Federal Register

Tuesday,
January 9, 2007

Part II

Department of the Interior

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; 12-Month Petition Finding and Proposed Rule To List the Polar Bear (Ursus maritimus) as Threatened Throughout Its Range; Proposed Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AV19

Endangered and Threatened Wildlife and Plants; 12-Month Petition Finding and Proposed Rule To List the Polar Bear (Ursus maritimus) as Threatened Throughout Its Range

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule and notice of 12-month finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the polar bear (*Ursus maritimus*) as threatened with critical habitat under the Endangered Species Act of 1973, as amended (Act). After review of all available scientific and commercial information, we find that listing the polar bear as a threatened species under the Act is warranted. Accordingly, we herein propose to list the polar bear as threatened throughout its range pursuant to the Act. This proposed rule, if made final, would extend the Act's protections to this species. Critical habitat for the polar bear is not determinable at this time. The Service seeks data and comments from the public on this proposed listing rule.

DATES: We will consider all comments on this proposed rule received by the close of business (5 p.m.) Alaska Local Time on April 9, 2007. Requests for a public hearing must be received by the Service on or before close of business (5 p.m.) Alaska Local Time on February 23, 2007.

ADDRESSES: If you wish to comment, you may submit your comments and materials concerning this proposed rule by any one of several methods:

1. You may submit written comments to the Supervisor, U.S. Fish and Wildlife Service, Marine Mammals Management Office, 1011 East Tudor Road, Anchorage, Alaska 99503.
2. You may hand deliver written comments to the Marine Mammals Management Office at the above address.
3. You may send comments by electronic mail (e-mail). You may send your comments by electronic mail (e-mail) directly to the Service at: *Polar_Bear_Finding@fws.gov* or to the Federal eRulemaking Portal at *http://www.regulations.gov.* See the Public Comments Solicited section below for file format for electronic filing and other information.

The complete file for this finding and proposed rule is available for inspection, by appointment, during normal business hours at the above address. These documents are also available on the Service's Marine Mammal Web site located at: *http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm.*

FOR FURTHER INFORMATION CONTACT: Scott Schliebe, Marine Mammals Management Office (see **ADDRESSES** section) (telephone 907/786–3800). Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339, 24 hours a day, 7 days a week.

SUPPLEMENTARY INFORMATION:

Public Comments Solicited

We intend that any final action resulting from this proposed rule will be as accurate and as effective as possible. Therefore, we request comments or information from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule. We particularly seek comments concerning:

(1) Information on taxonomy, distribution, habitat selection (especially denning habitat), food habits, population density and trends, habitat trends, and effects of management on polar bears;

(2) Information on the effects of sea ice change on the distribution and abundance of polar bears and their principal prey over the short and long term;

(3) Information on the effects of other potential listing factors, including oil and gas development, contaminants, ecotourism, hunting, poaching, on the distribution and abundance of polar bears and their principal prey over the short and long term;

(4) Information on regulatory mechanisms and management programs for polar bear conservation, including mitigation measures related to oil and gas exploration and development, hunting conservation programs, anti-poaching programs, and any other private, tribal, or governmental conservation programs which benefit polar bears;

(5) The specific physical and biological features to consider, and specific areas that may meet the definition of critical habitat and that should or should not be considered for a proposed critical habitat designation as provided by section 4 of the Act;

(6) Information relevant to whether any populations of the species may qualify as distinct population segments; and

(7) The data and studies refered to within this proposal.

If you wish to comment, you may submit your comments and materials concerning this proposed rule by any one of several methods, as listed above in the **ADDRESSES** section. If you submit comments by e-mail, please submit them in ASCII file format and avoid the use of special characters and encryption. Please include ''Attn: Polar Bear Finding'' and your name and return address in your e-mail message. Please note that the e-mail address will be closed at the termination of the public comment period.

Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their names and/or home addresses, etc., but if you wish us to consider withholding this information, you must state this prominently at the beginning of your comments. In addition, you must present rationale for withholding this information. This rationale must demonstrate that disclosure would constitute a clearly unwarranted invasion of privacy. Unsupported assertions will not meet this burden. In the absence of exceptional, documentable circumstances, this information will be released. We will always make submissions from organizations or businesses, and from individuals identifying themselves as representatives of or officials of organizations or businesses, available for public inspection in their entirety. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service Office at the address listed in **ADDRESSES.**

Background

Section 4(b)(3)(A) of the Act (16 U.S.C. 1531 et seq. requires that, for any petition to add a species to, remove a species from, or reclassify a species on one of the Lists of Endangered and Threatened Wildlife and Plants, we first make a determination whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted. To the maximum extent practicable, this determination is to be made within 90 days of receipt of the petition, and published promptly in the **Federal Register**.

If the petition is found to present substantial information, section

4(b)(3)(A) of the Act requires us to commence a status review of the species, and section 4(b)(3)(B) of the Act requires us to make a second finding, this one within 12 months of the date of receipt of the petition, on whether the petitioned action is: (a) Not warranted; (b) warranted; or (c) warranted but precluded (i.e., the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether any species is threatened or endangered, and expeditious progress is being made to add or remove qualified species from the Lists of Endangered and Threatened Wildlife and Plants). This determination is likewise to be published promptly in the **Federal Register**.

Species for which listing is warranted but precluded are considered to be ''candidates'' for listing. Section 4(b)(3)(C) of the Act requires that a petition for which the requested action is found to be warranted but precluded be treated as though resubmitted on the date of such finding, i.e., requiring a subsequent finding to be made within 12 months. Each subsequent 12-month finding is also to be in the **Federal Register**. We typically publish these findings in our Candidate Notice of Review (CNOR). Our most recent CNOR was published on September 12, 2006 (71 FR 53756).

Previous Federal Action

On February 17, 2005, we received a petition from the Center for Biological Diversity, dated February 16, 2005, requesting that we list the polar bear as threatened throughout its range, and that critical habitat be designated concurrently with the listing. The petition was clearly identified as such, and contained the name, authorized signature, and address of the requesting party. Included in the petition was supporting information regarding the species' taxonomy and ecology, historical and current distribution, present status, and actual and potential causes of decline. We acknowledged the receipt of the petition in a letter dated July 1, 2005. In that letter, we also advised the petitioners that, due to funding constraints in fiscal year (FY) 2005, and the need to comply with court orders and settlement agreements, we would not be able to begin processing the petition at that time.

In a letter dated July 5, 2005, the petitioner informed us that two additional parties were joining as petitioners: the Natural Resources Defense Council and Greenpeace, Inc. In the same letter, the petitioners informed us of two new scientific articles, Hansen et al. (2005) and Stroeve et al. (2005), that they wanted us to consider when conducting our evaluation of the petition to list the polar bear. In a letter we received on December 27, 2005, the petitioners submitted additional new information to be considered, along with the information in the initial petition, in making our 90-day finding.

On December 15, 2005, the petitioners filed a complaint for declaratory and injunctive relief in the United States District Court for the Northern District of California, challenging our failure to issue a 90-day finding in response to the petition as required by section 4(b)(3) of the Act. On February 7, 2006, we made our 90-day finding that the petition presented substantial scientific information indicating that listing the polar bear may be warranted; the finding and our initiation of a status review was published in the **Federal Register** on February 9, 2006 (71 FR 6745). In a stipulated settlement agreement approved by the Court on July 5, 2006, we agreed to submit a 12-month finding to the **Federal Register** by December 27, 2006. This notice constitutes our 12-month finding for the petition to list the polar bear as threatened, in fulfillment of the stipulated settlement agreement.

Status Assessment

Pursuant to section 4(b)(3)(A) of the Act, we conducted a status review of the polar bear. With this notice we announce the completion and availability of the Polar Bear Status Assessment (Status Assessment or Schliebe et al. (2006a)). The Status Assessment was compiled and edited by staff of the Service's Marine Mammals Management Office of Region 7 (Scott Schliebe; Thomas Evans; Kurt Johnson, Ph.D.; Michael Roy, Ph.D.; Susanne Miller; Charles Hamilton; Rosa Meehan, Ph.D.; and Sonja Jahrsdoerfer). Information contained in the original petition, as well as additional information provided by the petitioners, was considered during the development of the Status Assessment. In addition, all comments received from the public during the open public comment period were considered. To ensure that the Status Assessment would be complete and based on the best available scientific and commercial information, we solicited information from the public on the status of the polar bear in two separate public comment periods announced in the **Federal Register** (February 9, 2006; 71 FR 6745) and (May 17, 2006; 71 FR 28653). In addition, all available scientific and commercial information on polar bears and threats to polar bears was reviewed and considered during development of the the Status Assessment and proposed rule.

In accordance with Service policies, peer review of the draft Status Assessment was sought from 12 independent experts in the fields of polar bear ecology, contaminants and physiology, climatic science and physics, and traditional ecological knowledge. Comments were received from 10 peer reviewers, and those comments were addressed in revisions to the draft Status Assessment. The Status Assessment, a list of peer reviewers, and comments received from peer reviewers are available upon request from the Marine Mammals Management Office as well as on the Service's Marine Mammal Web site located at: *http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm*. Literature cited in the Status Assessment serves as the basis for the 12-month finding and proposed rule.

Species Biology

Information presented in this section is summarized from the Status Assessment (Schliebe et al. 2006a). For more detailed information on the biology of the polar bear, please consult the Status Assessment.

Taxonomy and Evolution

Throughout the Arctic, polar bears are known by a variety of common names, including nanook, nanuq, ice bear, sea bear, isbjørn, white bears, and eisbär. Phipps (1774) first proposed and described polar bear as a species distinct from other bears and provided a scientific name *Ursus maritimus*. A number of alternative names followed, but Harington (1966), Manning (1971, p. 9), and Wilson (1976) (all three references cited in Amstrup 2003, p. 587) subsequently promoted the name *Ursus maritimus* that has been used since. The polar bear is usually considered a marine mammal since its primary habitat is the sea ice (Amstrup 2003, p. 587), and it is evolutionarily adapted to life on sea ice (see further discussion under General Description section). The polar bear was included on the list of species covered under the U.S. Marine Mammal Protection Act of 1972 as amended (16 U.S.C. 1361 et seq.) (MMPA).

Genetic research has confirmed that polar bears evolved from grizzly (brown) bears (*Ursus arctos*) 250 to 300 thousand years ago (Cronin et al. 1991, p. 2990; Talbot and Shields 1996a, p. 574). Only in portions of northern Canada and northern Alaska do the ranges of polar bears and grizzly bears overlap. Cross-breeding of grizzly bears and polar bears in captivity has produced reproductively viable offspring (Gray 1972; Stirling 1988, p. 23). The first documented case of cross-breeding in the wild was reported in the spring of 2006.

General Description

Polar bears are the largest of the living bear species (DeMaster and Stirling 1981 p. 1; Stirling and Derocher 1990 p. 190). They are characterized by large body size, a stocky form, and fur color that varies from white to yellow. They are sexually dimorphic; females weigh 181 to 317 kilograms (kg) (400 to 700 pounds (lbs)) and males up to 654 kg (1,440 lbs). Polar bears have a longer neck and a proportionally smaller head than other members of the bear family (Ursidae), and are missing the distinct shoulder hump common to grizzly bears. The nose, lips, and skin of polar bears are black (Demaster and Stirling 1981 p. 1; Amstrup 2003 p. 588).

Polar bears are evolutionarily adapted to life on sea ice. Adaptations to this life include: (1) White pelage with water-repellent guard hairs and dense underfur; (2) a short furred snout; (3) small ears for reduced surface area; (4) teeth specialized for a carnivorous rather than an omnivorous diet; and (5) feet with tiny papillae and ‘‘suction cups’’ on the underside, for increased traction on ice (Stirling 1988, p. 24). Additional adaptations include large, paddle-like feet (Stirling 1988, p. 24), and claws that are shorter and more strongly curved than those of grizzly bears, and larger and heavier than those of black bears (*Ursus americanus*) (Amstrup 2003, p. 589).

