canada, USSR, China, Mongolia, Finland, Japan, and Korea.

Icebreakers are necessary to get cargo from Dutch Harbor in the Aleutian Islands to Russia and Europe in all but four months of the year (Hanson 1994). Pressure ridges present the greatest obstacle to shipping. To be an efficient world trade route, however, the vessels using this route will need to operate at their capacity in both directions, which will include backhauling cargoes between the Atlantic and the Pacific oceans (Fuhs 1992). Ships using this route must be built for ice, and of low draft in order to pass through the shallow straits of several seas, which requires smaller ships with correspondingly reduced capacity which minimizes economic return.

The increase in shipping to Europe passing by Alaska would open markets for Alaskan fish, coal, minerals, and timber. The construction of vessels, joint venture opportunities in vessel operation, and development of necessary infrastructure in Alaska are additional economic possibilities driving this endeavor (Fuhs 1992). The current assessment of the economic potential of this route for year round operations is poor, however, there is interest in its immediate limited use. Regardless of the degree to which international shipping develops on this route, Russia is likely to increase their shipping activities as they attempt to improve their current economic situation in the north by exploiting natural resources in the region (Hanson 1994).

The Soviet Ministry of the Merchant Marine established the International Northern Sea Route Program (INSROP), to evaluate all aspects of opening the NSR to international traffic. The environmental factors constitutes a subprogram and is coordinated by the Norwegian Polar Institute. The role of this subprogram is to assess the environmental impact of the NSR on important ecological and environmental resources and develop advice for operations to minimize impacts (Hanson 1994). The Norwegian Polar Institute is collaborating with other entities to accomplish this assessment, including the Geophysical Institute and the Institute of Marine Science of the University of Alaska - Fairbanks.

Increases in shipping through the Bering and Chukchi seas by icebreakers in the fall, winter, and spring has the potential to disrupt Alaska polar

RENA -

bears from the Chukchi subpopulation. Ships would likely use leads and polynyas to avoid breaking ice and reduce transit time. Leads and polynyas are important feeding habitats for polar bears, especially in winter and spring, and heavy shipping traffic could disturb bears and seals. Concomitant with increased traffic is the increased potential for accidents resulting in fuel spills that could affect polar bears directly as well as the food chain they depend.

C. Coal Mining

The Western Arctic Coal Development Project was initiated in 1984 to investigate a local energy supply for villages in northwest Alaska. Coal reserves were evaluated, and appeared that a commercial venture was feasible if the project were expanded to consider large-scale mining for overseas markets. The coal resources are located approximately 64 kilometers south of the village of Point Lay (Arctic Slope Consulting Engineers et al. 1988).

The method of transporting the coal has not been determined, however, a port facility at Omalik Lagoon and a road to the existing Red Dog Mine port have been proposed. A port at Omalik Lagoon would require dredging an entrance. This project and ancillary facilities has potential for environmental impacts. The Red Dog Mine is an open pit hard rock mine located northwest of Kotzebue on the south side of the Brooks Range.

Polar bears are observed annually along the coast near Cape Beaufort, in the vicinity of Omalik Lagoon. The Cape Beaufort area has also been used for denning (See Appendix A). Coal reserve areas are not known to be used for denning (Arctic Slope Consulting Engineers et al. 1988). The development of a port at Omalik Lagoon, or the use of the port at Red Dog Mine to transport coal to overseas markets would increase shipping traffic to the northwest coast of Alaska. For a commercial coal mine to be economical, coal would probably have to be shipped outside the ice-free period, which would require the use of icebreakers. Depending upon the timing and level of vessel traffic, polar bears could be adversely affected.

D. Contaminants

The arctic may be far from where pesticides, heavy metals, and radioactive wastes are used or produced but these pollutants and others can be found in arctic snow, ice, water, and air. These substances are of great concern in the arctic because cold temperatures and reduced sunlight slow their degradation and threaten consumers at the top of the food chain. It appears that many contaminants are being transported to the arctic from other regions. Several mechanisms for bringing contaminants to the arctic have been identified. In winter, air currents bring air over the pole from the industrialized east that arrive in the north as "arctic haze." Large rivers in Russia supply 70 percent of the annual freshwater influx to the Arctic Ocean and may supply large quantities of contaminants as well (Twitchell 1991).

1. Organochlorines

Polychlorinated biphenyls (PCB's) and pesticides and their metabolites are included in a group of chemicals called organochlorines. These substances are insoluble in water, but accumulate in fatty tissues and are biomagnified, so consumers at the top of the food chain, like polar bears, receive PCB concentrations that can be three billion times greater than concentrations in ocean water (Twitchell 1991). Polar bears eat ringed seal fat and skin (Stirling 1974); the parts of the seal where lipophilic organochlorines are concentrated (Norstrom et al. 1988).

Several studies have analyzed organochlorine levels in polar bear tissues to determine their presence (Bowes and Jonkel 1975, Lentfer 1976, Norstrom et al. 1988.). Bowes and Jonkel (1975) studied PCB's and total DDT contamination in polar bears in the Canadian Arctic from 1968 to 1972 and found mean PCB levels ranged from two to eight milligrams/kilogram in fat and muscle, while total DDT levels were 10 times less.

Lentfer (1976b) sampled bears from the Alaskan populations in 1970 and 1972, and found levels that were lower but comparable to Bowes and Jonkel (1975). Norstrom et al. (1988) tested polar bear tissues in 12 biogeographical zones between 1982 and 1984 and found levels were highest in bears from lower latitudes and lowest in bears from the high Arctic and were higher in the east than in the west. This is consistent with atmospheric currents from mid-latitude European and North American sources of contaminants. Between 1969 and 1984, DDT metabolites levels decreased and chlordanes increased (Norstrom 1988).

Polar bear offspring can receive organochlorines through their mother's milk. Female polar bears with dependent young often need their fat reserves to produce milk. In one sample of polar bear milk, PCB levels were 18.0 micrograms/gram lipid. Two cubs receiving this milk had PCB levels in muscle of 18.6 and 80.6 micrograms/gram lipid. Polar bear milk is 31 to 32 percent fat (Cook et al. 1970) and high levels of PCB's measured in young cubs indicates that PCB's are passed to cubs through milk (Bowes and Jonkel 1975).

PCB levels varied with age. In general, the youngest bears sampled had relatively high levels that declined after a few years, and then in a few cases increased again (Bowes and Jonkel 1975). PCB levels also varied with geographical location in the Canadian arctic and subarctic. Bears from the east had accumulated more PCB and DDT than bears from the west (Bowes and Jonkel 1975.)
Organochlorines are known to alter levels of reproductive hormones and cause reproductive failures. Apparently some organochlorines are capable of mimicking estrogen and combining with estrogen receptors to cause malfunctions in the reproduction process (Colborn et al. 1993).

2. Mercury

1000

Most mercury in the arctic appears to be from natural sources (Eaton and Farant 1982), although there is increasing evidence that man-made mercury is reaching the arctic in increased concentrations, via the atmosphere (Weiss et al. 1971, Slemr and Langer 1992).

Polar bears from the Beaufort Sea had seven times more mercury in their liver tissue and four times more mercury in their muscle tissue than did bears from the Chukchi Sea. Polar bears from the Beaufort Sea also had higher concentrations of mercury than bears from northeastern Canada. The differences in the concentration of mercury in bears from different locations support the theory that polar bears occur in somewhat discrete subpopulations (Manning 1971, Lentfer 1975b, Wilson 1976). However, dietary differences may also account for certain mercury patterns (Norstrom 1993).

Since polar bears eat mostly ringed seals, the Beaufort Sea food chain must accumulate mercury at a higher rate. It may be that ringed seals in the deep water of the Beaufort Sea feed more on pelagic vertebrates, whereas seals in the shallower Chukchi Sea feed on the pelagic vertebrates and benthic invertebrates.

Mercury is considered one of the most toxic metals because it rapidly biomagnifies in food webs. Metallic mercury is relatively insoluble and therefore not as toxic as methyl mercury compounds that predominate in fish. Effects of methyl mercury may occur slowly over a prolonged period and cause disorders of the central nervous system, congestion and degeneration of lung tissue, increased blood pressure, heart palpitations, anorexia, digestive problems, necrosis of heart and digestive tissue, and serious liver and kidney damage (ATSDR 1992). Some marine mammals have been shown to use selenium to de-methylate mercury and store it in a less toxic form (Koeman et al. 1975).

3. Cadmium and Other Heavy Metals

Other heavy metals (lead, cadmium, copper, zinc, and silver) are arriving in the arctic by wet and dry atmospheric deposition (Delmas 1986). Elevated cadmium levels have been found in several marine species. Walrus from the northeastern Bering Sea have high levels of cadmium in kidney tissue (Taylor et al. 1989, Warburton and Seagars 1993). Bears from the Canadian Arctic had cadmium concentrations of 0.6 to 2.3 milligrams/kilogram in liver tissue (Norstrom et al. 1986), which was comparable to bears from Svalbard reported by Norheim et al. 1992). Cadmium has been implicated in growth retardation, anemia, testicular damage, hypertrophy of the heart, and renal disfunction (Eisler 1985).

4. Radionuclides

The potential contribution of contaminants from Siberian arctic waters and the Gulf of Anadyr is unknown. However, recent disclosures regarding the sinking of radioactive wastes in arctic watersheds and coastal waters (Monastersky 1993), as well as previous accidental releases of nuclear fission products to the atmosphere, indicate the need to evaluate impacts of radionuclides in arctic species. Of the radionuclides, radiocesium is particularly dangerous because it dissolves in water and is stored in biological tissues (Monastersky 1993). Plutonium has been introduced to the marine environment through nuclear waste dumping, discarded nuclear powered submarines, and weapons testing. Plutonium is potentially very dangerous because it is retained for long periods in certain tissues, including lungs and bone (Brisbin 1991).

Perturbation of the Arctic environment from radionuclides may be the most serious to polar bears and their habitat.

5. Other Toxics

In addition to the potentially toxic substances that are being transported to the arctic by air and water currents, there are several substances that are used by humans in the arctic that are dangerous to polar bears. Ethylene glycol, is a common industrial solvent, coolant, and anti-freeze agent and is used widely in the Arctic.

In 1988, a dead female polar bear was found on a barrier island in the Beaufort Sea. The cause of death was determined to be ingestion of ethylene glycol mixed with rhodamine B. Rhodamine B is a pink dye used to mark roads and runways on snow and ice and was probably mixed with ethylene glycol for a solution that could be ready to use even when stored outdoors in winter.

The source of the toxic solution was not found but may have been an improperly stored barrel or a spill. Propylene glycol would be an excellent substitute for industrial needs and it is not toxic to wildlife (Amstrup et al. 1989).

E. Global Warming and Depletion of the Ozone

Climatic warming is predicted to occur over the next 50 to 100 years due to the increasing concentrations of greenhouse gases in the atmosphere. Most models predict that the greatest warming will occur in the polar and subpolar regions (Revkin 1989). An obvious result of warming in the arctic would be a reduction in sea ice. Even a moderate rise in temperature could result in a 50 percent decrease in sea ice cover.

Sea ice is a critical component of polar bear habitat because it provides a hunting platform, allows pregnant females to reach land dens and provides a platform for ice dens and long range movements. Ice is also critical substrate for ringed seals giving birth. Large annual variations in distribution and abundance of sea ice are common, and affect reproduction and survival of both polar bears and seals (Stirling et al. 1976, Stirling et al. 1982, Smith and Stirling 1978, Smith et al. 1991).

Stirling and Derocher (1993) speculated that global warming could affect polar bear hunting success by limiting access to seals, by a reduction in seal abundance or distribution, and by altering productivity of the marine ecosystem. The populations most likely to be impacted by the first effects of warming would be those in the southern extent of the range. For example, in Hudson and James bays, Canada, polar bears spend approximately four months fasting on shore waiting for ice to form so they can hunt seals. Pregnant females enter maternity dens immediately after this fast and fast for an additional four months (Stirling et al. 1977). Prolonging this fast could quickly result in nutritional stress that could lower reproductive rates and reduce cub survival. When bears can no longer put on enough fat to survive the lengthening ice-free season, human-bear interactions will become more frequent and intense as hungry bears begin looking to humans and their refuse for food. Eventually, polar bears in the southern range must either move north or perish.

Initially, in the High Arctic, sea ice could become less consolidated and more habitable for ringed seals. What was prime southern ringed seal habitat in Alaska could be invaded by less pagophilic seals, like spotted seals (*Phoca largha*) and harbor seals (*P. vitulina*). Some researchers believe that diseases that cause mass mortalities of seals (e.g. phocine distemper) may become more prevalent as the arctic waters warm (Lavigne and Schmitz 1990). While climatic warming could initially benefit polar bears at the highest latitudes, eventually, if ice cover became seasonal, bears could experience the same fate predicted for the Hudson Bay population.

Concomitant with increasing greenhouse gasses, the protective ozone layer is decreasing. Without this protection, primary production in the Arctic Ocean may be inhibited. A reduction in primary productivity has been documented in the Antarctic marine system during a time when the ozone decreased by 50 percent (Smith et al. 1992).

F. Human Population Growth within Polar Bear Habitat

1. North Slope Borough

The North Slope Borough (NSB) was established in 1972 and includes 90,000 square miles of northern Alaska and eight communities. Barrow is the largest community with 58 percent of North Slope residents. The remaining NSB villages in descending order of population are Point Hope, Wainwright, Nuiqsut, Anaktuvuk Pass, Kaktovik, Atqasuk, and Point Lay (Harcharek 1993).

The population of the NSB grew from 3,097 in 1970 to 5,979 in 1990, a 93 percent increase. From 1980 to 1990, the population grew by 42 percent from 4,199 to 5,979.

Projections for future population growth are based on several assumptions regarding North Slope economics. The general assumption is that Borough revenues will decline in the future, reducing employment opportunities. It is predicted that as non-natives lose their employment they will leave the Borough, but that even without employment Natives will stay. The NSB Planning Department's mid-range population estimate is 6,572 for the year 2,000 and 7,056 for the year 2010 (Harcharek 1993).

2. Northwest Arctic Borough

The Northwest Arctic Borough (NAB) was organized in 1986 and encompasses approximately 39,000 square miles of northwestern Alaska, including 300 miles of coastline. There are 11 communities, the largest of which is Kotzebue. As of the 1990 census, 6,000 people were living in the NAB, 80 percent of which were Inupiat Natives (Northwest Arctic Borough 1994).

3. Bering Strait Coastal Resource Service Area

The villages in the Bering Strait region are not incorporated into a borough, but are included in the Bering Straits Coastal Resource Service Area (CRSA) formed to implement a Coastal Management Plan under the Coastal Zone Management Act. More than half of the people living in this region, live in Nome (population 4,184 in 1993). Although Nome lies within the CRSA boundary it is treated separately and has its own Coastal Management Plan. Gambell and Savoonga, on St. Lawrence Island, are the next two largest villages in the CRSA with populations of 566 and 541, respectively. Shishmaref, located on a barrier island just offshore of the Seward Peninsula, is of similar size with a population of 533. Populations in the remaining villages in this area range from 145 to 445.

4. Potential Effects of Increased Subsistence Hunting

Population increases may not have a direct impact on polar bear habitat, since polar bears spend most of their time on sea ice and most maternity dens on land are not located adjacent to villages. However, subsistence hunting could increase and have a potential impact on polar bear populations. Increased human population may also result in the following: increased activity along coastal areas and the potential for increased disturbance of dens; increased adverse bear/human interactions which may result in lethal take of problem bears; and increased access of bears to contaminants such as petroleum products industrial solvents or other waste products.

Although polar bears are not considered a subsistence species by Inupiat people, polar bears are often killed while hunting other species used for subsistence (C. Brower, North Slope Borough, pers. comm.). Several factors besides an increase in the human population could influence subsistence hunting pressure: 1) people may purchase boats, snowmachines, guns, and ammunition, making hunting more efficient; and 2) hunters with less cash for supplies may have more time and incentive to hunt since food at the village store is expensive.

In 1972, with the implementation of the MMPA, sport hunting of polar bears ceased. Unrestricted Native subsistence hunting of non-depleted stocks is allowed as long as it is conducted in a non-wasteful manner and conforms to Section 101(b). Under the MMPA, the harvest can only be restricted if the polar bear population is determined to be depleted.

The number of polar bears harvested each year by subsistence hunters varies due to several factors. Ice conditions can cause bears to concentrate along the coast, which increases their availability to hunters. Carcasses from subsistence activities, especially bowhead whales, also attract polar bears into Native hunting areas.

Pregnant females and females with cubs tend to use coastal areas most, making them vulnerable to hunters. Harvest levels of females are of particular importance because any overharvest can threaten the ability of the population to sustain itself. In 1973, five circumpolar nations negotiated the Polar Bear Agreement. The Polar Bear Agreement includes a resolution that requests governments to prohibit the taking of cubs, or females with cubs, and hunting in active denning areas. In 1985, the Polar Bear Specialist Group (an affiliation of the IUCN) passed a resolution asking for voluntary restrictions to be selfimposed upon the users of polar bears in Alaska and Canada. The Fish and Game Management Committee of the NSB responded by asking Alaska hunters not to shoot cubs or females with cubs. In January 1988 they formed a cooperative agreement with the Inuvialuit Game Council called the NSB Inuvialuit Game Council Agreement (NSB/IGC) to ensure that the harvest of the Beaufort Sea subpopulation does not exceed the replacement rate they established. The Agreement provides:

- Harvest limits
- Protection measures for females and cubs
- Protection measures for pregnant females and denning bears
- A management system to regulate the number of polar bears harvested to comply with harvest limit allocations
- A reporting system to collect information from harvested polar bears
- Protection of important polar bear habitat

In the first year of the Agreement, Alaska hunters harvested 58 bears, which was 20 over the allocated amount. However, the number of females harvested was within the allocation limits. In the second year, the Alaska harvest was 24, 14 less than the allocated amount. The NSB is working to educate hunters regarding the intentions and conditions of the NSB/IGC, in order to gain their cooperation and support (Nageak et al. 1991)

The NSB/IGC provides a framework of protection of polar bears within the jurisdiction of the NSB. If such cooperative management agreements which rely upon voluntary compliance and Native self-regulation are successful, increases in the human population should not threaten the polar bear population.

A comparable conservation agreement does not currently exist for villages in the northwestern part of Alaska. However, talks are underway between the respective governments and Native organizations of Russia and the U.S. (Alaska). The Alaska Nanuuq Commission, formed in June 1994, is the organization representing Alaska Native polar bear interests.

G. Effects of Industrial Development on Polar Bears

1. Disturbances to Maternity Dens

/264200

Threats to polar bears from winter activities, related to oil exploration and production, include disturbance to maternity dens due to noise or activity around the den site and possible physical damage to dens in the path of a seismic survey or roadway. Although data is limited, 10 of 12 females in dens were tolerant of exposure to aircraft, over-snow vehicles, and foot traffic (Amstrup 1993). Of seven known dens disturbed by oil related activities, one responded by abandoning her den.

Although Amstrup (1993) is not a quantitative study of disturbance and related behavior, it does demonstrate variation in the behavioral responses of polar bears. The responses range from normal denning and emergence behavior, to possible early departure from dens, to possible increased activity levels at dens, to abandonment.

Timing of the disturbance may be a factor in whether or not a den is abandoned. Females appear to be more easily disturbed in the fall when they are searching for or excavating a den than when they are closer to or post-partum (Belikov 1976). It may not be a coincidence that when dens are open bears experience higher noise levels, which may equate to greater disturbances.

2. Displacement of Ringed Seals

Some oil and gas activities have the potential to affect polar bears indirectly by displacing ringed seals. A study conducted on the shore-fast ice in the Beaufort Sea examined the behavior of radio-tagged seals exposed to various human activities, and the rates of abandonment of lairs and breathing holes at various distances from human activities (Kelly et al. 1988).

The responses of individual ringed seals were quite variable. Some lairs and breathing holes remained active alongside seismic survey lines, snowmachine trails, gravel island construction, and helicopter flight paths, while others were abandoned quickly when exposed to noises. Some of this variation may be explained by differences in the weather and snow conditions at the time of noise exposure. For example, when the wind speed is high, the background level of noise may mask other noises making the seals appear more tolerant.

Although data were not sufficient to say what critical distances were for specific noise disturbances, fewer active seal structures were found within 150 meters of seismic lines than beyond 150 meters. It also appeared that gravel island construction resulted in seal structure abandonment rates similar to those near seismic lines.

In general, adult ringed seals displaced from oil industry activity are not likely to incur any increase mortality due to moving away from the noise source. Dependent seal pups are the most vulnerable component of the population to such disturbances. Disturbances that occur after pups are born but before they are weaned could result in abandonment of the pup, or the female may take the pup to an alternate lair (Smith and Stirling 1975). If the pup were moved before it had acquired an adequate blubber layer its core temperature would lower after exposure to sea water. The pup would then use large reserves of energy to dry (Taugbøl 1982).

Precisely how activities impact ringed seals and consequently affect polar bears is unclear. Seismic work and island construction over a large area or long period could result in decreases in ringed seal populations or change their distribution. Such changes could have detrimental affects on polar bears.

3. Bear/Human Interactions

Polar bears are attracted to industrial and other sites of human activity because of their fearlessness, and propensity to investigate novel objects, noises, and smells (Stirling 1988). Subadults learning to hunt are more likely to be hungry and thus attracted to camps and villages. Subadult bears are also less likely to move on if a food source is available (Fleck and Herrero 1988, Stirling 1988).

Attracting bears to industry facilities invites interactions between bears and humans that threaten the safety of both. Offshore drilling structures that are bottom-founded or anchored for the winter can create polynyas downstream of the direction of ice movement. These polynyas may attract seals or make seals more accessible to polar bears (Stirling 1988). The workers on bottom-founded drilling platforms and drillships are relatively secure from polar bears. Work performed on sea or on islands makes workers vulnerable to polar bears.

Bears have killed several people at oil industry sites in Canada (Fleck and Herrero 1988) and caused work stoppages. They have also damaged equipment including lights, snowmachines, and helicopters (Shideler 1993).

0600

4. Displacement of Bears

Icebreaker traffic and marine seismic activities could displace polar bears from ice floes in summer. Bears may abandon floes by swimming to land or other ice. For most bears, swimming long distances is not problematic (Stirling 1974). However, for cubs-of-the-year the energetic demands may exceed what the cubs have been able to store (Blix and Lentfer 1979).

While some bears appear to be attracted to human activities, others may be displaced from feeding, denning, and traveling areas in all seasons that disturbances are present.

5. Oil Spills

Oil spills have occurred in the Arctic, however no field studies have been conducted to determine the effects of oil on polar bears. One captive study (Øritsland et al. 1982) has been conducted, but most of the potential effects have been extrapolated from what is known about polar bear physiology and life history.

In arctic environments, the fate of an oil spill is influenced by the presence of ice. Broken ice promotes both oil dispersion and mousse formation. Oil spilled under winter ice tends to accumulate at the ice edge, in leads, polynyas, and seal breathing holes, while some may pool and freeze to the underside of the ice. Oil spilled in this environment tends to persist and move in association with the ice (Neff 1990).

Several facets of polar bear behavior increase the likelihood that they would contact spilled oil in the arctic environment during the period of ice cover. Their hunting behavior includes swimming between floes and along leads, submerging their heads to grab seals from leads and breathing holes. Their curious, fearless, and wide ranging nature tend to bring polar bears close to the centers of activity and possibly to the source of an oil spill.

Polar bears are fastidious in their grooming habits, even stopping during a meal to wash their paws and face in water (Stirling 1974). In captivity, three polar bears introduced to oil on a pool of water were extremely reluctant to enter it, even for food (Øritsland et al. 1981). In this study polar bears appeared to be able to detect oil on water and were reluctant to enter the water, perhaps to avoid fouling their fur.

A study to test the affects of oil on the insulative properties of fur, and the resulting changes in metabolic rate found that the metabolic rates of the test bears increased 27 to 86 percent within 24 hours. Within several hours of oiling, skin temperature became elevated, which exacerbated heat loss, and shivering was observed (Hurst et al. 1982).

Polar bears that were forced into oiled water emerged as soon as they were allowed and began grooming (Øritsland et al. 1981). Ingested oil caused vomiting and diarrhea and evidence of developing kidney and liver failure. Nasal passages were acutely inflamed and hydrocarbon levels were high in bile and urine as late as four or five weeks later (Englehardt 1981). Levels of hydrocarbons remained elevated in kidney, brain, and bone marrow tissues four weeks after oiling. All three bears developed anemia two to five weeks after immersion. One bear died about a month later. Although bears were forced to enter water in this study, bears have voluntarily contacted and ingested petroleum products such as oil or gasoline. Polar bears may also become oiled indirectly by scavenging oiled carcasses.

6. Illegal Hunting

Gall bladders and hides from polar bears are valuable on the world market, therefore the potential exists for illegal hunting in Alaska. Other items such as teeth, skulls, claws, and baculum may be considered valuable and offer enticement to illegal hunting. Illegal hunting is not an issue at oil filed development sites since private firearms are banned, only authorized persons can gain surface entry to the fields, and trained security forces patrol the fields to investigate unusual activity.

VIII. LAND OWNERSHIP OF HABITAT

Land ownership and land leasing status influence conservation and protection of polar bear habitat. Land ownership within the range of polar bears in Alaska is comprised of Federal, State, Native, and private lands (Figure 14).

The marine environment is under state and federal jurisdiction. State jurisdiction extends from the mean high tide level seaward three miles, and includes offshore barrier islands. Federal jurisdiction extends beyond the three-mile limit. Areas of ambiguity regarding jurisdictional claims exist in some instances. Several legal actions are in litigation and are pending.

Although not a landowner, industry leases land for mineral rights under federal and state lands and waters, and is a major land user.



Figure 14. Alaska land status.

IX. EXISTING HABITAT PROTECTION MEASURES, TREATIES, LAWS, AGREEMENTS

Management and protection of polar bears is addressed either directly or indirectly in numerous international laws, treaties, and agreements, and by U.S. Statutes and other authorities. The following is a brief summary of the six most significant documents related to protection of polar bear habitat:

A. Agreement on the Conservation of Polar Bears (Polar Bear Agreement)

The purpose of the Polar Bear Agreement is to protect the polar bear, its habitat, and the ecosystems of which it is a component. Particular emphasis is placed on protecting denning and feeding habitat and migration patterns. Five nations are signatories to the Agreement: Russia; Canada, Denmark, Norway, and the United States. 1005

Whether the treaty has been implemented fully has been a matter of interpretation and some controversy. Congressional floor statements during reauthorization of the MMPA in 1994 indicate Congresses intent that habitat protection terms of the Polar Bear Agreement be fully implemented through the MMPA.

B. Marine Mammal Protection Act of 1972 (MMPA) as Amended

The primary objective of the MMPA is to ensure the management of marine mammals to maintain the health and stability of marine ecosystems, and to maintain population stocks as a significant functioning element of the ecosystem. Maintaining each population/stock within levels determined to be optimum sustainable populations considering the carrying capacity of the habitat is also an objective.

The MMPA also advises that essential habitat be a focus of attention and efforts should be made to protect rookeries, mating grounds, and areas of similar significance from the adverse effects of man's actions. Furthermore, attempts to minimize adverse impacts from accidental, unintentional take of polar bears as a consequence of people engaging in other activities should be undertaken.

The 1994 MMPA amendments sought to clarify that the Secretary has the authority to protect habitat.

C. Outer Continental Shelf Lands Act (OCSLA) as Amended

OCSLA established Federal jurisdiction over submerged lands on the Outer Continental Shelf seaward of the State boundaries (3-mile limit) in order to expedite exploration and development of oil/gas resources on the OCS. Implementation of OCSLA is delegated to the Minerals Management Service (MMS) of the Department of the Interior. OCS projects which could adversely impact the Coastal Zone are subject to Federal consistency requirements under terms of the CZMA, as noted above. OCSLA also mandates that orderly development of OCS energy resources be balanced with protection of human, marine and coastal environments.

D. Coastal Zone Management Act (CZMA)

The CZMA was enacted to "preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation's coastal zone." This is a State program subject to Federal approval. The CZMA requires that Federal actions be conducted in a manner consistent with the State's CZM plan to the maximum extent practicable. Federal agencies planning or authorizing an activity that affects any land or water use or natural resource of the coastal zone must provide a consistency determination to the appropriate State agency. The North Slope Borough and Alaska Coastal Management Programs have operated effectively to assist in protection of polar bear habitat in recent times.

E. Alaska National Interest Lands Conservation Act (ANILCA)

This Act set aside the Arctic NWR. One of the establishing purposes of the Arctic NWR is to conserve polar bears. Most of the Arctic NWR has been declared Wilderness and is therefore off limits to oil/gas development. However, the coastal plain of Arctic NWR (Section 1002 designated lands), which provides important polar bear denning habitat, could be opened for development by Congress.

F. Marine Protection, Research and Sanctuaries Act

This Act was passed in part to "prevent or strictly limit the dumping into ocean waters of any material that would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities."

X. STRATEGY IMPLEMENTATION

Regulations for "Taking of Marine Mammals Incidental to Oil and Gas Exploration, Development, and Production Activities in the Beaufort Sea and adjacent Northern Coast of Alaska" were made effective for an 18-month period beginning December 16, 1993 and ending June 16, 1995.

Within this 18-month period, the Service is directed to "... develop and begin implementing a Polar Bear Habitat Conservation Strategy pursuant to the conservation planning process in Section 115 of the Marine Mammal Protection Act, and in furtherance of the goals of Article II of the 1973 international Agreement on the Conservation of Polar Bears."

This section proposes to provide for the conservation of polar bear feeding and denning habitats throughout Alaska, by designating them Important Habitat Areas. These generalized geographic habitat areas have demonstrated past polar bear dependence and are considered to be essential to the future welfare of populations. Further, the identification and future protection of these habitat values in these general areas is consistent with Article II of the Polar Bear Agreement. This Section also proposes several initiatives in furtherance of the goals of the international Agreement on the Conservation of Polar Bears. These initiatives include proposed development of a Native Village Communication Plan, a Polar Bear Advisory Council, and a number of International Conservation Initiatives.

The "take" regulations⁴, in requiring the development of the Habitat Conservation Strategy for polar bears, provide for the Service to "...identify and designate special considerations or closures of any habitat components to be further protected." The Service is not proposing closure of any of the areas delineated in the Strategy. However, it is possible that specific conditions of LOAs may result in prohibition of specific activities during specific periods or within specific areas to avoid a greater than negligible impact on polar bear use of identified habitats.

Pursuant to this directive, the Service is herewith identifying Important Habitat Areas for the conservation of important feeding and maternity denning. It is in these areas that there is a high probability and reasonable likelihood of incidental take⁵ of polar bears.

⁴Existing authorities within Section 101(5)(A) of the MMPA allow the Service to prescribe regulations setting forth the permissible methods of taking which result in the least practicable adverse impact to species or stock, and its habitat. Such means may include seasonal or area closures. The Secretary is further authorized to withdraw or suspend the permission to take marine mammals if these regulations, including methods of taking, monitoring, or reporting are not being substantially complied with, or that taking is having, or may have, more than a negligible impact on the species or stock concerned [50CFR Part 18, §18.27].

⁵Take, as defined by the MMPA, means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

Extension of these regulations for the full five-year term authorized by the MMPA will be contingent upon an affirmative finding regarding this Strategy by the Secretary of the Interior.

A. Measures for the Conservation of Important Polar Bear Feeding Habitat

1. Recurring Leads and Polynyas

Open water areas in pack ice, called leads and polynyas, provide important feeding habitat for polar bears throughout the winter and in early spring. These areas attract seals, the bear's major food source. Recurring leads and polynyas occur every year in certain areas where wind, ocean currents and the physical effects of land masses combine to create open water areas. The shape, size and exact location of leads and polynyas varies, but general locations are predictable.

Recurring leads and polynyas are less dependable in the Beaufort Sea than in the Chukchi and Bering seas, but usually occur parallel to the coast. Immediately north and east of Barrow, polar bears feed on seals and walrus along a recurring lead lying one to ten miles offshore. Another recurring lead, five to thirty miles offshore between Brownlow and Demarcation Points, begins to form in November and generally remains open until April. Other leads include: 1) Chukchi lead; 2) Pt. Hope polynya; 3) Shishmaref-Cape Thompson lead, and; 4) St. Lawrence Island polynya. Native hunters report polar bears hunting and feeding on ringed seals along this lead.

Recurring leads and polynyas are important polar bear feeding habitats which are identified for conservation under the regulation governing incidental take of marine mammals (Figure 5).

Recurring leads and polynyas are hereby designated Important Habitat Areas to insure that they receive additional consideration during oil and gas exploration, development, and production. To comply with the requirements of the "take" regulations which allow the incidental, but not intentional take of small numbers of polar bears, oil and gas activities in Important Habitat Areas in the Beaufort Sea are subject to a Letter of Authorization (LOA) from the Regional Director of the Alaska Region. LOAs may specify: 1) whether activities are authorized or prohibited; 2) the type of activity authorized; 3) the locations and time frame when the activity is authorized, and; 4) other terms or conditions appropriate to conservation of polar bears.

2. Carcass Feeding Areas

Marine mammal carcasses represent tons of potential food for polar bears. Areas along barrier islands and along the Chukchi and Beaufort sea coasts have been identified as important carcass feeding sites. Native hunters have reported polar bears feeding on the carcasses of walrus, gray whales, seals, and hunter-harvested bowhead whales during fall and winter (September through March) along the coast and barrier islands.

Native hunters report that carcasses are distributed both randomly and at predictable locations. Marine mammal carcasses consistently appear each year along certain reaches of shorelines, apparently as a result of prevailing winds, tides, or currents, and the species range. For example, limited numbers of walrus and/or walrus carcasses are found east of point Barrow. The Service anticipates marine mammal carcass sites to occur predominantly along the Chukchi and Bering sea coasts, but some are expected along the outer edge of barrier islands of the Beaufort Sea. The Service proposes to annually survey the Bering, Chukchi, and Beaufort sea coasts during the period coinciding with the extension of the "take" regulations to determine the location of important marine mammal carcass sites.

Identified carcass feeding sites are hereby designated Important Habitat Areas to insure that they receive additional consideration during oil and gas exploration, development, and production. Each fall, the Service will prepare an annual notice with a map showing the location of these Important Habitat Areas.

For activities proposed from September through March, Industry should consult with the Service to determine if they occur within any Important Habitat Areas.

To comply with the requirements of the "take" regulations which allow the incidental, but not intentional take of small numbers of polar bears, oil and gas activities in Important Habitat Areas in the Beaufort Sea are subject to a Letter of Authorization (LOA) from the Regional Director of the Alaska Region. LOAs may specify: 1) whether activities are authorized or prohibited; 2) the type of activity authorized; 3) the locations and time frame when the activity is authorized, and; 4) other terms or conditions appropriate to conservation of polar bears.

B. Measures for the Conservation of Important Polar Bear Maternity Denning Habitat

Mainland denning sites are important habitat for maternity denning, although variable snow conditions determine site suitability, and it is not predictable where mainland dens will be found. Location of maternity dens on moving pack ice is even less predictable. Den locations appear to be influenced by snow conditions and topographic features. Fidelity by individuals to specific sites has not been demonstrated, however a trend for increased use of land habitats versus ice habitats has been demonstrated in recent years.

Certain geophysical features provide more favorable snow conditions than others, such as barrier islands, which consistently attract denning bears. Other habitat types that attract pregnant females are cut banks near the mouths of coastal rivers and coastal bluffs. These features trap deep drifts of snow, which are a denning requirement.

East of Point Barrow, bears den in snow drifts near the Kachiksuk Bluffs west of Dease Inlet, at Point Poleakoon in Smith Bay; at the mouths of Nechelik and Kuprigruak channels of the Colville River; and in the Oliktok Point area. The heaviest denning along the Beaufort Sea coast occurs throughout the Arctic NWR coastal plain. The Niguanik Hills, Pokok Bluffs, and other sites located along banks of most of the streams bisecting the coastal plain provide essential habitat values. A number of dens have been located offshore on pack ice immediately adjacent to the refuge. The Arctic NWR was not included in the petition to the Service for development of the Beaufort Sea incidental take regulations submitted by 14 oil and gas companies since it was not open to exploration, development or production. Other areas important to terrestrial denning occur to the west of the Arctic NWR. Barrier islands are identified as Important Habitat Areas for their use by denning bears. Islands with a history of multiple dens include: Flaxman, Pingok, Cottle, Thetis, and Cross Islands. Other areas with documented denning use are the Sagavanirtok River Delta, and the Shaviovik-Bullen Point areas. West of Point Barrow near Wainwright, bears den along the Kuk River and tributary drainages, uplands, coastal areas and barrier islands near Icy Cape, and areas near Point Belcher. Near Point Lay bears den in the Kukpowruk River drainage, coastal areas near Cape Sabine, Cape Beaufort, Cape Dyer, and Cape Thompson.

Important terrestrial and nearshore maternity denning areas are hereby designated Important Habitat Areas to insure that they receive additional consideration during oil and gas exploration, development, and production (Figure 15). Areas delineated in Figure 15 are based upon their higher frequency of use over time. On-land bear dens are found generally within 25 miles of the Beaufort and Chukchi sea coasts. All lands within this area are generally considered potential polar bear denning habitat. Thus, Figure 15 reflects only a portion of this potential denning habitat. Polar bears may den in these areas also, particularly acknowledging the increased trend toward terrestrial denning. The importance of these areas for denning should not be diminished by designation of IHAs. The information used to delineate these



1987 V.

1000

1000

3

20-X

1000

a,

Mary ...

Sec.

割

Figure 15. General location of important terrestrial and nearshore maternity denning areas in Alaska.

March 1

R A

89

큀

and the second

areas comes from research conducted by the Alaska Department of Fish and Game (Lentfer 1974a) and the Service (Amstrup 1988, Amstrup and Durner 1992a, Amstrup and Gardner 1994) and information provided by Native hunters. To comply with the requirements of the "take" regulations which allow the incidental, but not intentional take of small numbers of polar bears, oil and gas activities in Important Habitat Areas in the Beaufort Sea are subject to a Letter of Authorization (LOA) from the Regional Director of the Alaska Region⁶. The decision to request a LOA is industry's although operators are liable for incidental takes in the absence of a LOA. LOAs may specify: 1) whether activities are authorized or prohibited; 2) the type of activity authorized; 3) the locations and time frame when the activity is authorized, and; 4) other terms or conditions appropriate to conservation of polar bears, such as the terms of conditions appropriate to conservation of polar bears, such as the terms of conditions appropriate to conservation of polar bears, such as the terms of the term

C. Measures to Further the Goals of the Agreement on the Conservation of Polar Bears

1. Village Communication Plan

Information provided by Native hunters knowledgeable of polar bear habitat was used during development of the Strategy. In an effort to continue communication with Native groups regarding the development and implementation of the Strategy, the Service proposes to visit affected communities to communicate the purpose, intent, and contents of the Strategy in public meetings. A formal communication plan will be informative and explain what the Service is doing and provide means of continued two-way communication and input into the management process. Local knowledge, especially from village elders, will be included when mitigative measures are evaluated. It will also reflect a continuing effort by the Service to work with the Alaska Nanuuq Commission and village residents for the long term protection of the Arctic environment. Another example would be to foster public education, especially in the schools concerning detection, avoidance, prevention of encounters, and human behavior around polar bears or if an encounter/attack were to occur.

Visits by the Service will be made in cooperation with the Alaska Nanuuq Commission. Service personnel will also meet individually with hunters who participated in development of the Strategy. Discussions will include how local knowledge was used in Strategy development and how it can best be accessed, stored, and used in the future.

⁶The Beaufort Sea Incidental Take Final Rule states, "<u>The Arctic National Wildlife Refuge is excluded</u>." Section 1003 of ANILCA states, "Production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas from the range shall be undertaken until authorized by an Act of Congress."

2. Polar Bear Advisory Council

The Service proposes to establish and support a Polar Bear Advisory Council. Approval and establishment of this Council will be in accordance with requirements of the Federal Advisory Committee Act. It will provide a more effective mechanism for providing public comment on Federal regulatory or management actions. This council will include representatives from the respective interested publics including industry, Native organizations (such as the Alaska Nanuuq Commission), conservation organizations, federal and state agencies, and other interested groups or individuals. The Service would like participation by as broad a spectrum of interested parties as possible with a bonafide interest in polar bear conservation, as well as ensuring efficient and effective operation of the Council.

The Council will have input into decisions concerning polar bear habitat conservation measures which affect the various stakeholders. The Council will be advisory in nature with the Service ultimately responsible for management decisions under the authorities provided within the MMPA for conservation of trust resources of local, national, and international interest. However, the advices and recommendations of the Council will be a matter of public record and the Service anticipates that they will provide important input and guidance to Service decisions on key issues. Meetings will be held at least once each year.

The roles, responsibilities, and composition of the council will be formally defined through a cooperative agreement. Potential roles include: review of draft incidental take regulations; input to development of LOAs for polar bear habitat protection, including specific operator terms or conditions; annual review of the results from monitoring programs; development of plans of cooperation with subsistence users; development of conservation partnerships or local agreements to conserve polar bear habitat; and review of the Service's implementation of the "Conservation Plan for Polar Bears in Alaska."

The issues of polar bear patrols and disposal of harvested whale carcasses are also topics that could be appropriately dealt with by the council.

3. Important Maternity Denning Areas in the Arctic National Wildlife Refuge

The Arctic NWR contains the greatest known concentration of denning polar bears in Alaska. During a 11-year study in the Beaufort Sea from 1981 to 1992, forty-four dens were located on or near the mainland of the coast of Alaska and Canada. Twenty (45 percent) were found within the August 10, 1995boundaries of the Arctic NWR, and 15 (35 percent) were found within the coastal plain 1002 area. Important maternity denning areas on the coastal plain of the Arctic NWR are included in Figure 15.

Approximately 1.5 percent of the population were marked annually, thus demonstrating the importance of this area for denning. In the later years of the study, the proportion of dens on land versus pack ice was higher than in the earlier years of the study, indicating a possible trend for bears to seek more land habitats for denning. Currently between 20-30 dens are believed to occur in the Arctic NWR during a given year.

Purposes for which the Arctic NWR was created include, "...(I) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, musk ox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons, and other migratory birds and Arctic char and grayling; (ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats."

Section 1003 of ANILCA states, "Production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas from the range shall be undertaken until authorized by an Act of Congress." The Arctic NWR will continue to be managed in a manner consistent with the purposes for which it was established. This will be done with particular regard for the important maternity denning areas on the refuge that are repeatedly used by polar bears. Any change in the current status of the Arctic NWR may necessitate a legal evaluation on the U.S. compliance with the Polar Bear Agreement. In addition, since this Strategy is premised on the assumption that the status of the Arctic NWR will remain as it is today, any change in the status will require a thorough biological assessment of the proposal and an evaluation of whether it will result in greater than "negligible" impacts to polar bears. If needed, the roles of IHAs, incidental take regulations, the Refuge Administration Act, and many other factors will be thoroughly evaluated from a technical and biological standpoint.

4. International Conservation Initiatives

The Service proposes to coordinate the cooperative conservation efforts set forth in this Strategy at the local, national, and international levels and to provide for permanent protection (long term and sustainable) of important polar bear habitat areas. Upon completion, the Strategy may be used as an example to implement habitat conservation measures internationally through cooperative agreements with Canadian and Russian counterparts and to further identify and protect polar bear habitats through joint initiatives.

The Service will conduct a workshop in 1995 to review the effectiveness of domestic implementation of the 1973 Polar Bear Agreement. The Service will within two years seek to convene the Contracting Parties to review the effectiveness of international implementation of the Polar Bear Agreement (This meeting is dependent upon funding). Habitat protection will be a major focus of these discussions. These meetings will establish the framework for determining future habitat conservation measures.

The Service also plans to promote habitat conservation at the international level through implementation of the United States/Russia Bilateral Agreement. This will involve research to identify important habitats including denning areas and their importance to Alaska polar bear populations.

Habitat protection for polar bears is part of a larger international effort to protect the Arctic environment, under the auspices of the Arctic Environmental Protection Strategy (AEPS) adopted in 1991 by eight Arctic countries. Specifically, the Conservation of Arctic Flora and Fauna (CAFF) is a component of the AEPS and represents an international forum of scientists, resource managers, indigenous peoples, and conservationists who share information on Arctic species and habitats and work together to promote more effective laws and conservation practices for Arctic flora and fauna.

CAFF has initiated a review of the current status of protected areas in their publication, "The State of Protected Areas in the Circumpolar Arctic 1994." This document identifies and maps protected areas in the Arctic and reviews management practices and regulations pertaining to these protected areas. The Arctic Monitoring and Assessment Program (AMAP), a working group under the AEPS is evaluating ringed seals as an indicator species. In addition they are drafting a report on the movement of contaminants through the Arctic food chain which is to include contaminant research findings for polar bears. Additional polar bear information will also need to be incorporated into the newly developing circumpolar mapping initiative and database.

Contents of the Strategy, as appropriate, will be incorporated into this forum at upcoming CAFF conventions. Communication links will be maintained with CAFF to determine future international joint efforts to conserve polar bear habitats.

D. Research Needs

Two areas which require further research were identified during development of the Strategy: 1) habitat use and relative importance of various habitat types, and; 2) the effects of contaminants on polar bears.

1. Terrestrial Habitats

Telemetry data provides den location information on polar bears in the Beaufort Sea. Further research is needed to identify important denning areas, particularly in western Alaska, and determine the physical and habitat characteristics of dens and site selection. The importance of den site selection on cub survival and population recruitment, and the increase of terrestrial dens need to be evaluated. The importance of coastal areas for feeding, and the location, abundance, and availability of marine mammal carcasses to polar bears also requires further study.

2. Ice Habitats

Although remote sensing has been used to assess polar bear ice habitat use, the techniques and technology to determine the spatial and temporal use of dynamic ice habitat by polar bears are still being refined and developed. The relative importance of different ice habitat types to polar bears and seals needs further study.

3. Effects of Contaminants on Polar Bears

The increase in oil and gas exploration, development, and production activities in the Arctic and sub-Arctic regions since 1975, and increases in pollution, raise concerns about the potential effects of heavy metal contamination on marine mammals. Regional differences in the levels of organochlorines in the Canadian Arctic have already been documented. However, relatively little information exists on heavy metal and organochlorine contamination of polar bears in Alaska. Baseline levels of heavy metals and organochlorines in polar bears have been adequately established, therefore determining future trends and sources of contamination through a regular ongoing monitoring system is needed.

4. Detection and Deterrent Techniques

Additional research on detection and deterrent technologies are needed. Recently released military technology formerly restricted to the public should be evaluated for application to polar bear research.

A. Process

Public meetings were held on January 20 and 25, 1994, in Anchorage and Barrow announcing the Service's intent to develop a Habitat Conservation Strategy for Polar Bears in Alaska. Public comment was invited. Additionally, public meetings were held in several coastal communities. Discussions with local residents provided information on polar bear habitat use within the area. The formal public comment period closed on February 11, 1994.

The Service also consulted with ad hoc technical groups and interested parties in meetings which convened in Anchorage on December 17, 1993, and July 1, August 5, and November 7, 1994. On February 28, 1995, at 60 FR 10868 the Service announced the availability of the Draft Strategy and sought review and comment on it. The original 60 day comment period would have expired on May 1, 1995. However, on May 8, 1995, the Service announced that it had extended the comment period 15 additional days (60 FR 22584) in response to specific requests for an extension. Public comment on the Strategy was extensive. The Service on June 14, 1995, extended the final regulations that authorize and govern the incidental, unintentional take of small numbers of polar bear and walrus during year around oil and gas industry operations in the Beaufort Sea and adjacent north coast of Alaska for an additional 60 days through August 15, 1995. The additional time allowed the regulations to continue in effect while the Service completed its evaluation of public comments before announcing a final decision on the draft Strategy.

B. Public Comment

A 75-day public comment period on the draft Habitat Conservation Strategy resulted in letters of comment from 29 organizations and greater than 200 individuals. These comments provide the basis for this summary.

The comments varied greatly and represented widely divergent points of view. Most of the comments from individuals were similar. They requested that the Arctic Coastal Plain be declared a polar bear reserve and advocated stronger protection measures for polar bear habitat. Copies of the comment letters were summarized by issue. The Service's Marine Mammals Management Office, Anchorage, Alaska, maintains the comments on file and specific copies are available upon request. The following is a summary of those comments organized by issue. The organizations or affiliations which commented on the Strategy are listed at the end of this section. Discussion of Comments on the Draft Habitat Conservation Strategy

1. Process of Development of the Draft Habitat Conservation Strategy

Comment: One respondent stated that the Service may have no authority to prepare and implement a Habitat Conservation Strategy for Polar Bears in Alaska, specifically pursuant to the management planning process in section 115(b) of the MMPA.

Response: The Service has the authority to develop management or conservation plans or strategies for species under its jurisdiction to prevent populations from becoming depleted, and with particular obligatory responsibility for those species in a depleted or threatened status as described in Section 115 of the MMPA. By adding Section 115(b) to the MMPA in the 1988 amendments, Congress directed the development of Conservation Plans for certain depleted species. They also noted that other non-depleted species could benefit from such plans. In House Report 100-975, the House stated the purpose of such conservation plans should be to identify the actions needed to restore and maintain marine mammal stocks within Optimum Sustainable Population (OSP) levels. Both the House and Senate (100-592) reports suggested that plans discuss current status, threats, habitat requirements, information gaps, and a strategy for accomplishing research and implementation of management strategies to achieve the goal. The proposed Habitat Conservation Strategy for Polar Bears in Alaska includes these components and is consistent with this advice and intent.

Comment: One respondent stated that the time frame allowed to develop the draft Strategy was compressed in order to meet the permitting schedule of oil companies operating in polar bear habitat, thus resulting in "...insufficient time to reach a reasonable level of understanding between the various perspectives invited to the table." Another responded that the Service's process used to develop the Strategy was flawed and subject to legal challenge because the public was informed after the fact and not involved in the process. This procedure constituted a violation of the Administrative Procedure Act (APA).

Response: The Strategy was linked to the Beaufort Sea Incidental Take Rulemaking (November 16, 1993) following public comment on the draft rulemaking. The intention of including the requirement was to present a cohesive and integrated statewide Strategy for polar bear habitat protection and to relate the incidental take rule to this Strategy. The Service's process to develop the Strategy was similar to that used for many other federal actions. It included: public meetings to announce the Service's intent to develop the Strategy and to solicit input on the contents of the Strategy; several meetings with interested parties including AOGA, ARCO, BP-Exploration, Alaska Nanuuq Commission, North Slope Borough, Audubon Society, Wilderness Society, Defenders of Wildlife, Greenpeace, State of Alaska, Marine Mammal Commission and the Indigenous People's Council for Marine Mammals; and a formal 60-day review period once the draft Strategy was completed (the comment period was then also extended for 15 days). This procedure was entirely consistent with the APA. In fact, the process used to develop the Strategy exceeds requirements set forth in the APA because there is no requirement to provide for public input during the drafting stage.

2. Compliance with the 1973 international Agreement on the Conservation of Polar Bears

Comment: Several respondents stated that the Service has a trust responsibility to provide for a pro-active, strong protection plan to fulfill requirements set forth in the Agreement. They stated that the draft Strategy fails to meet the terms of the Agreement to increase habitat protection because the proposed actions (Letters of Authorization [LOA's] for Important Habitat Areas [IHA's]) are completely voluntary, fail to prohibit industrial activities within IHA's, and are not subject to public involvement.

Response: The 1973 Agreement obligates the parties to protect habitat. The Service believes that the Beaufort Sea regulations, together with the final Strategy, are consistent with this obligation. The only takings anticipated from oil and gas activities are harassment-related, and the habitat precautions adopted in the Strategy will further reduce the risk of lethal take. Even though LOA's are not mandatory most companies involved in the oil and gas industry have voluntarily applied for LOA's. Although there has been some disturbance to polar bears and loss of denning habitat, particularly in the Colville Delta, the southern Beaufort Sea polar bear population has continued to increase. The Service does not believe that the current threats to polar habitat warrant the mandatory use of LOA's. The Service reserves the right to enforce more restrictive measures in the future if needed. Although industry, primarily oil and gas, has not adversely affected polar bear populations in the past 20 years, the potential still exists for major oil spills and disturbance to important denning and feeding areas in the process of exploration, development, and production activities. For the most part the areas of industry activities in the past have not coincided with habitat areas deemed to be important as evaluated through this effort.

The Service believes that the public will be more involved in the LOA process through the development of the Polar Bear Advisory Council.

Comment: To fully comply with the Agreement, some respondents propose that the Service adopt Alternative 3 of the Environmental

Assessment (EA), as well as the following protection measures: 1) designate the coastal plain of the Arctic National Wildlife Refuge (NWR) as a polar bear denning reserve; 2) recognize the system of leads and polynyas as a distinct key marine habitat for polar bear feeding and migration; 3) prohibit oil transportation and new oil and gas leasing in recurring leads and polynyas; 4) support the Russian proposal for an expansion of the Wrangel Island Nature Reserve in the Chukchi Sea to protect marine areas to the east and southeast of the Reserve; 5) initiate diplomatic discussions to designate international polar bear reserves and protect the Arctic ecosystem of which the polar bear is part; 6) protect habitat quality by initiating steps to eliminate contaminants affecting polar bear habitat and develop mechanisms to reduce greenhouse gas emissions.

Response: The Service does not perceive that the current threats to polar bear habitat warrant adoption of Alternative 3 of the EA at this time but may use them as guidance for further action if needed to conserve and protect polar bear habitat

- a) The Service considers Arctic NWR as currently protected.
- b) Reoccurring leads and polynyas are identified in the Strategy as Important Habitat Areas.
- c) No oil and gas leasing is currently planned in the Chukchi/Bering Seas. The Chukchi Lease Sale 148, between U.S. and Russia, has been canceled. The Service only has authority to make recommendations regarding oil and gas leasing or transportation of oil and gas through IHA.
- d) The Service would support international initiatives to expand critical polar bear habitat, such as the Wrangel Island Nature Reserve.
- e) The importance of strong U.S. leadership in conservation of the Arctic environment and polar bear conservation is recognized by the Service. The 1994 Amendments to the MMPA state the Service will begin consultation with the parties to the Agreement, review the Agreement, and decide whether future reviews will be necessary and how they will be conducted. The Service is active in the support of international Arctic initiatives to delineate existing levels of protection, including preserves, to identify important marine and terrestrial habitat areas, and to determine contamination levels under the Conservation of Arctic Flora and Fauna (CAFF) and Arctic Environmental Protection Strategy (AEPS).
- f) The Service has initiated a proposal to identify heavy metal and organochlorine contaminant levels in polar bears and is in the process of developing partnerships, and contracts to obtain funding. If contaminant levels are of concern then attempts will be made to identify the sources and supply information to those agencies or parties that have authority to regulate and/or clean up contaminant sources.

Comment: Some respondents stated that the MMPA was the legislation which was intended to enact the terms of the Agreement. Since the protection afforded polar bears under the MMPA exceeds the requirements under the Agreement no additional U. S. regulations are required or authorized under the Agreement.

Response: The United States' responsibilities to further the terms of the Agreement on the Conservation of Polar Bears, ratified in 1976, is also ample justification to develop and implement such a Strategy, however, it is not an authorizing authority. The MMPA provides authority to implement this function. Section 108 of the MMPA illustrates the importance the Act ascribes to bilateral and multilateral agreements with other nations for the protection and conservation of all marine mammals and authorizes and encourages the development of additional agreements to further the purposes of the MMPA. Section 113 of the MMPA provides specific guidance relative to the relationship between the MMPA and other Treaties and Conventions. It states that "the provisions of this title shall be deemed to be in addition to and not in contravention of provisions of any existing international treaty, convention, or agreement, or any statute implementing the same, which may otherwise apply to the taking of marine mammals." The statement demonstrates the importance the U.S. placed upon complying with the terms of these treaties or conventions.

When the Agreement was ratified in 1976, it was thought that the MMPA already provided protection for polar bears and their habitat. Although the MMPA is more restrictive in some cases (i.e. prohibition of harassment) and provides for subsistence uses, it is less restrictive than the Agreement with respect to the protection of females and females with cubs, use of aircraft and large vessels, and habitat protection. These concerns have been recently addressed in the 1994 amendments to the MMPA although they have not been dealt with in the Agreement. A meeting to review effectiveness of U.S. compliance with the international Agreement was held June 26-27, 1995, and a report to Congress is being drafted. Since 1973 scientific data has contributed significantly to our understanding of polar bears and their habitat use. In addition, there has been a substantial increase in oil and gas developments and increased concern over subsistence use of polar bears and other marine mammals.

Comment: One respondent stated that "permanent protection" needs clarification in reference to the International Conservation Initiatives section of the Strategy and the Agreement.

Response: The goal of the Service is to provide long term and sustainable habitat areas for polar bears. The area within Arctic NWR is considered protected at this time. Due to the absence of threats, much of the Arctic is currently protected and thus the creation of polar bear reserves is not the selected option. Permanent protection could include setting aside reserves but may also be afforded by seasonal restrictions to certain types of activity (i.e. no seismic work in known denning areas during the winter) and/or buffer zones around important feeding or denning areas. The Service will identify areas important to polar bears and encourage the monitoring and protection by developers and other interested parties.

Comment: One respondent stated that the definition of "taking" under the Agreement does not include harassment; therefore, issuing incidental take regulations may be contradictory to the intent of the Agreement.

Response: In 1973, lethal take was the only recognized take and the assumption was that all other forms of take were not addressed in the Agreement. Lethal takes which would likely occur under the incidental take program of the MMPA would arguably conflict with terms of the Agreement. Harassment, due to activities associated with oil and gas activities, was not an issue in 1973. The MMPA is currently more restrictive because it prohibits harassment unless specifically authorized.

3. Status of polar bear populations.

Comment: Polar bear populations are increasing and stabilizing near carrying capacity and do not warrant the restrictive requirement the Habitat Conservation Strategy appears to propose for denning areas.

Response: We disagree that healthy polar bear populations which have increased or stabilized near carrying capacity during the past do not warrant restrictive requirements to protect polar bear denning areas. The knowledge we have regarding these populations indicates that they have increased and are at healthy levels today. The Beaufort Sea stock assessment developed pursuant to Section 117 of the MMPA is founded on local knowledge and scientific data. Limited data exists for the Chukchi/Bering seas stock and its status cannot be accurately predicted. The scope of the Habitat Conservation Strategy is statewide, and it includes those areas for which incidental take regulations exist as well as those areas for which petitions to develop similar regulations may be expected in the future. As a strategy, it is forward looking and highlights important habitat areas including feeding and denning habitats. In particular, it recognizes the widely-accepted importance of these areas based upon their predictability of occurrence and utilization by polar bears. Denning habitats are especially important since they are the production nurseries for the future population. The low reproductive capacity of polar bears and their sensitivity to disturbance during denning are central to environmental precautions regarding human activities which occur in their vicinity.

4. Important Habitat Areas

Comment: Many commenters indicated that IHA's need to be more clearly defined, including the denning, feeding and migration areas designated on the maps. Some commenters stated that IHA's should: a) designate critical areas where absolute protection is warranted; b) identify who will define IHA's; c) clarify whether IHA's will change on an annual basis and whether they will extend into other areas such as ANILCA Section 1002 lands or private lands; and d) more thoroughly define implementation of habitat protection measures and include a description of a variety of levels of protection under different development scenarios.

Response: At present, IHA's have been identified based on the best available information. The Service lacks the resources to more thoroughly refine IHA boundaries on a seasonal basis. Refining the location of specific denning habitat is difficult because dens are difficult to detect and therefore, their locations are often remain unknown or are only detected upon emergence. Although, polar bears in the Beaufort Sea region do, however, exhibit fidelity to denning substrate and general geographic areas such as the terrestrial denning in northeast Alaska, including barrier islands, river drainages and areas of snow accumulation. In the Chukchi Sea region, recurrent denning occurs on Russia's Wrangel and Herald islands and the Chukotka Peninsula. The National Biological Service is currently conducting research on female polar bears in the Chukchi Sea region that may provide additional denning information. Until further information is made available the Service will continue to monitor dens in the Beaufort Sea region as reported by local villagers, industry, and the North Slope Borough.

Refining the location of specific feeding habitat and associated seasonal movements may be attempted on a case-by-case basis but it is a difficult task because primary feeding areas (leads and polynyas) occur in a dynamic ice habitat that changes according to wind and currents. Similarly, the locations where marine mammal carcasses concentrate in coastal areas are also affected by wind, currents, and other variable factors such as struck and lost ratios and harvest rates of hunters from neighboring communities. The Service will conduct annual aerial surveys for marine mammal carcasses to determine their distribution along the Alaskan coast. This information will be provided to operators planning activities near these areas so that carcass sites can be monitored and avoided if necessary.

a) The Service has identified IHA's to the extent possible, based on best available information, including scientific information and information provided by Native hunters. Additional research is needed on polar bear habitat use before it can be quantitatively defined to determine what is "critical" before absolute protection is warranted. The Service will evaluate proposed activities within the IHAs and determine the appropriate level of protection.

- b) IHA's will be defined by the Service based on best available information.
- c) IHA's can and do extend into areas that do not conform with jurisdictional (political) boundaries. They may cross private, state and federal lands. For example, polar bears den in the Kuk River area which is selected by both Native corporations. The Bureau of Land Management is the federal land manager. Although the Service generally lacks authority to enforce habitat conservation measures on non-Service lands, information regarding polar bear use will be provided to anyone operating in IHA's. The general location of IHA's will not change annually. As new information on den sites and carcass deposition sites the Service will adjust IHA boundaries as necessary. Updated information will be provided to those people operating in these areas. These areas may be discussed at village meetings as part of the Village Communications Plan.
- Habitat conservation implementation efforts are ongoing and continue d) to be developed and refined as time and funding permits. Implementation of the Strategy can be summarized as follows. The Strategy identifies habitat areas important to polar bears. Impacts to IHA's will be minimized through the LOA process and monitored. The process to develop Village Communication Plans and a Polar Bear Advisory Council will be initiated through a series of meetings that solicit input from interested parties on the best way to accomplish these goals. The Arctic NWR remains closed to oil and gas exploration and therefore is afforded the necessary habitat protection. Implementation of international conservation initiatives will focus on efforts to review the effectiveness of the Agreement on the Conservation of Polar Bears (Agreement), development of a United States/Russia Bilateral Agreement, and participation in AEPS/CAFF. Research on habitat use and relative importance of various habitat types, as well as the effects of contaminants on polar bears is a priority for the Service and will continue as funding permits. The Service's Conservation Plan for the Polar Bears in Alaska dated June 1994 discusses the Service's polar bear conservation priorities.

A description of possible levels of protection under different development scenarios is included in Table 1, page 10. Neither this table nor the Strategy as a whole are intended to be fully inclusive of every existing development scenario and the array of possible protection measures. The Service will handle each development activity on a case by case basis with input from the Polar Bear Advisory Council. For example, on-ice seismic operations will be restricted to activities prior to the advent of seal pupping to avoid seal displacement and pup abandonment.

Comment: One major concern identified by most commenters was the level of restrictions that will be applied to IHA's. Some commenters stated that oil and gas activities could be disruptive to polar bears during denning, their most vulnerable time, with possibly serious consequences on reproductive success. They claimed it was impossible to assure that industrial activities will not disturb dens because bears do not repeatedly use the same den sites. They also stated that temporal restrictions are insufficient because the oil industry has generally been unwilling to confine itself to strict time restrictions, as evidenced in the case of the bowhead whale seasonal drilling and the caribou calving and post-calving period. Also, if temporal restrictions are placed on denning periods, it may push activities into time periods when other species are vulnerable. Therefore, they recommended that IHA's should be designated as reserves where all industrial activities such as oil transportation via tankers or pipelines are prohibited, and that these measures should be extended to the 1002 area.

Response: The concept of creating reserves is included as an alternative for future management planning purposes in Appendix J. of the Strategy. However, at present, this action is dismissed for two reasons. First, the Coastal Plain of the Arctic NWR, a priority area for consideration of such a designation, is currently under protection of the Refuge Administration Act. Oil and gas activity in the Arctic NWR is currently specifically prohibited by ANILCA. Any exploration or development would require a compatibility findings with the purposes for which the Refuge was created. Secondly, a large potion of the Arctic is already a de facto reserve due to the absence of humans or their activities.

The Service supports the continued protection of polar bear habitat of the Arctic Refuge from oil and gas development. The Service is aware of the continuing interest in developing the North Slope for oil and gas development and is working with industry to minimize impacts to polar bear habitat through the LOA process. In addition, the Service proposes the development of village communication plans that will increase awareness of polar bear conservation and the Service's initiatives. The Service may not have authority to classify lands as reserves for areas not currently under Refuge jurisdiction but will continue to use existing legal authorities to recommend measures to mitigate adverse impacts and protect IHA's.

Comment: Other commenters stated that oil and gas activities in IHA's are not necessarily incompatible with polar bear use as evidenced by a polar bear population that is either increasing or stabilizing at capacity levels. One commenter stated that bears are curious, powerful, and able to adapt quickly to new circumstances; therefore, it is unlikely that industrial facilities will act as physical barriers to IHA's or that bears would be deterred by industrial noise. Other commenters stated that site fidelity to a habitat location by polar bears has not been established, therefore, it would be inappropriate to consider closures of IHA's to oil and gas activities, especially "with no net environmental benefit to bears". One commenter stated that carcass feeding areas should be deleted from IHA's because carcass distribution is unpredictable and potentially includes any Arctic shoreline. One commenter recommended that the Service annually designate all IHA's based on specific polar bear use of these areas and issue LOA's based on specific habitat use information. Other commenters suggested that a continuation of dialogue among agencies, Native users and industry occur to ensure that activities on the North Slope continue without harm to polar bear populations.

Response: Although current habitat loss does not appear to be a limiting factor to polar bear populations, the potential for environmental disasters such as an oil spill exist. Therefore, specific restrictions will be determined as necessary on a case-by-case basis depending on the type of activity, frequency, location and other factors. Polar bears have demonstrated fidelity to certain habitat types and show an increasing trend for terrestrial denning. Seasonal restrictions, buffer zones, and continued protection of Important Habitat Areas, including the Arctic NWR, are measures that will ensure that the species continues at healthy levels.

Comment: Some commenters stated that IHA's are unnecessary and violate ANILCA's set aside provisions. Limiting access to private, State or Native property and mineral rights may constitute "taking" and would be subject to certain NEPA requirements.

Response: The Service disagrees with the notion that identifying areas important to polar bears for their life cycle is a violation of ANILCA's set aside provisions. The Service does not propose to restrict any access or use of ANILCA lands that are outside the rights of the individuals who have legal authorization to use that land. The Service proposes to work cooperatively with operators authorized to conduct activities in polar bear habitat to increase awareness of the areas to polar bears and to minimize to the greatest extent possible any adverse impacts that these activities may have on polar bears or their habitat.

5. Incidental Take

Comment: Comments received regarding the incidental take regulations included: 1) closer scrutiny is needed to define what constitutes bona fide incidental take; 2) incidental take should include the language in the 1994 Marine Mammal Protection Act (MMPA) Amendments regarding lethal take in defense of life; incidental take should include a system for permitting unintentional harassment. Response: The term incidental take is considered to mean an alteration in natural behavioral patterns caused by human activities or actions. The MMPA amendments also allow for lethal take in defense of life, and take for harassment (deterrence). They define harassment as "any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild" (Level A Harassment); or "(ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (Level B Harassment). This information has been inserted into the Strategy.

Comment: Several respondents stated that it is not only inappropriate to link development of the draft Strategy with the incidental take regulations, but it is also not authorized by law. The incidental take regulations state that "subsequent to implementation by the Service of its Polar Bear Habitat Conservation Strategy, no adverse impacts will be authorized in those polar bear habitat areas afforded special protection through implementation of that strategy." Some respondents stated that this is contradictory language to the MMPA where Congress established the standard of "least practicable adverse impact," even for sensitive areas like rookeries or denning areas. These respondents state that no authority exists in either the Agreement or the MMPA that authorizes implementation of the Strategy, much less make the extension of the incidental take regulations contingent upon completion of the Strategy. The Service was requested to delete the following language from the incidental take regulations (50 CFR 18.123(b): "Subsequent to implementation by the Service of its Polar Bear Habitat Conservation Strategy, no adverse impacts will be authorized in those identified polar bear habitat areas afforded special protection through implementation of that strategy.

Response: Regarding the subject that the Service has exceeded its authority with respect to the regulatory structure proposed in 50 CFR 18.123(b), we assert that the Secretary is authorized through the broad powers described in Section 112, Regulations and Administration, to"prescribe such regulations as are necessary and appropriate to carry out the purposes of this title." This includes those specific to incidental take regulations. Therefore, we believe the Service is authorized to develop a Habitat Conservation Strategy for Polar Bears in Alaska and require its completion in order to extend the Beaufort Sea incidental take regulations.

The perceived discrepancy between the language "least practical adverse impact" (even for sensitive areas like rookeries or denning areas), and "no adverse impact" requires explanation. Identified polar bear habitat areas are afforded special protection from authorized activities through implementation of that strategy as described in 50 CFR 18.123.

With regard to a perceived conflict between the statute's standard of negligible impact and the implementing regulation's "no adverse impact" language, the Service has determined at this time as a matter of policy to delete the cited language from 50 CFR 18.123(b) because the final Strategy does not establish regulatory controls that require compliance with a "no adverse impact" standard. The Strategy emphasizes areas of special concern that, on a case-by-case basis, will be evaluated to determine what level of oil and gas activity can be maintained without causing the "negligible impact" to be exceeded. The Service believes, however, that adequate guidance and authority exists in the MMPA's sections 2, 112, and 101(a)(5)(A), and Section II of the 1973 Agreement to justify implementing a further level of protection for polar bear habitat if deemed necessary to satisfy the criteria of section 101(a)(5). Presently, however, it is believed that regulatory measures currently in place, together with the measures addressed in the Strategy, and Industry's cooperation and adherence to established guidelines to mitigate impacts to polar bears provide adequate protection to these animals and their habitat.

Comment: Some comments stated that it would be inappropriate to expand the incidental take regulations to the Coastal Plain because it is particularly important polar bear denning habitat. One respondent stated that the incidental take regulations are not scientifically defensible and questioned how the EA for incidental take regulations determined that there will be a negligible effect on polar bear populations when Optimum Sustainable Population (OSP) levels have not been identified, and the nature, timing and levels of proposed oil and gas activities, as well as the effect of past activities have not been determined. It was also stated that the Service should give serious consideration to discontinue these regulations because the draft Strategy fails to provide significant offsetting protection as required by Article III of the Agreement. In addition, the draft Strategy, EA and incidental take regulations all fail to quantify levels of take.

Response: The Strategy intentionally does not propose to expand the incidental take regulations to the Coastal Plain of the Arctic NWR, since the area by designation is a refuge where oil and gas activity is prohibited. Because of this level of existing protection the Service believes that it is inappropriate to propose that some additional level of protection would be necessary to protect the resources of the area. As indicated within the EA, "This is the area where the likelihood of maternity den encounters [by industry] is the greatest on the Alaska Beaufort Sea coast. Consequently, it is also the area in which the Service would most likely make a finding of Industry activity exceeding a finding of negligible impact."

The Service is responsible for polar bear conservation and believes it has correctly determined that the proposed industrial activities described in Industry's petitions will not result in a greater than negligible impact to polar bears. The finding was based upon the most current knowledge available. The Service continues to evaluate the population information for the Beaufort Sea in an attempt to estimate OSP. Within the petitioned scope of operations, lethal takes have been minimized by industries' efforts to conduct monitoring, provide bear awareness training, and other activities. The Service, through the Strategy, has reserved judgement on the effects of industrial activities occurring in IHA's and will evaluate the effects of activities in these areas on a case-by-case basis. The nature, timing and level of proposed oil and gas activities and the effect of past activities are explained within the Incidental Take Regulations for the Beaufort Sea.

The Service disagrees that the incidental take regulations and Strategy should be discontinued for alleged inconsistency with the 1973 international Agreement [Article III]. The Service is conducting a review of the effectiveness of U.S. compliance with the international Agreement and the issue of incidental take as directed by the 1994 amendments. It is now clear that the MMPA partially implements the international Agreement and additional efforts, including efforts (Strategy) to protect the ecosystem of which polar bears are a part, will be necessary to assure that the United States more fully complies with the spirit and intent of the Agreement.

6. Letters of Authorization (LOA's)

Comment: Language in the Strategy suggest that the LOAs are required only for activities that could result in unintentional taking of small numbers of polar bears in Important Habitat Areas.

Response: The MMPA established a moratorium on the taking of marine mammals, with certain exceptions, in all areas under United States jurisdiction. These exceptions which are described in Section 101 (a) (5) (A) and Section 101 (a) (5) (D) of the MMPA state that the taking of marine mammals unintentionally in the course of activities, either offshore or onshore, are prohibited unless authorized by the "small take" exemption or a waiver on the moratorium on taking (Section 101 (a) (3)). Under the MMPA the "small take" exemption cannot be issued unless it is found that the taking would have negligible impact, involve small number of animals, and not result in an unmitigable adverse impact on the availability of polar bears for subsistence use by Alaskan Natives. The Service is responsible for the conservation of polar bears in all areas, not just the IHAs.
Comment: If the Strategy is used as part of the LOA process, it should provide clear standards to guide implementation.

Response: The LOA is the primary Service mechanism, relative to incidental take, to implement provisions of the methods of taking, including conditions or prohibitions on the season, area, or technology utilized in taking. While some terms and conditions of LOA's are general and standardized, others vary on a case-by-case basis according to the type of operation, timing, location, frequency and duration of activity, relative importance of the area to polar bears, and other factors. The Service will advise Industry that: a) when it requests LOAs, it should note whether activities will occur near or within IHAs; describe how proposed activities may affect the habitat area in question; and describe the steps to be taken to prevent or minimize the impact to the area; b) a waiver to the MMPA's moratorium will be required if the activity is likely to have a greater than negligible effect or the effects cannot be reasonably determined; c) LOAs may prohibit certain activities in certain areas at certain times of the year (i.e. denning areas from mid-October to May). The Service's habitat conservation strategy provides information useful to the incidental take program and the development of conditions for LOAs. LOAs will be determined on a case-by-case basis and will assure negligible impact levels. As such they should avoid after-the-fact Secretarial withdrawal or suspension of these activities. Such withdrawal or suspension would likely cause considerable economic hardship on the entity conducting the activity.

Comment: Most respondents indicated that the terms and conditions of LOA's need clarification on: a) the terminology "subject to LOA"; b) specifically which requirements will be discretionary or mandatory i.e. buffer zones around dens and marine mammal carcasses; c) whether polar bear interactions plans will be mandatory and, if so, what these plans must contain; d) whether there will be seasonal restrictions on seismic work within leads and polynyas; e) whether LOA's will be required for all activities or only oil and gas activities; and f) who will develop and enforce LOA's.

Response: The terminology "subject to the LOA" means that industry operations would need an LOA to comply with the MMPA in the event an incidental take occurred. LOA's are specific to the operation and area in which the work is to be performed. Specific requirements such as buffer zones around dens are developed on a case-by-case basis. The terms and conditions of LOA's such as buffer zones, monitoring plans, and village cooperation plans are mandatory. Examples of regulations which are in effect and being adhered to are 1 mile buffer zones around known dens (Beaufort Sea), protection of the spring lead system by Point Hope and Point Lay from industrial activity, and start up and closing dates for exploratory activity in the Chukchi/Bering Seas. Presently LOAs have been developed by the Service only for oil and gas industry, at their request, through the Incidental Take Rulemaking. The LOA process could be expanded to include other activities and other areas (i.e., oil and gas activities in the Chukchi/Bering seas). Although currently there is no mandatory requirements for oil and gas or any other industry to obtain incidental take authority through the LOA process, industry in recent years has, for the most part, voluntarily sought authorization to avoid potential conflicts with polar bears and violations of the MMPA. The Service recognizes that the implementation measures need to be more throughly defined with respect to activity and seasonal use of different habitats by polar bears. In the future the Polar Bear Advisory Council would assist in providing recommendations concerning activities in polar bear management areas.

Comment: One respondent stated that LOAs, rather than conserving polar bear habitat, are permits to take polar bears. The inference was that LOAs are permissive instead of restrictive of activities in polar bear habitat.

Response: The intent of the LOA process is to protect polar bears, minimize current activities affecting polar bear habitat and provide for protection of habitat important for the long term survival of polar bears. The LOAs allow the Service to set forth terms specific to the activity, which in the current case, is oil and gas exploration, development and production.

Comment: Several respondents felt that mandatory LOAs are unnecessary and unwarranted, especially when applied to maternity denning areas, and should not be required for activities occurring in IHA's. Industry should be recognized for their exemplary record through inclusion in the draft Strategy of a description of current conservation practices such as "...every exploration and development site is managed to minimize the likelihood of human/bear encounters, including development of a sighting database, interaction plans, and extensive awareness training programs." On the other hand, several respondents stated their opposition to the Service's claim that "industry has been careful to avoid disturbing sensitive habitats of polar bears and other marine mammals as well as terrestrial birds and mammals," and encouraged removal of this sentence from the draft Strategy.

Response: The Service cannot require LOAs under the MMPA implementing regulation. Although the polar bear population in the southern Beaufort Sea is increasing under the current subsistence harvest levels and industrial activities, the potential exists for population impacts due to oil spills, disturbance to denning areas, and/or pollution. The

88

increase in the number of people in the Arctic ecosystem makes management of polar bears a more complex issue. The Service has tried to balance the concerns from conservation groups, industry, and subsistence users given the current status; the ultimate decision must rely on what is best biologically for polar bears and their habitat. Polar bears are a longlived species with a low reproductive potential. A two fold increase in the number of bears killed from 1960 to 1972 was shown to have drastic effects on the population. The protection of denning areas, feeding areas, and females with cubs is critical to the long-term survival of polar bear population in the southern Beaufort Sea.

Comment: One respondent cited the article "Tracking Arctic Oil", by the Natural Resources Defense Council (1991), as a document that shows that "...North Slope oil development has destroyed thousands of acres of wildlife habitat, caused declines in local wildlife populations and has left hundreds of open waste pits containing millions of gallons of oil industry waste."

Response: The purpose for the LOAs is to conserve and protect polar bear from oil and gas exploration, development and production activities. LOAs are not mandatory; however, other regulations and laws are mandatory and the Service provides recommendations to implementing agencies regarding polar bear conservation and habitat protection.

Comment: One respondent stated that it is unrealistic to expect that industry, once started, would withdraw activities from IHA's if monitoring indicated greater than negligible impacts. Some recommended replacing the LOA process with permanent prohibition on industrial activities in designated on-shore polar bear feeding and denning habitats. Other respondents stated that LOA's should be mandatory in IHA's and wherever take is likely to occur, especially in areas where there is a historic record of use for denning.

Response: Industry has shown good faith in requesting LOAs and has taken steps to minimize the impact of its activities on polar bears and their habitat. The Service is limited it its ability to regulate activities on lands not under federal jurisdiction.

Comment: One respondent stated LOAs could be issued with the following conditions: 1) prohibit exploration/development near known denning areas during denning season and near coastal and offshore feeding areas when bears are likely to be using them; 2) require that roads, pipelines and seismic profiling be conducted perpendicular to the coast; 3) require 1500' altitude for flights over denning and feeding areas; and 4) prohibit on-ice road construction and seismic activities during ringed seal pupping season (late March-early April).

Response: The list of conditions in this comment are currently adhered to by industry. Although the Arctic Refuge coastal plain and the area within the Arctic NWR, including the coastal plain is protected from oil production, leasing, and development, the Service recognizes the vulnerability of this area. The Service presently has little direct regulatory authority over polar bears until a finding is made that a stock or population has declined below its OSP level. The Service is interested in adopting pro-active conservation measures to ensure the future protection of important polar bear habitat areas. One mechanism to protect important polar bear habitat and minimize the impact of industry on important habitat areas not under the jurisdiction of the Service is through the LOA process. The Strategy, through the identification of IHAs, is a first step in the development of conservation measures to protect polar bear habitat.

7. Designating the Coastal Plain of the Arctic National Wildlife Refuge as a Polar Bear Denning Reserve.

Comment: Many comments were received regarding the failure of the draft Strategy to designate the coastal plain of the Arctic NWR as a polar bear denning reserve. Several commenters stated that it is the Service's trust responsibility to provide the highest level of protection possible to those polar bear habitats over which it has jurisdictional responsibilities, namely, the coastal plain of the Arctic NWR. Only those activities occurring throughout the range of polar bears that are compatible with their life histories should be supported. Some commenters stated that all industrial activities should be prohibited in the Arctic NWR. Although the Arctic NWR is currently protected from industrial activities, it remains subject to actions by Congress. If Congress votes to open the Refuge for oil and gas activities then other mechanisms (such as mandatory LOAs for IHAs, etc) would be needed to conserve and protect polar bears and their habitat as well as ensure national compliance with the international Agreement.

Respondents also stated that in addition to the Arctic NWR, important denning and feeding habitats identified in the Strategy should be protected through establishment of a network of polar bear reserves where all industrial activity is prohibited. International efforts should include negotiations with Canadian counterparts to include those lands adjacent to the coastal plain that are used by polar bears, and support of a Russian proposal to protect marine areas in the Chukchi Sea to the east and southeast of Wrangel Island Nature Reserve. The Service should also provide leadership through CAFF to expand the network of terrestrial and marine protected areas in the Arctic. Response: The Arctic NWR is currently designated and managed as a refuge to "...conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to...polar bears..." and to "fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats" (ANILCA Section 303). The refuge is currently closed to oil and gas exploration and development. If this situation changes the Service agrees that another mechanism might be necessary to protect this important habitat. At present, the Service believes that further measures to protect polar bear habitat are unwarranted due to a lack of threats. Further, a qualitative assessment of denning habitat types has not been undertaken. Therefore, continued research is necessary to determine the importance of specific habitat types to polar bears. The Service will continue to focus its management efforts on minimizing ongoing and future planned activities' impacts to polar bear habitat on a case-by-case basis.

The Service has international efforts underway in the polar bear conservation arena through discussions on a potential Bilateral Agreement with Russia. The Service supports international habitat protection measures in the Chukchi Sea for Wrangel Island but to date has not been formally contacted on this issue by the Russian government. The Service also has an active role in development of the AEPS/CAFF initiatives and will provide information regarding IHA's to CAFF once the Strategy is finalized.

Comment: One respondent voiced concern regarding blanket closures of areas for habitat protection. This respondent stated that the closures are unnecessary based on the oil industry's record of operation in polar bear habitat, scientific knowledge of polar bears, and the Native understanding of polar bears and their habitat needs. The respondent also stated that the goal to identify and preserve polar bear denning, feeding, and migratory habitat under the 1973 Agreement has been realized in practice, with respect to industrial operations, because bear populations are increasing and healthy, and incidental takes have been few. Industry is willing to work with Natives and others to address concerns regarding bear interactions and impacts. The commenter encourages the Service to provide "... some consistency and predictability in the mitigating measures industry will have to adhere to in response to the occasional presence of polar bears."

Response: The Strategy is the first step in identifying habitat areas important to polar bears. Continued research is necessary to refine our knowledge and understanding of these areas. The Service, as the lead agency responsible for managing polar bears, has a responsibility to ensure that lands over which it has jurisdiction that are important to polar bears are protected. Currently, the Arctic NWR is protected and no blanket closures on any lands are recommended or planned in the Strategy. Due to the dynamic characteristics of ice habitat, polar bear movements, and den selection, mitigating measures must be handled on a case-by-case basis. Additional research and information may lead to adoption of new conservation practices.

8. Threats

Comment: Several respondents stated concerns that the draft Strategy falls short in considering what may be needed to adequately address increased threats from further expected exploration and development. They also identified the lack of spill cleanup technology as a major threat and stated that the emphasis should be on prevention rather than mitigation. One respondent stated that the draft Strategy and EA downplay cumulative risks and known mortality from oil and gas activity in polar bear habitat. The respondent cited several examples of known mortality related to oil and gas activities and stated that non-lethal effects to reproduction or animal health due to oil spills, pollution, or other factors could have serious long-term effects that are not yet apparent. Other information provided in this Strategy indicates that, at certain times of year, polar bear are more likely to occur in areas proposed as IHAs. In addition, when polar bears are in these areas they are more likely to be engaged in biologically significant activities such as hunting, feeding, or denning. Therefore, according to the commenter, oil, gas, and other activities within the IHAs are likely to have greater than negligible effects and activities in onshore and nearshore areas may have unmitigable adverse effects with respect to the availability of bears for subsistence take.

One respondent stated that incidental take will increase if oil development in feeding and denning areas increases, and that disturbance to breeding or denning polar bears may result in a lower potential for reproductive success.

Respondents suggest that the Service defer oil and gas lease sales in recurring leads and polynyas and other IHAs throughout the Beaufort and Chukchi seas. Also, if leasing were to occur, the Service should require mandatory permitting in IHAs.

Response: The Service evaluated existing information regarding activities which pose a threat to polar bear habitat and incorporated it into the Strategy. The technology to effectively clean up oil discharged into marine pack ice habitats has not been developed and presents a serious problem. However, the Service, other federal and state agencies, have developed and continue to refine oil spill preparedness/contingency plans, require and bond the acquisition of storage equipment on-site, necessary to clean up spills which occur on land and/or open water. An attempt would be made to clean up an oil spill on ice using this equipment. The requirements for oil spill preparedness and clean up are extensive.

Regarding cumulative effects of these activities, the Strategy is not intended to provide an exhaustive assessment of the impact of various activities and is instead intended to provide a summary overview of the potential threats to polar bears for the actions which are proposed. Cumulative effects of the variety of activities which may effect polar bears are a real concern and are considered through a variety of existing programs. These include the Outer Continental Shelf leasing requirements, NEPA requirements, federal discharge standards, safety and hazardous waste standards, and a large number of other safeguards required of companies operating in polar bear habitat.

The Service is aware of only two mortalities in recent years, one related to oil and gas activities and the other by a Department of Defense contractor. Sublethal latent effects are difficult, if not impossible to confirm empirically or quantitatively. However, negative trends may be detected through a reduction in reproduction, lower survival rates, an unexplained increase in mortalities, or an overall decline in health among bears between 6 and 15 years old. The Strategy, while acknowledging threats, was not designed to lay out a worst case scenario nor to attempt to implement scenarios that are not practical or realistic in their implementation. The Service proposes to protect polar bear habitat through our authorities by minimizing the effect of industry through the LOA process.