Distribution and Movements

Polar bears evolved to utilize the Arctic sea ice niche and are distributed throughout most ice-covered seas of the Northern Hemisphere. They are generally limited to areas where the sea is ice-covered for much of the year; however, polar bears are not evenly distributed throughout their range. They are most abundant near the shore in shallow-water areas, and in other areas where currents and ocean upwelling increase marine productivity and serve to keep the ice cover from becoming too solidified in winter (Stirling and Smith 1975, p. 132; Stirling et al. 1981, p. 49; Amstrup and DeMaster 1988, p. 44; Stirling 1990, pp. 226–227; Stirling and Øritsland 1995, p. 2607; Amstrup et al. 2000b, p. 960). Over most of their range, polar bears remain on the sea ice year-round or spend only short periods on land. They occur throughout the East Siberian, Laptev, and Kara Seas of Russia; Fram Strait, Greenland Sea, and Barents Sea of northern Europe (Norway and Greenland (Denmark)); Baffin Bay, which separates Canada and Greenland, through most of the Canadian Arctic archipelago and the Canadian Beaufort Sea; and in the Chukchi and Beaufort Seas located west and north of Alaska.

The distribution of polar bears in most areas varies seasonally with the seasonal extent of sea ice cover and availability of prey. In Alaska in the winter, sea ice may extend 400 kilometers (km) (248 miles (mi)) south of the Bering Strait, and polar bears will extend their range to the southernmost proximity of the ice (Ray 1971, cited in Amstrup 2003, p. 587). Sea ice disappears from the Bering Sea and is greatly reduced in the Chukchi Sea in the summer, and polar bears occupying these areas move as much as 1,000 km (621 mi) to stay with the pack ice (Garner et al. 1990, p. 222; Garner at al. 1994b, pp. 407–408). Throughout the polar basin during the summer, polar bears generally concentrate along the edge of or into the adjacent persistent pack ice. Significant northerly and southerly movements of polar bears appear to depend on seasonal melting and refreezing of ice (Amstrup et al. 2000, p. 142). In other areas, for example, when the sea ice melts in Hudson Bay, James Bay, Davis Strait, Baffin Bay, portions of the Canadian High Arctic, and some portions of the Barents Sea, polar bears remain on land for up to several months while they wait for winter and new ice to form (Jonkel et al. 1976; Schweinsburg 1979; Prevett and Kolenosky 1982; Schweinsburg and Lee 1982; Ferguson et al. 1997; Lunn et al. 1997 all cited in Amstrup 2003, p. 587; Mauritzen et al. 2001, p. 1710).

The distribution patterns of some polar bear populations during the open water and early fall seasons have changed in recent years. In the Beaufort Sea, for example, greater numbers of polar bears are being found on shore during this period than recorded at any previous time (Schliebe et al. 2006b, p. 559). In Baffin Bay, Davis Strait, western Hudson Bay and other areas of Canada, Inuit hunters are reporting an increase in the numbers of bears present on land during summer and fall (Dowsley and Taylor 2005, p. 2; Dowsley 2005, p. 2). The exact reasons for changes may involve a number of factors, including changes in sea ice (Stirling and Parkinson 2006, p. 272).

Data from telemetry studies of adult female polar bears show that they do not wander aimlessly on the ice, nor are they carried passively with the ocean currents as previously thought (Pedersen 1945 cited in Amstrup 2003, p. 587). Results show strong fidelity to activity areas that are used over multiple years. Some polar bear populations are closely associated with pack ice. In the Chukchi and Beaufort Sea areas of Alaska and northwestern Canada, less than 10 percent of the polar bear locations obtained were on land (Amstrup 2000, p. 137; Amstrup, USGS, unpublished data); the majority of the land locations were locations with bears occupying maternal dens during the winter. A similar pattern was found in East Greenland (Wiig et al. 2003, p. 511). In the absence of ice during the summer season, some populations of polar bears in eastern Canada, Hudson Bay, and the Barents Sea are remaining on land for protracted periods of time until ice again forms and provides a platform for them to move to sea ice.

Food Habits

Polar bears are carnivorous and an upper level predator of the Arctic marine ecosystem. Polar bears prey heavily throughout their range on ringed seals (*Phoca hispida*) and, to a lesser extent, bearded seals (*Erignathus barbatus*) and in some locales, other seal species. On average, an adult polar bear needs approximately 2 kg (4.4 lbs) of seal fat per day to survive (Best 1985, p. 1035). Sufficient nutrition is critical and may be obtained and stored as fat when prey is abundant.

Although seals are their primary prey, polar bears also have been known to kill much larger animals such as walruses (*Odobenus rosmarus*), narwhal (*Monodon monoceros*), and belugas (*Delphinapterus leucas*) (Kiliaan et al. 1978; Smith 1980, p. 2206; Smith 1985; Lowry et al. 1987, p. 141; Calvert and Stirling 1990, p. 352; Smith and Sjare 1990, p. 99). In some areas and under some conditions, prey and carrion other than seals may be quite important to polar bear sustenance. Stirling and Øritsland (1995, p. 2609) suggested that in areas where ringed seal populations were reduced, other prey species were being substituted. Like other ursids, polar bears will eat human garbage (Lunn and Stirling 1985, p. 2295), and when confined to land for long periods they will consume coastal marine and terrestrial plants and other terrestrial foods (Russell 1975, p. 122; Derocher et al. 1993, p. 252), but the significance of other terrestrial foods to polar bears may be limited (Lunn and Stirling 1985, p. 2296; Ramsay and Hobson 1991, p. 600; Derocher et al. 2004, p. 169).

Reproduction

Polar bears are characterized by a late age at sexual maturity, small litter sizes, and extended parental investment in raising young, factors that combine to contribute to a very low reproductive rate. Reproduction in the female polar bear is similar to that in other ursids (bears).

Females generally mature and breed for the first time at 4 or 5 years and give birth at 5 or 6 years of age. Litters of two cubs are most common, but litters of three cubs are seen sporadically across the Arctic. When foraging conditions are difficult, polar bears may ''defer'' reproduction in favor of survival (Derocher et al. 1992, p. 564).

Polar bears enter a prolonged estrus between March and June, when breeding occurs. Ovulation is thought to be induced by mating (Wimsatt 1963; Ramsay and Dunbrack 1986; Derocher and Stirling 1992; all cited in Amstrup 2003, p. 599), and implantation is delayed until autumn. The total gestation period is 195 to 265 days (Uspenski 1977 cited in Amstrup 2003, p. 599), although active development of the fetus is suspended during most of this period. The timing of implantation, and therefore the timing of birth, is likely dependent on body condition of the female, which depends on a variety of environmental factors.

Newborn polar bears are helpless, have hair, but are blind and weigh only 0.6 kg (1.3 lb) (Blix and Lentfer 1979, p. 68). Cubs grow rapidly, and may weigh 10 to 12 kg (22 to 26 lbs) by the time they emerge from the den in the spring. Young bears will stay with their mothers until weaning, which occurs most commonly in early spring when the cubs are 2.3 years of age. Female polar bears are available to breed again after their cubs are weaned, so the reproductive interval for polar bears is 3 years.

Polar bears are long-lived mammals not generally susceptable to disease, parasites, or injury. The oldest known female in the wild was 32 years of age and the oldest known male was 28, though few polar bears in the wild live to be older than 20 (Stirling 1988, p. 139; Stirling 1990, p. 225). Due to extremely low reproductive rates, polar bears require a high rate of survival to maintain population levels. Survival rates increase up to a certain age, with cubs-of-the-year having the lowest rates and prime age adults (between 5 and 20 years of age) having survival rates that can exceed 90 percent.

Polar Bear—Sea Ice Habitat Relationships

Polar bears are distributed throughout the ice-covered waters of the circumpolar Arctic (Stirling 1988, p. 61), and are reliant on the sea ice as their primary habitat (Amstrup 2003, p. 587). Polar bears depend on sea ice for a number of purposes, including as a platform from which to hunt and feed upon seals; as habitat on which to seek mates and breed; as a platform to move to terrestrial maternity denning areas, and sometimes for maternity denning; and as a substrate on which to make long-distance movements (Stirling and Derocher 1993, p. 241). Mauritzen et al. (2003, p. 123) indicated that habitat use by polar bears during certain seasons may involve a trade-off between selecting habitats with abundant prey availability versus the use of safer retreat habitats with less prey. Their findings indicate that polar bear distribution may not be solely a reflection of prey availability, but other factors such as energetic costs or risk may be involved.

Stirling et al. (1993, p. 15) defined seven types of sea ice habitat and classified polar bear use of these ice types based on the presence of bears or tracks in order to determine habitat preferences. The seven types of sea ice were: stable fast ice with drifts; stable fast ice without drifts; floe edge ice; moving ice; continuous stable pressure ridges; coastal low level pressure ridges; and fiords and bays. Polar bears were not evenly distributed over these sea ice habitats, but concentrated on the floe ice edge, on stable fast ice with drifts, and on areas of moving ice (Stirling 1990 p. 226; Stirling et al. 1993, p. 18). In another assessment, categories of ice types included: pack ice; shore-fast ice; transition zone ice; and polynyas (*i.e.*, open water areas within the ice); and leads (USFWS 1995, p. 9). Pack ice, which consists of annual and multi-year ice in constant motion due to winds and currents, is the primary summer habitat for Alaskan polar bears. Shore-fast ice is used for feeding on seal pups, movements, and occasionally for maternity denning. Open water at leads and polynyas attracts seals and other marine mammals and provides preferred hunting habitats during winter and spring.

Polar bears must move throughout the year to adjust to the changing distribution of sea ice and seals (Stirling 1988, p. 63; USFWS 1995, p. 4). In some areas, such as Hudson Bay and James Bay, polar bears remain on land when the sea ice retreats in the spring and they fast for several months (up to 8 months for pregnant females) before fall freeze-up (Stirling 1988, p. 63; Derocher et al. 2004, p. 163). Some populations unconstrained by land masses, such as those in the Barents, Chukchi and Beaufort Seas, spend each summer on the multiyear ice of the polar basin (Derocher et al. 2004, p. 163). In intermediate areas such as the Canadian Arctic, Svalbard, and Franz Josef Land archipelagos, bears stay with the ice most of the time, but in some years they may spend up to a few months on land (Mauritizen et al. 2001, p. 1710). Most populations use terrestrial habitat partially or exclusively for maternity denning; therefore, females must adjust their movements in order to access land at the appropriate time (Stirling 1988, p. 64; Derocher et al. 2004, p. 166).

Sea ice changes between years in response to environmental factors may have consequences to the distribution and productivity of polar bears as well as their prey. In the southern Beaufort Sea, anomalous heavy ice conditions in the mid-1970s and mid-1980s (thought to be roughly in phase with a similar variation in runoff from the MacKenzie River) caused significant declines in productivity of ringed seals (Stirling 2002, p. 68). Each event lasted approximately three years and caused similar declines in the natality of polar bears and survival of subadults, after which reproductive success and survival of both species increased again.

Maternal Denning Habitat

Throughout the species' range, most pregnant female polar bears excavate dens in snow located on land in the fall-early winter period (Harington 1968, p. 6; Lentfer and Hensel 1980, p. 102; Ramsay and Stirling 1990, p. 233; Amstrup and Gardner 1994, p. 5). The only known exceptions are in Western and Southern Hudson Bay, where polar bears first excavate earthen dens and later reposition into adjacent snow drifts (Jonkel et al 1972, p. 146; Ramsey and Stirling 1990, p. 233), and in the southern Beaufort Sea, where a portion of the population dens in snow caves located on pack and shorefast ice. Successful denning by polar bears requires accumulation of sufficient snow for den construction and maintenance. Adequate and timely snowfall combined with winds that cause snow accumulation leeward of topographic features create denning habitat (Harington 1968, p.12).

A great amount of polar bear denning occurs in core areas (Harington 1968, pp. 7–8) which show high use over time. In some portions of the species' range, polar bears den in a more diffuse pattern, with dens scattered over larger areas at lower density (Lentfer and Hensel 1980, p. 102; Stirling and Andriashek 1992, p. 363; Amstrup 1993, p. 247; Amstrup and Gardner 1994, p. 5; Messier et al. 1994, p. 425; Born 1995, p. 81; Ferguson et al. 2000a, p. 1125; Durner et al. 2001, p. 117; Durner et al. 2003, p. 57).

Habitat characteristics of denning areas vary substantially from the rugged mountains and fjordlands of the Svalbard archipelago and the large islands north of the Russian coast (Lønø 1970, p. 77; Uspenski and Kistchinski 1972, p. 182; Larsen 1985, pp. 321–322) to the relatively flat topography of areas such as the west coast of Hudson Bay (Ramsay and Andriashek 1986, p. 9; Ramsay and Stirling 1990, p. 233) and north slope of Alaska (Amstrup 1993, p. 247; Amstrup and Gardner 1994, p. 7; Durner et al. 2001, p. 119; Durner et al. 2003, p. 61), to offshore pack ice-pressure ridge habitat. The key characteristic of all denning habitat is topographic features that catch snow in the autumn and early winter (Durner et al. 2003, p. 61). Across the range, most polar bear dens occur relatively near the coast. The main exception to coastal denning occurs in the western Hudson Bay area, where bears den further inland in traditional denning areas (Kolenosky and Prevett 1983, pp. 243–244; Stirling and Ramsay 1986, p. 349).

Polar bears are largely food deprived while on land in the ice-free period; during this time they survive on stored fat reserves. Pregnant females that spend the late summer on land prior to denning may not feed for 8 months (Watts and Stirling 1988, p. 627). This may be the longest period of food deprivation of any mammal, and it occurs at a time when the female gives birth to and then nourishes new cubs.

Current Population Status and Trend

The total number of polar bears worldwide is estimated to be 20,000–25,000. Polar bears are not evenly distributed throughout the Arctic, nor do they comprise a single nomadic cosmopolitan population, but rather occur in 19 relatively discrete populations (Figure 1). The boundaries of these populations are based on behavioral and ecological factors and were developed from decades of intensive scientific studies as well as traditional knowledge (Lunn et al. 2002, p. 41). Although there is overlap in areas occupied by members of the populations, with the exception of the Arctic Basin population, these boundaries are sufficiently discrete to manage the populations independently. Correspondence between genetic data and movement data reinforces current population designations (Paetkau et al. 1999, p. 1571; Amstrup 2003, p. 590).

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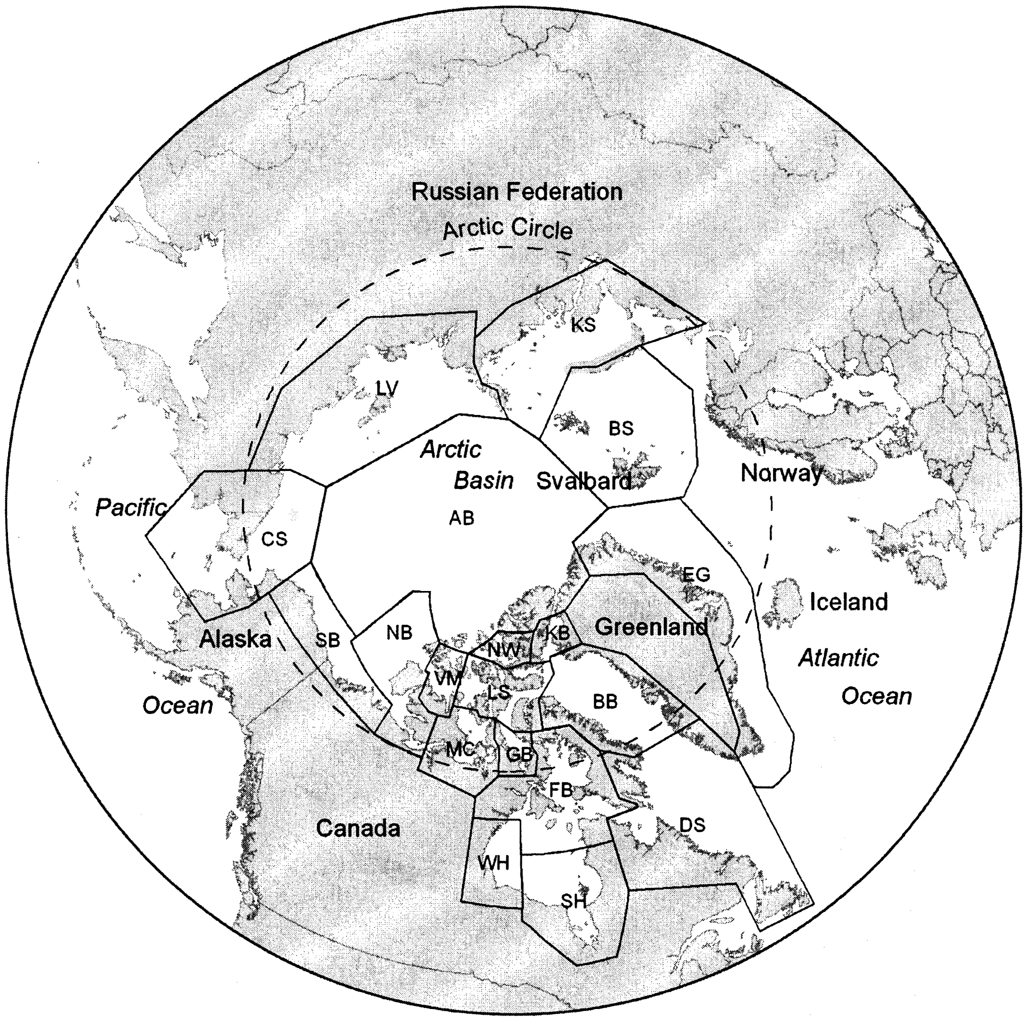
Figure 1. Distribution of Polar Bear Populations

Throughout the Arctic Circumpolar Basin



Legend: CS = Chukchi Sea; SB = Southern Beaufort Sea; NB = Northern Beaufort Sea; VM = Viscount Melville Sound, NW = Norwegian Bay; LS = Lancaster Sound; MC = M'Clintock Channel; GB = Gulf of Boothia; FB = Foxe Basin; WH = Western Hudson Bay; SH = Southern Hudson Bay; KB = Kane Basin; BB = Baffin Bay; DS = Davis Strait; EG = East Greenland; BS = Barents Sea; KS = Kara Sea; LV = Laptev Sea; AB = Arctic Basin

Population size estimates and qualitative categories of the current trend and status data for each polar bear population are discussed below. This discussion was derived from information presented at the World Conservation Union—International Union for Conservation of Nature and Natural Resources, Species Survival Commission (IUCN/SSC) Polar Bear Specialist Group (PBSG) meeting held in Seattle, Washington, in June 2005, and updated with results that became available as of October 2006 (PBSG 2006). The information on each population is based on the available status reports and revisions given by each nation. Categories of status include an assessment of whether populations are not reduced, reduced, or severely reduced from historic levels of abundance, or if insufficient data are available to estimate status. Categories of trend include an assessment of whether the population is currently increasing, stable, or declining, or if insufficient data are available to estimate trend. The current status and trend assessments do not consider the various factors that have been determined to threaten the species within the foreseeable future, as discussed later in this document in the five-factor analysis sections.

The East Greenland population number is unknown since no population surveys have been conducted in the past. The status and trend have not been determined due to the absence of abundance data. The Barents Sea population was estimated to comprise 3,000 animals based on the only population survey conducted in this vast area during 2004. Because only one abundance estimate is available, the status and trend cannot yet be determined. The Kara Sea population number is unknown because population surveys have not been conducted; thus status and trend of this population cannot yet be determined. The Laptev Sea population is estimated to comprise 800 to 1,200 animals, based on an extrapolation of historical aerial den survey data. Status and trend cannot yet be determined for this population. The Chukchi Sea population is estimated to comprise 2,000 animals based on extrapolation of aerial den surveys. Status and trend cannot yet be determined for this population. The Southern Beaufort Sea population is comprised of 1,500 animals based on conclusion of a recent population inventory. The predicted trend is declining and the status is designated as reduced. The Northern Beaufort Sea population is comprised of 1,200 animals. The trend is designated as stable and status is determined to be not reduced, although a new abundance estimate will be developed in the near future. The Viscount-Melville population is estimated to comprise 215 animals. The trend is increasing although the status is designated as severely reduced from prior excessive harvest. The Norwegian Bay population number is 190 animals and the trend is noted as declining while the status is listed as not reduced. The Lancaster Sound population is estimated to be 2,541 animals and the trend is stable and status is not reduced. The M'Clintock Channel population is estimated at 284 animals and the trend is increasing although the status is severely reduced from excessive harvest. The Gulf of Boothia population abundance estimate is 1,523 animals and the trend is stable and status is designated as not reduced. The Foxe Basin population comprises 2,197 animals and the population trend is stable and the status is not reduced. The Western Hudson Bay population estimate is 935 animals and the trend is declining and the status is reduced. The Southern Hudson Bay population estimate is 1,000 animals and the trend is stable and status is not reduced. The Kane Basin population is comprised of 164 animals and its trend is declining and status is reduced. The Baffin Bay population is estimated to be 2,074 animals and the trend is declining and status is reduced. The Davis Strait population is estimated at 1,650 animals based on traditional ecological knowledge (TEK) and data are unavailable to assess trends or status. The Arctic Basin population estimate, trend, and status are unknown.

For populations with long-term data we can establish trends, but cannot do so for populations with short-term or lack of data. Of the populations for which data are available to assess status and trend, two are noted to be increasing (Viscount Melville and M'Clintock Channel). Both of these populations were severely reduced in the past and are recovering under conservative harvest limits. The two populations with the most extensive time series of data, Western Hudson Bay and Southern Beaufort Sea, are both declining. However, based on environmental factors and observed patterns of population trends for some populations it is likely that most populations will exhibit declines in the future.

Summary of Factors Affecting the Polar Bear

Section 4 of the Act (16 U.S.C. 1533), and implementing regulations at 50 CFR part 424, set forth procedures for adding species to the Federal List of Endangered and Threatened Species. Under section 4(a) of the Act, we may list a species on the basis of any of five factors, as follows: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. In making this finding, information regarding the status and trends of the polar bear is considered in relation to the five factors provided in section 4(a)(1) of the Act.

In the context of the Act, the term ''threatened species'' means any species or subspecies or, for vertebrates, Distinct Population Segment (DPS) that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The term ''endangered species'' means any species that is in danger of extinction throughout all or a significant portion of its range. The Act does not define the term ''foreseeable future.'' The PBSG, when they reassessed the status of polar bears globally in June 2005, used the criteria described in the IUCN/SSC Red List process (IUCN 2004) to determine which Red List category the polar bear should be assigned. The criteria, used for all species that IUCN assesses in the Red List process, use observed, estimated, inferred or suspected population size reductions of a certain percentage over the last 10 years or three generations, whichever is the longer to categorize species. A generation, as defined by IUCN, is calculated as the age of sexual maturity (5 years) plus 50 percent of the length of the lifetime reproductive period (20 years). Based on these calculations, the projected length of 1 generation for a polar bear was calculated at 15 years, and the projected period for 3 generations was calculated as 45 years.

For another species evaluated for listing as threatened, the Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), the status assessment report (May et al. 2003 p. 10) considered the ''foreseeable future'' to be 2–3 decades (4 to 10 generations), depending on the productivity of the environment. For the greater sage grouse (*Centrocercus urophasianus*) the status reviewers agreed that given all of the uncertainties, a reasonable timeframe for ''foreseeable future'' for the threatened definition was approximately 30 to 100 years [approximately 10 greater sage-grouse generations or 2 sagebrush habitat regeneration cycles (70 FR 2244)].

Given the IUCN criteria, the life-history and population dynamics of polar bears, documented changes to date in both multi-year and annual sea ice, and the direction of projected rates of change of sea ice in future decades, we consider the three generation timespan used in the IUCN Red List criteria to be a reasonable projection of foreseeable future and provides a time frame for analysis of whether polar bears are likely to become endangered. Therefore, 45 years is the ''foreseeable future'' for the polar bear. This time frame is long enough to take into account multi-generational population dynamics and the capacity for ecological adaptation (Schliebe et al. 2006a).

We considered all relevant, available information under each of the listing factors in the context of present-day polar bear distribution. Our evaluation of the five factors with respect to polar bear populations is presented below. While the polar bear can be delineated into 19 populations, and population-specific interaction of various listing factors may affect these populations at different levels or rates, in this 12-month finding and proposed rule we evaluated the status of the species throughout its entire range because we find that the entire species meets the definition of a threatened species under the Act. Accordingly, we have not considered the petitioners' alternative of assessing whether listing of particular distinct population segments is warranted.

A. Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Polar bears are believed to be completely dependent upon Arctic sea ice for survival (Moore and Huntington, in press; Laidre et al. in prep.). They need sea ice as a platform for hunting, for seasonal movements, for travel to terrestrial denning areas, for resting, and for mating. Some polar bears use terrestrial habitats seasonally, such as pregnant females for denning and some bears, all sex and age classes, for resting during open water periods. While open water may not be an essential habitat for polar bears because life functions such as feeding, reproduction or resting do not occur in open water, open water is a fundamental part of the marine system that supports seal species, the principal prey of polar bears, and seasonally returns to ice in the form needed by the bears. Further, the open water interface with sea ice is an important habitat in that it is used to a great extent by polar bears. The extent of open water is important because vast areas of open water may limit a bear's ability to access sea ice or land. Snow cover is also an important component of polar bear habitat in that it provides insulation and cover for young polar bears and ringed seals in snow dens or lairs.

Overview of Arctic Sea Ice Change

Initial syntheses of climate models and environmental change data have identified potentially significant changes to the landscapes and biota in Arctic regions as a consequence of climate change (ACIA 2005, p. 1017; IPCC 2001a, p. 920). Climate trends are not occurring evenly or in a linear fashion throughout the world; Arctic regions are being disproportionately affected by higher levels of warming (Overpeck 2006, p. 1749). Observations of Arctic changes, including diminishing sea ice, shrinking glaciers, thawing permafrost, and Arctic greening, validate earlier findings (Morison et al. 2000, p. 360; Sturm et al. 2003, pp. 63–65; Comiso and Parkinson 2004, pp. 38–43; Parkinson in press).

Additional studies indicate that previous projections regarding the rate and extent of climate change underestimated the temperature trend, reductions to annual sea ice during the summer and winter periods, reductions to multi-year pack ice, and reductions in thickness (Rothrock et al. 2003, p. 3471; Stroeve et al. 2005, p. 2). Overpeck et al. (2005, p. 309) indicated that the Arctic is moving toward a new ''super interglacial'' state that falls outside of natural glacial-interglacial periods that have characterized the past 800,000 years. These changes appear to be driven largely by the albedo effect (see explanation in following paragraph), and there are few, if any, processes that are capable of altering this trajectory. There is no paleoclimatic evidence for a seasonally ice-free Arctic during the past 800,000 years (Overpeck et al. 2005, p. 309).

The National Snow and Ice Data Center (NSIDC is part of the University of Colorado Cooperative Institute for Research in Environmental Sciences, and is affiliated with the National Oceanic and Atmospheric Administration National Geophysical Data Center through a cooperative agreement) reported that the amount of sea ice in 2006 was the second lowest on record (since satellites began recording sea ice extent measurements via passive microwave imagery in 1978), and the pace of melting was accelerating. The latest sea ice measurements are thought to indicate that ice melt is accelerating due to a positive feedback loop. The albedo effect involves reduction of the extent of lighter-colored sea ice or snow, which reflects solar energy back into the atmosphere, and a corresponding increase in the extent of darker-colored water or land that absorbs more of the sun's energy. This greater absorption of energy causes faster melting, which in turn causes more warming, and thus creates a self-reinforcing cycle that becomes amplified and accelerates with time. Lindsay and Zhang (2005, p. 4892) suggest that feedback mechanisms caused a tipping point in Arctic sea ice thinning in the late 1980s, sustaining a continual decline in sea ice cover that cannot easily be reversed. Results of a new study by a team of scientists from the National Center for Atmospheric Research and two universities, using projections from a state-of-the-art community climate system model, suggest that abrupt reductions in the extent of summer ice are likely to occur over the next few decades, and that near ice-free September conditions may be reached as early as 2040 (Holland et al, 2006).

Observed and Projected Changes in Arctic Sea Ice

Sea ice is the defining characteristic of the marine Arctic and has a strong seasonal cycle (ACIA 2005, p. 30). It is typically at its maximum extent in March and minimum extent in September (Parkinson et al. 1999, p. 20, 840). There is considerable inter-annual variability both in the maximum and minimum extent of sea ice. In addition, there are decadal and inter-decadal fluctuations to sea ice extent due to changes in atmospheric pressure patterns and their associated winds, continental discharge, and influx of Atlantic and Pacific waters (Gloersen 1995, p. 505; Mysak and Manak 1989, p. 402; Kwok 2000, p. 776; Parkinson 2000b, p. 10; Polyakov et al. 2003, p. 2080; Rigor et al. 2002, p. 2660; Zakharov 1994, p. 42).

Observations have shown a decline in late summer Arctic sea ice extent of 7.7 percent per decade and in the perennial sea ice area of up to 9.8 percent per decade since 1978 (Stroeve et al. 2005, p.1; Comiso 2006, p. 75). A lesser decline of 2.7 percent per decade has been observed in yearly averaged sea ice extents (Parkinson and Cavalieri 2002, p. 441). The rate of decrease appears to be accelerating, with record low minimum extents in the sea ice cover recorded during 2002 through 2005 (Stroeve et al. in press; Comiso 2006, p. 75). Average air temperatures across most of the Arctic Ocean from January to August 2006 were about 2 to 7 degrees Fahrenheit (°F) warmer than the long-term average across the region during the preceding 50 years, indicating that ice melt is accelerating due to a positive feedback loop that enhances warming through the albedo effect. Observations have likewise shown a thinning of the Arctic sea ice of 32 percent or more from the 1960s and 1970s to the 1990s in some local areas (Rothrock et al. 1999, p. 3471; Yu et al. 2004, p. 11). The length of the melt period affects sea ice cover and ice thickness (Hakkinen and Mellor 1990; Laxon et al. 2003, cited in Comiso 2005,

p. 50). Earlier melt onset and lengthening of the melt season result in decreased total ice cover at summer's end (Stroeve et al. 2005, p. 3). For 2002 through 2005, the NSIDC reported a trend of earlier onset of melt season in all four years; in 2005 the melt season arrived the earliest, occurring approximately 17 days before the mean melt onset date (NSIDC 2005, p. 6). The result of longer melt season is that the ice season is decreasing by as much as 8 days per year in the eastern Barents Sea, and by lesser amounts throughout much of the rest of the Arctic (Parkinson 2000a, p. 351). Comiso (2003, p. 3506) calculated an increase in the sea ice melt season of 10 to 17 days per decade. Subsequently, Comiso (2005, p. 50) included additional data from recent years and ice-free periods and determined that the length of the melt season is increasing at a rate of approximately 13.1 days per decade. Comiso (2005, p. 50) stated that the increasing melt periods were likely reasons for the current rapid decline of the perennial ice cover. Belchansky et al. (2004, p. 1) found that changes in January multiyear ice volume were significantly correlated with duration of the intervening melt season.

Projected Changes in Sea Ice Cover

A number of climate models have been developed that project future conditions in the Arctic, as well as globally (ACIA 2005, p. 99; IPCC 2001b, p. 471). All models predict continued Arctic warming and continued decreases in the Arctic sea ice cover in the 21st century (Johannessen 2004, p. 328) due to increasing global temperatures, although the level of increase varies between models. Comiso (2005, p. 43) found that for each 1°Centigrade (C) (1.6 °F) increase in surface temperature (global average) there is a corresponding decrease in perennial sea ice cover of about 1.48 million km^2 (.57 million mi^2). Further, due to increased warming in the Arctic region, accepted models project almost no sea ice cover during summer in the Arctic Ocean by the end of the 21st century (Johannessen et al. 2004, p. 335). More recently, the NSIDC cautioned that the Arctic will be ice-free by 2060 if current warming trends continue (Serreze 2006, p. 2).

The winter maximum sea ice extent in 2005 and 2006 were both about 6 percent lower than average values, indicating significant decline in the winter sea ice cover. In both cases, the observed surface temperatures were also significantly warmer and the onset of freeze-up was later than normal. In both years, onset of melt also happened early (Comiso in press). A continued decline would mean an advance to the north of the 0 °C (32 °F) isotherm temperature gradient, and a warmer ocean in the peripheral seas of the Arctic Ocean. This in turn may result in a further decline in winter ice cover.

Predicted Arctic atmospheric and oceanographic changes for time periods through the year 2080 include increased air temperatures, increased precipitation and run-off, and reduced sea ice extent and duration (ACIA 2005, tables on pp. 470 and 476).

Effects of Sea Ice Habitat Change on Polar Bears

Observed and predicted changes in sea ice cover, characteristics, and timing have profound effects on polar bears. Sea ice is a highly dynamic habitat with different types, forms, stages, and distributions of ice that all operate as a complex matrix in determining biological productivity and use by marine organisms, including polar bears and their primary prey base—ice seal species. Polar bear use of sea ice is not uniform. Their preferred habitat is the annual ice located over continental shelf and inter-island archipelagos that circle the Arctic basin. Ice seals demonstrate a similar preference to these ice habitats.

Hudson Bay in Canada typifies change in the Arctic due to its southern location and occurrence on a divide between a warming and a cooling region (AMAP 2003, p. 22). It is therefore an ideal area to study the impacts of climate change. In addition, Hudson Bay has the most significant long-term time series of data on the ecology of polar bears and is the site of the first documented evidence of major and ongoing impacts to polar bears from sea ice changes. Many researchers over the past 40 years have predicted an array of impacts to polar bears from climatic change that include adverse effects on denning, food chain disruption, and prey availability (Budyko 1966; Vibe 1967, cited in Derocher et al. 2004, p. 164; Lentfer 1972, p. 169; Tynan and DeMaster 1997, p. 315; Stirling and Derocher 1993, pp. 241–244). Stirling and Derocher (1993, p. 240) first noted changes in polar bears in Western Hudson Bay such as declining body condition, lowered reproductive rates, and reduced cub survival; they attributed these changes to a changing ice environment. Subsequently, Stirling et al. (1999, p. 303) established a statistically significant link between climate warming in Western Hudson Bay, reduced ice presence, and observed declines in polar bear physical and reproductive parameters, including body condition (weight) and natality.

Increased Polar Bear Movements

Polar bears are inefficient moving on land; they expend approximately twice the average energy use of other mammals when walking (Best 1982, p. 63; Hurst et al. 1982, p. 273). Sea ice circulation in the Arctic is clockwise, and polar bears tend to walk against this movement to maintain a position near preferred habitat within large geographical home ranges (Mauritzen et al. 2003a, p. 111). Currently, ice thickness is diminishing and there is increased transport of multi-year ice from the polar region. This increased rate and extent of ice movements requires additional efforts and energy expenditure for polar bears to maintain their position near preferred habitats (Derocher et al. 2004, p.167). Ferguson et al. (2001, p. 51) found that polar bears inhabiting areas of highly dynamic ice had much larger activity areas and movement rates compared to those bears inhabiting more stable, persistent ice habitat. Although polar bears are capable of living in areas of highly dynamic ice movement, they show inter-annual fidelity to the general location of preferred habitat (Mauritzen et al. 2003b, p. 122).

As sea ice moves more quickly or becomes more fragmented, polar bears would likely use more energy to maintain contact with consolidated ice, because moving through highly fragmented sea ice is difficult and likely more energy-intensive than walking over consolidated sea ice (Derocher et al. 2004, p. 167). During summer periods the remaining ice in much of the central Arctic is now positioned away from more productive continental shelf waters and over much deeper, less productive waters, such as in the Beaufort and Chukchi Seas of Alaska. If the width of leads or extent of open water increases, the transit time for bears and the need to swim or to travel will increase (Derocher et al. 2004, p. 167). Derocher et al. (2004, p. 167) suggests that as habitat patch sizes decrease, available food resources are likely to decline, resulting in reduced residency time and thus increased movement rates. The consequences of increased energetic costs to polar bears are reduced weight and condition and corresponding reduction in survival and recruitment rates (Derocher et al. 2004, p. 167).

Additionally, as movement of sea ice increases and areas of unconsolidated ice increase, some bears will lose contact with the main body of ice and drift into unsuitable habitat from which it may be difficult to return (Derocher et al. 2004, p. 167). This already occurs in some areas such as Southwest Greenland and offshore from the island of Newfoundland (Derocher et al. 2004, p. 167). Increased frequency of such events could negatively impact survival rates and contribute to population declines (Derocher et al. 2004, p.167).