The respondent correctly identifies that the frequency of incidental take of polar bears could increase if activities occur within IHAs. It is not necessarily the Strategy's objective to eliminate the incidental take of polar bears but instead to ensure, through conditions on the activities (LOAs) that the effects remain negligible regarding rates of recruitment and survival. This may include prohibition of certain activities at specific time or locations in order to ensure that the activities do not result in greater than negligible impact to polar bear populations. It also will include authorization for the conduct of activities which meet the Service's criteria and conditions thus ensuring negligible effects to polar bear populations. The concept of making LOAs mandatory before conducting activities in IHAs was considered. It was believed that the authority to do so was not available through the Strategy and that instead a separate regulatory action or amendment to the MMPA would be required in order to provide the Service with this authority. A mitigative factor is that the MMPA prohibits all take unless authorized, therefore, any takes which occur in the absence of a LOA are illegal and the individual or organization causing the take remains liable. The Service will continue to provide Minerals Management Service and the State of Alaska with recommendations

93

concerning development plans and ways to mitigate the impact of proposed activities to polar bears and their habitat. The Service will advise MMS that environmental impact statements concerning oil and gas lease sales in the Beaufort and Chukchi Seas should describe whether activities will be in or near IHAs, and if so, describe how the activities may affect the IHAs, the steps proposed to prevent impact to the polar bear habitat, and information to support that no adverse impact will result on the availability of polar bears to hunters. It would be prudent for individuals operating in the specific areas, where there is a probability and likelihood of take, to obtain an authorization given the information in this Strategy, particularly in reference to IHAs.

Regarding the recommendation that the Service defer leasing in recurring leads and polynyas and other IHAs (denning) throughout the Beaufort and Chukchi seas, the Service believes that a carte blanche prohibition is not required. Also, it was believed that the Service does not possess the authority to accomplish this. Deferrals or prohibitions that already exist in practice include: the Chukchi polynya; the Arctic NWR; areas in Russia including Wrangel Island; international areas beyond the 200 mile limit; and areas beyond the continental shelf where technology is not available to conduct oil and gas activities.

Comment: Several commenters stated that industry is wrongly implicated as the greatest threat to polar bears, and that the draft fails to mention that research and Department of Defense activities have caused den abandonment and/or mortalities. The draft Strategy should focus on voluntary measures already in place and should delete discussion on hypothetical information such as global warming, supply barge, and oil barge traffic (the latter is currently non-existent in the Beaufort, Chukchi, and Bering seas).

Response: Industrial activities are the primary factor that has changed the landscape and level of human activity on the North Slope of Alaska in recent time and consequently has the greatest potential to influence polar bear habitat. The net effect of these changes to date generally has not affected polar bears at the population level. It is a credit to industry, based upon their actions to minimize or eliminate impacts to wildlife in general, that the activities have generally not had a noticeable effect. This may be because for the most part, activities have not occurred in prime polar bear habitat such as areas occupied by denning animals. The potential impact to polar bear denning or feeding habitat is real and must be recognized.

Comment: Regarding the potential to oil polar bears, one respondent stated that the Polar Bear Interaction Plans developed by industry have successfully minimized the attractiveness of industrial sites to polar bears, and that "spill response capabilities have resulted in no risk to bears from past incidents." Industry works closely with federal and state agencies as well as their contractor, Alaska Clean Seas, to ensure that spills do not occur, and that any spills that do occur are cleaned up rapidly.

Response: The Polar Bear Interaction Plans have been useful in minimizing impacts to polar bears, as have industry's efforts to work closely with federal and state agencies and Alaska Clean Seas. However, the Plans do not specifically address response to an oil spill event. The technology to ensure that spills do not occur and that spills in an ice environment are cleaned up rapidly has not been developed.

Comment: In response to the Service's statement that, "Oil and gas activities which displace seals, disturb denning bears and attract bears during the winter months, pose the greatest threat to bears," one commenter responded that, "The displacement of seals and subsequent effects on polar bears should be placed in a regional perspective, and in terms of the incidental take authority issued by the National Marine Fisheries Service that permits on-ice activity in ringed seal habitat. "

Response: The Service proposes to coordinate with National Marine Fisheries Service (NMFS) on LOAs regarding on-ice activities in polar bear habitat.

Comment: In response to the Service's statement that, "Noise and physical movement of equipment has the potential to cause female bears to emerge from their dens and disrupt bears and seals feeding in the area...noise from air and vehicles poses a potential threat to polar bears," one respondent stated that the Strategy should acknowledge that encounters between bears and industrial activities "...have usually resulted in no adverse impacts to the bears and that denning bears are well isolated from surface noise... [and that] denning polar bears demonstrate highly variable responses to disturbance."

Response: The reaction of denning bears to noise and disturbance is variable and unquantified. The season, location, timing, frequency and duration are thought to play important roles in the effects of disturbance. Research is incomplete on the subject and highly anecdotal. However, disturbance can and has resulted in disturbance to denning bears, abandonment, and mortality of young.

Comment: One respondent stated that the Strategy clearly contradicts conclusions in the Service's "Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement" of April, 1987, which concluded that the Nation has the..."ability to develop (oil and gas) resources in an environmentally sensitive manner as demonstrated by two decades of success at Prudhoe Bay and elsewhere...." The respondent recommended that the Service develop a Strategy that allows responsible resource development and multiple use of public lands and also include this as an alternative in the Environmental Assessment (EA).

Response: The Arctic NWR is closed to oil and gas activity. The Strategy is written with the assumption this status will remain as it is today. Any departure from this status will require a whole host of legislative and regulatory changes. In making comparisons concerning the past impact of industrial activity and future projections of impact, it is important to distinguish between Prudhoe Bay and the Arctic NWR or other areas of high polar bear habitat value. These areas are not comparable and they retain contrasting natural resource values. The LEIS, of April 1987, found that under a full scale development scenario activities would result in a "moderate" effect on the Beaufort Sea polar bear population. Industry has never been challenged concerning development in the IHAs. The ability of polar bears and seals to reproduce and coexist with development and yet remain available to subsistence users have not been demonstrated, and anecdotal information shows a general tendency for polar bears not to den in areas of human habitation or activity.

The Strategy in itself does not affect land use patterns and does not directly set aside any lands or waters from development. It does accurately identify areas of habitat importance, increases recognition of their importance, and offers mechanisms to assist resource managers in assuring these areas retain their values for wildlife in the future.

All three alternatives in the EA for the Strategy are, to varying degrees, consistent with responsible resource development. The draft of the EA was available for public review during the same 60 day comment period for the Strategy.

Comment: Some responses were received regarding the serious threats posed by pollution, ozone depletion, and climate change. Respondents suggested that the Service work cooperatively with other nations to prevent the spread of pollution in the Arctic ecosystem and to take the necessary steps to eliminate contaminants as well as develop mechanisms to reduce the greenhouse effect. One commenter stated that the Service should assume a role in the implementation of the Framework Convention on Climate Change, and work through the Arctic Environmental Protection Strategy (AEPS) to reduce sources of pollution.

96

Response: Concur. To the extent that the Service can effectively bring about "elimination" of contaminants or "prevent" the spread of pollution, we will work to achieve these laudable goals.

Comment: One commenter stated that the Service needs to clarify that Native subsistence take does not pose the greatest potential impact to polar bears. The commenter points out that subsistence take is self-controlled by the communities, the Alaska Nanuuq Commission, and through international agreements.

Response: The Service recognizes the use of polar bears for subsistence purposes and for the creation of handicrafts by Native users as long as polar bear populations are not depleted. However, subsistence take is the only lethal take of polar bears, except for defense of life, which is authorized by the MMPA. Subsistence take has the greatest potential to impact populations if harvests exceed sustainable levels. Current provisions of the MMPA do not provide for restriction of Native harvest until populations are found to be depleted. The Strategy recognizes the considerable contributions that the North Slope Borough/Inuvialuit Game Council have made to regulate harvest to sustainable levels, and the possible contributions that the Alaska Nanuuq Commission may make to future polar bear conservation.

9. Traditional Knowledge

Comment: One respondent recommended that the Service integrate traditional knowledge as a component of the Strategy rather than reference it as an appendix. The Service should also use the Village Communication Plan and Polar Bear Advisory Council as tools to include traditional knowledge in habitat conservation, and "...promote a greater understanding between the different perspectives at the table to ensure effective long-term habitat conservation."

Response: The Service has integrated Native knowledge in the Strategy through citations of personal communications as well as in the document in total. The Native knowledge section marked a premiere effort to collect and utilize information from Alaskan hunters regarding polar bear habitat use, and was developed as an independent pilot study. The Service appreciates the contributions of Native Alaskan hunters and is currently developing a technical report (unrelated to the Strategy) regarding the Native knowledge used in the Strategy.

10. Polar Bear Advisory Council (Council)

Comment: Many respondents stated that the roles and responsibilities of the Polar Bear Advisory Council should be clarified. The Service should: a) list the proposed number and composition of members and identify how they will be selected, and their length of terms; b) describe the powers of the Council and whether it will have authority to make policy for assuring compliance with national laws and the Agreement; and c) identify the source of funding for the Council.

Response: The Service recognizes that the selection criteria, length of term, composition, responsibilities, and funding sources of the Polar Bear Advisory Council need to be more thoroughly defined. The Polar Bear Advisory Council will include representatives from federal and state agencies, Native organizations, industry, and conservation organizations. The Service will not exclude organizations with a bonafide interest in polar bear conservation, but at the same time wants the Polar Bear Advisory Council to be effective and efficient. The Polar Bear Advisory Council will be advisory in nature with the Service ultimately responsible for decisions. The Service plans to seriously consider recommendations and advice by the Council and anticipates that they will help guide the Service on key issues concerning polar bear habitat conservation and protection as well as management and research needs. The recommendations from the council will be a matter of the public record. The funding status is presently unknown.

Comment: One respondent opposed establishment of a Council and stated that input from the Council into the LOA process is excessive and unwarranted since the Service had already determined that "no more than a negligible impact" would be associated with exploration and production activities. Another respondent stated that the Council is contradictory to the intent of the Federal Advisory Committee Act (FACA) and Presidential Executive Order 12838 issued on February 10, 1993, which orders reductions in the number of federal advisory committees and imposes restrictions on creation of new advisory committees. One respondent also stated that input from the Polar Bear Advisory Council is unnecessary for developing LOA's.

Response: Given the diversity of interests, land ownership, and legal considerations, the Service will seek input from representatives from the Advisory council, consisting of: Federal and State governments, industry, conservation organizations, and Native organizations and others to determine how best to manage and conserve polar bear habitat. The formation of an Polar Bear Advisory Council would be an important step toward the development of this cooperative effort.

Since the Polar Bear Advisory Committee would have representatives from industry and conservation organizations in addition to Federal, State, Local, and Tribal governments, this committee would have to comply with the goals of the Federal Advisory Committee Act. The Presidential Executive Order 12838, which was enacted to reduce and limit the number of advisory committees, does not preclude the formation of the Polar Bear Advisory Council. The Council would be truly beneficial to the government and involve participation by all parties with a legitimate interest. Industry, Native organizations, and conservation organizations have criticized the Service in the past for not being involved in the decision making process.

11. Village Communication Plans

Comment: One commenter stated that the Service should contribute more support to the Polar Bear Community Watch Program to reduce risks to humans and increase polar bears' chances of survival.

Response: Concur. The Service would like to be able to provide this support as requested. However, funding and personnel for this task, as with many other worthwhile tasks included within this Strategy and also within the Service's Five Year Conservation Plan, are unavailable. The Service is making every effort to identify and utilize available resources. For example, through a new Service initiative, ecosystem management, funds were made available to develop a poster in partnership with the North Slope Borough Department of Wildlife Management regarding the "do's and don'ts" of human interactions with polar bears. Although this is a relatively small project it demonstrates commitment to the problem and cooperation between managers and affected parties.

12. Research Needs

Comment: Respondents suggested additional research needs to: a) identify and protect breeding habitat and season; b) determine the importance of carcasses to females with cubs; and c) test additional polar bear detection and deterrence technologies.

Response: The Service listed only the most important research needs with respect to polar bear habitat protection within the Strategy. There is almost no information currently available on breeding habitat. Given fiscal restraints and more important research needs, it is unlikely that this information for Alaskan populations will be available in the near future. The Service has initiated carcass surveys in the fall of 1995 to determine the distribution and longevity of carcasses. A follow up study to determine the relative importance of these carcasses is under consideration. The Service is open to evaluating new detection and deterrent measures that might minimize bear/human encounters. Information from previous studies and current research on deterrent measures will be evaluated and included in the proposed deterrence regulations under the 1994 Amendments to the MMPA, Section 101 (a)(4).

13. Environmental Assessment (EA)

Comment: One respondent stated that the EA fails to comply with NEPA because of a lack of an adequate range of protection alternatives. Additional alternatives should be considered, such as existing habitat protection efforts, and instituting a permit system for unintentional harassment which would eliminate the need for incidental take regulations. The EA should also include a greater description of timing, nature and extent of possible industrial activity. The EA should clarify the alternative regarding the Arctic NWR and LOA's and the accompanying habitat protection measures.

One respondent stated that the EA should recognize that during the past 25 years industry has had a good environmental track record. In so doing the Service should develop an assessment of all the current habitat conservation practices, identify those practices that are most effective, and develop a more coordinated and unified implementation approach of these practices.

Response: Protection alternatives in the EA include the status quo (Alternative 1), making LOA's mandatory (Alternative 2), and prohibiting industrial activities in IHA's (Alternative 3), and a no action alternative (Alternative 4). The EA also includes proposed measures common to Alternatives 1-3. The Service believes that the EA includes all reasonable alternatives available at the time. The harassment provisions of the MMPA 1994 amendments must be implemented. Current management authority includes development of harassment regulations, deterrence regulations, the Incidental Take Rulemaking and the LOA process. Therefore, the permit system is not considered a reasonable alternative for polar bear habitat management.

The Service intended that the existing habitat measures to be implicit to the selected alternative in the EA. A more thorough discussion of existing habitat protection measures is included in Section VII.A.6, Section IX and Alternative J. of the Strategy. In addition, the Service has added a summary of existing habitat protection measures to section V.A. of the EA.

Several measures have been developed and implemented to protect polar bears and reduce chances of human/bear interactions during industrial operations in polar bear habitat. Through the Incidental Take Rulemaking industry applies for LOA's to incidentally take small numbers of polar bears. LOA's require that industry, especially while conducting activities during winter months, contact the Service or Alaska Department of Fish and Game to identify and avoid the locations of known active polar bear dens by one mile. Industry must also report new dens to the

100

Service, withdraw immediately, and avoid dens by one mile. Industry is also required to develop an approved Polar Bear Interaction Plan, including reporting procedures and environmental orientation training for all on-site personnel. Additional habitat protection measures, i.e. conducting seismic operations during the open water season in order to avoid disturbing denning bears, are included in LOA's on a case-by-case basis.

A greater description of timing, nature and extent of possible industrial activity is included in the Beaufort Sea incidental take rulemaking, accompanying EA, and lease sale EISs for the specific areas. Industry also routinely informs the Service of its planned activities through its requests for LOA's. The Service will continue to guide industry's activities in polar bear habitat through these means. In addition, a brief summary of future activities is included in section V of the EA.

The following oil and gas activities are planned for the Beaufort and Chukchi sea areas.

Beaufort Sea area: future plans include exploration, development and production of the Badami field, located beneath Mikkelsen Bay. This operation will consist of an unstaffed production pad connected to Prudhoe Bay facilities by a 59 kilometer pipeline. Planned on-site facilities include a dock, a road and an airstrip. No permanent road from Prudhoe Bay is planned. The pipeline will be constructed in winter and will follow the coast at least 1.6 km inland, and be elevated 1.5 meters above tundra to allow for wildlife to pass under it. In addition to construction of the pipeline, ten additional production wells are planned for construction between 1995-7. Support activities may involve use of helicopters and construction of ice landing strips for fixed-wing aircraft and roads..

Four proposed State of Alaska lease sales identified in the Five-Year (1995-1999) Oil and Gas Leasing Program could impact polar bear habitat along the Beaufort Sea coast. However, most of the acreage being offered has been offered before; industry passed up the offers and is likely to do so again.

Two Outer Continental Shelf (OCS) lease sales were proposed for the Beaufort and Chukchi seas planning area. OCS lease sales include offshore tracts from three miles off the coast or barrier islands to international boundaries. Lease sale 148, known as the simultaneous lease sale with Russia, has been deferred until the next Five- year lease plan. Sale 144 (Beaufort Sea) is scheduled for 1996.

List of Responding Organizations

Alaska Center for the Environment Alaska Coalition Alaska Miners Association Inc. Alaska Oil and Gas Association Alaska Wilderness League Alaska Wildlife Alliance Arctic Slope Regional Corporation **BP** Exploration Defenders of Wildlife Environmental Defense Fund Exxon Company, U.S.A. Friends of the Earth Greenpeace Gwich'in Steering Committee Humane Society of the United States Indigenous People's Council for Marine Mammals Marine Mammal Commission Minerals Management Service National Audubon Society National Parks and Conservation Association National Wildlife Federation Natural Resources Defense Council Northern Alaska Environmental Center North Slope Borough, Office of the Mayor Porcupine Caribou Management Board Sierra Club State of Alaska, Office of the Governor United States Senate, Committee on Appropriations Wilderness Society

XII. BIBLIOGRAPHY

- ATSDR. 1992. Draft toxicology profile for mercury. Prepared by U.S. Dep. Health and Hum. Serv. Agency for Toxic Substances and Disease Registry. 217 pp.
- Aagaard, K. 1987. Physical oceanography of the Chukchi Sea: an overview. Pages 3-10 in: D.A. Hale, ed. Chukchi Sea information update. OCS Report, MMS-0097. U.S. Dept. Int., Minerals Manage. Serv. and U.S. Dept. Comm./Nat. Ocn. and Atmos. Admin., OCSEAP, Anchorage, AK.
- Amstrup, S.C. 1985. Research on polar bears in Alaska, 1983-1985. Pages 85-115 in: Polar bears, Proceedings of the ninth working meeting of the IUCN/SSC polar bear specialist group. Edmonton, Alberta, Canada.
- Amstrup, S.C. 1986. Research on polar bears in Alaska, 1983-85. Pages 85-112 in: Proceedings of the 9th Working Meeting of the IUCN Polar Bear Specialist Group, Edmonton, Alberta 1985. Int. Union Conserv. Nature and Nat. Resour. Publ., Gland, Switzerland.
- Amstrup, S.C. 1988. Polar bear maternity denning in Alaska: 1988 Rep. of annual progress on polar bear work sub-unit no. 3: The reproductive significance of maternity denning on land with special reference to oil and gas exploration on the Arctic National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, Alaska. 22 pp.
- Amstrup, S.C. 1989a. Belcher project polar bear study 1989: preliminary summary. Unpubl. rep. on file. National Biological Survey, Anchorage, AK.
- Amstrup, S.C. 1993. Human disturbances of denning polar bears in Alaska. Arctic. 46(3):246-250.
- Amstrup, S.C., and D.P. DeMaster. 1988. Polar Bear, Ursus maritimus. Pages 39-56 in: J.W. Lentfer, ed. Selected Marine Mammals of Alaska: Species Accounts with Research and Management Recommendation. Marine Mammal Commission, Washington, D.C.
- Amstrup, S.C. and G.M. Durner. 1992a. Polar bear maternity denning on the Arctic National Wildlife Refuge, Alaska. Pages 189-197 in: T.R. McCabe, B. Griffith, N.E. Walsh, and D.D. Young, eds. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Interim Report, 1988-1990. U.S. Fish and Wildlife Service, Anchorage, Alaska. 432 pp.

- Amstrup, S.C. and G.M. Durner. 1992b. Responses of maternal polar bears to human activities in Alaska. Pages 198-206 in: T.R. McCabe, B. Griffith, N.E. Walsh, and D.D. Young, eds. Terrestrial research: 1002 area Arctic National Wildlife Refuge, Interim Report, 1988-1990. U.S. Fish and Wildlife Service, Anchorage, Alaska. 432 pp.
- Amstrup, S.C., and G.M. Durner. 1995. Activities, movements, and distribution of polar bears in the Beaufort Sea. in a PhD dissertation.
- Amstrup, S.C., and C. Gardner. 1991. Research on polar bears in northern Alaska 1985-1988. Pages 43-53 in S.C. Amstrup and O. Wiig, eds. Proceedings of the Tenth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.
- Amstrup, S.C., and C. Gardner. 1994. Polar bear maternity denning in the Beaufort Sea. J. Wildl. Manage. 58(1):1-10.
- Amstrup, S.C., C. Gardner, and G.M. Durner. 1992. Temporal and geographic variation of maternity denning among polar bears of the Beaufort Sea. Pages 165-188 in: T.R. McCabe, B. Griffith, N.E. Walsh, and D.D. Young, eds. Terrestrial research: 1002 area Arctic National Wildlife Refuge, Interim Report, 1988-1990. U.S. Fish and Wildlife Service, Anchorage, Alaska. 432 pp.
- Amstrup, S.C., C. Gardner, K.C. Myers, F.W. Oehme. 1989. Ethylene glycol (antifreeze) poisoning in a free-ranging polar bear. Vet. Hum. Toxicol. 31(4):317-319.
- Amstrup, S.C., I. Stirling, and J.W. Lentfer. 1986. Past and present status of polar bears in Alaska. Wildl. Soc. Bull. 14(3):241-254.
- Amstrup et al. 1995. Population dynamics of polar bears in the Beaufort Sea. in a PhD dissertation.
- ARCO Alaska, Inc. 1990. Fireweed #1 exploratory well, 1990-1991. Polar bear/personnel encounter and monitoring plans. ARCO Alaska, Inc., Anchorage. 16 pp.
- ARCO Alaska, Inc. 1991. Cabot #1 exploratory well project western Beaufort Sea, Alaska 1991/92. Polar bear/personnel encounter plan. ARCO Alaska, Inc., Anchorage. 14 pp.
- ARCO Alaska, Inc. 1992. ARCO announces oil discovery in Alaska's Beaufort Sea. News release, Anchorage, Alaska, October 14, 1992.
- Arctic Slope Consulting Engineers, Hanson Environmental Research Services, and Gray's Technical Services. 1988. Western Arctic Coal Development Project. Appendix D.
 1987 Field Program Environmental Assessment. Prepared for State of Alaska Department of Community and Regional Affairs and Alaska Native Foundation. vp.

- Arthur, S.M., G.W. Garner, and T.C. Rudnicky. 1993. Limitations of GAS and remote sensing for considering spatial and temporal change in studies of habitat use by polar bears. Fourth Nat. U.S. Fish and Wildl. Serv. GAS Workshop, Lafeyette, Louisiana. 19 pp.
- Baur, D. C. Reconciling the legal mechanisms to protect and manage polar bears under United States laws and the International Agreement for the Conservation of Polar Bears. 135pp. Unpubl report to the Marine Mammal Commission, 8/17/94 draft.
- Belikov, S.E. 1976. Behavioral aspects of the polar bear, Ursus maritimus. Pages 37-40 in: M.R. Pelton, J.W. Lentfer, and G.E. Folk, eds. Bears - their biology and management. IUCN Publ. New Ser. 40.
- Blanchard, B. 1991. Letter from Bruce Blanchard, Acting Director, U.S. Fish and Wildlife Service, to Robert J. Hofman, Scientific Program Advisor, Marine Mammal Commission, responding to transmittal of the proceedings from the "Workshop on Measures to Assess and Mitigate the Adverse Effects of Arctic Oil and Gas Activities on Polar Bears." June 11, 1991. 2 pp.
- Blix, A.S., and J.W. Lentfer. 1979. Modes of thermal protection in polar bear cubs at birth and on emergence from the den. Am. J. Physiol. 236:R67-R74.
- Blix, A.S., and J.W. Lentfer. 1992. Noise and vibration levels in artificial polar bear dens as related to selected petroleum exploration and developmental activities. Arctic 45:20-24.
- Bohlen, C. 1992. Letter from Curtis Bohlen, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, to John Turner, Director, U.S. Fish and Wildlife Service regarding implementation of the 1976 Agreement on the Conservation of Polar Bears. October 9, 1992. 2 pp.
- Bowes, G.W., and C.J. Jonkel. 1975. Presence and distribution of polychlorinated biphenyls (PCB) in arctic and subarctic marine food chains. J. Fish. Res. Board Can. 32:2111-2123.
- Brisbin, L., Jr. 1991. Avian radioecology. Pages 69-135 in: D.M. Power, ed. Current Ornithology. Plenum Press, NY. 335 pp.
- Bromley, M. 1985. Safety in bear country: a reference manual. Northwest Territories Dep. Renewable Resour. 24 pp.
- Burns, J.J. 1967. The Pacific bearded seal. Alaska Dep. Fish and Game, Pittman-Robertson Proj. Rep. W-6-R and W-14-R. 66 pp.

- Burns, J.J. 1981. Bearded seal Erignathus barbatus Erxleben, 1777. Pages 145-170 in: S.H. Ridgway and R.J. Harrison, eds. Handbook of marine mammals. Vol. 2. Seals. Academic Press, New York.
- Clarkson, P.L., and D. Irish. 1991. Den collapse kills female polar bear and two newborn cubs. Arctic. 44(1):83-84.
- Clausen, J., L. Braestrup, and O. Berg. 1974. The content of polychlorinated hydrocarbons in arctic mammals. Bul. Environ. Contam. Toxic. 12(5):529-534.
- Clough, N.K., P.C. Patton, and A.C. Christiansen, eds. 1987. Arctic National Wildlife Refuge, Alaska, coastal plain resource assessment--Report and recommendation to the Congress of the United States and final legislative environmental impact statement.
 U.S. Fish and Wildlife Service, U.S. Geological Survey, and Bureau of Land Management. Washington, D.C. Vols. I and II.
- Colborn, T., F.S. Von Saal, and A.M. Sota. 1993. Developmental effects of endocrinedisrupting chemicals in wildlife and humans. Environ. Health Perspectives 101(5):378-384
- Cook, H.W., J.W. Lentfer, A.M. Pearson, and B.E. Baker. 1970. Polar bear milk. IV. Gross composition, fatty acid, and mineral constitution. Can. J. Zool. 48:217-219.
- Corn, M.L., C. Copeland, and P. Baldwin. 1991. Arctic resources: over a barrel? Congressional Research Service Issue Brief #IB91011. The Library of Congress. Updated January 16, 1991. 12 pp.
- Degerbol, M., and P. Freuchen. 1935. Mammals. Rep. 5th Thule Exped. 1921-24, 2(4-5):109.
- Delmas, R.J. 1986. Past and present chemistry of north and south polar ice. Pages 175-186 in: B. Stonehouse, ed. Arctic Air Pollution. Cambridge Univ. Press, U.K.
- DeMaster, D.P., and I. Stirling. 1981. Ursus maritimus. Mamm. Species 145:1-7.
- DeMaster, D. P. and I. Stirling. 1983. The estimation of survival and litter size of polar bear cubs. Intl. Conf. Bear. Res. Manage. 5:260-263.
- Derocher, A.E., and I. Stirling. 1990. Distribution of polar bears, Ursus maritimus, during the ice-free period in western Hudson Bay. Can. J. Zool. 68:1395-1403.
- Derocher, A.E., D. Andriashek, and I. Stirling. 1993. Terrestrial Foraging by polar bears during the ice-free period in western Hudson Bay. Arctic 46(3):251-254.

- Eaton, R.D.P., and J.P. Farant. 1982. The polar bear as a biological indicator of the environmental mercury burden. Arctic 35(3):422-425.
- Eisler, R. 1985. Cadmium hazards to fish, wildlife, and invertebrates: a synoptic review. USFWS Biological Report 85(1.10). 46 pp.
- Englehardt, F.R. 1981. Oil pollution in polar bears: exposure and clinical effects. In: Proc. Fourth Arctic Mar. Oil Spill Prog. Tech. Sem., 16-18 June 1981.
- Fay, F.H. 1982. Ecology and biology of the Pacific walrus, Odobenus rosmarus divergens Illiger. N. Am. Fauna 74. 279 pp.
- Fay, F.H. 1977. Morbidity and mortality of marine mammals Bering Sea. U.S. Dep. Commer., NOAA, OCSEAP Environ. Assess. Alaskan Continental Shelf, Annu. Rep. 1:161-188.
- Felix, N.A. and M.T. Jorgenson. 1985. Effects of winter seismic exploration on the coastal plain, Arctic National Wildlife Refuge, Alaska, 1984. ANRW Progress Report No. FY 85-1 Impacts. Pages 622-694 in: G.W. Garner and P.E. Reynolds, eds. 1984
 Update report baseline study of the fish, wildlife, and their habitats. U.S. Fish and Wildlife Service, Anchorage, Alaska. 777 pp.
- Feltz, E.T., and F.H. Fay. 1966. Thermal requirements in vitro of epidermal cells from seals. Cryobiology 3:261-264.
- Fleck, S., and S. Herrero. 1988. Polar bear-human conflicts. NWT Govt. Contract Rept. No. 3. Yellowknife, NWT. 155 pp.
- Freeman, M.M.R. 1973. Polar bear predation on beluga in the Canadian Arctic. Arctic 26:163-164.
- Fuhs, P. 1992. The polar sea routes: Marco Polo in the 21st century. Follow-up to Northern Sea Route Experts Meeting Tromso, Norway, October 13-14. 12 pp.
- Furnell, D.J., and Oolooyuk. 1980. Polar bear predation on ringed seals in ice-free water. Can. Field-Nat. 94(1)88-89.
- Ganther, H.E., C. Goudie, M.L. Sunde, M.J. Kopecky, P. Wagner, S. Oh, and W. G. Hoekstra. 1972. Selenium: relation to decreased toxicity of methylmercury added to diets containing tuna. Science 175:1122-1124.
- Garner, G.W., and S.T. Knick. 1991. Research on polar bears in western Alaska 1986-1988. Pages 54-61 in: Proc. of the 10th Working Meeting IUCN/SSC Polar Bear Specialist Group, 25-29 October, 1988. Int. Union Conserv. Nature and Nat. Resour., Gland, Switzerland.

- Garner, G.W. and P.E. Reynolds, eds. 1986. Final rep., baseline study of the fish, wildlife and their habitats, Arctic National Wildlife Refuge, Section 1002(c), Alaska National Interest Lands Conservation Act. U.S. Fish and Wildlife Service, Region 7, Anchorage, Alaska. 695 pp.
- Garner, G.W., S.T. Knick, and D.C. Douglas. 1990. Seasonal movements of adult female polar bears in the Bering and Chukchi seas. Int. Conf. Bear Res. and Manage. 8:219-226.
- Garner, G.W., S.C. Amstrup, D.C. Douglas, and C.L. Gardner. 1989. Performance and utility of satellite telemetry during field studies of free-ranging polar bears in Alaska. Proc. Int. Symp. on Biotelemetry 10:67-76.
- Garner, G.W., S.C. Amstrup, I. Stirling, and S.E. Belikov. 1994. Habitat considerations for polar bears in the North Pacific Rim. Trans. of North Am. Wildl. and Nat. Resour. Conf. 59:in press.
- Gloersen, P., W.J. Campbell, D.J. Cavalieri, J.C. Comiso, C. Parkinson, and H.J. Zwally.
 1992. Arctic and Antarctic sea ice, 1978-1987: satellite passive-microwave observations and analysis. NASA Sci. Publ. SP-511. 290 pp.
- Hammill, M.O., and T.G. Smith. 1991. The role of predation in the ecology of the ringed seal in Barrow Strait, Northwest Territories, Canada. J. Mar. Mam. Sci. 7(2):123-135.
- Hanley, P.T., J.E. Hemming, J.W. Morsell, T.A. Morehouse, L.E. Leask, and G.S.
 Harrison. 1981. Natural resource protection and petroleum development in Alaska.
 FWS/OBS-80/22. U.S. Fish and Wildlife Service. 305 pp.
- Hanley, P.T., J.E. Hemming, J.W. Morsell, T.A. Morehouse, L.E. Leask, and G.S.
 Harrison. 1983. A handbook for management of oil and gas activities on lands in Alaska: Petroleum industry practices, environmental impacts and stipulations.
 FWS/OBS-80/23. U.S. Fish and Wildlife Service. 64 pp.
- Hanson, R. 1994. The Northern Sea Route: plain sailing or environmental disaster? WWF Arctic Bul. No. 3.94:10-12.
- Harcharek, R.C. 1993. North Slope Borough 1992 Economic Profile. Vol. VI. North Slope Borough Department of Planning and Community Services, Barrow, AK. 106 pp.
- Harington, C.P. 1968. Denning habits of the polar bear. Can. Wildl. Serv. Rep. 5:1-30.
- Hechtel, J. 1993. Detection systems. Pages 25-34 in: Guidelines for Oil and Gas Operations in Polar Bear Habitats. J.C. Truett, ed. OCS Study MMS 93-0008.

- Heyland, J.D., and K. Hay. 1976. An attack by a polar bear on a juvenile beluga. Arctic 29:56-57.
- Hofman, R.J. 1991. Letter from Robert J. Hoffman, Scientific Program Director, Marine Mammal Commission, to John F. Turner, Director, U.S. Fish and Wildlife Service, regarding whether oil and gas development in the Arctic National Wildlife Refuge would be in conflict with protection of the Beaufort Sea polar bear population and U.S. obligations under the 1976 International Agreement on the Conservation of Polar Bears. September 17, 1991. 3 pp.
- Hood, D.W., and E.J. Kelley. 1974. Introduction. Pages xv-xxi in: Oceanography of the Bering Sea: with emphasis on renewable resources. D.W. Hood, and E.J. Kelley, eds. Inst. of Mar. Sci., Fairbanks, Ak.
- Hurst, R.J., N.A. Øritsland, and P.D. Watts. 1982. Body mass, temperature and cost of walking in polar bears. Acta Physiol. Scand. 115:391-395.
- Inuvialuit Game Council and North Slope Borough Fish and Game Management Committee. 1988. Polar bear management in the Southern Beaufort Sea, an agreement between Inuvialuit Game Council, Inuvik, N.W.T., Canada and North Slope Borough Fish and Game Management Committee, Barrow, Alaska, U.S.A. 13 pp.
- Jacobson, M.J. and C.W. Wentworth. 1982. Kaktovik subsistence, land use values through time in the Arctic National Wildlife Refuge. U.S. Fish and Wildlife Service, Northern Alaska Ecological Services, Fairbanks, Alaska. 142 pp.
- Jonkel, C.J. 1970. Polar bear research in Canada. Proceedings, Conference on Productivity and Conservation in Northern Circumpolar Lands. IUCN Publ. New Ser. 16:150-156.
- Jonkel, C. J., G.B. Kolenosky, R.J. Robertson, and R.H. Russell. 1972. Further notes on polar bear denning habits. Pages 142-158 in S. Herrero, ed. Bears-Their Biology and Management. IUCN Publ. New Ser. 23.
- Kelly, B.P. 1988. Bearded seal, *Erignathus barbatus*. Pages 77-94 *in*: J.W. Lentfer, ed. Selected Marine Mammals of Alaska: Species Accounts with Research and Management Recommendations. Marine Mammal Commission, Washington, D.C.
- Kelly, B.P., and L.T. Quakenbush. 1990. Spatio-temporal use of lairs by ringed seals (*Phoca hispida*). Can. J. Zool. 68(12):2503-2512.

- Kelly, B.P., J.J. Burns, and L.T. Quakenbush. 1988. Responses of ringed seals (*Phoca hispida*) to noise disturbance. Pages 27-38 in: Port and ocean engineering under arctic conditions. Vol. II Symposium on noise and marine mammals. W.M. Sackinger, M.O. Jeffries, J.L. Imm, and S.D. Treacy. The Geophysical Inst, Univ. of Alaska, Fairbanks, Ak.
- Kelly, B.P., L.T. Quakenbush, and J.R. Rose. 1986. Ringed seal winter ecology and effects of noise disturbance. Final rep., OCSEAP Res. Unit 232, Part 2, to U.S. Dep. Commer., NOAA, Natl. Ocean Serv., Ocean Assess. Div., Alaska Office, Anchorage, AK. 91 pp.
- Kelly, B.P., S.C. Amstrup, C. Gardner, and L.T. Quakenbush. 1987. Predation on ringed seals in the western Beaufort Sea. In Abstracts of the 7th Biennial Conference on the Biology of Marine Mammals, Miami, 5-9 Dec. 1987. Society for Marine Mammalogy, Lawrence, KS.
- Kiliaan, H.P.L., and I. Stirling. 1978. Observations on over-wintering walruses in the eastern Canadian High Arctic. J. Mammal. 59:197-200.
- Kingsley, M.C.S., I. Stirling, and W. Calvert. 1985. The distribution and abundance of seals in the Canadian High Arctic, 1980-82. Can. J. Fish. Aquat. Sci. 42:1189-1210.
- Kleinenberg, S.E., A.V. Yablokov, B.M. Bel'kovich, and M.N. Tarasevich. 1964. Beluga (*Delphinapterus leucas*): investigation of the species. Akad. Nauk SSSR, Moscow. 454 pp. (Transl. from Russian by Israel Prog. Sci. Transl., 1969, 376 pp. Avail. Natl. Tech. Inf. Serv., TT67-51345.)
- Koeman, J.H., W.S.M. Van de Ven, J.J.M. De Goeij, P.S. Tjioe, and J.L. Van Haaften. 1975. Mercury and selenium in marine mammals and birds. Sci. Total Environ. 3:279-287.
- Kurten, B. 1964. The evolution of the polar bear, Ursus maritimus Phipps. Acta. Zool. Fennica 108. 30 pp.
- LaBelle, J.C., J.L. Wise, R.P. Voelker, R.H. Schulze, and G.M. Wohl. 1983. Alaska Marine Ice Atlas. AEIDC. Univ. of Alaska. 302 pp.
- Larsen, T. 1985. Polar bear denning and cub production in Svalbard, Norway. J. Wildl. Manage. 49:320-326.
- Lavigne, D.M., and O.J. Schmitz. 1990. Global warming and increasing population densities: a prescription for seal plagues. Mar. Poll. Bull. 21(6):280-284.
- Lentfer, J.W. 1972. Polar bear sea ice relationships. Pages 165-171 in S. Herrero, ed. Bears - their biology and management. IUCN Publ. New Ser. 23.

Lentfer, J.W. 1974a. Polar bear reproductive biology and denning. Alaska Dep. Fish and Game, Pittman-Robertson Proj. Rep. W-17-3 and W-17-4. 32 pp.

1 (23)

- Lentfer, J.W. 1974b. Discreetness of Alaskan polar bear populations. Proc. Int. Cong. Game Biol. 11:323-329.
- Lentfer, J.W. 1975a. Polar bear denning on drifting sea ice. J. Mammal. 56:716-718.
- Lentfer, J.W. 1976a. Environmental contaminants in polar bears, Job. No. 5.5R. Alaska Dept. Fish and Game. 22 pp.
- Lentfer, J.W. 1976b. Polar bear reproductive biology and denning. Alaska Dep. Fish and Game, Pittman-Robertson Proj. Rep. W-17-4. 22 pp.
- Lentfer, J.W. 1982. Polar bear (Ursus maritimus). Pages 557-566 in J.A. Chapman and G.A. Feldhamer, eds. Wild Mammals of North America: Biology, Management, and Economics. The Johns Hopkins University Press, Baltimore.
- Lentfer, J.W. 1983. Alaska polar bear movements from mark and recovery. Arctic. 36:282-288.
- Lentfer, J.W. (convener). 1990. Workshop on measures to assess and mitigate the adverse effects of arctic oil and gas activities on polar bears. 24-25 January 1989. Anchorage, Alaska. 39 pp.
- Lentfer, J.W. 1991. Written testimony for the House Subcommittee on Fisheries and Wildlife Conservation and the Environment, Public Hearing on H.R. 1320 and H.R. 759. Presented by Jack W. Lentfer, June 11, 1991. 4 pp.
- Lentfer, J.W., and R.J. Hensel. 1980. Alaskan polar bear denning. Pages 101-108 in C.J. Martinka and K.L. McArthur, eds. Bears - their biology and management. Fourth International Conf. of Bear Res. and Manage. U.S. Gov. Print. Off., Washington, D.C.
- Lentfer, J.W., R.J. Hensel, J.R. Gilbert, and F.E. Sorensen. 1980. Population characteristics of Alaskan polar bears. Pages 102-115 in: C.J. Martinka and K.L. McArthur, eds. Bears-their biology and management. Fourth International Conference on Bear Research and Management. U.S. Gov. Print. Off., Washington, D.C.
- Lønø, O. 1970. The polar bear (Ursus maritimus Phipps) in the Svalbard area. Nor. Polarinst. Skr. 149. 103 pp.

Lowry, L.F., J.J. Burns, and R.R. Nelson. 1987. Polar bear, Ursus maritimus, predation on belugas, Delphinapterus leucas, in the Bering and Chukchi seas. Canadian Field-Naturalist 101(2):141-146.

888C775-

en si

- Lunn, N.J., and G.B. Stenhouse. 1985. An observation of possible cannibalism by polar bears (Ursus maritimus). Can. J. Zool. 63:1516-1517.
- Lunn, N.J., and I. Stirling. 1985. The ecological significance of supplemental food to polar bears during the ice-free period of western Hudson Bay. Can. J. Zool. 63:2291-2297.
- Manning, T. 1971. Geographical variation in the polar bear (Ursus maritimus Phipps). Can. Wildl. Serv. Rep. Ser. 13. 27 pp.
- Martin, S.K., and C.J. Jonkel. 1983. Use of sea ice habitat by polar bears. Int. Conf. Bear Res. and Manage. 5:255-259.
- McLaren, I.A. 1958. The biology of the ringed seal (*Phoca hispida* Schreber) in the eastern Canadian Arctic. Fish. Res. Board Can. Bull. 118. 97 pp.
- Messier, F., M.K. Taylor, and M.A. Ramsay. 1992. Seasonal activity patterns of female polar bears (*Ursus maritimus*) in the Canadian Arctic as revealed by satellite telemetry. J. Zool. Lond. 226:219-229.
- Monastersky, R. 1993. Hazard from Soviet nuclear dumps assessed. Science News 143:310-311.
- Nageak, B.P., C.D.N. Brower, and S.L. Schliebe. 1991. Polar bear management in the southern Beaufort Sea: an agreement between the Inuvialuit Game Council and North Slope Borough Fish and Game Committee. Trans. N. Am. Wildl. and Nat. Res. Conf. 56:337-343.
- Neff, J.M. 1990. Composition and fate of petroleum and spill-treating agents of the marine environment. Pages 1-33 *in*: Sea Mammals and Oil: Confronting the Risks. J.R. Geraci and D.J. St. Aubin, eds. Academic Press, San Diego, CA.
- Nelson, R.K. 1969. Hunters of the Northern Ice. University of Chicago Press. Chicago IL. 429 pp.
- Norheim, G., J.U. Skaare, and Ø. Wiig. 1992. Some heavy metals, essential elements, and chlorinated hydrocarbons in polar bear (*Ursus maritimus*) at Svalbard. Environ. Poll. 77:51-57.
- Norstrom, R.J. 1993. Contaminant trends in polar bears. Pages 120-126 in: J.L. Murray and R.G. Shearer, eds. Environmental Studies No. 70: Synopsis of Research Conducted Under the 1991/93 Northern Contaminants Program. Ottawa.

- Norstrom, R.J., R.E. Schweinsberg, and B.T. Collins. 1986. Heavy metals and essential elements in liver of the polar bear (*Ursus maritimus*) in the Canadian arctic. Sci. Total Environ., 48:195-212.
- Norstrom, R.J., M. Simon, D.C.G. Muir, and R.E. Schweinsburg. 1988. Organochlorine contaminants in arctic marine food chains: identification, geographical distribution, and temporal trends in polar bears. Environ. Sci. Technol. 22:1063-1071.
- Northwest Arctic Borough. 1994. Revised Coastal Management Plan. 1994. Public Hearing Draft. Prep. by The Northwest Arctic Borough Planning Dep. and Northwest Alaska Planning and Consulting Services. v.p.
- Øritsland, N.A., F.R. Engelhardt, F.A. Juck, R.A. Hurst, and P.D. Watts. 1981. Effects of crude oil on polar bears, Environ. Stud. Rep. No. 24. Northern Affairs Program Dept. of Indian Affairs and Northern Development, Ottawa, Ontario, Canada.

Øritsland et al. 1982. Oil and bears. p. 47.

Papanin, I. 1939. Life on an ice-floe. Hutchinson, London. 240 pp.

- Parovschikov, V.J. 1964. Breeding of the polar bear on the Franz Josef archipelago. Bull. Moscow Soc. Nat. 69:127-129. (In Russian).
- Parovschikov, V.J. 1968. Polar bear on Franz Josef Land. Problems of the North 11:179-192.
- Pedersen, S., M. Coffing, and J. Thompson. 1985. Subsistence land use and place names maps for Kaktovik, Alaska. Technical Paper No. 109. Alaska Department of Fish and Game, Fairbanks. 140 pp.
- Pitman, R.W. 1984. Tidal data from the Bering, Chukchi, and Beaufort seas. U.S. Dept. Comm./Nat. Ocn. and Atmos. Admin., OSCEAP Fin. Rep. 41(1986):147-207.
- Ramsay, M.A., and I. Stirling. 1988. Reproductive biology and ecology of female polar bears (Ursus maritimus). J. Zool. (Lond). 214:601-634.
- Ramsay, M.A., and I. Stirling. 1986. Long-term effects of drugging and handling freeranging polar bears. J. Wildl. Manage. 50:619-626.
- Revkin, A.C. 1989. Endless summer: living with the greenhouse effect. Discover 9(10):50-61.
- Rose, F. 1992. ARCO oil find in Beaufort Sea is likely to renew debate over wildlife refuge. The Wall Street Journal, October 15, 1992.

- Russell, R.H. 1975. The food habits of polar bears of James Bay and southwest Hudson Bay in summer and autumn. Arctic 28:117-129.
- Schliebe, S.L. 1985. Summary of Alaskan polar bear Native subsistence harvest. U.S. Fish and Wildlife Service, Marine Mammal Project, unpubl. report. Anchorage, Alaska. 15 pp.
- Schliebe, S. L. and T. J. Evans. 1993. Summary of polar bear management in Alaska. In: Proceedings of the 11th working meeting of the IUCN/SSC Polar Bear Specialists Group. January 25-30, 1993.
- Schliebe, S.L. 1989. Occurrence and distribution of walrus and other marine mammal carcasses along western Alaska beaches in the Chukchi Sea: August 1989. Unpubl. U.S. Fish and Wildlife Service Rep. 8 pp.
- Scholander, P.R., V. Walters, R. Hock, and L. Irving. 1950. Heat regulation in some arctic and tropical mammals and birds. Bibl. Bull. 99:225-236.
- Schweinsburg, R.E., and L.J. Lee. 1982. Movement of four satellite-monitored polar bears in Lancaster Sound, Northwest Territories. Arctic. 35:504-511.
- Shideler, D. 1993. Attraction to human activity. Pages 17-23 in: Guidelines for Oil and Gas Operations in Polar Bear Habitats. J. Truett, ed. OCS Study, MMS 93-0008. Washington, D.C.
- Slemr, F., and E. Langer. 1992. Increase in global atmospheric concentrations of mercury inferred from measurements over the Atlantic Ocean. Nature 355:434-437.
- Smith, M. and B. Rigby. 1981. Distribution of polynas in the Canadian Arctic. In: Stirling, I., and H. Cleator, eds. Polynyas in the Canadian Arctic. Occasional Paper No. 45. Edmonton: Canadian Wildlife Servic. 7-27.
- Smith, R.C., B.B. Prezelin, K.S. Baker, R.R. Bidigare, N.P. Boucher, T. Coley, D. Karentz, S. Mackintyre, H.A. Matlick, D. Menzies, M. Ondrusek, Z. Wan, and K.J. Waters. 1992. Ozone depletion: Ultraviolet radiation and phytoplankton biology in antarctic waters. Science 255:952-959.
- Smith, T.G. 1980. Polar bear predation of ringed and bearded seals in the land-fast sea ice habitat. Can. J. Zool. 58(12):2201-2209.
- Smith, T.G., and I. Stirling. 1975. The breeding habitat of the ringed seal (*Phoca hispida*). The birth lair and associated structures. Can. J. Zool. 53:1297-1305.
- Smith, T.G., and I. Stirling. 1978. Variation in the density of ringed seal (*Phoca hispida*) birth lairs in the Amundsen Gulf, Northwest Territories. Can. J. Zool. 56:1066-1070.

- Smith, T.G., M.O. Hammill, and G. Taugbøl. 1991. A review of the developmental, behavioral, and physiological adaptations of the ringed seal, *Phoca hispida*, to life in the arctic winter. Arctic 44:124-131.
- State of Alaska, Division of Oil and Gas. 1992. Sale announcement, State of Alaska, Competitive oil and gas lease sale 68 (Beaufort Sea), includes mitigation measures. February 25, 1992. 15 pp.
- State of Alaska, Division of Oil and Gas. 1991. Sale announcement, State of Alaska, Competitive oil and gas lease sale 61 (White Hills), includes mitigation measures. October 22, 1991. 14 pp.
- Stefansson, V. 1921. The friendly Arctic. Macmillan, New York. 361 pp.
- Stenhouse, G.B., L.J. Lee, and K.G. Poole. 1988. Some characteristics of polar bears killed during conflicts with humans in the Northwest Territories, 1976-86. Arctic 41(4):275-278.
- Stirling, I. 1974. Midsummer observations on the behavior of wild polar bears (Ursus maritimus). Can. J. Zool. 52:1191-1198.
- Stirling, I. 1980. The biological importance of polynyas in the Canadian Arctic. Arctic 33(2):303-315.
- Stirling, I. 1988. Attraction of polar bears Ursus maritimus to offshore drilling sites in the eastern Beaufort Sea. Polar Record 24(148):1-8.
- Stirling, I. 1990. Polar bears and oil: ecologic perspectives. Pages 223-234 in: J.R. Geraci and D.J. St. Aubin, eds. Sea Mammals and Oil: Confronting the Risks. Acad. Press. San Diego CA.
- Stirling, I., and D. Andriashek. 1992. Terrestrial maternity denning of polar bears in the eastern Beaufort Sea area. Arctic 45:363-366.
- Stirling, I., and W.R. Archibald. 1977. Aspects of predation of seals by polar bears. J. Fish. Res. Board Can. 34:1126-1129.
- Stirling, I., and A.E. Derocher. 1993. Possible impacts of climatic warming on polar bears. Arctic 46(3):240-245.
- Stirling, I., and P.B. Latour. 1978. Comparative hunting abilities of polar bear cubs of different ages. Can. J. Zool. 56:1768-1772.

- Stirling, I., and E.H. McEwan. 1975. The caloric value of whole ringed seals (*Phoca hispida*) in relation to polar bear (*Ursus maritimus*) ecology and hunting behavior. Can. J. Zool. 53:1021-1027.
- Stirling, I., and T.G. Smith. 1975. Interrelationships of Arctic Ocean mammals in the sea ice habitat. Proc. Circumpolar Conf. North. Ecol., Ottawa, Can. 2:129-136.
- Stirling, I., D. Andriashek, and W. Calvert. 1981. Habitat preferences and distribution of polar bears in the western Canadian Arctic. Final rep. to Dome Petroleum Ltd., Esso Resources Canada Ltd., and Canadian Wildlife Service. 49 pp.
- Stirling, I., W.R. Archibald, and W. Calvert. 1993. Habitat preferences of polar bears in the western Canadian Arctic in late winter and spring. Polar Record 29:13-24.
- Stirling, I., W. Calvert, and D. Andriashek. 1984. Polar bear (Ursus maritimus) ecology and environmental considerations in the Canadian High Arctic. Pp. 201-222 in R. Olson, F. Geddes, and R. Hastings, eds. Northern ecology and resource management. Univ. Alberta Press, Edmonton.
- Stirling, I., H. Cleator, and T.G. Smith. 1981. Marine mammals. Pages 45-58 in: I. Stirling and H. Cleator, eds. Polynyas in the Canadian Arctic. Occasional Paper No. 45. Canadian Wildlife Service, Edmonton, Alberta.
- Stirling, I., M.C.S. Kingsley, and W. Calvert. 1982. The distribution and abundance of seals in the eastern Beaufort Sea, 1974-1979. Occasional Paper No. 7. Ottawa: Canadian Wildlife Service. 25 pp.
- Stirling, I., A.M. Pearson, A.M., and F.L. Bunnell. 1976. Population ecology studies of polar and grizzly bears in northern Canada. Transactions of the North American Wildlife and Natural Resources Conference 41:421-429.
- Stirling, I., D. Andriashek, P. Latour, and W. Calvert. 1975. The distribution and abundance of polar bears in the eastern Beaufort Sea. Dep. Environ., Victoria, B.C., Beaufort Sea Tech. Rep. 2. 59 pp.
- Stirling, I., C. Jonkel, P. Smith, R. Robertson, and D. Cross. 1977. The ecology of the polar bear (Ursus maritimus) along the western coast of Hudson Bay. Occasional Paper 33. Ottawa: Canadian Wildlife Service. 64 pp.
- Stishov, M.S. 1991. Results of aerial counts of the polar bear dens on the Arctic coasts of the extreme northeast Asia. Pages 90-92 in: S.C. Amstrup and O. Wiig, eds. Polar bears. Int. Union Conserv. Nature Nat. Resour., Species Survival Comm. Occasional Paper 7. 107 pp.

- Stringer, W.J., S. Barrett, and L. Schreurs. 1980. Nearshore ice conditions and hazards in the Beaufort, Chukchi, and Bering seas. Geophysical Institute, University of Alaska, Fairbanks, AK. UAGR No. 274. 161 pp.
- Stringer, W. J. and J. E. Groves. 1991. Location and areal extent of polynyas in the Bering and Chukchi Seas. Arctic. 44: supp. 1, 164-171.
- Taugbøl, G. 1982. Ringed seal thermoregulation, energy balance and development in early life, a study on *Pusa hispida* in Kongsfjord, Svalbard. Unpubl. thesis, 102 pp. (Transl. from Norwegian by Can. Fish. Aquat. Sci., No. 5090, 1984, 109 pp)
- Taylor, M.K. 1982. The distribution and abundance of polar bears (Ursus maritimus) in the Beaufort and Chukchi seas. PhD dissertation, Univ. of Minnesota, Minneapolis.
- Taylor, M.K., T. Larsen, and R.E. Schweinsburg. 1985. Observations of intraspecific aggression and cannibalism in polar bears (Ursus maritimus). Arctic 38:303-309.
- Taylor, D.L., S. Schliebe, and H. Metsker. 1989. Contaminants in blubber, liver and kidney tissue of Pacific walruses. Mar. Pollut. Bull. 20:465-469.
- Taylor, M.K., D.P. DeMaster, F.L. Bunnell, and R.E. Schweinsburg. 1987. Modeling the sustainable harvest of female polar bears. J. Wildl. Manage. 51:811-820.
- Tremaine, R. 1993. Preparation of site-specific bear interaction plan. Pages 85-87 in: Guidelines for Oil and Gas Operations in Polar Bear Habitats. J.C. Truett, ed. OCS Study MMS 93-0008.
- Turner, J.F. 1991. Letter from John F. Turner, Director, U.S. Fish and Wildlife Service, responding to September 17, 1991, letter from Robert J. Hoffman, Scientific Program Director, Marine Mammal Commission, regarding Service polar bear management and research activities. October 17, 1991. 8 pp.

Twitchell, K. 1991. The not-so-pristine Arctic. Canadian Geographic 53-60.

- U.S. Fish and Wildlife Service. 1991. Final Environmental Assessment: Final rule to authorize the incidental take of small numbers of walruses and polar bears during open water oil and gas exploration in the Chukchi Sea, and Finding of No Significant Impact. June 1991. Department of the Interior, U.S. Fish and Wildlife Service. 55 pp.
- U.S. Fish and Wildlife Service. 1994. Conservation plan for the polar bear. Marine Mammals Management, U.S. Fish and Wildlife Service, Anchorage, Alaska. 79 pp.

- U.S. Minerals Management Service. 1989. Arctic area oil and gas activities. Plate 1 of 3. U.S. Department of the Interior, Minerals Management Service, Alaska Summary/Index. 12/89.
- U.S. Minerals Management Service. 1993. Guidelines for Oil and Gas Operations in Polar Bear Habitat. J.C. Truett, ed. OCS Study MMM 93-0008.
- Uspenski, S.M. 1965. Distribution, number, and preservation of the white polar bear in the Arctic. Bull. Moscow Soc. Nat. 70:18-24. (English summary).
- Uspenski, S.M., and A.A. Kistchinski. 1972. New data on the winter ecology of the polar bear (*Ursus maritimus*) on Wrangel Island. Pages 181-197 in S. Herrero, ed. Bears their biology and management. IUCN Publ. New Ser. 23.
- Uspenski, S.M., S.E. Belikov, and A.G. Kupriyanov. 1980. Polar bear research and conservation in the U.S.S.R., 1975-76. in Proceedings of the Sixth Working Meeting of the IUCN Polar Bear Specialists Group, Switzerland, 1976:178-86.
- Walker, D.A., K.R. Everett, P.J. Webber, and J. Brown. 1980. Geobotanical atlas of the Prudhoe Bay region, Alaska. U.S. Army Corp. Engineers, CRREL Report 80-14.
- Warburton J., and D.J. Seagars. 1993. Heavy Metal Contrations in the Liver and Kidney Tissues of Pacific Walrus. USFWS Technical Report. R7/MMM 93-1.
- Weiss, H.V., M. Koide, and E.D. Goldberg. 1971. Mercury in a Greenland ice sheet: evidence of recent input by man. Science 174:692-694.
- Wilson, D.E. 1976. Cranial variation in polar bears. Pages 447-453 in M.R. Pelton, J.W. Lentfer, and G.E. Folk, eds. Bears their biology and management. IUCN Publ. New Ser. 40.
- Wilson, D.E., S.D. Pace, P.D. Carpenter, H. Teas, T. Goddard, P. Wilde, and P. Kinney. 1982. Nearshore coastal currents - Chukchi Sea, Summer 1981. U.S. Dept. Comm./Nat. Ocn. and Atmos. Admin., OSCEAP Final Rep. 41(1986):209-519.
- Woodby, D.A., and G.J. Divoky. 1982. Spring migration of eiders and other waterbirds at Point Barrow, Alaska. Arctic 35:403-410.

Personal Communications and Sources of Unpublished Data

- S. Amstrup, National Biological Survey, Anchorage, Alaska
- C. Brower, North Slope Borough, Department of Wildlife Management, Barrow, Alaska
- G. Divoky, Seattle, Washington
- T. Eley, Koyukuk/Nowitna National Wildlife Refuge, Galena, Alaska
- G. Garner, National Biological Survey, Anchorage, Alaska
- J. George, North Slope Borough, Department of Wildlife Management, Barrow, Alaska
- B. Kelly, Institute of Marine Science, University of Alaska, Fairbanks, Alaska
- M. Iya, Alaska Walrus Commission, Deceased
- J. Lentfer, Marine Mammal Commission, Homer, Alaska
- C. Pungowiyi, International Circumpolar Conference
- L. Quakenbush, U.S. Fish and Wildlife Service, Fairbanks, Alaska
- S. Schliebe, U.S. Fish and Wildlife Service, Anchorage, Alaska
- D. Shideler, Alaska Department of Fish and Game, Fairbanks, Alaska
- R. Suydam, North Slope Borough, Department of Wildlife Management, Barrow, Alaska

This page intentionally blank

RAZ^C

क्रा

676

1.

Reserved

have....t

9520

BETA

eser-

٨c

8337

Rag-

Rare?

80-0

.

Appendix A: Native Knowledge of Polar Bear Habitat Use

(mana)

(5) (S)

1

177.78

CHARGE.

TABLE OF CONTENTS

List of Tables A-2		
List of Figures A - 2		
1.	Objectives A-4	
2.	Habitat Use AreasA - 5a.St. Lawrence Island (Gambell and Savoonga)A - 5b.Little DiomedeA - 7c.WalesA - 8d.ShishmarefA - 9e.KotzebueA - 10f.KivalinaA - 10g.Point HopeA - 11h.Point LayA - 12j.BarrowA - 14k.NuiqsutA - 15l.KaktovikA - 16	
3.	Additional Concerns and Issues Raised by Hunters During Collection of Native Knowledge A - 17	

List of Tables

Table 1.Native Polar bear hunters consulted in coastal Alaska, 1994.

List of Figures

Figure A-1.	General location for collection of Native knowledge.
Figure A-2.	Areas used by polar bears in fall/winter as identified by 8 hunters from St
-	Lawrence Island, Alaska.
Figure A-3.	Areas used by polar bears in spring/summer as identified by 8 hunters from St.
	Lawrence Island, Alaska.
Figure A-4.	Areas used by polar bears in fall/winter as identified by 3 hunters from Little
	Diomede Island, Alaska.
Figure A-5.	Areas used by polar bears in spring/summer as identified by 3 hunters from Little
	Diomede Island, Alaska.
Figure A-6.	Areas used by polar bears in fall/winter as identified by 4 hunters from Wales, Alaska.
Figure A-7.	Areas used by polar bears in spring/summer as identified by 4 hunters from
U	Wales, Alaska.
Figure A-8.	Areas used by polar bears in fall/winter as identified by 5 hunters from
-	Shishmaref, Alaska.
Figure A-9.	Areas used by polar bears in spring/summer as identified by 5 hunters from
-	Shishmaref, Alaska.
Figure A-10.	Areas used by polar bears in fall/winter as identified by 4 hunters from Kivalina,
	Alaska.
Figure A-11.	Areas used by polar bears in spring/summer as identified by 4 hunters from
	Kivalina, Alaska.
Figure A-12.	Areas used by polar bears in fall/winter as identified by 6 hunters from Point
	Hope, Alaska.
Figure A-13.	Areas used by polar bears in spring/summer as identified by 6 hunters from Point
	Hope, Alaska.
Figure A-14.	Areas used by polar bears in fall/winter as identified by 6 hunters from Point Lay, Alaska.
Figure A-15.	Areas used by polar bears in spring/summer as identified by 6 hunters from Point
	Lay, Alaska.
Figure A-16.	Areas used by polar bears in fall/winter as identified by 7 hunters from
	Wainwright, Alaska.
Figure A-17.	Areas used by polar bears in spring/summer as identified by 7 hunters from
T ' 4 10	Wainwright, Alaska.
Figure A-18.	Areas used by polar bears in fall/winter as identified by 6 hunters from Barrow,
Figure A 10	Alaska.
rigure A-19.	Areas used by polar bears in spring/summer as identified by 6 numers from
	Dallow, Alaska.

1080-T

ക്രം

r

9971

1980), ⁻
- Figure A-20. Areas used by polar bears in fall/winter as identified by 7 hunters from Nuiqsut, Alaska.
- Figure A-21. Areas used by polar bears in spring/summer as identified by 7 hunters from Nuiqsut, Alaska.
- Figure A-22. Areas used by polar bears in fall/winter as identified by 5 hunters from Kaktovik, Alaska.
- Figure A-23. Areas used by polar bears in spring/summer as identified by 5 hunters from Kaktovik, Alaska.

1. Objectives

The primary objective of the Native knowledge survey was to identify polar bear habitat use areas within hunter habitat use (i.e., subsistence) areas for each village. Villages were selected for their consistent pattern of harvest and location within polar bear habitat. Selected villages represent a sample of Alaskan communities with polar bear hunters and experts.

Information was collected through discussions with hunters selected by their villages for their intimate knowledge of local polar bear ecology and habitat use. Oral information was recorded in writing; spatial information was recorded on maps. A total of 61 hunters were contacted (Table 1). Participation was voluntary. The Service conducted follow up visits to each village (except Barrow and Kaktovik) to verify interpretation of collected information.

No attempt to quantify the local knowledge was made by the Service, cooperating parties, or any Alaskan Native participants. Due to financial, regulatory, and time constraints, the Service was unable to attempt a formal sampling strategy. Rather, collection of local knowledge in the Strategy represents a baseline information gathering mission.

Map information was digitized into a Geographical Information System (GIS) using ARC/ INFO software. Maps illustrate polar bear seasonal movements, denning and feeding areas that occur in the Bering, Chukchi and Beaufort seas. Spring and summer activities were combined, as were fall and winter.

Information presented here has some limitations that warrant further discussion. Polar bear habitat is highly variable. Ice is directly affected by wind and ocean currents. When wind direction changes, lead systems and ice edges can change dramatically and alter the accessibility and desirability of the area to polar bears. Denning locations are related to snow depth and deposition which vary annually. Hunter responses often reflected this through such statements as "Bears den wherever there are high enough snowdrifts" or "This lead is present when the wind blows from the south". Therefore, shaded areas on maps should be interpreted as approximations of that habitat type, rather than definitive locations.

Information reflects polar bear habitat use areas where hunters spend most of their time, and does not reflect habitat use in areas that are inaccessible or unused by hunters. For example, denning areas are most often observed along coastlines or river drainages, which also represent hunters' travel corridors, particularly between villages and camps. Furthermore, individual responses varied according to hunting range and experience of each hunter. Shaded areas on maps represent combined hunter information, which may have diminished the accuracy of individual responses.

Village	Total Number of Hunters	Active	Elder	Number of Hunters who Verified
Barrow	6	4	2	0
Gambell	4	3	11	4
Kaktovik	5	3	2	0
Kivalina	4	3	1	2
Little Diomede	3	2	11	2
Nuiqsut	7	5	22	2
Point Hope	66	33	3	4
Point Lay	6	4	2	3
Savoonga	4	33	1	3
Shishmaref	5	4	1	2
Wainwright	7	2	5	5
Wales	4	3	1	2
TOTAL	61	39	22	29

Table A-1. Native polar bear hunters consulted in coastal Alaska, 1994.

2. Habitat Use Areas

a. St. Lawrence Island (Gambell and Savoonga)

Hunters from Gambell and Savoonga described polar bear habitat use on and around St. Lawrence Island. Gambell hunters tend to use areas between Gambell and Southwest Cape; Savoonga hunters tend to use areas between Savoonga and Southeast Cape. However, there is a significant amount of overlap and both villages use the south side of St. Lawrence, including the Punuk Islands.

Seasonal Movements

Polar bears typically arrive on St. Lawrence Island with advancing pack ice in December. Hunters report that when winds blow from the west, south, southeast or southwest in winter, fewer bears occur on land. Bears approach the island from any direction and also occasionally summer over, as evidenced by tracks in 1982 and again in the late 1980's, as well as in 1994.

Once on land, bears often travel in loose groups during dark hours. Between December and March bears are frequently seen near Gambell (Troutman Lake), Booshu Camp, Niyrakpak Lagoon, river drainages on the Putgut Plateau (Okok, Kookoolitok rivers and Kaklongegek Creek), Silook Camp, Kookooligit Mountains, Oomeyaluk Bay (Fossil and Ongoyeyuk river drainages), Maknek River drainage, and Northeast Cape area.

In spring, most bears move in the transition zone and along leads on both the east and west side of St. Lawrence Island 5-20 mi offshore. Bears also move from the Southwest Cape area (Singikpak Point, Boxer Bay and Impaghuk Point) and Powooiliak Bay north across the Putgut Plateau. On the east end of St. Lawrence Island bears have been observed moving north from the Maknik Lagoon area. Hunters report that bears tend to follow creeks and drainages, but have also been observed on high ridges in the mountains.

8075-.

Feeding

Polar bears can be found anywhere on St. Lawrence Island, eating a variety of foods. Reports include bears eating walrus, crabs, clams, and squirrels. One hunter observed a polar bear trying to catch ravens; another reported harvesting a polar bear full of oldsquaw. Another hunter reported a sighting of a polar bear rolling up and eating seaweed. Their preferred food source, however, is seal blubber.

In fall, bears are frequently observed along the entire coastline feeding on whale, seal, and walrus carcasses, especially between Gambell and Southwest Cape, Powooiliak and Oomeyaluk bays, between Southeast and Northeast capes, and around the Punuk Islands. The shore-fast ice edge around the Punuk Islands and between Southeast Cape and Northeast Cape is also used by polar bears to hunt ringed seals and walrus between December and April. In addition, Northwest, Southeast, and Northeast capes were identified as areas where ice breaks and bears hunt for ringed seals, often within 5 mi of shore.

Although highly variable, some recurring leads were identified as areas where polar bears have often been observed feeding on ringed seals and/or walrus, 1-10 mi offshore. Bears were observed most frequently from December to March between Northeast Cape and Savoonga (north of Sevak Camp and Kintanga Bay), and between Savoonga and Gambell (north of Kangee and Apatiki camps).

Denning

Only one known maternity den was reported for St. Lawrence Island. This den was observed in March, between 1955 and 1960 in the Kookooligit Mountains south of Savoonga, approximately one mile south of Atuk Lake. Several islanders identified Powooiliak Camp near Southwest Cape as a former denning and summer use area for bears, as well as an abandoned village site, dating back to the 1800's. In addition, shelter dens are common around St. Lawrence Island. The most recent sighting occurred in January, 1994, 1-2 mi southeast of Gambell.

One respondent attributes the minimal maternity denning to noise pollution; another to the lack of snow and the fact that the bears arrive (with the ice) on St. Lawrence Island too late in the season to establish dens. One hunter stated that winter is starting later in the last few years, resulting in more open and warmer water later in the year.

b. Little Diomede

Hunters from Little Diomede described polar bear habitat use around and between Little and Big Diomede islands, and south to Fairway Rock.

Seasonal Movements

In fall, hunters observe polar bears moving south with advancing ice. In winter, bears move around and between the islands in all directions and have also been seen in the village and along shore-fast ice. In spring, bears are often observed south of the islands along open water, the extent of which varies with wind and currents. Overall, bears begin to move north both between the islands and along the east side of Little Diomede, as well as on pack ice moving with the main current, approximately half way between the Diomedes and the mainland.

Feeding

Between October and December, bears have been observed feeding on seals on the east side of Little Diomede in polynyas and leads in the transition zone. The extent of open water depends on winds and currents and is highly variable. In spring, on the south side of the Diomedes, leads and polynyas occur in the transition zone, often within one mile of shore. Bears have been observed feeding on ringed and spotted seals between March and May.

Denning

A female with cubs was observed at a maternity den in March, 1990, on the east side of Little Diomede, where a large valley meets the coast. The den was

excavated in a snowdrift approximately 50 feet above sea level and was approximately 3-4 feet high, with two chambers each approximately 13 feet long, and the opening facing east. Additional dens were reported in this area (1937-38, 1970's, 1993), but additional information is necessary to determine whether these were shelter or maternity dens.

c. Wales

Hunters from Wales described polar bear habitat use between Lost River and Ikpek.

Seasonal Movements

Polar bears arrive along the coast between Wales and Ikpek in November/December when the pack ice advances from the north. A large influx of bears appear first; gradually numbers taper off.

Bears have been observed by both Wales and Shishmaref hunters between December and June moving across land between York and Ikpek. Bears head north when wind is from the north, and vice versa, presumably using their sense of smell to hunt. Generally, bears leave the coast and move north with the receding pack ice between April and June when the winds are usually from the southwest.

Feeding

Bears have often been observed between November and May on the coast between Wales and Ikpek feeding on stranded beluga, gray, sei (*Balaenoptera borealis*), minke (*Balaenoptera acutorostrata*) and bowhead whale, walrus, and spotted (*Phoca largha*), bearded and ringed seal carcasses, and in spring, along edges of shore-fast ice feeding on seals. The extent of shore-fast ice during these months varies but is usually 2-10 mi. The coastline between Tin City and the mouth of the Lost River is less frequently used by bears. Bears have been observed between November and May, but only when wind is from the south or southwest.

Denning

In January or February, between 1983 and 1986, two dens were observed 15-20 mi northeast of Wales. Both dens were excavated into snowdrifts 10-15 ft. high with openings facing northwest. Several years later, in March, 1991, another den was observed in a snowdrift at the second inlet northeast of Wales and a quarter of a mile inland when a hunter fell through the roof! Two hunters also reported

\$3700

knowledge of a den along Mint River although they had not actually observed the den themselves.

Shelter dens and overnight scrapes have been observed along the coast near Tin City and between Wales and Shishmaref in snowdrifts and when pack ice advances enough to cause pressure ridges.

d. Shishmaref

Hunters from Shishmaref described polar bear habitat use between Ikpek Lagoon and the Northwest Corner lighthouse (approximately half way between Singeak and Cape Espenberg).

Seasonal Movements

Bears arrive along the coast between November and January with the advancing pack ice, when wind is predominantly from the north. Bears have also been observed travelling inland in April-June between York and Ikpek, as described by Wales hunters. Most observations occurred along river drainages, namely the Mint, Pinguk, Kugrupaga and Nuluk rivers and Trout Creek. Bears leave the coast between March and June with the receding pack ice.

Feeding

In fall, polar bears have been observed feeding on walrus and whale carcasses between November and January along barrier islands between Ikpek Lagoon and Singeak. Bears have also been reported near drying racks and seal oil caches in Shishmaref, between December and March. Between January and May, after a strong south wind, shore-fast ice drifts out and refreezes approximately 5-30 mi offshore (transition zone) between Singeak and Lopp Lagoon. Bears hunt seals in leads and along edges of this habitat.

Denning

No maternity dens were identified by Shishmaref hunters. One hunter stated that females den further south or out on ice; by the time they arrive on the coast near Shishmaref they are already travelling with their cubs.

Prior to the 1960's shelter dens were frequently observed 20-30 mi out when travel on ice was possible with use of dog teams. Shelters were located in pressure ridges and behind ice blocks facing away from the prevailing wind.

e. Kotzebue

The Kotzebue (Indian Reorganization Act) (IRA) Council informed the Service that hunters in Kotzebue declined participation in this project. Therefore, no information was collected in Kotzebue.

f. Kivalina

Hunters from Kivalina described polar bear habitat use between Kotlik Lagoon (Kiligmak Inlet) and Chariot.

Seasonal Movements

Bears have been observed approaching and travelling along the coast between November and February, especially near Cape Seppings, when wind blows from the west. In spring, bears are observed more frequently along offshore leads and the receding pack ice. Between 1974 and 1992, winter observations include sightings of bears in the Wulik River area, as far inland as 20 mi, once eating from a stored fish cache, and once on a moose/caribou carcass. It is unclear whether bears travel inland seasonally i.e., possibly to look for den locations, or whether these bears were drawn inland to camps to investigate possible food sources.

Feeding

In January/February, polar bears have been observed feeding along the coast on walrus, bearded and ringed seal carcasses between Chariot and Kotlik Lagoon (Kiligmak Inlet). Bears have also been observed near the Kivalina dump on numerous occasions. In addition, a nearshore lead occurs in winter, 2-10 mi offshore. This lead occurs in active, young ice and is usually closer to land in winter when wind blows from the west, and farther offshore in spring. One hunter said that if this lead closes up during heavy north, south, or east winds, bears will make a hole in the ice for seals to use. A second lead also develops between Point Hope and Shishmaref, approximately 30-40 mi offshore. This lead to remain open between January and May, even when ice is close against the land. Hunters report that this lead is where most bears occur in spring, travelling north.

Denning

No dens were reported by Kivalina hunters. Most bears are believed to den on the pack ice side of the lead system that occurs 30-40 mi offshore.

g. Point Hope

Hunters from Point Hope described polar bear habitat use between Crowbill Point near Chariot and Corwin Bluffs, east of Cape Lisburne.

Seasonal Movements

In late November/early December, polar bears advance south and east with the pack ice towards the coast between Point Hope and Cape Lisburne. In spring (May/June), bears move offshore and north with the receding pack ice.

Feeding

Between December and February bears have been observed feeding on walrus and whale carcasses along the coast between Crowbill Point and Corwin Bluffs, and along barrier islands immediately north and south of Point Hope. Adjacent shore-fast ice, typically extending 3-5 mi out, is also used to feed on seals during late winter/early spring months. During breakup, (March-June), bear use of the receding ice edge increases.

Denning

No actual den sightings were reported by Point Hope hunters. However, several observations of females with cubs of the year were reported in April, 1972, at both Cape Thompson and Cape Dyer.

h. Point Lay

Point Lay hunters described polar bear habitat use between Cape Lisburne and Icy Cape.

Seasonal Movements

Between September and December polar bears travel along the coast and edge of shore-fast ice from Icy Cape to Cape Beaufort. Bear observations between December and February are infrequent. In spring (March-June), most bears move north along a lead occurring approximately 5-10 mi offshore, and eventually leave with the receding ice.

Feeding

In fall, bears have been observed feeding on walrus and whale carcasses along the coast and barrier islands between Cape Lisburne and Icy Cape and within Kasegaluk Lagoon. Hunters report that walrus carcasses on the shoreline between

Cape Lisburne and Omalik Lagoon have attracted bears since the 1940's during spring and summer months as well. The number of walrus that wash up on the shore varies each year according to such factors as hunter struck-and-lost ratio, wind, and ocean currents. However, overall, one hunter observed that there were more carcasses between the 1930's and 1950's than present. Bears are also often observed near Cape Beaufort between March and May during Native beluga hunting activities. At this time bears are feeding on carcasses or spotted and bearded seals that occur along a lead approximately 5-10 mi offshore from Cape Beaufort to Icy Cape. Location of this lead can vary up to 20 mi from year to year.

Denning

Fall observations of dens include one den located ca. 1935-40, approximately 1-2 mi south of Sitkok Point, in a snowbank along the coast, and another, located ca. 1965-70, approximately 1-3 mi southeast of Siksrikpak Point, in a snowbank along a lake. A third den was located on a coastal bluff approximately 2 mi north of Cape Beaufort with the opening facing south (November, year unknown).

Dens have been observed near the Kukpowruk River since the 1940-50's. One den was located on a barrier island at the mouth of the Kukpowruk River in a snowdrift (April, year unknown). In April, 1992 a den (opening facing west) was located in a snowbank along a large bend approximately 5-10 mi up the Kukpowruk River.

Dens have also been observed in close proximity to Point Lay. One den was located in a snowbank in the old cemetery in the spring, ca. 1940. One hunter reported that his uncle located a den in a snowbank on a barrier island approximately 3 mi north of Akunik Pass in April, ca. 1930 with the den opening facing southeast.

Several spring sightings of females with cubs of the year occurred near Avak River headwaters, Avak Inlet, and the Epizetka River south to the Kukpowruk River, indicating possible denning areas. Also, Wainwright hunters reported tracks of bear families leaving the Kitonak Hills south of Beaufort and Sabine capes.

i. Wainwright

Hunters from Wainwright described polar bear habitat use between Icy Cape and Point Franklin.

Seasonal Movements

In September-November polar bears move south with advancing ice along the coast and newly freezing shore-fast ice between Icy Cape and Point Franklin. Several hunters identified two waves of bear migration: one in September, and one in November, made mostly by females with cubs and older males largely absent. In late winter and spring bears travel along leads and the edge of shore-fast ice. Between March and May adult male polar bears move from the pack ice towards the coast.

Feeding

After bears approach the coast with advancing ice they are frequently observed feeding on walrus and gray whale carcasses along the coast and barrier islands between Utukok River and Point Franklin. This occurs when pack ice is close to land and leads are absent, lessening seal availability. Later in the year when open water is present bears feed on ringed and spotted seals on the edge of shore-fast ice and in the transition zone along this coast.

In spring (April-June), an offshore lead occurs between Icy Cape and Point Franklin. The lead expands and contracts depending on ice conditions, prevailing winds, and currents, but usually runs further offshore at Wainwright and Icy Cape, and closer to shore at Point Franklin. Polar bears feed on seals here and also occasionally visit bowhead butcher sites. Polar bears have been observed feeding in the transition zone 10-20 mi out during summer months on ringed and spotted seals, as well as walrus calves.

Denning

Hunters report that bears may go as far inland as the Brooks range to find the right snow conditions to den. In fall, dens have been observed in snowdrifts at the headwaters of the Nokotlek River (November, 1991); Pingorarok Pass (December/January, 1970); Point Collie (November, 1993); west side of Kuk River (December, 1993); shoreline on east side of Wainwright Inlet, near the Distant Early Warning (DEW) line site (November, year unknown); and half way between Wainwright and Point Belcher near the coast (November, 1990).

In spring, dens have been observed along barrier island north of Akoliakatat Pass (March/April 1950's and 1993); mouth of the Nokotlek River (March/April 1965 and multiple years); Point Collie (March/April, 1994); Wainwright Inlet near DEW line runway (March/April, 1994); east side of Kuk River near a coal mine (March/April, 1994); approximately 30 mi inland along Avalik River (March/April, 1994); mouth of Sinaruruk River north of Wainwright (March/April, 1994); half mile offshore from Point Belcher (March/April, 1994);

near Kugrua Bay (April, 1994); and Skull Cliff, near Kunarak Creek (March/April, 1993). With the exception of the den offshore from Point Belcher, all dens were excavated in snowdrifts along river banks or coastal bluffs.

Additional spring sightings of females with cubs of the year occurred south of Icy Cape and Kasegaluk Lagoon (late 1970-80's); at Killimantavi Point and south along the Alatakrok River (March/April, multiple years), and between the Nokotlek, Ivisaruk, and Kuk rivers (March-May, years unknown); and east of Point Belcher near Atanik and Kugrua Bay (March/April, 1994).

j. Barrow

Hunters from Barrow described polar bear habitat use between Point Franklin and Teshekpuk Lake.

Seasonal Movements

No seasonal movements other than those described in the following feeding and denning sections were identified by hunters from Barrow.

Feeding

Between September and November, bears have been observed along the coast and barrier islands between Point Franklin and Pogik Bay (east of Lonely) feeding on walrus, gray whale, and seal carcasses. Between mid-July and September, polar bears have been observed on migrating ice floes between Point Franklin and Pogik Bay feeding on walrus and seals. Between December and March bears have been observed feeding on seals along edges of shore-fast ice, typically 1-15 mi out, in the transition zone and along edges of pack ice.

In spring, (March-May), bears have been observed feeding on seals and walrus 1-10 mi offshore along a teardrop shaped lead, and in the transition zone, 3-50 mi offshore.

Denning

In fall, bears have been observed denning in snowdrifts (all den openings facing the ocean) at the headwaters of Omikmak Creek, southeast of Wainwright Inlet (November, 1952); northeast of the Sinaruruk River (November, 1946); Skull Cliff (November, 1982); north of Walakpa Bay (November, 1981 and 1993-4); coastal bluffs 2-3 mi south of Nunuvak Bay (November, 1993); near Point Barrow (October/November, 1993); Lake Sungovoak (two dens, November, 1939); Kachiksuk Bluffs, west of Dease Inlet (November, 1979).

Two hunters reported dens not actually observed by themselves but by other village hunters along the Meade River near Ikmakruk Lake (October/November, 1993); the southeast corner of Teshekpuk Lake (November, 1992); and along the Chipp River hunting camp known as Chipp 9 (November, 1993).

k. Nuiqsut

Hunters from Nuiqsut described polar bear habitat use between Teshekpuk Lake and Tigvariak Island.

Seasonal Movements

In fall, polar bears are observed most frequently during bowhead whaling activities. Yearling cubs were observed travelling east and west along the coast between Beechey Point and Oliktok Point in December, 1940, 1970, and 1982. Between April and July, bear tracks are regularly observed (with no evidence of feeding) along an offshore lead between the Colville River and the McClure Islands.

Feeding

Almost every fall bears feed on hunter-harvested bowhead whale carcasses at Oliktok Point and Cross Island. Single occurrences were also reported for West Dock (Prudhoe Bay) and Narwhal Island. During summer, hunters have observed bears feeding on ringed seals in the transition zone 20-25 mi offshore between the Colville River and Prudhoe Bay, and feeding on carcasses on Tigvariak Island.

Denning

In fall, dens have been observed at Point Poleakoon in Smith Bay, (December, year unknown); approximately 5 mi south of Atigaru Point, two dens within half a mile of each other (February, 1987, March, 1989); and the Colville River east to Prudhoe Bay i.e. at the mouth of Nechelik and Kuprigruak channels of the Colville River (1992 and 1940-50's, respectively); and the Oliktok Point area (December, 1957-93).

In spring, dens have been observed repeatedly between the Colville River and Prudhoe Bay since ca. 1940-75 i.e. at Woods Point and the Kuprigruak Channel of the Colville River; 5 mi south of Nuiqsut (April, 1949); 3-5 mi northeast of Nuiqsut; Oliktok Point; Beechey Point; Howe Island, and near the mouth of the Sagavanirktok River delta. All dens were located on barrier islands or along creeks, rivers and sloughs with high banks that accumulate deep snow drifts. Several offshore dens were observed in spring, one den located approximately 5-15 mi north of the Colville River (year unknown); one approximately 10 mi north of Thetis Island (May, 1989); and one on Pingok Island (April, 1975).

1. Kaktovik

Kaktovik hunters described polar bear habitat use between Brownlow and Demarcation points.

Seasonal Movements

Beginning in September, bears can be seen anywhere along the coast but are most frequently observed during Native whale harvesting activities near Kaktovik and when leads are closed offshore. In spring, polar bears move from east to west along a lead system 5-30 mi offshore between Brownlow and Demarcation points. Occasionally, bears come closer to the coastline near Jago Lagoon, east of Kaktovik. One hunter added that bears travel along coastal barrier islands during breeding season.

Feeding

In September, during bowhead whaling activities, polar bears are attracted to the coast north of Kaktovik, particularly the spit east of town near the landing strip. Between Brownlow and Demarcation points a lead system, 5-30 mi offshore, begins to form in November and is present, yet changing, until April. The lead opens on the east end during west wind and vice versa, often opening 5 mi wide. Polar bears feed on ringed seals here.

Denning

All but one den reported from Kaktovik hunters were observed in spring along rivers and streams that foster the formation of deep snow drifts.

Dens were observed at Marsh Creek, approximately 5 mi inland from the coast (April, prior to 1975); Sadlerochit River near Sadlerochit Spring, approximately 5-25 mi inland from the coast (April, prior to 1975); on shore-fast ice approximately 5 mi north of Kaktovik (March, 1950); and along the Niguanak River (April, year unknown). One respondent said that elders have told him of observing dens along the Canning, Jago and other rivers where banks are high and deep drifts form.

£7837

3. Additional Concerns and Issues Raised by Hunters During Collection of Native Knowledge.

Discussions between Service representatives and village hunters yielded information that is not of direct relation to habitat use or protection. However, it is the opinion of the authors that the hunter's responses should be expressed within this document if the Strategy is truly reflective of cooperative management efforts. A summary is provided below.

Service employees asked hunters what could be done together (Native community and government) to ensure that polar bears were always present in the future. Responses varied both within and between villages. Several hunters from St. Lawrence, Wales, Shishmaref, Kivalina, Point Hope, and Kaktovik stated that they favor the MMPA and current level of take because it allows bear populations to remain stable, and bears should be left alone.

On the issue of sport hunting, some concern was expressed that if sport hunting was allowed it could result in reduced hunting opportunities for subsistence hunters because bears would be driven further out on the ice and would be less accessible. Some hunters said that the economic gain would not be enough to compensate for this loss. Several hunters from Shishmaref, Kivalina and Point Lay were opposed to sport hunting and especially trophy hunting, adding that trophy bears should be left alone and only younger bears, if any, should be taken. Hunters from Kaktovik and St. Lawrence suggested guided photography for tourists as an alternate form of commercialization.

Most hunters who supported sport hunting added one or more of the following conditions:

- regulate and monitor sport hunting at the community level i.e. with Native guides or the ANC; Natives must be in a position to monitor what hunters are doing
- set a harvest limit quota
- divide quota up evenly between villages, so no one village can dominate the enterprise
- allow sport hunting only with local guides
- allow sport hunting only if populations are healthy
- allow sport hunting only by snowmachine or boat, not by plane
- allow sport hunting only if economic gain is shared within each community

A separate, yet related issue is the commercial sale of hides. Many hunters favor the commercial sale of hides from Natives to non-Natives as a source of economic gain. Again however, most respondents were cautious and expressed the following conditions:

- allow commercial sale of hides only if harvest limits are set and a monitoring system is in place (mimic Canadian system)
- profits should be shared within the community
- hunting must be guided by Natives.