Polar Bear Distribution Changes

Recent studies indicate that polar bear distributions are changing and that these changes are strongly correlated to similar changes in sea ice and the ocean-ice system. Specifically, in Western Hudson Bay, breakup of the annual sea ice now occurs approximately 2.5 weeks earlier than it did 30 years ago (Stirling et al. 1999, p. 299). The earlier spring breakup was highly correlated with dates that female polar bears came ashore (Stirling et al. 1999, p. 299). Declining reproductive rates, subadult survival, and body mass (weights) have resulted from longer periods of fasting on land as a result of the progressively earlier breakup of the sea ice caused by an increase in spring temperatures (Stirling et al. 1999, p. 304; Derocher et al. 2004, p. 165).

Stirling et al. (1999, p. 304) reported a significant decline in the condition (weights) of both male and female adult polar bears since the 1980s in Western Hudson Bay, as well as lower natality rates. A positive relationship between body mass of females with cubs and survival of cubs was also established; survival of cubs of mothers in better condition (heavier) was greater than survival of cubs from lighter mothers (Derocher and Stirling 1996, p. 1248).

Stirling et al. (1999, p. 304) cautioned that although downward trends in the size of the Western Hudson Bay population had not been detected, if trends in life history parameters continued downward ‘‘they will eventually have a detrimental effect on the ability of the population to sustain itself.’’ Population declines have now been determined based on a recent analysis of an ongoing mark-recapture population study, and the earlier predictions of Stirling et al. (1999; p. 304) have been proven. Between 1987 and 2004, the number of polar bears in the Western Hudson Bay population declined from 1,194 to 935, a reduction of about 22 percent (Regehr et al. in prep.). Progressive declines in the condition and survival of cubs, subadults, and bears 20 years of age and older, likely initiated the decline in the size of the Westen Hudson Bay population; these declines appear to have been initiated by progressively earlier sea ice breakup. Once the population began to decline, existing harvest rates of this population contributed to the reduction in the size of the population (Regehr et al. in prep.).

Starting in the 1990s, Schliebe (unpublished data) has observed a trend of increasing use of coastal areas by polar bears during the fall open water period in the Southern Beaufort Sea. High numbers of bears were found to be using coastal areas during some years, where previously observations of polar bears on the coast were rare. The study period included record minimal ice conditions for the month of September in four of the six survey years. There was a significant relationship between the mean distance from the coast to the edge of pack ice and the numbers of bears observed on the coast. As the distance to the edge of the ice increased, the number of bears near shore increased. Conversely, as ice advanced toward shore, the number of bears near shore decreased. These results suggest that environmental factors, possibly similar to those observed in Western Hudson Bay, are influencing the distribution of polar bears in the southern Beaufort Sea. They also suggest that increased polar bear use of coastal areas may continue if the summer retreat of the sea ice continues to receed in the future as predicted (Serreze et al. 2000, p. 159; Serreze and Barry 2005).

Gleason et al. (2006, p. 1) also found a shift in polar bear distributions in the southern Beaufort Sea. Their study evaluated polar bear distribution during three periods (1979 to 1986, 1987 to 1996, and 1997 to 2005), and found that the September distribution of polar bears was primarily associated with offshore sea ice during the earlier two periods, but land and open water during the later period. These findings coincide with the lack of pack ice (concentrations of greater than 50 percent) caused by a retraction of ice in the study area during the latter period (Stroeve et al. 2005, p. 2; Comiso 2002 in Comiso 2005, p. 46; Comiso 2003, p. 3509; Comiso 2005, p. 52).

The findings of Gleason et al. (2006 p. 1) are consistent with those reported by Schliebe et al. (2006b, p. 559), and confirm an increasing trend in use of coastal areas by polar bears in the southern Beaufort Sea in recent years and a decline in ice habitat near shore. The proximate causes for changes in polar bear distribution are thought to be (1) retraction of pack ice far to the north for greater periods of time in the fall and (2) later freeze-up of coastal waters.

Other polar bear populations exhibiting distribution changes with larger numbers of bears onshore include the Chukchi Sea (Kochnev 2006, p. 162), Baffin Bay, Davis Strait, Foxe Basin, and Hudson Bay populations (Stirling and Parkinson 2006). Stirling and Parkinson (2006, p. 261–275) provide an analysis of pack ice and distribution changes for the Baffin Bay, Davis Strait, Foxe Basin, and Hudson Bay populations. They indicate that earlier sea ice breakup will likely result in longer periods of fasting for polar bears during the extended open-water season and this is why more polar bears have been observed near communities and hunting camps in recent years. Distribution changes of polar bears have been noted during a similar period of time for the northern coast of Chukotka (Kochnev 2006, p. 162) and on Wrangel Island, Russia (Kochnev 2006, p. 162; N. Ovsyanikov, pers. comm.). The relationship between the maximum number of polar bears, the number of dead walruses, quantity of accessible food, and the distance of the ice-edge from Wrangel Island was evaluated. The regression analysis revealed that the strongest correlation was between bear numbers and distance to the ice-edge (Kochnev 2006, p. 162).

In Baffin Bay, traditional Inuit knowledge studies and anecdotal reports indicate in many areas that greater numbers of bears are being encountered on land during the summer and fall open-water seasons. Interviews with elders and senior hunters in three communities in Nunavut, Canada, revealed that most respondents (83 percent) believed that the population of polar bears had increased. The increase was attributed to more bears seen near communities, cabins, and camps, and hunters encountering bear sign in areas not previously used by bears. Some people interviewed noted that these observations could reflect a change in bear behavior rather than an increase in population.

Stirling and Parkinson (2006, p. 263) evaluated sea ice conditions and distribution of polar bears in five populations in eastern Canada: Western Hudson Bay, Eastern Hudson Bay, Baffin Bay, Foxe Basin, and Davis Strait. Their analysis of satellite imagery beginning in the 1970s indicates that the sea ice is breaking up at progressively earlier dates, so that bears must fast for longer periods of time during the open water season. Stirling and Parkinson (2006, pp. 271–272) point out that long-term data on population size and body condition of bears from the Western Hudson Bay, and population and harvest data from the Baffin Bay population indicate that these populations are declining or likely to be declining. The authors indicate that as bears in these populations become more nutritionally stressed, the numbers of animals will decline and the declines will probably be significant. Based on the recent findings of Holland et al. (2006) these events are predicted to occur within the foreseeable future as defined in this rule (Stirling, pers. comm. 2006).

Seasonal polar bear distribution changes noted above and the negative effect of prolonged use of terrestrial habitat are a concern for populations. Although polar bears have been observed using terrestrial food items such as blueberries, snow geese (*Anser caerulescens*), and reindeer (*Rangifer tarandus*), these alternate foods are not believed to represent significant sources of energy (Derocher et al. 2004, p. 169). Also, the inefficiency of polar bear locomotion noted above likely explains why polar bears are not known to hunt musk oxen (*Ovibos moschatus*) or snow geese, potential prey species that co-occur with the polar bear in many areas (Lunn and Stirling 1985, p. 2295). The energy needed to catch such species would almost certainly exceed the amount of energy a kill would provide (Lunn and Stirling 1985, p. 2295). Consequently, adaptive behaviors of using terrestrial habitat instead of sea ice will not offset energy losses from decreased seal consumption, and nutritional stress will result.

Effects of Sea Ice Habitat Changes on Polar Bear Prey

Reduced Seal Productivity

Ringed seals in many areas prefer stable, shore-fast ice for construction of birth lairs. Pups are born between mid-March and mid-April, nursed for about 6 weeks, and weaned prior to spring breakup in June (Smith 1980, p. 2201; Stirling 2002, p. 67). During this time period, both ringed seal pups and adults are hunted by polar bears (Smith 1980, p. 2201). Ferguson et al. (2005, pp. 130–131) demonstrated that decreased snow depth in April and May, possibly influenced by the timing of spring breakup, may have a detrimental effect on ringed seal recruitment in Western Hudson Bay. Reduced snowfall results in less snow drift accumulation to the leeward side of pressure ridges; pups in lairs with thin snow roofs are more vulnerable to predation than pups in lairs with thick roofs (Ferguson et al 2005, p. 131). Access to birth lairs for thermoregulation is considered crucial to the survival of nursing pups when air temperatures fall below 0 °C (32 °F) (Stirling and Smith 2004, p. 65). Warming temperatures that melt snow-covered birth lairs contributed to pups being exposed to ambient conditions and suffering from hypothermia (Stirling and Smith 2004, p. 63). Ferguson et al. (2005, p. 121) concluded that ''earlier spring breakup of sea ice together with snow trends suggest continued low pup survival in western Hudson Bay.''

Harwood et al. (2000, pp. 11–12) reported that an early spring breakup negatively impacted the growth, condition, and probably the survival of unweaned ringed seal pups. Early breakup was believed to have interrupted lactation in adult females, which in turn, negatively affected the condition and growth of pups. Earlier ice breakups similar to those documented by Harwood et al. (2000, p. 11) and Ferguson et al. (2005, p. 131) are predicted to occur more frequently, and as a result a decrease in productivity and abundance of ringed seals is predicted (Ferguson et al. 2005, p. 131). Similar to earlier spring breakup or reduced snow cover, increased rain on snow events during the late winter also negatively impact ringed seal recruitment by damaging or eliminating snow-covered pupping lairs, increasing exposure and the risk of hypothermia, and facilitating predation by polar bears and Arctic foxes (*Alopex lagopus*) (Stirling and Smith 2004, p. 65). Stirling and Smith (2004, p. 64) document the collapse of the snow roofs of ringed seal birth lairs near southeastern Baffin Island and the resultant exposure of adult seals and pups to hypothermia. Predation of pups by polar bears was observed and the researchers suspect that most of the pups in these areas were eventually killed by polar bears (Stirling and Archibald 1977, p. 1127), Arctic foxes (Smith 1976 cited in Stirling and Smith 2004, p. 65) or possibly gulls (Lydersen and Smith 1989 cited in Stirling and Smith 2004, p. 66). Stirling and Smith (2004, p. 66) postulated that should early season rain become regular and widespread in the future, mortality of ringed seal pups will increase, especially in more southerly parts of their range, and local populations may be significantly reduced. Any significant decline in ringed seal numbers, especially in the production of young, could affect reproduction and survival of polar bears (Stirling and Smith 2004, p. 66).

Reduced Prey and Availability

Ringed seals are the primary prey of the polar bear in most areas, though bearded seals, walrus, harbor seals (*Phoca vitulina*), harp seals (*Phoca greenlandica*), hooded seals (*Crystophora cristata*), and beluga whales are sometimes taken and may be locally important to some populations (Stirling and Archibald 1977, p. 1129; Smith 1980, p. 2206; Smith and Sjare 1990, p. 100; Iverson et al. 2006, p. 114). Ice-associated seals, including the ringed seal, are vulnerable to habitat loss from changes in the extent or concentration of Arctic ice because they depend on pack-ice habitat for pupping, foraging, molting, and resting (Tynan and DeMaster 1997, p. 312; Derocher et al. 2004, p. 168).

Polar bear populations are known to fluctuate based on prey availability (Stirling and Lunn 1997, p. 177). For example, declines in ringed and bearded seal numbers and productivity have resulted in marked declines in polar bear populations (Stirling 1980, p. 309; Stirling and Øslashritsland 1995, p. 2609; Stirling 2002, p. 68). Ringed seal young-of-the-year represented the majority of the polar bear diet, and fluctuations in the productivity of ringed seal pups will likely be reflected immediately in polar bear reproduction and cub survival (Stirling and Lunn 1997, p. 177). For polar bears, the most critical factor which affects reproductive success, subsequent condition, and survival is the availability of ringed seal pups from about mid-April to ice break up sometime in July (Stirling and Lunn 1997, p. 176).

Thus, major declines in sea ice habitat as projected will likely result in a decline in polar bear abundance over time due to reduced prey availability (Derocher et al. 2004, p. 167). The effects of declining ice habitat on seals will vary depending on the location, timing and extent of reductions, based on the information presented by Derocher et al. (2004). While it is possible that reduced ice cover along with increased open and warmer water will enhance primary productivity of seal prey items, and thus seal productivity, ultimately such a regime will negatively impact polar bears. An increased area and duration of open water will result in polar bears having reduced access to prey during critical periods of the year and physical condition of bears will decline. Further, reductions in sea ice cover will result in diminished productivity and distribution changes of ringed seals over time because seals depend on sea ice for pupping and resting. Thus a reduction in sea ice is likely to result in a net reduction in abundance of ringed seals (ACIA 2005, p. 520).