A few hunters mentioned that they do not currently hunt because there is no market for the hides (i.e. it is too much work to cut up hides if there is no market for them). At least one hunter stated that bears are overabundant and that more bears should be harvested and hides sold to improve the local economy.

On the issue of hunting females with cubs, responses also varied. Several hunters stated that they support hunting females with cubs if there is a quota on the number of bears each hunter can take as set by the ANC, and as long as populations are healthy and economic gain is shared within the community. One respondent from the Chukchi region said that hunting females with cubs should be monitored by the village council, similar to the way it is on the North Slope. He added that if the population decreases the Service should then assist the council in its monitoring efforts. One hunter said that if females and cubs are hunted, only one cub should be taken, and the female and other cub should be allowed to go. Some hunters held a more conservative approach and stated that females with cubs should not be harvested unless the meat is eaten or hunters were experiencing a shortage of food. Several hunters stated that no bears should be taken.

Additional issues of concern can be summarized as follows:

- potential contamination of food, oil spills, and offshore oil lease sales, and their affect on wildlife and the Inupiat way of life (Kaktovik, St. Lawrence Island)
- knowledge of contaminants and their effects, especially cleanup of radiation (Point Hope)
- quality of meat and health of bears that have been tranquilized and collared (St. Lawrence Island, Shishmaref, Nuiqsut, Kaktovik)
- need to maintain a healthy polar bear population by protecting fish and seals (Little Diomede)
- need to provide more education and information exchange between Native and non-Native communities to prevent harmful misconceptions about Natives decision making processes that are made in poor judgement.
- information is collected but feedback is left out. Natives never understand what information scientists or researchers are asking, or how it will be used.



. 1978-18 ALC: FEB

-Trans

751, 24

(constant)

Figure A-1. General location for collection of Native knowledge.

CONC. IN

2





ALC: NO

8

1000

187

100

1

S.

8

素

RAN

8

2

ALC: N



ann a'

____ - ___

(LES)

157283

1.53

) j

. .

the sub

Figure A-3. Areas used by polar bears in spring/summer as identified by eight hunters from Gambell and Savoonga, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

A-21



Figure A-4. Areas used by polar bears in fall/winter as identified by three hunters from Little Diomede, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

Concession of the

1000

Ŋ

1050

Party in

3

1

NR.

\$

Marcula

10

2011

A-22

1



Ì

1013000

1224

Figure A-5. Areas used by polar bears in spring/summer as identified by three hunters from Little Diomede, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

A-23

-t- sear



Figure A-6. Areas used by polar bears in fall/winter as identified by four hunters from Wales, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

3

「「「「「」」

3

な目がし

あけら

the state

10.00

間に

1000

Sec.



E LIS

prosecond and

10.00

land.

(Colorado

Figure A-7. Areas used by polar bears in spring/summer as identified by four hunters from Wales, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.



Figure A-8. Areas used by polar bears in fall/winter as identified by five hunters from Shishmaref, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

international distances of the second second

1

2000

10.00

in the

3

Marine

A-26

3

191

要相応



interio,

TSMET

1

filling the second

10000

Figure A-9. Areas used by polar bears in spring/summer as identified by five hunters from Shishmaref, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.



Figure A-10. Areas used by polar bears in fall/winter as identified by four hunters from Kivalina, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

Sec. 72

1833-

100

ŕ

福三日

Marca

2

8

7

100

1

C2103

100

1

11.700

and the second

11/439



Figure A-11. Areas used by polar bears in spring/summer as identified by four hunters from Kivalina, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

A-29

ALC: N



Figure A-12. Areas used by polar bears in fall/winter as identified by six hunters from Point Hope, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

Sec. 1

Rerr

No.

100

074

Ð,

200

1

ľ

ALC: NO

ŧ.

A-30

7

100

翻

り

Cape Lisburne Ayugatak Lagoon Corwin Bluffs Cape Dyer \mathcal{D} Point Hope Feeding Areas: Coast and Shorefast Ice Seasonal Movements **Denning Areas** 16 32 0 ZOR TH Cape Thompson Kilometers Crowbill Point

, Ja

thread a

theres

Figure A-13. Areas used by polar bears in spring/summer as identified by six hunters from Point Hope, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.



Figure A-14. Areas used by polar bears in fall/winter as identified by six hunters from Point Lay, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

00

X

100

2

調い

1000

A-32

Partice of

2007

1444

100 C

DAT.

Ŋ

THE OWNER OF



disat

CONE!

Figure A-15. Areas used by polar bears in spring/summer as identified by six hunters from Point Lay, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.



Figure A-16. Areas used by polar bears in fall/winter as identified by seven hunters from Wainwright, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

1000 V

2

1

1000

朝

ACC No. ja) j

剥り ALL REAL

1

8

è.

1000



- ----

1554

--- - - **-** - **-** - **-**

----- P

the set

or the second

had

hai

2

Figure A-17. Areas used by polar bears in spring/summer as identified by seven hunters from Wainwright, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

(The second



Figure A-18. Areas used by polar bears in fall/winter as identified by six hunters from Barrow, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

n.

COLOR -

翻

and the second

 $\overline{\gamma}$

酮

1

1987 - L

 $\overline{\mathbf{x}}$

朝日

A-36

R.

No.

(a)

No.



్ల

Figure A-19. Areas used by polar bears in spring/summer as identified by six hunters from Barrow, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

Q

ω

00

0 00

′0 ©

(

00

\$



Figure A-20. Areas used by polar bears in fall/winter as identified by seven hunters from Nuiqsut, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

副行

割

2

100

₹

E.

100

ž

Real Property in

100 C

1000

1.1


ित्व

second

Figure A-21. Areas used by polar bears in spring/summer as identified by seven hunters from Nuiqsut, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.



Figure A-22. Areas used by polar bears in fall/winter as identified by five polar bear hunters from Kaktovik, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

100

R,

割りし

Different C

HICK.

100 m

Ъţ.

2000

1

§ \

ą.

ALMON

10.00 m





Figure A-23. Areas used by polar bears in spring/summer as identified by five polar bear hunters from Kaktovik, Alaska. Ice habitat is highly variable and shaded areas should be viewed as dynamic rather than fixed. Information is limited to habitat use areas of participating hunters and does not include possible polar bear habitat use outside those areas.

This page intentionally blank

88.7°

5.

ndara -

en C

1000

Section -

6337777

480°

estern

880.C

52.)*

1987.-

Appendix B: Agreement on the Conservation of Polar Bears.

The Governments of Canada, Denmark, Norway, and the Union of Soviet Socialist republics, and the United States of America,

Recognizing the special responsibilities and special interests of the States of the Arctic Region in relation to the protection of the fauna and flora of the Arctic Region;

Recognizing that the polar bear is a significant resource of the Arctic Region which requires additional protection;

Having decided that such protection should be achieved through co-ordinated national measures taken by the States of the Arctic Region;

Desiring to take immediate action to bring further conservation and management measures into effect;

Have agreed as follows:

ARTICLE I

1. The taking of polar bears shall be prohibited except as provided in Article III.

2. For the purpose of this Agreement, the term "taking" includes hunting, killing and capturing.

ARTICLE II

Each Contracting Party shall take appropriate action to protect the ecosystems of which polar bears are part, with special attention to habitat components such as denning and feeding sites and migration patterns and shall manage polar bear populations in accordance with sound conservation practices based on the best available scientific data.

ARTICLE III

1. Subject to the provisions of Articles II and IV, and Contracting Party may allow the taking of polar bears when such taking is carried out:

(a) for bona fide scientific purposes; or

(b) by that Party for conservation purposes; or

(c)to prevent serious disturbance of the management of other living resources, subject to forfeiture to that Party of the skins and other items of value resulting form such taking; or

(d) by local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party; or (e) wherever polar bears have or might have been subject to taking by traditional means by its nationals.

2. The skins and other items of value resulting from taking under sub-paragraphs (b) and (c) of paragraph 1 of this Article shall not be available for commercial purposes.

ARTICLE IV

The use of aircraft and large motorized vessels for the purpose of taking polar bears shall be prohibited, except where the application of such prohibition would be inconsistent with domestic laws.

ARTICLE V

A Contracting Party shall prohibit the exportation from, the importation and delivery into, and traffic within, its territory of polar bears or any part or product thereof taken in violation of this Agreement.

ARTICLE VI

1. Each Contracting Party shall enact and enforce such legislation and other measures as may be necessary for the purpose of giving effect to this Agreement.

2. Nothing in this Agreement shall prevent a Contracting Party from maintaining or amending existing legislation or other measures or establishing new measures on the taking of polar bears so as to provide more stringent controls than those required under the provisions of this Agreement.

ARTICLE VII

The Contracting Parties shall conduct national research programs on polar bears, particularly research relating to the conservation and management of the species. They shall as appropriate coordinate such research with research carried out by other Parties, consult with other Parties on the management of migrating polar bear populations, and exchange information on research and management programs, research results and data on bears taken.

ARTICLE VIII

Each Contracting Party shall take action as appropriate to promote compliance with the provisions of the Agreement by nationals of States not party to this Agreement.

ARTICLE IX

The Contracting Parties shall continue to consult with one another with the object of giving further protection to polar bears.

ARTICLE X

1. This Agreement shall be open for signature at Oslo by the Governments of Canada, Denmark, Norway, the Union of Soviet Socialist Republics and the United States of America until 31st March 1974.

2. This Agreement shall be subject to ratification or approval by the signatory Governments. Instruments of ratification or approval shall be deposited with the Government of Norway as soon as possible.

3. This Agreement shall be open for accession by the Governments referred to in paragraph 1 of this Article. Instruments of accession shall be deposited with the Depositary Government.

4. This Agreement shall enter into force ninety days after the deposit of the third instrument of ratification, approval, or accession. Thereafter, it shall enter into force for a signatory or acceding Government on the date of deposit of its instrument of ratification, approval or accession.

5. This Agreement shall remain in force initially for a period of five years from its date of entry into force, and unless any Contracting party during that period requests the termination of the Agreement at the end of that period, it shall continue in force thereafter.

6: On the request addressed to the Depositary Government by any of the Governments referred to in paragraph 1 of this Article, consultations shall be conducted with a view to convening a meeting of representatives of the five Governments to consider the revision or amendment of this Agreement.

7. Any Party may denounce this Agreement by written notification to the Depositary Government at any time after five years from the date of entry into force of the Agreement. The denunciation shall take effect twelve months after the Depositary Government has received the notification. 8. The Depositary Government shall notify the Governments referred to in paragraph 1 of this Article of the deposit of instruments of ratification, approval or accession, of the entry into force of this Agreement and of the receipt of notifications of denunciation and any other communications from a Contracting Party specifically provided for in this Agreement.

9. The original of this Agreement shall be deposited with the Government of Norway which shall deliver certified copies thereof to each of the Governments referred to in paragraph 1 of this Article.

10. The Depositary Government shall transmit certified copies of this Agreement to the Secretary General of the United Nations for registration and publication in accordance with Article 102 of the Charter of the United Nations.

IN WITNESS WHEREOF the undersigned, being duly authorized by their Governments, have signed this Agreement.

DONE at Oslo, in the English and Russian languages, each text being equally authentic, this fifteenth day of November, 1973.

I hereby certify that this is a true copy of the original document deposited in the archive of the Royal Norwegian Ministry of Foreign Affairs.

Per Tresselt.

Head of Division, Legal Department Royal Norwegian Ministry of Foreign Affairs. Resolution appended to the 1973 Agreement on the Conservation of Polar Bears by the Plenipotentiaries who signed the Polar Bear Agreement

RESOLUTION ON SPECIAL PROTECTION MEASURES

THE CONFERENCE,

्य सब्द

BEING CONVINCED that female polar bears with cubs and their cubs should receive special protection;

BEING CONVINCED FURTHER that the measures suggested below are generally accepted by knowledgeable scientists to be sound conservation practices within the meaning of Article II of the Agreement on the Conservation of Polar Bears;

HEREBY REQUESTS the Governments of Canada, Denmark, Norway, the Union of Socialist Republics and the United States of America to take such steps as possible to:

- 1. Provide a complete ban on the hunting of female polar bears with cubs and their cubs; and
- 2. Prohibit the hunting of polar bears in denning areas during periods when bears are moving into denning areas or are in dens.

This page intentionally blank

re-s-

88-5

Real P

Appendix C: Polar Bear Stock Assessments (Draft versions dated 3/16/95).

POLAR BEAR (Ursus maritimus): Alaska Beaufort Sea Stock

U.S. Fish and Wildlife Service, Marine Mammals Management, Anchorage, Alaska

A Conservation Plan has been completed for polar bears in Alaska by the U.S. Fish and Wildlife Service (FWS 1994); all information contained in that Plan is incorporated by reference into this stock assessment. On August 23, 1994, a notice of availability and a request for public comments on a draft of this stock assessment was published in the *Federal Register* (59[162]:43353-43355). Comments were accepted through December 1, 1994. Public input, including that of the appointed Scientific Review group for the Alaska Region, has been considered in the preparation of this document.

STOCK DEFINITION AND GEOGRAPHIC RANGE

Polar bears are circumpolar in their distribution in the northern hemisphere. They occur in several largely discrete stocks or populations (Harington 1968). Polar bear movements are extensive and individual activity areas are enormous (Garner 1990). Several polar bear stocks are known to be shared between countries. Lentfer (1974) hypothesized that two Alaska stocks exist based upon: (a) variations in levels of heavy metal contaminants of organ tissues (Lentfer 1976, Lentfer and Glaster 1987); (b) morphological characteristics (Manning 1971; Lentfer 1974; Wilson 1976); (c) physical oceanographic features which segregate stocks and; (d) movement information collected from telemetry studies of adult female bears (Lentfer, 1983).



Figure 1. Polar bear distribution.

Recent studies (Amstrup 1995, and Amstrup and Garner unpublished data) have shown that the eastern bound of the Beaufort Sea stock occurs south of Banks Island and east of the Bailie Islands. The western bound is near Point Hope. An area of overlap between these stocks occurs between Point Barrow and Point Hope, centered near Point Lay (Amstrup 1995; Garner unpublished data). Telemetry data further indicate that adult female polar bears marked in the Beaufort Sea spend about 25% of their time in the northeastern Chukchi Sea, whereas females captured in the Chukchi Sea spend only 6% of their time in the Beaufort Sea. Activity areas of Beaufort Sea females exceed 100,000 km² (Amstrup 1995).

Past management regimes have consistently distinguished between these stocks based upon the previous information. A management agreement with hunters of Alaska and the Northwest Territories is specific to the Beaufort Sea stock. Similarly, a future management agreement with Russia will be specific to the Chukchi/Bering seas stock. The bounds of these stocks may be refined in the future based upon the availability of new information, including an emerging technique to assess genetic variability.

POPULATION SIZE

Polar bears occur at low densities throughout their circumpolar range (DeMaster and Stirling 1981). They are long lived, mature late, have an extended breeding interval, and have small litters. Population size in Alaska has been difficult to estimate because of logistical inaccessibility of the habitat, movement of bears across international boundaries, and budget limitations (Amstrup and DeMaster 1988; Garner 1992).

Minimum Population Estimate

Brooks estimated a portion of the Alaska population to be 4,900 in 1970. Lentfer (ALJ 1977) suggested that the Chukchi/Bering seas stock (Wrangel Island to western Alaska) numbered about 7,000; the Beaufort Sea stock numbered about 2,500 (Banks Island Canada to Barrow). Chapman estimated the Alaska population (both stocks) at 5,550 to 5,700 (ALJ 1977). Statistical measures of confidence for these estimates were not provided. Amstrup et.al. 1986, estimated the Beaufort Sea stock at 1,778 (S.D. \pm 803; C.V. = 0.45) during the 1972-83 period. The total Alaska population (both stocks) was most recently estimated at 3,000 to 5,000 animals (Amstrup and DeMaster 1988). The area for which the later estimate applies, the analysis which resulted in the estimate, and the statistical reliability or accuracy of the estimate are not provided.

Beaufort Sea

Recent modeling and analysis of an expanded population data base, derived from capturing, marking and recapturing animals, provides potential estimates of abundance for this stock. Population size was estimated through a modified Petersen model incorporating independent measures of survival. The estimate is corrected, based on radio telemetry, for animals unavailable for sampling. Estimates were developed for the entire population and also just for the female component. The reason for estimating the female component was that capture bias excluding males occurred during some years. This capture bias should not have affected the capture of females however. The following discusses three population estimates. The population size estimate, judged most accurate for the early years of the mark and recapture study was obtained in 1976 (N=835, C.V.= 0.29). This was the lowest C.V. value for any of the early years of the study. The population size estimate for the later years judged most accurate was obtained in 1986 (N=1,417, C.V.=0.10). This was the lowest C.V. value for any of the later years of the study. The study was the lowest C.V. value for any of the later years of the study. The study was obtained in 1986 (N=1,417, C.V.=0.10).

$$r = \frac{Ln(\frac{1417}{835})}{10} = 0.053$$

During the same period and using the same data, the number of females changed from 598 (C.V.=0.45) to 744 (C.V.=0.13). This change resulted in a suggested instantaneous growth rate of 0.022. This more modest rate of growth suggested for females may reflect the trophy harvest of males during the 1960's and early 1970's which

$$r = \frac{Ln(\frac{744}{598})}{10} = 0.022$$

strongly favor males. Therefore, the male segment may have exhibited greater net increases after 1973 when harvests of large numbers of adult male bears ceased. However, the estimates generated by the Petersen technique are not as accurate as desirable.

A third estimate, projected by Leslie Matrix computation, for population growth in females based upon satellite telemetry data is 0.024. This estimate includes measured survival and recruitment rate parameters obtained through the mark and recapture program and from telemetry. This estimate is the most accurate and it has the greatest confidence. The three independent growth rates are applied to the 1986 population estimate below to derive a 1994 population size projection.

Applying the growth rate of 0.0503 to the 1986 estimate resulted in a 1994 population size of 2,165:

$$N_{94} = N_{86}e^{\pi} = 1,417e^{(.053 \times 8)} = 2,165$$

Applying the growth rate of .022 resulted in a population size of 1,690:

$$N_{94} = N_{86}e^{rt} = 1,417e^{(.022 \times 8)} = 1,690$$

Applying the growth rate of .024 resulted in a population size of 1,717:

$$N_{94} = N_{86}e^{rt} = 1,417e^{(.024 \times 8)} = 1,717$$
 (selected)

The population point estimate with the greatest confidence is 1,717. Thus the N_{MIN} value calculated here "provides reasonable assurance that the stock size is equal to or greater than the estimate" (following the 1994 reauthorization of the Marine Mammal Protection Act. For a population size of 1,717 and a corresponding C.V. of 0.13, N_{MIN} is 1,579.

$$N_{MIN} = \frac{N}{e^{\sqrt{0.842(Ln(1+CV(N)^2))}}} = 1,579$$

Current Population Trend

Prior to the 20th century, when Alaska's polar bears were hunted primarily by Natives, both stocks probably existed near carrying capacity (K). In the Beaufort Sea once harvest by non-Natives became common, size of these stocks declined rapidly (Amstrup 1995). Since passage of the Marine Mammal Protection Act (MMPA) in 1972, both stocks seem to have grown judging from: (a) mark and recapture data; (b) observations by Natives and residents of coastal Alaska and Russia; (c) catch per unit effort indices; (d) reports from Russian scientists (Uspenski and Belikov 1991); and (e) harvest statistics on the age structure of the population. Recapture data on survival and recruitment for females from the Beaufort Sea stock indicate a population growth rate of 2.4% over the last 20 years. Comparisons of Beaufort Sea data from 1967-74 and 1981-92 periods (Amstrup 1995) reveal no *significant* changes in age at first reproduction, numbers of cubs produced per female, or litter sizes for cubs-of-the-year (COYs) or 2-year-olds. But sizes of yearling litters were greater in the earlier period. Small sample sizes in the first period and differences in sampling procedures between the two periods may mask any change in litter sizes for COYs and 2-year-olds. Age structure of the population was younger during the first period, when survival was higher for young and lower for adults, compared to the second period. These later changes are consistent with populations approaching K. Subsequently, this stock has been assigned a recovery rate F_R of 1.0.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Default values for R_{MAX} for Alaska polar bear stocks were not established at the La Jolla PBR workshop. Taylor et.al. 1987 model the sustainable yield of the female component of the population at < 1.6% per annum. The following information is used to understand the R_{MAX} determination. From 1981-92, vital rates of polar bears in the Beaufort Sea were as follows: average age of sexual maturity (females) was 6 years; average COY litter size was 1.67; average reproductive interval was 3.68 years; and average annual natural mortality (nM) varies by age class but was from 1-3% in adults (Amstrup, 1995).

Currently, the Beaufort Sea population N may approach K. A Leslie type matrix of recapture data, which incorporates the best reproductive rates, and the best survival rates determined by the Kaplan Meir method, projects an annual intrinsic growth rate (including natural mortality but not human mortality) of 6.03% for the Beaufort Sea stock (Amstrup 1995). Mortalities of bears caused by man were censored in the calculation rather than included as mortalities. Thus, this calculation determined a "natural survival rate. Survival rates for cubs and yearlings also were also calculated with the assistance of radio telemetry. This mimics a situation in nature where environmental resistance was low and survival high. This rate of growth (6.03%) assumes human effects are absent. Further, the calculation assumes a 50M:50F population sex ratio.

POTENTIAL BIOLOGICAL REMOVAL (PBR)

In the following calculation: $(N_{MIN})(1/2 R_{MAX})(F_r) = PBR$ the minimum population estimate, N_{MIN} was 1,579; the maximum rate of increase R_{MAX} was 6.03; and the recovery factor F_R was 1.0 since the population is believed to be within OSP. The PBR for the Beaufort Sea stock derived from this information is 48 bears per year.

The PBR estimated above assumes an equal sex ratio in the harvest. In the Beaufort Sea, however, the sex ratio of the harvest is approximately 2M:1F. Accounting for males selection in the harvest results in revised PBR of 72 bears per year. The figure is conservative and incorporates the best information available with the greatest measurable accuracy and highest confidence.

Scientific data further indicates population growth, and empirical observation by Native hunters and others indicates increased numbers of bears onand near-shore, contributing to support this selection.

ANNUAL HUMAN CAUSED MORTALITY

Subsistence and Sport Harvest

Historically, polar bears have been killed for subsistence, handicrafts and recreation. Based upon records of skins shipped from Alaska, the estimated annual harvest for 1925-53 averaged 120 bears and was primarily by Native hunters. Recreational hunting using aircraft was common from 1951-72, increasing annual harvest to 150 during 1951-60 and to 260 during 1960-72 (Amstrup *et al.* 1986; Schliebe et al. in preparation). Aerial hunting has been prohibited since 1972. This reduced the mean annual harvest to 122 during 1980-92 (SD=52; range 64-296)



Figure 2. Annual harvest of polar bears in Alaska (1960-1994). Both stocks are shown for comparison.

(Schliebe *et al.* in preparation). Harvests of Beaufort Sea polar bears accounted for 30% of the total Alaska kill (annual mean=36 bears). The sex ratio of the harvest from 1980-91 was 66M:34F.

A self-management agreement has been developed between Canadian Inuit and Alaskan Inupiat of the North Slope (Nageak *et al.* 1990). Since initiation of this local user agreement, 1988-1993, the combined mean Alaska/Canada mean harvest from the stock has been 63 bears per year of an annual allocation guideline of 76. Included within this kill are a small number of takes for defense of property or life by coastal Natives. The sex ratio is 65M:35F. The number of unreported kills is negligible, although sex remains unreported for approximately 11% of the harvest. The mean harvest of 63 animals is less than the PBR of 72. The harvest in Canada is regulated by a quota system. The harvest in Alaska is regulated by voluntary actions of local hunters.

Other Removals

Orphaned cubs are occassional removed from the wild and placed into zoos: 2 cubs were placed into public display facilities during the past five years. Also during this period 2 bears were killed during industrial or development activities.

Fisheries Information

Polar bear stocks in Alaska have no direct interaction with commercial fisheries activities.

STATUS OF STOCK

The Beaufort Sea stock of polar bears in Alaska is designated a "non-strategic stock." The conservatively calculated PBR is greater than the average human harvest. The stock does not experience any incidental loss to

commercial fishing. Industrial activities have not been found to be effecting rates of recruitment or survival. The stock has not been determined to be "depleted" under the terms of the MMPA and is therefore within optimum sustainable population levels. The stock is not listed as "threatened" or "endangered" under terms of the Endangered Species Act. This stock has increased during the past 20 + years and exhibits a 2.4% annual growth beyond harvests which is estimated at 3.7% of the projected Beaufort Sea population. Evidence indicates that a sustainable harvest is greater than the current take. The Beaufort Sea stock appears to be increasing slightly or stabilizing near K.

REFERENCES

12943

- Administrative Law Judge. 1977. Environmental Impact Statement: Consideration of a waiver of the moratorium and return of management of certain marine mammals to the State of Alaska. 2 Volumes.
- Amstrup, S.C., and D.P. DeMaster. 1988. Polar bear, Ursus maritimus. Pages 39-45 in J.W.Lentfer, ed. elected Marine Mammals of Alaska: Species Accounts with Research and Management Recommendations. Marine Mammal Commission, Washington, D.C.
- Amstrup, S.C., I. Stirling, and J.W. Lentfer. 1986. Past and present status of polar bears in Alaska. Wildlife Society Bulletin. 14:241-254.
- Amstrup, S.C., G. Garner, and G.M. Durner. Status and trends in polar bear populations of Alaska. Unpublished NBS Report.

Amstrup, S.C.. 1995. Movements, distribution, and population dynamics of polar bears in the beaufort Sea. PhD Dissertation. University of Alaska-Fairbanks, Fairbanks, Alaska, In Prep.

Bunnell, F. L. and D. E. N. Tait. 1981. Population dynamics of bears -- implications. In C. W. Fowler and T. D. Smith, eds. Dynamics of Large Mammal Populations. J. Wiley and Sons, New York.

DeMaster, D. P., and I. Stirling. 1981. Ursus maritimus. Mammalian Species:1-7.

- FWS. 1994. Conservation plan for the polar bear in Alaska. Marine Mammals Management, U. S. Fish and Wildlife Service, Anchorage, AK. 79pp.
- Garner, G.W., S.T. Knick, and D.C. Douglas. 1990. Seasonal movements of adult female polar bears in the Bering and Chukchi seas. International Conference on Bear Research and Management 8:219-226.
- Garner, G.W., L.L. McDonald, D.S. Robson, D.P. Young Jr., and S.M. Arthur. 1992. Literature review: population estimation methodologies applicable to the estimation of abundance of polar bears. Internal Report, U.S.FWS. 102pp.
- Garner, G.W., L.L. McDonald, S.M. Arthur, and T.L. Olson. 1994. Operating procedures: Pilot polar bear survey Beaufort Sea: 1994. Internal Report, U.S.FWS, 39 pp.
- Harington, C.R. 1968. Denning habits of the polar bear (Ursus maritimus) Phipps. Canadian Wildlife Service Report, Series 5. 33 pp.
- Lentfer, J.W. 1974. Discreteness of Alaskan polar bear populations. Proceedings of the International Congress of Game Biologists 11:323-329.
- Lentfer, J.W. 1976. Environmental contaminants and parasites in polar bears. Alaska Department of Fish and Game, Pittman-Robertson Project Report. W-17-4 and W-17-5. 22 pp.
- Lentfer, J.W. 1983. Alaskan polar bear movements from mark and recovery. Arctic 36:282-288.
- Lentfer, J.W., and W.A. Galster. 1987. Mercury in polar bears from Alaska. J. Wildlife Diseases 23:338-341.
- Manning, T.H. 1971. Geographical variation in the polar bear Ursus maritimus Phipps. Canadian Wildlife Service Report Series No. 13. 27 pp.
- Nageak, B.P., C.D.N. Brower, and S.L. Schliebe. 1991. Polar bear management in the southern Beaufort Sea: An Agreement between the Inuvialuit Game Council and the North Slope Borough Fish and Game Committee. in Transactions of North American Wildlife and Natural Resources Conference. 56:337-343.

Pederson, A. 1945. Der Eisvar: Verbreitung und lebenweise. E.Braunn and Co., Copenhagen. 166pp.

Schliebe, S.L., S.C. Amstrup, and G.W. Garner. 1995. The status of polar bear in Alaska, 1993. in O. Wiig, G.W. Garner, and M.K. Taylor eds. Proceedings of the Eleventh Working Meeting of the IUCN/SSC Polar Bear Specialist Group. In Prep. Taylor, M.K., D.P. DeMaster, F.L. Bunnell, and R.E. Schweinsburg. 1987. Modeling the sustainable harvest of female polar bears. J. of Wildlife Management. 51:811-820.

R.G.

De.

Uspenski, S.M. and S.E. Belikov. 1985. Polar bear research and conservation in the USSR 1979-80. Pages 129-142 in Proceedings of the Eighth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.

Uspenski, S.M. 1986. Research and management of polar bear populations in the USSR 1981-85. Pages 133-136 in Proceedings of the Ninth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.

Uspenski, S.M., and S.E. Belikov. 1991. Polar Bear Populations in the Arctic: Current State, Studies, and Management (1985-87) in S.C. Amstrup and O. Wiig, eds. Proceedings of the Tenth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.

Wilson, D.E. 1976. Cranial variation in polar bears. International Conference Bear Research and Management 3:447-453.

POLAR BEAR(Ursus maritimus): Alaska Chukchi/Bering Stock

U.S. Fish and Wildlife Service, Marine Mammals Management, Anchorage, Alaska

A Conservation Plan has been completed for polar bears in Alaska by the U.S. Fish and Wildlife Service (FWS 1994); all information contained in that Plan is incorporated by reference into this stock assessment. On August 23, 1994, a notice of availability and a request for public comments on a draft of this stock assessment was published in the *Federal Register* (59[162]:43353-43355). Comments were accepted through December 1, 1994. Public input, including that of the appointed Scientific Review Group for the Alaska Region, has been considered in the preparation of this document.

STOCK DEFINITION AND GEOGRAPHIC RANGE

Polar bears are circumpolar in their distribution in the northern hemisphere. They occur in several largely discrete stocks or populations (Harington 1968). Polar bear movements are extensive and individual activity areas are enormous (Garner 1990). Several polar bear stocks are known to be shared between countries. Lentfer (1974) hypothesized that two Alaska stocks exist based upon: (a) variations in levels of heavy metal contaminants of organ tissues (Lentfer 1976, Lentfer and Glaster 1987); (b) morphological characteristics (Manning 1971; Lentfer 1974; Wilson 1976); (c) physical oceanographic features which segregate the Chukchi Sea and Bering Sea stocks from the Beaufort Sea stock and; (d)



Figure 1. Polar bear distribution.

movement information collected from telemetry studies of adult female bears (Lentfer, 1983, Amstrup 1995). Recent studies (Garner et al. 1990; Amstrup 1995) have shown that the eastern bound of the stock is not further than Point Barrow, and very limited movement occurs sporadically into the Beaufort Sea. The western bound of the stock is near the eastern portion of the Eastern Siberian Sea. The boundary between the Eastern Siberian Sea and the Chukchi Sea is designed on the bases of movements of adult female polar bears initially captured on Wrangel Island (no movement into the Eastern Siberian Sea) and those captured in the Eastern Siberian Sea (limited short term movement into the western Chukchi Sea). The Chukchi/Bering seas stock extends into the Bering Sea; its southern boundary is determined by the annual extent of pack ice (Garner unpublished data). Adult female polar bears captured in the Beaufort Sea, and their cubs, may make seasonal movements into the Chukchi Sea in and area of overlap located between Point Barrow and Point Hope, centered near Point Lay (Amstrup; Garner unpublished data). Telemetry data indicate that these bears, marked in the Beaufort Sea, spend about 25% of their time in the northeastern Chukchi Sea, whereas females captured in the Chukchi Sea spend only 6% of their time in the Beaufort Sea. Activity areas of females in the Chukchi/Bering seas averaged 244,463 km² (Garner et al. 1990); radio collared adult females spent a greater proportion of their time in the Russian region than in American region (Garner et al. 1990). Genetic data evaluated do not currently indicate stock differences (Cronin et al. 1991).

Past management regimes have consistently distinguished between these stocks based upon the previous information. A management agreement with hunters of Alaska and the Northwest Territories is specific to the Beaufort Sea stock. Similarly, a future management agreement with Russia will be specific to the Chukchi/Bering seas stock. The bounds of these stocks may be refined in the future based upon the availability of new information, including an emerging technique to assess genetic variability.

C - 7

POPULATION SIZE

Polar bears occur at low densities throughout their circumpolar range (DeMaster and Stirling 1981). They are long lived, mature late, have an extended breeding interval, and have small litters. Population size in Alaska has been difficult to estimate because of logistical inaccessibility of the habitat, movement of bears across international boundaries, and budget limitations (Amstrup and DeMaster 1988; Garner 1992).

Minimum Population Estimate

Brooks estimated a portion of the Alaska population to be 4,900 in 1970. Lentfer (ALJ 1977) suggested that the Chukchi/Bering seas stock (Wrangel Island to western Alaska) numbered about 7,000; the Beaufort Sea stock numbered about 2,500 (Banks Island Canada to Barrow). Chapman estimated the Alaska population (both stocks) at 5,550 to 5,700 (ALJ 1977). Statistical measures of confidence were not provided for any of these estimates. The Alaska population (both stocks) was most recently estimated at 3,000 to 5,000 animals (Amstrup and DeMaster 1988). The area for which the estimate applies, the analysis which resulted in the estimate, and the statistical reliability or accuracy of the estimate are not provided.

Chukchi/Bering Seas

Defensible estimates of population size are currently unavailable. A crude approximation of the population range for this stock may be derived by subtracting the Beaufort Sea population estimate, 1,778 (Amstrup *et al.* 1986) from the total Alaska statewide estimate, 3,000 to 5,000, (Amstrup and DeMaster 1988), to derive an estimated population range for the Chukchi/Bering Sea stock, 1,222 to 3,222. Other sources of information with potential to estimate the size of this stock have not been included due to large variation and uncertainty in the data. Since a reliable estimate for the size of this stock is unavailable, the N_{MIN} has not been calculated.

Current Population Trend

Prior to the 20th century, when Alaska's polar bears were hunted primarily by Natives, both stocks probably existed near carrying capacity (K). In the Beaufort Sea once harvest by non-Natives became common, size of these stocks appeared to have declined rapidly (Amstrup 1995). Similar declines could reasonably have occurred in the Chukchi Sea, although no data exist to test this assumption. Since passage of the Marine Mammal Protection Act (MMPA) in 1972, both stocks seem to have grown --- judging from (a) mark and recapture data, although recapture data are too sparse for the Chukchi stock to quantify its growth; (b) observations by Natives and residents of coastal Alaska and Russia; (c) catch per unit effort indices; (d) reports from Russian scientists (Uspenski and Belikov 1991); and (e) harvest statistics. The stock has been assigned a recovery rate F_R of 1.0.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Default values for R_{MAX} for Alaska polar bear stocks were not established at the La Jolla PBR workshop. Population/stock specific scientific data to estimate R_{MAX} are not available for the Chukchi/Bering seas stock of polar bears. Taylor et. al. 1987 estimated the sustainable yield for adult female polar bears from a hunted population to be < 1.6% per annum based upon modeling.

POTENTIAL BIOLOGICAL REMOVAL (PBR)

In the following calculation: $(N_{MIN})(1/2 R_{MAX})(F_R) = PBR$ cannot be calculated for the Chukchi/Bering seas stock with current information. Increased efforts are necessary to estimate the size, harvest and vital rates for this stock.

ANNUAL HUMAN CAUSED MORTALITY

Subsistence Harvest

Historically, polar bears have been killed for subsistence, handicrafts and recreation. Based upon records of skins shipped from Alaska, the estimated annual harvest for 1925-53 averaged 120 bears and was primarily by Native hunters. Recreational hunting using aircraft was common from 1951-72, increasing annual harvest

C - 8

to 150 during 1951-60 and to 260 during 1960-72 (Amstrup *et al.* 1986; Schliebe et al. in preparation). Aerial hunting has been prohibited since 1972. This reduced the mean annual harvest to 122 during 1980-92 (SD=52; range 64-296) (Schliebe *et al.* in preparation). Harvests from the Chukchi/Bering seas stock accounted for 70% (mean=86) of the annual kill during this period.

More recently the harvest levels have been declining, 1988-1994 mean harvest was 55 bears, and the sex ratio has been 68M:32F. A small unquantified number of recorded subsistence kills were taken for defense of life or property and used as subsistence takes. The number of unreported kills since 1980 to the present time is thought to be negligible. In western Alaska, there is presently no Federal control on the number of bears taken providing the population is not



Figure 2. Annual harvest of polar bears in Alaska (1960-1994). Both stocks are shown for comparison.

depleted and the taking is not wasteful. A formal self-imposed hunter management agreement, with harvest guidelines, similar to that of the North Slope Borough and Canadian Inuvialuit Game Council mangement agreement has not yet been developed. However discussion continues to develop a management agreement for this stock between Native representatives of both countiries and between the United States and Russian government.

Other Removals

Russia prohibited all hunting of polar bears in 1956 in response to the population declines caused by overharvest. In Russia, only a small number of animals, less than 3-5 per year, were removed for placement in zoos (Uspenski and Belikov 1986). In Alaska, only 4 orphaned cubs of the year have been placed into zoos since 1989. Increased illegal hunting of polar bears in the Russian Arctic was recognized in 1992, primarily in response to decentralization of management authority, entering a free market economy, and increase economic pressures. The magnitude of this harvest is not known. In Alaska an illegal harvest, if it occurs, is so small as to be undetectable. Industry has not been responsible for any lethal take of polar bears in this region.

Fisheries Information

Polar bear stocks in Alaska have no direct interaction with commercial fisheries activities.

STATUS OF STOCK

The Chukchi/Bering seas stock of polar bears in Alaska is a "non-strategic stock." The stock does not experience any incidental loss to commercial fishing. The stock has not been designated as "depleted" under the terms of the MMPA. This stock is not listed as "threatened" or "endangered" under terms of the Endangered Species Act. The stock appears to have increased during the past 20 + years despite a substantial annual harvest estimated at 86 bears per year. The stock appear to be increasing slightly or stabilizing at a relatively high level, however this populations relationship to K can not be determined with existing information.

REFERENCES

- Administrative Law Judge. 1977. Environmental Impact Statement: Consideration of a waiver of the moratorium and return of management of certain marine mammals to the State of Alaska. 2 Volumes.
- Amstrup, S.C., and D.P. DeMaster. 1988. Polar bear, Ursus maritimus. Pages 39-45 in J.W.Lentfer, ed. elected Marine Mammals of Alaska: Species Accounts with Research and Management Recommendations. Marine Mammal Commission, Washington, D.C.
- Amstrup, S.C., I. Stirling, and J.W. Lentfer. 1986. Past and present status of polar bears in Alaska. Wildlife Society Bulletin. 14:241-254.
- Amstrup, S.C., G. Garner, and G.M. Durner. In preparation. Status and trends in polar bear populations of Alaska. Unpublished NBS Report.
- Amstrup, S.C. 1995. Movements, distribution, and population dynamics of polar bears in the Beaufort Sea. PhD Dissertation. University of Alaska-Fairbanks. Fairbanks, Alaska, In Prep.
- Bunnell, F. L. and D. E. N. Tait. 1981. Population dynamics of bears -- implications. In C. W. Fowler and T. D. Smith, eds. Dynamics of Large Mammal Populations. J. Wiley and Sons, New York.
- Cronin, M.A., S.C. Amstrup, G.W. Garner, and E.R. Vyse. 1991. Interspecific and intraspecific mitochondrial DNA variation in North American bears (Ursus). Candaian Journal of Zoology. 69:12:2985-2992.
- DeMaster, D. P., and I. Stirling. 1981. Ursus maritimus. Mammalian Species:1-7.
- Garner, G.W., S.T. Knick, and D.C. Douglas. 1990. Seasonal movements of adult female polar bears in the Bering and Chukchi seas. International Conference on Bear Research and Management 8:219-226.
- Garner, G.W., L.L. McDonald, D.S. Robson, D.P. Young Jr., and S.M. Arthur. 1992. Literature review: population estimation methodologies applicable to the estimation of abundance of polar bears. Internal Report, U.S.FWS. 102pp.
- Garner, G.W., L.L. McDonald, S.M. Arthur, and T.L. Olson. 1994. Operating procedures: Pilot polar bear survey Beaufort Sea: 1994. Internal Report, U.S.FWS, 39 pp.
- Harington, C.R. 1968. Denning habits of the polar bear (Ursus maritimus) Phipps. Canadian Wildlife Service Report, Series 5. 33 pp.
- Lentfer, J.W. 1974. Discreteness of Alaskan polar bear populations. Proceedings of the International Congress of Game Biologists 11:323-329.
- Lentfer, J.W. 1976. Environmental contaminants and parasites in polar bears. Alaska Department of Fish and Game, Pittman-Robertson Project Report. W-17-4 and W-17-5. 22 pp.
- Lentfer, J.W. 1983. Alaskan polar bear movements from mark and recovery. Arctic 36:282-288.
- Lentfer, J.W., and W.A. Galster. 1987. Mercury in polar bears from Alaska. J. Wildlife Diseases 23:338-341.
- Manning, T.H. 1971. Geographical variation in the polar bear Ursus maritimus Phipps. Canadian Wildlife Service Report Series No. 13. 27 pp.

Nageak, B.P., C.D.N. Brower, and S.L. Schliebe. 1991. Polar bear management in the southern Beaufort Sea: An Agreement between the Inuvialuit Game Council and the North Slope Borough Fish and Game Committee. in Transactions of North American Wildlife and Natural Resources Conference. 56:337-343.

Pederson, A. 1945. Der Eisvar: Verbreitung und lebenweise. E.Braunn and Co., Copenhagen. 166pp.

- Schliebe, S.L., S.C. Amstrup, and G.W. Garner. In Prep. The status of polar bear in Alaska, 1993. in O. Wiig, G.W. Garner, and M.K. Taylor eds. Proceedings of the Eleventh Working Meeting of the IUCN/SSC Polar Bear Specialist Group.
- Taylor, M.K., D.P. DeMaster, F.L. Bunnell, and R.E. Schweinsburg. 1987. Modeling the sustainable harvest of female polar bears. J. of Wildlife Management. 51:811-820.
- U.S. Fish and Wildlife Service. 1994. Conservation plan for the polar bear in Alaska. Marine Mammals Management, U.S. Fish and Wildlife Service, Anchorage, AK. 79pp.
- Uspenski, S.M. and S.E. Belikov. 1985. Polar bear research and conservation in the USSR 1979-80. Pages 129-142 in Proceedings of the Eighth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.
- Uspenski, S.M. 1986. Research and management of polar bear populations in the USSR 1981-85. Pages 133-136 *in* Proceedings of the Ninth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.

C - 10

Uspenski, S.M., and S.E. Belikov. 1991. Polar Bear Populations in the Arctic: Current State, Studies, and Management (1985-87) in S.C. Amstrup and O. Wiig, eds. Proceedings of the Tenth Working Meeting of the IUCN/SSC Polar Bear Specialist Group.

(2003)

Wilson, D.E. 1976. Cranial variation in polar bears. International Conference Bear Research and Management 3:447-453.

This page intentionally blank

P50

1222

in the second

£

P. Balan

1000 mm

gers -

PERSO

इंट्राइटि

~~^{#1}

85

F. Nikisi

ß\$;~~

1965 (-

ger----

12 m

Re-

.

Appendix D: Federal Register Notice for the Beaufort Sea Incidental Take Final Rule.

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 18

RIN 1018-AB79

Marine Mammals; Incidental Take During Specified Activities

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Fish and Wildlife Service (Service) is issuing final regulations that will authorize the incidental, and govern unintentional take of small numbers of polar bears and walrus during oil and gas industry (exploration, operations development, and production) year-round in the Beaufort Sea and adjacent northern coast of Alaska.

Under provisions of the Marine Mammal Protection Act, the taking of these marine mammals may be allowed only if the Director of the Service finds, based on the best scientific evidence available, that the cumulative total of such taking over a 5-year period will have a negligible impact on the availability of these species and will not have an unmitigable adverse impact on the availability of these species for subsistence uses by Alaskan Natives. If these findings are made, the Service is required to establish specific regulations for the activity that set forth: (1) permissible methods of taking; (2) means of effecting the least practicable adverse impact on

the species and their habitat and on the availability of the species for subsistence uses; and (3) requirements for monitoring and reporting.

Through the preparation of an Environmental Assessment, the Service has found that the total expected takings of polar bear and walrus during oil and gas industry exploration, development, and production activities will have a negligible impact on these species, and there will be no unmitigable adverse impacts on the availability of these species for subsistence uses by Alaskan Natives.

This rulemaking does not authorize the actual activities associated with oil and gas industry operations; the Department of the Interior's Minerals Management Service is responsible for permitting activities associated with such operations. Instead, this rulemaking authorizes the issuance of Letters of Authorization (LOA) that will permit the unintentional takes of small numbers of polar bears and walruses incidental to oil and gas exploration, development, and production activities.

DATES: Effective date: This rule is effective beginning December 16, 1993, through June 16, 1995. The regulations will apply for a period of 18 months beginning December 16, 1993 for entities conducting oil and gas industry activities. Certain conditions will apply as explained in the S U P P L E M E N T A R Y INFORMATION. If these conditions are met, the regulations will be extended pursuant to notice and opportunity for public comment, for an additional 42 months, for a total of 5 years. Comments: Comments on the final rule must be received by December 16, 1993.

ADDRESSES: Written comments should be submitted by mail to Supervisor, Office of Marine Mammals Management, Fish and Wildlife Service, 4230 University Drive, Suite 310, Anchorage, Alaska 99508. Comments may also be hand delivered to the same address. Comments and materials received in response to this action will be available for public inspection at this address during normal working hours of 8 a.m. to 4:30 p.m., Monday through Friday.

F O R F U R T H E R INFORMATION CONTACT: John Bridges, Office of Marine Mammals Management, Fish and Wildlife Service, 4230 University Drive, Suite 310, Anchorage, Alaska 99508, (907) 271-2343.

S U P P L E M E N T A R Y INFORMATION:

Need for Action

In Alaska, the Service is responsible for the management of three marine mammal species: polar bear (<u>Ursus maritimus</u>), sea otter (<u>Enhydra lutris</u>) which is not covered by this rule and the Pacific walrus (<u>Odobenus rosmarus</u> <u>divergens</u>). These species are not listed as threatened or endangered and, therefore, are not provided protection by the Endangered Species Act. However, they are protected under the Marine Mammal Protection Act of 1972, hereafter referred to as the Act. Additional protection is also accorded by the 1973 international Agreement on the Conservation of Polar Bears (Polar Bear Agreement). The United States, Canada, Denmark, Norway, and the former Union of Soviet Socialist Republics are signatories to this treaty; the United States ratified the treaty on November 1, 1976.

The Act placed a general moratorium on the taking of any "Take" marine mammal. as defined by the Act means to harass, hunt, capture, or kill or to attempt to harass, hunt, capture, or kill any marine mammal. The Act was amended in 1981 to include Section 101(a)(5) which gave the Secretary of the Interior authority to allow, on request by U.S. citizens (as defined in 50 CFR 18.27(c)), the incidental, but not intentional, take of small numbers of marine mammals in a specified activity (other than commercial specified fishing) within a geographical area. Specific authorizing regulations may be issued for a period of up to 5 years; LOAs may be issued upon request subsequent to issuance of specific authorizing regulations.

The taking of marine mammals may be allowed only if the Service finds, based on the best scientific evidence available, that such takes will have a negligible impact on the species or stock and will not have an "unmitigable adverse impact" on the availability of the species or stock for subsistence uses. Also, regulations must be published that include permissible methods of taking and other means to ensure the least practicable adverse impact on the species and its habitat and on the availability of the species for subsistence uses. These regulations must include requirements for monitoring and reporting. After final regulations are established, LOAs may be issued, upon request, to individual entities to conduct activities pursuant to the regulations.

As a result of 1986 amendments to the Act, the Service on September 29, 1989, published a final rule (54 FR 40338) amending 50 CFR 18.27 (i.e., regulations governing small takes of marine mammals incidental to specified activities) that included, among other things, a revised definition of "negligible impact" and a new definition for "unmitigable adverse impact." Negligible impact is now defined as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." 50 CFR 18.27(c). Unmitigable adverse impact means "an impact resulting from the specified activity (1) that is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by (i) causing the marine mammals to abandon or avoid hunting areas, (ii) directly displacing subsistence users, or (iii) placing physical barriers between the marine mammals and the subsistence hunters; and (2) that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met." Ibid.

Oil and gas exploration, development and production

activities conducted in marine mammal habitat risk violating the moratorium on the taking of marine mammals and therefore violating the terms of the Act. Although there is no legal requirement for the oil and gas industry to obtain incidental take authority, they have chosen to seek authorization to avoid potential conflicts between their activities and the requirements of the Act.

Summary of Request

On December 17, 1991, BP Exploration (Alaska), Inc., for itself and on behalf of Amerada Hess Corporation, Amoco Production Company, ARCO Alaska, Inc., CGG American Service, Inc., Conoco Inc., Digicon Geophysical Corp., Exxon Corporation, GECO Geophysical Co., Halliburton Geophysical Services. Inc., Mobil Oil Northern Corporation, Geophysical of America, Texaco Inc., Unocal Corporation, and Western Geophysical Company (collectively referred to as "Industry" throughout the remainder of this document), petitioned the Service to promulgate regulations pursuant to Section 101(a)(5) of the Act. The regulations sought would allow the incidental, but not intentional, take of small numbers of polar bear (Ursus maritimus) and Pacific walrus (Odobenus rosmarus divergens) in the event that such a taking occurs in the course of oil and gas exploration, development, or production activities during year-round operations in the Beaufort Sea, in Alaskan State waters, and Outer Continental Shelf (OCS) waters and the adjacent northern coast of Alaska. Specifically, the offshore

D - 2

geographic region addressed by this action is defined by a north/south line at Barrow, Alaska, including all Alaska State waters and the OCS waters and east of that line to the Canadian border. The onshore region is defined as that same north/south line at Barrow, 25 miles inland and east to the Canning River. Industry excluded the Arctic National Wildlife Refuge from its petitions.

A proposed rule was published by the Service on December 30, 1992

(57 FR 62283), with a 75-day comment period that ended on March 15, 1993. Public meetings were held in Anchorage, Barrow, Nuigsut, and Kaktovik, Alaska. More than 50 persons attended the public meetings, and 12 entities, including conservation groups, and local Federal, State, private government agencies, industry, Native organizations and other interested parties. commented on the proposed rule. These comments are summarized along with responses in the discussions below.

The Service prepared an Environmental Assessment on this action and found that there would be no significant impacts on populations of walruses and polar bears and that there would be no unmitigable adverse impacts on the availability of these species for subsistence uses by Alaska Natives. A Finding of No Significant Impact (FONSI) has been made on the Environmental Assessment. A copy of the Environmental Assessment and FONSI are available on request from the persons listed above in the section entitled, "FOR FURTHER INFORMATION CONTACT."

The Service hereby is issuing, at the request of the Industry, regulations to allow the incidental take of small numbers of polar bears and walrus. Oil and gas exploration, development, and production activities conducted in proximity to marine mammals risk violating the provisions of the Act if those activities result in "takes" of polar bears or walrus. The regulations along with LOAs will allow the Industry to operate within the law in the event an incidental take occurs during the course of normal operations.

The final regulations allow the issuance of LOAs that will permit the incidental, unintentional take of polar bears and Pacific walrus in the Beaufort Sea and northern coast of Alaska. The regulations will be in effect for a period of 18 months beginning 30 days after the publication date of this document in the Federal Register for entities conducting oil and gas industry activities. Certain conditions will apply as explained below. If these conditions are met, the regulations will be extended pursuant to notice and opportunity for public comment, for an additional 42 months, for a total of 5 years.

These regulations do not authorize the intentional harassment, hunting, capturing, or killing of polar bears or walrus. They are designed to allow Industry operations to continue while working under the provisions of the Act.

These regulations do not permit the actual activities associated with oil and gas exploration, development and production, but rather allow the incidental, unintentional take of the two marine mammal species. The Department of the Interior's Minerals Management Service and the Bureau of Land Management are responsible for permitting activities associated with oil and gas activities in Federal waters and on Federal lands, respectively, and the State of Alaska is responsible for activities on State lands and in State waters.

In addition to its responsibilities under the Act, the Department of the Interior has further responsibilities under the 1973 multilateral Polar Bear Agreement. Specifically, Article II of this Agreement requires that:

"Each Contracting Party shall take appropriate action to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns..."

In comport with, and to meet more fully the intent of the Agreement, under this final rulemaking, within 18 months of its effective date, the Service has been directed by the Secretary of the Interior to develop and begin implementing a strategy for the identification and protection of important polar bear habitats. Development of such strategy will be done as part of the Service's management plan process pursuant to Section 115 of the Act, and in cooperation with signatories to the Agreement, the Polar Bear Department of State, the State of Alaska, Alaskan Natives, Industry, conservation organizations, and academia.

For the regulations to be extended beyond the initial 18 months from their effective date for a total 5-year period, the Service must develop and begin

implementing the Polar Bear Habitat Conservation Strategy. The extension of these regulations, and further authorizations under the provisions of this rule beyond 18 months, will be contingent upon the following: (1) within a period of 18 months from the effective date of this rulemaking, the Service will develop and begin implementing a Polar Bear Habitat Conservation Strategy, pursuant to the management planning process in Section 115 of the Act, and in furtherance of the goals of Article II of the 1973 international Agreement on the Conservation of Polar Bears; (2) the identification designation of special and considerations or closures of any polar habitat components to be further protected; (3) public notice comment and on those considerations or closures; (4) affirmative findings of the Secretary of the Interior; and (5) public notice and comment on the Secretary's intention to extend the term of the incidental take regulations for a period not to exceed a total of 5 years.

The authorizations for incidental take pursuant to provisions of this rule (i.e., LOAs) will be for periods of no more than one year. However, for the second year, LOAs could be subject to a 6-month limit.

Further, concern has been expressed regarding polar bear encounters where human life is in jeopardy. When human activity occurs in polar bear habitat, polar bear/human encounters are possible. However, in over 20 years of industry activity in this area, only one polar bear has been killed in defense of human life. Polar bear interaction training and knowledge of polar bear interaction plans will be required of each person operating under these regulations. In cases where polar bears must be deterred or killed for the protection of human life or welfare, the Service has authority to allow such action under Section 109(h)(1) of the Act.

The authorization to take polar bear and walrus is directed to incidents that occur between Industry activities and the two species that cause minor disturbances to those marine mammals. However, minor disturbances of marine mammals, especially those that may occur in the absence of any negligence or intentional action by a person carrying out an otherwise lawful activity, may not constitute a "take."

The regulations include requirements for monitoring and reporting and measures to effect the least practicable adverse impact on these species and their habitat and on the availability of these species for subsistence uses. These regulations are based on the assumption that exploration, development, and production activities in this area may involve the taking of polar bears and walrus. The Service has found that the total impact of the takings will have a negligible impact on these species and on their availability for subsistence uses.

These regulations may be extended for a total term of 5 years, subject to public notice and comment, only if a Polar Bear Habitat Conservation Strategy has been developed and implementation begun by the Service by the end of the 18month period following the effective date of this final rule.

An LOA will be required to conduct activities pursuant to these regulations. An LOA may be requested by each group or individual conducting an oil and gas Industry related activity where there is the likelihood of taking polar bear or walrus. The regulations require those who request an LOA to submit a polar bear awareness and interaction plan and a plan to monitor the effects on polar bear and walrus that are present during the authorized activities. Also, an applicant for an LOA must identify, in a plan of cooperation, what measures have been taken to minimize adverse impacts on the availability of marine mammals for subsistence uses if the activity takes place in or near a subsistence hunting area. Each request for an LOA will be

evaluated on the specific activity and the specific location, and each LOA

will be specifically conditioned for that activity and location.

LOAs will be issued annually by the Service. However, for the second year LOAs could be limited to 6 months contingent upon the Service developing and beginning implementation of the Polar Bear Habitat Conservation Strategy.

Continuation of the regulations and issuance of LOAs beyond the 18-month period are dependent upon events, developments, and achievements during the 18 months that regulations are in effect. If the regulations are extended for the total 5-year period, LOAs for the out-years will be issued annually by the Service; reissuance will be contingent upon submission of reports of monitoring activities for

the previous year, evaluation by the Service, and subsequent determination that reissuance is Because oil and gas iustified. development and production are continuous long-term activities, upon initial approval, LOAs for development and production would be issued for the life of the activity or until expiration of the regulations, whichever occurs first. However, submission by Industry of monitoring results associated with development and production activities would still be required annually for review by the Service; continued operation under such an LOA would be based upon annual approval by the Service of the monitoring results. If activities exceeded the standards established in Section 101(a)(5)(B) of the Act and implemented in 50 CFR 18.27(f), or any subsequent polar bear habitat protection provisions and standards imposed as a result of the Service's Polar Bear Habitat Conservation Strategy, the Service could withdraw or suspend the authorizing regulations (after notice and opportunity for public comment, or in an emergency without notice and opportunity for public comment). For example, if review of monitoring data indicated that activities were having unforeseen negative impacts polar bear or walrus to populations or their availability for subsistence purposes, mechanisms exist in 50 CFR 18.27(f) to revoke incidental take authorization conferred through LOAs. The regulations in 50 CFR 18.27(f) state, in part:

"(5) Letters of Authorization shall be withdrawn or suspended, either on an individual or class basis, as appropriate, if, after notice and opportunity for public comment, the Director determines: (i) The [specific] regulations prescribed are not being substantially complied with, or (ii) the taking allowed is having, or may have, more than a negligible impact on the species or stock, or where relevant, an unmitigable adverse impact on the availability of the species or stock for subsistence uses."

Regulations in 50 CFR 18.27(f) also provide for revoking incidental take authorization in emergency situations by stating:

"(6) The requirement for notice and opportunity for public review in paragraph (f)(5) of this section shall not apply if the Director determines that an emergency exists which poses a significant risk to the well-being of the species or stocks of marine mammals concerned."

Description of Activity

In accordance with 50 CFR 18.27, Industry submitted three separate written petitions for the promulgation of incidental take regulations pursuant to Section 101(a)(5) of the Act covering: (1) polar bear for exploration operations during the ice-covered period in coastal arctic Alaska and the Beaufort Sea, (2) polar bear and walrus for open-water exploration operations in the Beaufort Sea, and (3) polar bear and walrus for oil development and gas and production in arctic Alaska.

Activities covered in the petition are exploration activities such as geological and geophysical surveys which include: geotechnical site investigation, reflective seismic exploration, vibrator seismic data collection, airgun and watergun seismic data collection, explosives seismic data collection, and geological surveys and drilling operations. The latter include: drillships, floating drill platforms such as the Kulluk, ice pads, artificial islands, caissonretained islands, and two types of bottom-founded structures: (1) concrete island drilling system, and (2) single steel drilling caisson.

Industry documents indicate that exploratory activities for the open-water periods of 1993 through 1998 are primarily located in an area defined by a north/south line at Barrow and include all Alaska State waters and the OCS waters east of that line to the Canadian border. Estimates of the activities are approximately 28,200 vessel miles of seismic exploration, with as many as 10 vessels acquiring seismic data in the authorized area in any one vear. From 3 to 12 geotechnical/geochemical programs are projected to be conducted over the time span that the regulations could be in effect. Exploratory drilling is estimated to be conducted at 2 to 19 locations over the 5 year period, utilizing drillships at 2 to 8 locations and bottom-founded structures at 3 to 11 locations.

Industry documents indicate that exploratory activities for the ice-covered periods of 1993 through 1998 are in the geographic area defined by a north/south line at Barrow and include all Alaska coastal areas, State waters and OCS waters east to the Canadian border. Industry estimates approximately 35 seismic programs (covering 7,400 to over 10,000 line miles), 7 geotechnical/geochemical programs, and 5 to 15 exploratory drilling operations over the next 5 The petitions years. also include development and production activities of nine separate oil and gas fields in a region of 88,280 square miles. The nine fields are Prudhoe Bay, Kuparuk, Endicott, Lisburne, Milne Point, Niakuk, Point McIntyre, West Sak, and Ugnu and are collectively known as the Production Area. The Production Area extends from Barrow on the west to the Canning River on the east and 25 miles inland from the The Arctic National coast. Wildlife Refuge is specifically excluded from this action. The Production Area is operated yearround. The Prudhoe Bay Unit, discovered more than 20 years ago, is in decline and no major development activities are planned with the exception of a gas handling facility. New development is anticipated to be small and would use existing facilities and infrastructure.

Exploration, development, and production activities similar to those discussed in the petitions are conducted. currently being Operations of this type have been ongoing since the discovery of the Prudhoe Bay oil field in 1968. Because of many variables influencing Industry activities, predictions as to the exact dates, duration and location are speculative. However, specific dates, duration and locations will be required when applications for LOAs are submitted.

To reduce duplication of time, effort, and documentation, and since the three petitions submitted by Industry are similar activities in one specific geographical area, the Service determined, in accordance with Section 101(a)(5) of the Act and 50 CFR Part 18.27, the three petitions could be combined into one rulemaking authorizing a specified activity within a specified geographical region.

Biological Information

The geographical area covered by this action is the land and water area east of a north/south line through Barrow, Alaska. The onshore area is 25 miles inland and east to the Canning River. The Arctic National Wildlife Refuge is outside of the authorized area. Offshore the area extends through Alaska State waters and into the OCS waters of the Beaufort Sea from Barrow east to the Canadian border.

Walrus

The Pacific walrus primarily occurs in the waters of the Bering and Chukchi Seas along the western coast of Alaska. Most of the population congregates near the ice edge of the Chukchi Sea pack ice during the summer. The primary summer range of the walrus does not extend east of Point Barrow. In the winter, walrus occur in areas where there are polynyas, open leads or thin ice in which they can create and maintain breathing holes. Major concentrations in the winter are located in the northwestern Bering Sea and the southeastern Bering Sea. Walrus do occur in the Beaufort Sea but only in small numbers.

Polar bear

Polar bears occur only in the Northern Hemisphere, where their distribution is circumpolar, and they live in close association with polar ice. In Alaska, their distribution extends from south of the Bering Strait to the U.S.-Canada border. The world population has been estimated at 10,000-20,000, with possibly as many as 5,000 bears in Alaska. The Beaufort Sea population (from Point Barrow to Cape Bathurst, Northwest Territories) is estimated to be 1,300 to 2,500 bears. The most extensive north-south movements of polar bears occur with the ice in the spring and fall.

Females without dependent cubs breed in the spring and enter maternity dens by late November. Females with cubs do not mate. An average of two cubs, sometimes one and rarely three, are usually born in December and the family group emerges in late March or early April. Only pregnant females den for an extended period during the winter. Other polar bears may burrow out depressions to escape harsh winter winds. Polar bears become sexually mature at 4-8 years old and the average reproduction interval for polar bear is 3-4 years. The maximum reported age of reproduction in Alaska is 18 years. Based on these conditions, a polar bear may produce about 10 cubs in her lifetime.

Ringed seals are the primary prey species of the polar bear. Occasionally bearded seals and walrus calves may be hunted. Polar bears have been known to eat nonfood items such as styrofoam, plastic, car-batteries, anti-freeze and lubricating fluids.

The fur and blubber of the polar bear provide vital protection from the cold air and frigid water. Newly emerged cubs may not have a sufficient layer of blubber to maintain body heat when immersed in water for long periods of time. For this reason the mother is very protective of the cubs. It has been suggested that cubs abandoned prior to the normal weaning age of 2.5 years will likely not survive.

Polar bears have no natural predators, and they do not appear to be prone to death by diseases or parasites. The most significant source of mortality is man. Since 1972, with the passage of the Act, only Alaskan Natives have been allowed to hunt polar bears for their subsistence needs, handicrafts and clothing items. The Native harvest occurs without restrictions on sex, age, number or season, providing it is non-wasteful. From 1980-1991, the total annual harvest averaged 125 bears. The majority of this harvest (71 percent) came from the Chukchi Sea area. Effects of Oil and Gas Industry Activities on Marine Mammals and on Subsistence Uses

Walrus

Oil and gas industry activities such as air and vessel traffic, noise from air traffic, seismic surveys, ice breakers, supply ships and drilling may frighten or displace walrus. However, as previously stated in this document, the primary range of the Pacific walrus is west of Point Barrow and the likelihood of many walrus being in the Beaufort Sea is small. Therefore, it is unlikely that Industry activities will result in more than a negligible impact on the species. Likewise, activities during the icecovered periods and the onshore development and production activities should not impact the walrus.

In the early spring, females and calves may become concentrated in the limited amount of open water between the shorefast ice and the pack ice, or the shear zone. These areas of congregation or preferred habitat result primarily because of the presence of open water. This congregation activity makes the walrus vulnerable to early arriving industry-related traffic. Air and vessel traffic may cause the animals to stampede off the ice which may result in trampling and separation of cow-calf pairs.

Stationary drilling structures may affect the movement of walrus. Walrus may be attracted to the activity or repelled by noise or smell. In the 1989 drilling season, an incident occurred in a Chukchi Sea operation where a young walrus surfaced in the center hole (moonpool) of the drillship. The walrus was removed from the drilling area by the use of a cargo net. The walrus left the scene of the incident and was not seen again.

Seismic surveys generally take place on solid ice or open water. Since most walrus activity occurs near the ice edge, interactions with walrus and the seismic activity are unlikely.

Subsistence

Compared to the overall harvest of walrus by Alaskan Natives, few are harvested in the Beaufort Sea along the northern coast of Alaska. The walrus constitutes a small portion of the harvest for the villages of Barrow and Nuigsut. Annual harvest data of subsistence resources averaged for the period of 1962-1982 shows that the village of Barrow averaged 55 walrus per year, Nuiqsut averaged 3 walrus per year and Kaktovik shows no harvest. The majority of kills by the village of Barrow occurred to the southwest in the Chukchi Sea. Therefore, oil

and gas exploration, development and production activities should have a negligible impact on walrus subsistence activities.

Polar Bear

Oil and exploration, gas development production and activities in the Beaufort Sea and adjacent northern coast of Alaska may affect the polar bear. Drillships and icebreaker activity may be physical obstructions to their normal movement. Noise, sights, and smells produced by activities may attract or repel bears. These disruptions may introduce changes in the bears' natural behavior that may be detrimental.

Exploration activities during the open-water season are not likely to impact upon the movements or natural behavior of the polar bear. Although polar bears have been documented in open water, miles from the ice edge or ice floes, normally the polar bear is found near the ice edge. Therefore, it is unlikely that exploration activities in the openwater season will have more than a negligible impact on the polar bear.

Winter oil and gas activities have a far greater possibility of having a detrimental impact on the polar bear. Since the polar bear continues to move over the ice pack throughout the year, interactions with industry activities are likely. Curious polar bears are likely to investigate drillships and artificial or natural islands where drilling operations occur. Any onice activity creates an opportunity for industry/bear interactions.

Offshore drillsites within the pack ice may modify the habitat

by creating open water leads down current from the activity. These open water leads may create temporary niches for subadult or non-breeding ringed seals, the primary prey species for the polar bear. Should this occur, polar bears would likely be attracted, thereby creating a possibility of industry/polar bear encounters. However, most offshore drilling operations are conducted from raised platforms which isolate the drilling operation and industry employees from the ice and polar bears.

Polar bear interaction plans are developed for each operation. Industry personnel are required to participate in a polar bear interaction training program while on-site. These training programs and interaction plans are designed to ensure that the activity and possible interactions have the least detrimental effect on industry personnel and the polar bear. Occasionally, work may be required on the ice adjacent to elevated drillships or platforms. In such cases, work areas are welllighted and open to reduce the likelihood that a polar bear would approach the work area undetected.

Winter seismic activity (survey crews) has a potential of disturbing denning females. Denning females are sensitive to noise disturbances and may be discouraged from seeking a preferred denning site, or may abandon dens, thereby risking the lives of the offspring. Prior to initiating seismic survey activity, Industry provides the Service with its proposed survey route(s). Through satellite observations of radio collared bears the Service is able to inform Industry of known denning sites, and from knowledge of the geographical area the Service identifies areas of probable denning sites. Once sites are identified. Industry cooperates with the Service to alter survey routes to pass within no less than one mile of the denning sites. This oncooperative going operating procedure ensures that known den sites are avoided within all practicable limits and every effort is made to keep at least one mile from known denning sites.

Subsistence

The polar bear is not a primary subsistence species of the villages of Barrow, Nuigsut, or Kaktovik. Preliminary data from the Service's Marking, Tagging, and Reporting Program indicate that from July 1, 1989, to June 30, 1991, a total of 27 polar bears were killed by the Natives of Barrow. No polar bears were harvested by the Natives of the villages of Nuiqsut or Kaktovik. Hunting success varies considerably from year to year because of variable ice and weather conditions.

Industry works with the local Native groups to achieve a cooperative relationship between oil and gas activities and subsistence activities. Oil and gas exploration, development and production will not have more than a negligible impact on subsistence activities.

Oil Spills

The accidental discharge of oil into the environment during industry activities could result from operational spills during refueling, handling of lubricants and liquid products, and during general maintenance. These spills are projected to be small in quantity, generally less than a barrel of oil per incident. Drilling units maintain onboard cleanup equipment and train personnel to handle operational spills. These spills are not expected to pose a threat to polar bear or walrus.

A blowout (i.e., the loss of control of a well during drilling) is a potentially more serious type of spill accident. Based on data Minerals calculated bv the Management Service. the probability of a blowout in the Beaufort Sea is extremely low. Data compiled by that agency verify that blowouts have occurred in the Canadian Beaufort Sea: however, in the course of exploratory drilling on the Alaska OCS, no blowouts have occurred.

The Service acknowledges that there is a low probability of oil spills connected with a blowout but the potential effects to polar bears or their habitats by oil spills may be significant. Polar bears may be directly impacted by a spill by swimming in oil-contaminated waters. Bears which have been fouled by oil may suffer thermoregulatory problems, ingest oil, and may exhibit other detrimental effects such as inflammation of the nasal passages or central nervous system. Bears that contact oil are likely to die. An investigative study, Effects of Crude Oil on Polar Bears (Environmental Studies No. 24), was designed by N.A. Oritsland to simulate an arctic oil spill and determine its effect on polar bears experimentally exposed to the crude oil. The report states:

"A general conclusion which may be drawn from this study is that the polar bear is a potentially greatly impacted species when exposed to oil spills. An initial

effect of coating with oil is that thermoregulatory and metabolic stresses develop which may cause serious disability if protracted in the wild. Oil fouling of the fur led to grooming and licking of the oil from the fur, with consequent ingestion of the oil, and absorption into the body from the gut. Residence of oil in the fur may be expected to be long if the animal is not cleaned completely, prolonging exposure by grooming/ingestion activities. Uptake of petroleum hydrocarbons and their distribution to body tissues led to behavioral abnormalities, including anorexia, as well as to tissue damage. A wide range of tissues were found to be affected, much of the effect related to uremia and severe dehydration. Peripheral hemolysis and a lack of bone marrow erythropoietic response resulted in an acute anemia in all oiled bears. The systemic toxicity effects were latent, not becoming pronounced until weeks after the initial exposure. Renal changes were the most serious under the laboratory conditions and can be assessed as the direct cause of death of two of the three oil exposed polar bears" (Oritsland et al., 1981).

17:24

A study by Derocher and Stirling (1990) documented a significantly oiled bear which appeared to have completely recovered from an oiling episode four years after it was originally sighted.

The probability of an oil spill must be balanced with the potential severity of harm to the species or stock when determining negligible impact. Even if the potential effects of a spill may be significant, if the probability of occurrence is low, a finding of negligible impact may be appropriate.

Due to the small number of walrus in the Beaufort Sea area, impacts to walrus resulting from oil spills are foreseen as negligible.

Conclusions

Based on the previous discussion, the Service makes the following findings regarding this action.

Impact on Species

The Service finds, based on the information scientific hest available, that the effects of oil and gas related exploration, development and production activities for the next 5 years in the Beaufort Sea and adjacent northern coast of Alaska will have a negligible impact on the polar bear and the Pacific walrus and habitat and their on the availability of these species for subsistence uses if certain conditions are met. Oil and gas activities have occurred in the Beaufort Sea and the northern coast of Alaska for many years. To date, there has been only one documented case of a lethal take of a polar bear in defense of life at an exploratory drill site. Amstrup (1989) reported a case in which a bear died after eating ethylene glycol colored with rhodamine B. This chemical combination is used for marking runway center lines on snow and ice. Other incidents, including harassment as defined by the Act, may have occurred, but no reports or legal action have verified such an incident.

Liability for illegal discharges of toxic materials into the environment is described in the

Clean Water Act and other statutes such as the Resource Conservation and Recovery Act (RCRA). In the event of a catastrophic spill, the Service would reassess the impacts to the polar bear and/or walrus populations and reconsider the appropriateness of authorizations for taking through Section 101(a)(5) of the Act.

This finding of "negligible impact" applies to exploration, development, and production activities related to oil and gas activities. The following are generic conditions to eliminate interference with normal breeding, feeding, and possible migration patterns to ensure that the effects to the species remain negligible. These conditions will be site specific and species specific and may be expanded in the first year LOAs. Specific to polar bears, based on the results of the activities conducted under the first 1-year LOAs, information and protection provided under the Service's Polar Bear Habitat Conservation Strategy, and the findings Secretary's at the conclusion of the 18-month period of this rule, these conditions could be modified substantially or additional conditions developed in the event that, after public notice and comment, this rule was extended for the full 5-year term.

(1) No intentional taking of polar bear or walrus will be authorized. Should a situation arise where an intentional take (e.g., harassment associated with deterrent activities and/or lethal take) is required for the protection of human life or welfare, the Service may authorize such action under the authority of Section 109(h)(1) and 112(c) of the Act.

For the protection of (2)pregnant polar bears during activities (selection, denning birthing, and maturation) in known and confirmed denning areas, Industry will be restricted from activities in specific locations during certain specified times of the year. These restrictions will be applied on a case-by-case basis in response to a request for an LOA. In possible denning areas, pre-activity surveys, as determined by the Service, will be required to determine the presence or absence of denning activity.

(3) Each activity authorized by an LOA will require a site-specific plan of operation, a site-specific monitoring and reporting plan, a awareness bear and polar interaction plan and where relevant, a plan of cooperation. The purpose of the required plans is to ensure that the levels of activity and possible takes are consistent with the finding that the cumulative total of takes will have a negligible impact on polar bear and Pacific walrus, their habitat, and where relevant, on the availability of the species for subsistence uses.

Impact on Subsistence

Polar bear and Pacific walrus contribute a small amount of the total subsistence harvest for the villages of Barrow, Nuiqsut, and Kaktovik. However, this does not mean that the harvesting of these species is not important to Alaskan Natives. To ensure that the impact of oil and gas activity on the availability of the species or stock for subsistence uses is negligible, prior to receipt of an LOA, when working in a subsistence hunting or fishing area, Industry will be required to provide evidence to the Service that a plan of cooperation has been presented to the subsistence communities, the Eskimo Walrus Commission and the North Slope Borough. This plan of cooperation will provide the procedures on how Industry will work with the affected Native communities and what actions will be taken to avoid interference with subsistence hunting of polar bear and walrus. The Service will review the plan to ensure that potential effects on the availability of the species are negligible.

If there is evidence that oil and gas activities will affect, or in the future may affect, the availability of polar bear or walrus for subsistence, the Service will reevaluate its findings regarding limits of incidental take and the measures required to ensure continued subsistence hunting opportunities.

Monitoring and Reporting

The purpose of monitoring programs is to determine shortterm and long-term direct, indirect cumulative and effects of authorized oil and gas activities on polar bear and walrus in the Beaufort Sea and the northern Plans must coast of Alaska. identify the methods that will be used to determine and assess the effects on the movements, behavior and habitat use of polar bear and walrus in response to Industry activity. The results of the monitoring activity will be summarized and reviewed each year. Objectives for each year will be based on the previous year's monitoring results.

A Service-approved plan for monitoring and reporting the effects of Industry exploration, development and production activities on polar bear and walrus will be required of all applicants prior to issuance of an LOA. For exploratory activities, a monitoring and reporting plan must be submitted each year, at least 90 days prior to initiation of planned activities, except that this 90-day requirement is waived for the first year. Monitoring results must be submitted, in final form, to the Service 90 days after completion of the activity. Since development and production activities are continuous long-term activities, upon approval, LOAs and their required monitoring and reporting plans would be issued for the life of the activity or until expiration of the regulations, whichever occurs first. Monitoring results associated with LOAs for development and production activities will be submitted by Industry annually for review by the Service. Continued operation under the LOA will be based upon annual approval of the monitoring results.

Discussion of Comments on the Proposed Rule Comments: Several commenters believed the proposed action would violate the intent of the 1973 international Polar Bear Agreement and does not go far enough to protect important polar bear habitat components.

Response: This Final Rule is authorized by section 101(a)(5) of the Act and the Service sees no conflict between the rule and the Polar Bear Agreement. Article I of the Agreement states that "the taking of polar bears shall be prohibited..."; and the term "taking" is defined in Article I as including "hunting, killing and capturing," none of which is

authorized by this final rule. As the resource agency responsible for polar bears, the Service is concerned about polar bear habitat and intends to ensure that polar bear habitat remains healthy and However, in comport intact. with, and to meet more fully the intent of the Polar Bear Agreement, under this final rulemaking, within 18 months of its publication, the Service will develop and begin implementing a strategy for the identification and protection of important polar bear habitats. Issuance of the rule beyond its 18-month effectiveness will be subject to public notice and comment, and will be contingent upon the development and implementation of this Habitat Conservation Strategy, special considerations or closures of any polar bear habitat components to be protected such as denning and feeding sites and migration routes, and affirmative findings of the Secretary of the Interior. Based on the results of the activities conducted under LOAs during the 18-month period of this final rule, protection information and provided under the Service's Habitat Conservation Strategy, and the Secretary's findings at the conclusion of the 18-month period, conditions specific to polar bears could be modified substantially or additional conditions developed. Pursuant to the development and implementation of the Polar Bear Habitat Conservation Strategy, additional measures could include designation of the special protective areas (e.g., "sanctuaries"), to ensure that important denning and feeding sites, migration routes, or other components have a high degree of protection. The Service will require and evaluate monitoring programs that will report the

no za

effects of the activity on polar bears and their habitat. The analysis of these monitoring reports may result in the modification of regulations or the conditions of operation, as necessary, to assure that the activity is having no more than a negligible effect upon polar bear rates of recruitment and survival. The Service may suspend or withdraw authorization for incidental take if monitoring programs indicate that the taking is having a greater than negligible effect on the population.

Comment: The Service has failed to "estimate the numbers of each species of marine mammal that may be taken and fully explain its rationale for determining that those numbers are appropriately characterized as 'small'."

The regulations Response: implementing the 1986 amendments to section 101(a)(5) of the Act define "small numbers" to mean "a portion of a marine mammal species, or stock, whose taking would have a negligible impact on that species or stock" (50 CFR 18.27 (c)). The Service declines to prescribe actual numbers for taking levels. Such numerical limits do not take into account the effect of the type of taking such as harassment versus mortality. Congress recognized the imprecision of the term "small numbers," but "was unable to offer a more precise formulation because the concept is not capable of being expressed in absolute numerical limits." H.R. Rep. No. 228, 97th Cong. 1st Sess. 20 (1981).

Comment: There is no justification for establishing a 5-

year period for the duration of the regulations.

Response: The suggestion that the Service consider issuing incidental take regulations for a period shorter than the 5 years allowed in Section 101(a)(5) of the Act may be based on an assumption that a lack of information would justify issuing the regulations for only a "trial" period. The mechanisms are already in place to withdraw incidental take authority should the impacts demand such action. Each specific activity covered by these regulations will be required to obtain an LOA prior to beginning that activity. Monitoring and reporting are requirements of the LOA. Therefore, upon annual review of the monitoring and reporting data, should the need arise, the Service has the authority to revoke incidental take authorization. (50 CFR 18.27(f)). However, in consideration of the 1973 international Agreement on the Conservation of Polar Bears and its intent to protect and conserve habitat components, the Service will develop and begin implementation of a Polar Bear Habitat Conservation Strategy. Because special considerations or closures of any polar bear habitat components may be identified as needing further protection (e.g., denning and feeding sites and migration routes), the Secretary of the Interior has decided to make this rule effective for 18 months only, during which time the Strategy will be developed and implementation begun. Extension of the rule for the full 5-year period will be contingent upon not only development and beginning implementation of the Strategy, but also the Secretary's findings at

the conclusion of the 18-month period, which would include consideration of the results of activities conducted under LOAs. The rule would not be extended for the full 5-year term without public notice and opportunity for Pursuant to the comment. development and implementation of the Polar Bear Habitat Conservation Strategy and a decision to extend the rule, additional protective measures could include the designation of special protective areas (e.g., "sanctuaries"), to ensure that important denning and feeding sites, migration routes, or other habitat components have a high degree of protection. During the 18-month period of this rule, the Service will require and evaluate monitoring programs that will report the effects of Industry activity on polar bears and their habitat components. If the decision is made to extend the rule to the full 5-year term, the analysis of these monitoring reports also may result in the modification of those regulations or the conditions of operation, as necessary, to assure that an activity is having no more than a negligible effect upon polar bear habitat components or rates of recruitment and survival. The Service may suspend or authorization for withdraw incidental take if monitoring programs indicate that the taking is having a greater than negligible effect on the population.

Comment: Commenters believed that the Service should prepare a full Environmental Impact Statement (EIS).

Response: Through the preparation of an Environmental Assessment (EA), the Service found that the action will not significantly affect the quality of the human environment, thereby resulting in a "Finding Of No Significant Impact (FONSI)." Therefore, in accordance with the National Environmental Policy Act, no EIS is required. The EA publicly disclosed the Service's analysis of whether the proposed activity has only a negligible impact on a species or stock and does not have an unmitigable adverse impact on subsistence users.

Commenters appeared to confuse the potential impacts resulting from the incidental take of polar bear and walrus and the potential impacts resulting from oil and gas exploration, development, and production activities. The Service does not authorize the actual oil and gas activities. Those activities are authorized by other State and Federal agencies. The Service is confident in its position that the regulation does not significantly affect the quality of the human environment and, therefore, the preparation of an EIS is not required.

Comment: The EA and the Preamble of the Proposed Rule do not adequately address the need for the proposed action.

Response: Additional information has been added to the EA and the Final Rule's Preamble stating the need for the regulations.

Comment: Commenters stated that the annual review of monitoring and reporting plans is not adequate.

Response: Section 101(a)(5) of the Act does not outline specific monitoring and reporting

requirements. Monitoring and reporting requirements will be specifically designed and approved for each specific activity by authorized an LOA. Monitoring and reporting requirements will be different depending upon whether the activity will be taking place on land, on ice, or in open water. An LOA will require the submission of a monitoring and reporting plan to be reviewed and approved by the Service prior to initiation of A report to the the activity. Service of monitoring and reporting activities will be required to be submitted 90 days after completion of exploration activities. The 90-day submittal time prior to the activity, the 90dav submittal time after completion of the activity and the time required for the actual activity make review of the monitoring and reporting plans often more than annually unrealistic. However, the Service is made aware of all sightings as soon as possible during the ongoing activity. Therefore, if needed, the monitoring and reporting plans could be modified to meet the current situation.

Comment: One commenter pointed apparent out an inconsistency between the Service's BPX Proposed Rule (December 30, 1992, 57 FR 62284) and the Service's Shell Western E & P, Inc. (SWEPI), Final Rule (June 14, 1991, 56 FR 27453) over the issue of whether "minor disturbances" The commenter are takes. expressed confusion over our interpretation between the two rules and questioned if the Service's standard for takes had changed from the SWEPI Final Rule to the BPX Proposed Rule?

Response: The Service's standard as established in the SWEPI Final Rule has not changed. In developing that rule, the Service presented (at 56 FR 27453, column 2, last paragraph) the following rationale to clarify confusion over the term "take." That rationale still stands.

p.289

"The term 'take' as defined in 50 CFR 18.3 means to harass, hunt, capture, collect, or kill any marine mammal including, without limitation, any of the following: The collection of dead animals or parts thereof; the restraint or detention of a marine mammal, no matter how temporary; tagging a marine mammal; or the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in the disturbing or molesting of a marine mammal. It is true that proof of 'take' need not involve a showing of death or physical injury. However, minor disturbances of marine mammals, especially those that may occur in the absence of any negligence or intentional action by a person carrying out an otherwise lawful activity, may not constitute a 'take.'

The argument presented in our BPX Proposed Rule related specifically to the issue of bear/human encounters where human life is in jeopardy and whether, in such instances, the regulation could be used to authorize intentional nonlethal or lethal takings of polar bears. The rationale presented in the BPX Proposed Rule was intended as an argument against use of the regulation to authorize intentional takes of any sort; it was not intended as an argument for redefining and expanding the

definition of take to include "minor disturbances."

Comment: The Proposed Rule's Preamble and the EA contain an extensive and detailed listing of objectives sought to be achieved through monitoring programs. Some appear to go far beyond what may legally and realistically be expected of an LOA holder. Research is not the responsibility of an LOA holder.

Response: The Secretary of the Interior is directed to prescribe regulations requiring the monitoring and reporting of incidental takes. The monitoring and reporting is to help the Service make the decision that the total taking during the 5-year period will have a negligible impact on the species or stock. It is the responsibility of the applicant to provide the required information and to demonstrate negligible The monitoring is to impact. determine and report when, where, how, and how many marine mammals, by species, age/size, and sex are taken in the course of the authorized activity. Monitoring methods which may accomplish these tasks include shipboard observations, aerial surveys, and possible monitoring of radio tagged walruses and polar bears in the vicinity of the authorized activity. Long-term population monitoring programs should be developed to detect possible changes in abundance, distribution, and productivity. Programs which address these basic biological questions are not necessarily the responsibility of the applicant. Basically, the Service will not specifically define what information gathering will be required. Flexible monitoring and reporting requirements, developed

by the Service, in cooperation with other interested agencies and groups, will be most beneficial to the Service and the species of concern.

Comment: There seems to be a misunderstanding of the proposed area. Several commenters said "regulations do not exclude ANWR," and "the proposed regulations include ANWR."

Response: The EA, the Preamble and the actual regulations are clear in this regard. The Industry petitions for incidental take regulations specifically excluded the Arctic National Wildlife Refuge (ANWR). The regulations do not include the ANWR.

Comment: The regulations should provide an opportunity for public review and comment on LOA applications.