Grebmeier et al. (2006, p. 1461) found that a major ecosystem shift is occurring in the Northern Bering Sea indicated by a decrease in benthic (bottom-dwelling) prey populations, which could affect Pacific walrus and bearded seal populations and result in an increase in pelagic fish. Arctic cod (*Boreogadus saida*), one of the primary prey species of ringed seals, is strongly associated with sea ice throughout its range and uses the underside of the ice to escape from predators (Craig et al. 1982 and Sekerak 1982 cited in Gaston et al. 2003, p. 230). It is therefore likely that a decrease in seasonal ice cover could have adverse effects on Arctic cod (Tynan and DeMaster 1997, p. 314; Gaston et al. 2003, p. 231). Sea ice regime changes in the Arctic have been implicated in distribution changes of other species as well. Cooper et al. (2006, p. 98) observed orphaned Pacific walrus in waters as deep as 3,000 m (9,843 ft) in the Canada Basin of the Arctic Ocean. These observations indicate that the Pacific walrus population may be ill-adapted to rapid seasonal sea ice retreat off Arctic continental shelves.

Several species of seals that currently occur at the southern edge of the range of polar bears could also expand their range northward. In the north Pacific, this could include harbor seals (*Phoca vitulina*), spotted seals (*Phoca largha*), and ribbon seals (*Phoca fasciata*). In the north Atlantic, harp and hooded seals could expand northward and become available as prey, particularly if their pupping (natal) grounds located on heavy, thicker ice are only available in more northern latitudes (Derocher et al. 2004, p. 168). A study of seals preyed upon by polar bears in three major regions of the Canadian Arctic, Davis Strait, western Hudson Bay, and the Beaufort Sea, revealed that diets differed among the regions, and within the region for Davis Strait. These differences were thought to be based on different rates of availability of the different seal species, as determined by their abundance.

The absence of ice in southerly pupping areas or the relocation of pupping areas to more northerly areas could affect seal production. Repeated years of little or no ice in the Gulf of St. Lawrence resulted in almost zero production of harp seal pups, compared to hundreds of thousands in good ice years (ACIA 2005, p. 510). Marginal ice conditions and early ice breakup during harp seal whelping are believed to have resulted in increased juvenile mortality from starvation and cold stress and an overall reduction in this age class (Johnston et al. 2005, pp. 215–216). Northerly shifts of whelping areas for hooded seals were reported to occur during periods of warmer climate and diminished ice (Burns 2002 p. 42). In recent years, the position of the hooded seal whelping patch near Jan Mayen has changed position, likely in response to decreased sea ice in East Greenland; the number of seal also decreased (T. Haug, pers. comm. 2005). Marginal sea ice cover may have significant effects on harp and hooded seals since the amount and quality of ice suitable for whelping may be greatly reduced, resulting in higher density whelping areas (Johnston et al. 2005, p. 218). Crowding in whelping areas may increase the risks of disease transmissions and epizootics (Fay 1974, p. 394), but the effects of crowding at the harp and hooded seal whelping patches are largely unknown (Johnston et al. 2005, p. 218). Born (2005a) indicated that early ice breakup in years with ''light'' ice conditions may influence seals other than ringed seals. Other ice breeding seals, ribbon and spotted seals, may also be similarly affected by marginal ice conditions and early breakup (Born 2005a). It is unlikely that increased take of other species such as bearded seals, walrus, or harbor seals, even where they are available, could compensate for reduced availability of ringed seals (Derocher et al. 2004, pp. 168–169).

Changes in prey availability may have especially large impacts on immature bears. Polar bears feed preferentially on blubber, and adult bears often leave much of a kill behind. Younger bears, which are not as efficient at taking seals, are known to utilize these kills to supplement their diet (Derocher et al. 2004, p. 168). Younger bears may be disproportionately impacted if there are fewer kills or greater consumption of kills by adults, resulting in less prey to scavenge (Derocher et al. 2004, pp. 167–168). Altered prey distribution would also likely lead to increased competition for prey between dominant and subordinate bears, resulting in subordinate or sub-adult bears having reduced access to prey (Derocher et al. 2004, p. 167). Thus, a decrease in ringed seal abundance and availability would result in a concomitant decline in polar bear populations.

Demographic Effects on Polar Bears

The potential effects of sea ice changes on population size are difficult to quantify, especially for a long-lived and widely dispersed species like the polar bear. The key demographic factors for polar bears are physical condition, reproduction, and survival. Alteration of these characteristics has been associated with elevated risks of extinction for other species (McKinney 1997; Beissinger 2000; Owens and Bennett 2000 all cited in Derocher et al. 2004, p. 170).

Physical condition of polar bears has been shown to determine the welfare of individuals, and ultimately, through their reproduction and survival, the welfare of populations (Stirling et al. 1999, p. 304; Regehr et al. in prep). Declines in fat reserves during critical times in the polar bear life cycle are likely to lead to an array of impacts including a delay in the age of first reproduction, decrease in the proportion of females with adequate fat stores to complete successful denning, decline in litter sizes with more single cub litters and fewer cubs overall, as well as lower cub body weights and lower survival rates (Derocher et al. 2004, p. 170). Derocher and Stirling (1998, pp. 255–256) demonstrated that body mass of adult females is correlated with cub mass at den emergence, with heavier females producing heavier cubs and lighter females producing lighter cubs. Heavier cubs have a higher rate of survival (Derocher and Stirling 1996, p. 1249). Females in poor condition will result in a higher proportion that do not initiate denning or are likely to abandon their den and cub(s) mid-winter (Derocher et al. 2004, p. 170). Females with insufficient fat stores or in poor hunting condition in the early spring after den emergence could lead to increased cub mortality (Derocher et al. 2004, p. 170). In the southern Beaufort Sea, Regehr et al. (2006, p. 20) recently found that survival rates for cubs were significantly lower than estimates from earlier studies. The lower survival rate of cubs coincided with warming temperatures and altered atmospheric circulation starting in the winter of 1989–1990 that caused an abrupt change in sea ice conditions in the Arctic basin. In addition, sea ice conditions that include broken or more fragmented ice may require young cubs to enter water more frequently and for more prolonged periods of time, thus increasing mortality from hypothermia. Blix and Lenter (1979, p. 72) and Larsen (1985, p. 325) indicate that cubs are unable to survive immersion in icy water for more than approximately 10 minutes. This is due to cubs having little insulating fat, their fur losing its insulating ability when wet (though the fur of adults sheds water and recovers its insulating properties quickly), and the core body temperature dropping rapidly when they are immersed in icy water (Blix and Lenter 1979, p. 72).

Reductions in sea ice, as discussed above, will alter ringed seal distribution, abundance, and availability for polar bears. Such reductions will, in turn, decrease polar bear body condition (Derocher et al. 2004, p. 165). Derocher et al. (2004, p. 165) projected that most females in the Western Hudson Bay population may be unable to reach the minimum 189 kg (417 lbs) body mass required to successfully reproduce by the year 2012.

Furthermore, with the extent of winter sea ice projected to be reduced in the future, opportunities for increased feeding to recover fat stores during this season may be limited. Mortality of polar bears is thought to be the highest in winter when fat stores are low and energetic demands are greatest. Pregnant females are in dens during this period using fat reserves and not feeding. Polar bears hunt seals at their breathing holes, however, increased open water or fragmented ice will provide seals alternatives to establishing breathing holes, likely reducing their availability to polar bears and decreasing bear hunting success (Derocher et al. 2004, p. 167).

In general, Derocher et al. (2004, p. 170) predict demographic impacts will adversely affect female reproductive rates and juvenile survival first while adult female survival rates would be affected under severe conditions. Regehr et al. (2005, p. 233) showed that while the Western Hudson Bay population has declined 22 percent since 1987, this decline was not uniform across all age classes of bears. Survival of prime-adult polar bears (age 5 to 19 years) was stable over the course of the study; however, survival of juvenile, subadult, and past prime age polar bears declined as a function of earlier spring sea ice breakup date.

The Southern Beaufort Sea population has also been subject to dramatic changes in the sea ice environment beginning in the winter of 1989 to 1990 (Regehr et al. 2006, p. 2). These changes were linked initially through direct observation of distribution changes during the fall open water period. With the exception of the Western Hudson Bay population, the Southern Beaufort Sea population has the most complete and extensive time series of life history data, dating back to the late 1960s. A 5-year coordinated capture-recapture study of this population to evaluate changes in the health and status of polar bears and life history parameters such as reproduction, survival, and abundance was completed in 2006. Results of this study indicate that the estimated population size has gone from 1,800 bears (Amstrup et al. 1986, p. 244; Amstup 2000, p. 146) to 1,526 polar bears in 2006 (Regehr et al. 2006, p. 16). The precision of the earlier estimate of 1,800 polars was low, and consequently the 2006 estimate of 1,526 is not statistically significantly different. Amstrup et al. (2001, p. 230) provides an additional population estimate of as many as 2,500 bears for this population in the late 1980s, although the statistical variance could not be calculated and thus precludes comparative value of the estimate. Survival rates, weights, and skull sizes were compared for 2 periods of time, 1967 to 1989 and 1990 to 2006. In the later period, estimates of total survival for cubs declined significantly from .65 (Amstrup and Durner 1995, p. 1316) to .43. Cub weights also decreased slightly. The authors believed that poor survival of new cubs may have been related to declining physical condition of females entering dens and consequently of the cubs born during recent years as reflected by smaller skull measurements. Also, between years during the 5-year study, a general decline in survival rates for cubs, females older than cubs, and males older than cubs was noted. In addition, body weights for adult males decreased significantly and skull measurements were reduced since 1990. Since male polar bears continue to grow into their teen years (Derocher et al. 2005, p. 898), if nutritional intake was similar since 1990, the size of males should have increased (Regehr et al. 2006, p. 18). The observed changes reflect a trend toward smaller size adult male bears. Although a number of the indices of population status were not independently significant, nearly all of the indices illustrated a declining trend. In the case of Western Hudson Bay, declines in cub survival and physical stature were recorded for a number of years (Stirling et al. 1999, p. 300; Derocher et al. 2004, p. 165) before a statistically significant decline in the population size was confirmed (Regehr et al. in prep.). Amstrup (pers. comm. 2006) indicates that if the trends in loss of sea ice continue as predicted, then, similar to the conditions for the Western Hudson Bay population, the ultimate effect will be a significant decline in the population trend for the Southern Beaufort Sea population. This declining trend will occur within the 45-year period determined to be the foreseeable future.

In further support of the interaction of environmental factors, nutritional stress and their effect on polar bears, several unusual mortality events have been documented in the southern Beaufort Sea. During the winter and early spring of 2004, three observations of polar bear cannibalism were recorded (Amstrup et al. 2006, p. 1). Similar observations had not been recorded in that region despite studies extending back for decades. In the fall of 2004, four polar bears were observed to have drowned while attempting to swim between shore and distant pack ice in the Beaufort Sea. Despite offshore surveys extending back to 1987, similar observations had not previously been recorded (Monnett and Gleason 2006, p. 3). In spring of 2006, three adult female polar bears and one yearling were found dead. Two of these females and the yearling had no fat stores and apparently starved to death, while the third adult female was too heavily scavenged to determine a cause of death. This mortality is suspicious because prime age females have had very high survival rates in the past (Amstrup and Durner 1995, p. 1315). Similarly, the yearling that was found starved was the offspring of another radio-collared prime age female whose collar had failed prior to her yearling being found dead. Annual survival of yearlings, given survival of their mother, was previously estimated to be 0.86 (Amstrup and Durner 1995, p. 1316). The probability, therefore, that this yearling died while its mother was still alive was only approximately 14 percent. Regehr et al. (2006, p. 27) indicate that these anecdotal observations, in combination with changes in survival of young and declines in size and weights reported above suggest mechanisms by which a changing sea ice environment can affect polar bear demographics and population status.