Response: The Act does not require a public comment period for applications for LOAs. The Service's general implementing regulations in 50 CFR 18.27 state that once specific regulations are effective, LOAs will be processed, to the maximum extent possible, within 30 days from the date they are received. The Service will notify interested parties, such as the closest coastal community, State of Alaska, and the Marine Mammal Commission regarding the receipt and content of the LOA application. Notice of issuance of LOAs will be published in the Federal Register. Generally speaking, the public has had the opportunity to comment on all activities that the Industry will likely conduct in the next 5 years. The regulations and the

determination of "negligible" impact are based on Industry petitions which presented activities likely to be conducted for the next 5 years. Also, the public will have an opportunity to review and comment on activities during development and implementation by the Service of the Polar Bear Habitat Conservation Strategy.

Comment: Some commenters disagreed that the total impact of the takings will have a negligible effect on the species and on their availability for subsistence uses. Furthermore, they stated that issuance of these regulations violates the rights of the Native people.

The regulations Response: authorize the incidental take of polar bear and walrus associated with Industry activities. The regulations do not authorize the actual oil and gas activities. Lethal take of the species are not authorized by the regulations. Only the "incidental," by chance, or unexpected take is authorized under the regulations. Industry activities were present on the North Slope prior to the enactment of the "small take" provisions of the Act. Likewise, these activities have been conducted since the enactment of the Act. During that period of time, all known lethal takes of polar bears have been extremely small (possible 2-3). Takes of polar bears due to "harassment" possibly have been numerous, but there is no way to document such actions. Once the LOA process is in place and monitoring and reporting are required, the Service will have documentation on the non-lethal interactions with polar bears. The Service is confident that the authorized activities will

have a negligible impact on the species and will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses. Further assurance that coastal Alaskan Natives will not be adversely impacted is in the requirement that a holder of an LOA cooperate the affected with Native community. Prior to authorization, applicants must assure the Service that they have met with the local affected villages and agreed upon a plan of action that will not have an unmitigable adverse impact on subsistence uses. Further, once the Service completes the development and begins implementing the Polar Bear Habitat Conservation Strategy, any additional protection provided to polar bear denning and feeding sites and migration patterns should further ensure that an unmitigable adverse impact on subsistence uses will not occur.

Comment: §18.126, In "Measures to ensure the availability of species for subsistence." the word "traditional" should be deleted. Traditional subsistence hunting areas or areas where subsistence hunting "historically" took place may no longer be utilized as subsistence hunting areas.

Response: The Service agrees. The purpose of §18.126 is to ensure that Industry activities do not conflict with subsistence hunting activities. To ensure a dialogue between Industry and subsistence Native hunters, this section has been changed to require that a plan of cooperation be submitted with each application for an LOA as evidence of agreement between Industry and the Native community. This procedure will allow the Native subsistence community to have input concerning possible adverse effects.

Required Determinations

The Service has prepared an Environmental Assessment (EA) in conjunction with this rulemaking. The Service has concluded in a Finding of No Significant Impact (FONSI) that this is a not major Federal action significantly affecting the quality of the human environment within the meaning of Section 102(2)(C) of the National Environmental Policy 1969. Act of Therefore, preparation of an Environmental Impact Statement is not required. A copy of the EA and FONSI may be obtained from the individual identified above in the section entitled, "FOR FURTHER INFORMATION CONTACT."

This rule has been reviewed under Executive Order 12866. Under the Regulatory Flexibility Act, 5 U.S.C. 601 et seq., it has been determined that this rule will not have a significant economic effect on a substantial number of small entities. Oil companies and their contractors, conducting exploration, development, and production activities in Alaska, have been identified as the only applicants under the likelv regulations. These potential applicants have not been identified as small businesses.

This final rule is not expected to have a potential takings implication under Executive Order 12630 because it authorizes incidental, but not intentional, take of polar bear and walrus by oil and gas industry companies and thereby exempts them from civil and criminal liability. The rule also does not contain policies with federalism implications sufficient to warrant preparation of a Federalism Assessment under Executive Order 12612. T h e collections of information contained in this rule have been approved by the Office of Management and Budget under the Paperwork Reduction Act (44 U.S.C. 3501 <u>et seq</u>.) and assigned clearance number 1018-0070.

List of Subjects in 50 CFR Part 18 Administrative practice and procedure, Imports, Indians, Marine mammals, Transportation.

For the reasons set forth in the preamble, part 18, subchapter B of Chapter 1, Title 50 of the Code of Federal Regulations is amended as set forth below:

PART 18-MARINE MAMMALS 1. The authority citation for 50 CFR Part 18 continues to read as follows: 16 U.S.C. 1361 <u>et seq</u>.

2. A new Subpart J is added as follows:

Subpart J-Taking of Marine Mammals Incidental to Oil and Gas Exploration, Development, and Production Activities in the Beaufort Sea and Adjacent Northern Coast of Alaska.

§18.121 Specified activity and specified geographical region. §18.122 Effective dates. §18.123 Permissible methods. §18.124 Prohibitions. §18.125 Level of activity. §18.126 Measures to ensure availability of species for subsistence. §18.127 Requirements for monitoring and reporting. §18.128 Letters of Authorization. §18.129 Information collection requirements.

Subpart J-Taking of Marine Mammals Incidental to Oil and Gas Exploration, Development, and Production Activities in the Beaufort Sea and Adjacent Northern Coast of Alaska.

\$18.121 Specified activity and specified geographical region.

Regulations in this subpart apply to the incidental, but not intentional, take of polar bear and walrus by U.S. citizens (as defined in § 18.27(c)) engaged in oil and gas exploration, development, and production activities in the Beaufort Sea and adjacent northern coast of Alaska. The specified geographical area is defined by a North/South line at Barrow, Alaska, and includes all Alaska State waters, and Outer Continental Shelf waters east of that line to the Canadian border and an area 25 miles inland from Barrow on the west to the Canning River on the east. The Arctic National Wildlife Refuge is excluded.

§18.122 Effective dates.

Regulations in this subpart are effective for an 18-month period, from (December 16, 1993) through (June 16, 1995) for oil and gas exploration, development, and production activities. Within the 18 month effective period of this rulemaking, the Service will develop and begin implementing a Polar Bear Habitat Conservation Strategy, pursuant to the management planning process in Section 115 of the Marine Mammal Protection Act and in furtherance of the goals of Article II of the 1973 international Agreement on the Conservation of Polar Bears.

This Polar Bear Habitat Conservation Strategy mav identify and designate special considerations or closures of any polar bear habitat components to be further protected; public notice and comment will be sought on those considerations or closures. By (June 16, 1995), pursuant to notice and opportunity for public comment, these regulations may be extended for the full 5-year term authorized by the Act, contingent upon the Service developing and beginning to implement this Polar Bear Habitat Conservation Strategy, review of monitoring reports submitted by holders of Letters of Authorization, and an affirmative finding by the Secretary of the Interior.

§18.123 Permissible methods.

(a) The incidental, but not intentional, take of polar bear and walrus by U.S. citizens holding a Letter of Authorization (see §18.128) is permitted for takes resulting from:

(1) activities associated with conducting geological and geophysical surveys;

(2) activities associated with drilling exploratory wells and associated activities; and

(3) activities associated with drilling production wells and performing production support operations.

(b) The methods and activities identified in §18.123(a) must be conducted in a manner that minimizes to the greatest extent practicable adverse impacts on polar bear and walrus, their habitat and on the availability of these marine mammals for subsistence uses. Subsequent to implementation by the Service of its Polar Bear Habitat Conservation Strategy, no adverse impacts will be authorized in those identified polar bear habitat areas afforded special protection through implementation of that strategy.

(c) The Service will evaluate each request for a Letter of Authorization based on the specific activity and the specific geographical location. Each Letter of Authorization will identify allowable conditions or methods that are specific to the activity and location.

§18.124 Prohibitions.

(a) Intentional takes of polar bear or walrus are not authorized by these regulations. (Note: Pursuant to Section 109(h)(1) of the Marine Mammal Protection Act, the Service may authorize the intentional take (e.g., harassment associated with deterrent activities and/or lethal take) for the protection of human life or welfare.)

(b) Any take that fails to comply with the terms and conditions of these specific regulations or of the Letters of Authorization is prohibited.

§18.125 Level of activity.

When Letters of Authorization are requested, the Service will determine whether the level of activity identified in the request exceeds that considered by the Service in making a finding of negligible impact on the species and a finding of no unmitigable adverse impact on the availability of the species for subsistence. If the level of activity is greater, the Service will re-evaluate its findings to determine if those findings continue to be appropriate based on the greater level of activity. Depending on the results of the evaluation, the Service may allow the authorization to stand as is, add further conditions, or withdraw or suspend the authorization.

§18.126 Measures to ensure availability of species for subsistence.

When applying for a Letter of Authorization, the applicant must submit a plan of cooperation that identifies what measures have been, and will be, taken to minimize adverse effects on the availability of polar bear and walrus for subsistence uses. The applicant must contact affected subsistence communities to discuss potential conflicts with the location, timing, and methods of planned operations. The applicant must make reasonable efforts to assure that activities do not interfere with subsistence hunting or that adverse effects on the availability of polar bear or walrus are properly mitigated.

§18.127 Requirements for monitoring and reporting.

(a) Holders of Letters of Authorization are required to cooperate with the Service and other designated Federal, State, or local agencies to monitor the impacts of oil and gas exploration, development and production activities on polar bear and walrus.

(b) Holders of Letters of Authorization must designate a qualified individual or individuals to observe and record the effects of the activities on polar bear and walrus. (c) When applying for a Letter of Authorization, the applicant must include a site-specific plan to monitor the effects of the activity on the populations of polar bear and walrus that are present during the on-going activities. This plan, which must be approved by the

Service's Alaska Regional Director, must identify the survey techniques that will be utilized to determine the actions of the polar bear and walrus in response to the on-going activity. The monitoring program must document the actions of these marine mammals and estimate the actual level of take. The monitoring requirements will vary depending on the activity, the location, and the time.

(d) If the activity is planned in polar bear habitat, the operator must develop a polar bear awareness and interaction plan subject to approval by the Service. For the protection of human life and welfare, each employee on site must complete a basic polar bear encounter training course.

(e) At its discretion, the Service may place an observer on site of the activity, on board drillships, drill rigs, aircraft, icebreakers, or other support vessels or vehicles to monitor the impact of the activity on polar bear and walrus.

(f) The holder of the Letter of Authorization must submit a report to the Service's Alaska Regional Director within 90 days after completion of activities. For development and production activities, the annual monitoring report must be submitted no later than 15 days after completion of the previous year's activities. The report must include, at a
minimum, the following information:

encas

(1) Dates and time of activity;

(2) Dates and locations of polar bear or walrus activity related to monitoring the effects of the activity; and

(3) Results of the monitoring activities including an estimate of the actual level of take.

§18.128 Letters of Authorization.

Each person or entity (a) conducting an oil and gas exploration, development, or production activity in the geographical area described in §18.121, that may take a polar bear or walrus in execution of those activities, should apply for a Letter of Authorization for each exploration activity or a Letter of for each Authorization development and production area. The application for authorization must be submitted to the Service's Alaska Regional Director at least 90 days prior to the start of the proposed activity.

Note: The requirement that an application for a Letter of Authorization be filed at least 90 days before an activity is scheduled to begin becomes effective 120 days after issuance of these final regulations. The final regulations become effective 30 days after publication.

(b) When an application for a Letter of Authorization is submitted, it must include the following information:

(1) A description of the activity, the dates and duration,

the specific location and the estimated area affected by that activity;

(2) A plan to monitor the behavior and effects of the activity on polar bear and walrus; and

(3) A polar bear awareness and interaction plan.

(4) Where relevant, a cooperation plan that describes the measures to be taken to mitigate potential conflicts between the proposed activity and subsistence hunting.

(c) In accordance with \$18.27(f), decisions made concerning withdrawals of Letters of Authorization, either on an individual or class basis, with regard to factors other than the term of Letters of Authorization, will be made only after notice and opportunity for public comment.

(d) The requirement for notice and public comment in §18.128(c) will not apply should the Service determine that an emergency exists that poses a significant risk to the well-being of the species or stock of polar bear or walrus.

§18.129 Information collection requirements.

The collections of information contained in this rule have been approved by the Office of Management and Budget under the Paperwork Reduction Act (44 U.S.C. 3501 <u>et seq</u>.) and assigned clearance number 1018-0070. It is necessary to collect the information in order to describe the activity and estimate the cumulative impacts of potential takings by all persons conducting the activity. The information is used to evaluate the application and determine whether to issue specific regulations and, subsequently, Letters of Authorization.

The public burden associated with the 5-year period potentially covered by this is estimated at 5,802 hours including 1,002 hours to complete the three applications for specific regulations (334 hours each), 720 hours to complete 90 applications Letters for of Authorization (8 hours each), 2,880 hours to comply with recordkeeping requirements associated with 90 Letters of Authorization, and 1,200 hours to complete 150 required annual reports (8 hours each). Direct comments regarding the burden estimate or any other aspect of this requirement to the Information Collection Clearance Officer, U.S. and Fish Wildlife Service. Department of the Interior, Mail Stop 224 ARLSQ, 1849 C Street, NW., Washington, DC 20240, and the Office of Management and Budget, Paperwork Reduction Project (1018-0070), Washington, DC 20503.

Dated: July 22, 1993 Richard N. Smith Acting Director, U.S. Fish and Wildlife Service. [FR Doc. 93-28053 Filed 11-15-93 8:45am] Billing Code 4310-55-M

This page intentionally blank

Roive

#80 ·-

ß.

ĸ

NON

-

194

pero i

635111

أمضغط

(AF)

8975

ſ\$₽.~

. .

Appendix E. Protocol of Intentions Between the Indigenous Peoples of Chukotka and Alaska.

PROTOCOL OF INTENTIONS BETWEEN THE INDIGENOUS PEOPLES OF CHUKOTKA AND ALASKA

on the Conservation, Protection, Management, and Study of the Bering and Chukchi Seas Shared Polar Bear Population

The Parties to the Protocol:

Guided by the Convention of the International Labor Organization # 169 regarding the indigenous and nomadic peoples in independent countries, the Arctic Environmental Protection Declaration (Rovaniemi, 1991), the Protocol of Intentions on the Conservation and Regulated Use of the Bering and Chukchi Seas Polar Bear Population (1992), signed by the Ministry of Ecology and Natural Resources of the Russian Federation and the U.S. Fish and Wildlife Service, the Nuuk Declaration on the Arctic Development and Environment (1993), and the Resolutions of the 1st Congress of Indigenous Minorities of Chukotka (Anadyr, 1994),

and

Recognizing that population's unique role in the lives of the indigenous Native peoples in the preservation and development of their traditional ways of life, and noting the fragility and vulnerability of the Bering and Chukchi Seas ecosystems and the international status of the polar bear habitat including migratory routes, and recognizing the mutual concerns of Alaskan and Chukotkan users,

have decided:

1. In order to review all issues regarding the study, conservation and management of the shared polar bear population of the Bering and Chukchi Seas, to combine efforts of indigenous villages of the northern coastal areas of Chukotka and western and north-western coasts of Alaska to develop an Agreement for the joint management for the Bering and Chukchi Seas polar bear population.

2. The Agreement should follow the following priority principles of cooperation between the indigenous peoples of Chukotka and Alaska:

(a) The text of the Agreement must not contradict the International Agreement on the Conservation of Polar Bears (1973);

(b) It is essential to create a special working roup composed of representatives of indigenous peoples which must be involved in the work between the federal agencies of Russia and United States in the development of an international agreement between the United States and Russia;

(c) The Agreement must provide for a unified system of management of the polar bear population and protection of polar bear habitats on the basis of western scientific knowledge and the traditional knowledge of Natives and on the basis of their concerns of national subsistence use, including exchange of environmental information, estimates of population, coordination of activity on conservation, protection and management of the shared population, and exchange of information on environmental jurisdiction; (d) The Agreement must provide for the development of measures based on sustainable management and harvesting of the polar bear population by the indigenous peoples of Chukotka and Alaska as a source of food and subsistence use;

(e) The Agreement must take into consideration the appropriate environmental federal laws relating to Chukotka and Alaska and should assess responsibility for violating the requirements of the united management of the shared polar bear population.

3. This Protocol is a provisional one providing the basis for the future development of a more detailed plan and joint agreements on the management, study, and conservation of the shared polar bear population by indigenous peoples of Chukotka and Alaska with the participation of federal agencies and the federal governments of Russia and United States.

4. To hold a meeting of working groups in 1994 in order to develop an Agreement between Native peoples of Chukotka and Alaska on the joint management of the shared polar bear population.

DONE on April 25, 1994 at Anadyr (Chukotka, Russia) in duplicate, in the English and Russian languages, both texts being equally authentic.

Signed on behalf of the Chukotka Natives

Alaxander A. Omrypkir President Chukotka Native Association

Zoya V. Badmaeva Chairman of the Elders Council Chukotka Native Association Signed on behalf of the Natives of Alaska

Charles H. Johnson Executive Director Eskimo Walrus Commission

Charles D. N. Brower Executive Manager, Department of Wildlife Management, North Slope Borough an c

Walter G. Sampson Vice President Lands, NANA Regional Corporation

Appendix F. Federal Register Notice of Intent to Prepare a Polar Bear Habitat Protection Strategy, Conduct Public Meetings, and Request for Information.

Billing Code: 4310-55

DEPARTMENT OF INTERIOR

Fish and Wildlife Service

Polar Bear Habitat Protection Strategy

AGENCY: Fish and Wildlife Service, Interior

ACTION: Notice of intent to prepare a polar bear habitat protection strategy, conduct public meetings, and request information.

SUMMARY: The U.S. Fish and Wildlife Service (Service) intends to develop and implement a strategy for the identification and protection of important polar bear habitats. Development of the strategy for Alaska will be achieved as part of the Service's on-going polar bear conservation planning process and in cooperation with the State of Alaska, Alaska Natives, oil and gas industry, conservation organizations, and others. The Service is requesting information, suggestions, and participation in the development of this strategy.

DATE: Comments and information should be received by February 11, 1994. Public meetings on the strategy are scheduled as follows;

1. January 20, 1994, 7:30 p.m., Wilda Marston Theater, 1st floor, Loussac Library, 3600 Denali Street, Anchorage, Alaska. 2. January 25, 1994, 7:30 p.m. North Slope Borough Assembly Chambers, Barrow, Alaska.

ADDRESS: Written comments should be submitted to Supervisor, Marine Mammals Management, U.S. Fish and Wildlife Service, 4230 University Drive, Suite 310, Anchorage, AK 99508. Comments may also be hand delivered to the same address or sent by FAX (907) 271-2381. Comments and materials received in response to this action will be available for public inspection at this address during normal working hours of 8:00 a.m. to 4:30 p.m., Monday through Friday.

FOR FURTHER

INFORMATION CONTACT: Scott Schliebe at the U.S. Fish and Wildlife Service, Marine Mammals Management, 4230 University Drive, Suite 310, Anchorage, AK 99508, (800) 362-5148 or (907) 271-2394.

SUPPLEMENTARY INFORMATION:

Background

On December 30, 1992, the Service issued a proposed rule that would authorize the incidental take of small numbers of polar bear and Pacific walrus during oil and gas industry operations year round in the Beaufort Sea and adjacent northern coast of Alaska (57 FR 62283). The final rule to authorize incidental take was issued on Tuesday, November 16, 1993. The final rule contains a provision that the U.S. Fish and Wildlife Service will develop and begin implementing a polar bear habitat protection strategy within 18 months. This provision is in response to public comments on the proposed rule and in agreement with the 1973 International Agreement on the Conservation of Polar Bears.

Information Solicited

The Service requests interested persons to submit comments, information, and suggestions concerning the development and implementation of an Alaska Polar Bear Habitat Protection Strategy. A draft Polar Bear Habitat Protection Strategy will be developed based upon comments received, information generated from polar bear research, and local knowledge of the indigenous people. A Federal Register notice will announce the development of the draft Alaska Polar Bear Habitat Protection Strategy. Once the draft Strategy is developed, opportunities for public review and comment will be provided.

Date

Walter 0. Stieglitz Regional Director

This page intentionally blank

)

ляк,

eres.

PD-8

हरू २

¢.

(725)**

SST.

1955

M638/219

862500

. 16

- 1887-

祝秋(***

6⊲0⊂

1940

原料:"

.

Appendix G: Environmental Assessment and Finding of No Significant Impact Dated 4/26/93, Beaufort Sea Incidental Take Final Rule.

FINDING OF NO SIGNIFICANT IMPACT

Promulgation of Regulations for Taking Marine Mammals Incidental to Specified Activities

Based on a review and evaluation of the information contained in the supporting reference below, I have concluded that approval and implementation of the action would not significantly affect the quality of the human environment, and that the preparation of an Environmental Impact Statement on this action is not required by Section 102(2) of the National Environmental Policy Act or its implementing regulations.

Supporting Reference

(1) U.S. Fish and Wildlife Service-Environmental Assessment on the regulations governing the taking of small numbers of marine mammals incidental to oil and gas activities in the Beaufort Sea and adjacent coastal Alaska.

Dated: <u>4/26/93</u>

<u>/S/ Acting Regional Director David B. Allen</u> Regional Director, Region 7 U.S. Fish and Wildlife Service

FINAL

ENVIRONMENTAL ASSESSMENT

FINAL RULE TO AUTHORIZE THE INCIDENTAL TAKE OF SMALL NUMBERS OF POLAR BEAR AND WALRUS DURING OIL AND GAS ACTIVITIES IN THE BEAUFORT SEA AND ADJACENT COASTAL ALASKA

£.7~

DEPARTMENT OF THE INTERIOR U.S. Fish and Wildlife Service

April 1993

ENVIRONMENTAL ASSESSMENT

Final Regulations Governing the Taking of Small Numbers of Polar Bear and Walrus Incidental to Oil and Gas Activities in the Beaufort Sea and Adjacent Coastal Alaska

I. DESCRIPTION OF AND NEED FOR THE ACTION

<u>Need</u>

In Alaska, the U.S. Fish and Wildlife Service (Service) is responsible for the management of three marine mammals: polar bear (<u>Ursus maritimus</u>), sea otter (<u>Enhydra lutris</u>) and the Pacific walrus (<u>Odobenus</u> rosmarus divergens). These mammals are not listed as threatened or endangered and therefore, are not provided protection by the Endangered Species Act. However, they are protected under the Marine Mammal Protection Act of 1972, hereafter referred to as the Act.

The Act placed a general moratorium on the taking of any marine mammal. "Take" as defined by the Act means to harass, hunt, capture or kill or attempt to harass, hunt, capture or kill any marine mammal. The Act was amended in 1981 to include Section 101(a)(5) which gives the Secretary of the Interior authority to allow the incidental, but not intentional, take of small numbers of marine mammals in a specified activity within a specified geographical area.

The taking of marine mammals may be allowed only if the Director of the Service finds, based on the best scientific evidence available, that the total of such taking in the specified activity will have a negligible impact on the species or stock and will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses. If these findings are made, the Service issues regulations that must include monitoring and reporting requirements and permissible methods of taking and other means to ensure the least practicable adverse impact on the species and its habitat and on the availability of the species for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance. Upon request by citizens of the United States the Service can issue Letters of Authorization (LOA) to conduct activities under the provisions of the regulations.

Section 101(a)(5) of the Act, directs the Secretary of the Interior and thereby the Service, to allow, upon request by U.S. citizen, the incidental, but not intentional, taking of small numbers of marine mammals provided certain requirements are met. The Service, hereby, is issuing at the request of the oil and gas industry (Industry), regulations to allow the incidental take of polar bear and walrus. Oil and gas exploration, development and production activities conducted in proximity to marine mammals risk violating the provisions of the Act if those activities result in a "take" of polar bear or walrus. The regulations will allow the Industry to operate within the law in the event an incidental take occurs during the course of normal operations.

Incidental take authorization will be granted for a period of five years or less.

Subsistence

In 1986, the Act was amended to authorize the issuance of incidental take regulations for depleted as well as non-depleted species. The legislative history to the 1986 amendments called for a revised definition of negligible impact and a new definition for unmitigable adverse impact. The amendments changed the standard used to evaluate the impact on subsistence uses from "negligible impact" to "not having an unmitigable adverse impact." Two elements must be present to make a determination that the activities will have an adverse impact that cannot be mitigated. First, the impact from the activities must be likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by (1) causing the marine mammals to abandon or avoid hunting areas, (2) directly displacing subsistence users, or (3) placing physical barriers between the marine mammals and subsistence hunters. Second, it must be an impact that cannot be sufficiently mitigated by other measures to allow subsistence needs to be met.

Letters of Authorization

Any oil and gas industry company conducting an activity that is likely to take either of the two species of marine mammals (i.e., polar bear and walrus) included in the incidental take exemption should apply for a LOA. The application must be submitted at least 90 days before the activity is scheduled to begin.

An application must contain a description of the activity including the method to be used, the dates and duration of the activity, the specific location of the activity, the estimated area that actually will be affected by the activity and the number and type of takes.

An application must also include a plan to monitor the effects of the activity on marine mammals and on the availability of marine mammals for subsistence use. In polar bear habitat, a polar bear awareness and interaction plan must be included. Also, it must include a cooperation plan with a description of the measures taken to minimize any potential conflicts between the proposed activity and subsistence hunting.

Issuance of a LOA will be based on a determination that the level of taking will be consistent with the findings made for the total taking allowed under the specific regulations. Notice of issuance of a LOA will be published in the <u>Federal Register</u> within 30 days of being issued. LOAs will specify the period for which they are valid and any additional terms and conditions appropriate for the specific activity. The individual company conducting the activity requests, and holds, the LOA.

LOAs shall be withdrawn or suspended if, after notice and opportunity for public comment, the Director determines: (1) the regulations prescribed are not being substantially complied with, or (2) the taking allowed is having, or may have, more than a negligible impact on the species or stock or an unmitigable adverse impact on the availability of the species or stock for subsistence uses. The requirement for notice and opportunity for public review shall not apply if the Director determines that an emergency exists which poses a significant risk to the well-being of the species or stocks of marine mammals concerned. A violation of any of the terms and conditions of a LOA or of the specific regulations may subject the holder and/or any individual who is operating under the authority of the holder's LOA to penalties provided in the Act.

Request for the Promulgation of Regulations

On December 17, 1991, the U.S. Fish and Wildlife Service received three separate requests from BP Exploration (Alaska) Inc., for itself and on behalf of Amerada Hess Corporation, Amoco Production Company, ARCO Alaska, Inc., CGG American Service, Inc., Conoco Inc., Digicon Geophysical Corp., Exxon Corporation, GECO Geophysical Co., Halliburton Geophysical Services, Inc., Mobil Oil Corporation, Northern Geophysical of America, Texaco Inc., Unocal Corporation and Western Geophysical Company, (hereafter collectively identified as "Industry" throughout this document) seeking promulgation of regulations to allow the incidental take of small numbers of polar bear (Ursus maritimus) and Pacific walrus (Odobenus rosmarus divergens) during oil and gas activities (exploration, development and production) and associated support operations on the North Slope of Alaska, in Alaska State waters and on the Outer Continental Shelf (OCS) year round over the next 5 years.

Activities to be conducted include exploration operations such as geological and geophysical surveys, drilling of stratigraphic test wells, and exploratory drilling for oil and gas together with associated support

activities, development activities and subsequent production activities. Potential sources for incidental taking include noise, physical obstruction, human/animal encounters and accidental oil spills.

Promulgation of Rule

- A. Authority. 50 CFR 18.27, Regulations governing small takes of marine mammals incidental to specified activities.
 - (1) Purpose of regulations. Section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, 16 U.S.C. 1371(a)(5), Public Law 97-58, provides a mechanism for allowing, upon request, during periods of not more than five consecutive years each, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region.
- B. Definitions, as defined in 50 CFR 18.3 and 18.27:
 - (1) "Citizens of the United States" and "U.S. citizens" mean individual U.S. citizens or any corporation or similar entity if it is organized under the laws of the United States or any governmental unit defined in 16 U.S.C. 1362(13).
 - (2) "Negligible impact" is an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.
 - (3) "Small numbers" means a portion of a marine mammal species or stock whose taking would have a negligible impact on that species or stock.
 - (4) "Specified activity" means any activity, other than commercial fishing, which takes place in a specified geographical region and potentially involves the taking of small numbers of marine mammals. For this rulemaking action the specified activity is oil and gas industry related activities and the specified geographical region is the Beaufort Sea and the northern coast of Alaska.
 - (5) "Take" means to harass, hunt, capture, collect or kill, or attempt to harass, hunt, capture, collect or kill any marine mammal.
 - (6) "Incidental, but not intentional taking" means takings which are infrequent, unavoidable or accidental. It does not mean that the takings must be unexpected.
- C. Incidental Takes
 - 1. Sources of Takes
 - a. Noise. Oil and gas exploration, development and production activities produce noise from many different sources. Noise will be generated by stationary operations such as a drill platform, a production center or a water treatment plant. Mobile sources also generate noise. Personnel vehicles, aircraft and boat traffic are sources of mobile noise.
 - b. Physical obstruction. The Endicott causeway and associated production facilities, transportation corridors and pipelines are examples of physical obstructions which may impact movements of the polar bear. Ice management vessels (icebreakers) may present physical obstructions to polar bear and walrus.

- c. Human/animal encounters. Industry personnel and polar bear will be inhabiting the same area. Therefore, encounters between the two are possible. During exploratory work at a Camden Bay offshore well site in 1990, a 2-year-old female polar bear was taken (killed) for the protection of human life. However, this is the first documented lethal take of a polar bear in 15 years of exploratory work in the area. There is no record of polar bears being killed as a result of industry related activities in the production area in over 20 years of operation. However, polar bears are known to eat toxic nonfood items such as styrofoam, plastics, and car batteries (Lunn and Stirling 1985), hydraulic, and lubricating fluids (Russell 1975, Derocher and Stirling 1990) and one polar bear is known to have died as a result of consuming anti-freeze, ethylene glycol colored with rhodamine B. This chemical combination is used for marking airport runway centerlines on snow and ice (Amstrup et al. 1989).
- d. Contact with oil spills. There is a possibility that polar bear or walrus may come into contact with oil that has been accidentally spilled. Should an accidental spill occur during industry operations, an incidental take may occur.

Proposed Operations in the Beaufort Sea and the Northern Alaska Coastal Area.

Industry has submitted three petitions for exploration during summer operations; exploration during the ice-covered period in coastal arctic Alaska and the Beaufort Sea; and development and production and associated operations in arctic Alaska year-round.

Industry activities on and adjacent to the Beaufort Sea encroach upon arctic habitat which supports the polar bear and, to a lesser extent, the Pacific walrus. Activities conducted in this area may result in an encounter with a polar bear or a walrus. In the context of the Act, such an encounter with a polar bear or a walrus may be construed as a "taking."

Below is a summary of operations and actions that are anticipated to be conducted over the next five years. Similar activities have been conducted in the past and are likely to continue to be conducted over the life of the oil fields.

For the summertime (open-water) operations, Industry indicates that approximately 28,200 vessel miles of seismic exploration are anticipated over the five-year period, with as many as 10 vessels acquiring seismic data in the Alaska Beaufort Sea in any one year. From 3 to 12 geotechnical/geochemical programs are projected to be conducted during the five years. Exploratory drilling is estimated to be conducted at 2 to 19 locations over the five years. Exploratory drilling will utilize drillships at 2 to 8 locations and bottom-founded structures at 3 to 11 locations. For the purpose of assessing possible impacts related to this action, it is assumed that these activities will occur equally spaced over time and area for the five year period.

For the wintertime (ice-covered periods) operations, Industry indicates that approximately 35 seismic programs (covering from 7,400 to over 10,000 line miles) and 7 geotechnical/geochemical programs are expected to be conducted. Exploratory drilling is estimated to be conducted at 5 to 15 locations over the life of the regulations. Since it is not feasible to predict with accuracy the exploration activities for the next five years, the locations of these operations are assumed for the purpose of this action to be approximately equally distributed among the onshore and offshore tracts presently under lease and to be leased during the 5-year period.

Due to the large number of variables affecting exploration activities, predictions of exact dates and locations of operations for the next five years is speculative. However, prior to receipt of an LOA, Industry must provide specific dates and locations of proposed activities.

A. Exploration Operations

- 1. Geological and Geophysical Surveys. Geological and geophysical surveys are conducted to assess the potential value of the lease tracts. Typical geophysical surveys, such as "shallow hazard" and "site clearance" surveys are designed to identify hazards which may be encountered during exploratory drilling. Geophysical surveys can be divided into two classes, "deep seismic" and "shallow hazard," of which both generally utilize the "reflective" method of data collection.
 - (a) Geotechnical Site Investigation. Shallow cores provide information about soil conditions. Site investigations are required to develop foundation design criteria for any planned structure, and to determine the optimal location for the facility.
 - (b) Reflective Seismic Exploration. Deep seismic and shallow hazard surveys utilize the "reflection" seismic exploration process of gathering information about the earth's subsurface by measuring acoustic waves which are generated on or near the surface. Large numbers of personnel (40-110) and vehicles (15) may be required to conduct seismic operations.
 - (c) Vibrator Seismic Data Collection. This technique utilizes a continuous cable along the length of the seismic line being recorded. In a 16 to 18 hour day, usually 4 to 5 miles of vibrator seismic operation can be conducted.
 - (d) Airgun and Watergun Seismic Data Collection. These techniques utilize compressed air or water to create a pressure wave - the seismic impulse. Airgun and watergun techniques are generally used in open water conditions and not during arctic winter exploration.
 - (e) Vertical Seismic Profiles. This is a form of well logging that is conducted off the drill pad. This process is used to correlate the reflections on the seismic data with formations seen during drilling.
- 2. Drilling
 - (a) Artificial Island. These man-made structures are constructed in shallow offshore waters, usually in waters less than 50 feet deep, primarily for the purpose of providing a foundation for drilling equipment and personnel. Artificial islands have been most utilized for exploratory operations; however, the Endicott facility is an example of an artificial island supporting production operations. Artificial islands have been constructed from sand, gravel and water (ice) at various times of the season. Usually the construction materials (sand and gravel) are hauled to the site via barge (open-water) or truck (ice-road). Typically a drill rig site is staffed by 50 personnel.
 - (b) Bottom-founded Structures.
 - (i) Concrete Island Drilling System (CIDS). This system is a mobile, water-ballasted, composite concrete/steel unit capable of year-round operations in the Arctic without extensive bottom preparation. This system is a stand alone, gravity-type structure capable of withstanding pack ice movements without additional ice resisting structures.
 - (ii) Single Steel Drilling Caisson. The Single Steel Drilling Caisson (SSDC) is a drilling unit constructed by modifying the forward section of an oceangoing Very Large Crude

Carrier designed to carry out year-round drilling operations under Arctic environmental conditions.

- (c) Kulluk. The Kulluk is a floating drilling unit designed for extended season drilling in Arctic waters of 18 to 185 meters (60 to 600 feet) to depths of 6,100 meters (20,000 feet). The Kulluk is capable of withstanding ice forces likely to be encountered during breakup and freeze-up thereby allowing it the opportunity to operate earlier in the spring breakup season or longer into the fall freeze-up season.
- (d Ice Pads/Ice Islands/Ice Roads. Ice pads, islands, and roads are constructed using the spray ice technique. The technique consists of spraying water into the air allowing the water to freeze and fall to the surface. This technique is utilized to reduce cost and impacts to the area.
- (e) Drillships. Drillships are used in Arctic waters deeper than 18 to 24 meters (60 to 80 feet) because bottom-founded drilling structures (e.g. CIDS) are limited to water depths of less than 24 meters (80 feet). Drillships operate only during periods of open water. Drillships are usually supported by one or more ice management vessels (icebreakers) to ensure that ice will not damage the drilling operation. A blowout preventer is typically located at the seabed in a hole dug below the ice-scour depth. The blowout preventer is an important safety feature enabling the drillship to shut down operations and move from the site without exposing the well. A barge and a tug typically accompany the drilling ship to serve as a standby safety vessel and also provide support as oil spill response and refueling support. Personnel, usually around 100, are routinely ferried between the ship and shore by helicopter.
- B. Development and Production Operations. Alaska's North Slope is located along the shores of the Beaufort Sea, north of the Brooks Range. This region encompasses an area of 88,280 square miles and contains more than 9 separate oil and gas fields of which 5 are in production. Additional discoveries have been made and more production fields are expected within the next five years. The currently producing oil fields are Prudhoe Bay, Kuparuk, Endicott, Lisburne and Milne Point. Niakuk and Point McIntyre fields are expected to be brought into production in the near future. Two other fields, West Sak and Ugnu, are not expected to be developed soon but pilot and evaluation operations may continue.

Development and production is an ongoing year-round operation. Operations are likely to remain somewhat constant over the next five years as some reservoirs become depleted and other reserves are brought on-line.

- 1. Oil Production Fields
 - (a) Prudhoe Bay Field. The Prudhoe Bay field encompasses approximately 350 square miles but surface production facilities are located only on about 200 square miles. Oil wells within the Production Area are clustered together on gravel pads. The technology of directional drilling (angle drilling) allows greater downhole areas to be developed while impacting less surface area. Over 1,000 wells have been drilled in Prudhoe Bay. This figure includes gas and water injection wells. Production facilities at Prudhoe Bay include six separation centers, an electric power station, a Central Gas Facility and the Central Compression Plant. Each of these facilities provide a unique service which prepares the crude oil for shipment down the Trans-Alaska Pipeline System.

- (b) Kuparuk Field. The Kuparuk field lies about 30 miles west of Prudhoe Bay and covers an area of 170,000 acres with a daily production rate of about 325,000 barrels. The Kuparuk Field is the second largest field in the United States. The major production installations include three separation centers and a seawater treatment plant at Oliktok Point. The seawater treatment plant treats seawater for injection into the reservoir for the enhancement of oil recovery.
- (c) Endicott. The Endicott field is located offshore in the Beaufort Sea and is about 10 miles northeast of Prudhoe Bay. Endicott is the first continuous, offshore producing field in the Arctic. The Endicott Production project consists of two artificial gravel islands; a 55-acre Main Production Island and a 16-acre Satellite Drilling Island. The two islands are connected to the mainland and the Prudhoe Bay road system by a 5-mile causeway.
- (d) Lisburne. The Lisburne field underlies the Prudhoe Bay reservoir and is currently producing. The field facilities include five well pads and a production center that separates gas and water from the crude oil. The current development plan calls for up to 90 oil production wells, of which 75 have been drilled through 1990.
- (e) Milne Point. The Milne Point field is located along the south shore of Simpson Lagoon and to the northeast of the Kuparuk field. Since startup in 1985, 11 production pads and 51 wells have been constructed or drilled.
- (f) Niakuk. The Niakuk field is located between the Prudhoe Bay field and the Endicott field approximately one mile offshore. The Niakuk field is not in the production stage but is planned to come into production in the near future.
- (g) Point McIntyre. The Point McIntyre field is located in the nearshore, about two miles north of the Prudhoe Bay producing area. Point McIntyre is not in the production stage at this time. Proposed development will include a drill pad at the existing West Dock and will utilize the Lisburne Production Center for processing the recovered crude oil.
- 2. Oil Production Processes.
 - (a) Production Wastes. Most wastes generated resulting from oil production activities are non-hazardous. These wastes include drilling muds and cuttings and are known as "associated wastes." The drilling mud is designed to prevent the uncontrolled release of oil or gas from the well. Much of the muds and cuttings are recycled. When the muds and cuttings must be disposed they are injected into confining subsurface geologic formations. Reserve pits, for surface disposal of cuttings, have been eliminated by new technology which grinds drilling cuttings to a size small enough to inject into a confining geologic layer. Also included in "associated wastes" are tank-bottom sludges, residues and pigging wastes. The liquid wastes are injected into approved Class II disposal wells and the solids are placed (currently) in lined surface impoundments. However, industry is currently planning and designing a North Slope Waste Management Facility for associated wastes which will eliminate the requirement for surface waste storage. The facility will handle all North Slope oil fields and third-party contractor non-hazardous and exempt oily wastes. The small amounts of hazardous waste that are generated by the Production Area facilities are managed in accordance with current Federal regulations.
 - (b) Production Support Operations. Equipment and supplies are delivered by air, barge, or by the 360-mile North Slope haul road. Barge shipments are limited to a 6-week period each summer when the Arctic icepack moves offshore enough to allow passage of vessels. Two

docks and staging areas handle bulk supplies and heavy equipment, including huge modular buildings delivered by barge. Aircraft, into Deadhorse, Alaska, or ARCO Alaska's private strip, are the primary carriers of personnel, mail, rush-cargo, and perishable items.

II. ALTERNATIVES INCLUDING THE SELECTED ACTION

<u>Selected</u>

The selected alternative promulgates regulations which will allow the incidental take of small numbers of marine mammals associated with oil and gas activities in the Beaufort Sea and adjacent northern Alaska coast. The regulations resulting from this alternative allow the incidental take of two marine mammal species, polar bear and walrus, in the execution of normal exploration, development and production activities. These activities must be conducted in accordance with standard operating procedures and in accordance with State and Federal law. Intentional harassment, hunting, capturing, or killing are not authorized by this alternative.

This alternative will include mitigation, monitoring and reporting requirements specific to subsequent LOAs. Each request for a LOA will be reviewed by the U.S. Fish and Wildlife Service and a determination will be made on the adequacy of mitigation, monitoring and reporting requirements to protect the subject species.

No Action

The no action alternative would assert that no incidental take regulations would be promulgated. The moratorium on the taking of marine mammals imposed by the Act would prohibit Industry from "taking" marine mammals, and neither specific regulations nor Letters of Authorization would be developed and issued to allow the taking of marine mammals incidental to the described oil and gas activities. Takings that occur incidental to oil and gas related activities would continue to be subject to prohibitions found in the Act and Industry would face possible liability for penalties under the Act.

III. AFFECTED ENVIRONMENT

Physical

The offshore geographic region addressed by this action is defined by a north/south line at Barrow, Alaska, including all Alaska State waters and the Outer Continental Shelf (OCS) waters east of that line to the Canadian border. The onshore region is defined as that same north/south line at Barrow, 25 miles inland and east to the Canning River. The onshore area east of the Canning River, specifically the Arctic National Wildlife Refuge, is excluded from this proposal.

The regional climate is typical of the Arctic zone. Summers are short, cool and generally cloudy. During the summer the top layer of ground, the tundra, thaws down to 12 to 16 inches and the landscape becomes an enormous wetland, dotted with lakes and smaller thaw ponds. Winters are very cold. For 56 days in the winter, the sun never rises above the horizon and temperatures can drop to as low as -60°F. Surface winds are common throughout the year and result in wind chill factors well below the actual temperature. The area receives less than 7 inches of precipitation a year and can be considered an arid environment.

The Beaufort Sea can be divided into two separate conditions based upon seasonal variations:

A. Summer (open water)- In the summer, shorefast ice melts and the pack ice recedes northward, resulting in an area of open water along the coast. By mid-July, much of the lagoonal and open-shelf

fast ice in the near shore has melted. The extent of open water along the coast varies from year to year. Variation is dependent upon climatic factors.

The open-water season is triggered by warming temperatures, usually about late June, prolonged insolation, and runoff from streams. The pattern of breakup is somewhat predictable, first at the mouths of the rivers and then in lagoons.

- B. Winter (ice covered)- Winter conditions in the Beaufort Sea begin with freeze-up and an increase in the amount of sea ice. There are considerable variations from year to year and the edge of the pack ice in September is from about 12 to 66 miles offshore (Labelle et al. 1983). In October, the ice edge has moved south of Barrow and from November through May, the ice covers nearly all of the Beaufort Sea. The winter sea-ice regime can be divided into three distinct zones: landfast-ice zone, shear zone, and pack-ice zone.
 - (1) Landfast-Ice zone. The landfast-ice zone extends from the shore out to the zone of grounded ridges. These ridges first form in about 24 to 45 feet of water but by late winter may extend to deeper water. Wind and water stress on floating sheets of ice result in deformation and displacement. Deformations take the form of ridges and rubble fields. However, as winter progresses, displacements and deformations decrease because the ice in the landfast zone thickens and strengthens and becomes more resistant to movement.
 - (2) Shear Zone. Seaward of the landfast-ice zone is the shear zone or the stamukhi. The shear zone, as the name indicates, is a region of dynamic interaction between the stable landfast ice and the moving ice of the pack-ice zone. This interaction in the shear zone results in the formation of ridges and leads.
 - (3) Pack-Ice Zone. The pack-ice lies seaward of the shear zone and includes first year ice, multi-year ice and ice islands. The first year ice that forms in the fractures, leads, polynyas (large areas of open water) varies in thickness from less than one inch to greater than a few feet. Multi-year ice is ice that has survived for more than a year.

The violent interactions between ice zones creates deformed ice, known as ice ridges. These ridges are usually about 3 to 6 feet in height. Ridges may reach heights of 20 feet.

Ice islands are large icebergs that break away from ice shelves located along the coasts of Ellesmere Island and drift into the Beaufort Sea, where they may drift for many years.

Biological (Wildlife)

The Beaufort Sea and adjacent coastline area is important habitat for numerous residents as well as migratory species of fish, birds and marine mammals. This assessment will focus on marine mammals, the species of concern.

The Pacific walrus. The Pacific walrus (Odobenus rosmarus divergens), which includes about 80 percent of the world's walrus population, occurs primarily in the Bering and Chukchi seas (Sease and Chapman 1988). The minimum estimate for the Pacific walrus population was 201,039 animals in 1990 (Gilbert et al. 1992). Most of the walrus population is associated with the moving pack ice year-round. Walrus spend the winter in the Bering Sea and most of the adult female population with dependent young migrate into the Chukchi Sea in the summer. Most adult males remain in the Bering Sea using terrestrial haulouts in Bristol Bay and along the Russian coast. Spring migration begins in April, as walruses move north through the Bering Strait by late June. Females with calves comprise most of the early spring migrants. A few walrus may move east through the Beaufort Sea, but the majority of the population occurs north and west of Barrow, Alaska. According to records from the Service's Marking, Tagging and Reporting Program, 22 walrus were killed by Native residents of Barrow in 1991. All of the 22 walrus were killed to the north or west of the village.

The Polar Bear. The polar bear (<u>Ursus maritimus</u>) is found throughout the Arctic. They are found as far south in the eastern Bering Sea as St. Matthew Island and the Pribilof Islands (Ray 1971), and are commonly found within 300km of the Alaskan Coast of the Chukchi and Beaufort seas, from the Bering Strait to the Canadian border (Frame 1969; Amstrup, unpubl. data). The Beaufort Sea population (from Point Barrow to Cape Bathurst, Northwest Territories) is estimated to be 1,300 to 2,500 bears. While reliable information on the size of the populations is not available, the most widely accepted estimate for the total Alaska population is 3,000 to 5,000 animals (Amstrup 1983).

Research by the Service suggests that polar bears spend most of their time in the shear zone and the active ice immediately beyond. Sea ice and food availability are two important factors affecting the distribution of polar bear. Due to the abundance and availability of subadult seals, drifting pack ice off the Alaskan Beaufort Sea coast supports many polar bears.

Male polar bears do not hibernate or spend extended periods of time in dens. Occasionally male polar bears may seek temporary protective shelter from extreme harsh weather. Pregnant female polar bears occupy winter dens for extended periods.

Although insufficient data exist to accurately quantify polar bear denning along the Alaskan Beaufort Sea coast, dens in the area appear to be less concentrated than in Canada on the east and Russia to the west. Pregnant females enter the den by late November and the young are usually born in late December or early January (Harington 1968). There are normally two cubs, occasionally one cub, and rarely three cubs. Female bears are quite sensitive to outside disturbances during this period (Belikov 1976, Lentfer and Hensel 1980, Amstrup 1986). After birth the female and the cubs remain in the den where the cubs are nurtured to the point where they can walk and stay close to the female. In late March or early April the female and the newborn cubs exit the den. If the mother moves young cubs from the den before they can walk or withstand the cold, death is likely. Therefore, successful denning, birthing, and rearing activities require a relatively undisturbed environment. Radio-tracking studies indicate that denning in multiyear pack ice in the Alaskan Beaufort may be normal (Amstrup 1986). In the winters of 1983 and 1984, 26 radio-tagged bears were followed to maternity den sites. Only 4 dens were on land and 21 dens were on the pack ice (one den site was not located).

Polar bears feed primarily on ringed seals and to a much lesser extent on bearded seals and walrus. The polar bear is an opportunistic feeder, sometimes feeding on whale carcasses and also human refuse.

Alaskan Natives have hunted polar bears for thousands of years. In the 1950's and 1960's and until the passage of the Act in 1972, polar bears were heavily hunted by sportsmen. Between 1961 and 1972 the number of polar bears taken annually in Alaska ranged from 148 to 405 and averaged 260 (Lentfer 1973, Amstrup et al. 1986). An exemption under the Act allows subsistence and handicraft harvest of polar bears by Alaskan Natives. This subsistence activity is monitored by the Service. Native harvest of polar bears has averaged about 125 animals per year since 1980. Approximately 70 percent of this harvest is by residents of the Chukchi and Bering Sea regions, with the remainder in the Beaufort Sea area.

The International Agreement on the Conservation of Polar Bears states that "the taking of polar bear shall be prohibited." The term taking: includes hunting, killing, and capturing." Article III of the agreement states "Each contracting party shall take appropriate action to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns, and shall manage polar bear populations in accordance with sound conservation practices based on the best available scientific data."

IV. ENVIRONMENTAL IMPACTS

The Service has management responsibility for three species of marine mammals in Alaska (polar bear, Pacific walrus and sea otter). The following section discusses the impacts to the polar bear and Pacific walrus and their habitat. The sea otter is not considered in this document because its range does not include the Beaufort Sea.

Selected Action

cause

A. Impacts to the Species. Potential impacts likely to affect polar bear and/or walrus are noise, physical obstructions, human/animal encounters, and accidental oil spills.

Noise can affect both the polar bear and the walrus and will be generated by a variety of activities. Noise will result from drilling activities, geophysical operations, operation of power plants and waste facilities; from automobile, airplane or boat traffic; and from construction operations associated with oil field activities.

Bears react differently to different noises and noise levels. Bears tend to flee such noise as an approaching helicopter or the loud sound of a warning shot fired from a gun. Continual noise such as the operational noise of an industrial site may be an attractant to a curious bear. No formal studies are known to have been conducted to determine the response of polar bears to vehicular or aircraft traffic. However, it is widely accepted that a polar bear will respond by fleeing or react with extreme caution until becoming accustomed or acclimated to the noise.

Mobile noise which will be associated with geological and geophysical (G&G) survey activities could be detrimental to polar bear denning activities. Should G&G activities coincide with the initiation of denning by a pregnant female polar bear, there is a possibility that the preferred denning site may be avoided. Also, should the G&G activity disturb a female during parturition activities, the cubs may be aborted. Further, should a female be disturbed such that she chooses to leave the den before the cubs are of adequate size or strength, the cubs may not survive. Should these scenarios result in the loss of cubs, especially female cubs, the overall loss would result in an adverse impact to the immediate polar bear family and the population.

Noises associated with helicopters, icebreakers, and supply boats are likely to have the greatest potential for impacts to walrus. Observations have shown that walrus respond differently in different situations. When approached by a moving vessel in open water, the walrus may swim away and avoid the vessel. In ice-covered waters walrus often scramble from the ice, assumed to be a flight response, seeking the protection of the water.

Physical obstructions such as causeways, roadways, artificial islands, and offshore drill rigs should have very little effect on the movements of polar bears. Bears have demonstrated that they have little fear of man-made structures as they routinely cross causeways and roadways, and investigate artificial islands and offshore drill rigs. Due to the relatively small size of these structures and ability of bears to travel great distances, industry structures should have little effect on polar bear movement.

Physical obstructions such as gravel pads and artificial gravel island drilling operations are likely to have little effect on the movement of walrus. However, the gravel islands may be utilized as a haul

out area. Offshore drilling rigs, or ice management vessels (icebreakers) may affect walrus, especially if such vessels are operating near the ice edge.

Human/animal encounters are by far the most dangerous for the polar bear. Whenever humans work in the habitat of the animal, there exists the chance of an encounter. However, such encounters are uncommon. In over 20 years of oil and gas related activities on the North Slope and in the Beaufort Sea, only one polar bear has been intentionally taken by lethal means. This encounter occurred in 1990 at a remote exploration activity, and the killing of the polar bear was for the protection of human life. No polar bears have been known to be killed for the protection of human life inside the production area since oil and gas activities began. However, one polar bear is known to have died from the consumption of ethylene glycol colored with rhodamine B.

Although bears may be found along the coast during open-water periods (summer), encounters are more likely to occur during winter operations. Potentially dangerous encounters are most likely at gravel island exploratory sites. These sites are at ice level and are easily accessible by the polar bear. Industry has helped in developing devices to aid in detecting polar bear. In an effort to reduce human/bear encounters, Industry has developed polar bear interaction plans which require each employee that will be working in bear habitat to complete a polar bear encounter training course.

As related to oil and gas industry operations, human/walrus encounters are not expected to occur.

Oil spills from industry activities and the subsequent impacts on marine mammals are a major concern. Spilled oil would accumulate at the ice edge, in leads, and similar areas of importance to marine mammals. Marine mammal activities would bring the animals into contact with the oil resulting in adverse impacts. Spills of crude oil and petroleum products associated with production facilities are likely to be small. Spill data for 1990 Prudhoe Bay Unit and Lisburne oil fields combined indicates that more than 50 percent of the spills reported were between 1-10 gallons and nearly 90 percent were under 100 gallons. The average spill size in 1990 was reported at 73 gallons. There is an average of less than one spill per year greater than 1000 gallons.

Production wastes are disposed of in monitored surface pits or injected into permitted disposal wells for containment below the confining geological layer. Hazardous waste materials are stored in secured areas prior to shipment to designated hazardous waste treatment sites in the contiguous United States. Solid waste such as empty drums, paper products, and wood are handled at the North Slope Borough landfill or incinerator.

The Oil Spill Risk Analysis (OSRA) model used by Mineral Management Service in its Environmental Impact Statements assessed the prospect of a significant oil spill occurring "during the life of the field." Since no significant oil spills have ever occurred from exploratory drilling on the U.S. Outer Continental Shelf, the OSRA assigns zero as the probability that such an event will occur during exploration.

Oil spills or accidental discharges of oil into the water, on ice, or on land may result from operational activities. However, a more serious release of oil may result from a "blowout." A blowout is the loss of control of a well during drilling activities. Usually the result of a blowout is the release of water, gas or oil. Based upon data from the Minerals Management Service, the probability of a major blowout in the Beaufort Sea is extremely low.

Polar bears are generally widely distributed in low numbers across the Beaufort Sea area. There is a low probability that more than small numbers of polar bears would be affected by an oil spill. Should polar bears become heavily coated with oil, death is likely because they rely heavily on their fur for thermal insulation. An investigative study, Effects of Crude Oil on Polar Bears

(Environmental Studies No. 24) was designed by N.A.Oritsland to simulate an arctic oil spill and determine its effects on polar bears experimentally exposed to the crude oil. The conclusions of the study were:

"A general conclusion which may be drawn from this study is that the polar bear is a potentially greatly impacted species when exposed to oil spills. An initial effect of coating with oil is that thermoregulatory and metabolic stresses develop which may cause serious disability if protracted in the wild. Oil fouling of the fur led to grooming and licking of the oil from the fur, with consequent ingestion of the oil, and absorption into the body from the gut. Residence of oil in the fur may be expected to be long if the animal is not cleaned completely, prolonging exposure by grooming/ingestion activities. Uptake of petroleum hydrocarbons and their distribution to body tissues led to behavioral abnormalities, including anorexia, as well as to tissue damage. A wide range of tissues were found to be affected, much of the effect related to uremia and severe dehydration. Peripheral hemolysis and a lack of bone marrow erythropoietic response resulted in an acute anemia in all oiled bears. The systemic toxicity effects were latent, not becoming pronounced until weeks after the initial exposure. Renal changes were the most serious under the laboratory conditions and can be assessed as the direct cause of death of two of the three oil exposed polar bears" (Oritsland, et al., 1981).

A study by Derocher and Stirling (1990) documented a significantly oiled bear which appeared to have completely recovered from an oiling episode four years after it was originally sighted.

Walrus are not likely to be impacted by contact with spilled oil to the extent that polar bears could be because oil on the pelage of walrus would not significantly reduce thermo-insulation.

B. Impacts to Subsistence. The affected region contains the traditional Inupiat communities of Barrow, Nuiqsut, and Kaktovik. Of the eight North Slope communities, all are represented by Alaska Native Claims Settlement Act Corporations, seven have municipal governments, and several have active tribal organizations. The entire North Slope region is also represented by the North Slope Borough (NSB), the Arctic Slope Regional Corporation, and the Inupiat Community of the Arctic Slope. The NSB attempts to provide education, job-training and well-paying jobs to the local residents. Barrow, Nuiqsut and Kaktovik are influenced by the geographical and economical expanse of the oil industry. Revenues from oil and oil-related activities have changed the lives of people who live on the northern coast of Alaska. Modern schools, waterplants, powerplants and community centers make life much easier in the communities. Cable television, computers, telephones and daily air service link the communities with the outside world. Even though these changes have come, the communities remain clearly Inupiat. The people continue to hunt, fish and gather subsistence resources just as their ancestors did. Subsistence activities are still done with skin boats and black powder shoulder guns, as well as the use of modern conveniences such as airplanes, aluminum boats with gasoline outboard engines, high caliber rifles and snowmobiles.

Subsistence activities are a spiritual and emotional part of the Inupiat life, embracing the values of sharing, association, leadership, kinship, arctic survival, and hunting skill. These values help bond a community together. Damage to subsistence species, loss of access to the subsistence area and the loss of Native foods or the interruption of subsistence species' migration are valid concerns of the Native community.

The following are the villages affected by this proposed action and the <u>primary</u> subsistence species utilized:

Barrow - Bowhead whale, bearded seal, and caribou. Nuiqsut - Caribou, moose, and fish. Kaktovik - Bowhead whale, caribou and fish.

C. Monitoring and Reporting: Section 101(a)(5)(A) of the Act states that the Secretary of Interior may allow the incidental, but not intentional, taking of marine mammals provided regulations set forth requirements pertaining to the monitoring and reporting of such taking.

Prior to issuance of a LOA, the applicant will be required to submit a monitoring and reporting plan to the Service. Upon review and approval of the submitted monitoring and reporting plan, the plan will become an integral part of the LOA.

The purpose of monitoring and reporting is to determine short-term and long-term direct, indirect, and cumulative effects of authorized oil and gas activities on polar bear and walrus in the Beaufort Sea and the northern coast of Alaska. Plans will be required to identify the methods used to determine and assess the effects of the authorized activity on movements, behavior, and habitat use of polar bear and walrus. Monitoring and reporting plans will be reviewed annually and modifications will be made, if necessary, based upon interpretation of results.

No Action

Under the no action alternative, no regulations allowing the incidental, but not intentional, take of small numbers of marine mammals, specifically polar bear and walrus, specific to oil and gas activities in the Beaufort Sea and adjacent coastal Alaska, would be promulgated. Oil industry activities would continue "status quo." With no regulations in place to allow small takes, Industry would be liable for violating the Act's moratorium on the taking of any marine mammal and subject to penalties therein for incidental takes that might occur during the course of otherwise lawful oil and gas operations.

V. AGENCIES AND PERSONS CONSULTED

Upon receipt of the petitions submitted by BP Exploration (Alaska), Inc., copies were distributed to the interested agencies or groups. The petitions were distributed for information and no comments were solicited. On Wednesday, December 30, 1992, the proposed regulations were issued in the <u>Federal Register</u> (Vol. 57, No 251, 62283 - 62289) notifying the general public of public meeting dates and places and soliciting comments on the proposed regulations. Written comments were received from the following:

Greenpeace, Alaska Nancy S. Wainwright Defenders of Wildlife State of Alaska - Department of Fish and Game Jackson & Kelly - Petitioner's representative Trustees for ALASKA North Slope Borough The Wilderness Society Minerals Management Service, Department of Interior International Wildlife Coalition Mary Eileen Bannister Friends of Animals Carol A. Jensen Diane M. Williams Jennifer A. Kowalski Maureen J. Caires Eugene J. Caires, Jr. Renee Bond

VI. REFERENCES CITED

- Amstrup, S.C. 1983. Polar Bear Research in Alaska, Spring 1982. Unpublished report. Anchorage, AK: Denver Wildlife Research Center, Marine Mammal Section.
- Amstrup, S.C. 1986. Research on polar bears in Alaska, 1983-1985. Pages 85-115 in Polar Bears:
 Proceedings of the Ninth Working Meeting of the IUCN/SSC Polar Bear Specialist Group, 9-11 August 1985, Edmonton, Alberta, Canada. Int. Union Conserv. Nature and Nat. Resour., Gland, Switzerland.
- Amstrup, S.C, I. Stirling, and J.W. Lentfer. 1986. Past and present status of polar bears in Alaska. Wildl. Soc. Bull. 14(3):241-254.
- Amstrup, S.C., C. Gardner, K.C. Meyers, and F.W. Oehme. 1989. Ethylene glycol (antifreeze) poisoning in a free-ranging polar bear. Vet. and Human Toxicol. 31(4):317-319.
- Belikov, S.E. 1976. Behavioral aspects of the polar bear, <u>Ursus maritimus</u>. Pages 37-40 in: M. R. Pelton, J.W. Lentfer, and G.E. Folk, eds. Bears-their biology and management. IUCN Publ. New Ser. 40.

Derocher, A.E. and I. Sterling. Oil contamination of two polar bears. (in press).

- Frame, G.W. 1969. Occurrence of polar bears in the Chukchi and Beaufort seas, summer, 1969. J. Mammal. 53: 187-189.
- Gilbert, J., G. Fedoseev, D. Seagars, E. Razlivalov, A. Lachugin. 1992. Aerial census of Pacific walrus, 1990. USFWS Administrative Report R/7MMM 92-1. 31pp.
- Harington, C.P. 1968. Denning habits of the polar bear. Can. Wildl. Serv. Rep. 5:1-30.
- LaBelle, J.C., J.L. Wise, R.P. Voelker, R.H. Schulze, and G.M. Wohl. 1983. Alaska Marine Ice Atlas. University of Alaska, ETC. Anchorage, AK.
- Lentfer, J.W. 1973. Polar bear report. Alaska De. Fish and Game, Pittman-Robertson Prog. Rep. W-17-4 and W-17-5. 24pp.
- Lentfer, J.W. and R.J. Hensel. 1980. Alaskan polar bear denning. Pages 101-108. <u>in</u>: C.J. Martinka and K.L. McArthur, eds. Bears-their biology and management. Fourth International Conference on Bear Research and Management. U.S. Gov. Print. Off., Washington, D.C.
- Lunn, N.J. and I. Stirling. 1985. The ecological significance of supplemental food to polar bears during the ice-free period of western Hudson Bay. Can. J. Zool. 63:2291-2297.
- Oritsland, N.A., F.R. Engelhardt, F.A. Juck, R.J. Hurst, and P.D. Watts. 1981. Effect of crude oil on polar bears. Environmental Studies No. 24. Northern Affairs Program, Northern Environmental Protection Branch, Indian and Northern Affairs, Canada. 268pp.
- Ray, C.E. 1971. Polar bear and mammoth on the Pribilof Islands. Arctic 24:9-19.
- Russell, R.H. 1975. The food habits of polar bears of James Bay and Southwest Hudson Bay in summer and autumn. Arctic 28:117-129.

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

827%

£3577

Sec.

REAL

65267

\$\$803***

MRG-P-

MPCS

pite en

881-7r

APPENDIX H: Inuvialuit Game Council and North Slope Borough Management Agreement for Polar Bears of the Southern Beaufort Sea.

The Inuvialuit of Canada and the Inupiat of the United States,

Noting that both groups have traditionally harvested a portion of polar bears from the same population in the southern Beaufort Sea;

And Noting that the continued hunting of polar bears is essential to maintain the dietary, cultural and economic base of the groups;

And Noting that the maintenance of a sustained harvest for traditional users in perpetuity requires that the number of polar bears taken annually not exceed the productivity of the population;

And Noting that the International Agreement on the Conservation of Polar Bears makes provision for cooperation in the research and management of shared populations;

And Noting that nothing in this Agreement shall be read to abrogate the responsibilities of Federal, Provincial or State authorities under existing or future statutes;

And Noting that the Inuvialuit and the Inupiat will have a long-term fundamental influence on the maintenance and use of this resource and that the efforts of other parties will also be required to ensure effective conservation; Have agreed as follows:

ARTICLE I

Definitions:

(a) The species considered in this Agreement is the polar bear (<u>Ursus maritimus</u>).

(b) The area covered by this Agreement is the southern Beaufort Sea from approximately Baillie Islands, Canada, in the east to Icy Cape, USA in the west.

(c) The people covered by this Agreement are the Inuvialuit of Canada and the Inupiat of the North Slope of Alaska.

(d) The settlements whose hunting practices may be affected by this Agreement are Barrow, Nuiqsut, Wainwright, Atqasuk and Kaktovik in the United States and Inuvik, Aklavik, Tuktoyuktuk and Paulatuk in Canada.

(e) Sustained yield is a level of taking which does not exceed recruitment and is consistent with population ranges determined to be optimal and sustainable.

(f) The Joint Commission shall consist of two (2) representatives designated by each of the Inuvialuit Game Council and the North Slope Borough Fish and Game Management Committee. The Technical Advisory Committee shall be appointed by the Joint Commission.

ARTICLE II

Objectives:

(a) To maintain a healthy viable population of polar bears in the southern Beaufort Sea in perpetuity.

(b) To provide the maximum amount of protection to female polar bears.

(c) To minimize detrimental effects of human activities, especially industrial activities, on important bear habitat.

(d) To manage polar bears on a sustained yield basis in accordance with all the best information available.

(e) To encourage the collection of adequate technical information on a timely basis to facilitate management decisions.

(f) To further refine the eastern and western boundaries of the population of polar bears.

(g) To encourage the wise use of polar bear products and by-products within the context of management on a sustained yield basis.

(h) To facilitate the exchange of polar meat and products between traditional users in Alaska and Canada (Enabling legislation required).

(i) To legalize the sale of polar bear hides and byproducts by the traditional Alaskan users in Alaska (Enabling legislation required).

(j) To facilitate the export of polar bear hides and other polar bear products from the Western Arctic of Canada into the USA (Enabling legislation required).

(k) To consider at a later date a limited legalized Alaskan sport harvest of polar bears which emphasizes benefits to local hunters of the area (Enabling legislation required for Federal management).

ARTICLE III

<u>Regulations</u>; to conserve this population of polar bears, the Inuvialuit and the Inupiat have agreed as follows:

(a) All bears in dens or constructing dens are protected.

(b) Family groups made up of female and cubs-ofthe-year or yearlings are protected. The birthdate of cubs is fixed at January 1 and cubs less than five feet
(152 cm.) in straight line body length are protected.
(c) The hunting season shall extend from December 1 to May 31 in Canada and from September 1 to May 31 in Alaska.

(d) The annual sustainable harvest shall be determined by the Technical Advisory Committee in consultation with the Joint Commission and shall be divided between Canada and Alaska according to annual review of scientific evidence. Allocation agreements shall be negotiated and ratified prior to September 1 annually. Each signatory to this Agreement shall determine for itself the distribution of the harvest within its jurisdiction.

(e) These regulations do not preclude either party from unilaterally introducing additional conservation practices within their own jurisdictions.

(f) Any readjustment of the boundaries pursuant to the above may necessitate a readjustment of user allocations under the management plan.

(g) The use of aircraft or large motorized vessels for the purpose of taking polar bears shall be prohibited.

(h) Each jurisdiction shall prohibit the exportation from, the importation and delivery into, and traffic within, its territory of polar bears or any part or product thereof taken in violation of this Agreement.

(i) Polar bears in villages during closed seasons should be deterred from the area.

(j) Polar bears threatening human safety or property may be taken at any time of the year and may be counted against the village allocation as ascribed by the Joint Commission.

ARTICLE IV

Collection of Data and Sharing of Information:

(a) The following data will be recorded for each bear killed: sex, date and location of the kill, and hunter's name.

(b) The following shall be collected from each bear killed: an undamaged post-canine tooth, ear tags or lip tatoos if the tags are missing, other specimens as agreed to by the hunters of either jurisdiction for additional studies.

(c) A summary of all harvest information from each jurisdiction shall be exchanged annually.

(d) The number of collars deployed for research purposes shall be limited to the minimum number necessary to provide accurate population information.

ARTICLE V

Duration of Agreement:

(a) This Agreement shall enter into force when it has been signed by the representative of both parties.

(b) This Agreement shall remain in force unless either Contracting Party requests it be terminated. (c) Amendments to the Agreement may be proposed by either signatory and accepted or rejected by mutual agreement after consultation with the North Slope Borough Fish and Game Management Committee.

The Alaskan signatories of this document have no authority, to bind and do not purport to bind the North Slope Borough to any agreement which would otherwise be in violation of the exclusive federal treaty power established by the United States Constitution, but are acting solely as representatives of the local traditional user group of the polar bear resource in furthering the consultation, management, and information exchange goals of the International Agreement on the Conservation of Polar Bears.

SIGNED on this the 29th day of January, 1988 in the Town of Inuvik, Northwest Territories.

On behalf of the North Slope Inupiat Nolan Solomon, Chairman North Slope Borough, Fish & Game Management Committee Benjamin P. Nageak, Director, North Slope Borough,Department of Wildlife Management

On behalf of the Inuvialuit Game Council Alex Aviugana, Chairman, Inuvialuit Game Council Andy Carpenter, Vice Chairman, Wildlife Management Advisory Council (N.W.T.) **APPENDIX I:**

PROTOCOL U.S./RUSSIA BILATERAL AGREEMENT

PROTOCOL

U.S./Russia Technical Consultation for the Conservation of Polar Bears of the Chukchi/Bering Sea Region

Summary

Representatives from Russia and the United States (attendance list attached) met in Nome, Alaska on September 6-9, 1994, for the expressed purposes of advancing technical discussion on the joint conservation of the shared population of polar bears occupying the Chukchi, Bering and portions of the Eastern Siberian Sea. The following summarizes the highlights of these talks and establishes a direction for future efforts.

The following are major points of agreement of the Parties:

Summary

- * The 1973 International Agreement on the Conservation of Polar Bears shall serve as the basic framework for our joint conservation agreements.
- * The Parties agree that in order to accomplish the objectives of a conservation doctrine, that both a Government to Government Agreement in conjunction with a Native to Native agreement will be developed. Further the Parties resolve to facilitate Alaska Native to Chukotka Native communication in preparation of a Native to Native Agreement.
- * The Parties recognize that sound biological information, including scientific data and traditional ecological knowledge, will be fundamental to the agreement. Therefore, the Parties agree to continue and to expand cooperative research programs to enhance our knowledge of polar bears.
- * Principles of sustained yield will be institutionalized in the agreement and will serve as the basis for future harvest guidelines and allocation.
- * Subsistence use of polar bears including the making and selling of articles of handicraft and clothing is a recognized legitimate use.
- * Both Parties shall strive to minimize commercial exploitation of polar bears harvested for subsistence purposes.

- * Habitat protection and conservation shall be a cornerstone to a future agreement.
- * Both Parties recognize the need to make their best efforts to curb illegal take or trade of polar bears or their products within their respective jurisdictions.
- * Monitoring and verification programs shall be an integral component of a future agreement. All efforts shall be made to secure funding in support of the preparation and implementation of monitoring programs.
- * Both Parties resolve to seek appropriate authorizations to begin formal negotiation of this agreement as soon as possible.

Therefore, the Parties resolve to exchange documents to further the mutually agreed principles of conservation listed above.

The Parties further resolve to conduct consecutive meetings of Government to Government and Native to Native Parties to further advance the agreements and that these meetings shall be conducted not later than 1 year from the date of signing of this meeting summary.

The Parties also discussed the matter of conservation and management of the shared population of Pacific walrus, and signed a separate Protocol of Intentions which is appended to this Protocol.

Signed on September 9, 1994, in Nome (Alaska, U.S.A.) in duplicate in the English and Russian languages, both texts being equally authentic.

David B. Allen Acting Regional Director U.S. Fish and Wildlife Service Resources United States of America Grigoriy Kovalev Deputy Chief Main Dept. of Biological

Russian Federation

Appendix J. Options Considered to Conserve Polar Bear Habitat

A. Background and Overview of the Existing Situation:

In Alaska, Arctic areas have changed markedly during the past 20-30 years. Increasing human populations have become much more mobile and able to afford high powered boats, snowmachines and all-terrain vehicles. Industry has become a major factor in oil and gas exploration, production and extraction of hard minerals. Infrastructures for transporting resources and commodities to and from these areas has expanded. Pollution and waste of different kinds, including nuclear waste, have consequences for Arctic habitats and for climatic conditions (CAFF September 1993). Concurrent with these developments polar bear populations in coastal Alaska have exhibited signs of growth and in western Alaska the stock has reoccupied their former range in the Bering Sea. The growth in polar bear populations is believed to have resulted from marked reductions in harvest rates when the MMPA was passed in 1972, and hunting by non-Natives was banned.

Today, polar bear habitat in the Alaska Arctic remains relatively undisturbed and pristine. Only minor levels of direct alteration of habitats has occurred in recent years. The most significant changes have been caused by the discovery and development of a world class oil field in the Prudhoe Bay vicinity, and the subtle changes in the circumpolar accumulation of anthropogenic sources of contamination.

Polar bear populations have increased in recent years and appear to be at healthy levels within the capacity of the environment to support these levels. The baseline knowledge on the ecology of polar bears has increased dramatically during the past 20 years, however, many aspects remain poorly understood. This is particularly true in describing quantitatively the interrelationships of polar bears and their utilization of habitats. Yet, a fundamental conservation management philosophy through the intervening period has been to conserve and protect those habitats deemed essential for feeding, migrating, or denning, consistent with existing laws and statutes.

The international Agreement provided guidance to the Five-Party signatories in achieving the broader conservation goal. It is believed to have created a <u>de facto</u> high seas sanctuary for polar bears by excluding take in areas where it has not occurred in the past. The vast majority of the high Arctic is indeed reserved for polar bears since no human activities currently occur in the high polar basin.

The MMPA provides guidance and authorities for conserving marine mammal populations. It is considered a proactive, progressive conservation tool which provides general guidance to managing agencies to maintain ecosystems in a healthy state. Development of the Strategy is also considered a proactive tool for polar bear habitat conservation. The Strategy identifies areas important to polar bears for denning, feeding and seasonal movements. Habitat protection measures included in the Strategy are appropriate for the current situation in Alaska. The Service considered many additional conservation and protection measures that were recommended by interested parties during preparation of the Strategy. These options, many of which would require additional regulatory measures, were not adopted in the final Strategy. The Service decided not to use them at this time, reasoning that they were not necessary because polar bear populations in Alaska are healthy. Furthermore, the Service believes that regulatory measures currently in place, together with the measures addressed in the Strategy, and Industry's cooperation and adherence to established guidelines to mitigate impacts to polar bears provide adequate protection to these animals and their habitat.

The impetus for many of the options listed in this appendix came from public comments when the Service was developing the draft Strategy. They were omitted from the draft Strategy but are included in this final document as a result of further comment during the public comment period requesting that they be made a part of the Strategy. They are intended for future reference, as appropriate. These measures are options that remain available to resource managers and other humans living or working in the Arctic, should additional protection become necessary in the future.

The options focus on feeding, denning, migration, and breeding habitats. The list is neither all-inclusive nor prioritized, it does not consider land ownership status, nor is it limited by current law, regulation, or policy. This list simply identifies potential options for habitat protection and polar bear conservation considered during preparation of the Strategy. Many of the options have been previously identified in a variety of documents listed within the Literature Cited section.

- B. Options for Protection of Feeding Habitat
 - B1) Prohibit and/or limit activities in known recurrent leads or polynyas i.e.
 St. Lawrence Island and Point Hope polynyas; recurring leads between
 Point Hope and Shishmaref and along the Beaufort Sea coast.
 - B2) Identify and protect coastlines and barrier islands where the greatest use of carcasses occurs in the fall and winter i.e. Point Franklin to Atanik, Kaseguluk Lagoon barrier islands, Point Hope peninsula, Cape Deceit to Wales.
 - B3) Delete important habitat areas from federal and state lease sales.

- B4) Limit ship traffic in transition zones (between shore ice and pack ice) during winter and spring (October 30-June 15).
- B5) Identify and protect areas important to seals i.e. birthing lairs and pupping areas.
- C. Options for Protection of Denning Habitat
 - C1) Prohibit all activities within one mile of known polar bear dens from October 30 to April 15.
 - C2) Prohibit activities on barrier islands and coastal areas near river systems, or prominent areas of topographic relief common to den sites from October 30 to April 15.
 - C3) Prohibit permanent construction on barrier islands and coastal areas near river systems, or prominent areas of topographic relief.
 - C4) If an activity can not be delayed or relocated, then initiate the activity prior to the denning season (October 30).
 - C5) Delete known denning areas from lease sales.
 - C6) Base protection of important polar bear denning areas on past use of denning areas i.e. the Arctic NWR, especially the Coastal Plain. Specific areas include the Pokok Bluffs, Niguanik River and associated uplands, and the Canning and Staines river deltas. Other areas of importance include barrier islands between the Canadian border and Point Barrow i.e. Flaxman, Cross, Pingok, Thetis, Cottle, and others; the Colville River delta, uplands in the Naval Petroleum Reserve-Alaska (NPRA); the Kuk River drainage; areas near Icy Cape, and upland areas inland near Cape Sabine.
 - C7) Design road routes to minimize disturbance to denning areas i.e. construct roads perpendicular rather than parallel to the coast.
 - C8) Design and implement a zonal management plan for habitat, including denning habitat, which considers a gradient of activity areas from intense activity to no activity. Include seasonal restrictions that protect habitat. Authorize sequential development which strives for the cumulative no net loss of habitat or its use.

J - 3

- C9) Require aircraft to maintain a 1,500 feet minimum altitude and follow directed courses over areas where polar bears may be present i.e. not change altitude or direction to observe or photograph bears.
- C10) Require anyone operating in important polar bear habitat to consult with the Service prior to initiating any field activities which could impact denning polar bears to acquire the most recent information on possible locations of den sites. If the operator encounters polar bear dens in the field the dens must be immediately reported to the Service Regional Director, and subsequently avoided.
- D. Options for the Protection of Habitats Used for Seasonal Movements

Polar bear seasonal movements occur over vast areas and in essentially all ice habitats; no known activities that would hinder or restrict movements or breeding are believed to exist. Almost the entire population of polar bears in the Beaufort Sea travels and uses the area extending north offshore 100 to 200 miles. The edge of the pack ice appears to concentrate animals at certain times of the year. Satellite telemetry confirms the importance of this area for collared adult female polar bears and their dependent young.

In western Alaska animals moving from the Chukchi Sea into and out of the Bering Sea must travel through the relatively confined area of the Bering Straits. This area could be considered an important corridor seasonally, as could offshore areas parallel to the Chukotka Peninsula. In certain years the Seward Peninsula mainland and barrier islands is believed to funnel animals along the coast during the fall and early winter as they move into the Bering Sea. Similarly, the Point Hope peninsula tends to concentrate bears moving through the area. Movements are believed to be influenced strongly by climatic conditions, especially wind direction and speed, temperature, and ice conditions.

- D1) Protect the areas described above by limiting establishment of permanent transport lanes in the Bering Straits and along the edge of shorefast ice between October 30 and June 15.
- E. Options for the Protection of Habitats Used for Breeding

The importance of these habitats is not fully understood; nor have breeding habitats been identified. Further research is necessary before options for protection can be included.

F. Options for Protection of Habitats from Contaminants or Anthropomorphic Pollution

J - 4

Safe management of waste, hazardous substances such as fuels, and other chemicals is a major concern for operating stipulations associated with oil and gas activities. This includes the storage and disposal of such substances, as well as their use.

- F1) Develop solid waste management plans; incinerate putrescible waste daily; incinerate or return combustible solid waste to the permittee's base of operations for disposal in accordance with applicable federal, state and local standards; return non-combustible solid waste, including, but not limited to, fuel drums and shot wire, to the permittee's base of operations for disposal in accordance with applicable federal, state and local standards.
- F2) Track use, storage, and disposal of hazardous chemicals. Develop and implement plans for control, use, and disposal of fuel and hazardous wastes. Reinject drilling muds, cuttings, and other wastes where geologically feasible. Transport hazardous wastes to an approved disposal site.
- F3) Discharge gray water to the surface only if it is filtered, disinfected, and does not release directly into lakes and rivers.
- F4) Require that all spills or leakages of any hazardous substances, fires, fatalities, and other conditions which threaten resources, the environment, or human safety be reported by the permittee to the Service's Regional Director immediately or as soon as communication can be established.
- F5) Avoid discharge of petroleum, petroleum products, or toxic materials into important habitat areas. All hazardous substances utilized and/or generated in conducting exploratory activities is to be contained, controlled, and cleaned up in accordance with the permittee's approved hazardous substances control and contingency plan. Such measures are to take precedence over all other matters except human safety.
- F6) Train personnel in use, storage, and disposal of toxins.
- F7) Use non-toxic alternatives whenever possible i.e. propylene glycol instead of ethylene glycol.
- F8) Develop an emergency plan for contaminant spills, including spill containment and clean-up.
- F9) Design and implement a monitoring program to detect possible changes in ringed seal distribution and abundance before they significantly affect polar bears.

- F10) Monitor contaminant levels in ringed seals and other polar bear food chain components over time.
- G. Options for Minimizing Bear-Human Interactions

Options listed here not only minimize bear-human interaction but may also minimize impacts to denning bears.

- G1) Use bear-proof fencing around certain facilities; prohibit wildlife feeding, this includes the leaving of garbage or edibles in a place which would attract wildlife; keep garbage in covered animal-proof containers while awaiting incineration; and institute employee education programs as appropriate.
- G2) Collect and analyze sighting data to identify industrial noise that may attract bears and develop procedures for eliminating such noise until an attracted bear vacates the area.
- G3) Minimize expansion of existing work camps and construction of new camps and other human communities in areas where polar bears may occur.
- G4) Prepare and implement Polar Bear Interaction Plans for drill sites and other facilities.) Train workers to minimize chance encounters with polar bears and how to respond if they do encounter bears.
- G5) Construct automatic bear detection, warning, and deterrent systems around inhabited sites.
- G6) Hire and train monitors to watch for polar bears in the vicinity of drill rigs and, as possible, to use non-lethal means (e.g., loud noises, bright lights, plastic bullets) to keep bears away from such areas.
- G7) Design research camps and conduct research activities to minimize bearhuman interactions.
- G8) Thoroughly train research personnel in immobilization and handling procedures to minimize stress to animals.
- G9) Require environmental briefings all personnel operating in the Arctic. These would include informing personnel using snowmobiles, aircraft, and other vehicles for work or recreation that approach or pursuit of polar bears in ways that affect their movements or behavior constitutes harassment and is illegal and unsafe.

- G10) Consolidate construction activities and maintenance of facilities and pipelines to minimize effects on polar bears and their habitats.
- G11) Restrict human activities and construction of facilities from the coastline to three miles inland.
- G13) Authorize Field Monitors of exploratory activities to suspend activities with the Regional Director's concurrence.
- G14) Require submittal of an overall plan for each exploration or development program i.e. seismic program, surface geology study, exploration well, field development, etc., followed by submittal of an annual Plan of Operations, to the Polar Bear Advisory Council before exploration or development activities may commence.
- G15) Require that permittee operate in a manner that does not impede or restrict the free passage and movement of polar bears.
- H. Options for Additional Research to Fill Data Gaps

03.00

- H1) Conduct research to further define areas where development might have the most serious effects on important polar bear habitat.
- H2) Identify and undertake additional studies necessary to determine potential impacts on polar bears and their habitat from coastal and offshore oil, gas, and hard mineral development. Include monitoring responses of bears to development activity and studies that directly measure effects of disturbance on polar bears coming ashore to den.
- H3) Conduct research on the effectiveness of various conditions of the bearhuman interaction plans.
- H4) Conduct research on various aspects of the emergency oil spill response plan including effects of oil on polar bears and effectiveness of rehabilitation conventions.
- H5) Conduct research on polar bear deterrent methods. Collect polar bear sighting and behavior data to determine areas where bear/human encounters are most likely to occur. Test and evaluate effectiveness of detection and deterrent methods, including fencing at development sites, the use of chemical deterrents by individuals, and the effectiveness of plastic bullets as deterrents.

- H6) Characterize den site selection and search patterns. Quantify relative importance of land denning to ice denning.
- H7) Track radio-collared bears to determine habitat use patterns and behavior as bears contact development activities.
- H8) Conduct cooperative research with Russian scientists to observe characteristics of polar bear habitat use areas in Russia to help in delineating essential habitat in the United States.
- H9) Develop a program for monitoring development activities and their effects on polar bears.
- H10) Conduct research in event of an oil spill to determine at what level a behavioral response is elicited.
- H11) Establish an expert group to review literature and make additional recommendations on research needs to determine short-and long-term effects of acute and chronic oil contamination on polar bears.
- H12) Determine rates of deposition and concentration of potentially hazardous substances.
- H13) Analyze tissues from hunter-killed bears for contaminants.
- H14) Design and implement surveys for before, during, and after development to monitor numbers, behavior, and reproductive success of denning bears in identified essential denning habitats; use a geographic information system to help identify conflict areas, assess critical data gaps, select development strategies to avoid or minimize conflicts, and evaluate the effectiveness of research and management programs.
- H15) Conduct further research on the effects of noise and harassment on polar bears. Expand on Blix and Lentfer's (1992) work on noise and vibration in artificial dens, including instrumenting and monitoring mature females in the autumn with radios that transmit motion, physiological, and location data. If the metabolic rate of denning bears increases in response to noise, consult physiologists regarding bioenergetics and possible cumulative and adverse effects of repeated noise disturbance during the denning period. Study effects of aircraft, ship, snowmobile, and other vehicle operations as components of habitat alteration and noise.
- H16) Conduct research to identify methods for effective mitigation of secondary or indirect effects of noise and disturbance on polar bears. Continue efforts
to develop smaller, longer-lived radio tags for monitoring polar bears via satellite. Evaluate survey, mark-recapture, telemetry, harvest monitoring, and other data to identify optimum indicators of population status and how those indicators might be most effectively monitored.

- I. Options for International Habitat Conservation Efforts
 - I1) Develop a role for the Service or DOI in decision-making on the implementation of the Framework Convention on Climate Change.
 - I2) Develop initiatives to end production of chemical that are affecting polar bear habitat.
 - I3) Coordinate internationally through the IUCN Polar Bear Specialist Group, CAFF, and other entities and implement preventive measures to reduce introduction of contaminants to the environment.
 - I4) Support Russian initiatives to expand the Wrangel Island Reserve.
- J. Options for Modification of Laws and Treaties
 - J1) Provide the Service with authority under OCSLA to determine impacts on polar bears and their habitats. Require Service approval of exploration and development operator plans and stipulations prior to conducting activities.
 - J2) Amend the MMPA to make application for incidental take regulations mandatory.
 - J3) Modify CZMA habitat protection requirements to include protection measures for polar bears.

This page intentionally blank ARLIS **8**507

053

ANC IN

68-10-

and the second

Alaska Resources Library & Information Services Anchorage Alaska