Open Water Habitat

As indicated earlier, open water is not considered essential habitat to polar bear life functions because activities such as feeding, reproduction, or resting do not occur on the open water and are limited when only open water is available. However, the extent of open water is important in that vast areas of open water present a barrier or hazard under certain circumstances for polar bears to access sea ice or land. Diminished sea ice cover will also increase the energetic cost to polar bears for travel, pose potential for drowning that may occur during long distance swimming or swimming under unfavorable sea wave conditions, and may result in hypothermia for young cubs as previously discussed. Under diminishing sea ice scenarios (IPCC 2001, p. 489; ACIA 2005, p. 192; Serreze 2006), ice-dependent seals, the principal prey of polar bears will also be affected through distribution changes and reductions in productivity, ultimately translating into reductions in population size.

Reduced Feeding Opportunities

Polar bears are capable of swimming great distances, but exhibit a strong preference for sea ice (Mauritzen et al.

2003b, pp. 119–120). However, polar bears will also quickly abandon sea ice for land once the sea ice concentration drops below 50 percent. This is likely due to reduced hunting success in broken ice with significant open water (Derocher et al. 2004, p. 167; Stirling et al. 1999, pp. 302–303). Bears have only rarely been reported to capture ringed seals in open water (Furnell and Oolooyuk 1980 cited in Derocher et al. 2004, p. 167), therefore it is unlikely that hunting in ice-free water would be able to compensate for the corresponding loss of sea ice and the access sea ice affords polar bears to hunt ringed seals (Stirling and Derocher 1993, p. 241; Derocher et al. 2004, p. 167).

Overall, a reduction in sea ice and corresponding increase in open water is likely to result in a net reduction in ringed and bearded seals, and Pacific walrus abundance (ACIA 2005, p. 510) as well as a reduction in ribbon and spotted seals (Born 2005a). While harp and hooded seals may change their distribution and potentially serve as a prey for polar bears, it appears unlikely that these species can successfully redistribute in a rapidly changing environment and reproduce and survive at former levels. Loss of southern pupping areas due to inadequate or highly variable ice conditions may also serve to reduce these species as a potential polar bear prey (Derocher et al. 2004, p. 168). It is also unlikely that increased take of other species such as bearded seals, walrus, harbor seals, or harp and hooded seals regionally if they are available, could compensate for reduced availability of ringed seals (Derocher et al. 2004, p. 168).

Open Water Swimming

Open water is considered to present a potential hazard to polar bears required to make long distance transits of that open water seeking sea ice or land habitat. As indicated previously, four polar bears drowned in open water while attempting to swim between shore and distant ice in 2004 (Monnett and Gleason 2006, p. 5). Because the survey area covered 11 percent of the study area, an extrapolation of the survey data to the entire study area indicates that up to 36 bears may have been swimming and 27 of these may have drowned during this event. Seas during this period were rough and extensive areas of open water persisted between pack ice and land. Mortalities due to offshore swimming during late-ice (or mild ice) years may also be an important and unaccounted source of natural mortality given energetic demands placed on individual bears engaged in long-distance swimming (Monnett and Gleason 2006, p. 6). This evidence suggests that drowning-related deaths of polar bears may increase in the future if the observed trend of regression of pack ice and/or longer open water periods continues.

Wave height (sea state) increases as a function of the amount of open water surface area. Thus ice reduction not only increases areas of open water across which polar bears must swim, but may have an influence on the size of wave action. Considered together these may result in over-all increases in bear mortality associated with swimming when there is little sea ice to buffer wave action (Monnett and Gleason 2006, p. 5). Evidence of such mortality has also been reported by Julian Dowdeswell, Head of the Scott Polar Research Institute of England, who observed one exhausted and one apparently dead polar bear apparently stranded at sea east of Svalbard in 2006.

Terrestrial Habitat

Although sea ice is the polar bear's principal habitat, terrestrial habitat serves a vital function seasonally for denning. In addition, use of terrestrial habitat is seasonally important for resting and feeding in the absence of suitable sea ice. This habitat may take on a more prominent role in maintaining the health and condition of polar bears in future years. The following section describes the effects or potential effects of climate change and other factors on polar bear use of terrestrial habitat. It focuses on access to or changes in the quality of denning habitat, and on distribution changes and corresponding increases in polar bear-human interactions in coastal areas. Also discussed are the potential consequences of and potential concerns for development, primarily oil and gas exploration and production that occurs in polar bear habitat (marine and terrestrial).

Access to and Alteration of Denning Areas

Many female polar bears repeatedly return to specific denning areas on land (Harrington 1968, p. 11; Schweinsburg et al. 1984, p. 169; Garner et al. 1994b, p. 401; Ramsay and Stirling 1990, p. 233). To access preferred denning areas, pack ice must drift close enough or must freeze sufficiently early in the fall to allow pregnant females to walk or swim to the area by late October or early November (Derocher et al. 2004, p. 166). Under likely climate change scenarios, the distance between the edge of the pack ice and land will increase (ACIA 2005, pp. 456–459). As distance increases between the southern edge of the pack ice and coastal denning areas, it will become increasingly difficult for females to access preferred denning locations. Most high-density denning areas are located at more southerly latitudes (Figure 2). For populations that den at high latitudes in the Canadian archipelago islands, the effects may be less or may become evident later in time than for more southerly populations.

The most recent study based on updated modeling suggests that near ice-free September conditions may be reached as early as 2040 (Holland et al., 2006). Derocher et al. (2004, p. 166) predicted that under these climate change scenarios, pregnant female polar bears will likely be unable to reach many of the most important denning areas in the Svalbard Archipelago, Franz Josef Land, Novaya Zemlya, Wrangel Island, Hudson Bay, and the Arctic National Wildlife Refuge and north coast of the Beaufort Sea (Figure 2).

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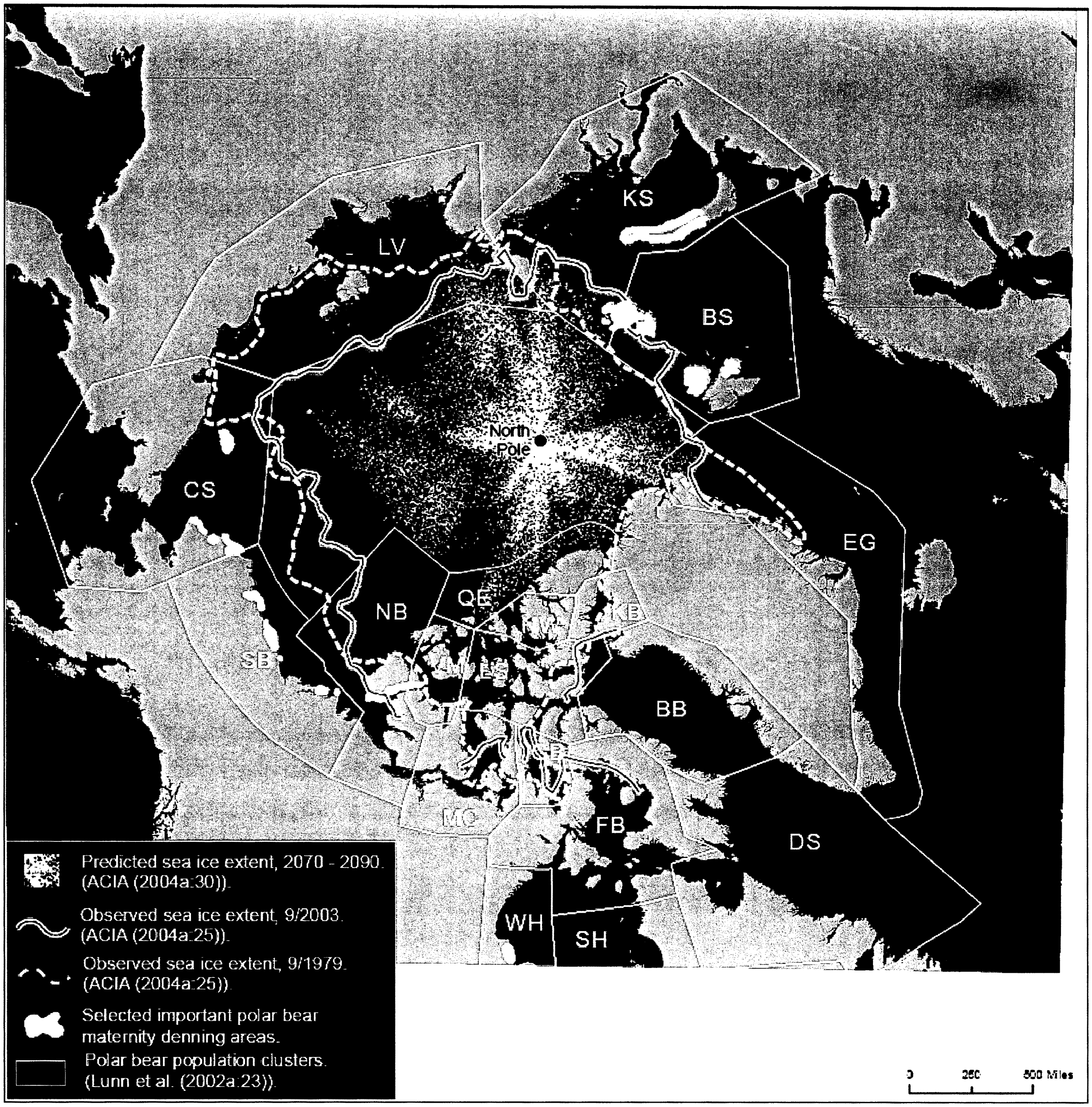
Figure 2. Selected Polar Bear Terrestrial Denning Areas Compared to Past, Present, and Predicted Future Summer Sea-Ice Extent



Polar Bear Population Abbreviations. CS = Chukchi Sea; SB = Southern Beaufort Sea; NB = Northern Beaufort Sea; QE = Queen Elizabeth Islands; VM = Viscount Melville Sound; NW = Norwegian Bay; LS = Lancaster Sound; MC = M'Clintock Channel; GB = Gulf of Boothia; FB = Foxe Basin; WH = Western Hudson Bay; SH = Southern Hudson Bay; KB = Kane Basin; BB = Baffin Bay; DS = Davis Strait; EG = East Greenland; BS = Barents Sea; KS = Kara Sea; LV = Laptev Sea; Arctic Basin is the unlabelled area centered on the North Pole

Source: Adapted from Lunn et al. (2002a:23) and ACIA (2004:25, 30).

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Increased drift rates of ice floes that may serve as a platform for denning are of concern (Derocher et al. 2004, p. 166). In northern Alaska, polar bear maternity dens were found on drifting multiyear ice several hundred km north of the coast (Amstrup and Gardner 1994, p. 5). Although use of pelagic denning habitat is not widespread, in the past it has provided important habitat for some populations. Though the stability of pack ice and corresponding use for denning in the future under projected diminishing sea ice scenarios are uncertain, recent findings by Fishbach et al. (2005, p. 1) indicate an increasing trend for a greater proportion of polar bears dens in northern Alaska to be located on land and fewer to be located on pack ice. The findings indicate that changes in the character and suitability of sea ice have resulted in the detected shift of denning on land.

In some locations, bears may adopt the denning strategy used by the Western Hudson Bay population, where pregnant females leave the ice in the spring at breakup and summer in locations near where they ultimately den (Derocher et al. 2004, p. 166). Under such a scenario females must accumulate sufficient fat stores to fast for 8, or more, months before they can return to sea ice to resume feeding on seals (Derocher et al. 2004, p. 166). While this strategy may be used more frequently in the future, its usefulness in maintaining populations is questionable. The results of Regehr et al. (in press) indicate that the Western Hudson Bay population has been in decline over the past 19 years, with the physical condition of bears declining due to greater periods of fasting on land caused by earlier spring breakup (Stirling et al. 1999, p. 300).

Climate change also impacts the quality of snow for denning (Derocher et al. 2004, p. 166). Insufficient snow limits den construction (Derocher et al. 2004, p. 166). Changes in the amount and timing of snowfall also impact the thermal properties of the dens (Derocher et al. 2004, p. 166). Because polar bear cubs are born helpless and nurse up to 3 months before emerging from the den; major changes in the thermal properties of dens could negatively impact cub survival (Derocher et al. 2004, p. 167). For example two cubs born to a captive held female without a den and exposed to temperatures of approximately −43 °C (−45 °F), both died within 2 days (Blix and Lentfer 1979, p. 67).

Finally, the occurrences of rain events are projected to increase throughout the Arctic in winter (ACIA 2005, p. 993). Increased rain in late winter and early spring can result in both polar bear natal den collapses as well as ringed seal den collapses (Stirling and Smith 2004, p. 64). Polar bear den collapse following a warming period in the Beaufort Sea resulted in the death of a mother and her two young cubs (Clarkson and Irish 1991, p. 83). In another instance, unseasonable rain south of Churchill, Manitoba, caused large snow banks along creeks and rivers used for denning to collapse from the weight of the wet snow (Stirling and Derocher 1993, p. 244).

Oil and Gas Exploration, Development, and Production

Each of the Parties to the 1973 Polar Bear Agreement (see International Agreements and Oversight section below), have developed detailed regulations pertaining to the extraction of oil and gas within their countries. The greatest level of oil and gas activity within polar bear habitat is currently occurring in the United States (Alaska). Exploration and production activities are also actively underway in Russia, Canada, Norway, and Denmark (Greenland). In the United States, all such leasing and production activities are required to comply with the National Environmental Policy Act (42 U.S.C. 4321 et seq. (NEPA), and numerous other statutes, which guide exploration, development and production so as to minimize possible environmental impacts. In Alaska, the majority of oil and gas development is on land, however, some offshore production sites have been developed, and others are planned.

Historically, oil and gas activities have resulted in little direct mortality to polar bears, and that mortality which has occurred, has been associated with human bear interactions as opposed to a spill event. However, oil and gas activities are increasing as development continues to expand throughout the United States Arctic and internationally, including in polar bear terrestrial and marine habitats. The greatest concern for future oil and gas development is the effect of an oil spill or discharges in the marine environment impacting polar bears or their habitat. Much of the north slope of Alaska contains habitat suitable for polar bear denning (Durner et al. 2001, p. 119). Further, in northern Alaska and elsewhere, distribution of polar bears appears to be changing to use of land areas during the open water season. Some of these areas coincide with areas that have been developed for oil and gas production. This increases the potential for interactions with humans (Durner et al. 2001, p. 115; National Research Council (NRC) 2003, p. 168).

The National Research Council (2003, p. 169) evaluated the cumulative effects of oil and gas development in Alaska and concluded the following relates to polar bears and ringed seals:

- ''Industrial activity in the marine waters of the Beaufort Sea has been limited and sporadic and likely has not caused serious cumulative effects to ringed seals or polar bears.
- Careful mitigation can help to reduce the effects of oil and gas development and their accumulation, especially if there is no major oil spill. However, the effects of full-scale industrial development of waters off the North Slope would accumulate through the displacement of polar bears and ringed seals from their habitats, increased mortality, and decreased reproductive success.
- A major Beaufort Sea oil spill would have major effects on polar bears and ringed seals.
- Climatic warming at predicted rates in the Beaufort Sea region is likely to have serious consequences for ringed seals and polar bears, and those effects will accumulate with the effects of oil and gas activities in the region.
- Unless studies to address the potential accumulation of effects on North Slope polar bears or ringed seals are designed, funded, and conducted over long periods of time, it will be impossible to verify whether such effects occur, to measure them, or to explain their causes.''

There is the potential for alteration of polar bear habitat from oil and gas development, exploration (seismic) or other activities in denning areas, and potential oil spills in the marine environment. Any such impacts would be additive to other factors already or potentially affecting polar bears and their habitat.

Documented impacts on polar bears by the oil and gas industry during the past 30 years are minimal. Polar bears spend a limited amount of time on land, coming ashore to feed, den, or move to other areas. At times, fall storms deposit bears along the coastline where bears remain until the ice returns. For this reason, polar bears have mainly been encountered at or near most coastal and offshore production facilities, or along the roads and causways that link these facilities to the mainland. During those periods, the likelihood of interactions between polar bears and industry activities increases. We have found that the polar bears interaction planning and training requirements set forth in these regulations and required through the letters of authorization (LOA) process have increased polar bear awareness and minimized these encounters. LOA requirements have also increased our knowledge of polar bear activity in the developed areas.

No lethal take associated with industry has occurred during the period covered by incidental take regulations. Prior to issuance of regulations, lethal takes by industry were rare. Since 1968, there have been two documented cases of lethal take of polar bears associated with oil and gas activities. In both instances, the lethal take was reported to be in defense of human life. In the winter of 1968–1969, an industry employee shot and killed a polar bear. In 1990, a female polar bear was killed at a drill site on the west side of Camden Bay. In contrast, 33 polar bears were killed in the Canadian Northwest Territories from 1976 to 1986 due to encounters with industry. Since the beginning of the incidental take program, which includes measures that minimize impacts to the species, no polar bears have been killed due to encounters associated with the current industry activities on the North Slope of Alaska.

However, based on mitigation measures in place now and likely to be used in the future, historical information on the level of oil and gas development activities occurring within polar bear habitat within the Arctic, the lack of direct quantifiable impacts to polar bear habitat from these activities noted to date, and because of the localized nature of the development activities, or possible events such as oil spills, they do not threaten the species throughout all or a significant portion of its range.

Conclusion for Factor A

Polar bears have evolved in a sea ice environment and sea ice serves as an essential platform from which they meet life functions. Polar bear populations throughout the Arctic are being affected by changes in their sea ice habitat. Increased temperatures, earlier onset of and longer melting periods, increased rain-on-snow events, and positive feedback systems which amplify these phenomena will all operate to decrease the extent of sea ice during all seasons. This will result in fragmentation of habitat, increase the extent of open water areas in all seasons, reduce the amount of heavier and more stable multi-year ice, and affect the quality of shore fast ice. In turn, these factors will negatively impact polar bears by increasing the energetic demands of movement in seeking prey, redistributing substantial portions of populations seasonally into terrestrial habitats with marginal values for feeding, and increasing levels of negative bear-human interactions. As the sea ice edge retracts to deeper, less productive polar basin waters, polar bears will face increased intraspecific competition for limited food resources and increased open water swimming. We expect similar reductions in productivity for most ice seal species (decreasing availability or timing of availability for polar bears as food), composition changes of seal species in some areas, and eventually decreased levels of seal abundance. Prey species, such as ringed seals, will likely remain distributed in shallower, more productive southerly areas characterized by vast expanses of open water. These factors will, in turn, result in the reduced physical condition of polar bears, which leads to population-level demographic declines through reduction of survival and recruitment rates. The ultimate effect of these inter-related events, factors, and effects (Table 1) will be that polar bear populations will decline or continue to decline. Not all populations will be affected evenly in the level, rate, and timing of impact, but within the foreseeable future, it is predicted that all populations will be either directly or indirectly impacted.

TABLE 1.—LIKELY IMPACTS TO THE POLAR BEAR FROM RECESSION OF THE SEA ICE—ADAPTED AND MODIFIED FROM DEROCHER ET AL. (2004, P. 171)

Characteristic	Time frame [1]	Projected change
Body weight/condition	Short	Decline, increased variation.
Movement patterns	Short	Increased, alteration of existing patterns.
Cub survival	Short	Decline, increased variation.
Reproductive rates	Short	Variable, increased variation.
Bear-human interactions	Variable	Increase.
Den areas	Medium	Reduced access, modification of areas used.
Growth rates	Medium	Variable, downward trend.
Prey composition	Medium	Change in species, utilization, age of prey.
Population boundaries	Medium	Mixing of adjacent populations.
Population size	Medium	Variable downward trend.
Intraspecific aggression	Variable	Increased.
Cannibalism	Variable	Possible increase.
Adult survival	Medium-Long	Decline, Increased variation.

[1] Short = <10 years, Medium = 10–20 years, Long = >20 years. Time frame of impact will vary between populations and is dependent upon rate of change in a given population.

The southerly populations of Western Hudson Bay, Southern Hudson Bay, Foxe Basin, Davis Strait, and Baffin Bay, where bears already experience stress from seasonal ice retreat fasting, will be affected earliest (Stirling and Parkinson 2006). Earlier melt periods and increased open water periods will result in lengthened seasonal use of land and increased period of fasting, resulting in decreased physical condition for bears in these populations. Other populations including the Chukchi Sea, Barents Sea, Southern Beaufort Sea and possibly the Kara Sea and Laptev Sea (these are characterized as open Arctic Basin populations) will, or are currently, experiencing initial effects of changes in sea ice. These populations are vulnerable to large-scale dramatic seasonal fluctuations in ice movements, decreased abundance and access to prey, and increased energetic costs of hunting. We expect that the polar bear populations inhabiting the central island archipelago of Canada will be affected later. These more northerly populations are expected to be affected last due to the buffering effects of the island archipelago complex, which lessens effects of oceanic currents and seasonal retractions of ice and retains a higher proportion of heavy, more stable multi-year sea ice. These populations include Norwegian Bay, Lancaster Sound, M'Clintock Channel, Viscount-Melville, Kane Basin, and the Gulf of Boothia.

For polar bears, current and anticipated changes to the sea ice habitat are expected to threaten the species (Aars et al. 2006). This conclusion is consistent with the 2006 finding by the World Conservation Union (IUCN). The IUCN, based on the PBSG assessment, reclassified polar bears as ''vulnerable.'' The basis for the classification was the projected change in sea ice, effect of climatic warming on polar bear distribution and condition, and corresponding effect on reproduction and survival.

Some scientists conclude that the ''future persistence of polar bears is tenuous'' (Derocher et al. 2004, p. 172), reinforcing their earlier warnings that ''[u]ltimately, if sea ice disappeared altogether, polar bears would become extinct'' (Stirling and Derocher 1993, p. 243). Changes in the timing of sea ice formation and break-up and the loss of the polar bear's sea ice habitat will pose increasing risk to polar bears as the climate continues to warm (Derocher et al. 2004, p. 164), and ultimately all polar bear populations will suffer. Rosentrater (2005, p. 3) notes ''if current trends continue, polar bears and other species that require a stable ice platform for survival could become extinct by the end of the century.''

This opinion is not universally shared. Other polar bear biologists have indicated that it is possible, even with the total loss of summer sea ice, that a small number of polar bears would survive semi-indefinitely and not go extinct provided there is still some ice cover during the winter and marine mammals continued to be available for capture or scavenging. As a species, polar bears have survived at least two warming periods, the Eem Interglacial period (140,000–115,000 years Before Present (BP)), and the Holocene ''climate optimum'' (ca 8000–4000 BP) (Dansgaard et al. 1993, p. 218; Dahl-Jensen et al. 1998, p. 268). Greenland ice cores revealed that the climate was much more variable in the past and some of the historical shifts between the warm and cold periods were rapid, suggesting that the recent relative climate stability seen during the Holocene may be an exception (Dansgaard et al. 1993, p. 218). The precise impacts of these warming periods on polar bears and the Arctic sea ice habitat are unknown.

A recent study of the Bering Sea, one of the most productive marine ecosystems on the planet, concluded ''[a] change from arctic to subarctic conditions is underway in the northern Bering Sea'' (Grebmeier et al. 2006, p. 1461). This is being caused by warmer air and water temperatures, and less sea ice. ''These observations support a continued trend toward more subarctic ecosystem conditions in the northern Bering Sea, which may have profound impacts on Arctic marine mammal and diving seabird populations as well as commercial and subsistence fisheries'' (Grebmeier et al. 2006, p. 1463).

As the changes in marine ecosystems continue, polar bear populations are expected to experience impacts comparable to those already observed in the Western Hudson Bay (Stirling et al. 1999, p. 304) as well as in the Southern Beaufort Sea (Regehr et al. 2006, p.14). Changes in the timing of sea ice formation and break up will pose increasing risk to polar bears as the climate continues to warm (Derocher et al. 2004, p. 173), and ultimately affect all polar bear populations and threaten the species throughout all or a significant portion of its range in the foreseeable future.

We find that polar bear populations throughout their distribution in the circumpolar Arctic are threatened by ongoing and projected changes in their sea ice habitat.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Use of polar bears for commercial, recreational, scientific, and education purposes is generally low, with the exception of harvest. Use for non-lethal scientific purposes is highly regulated and does not pose a threat to populations. Similarly, the regulated, low-level of use for educational purpose through placement of cubs or orphaned animals into zoos or public display facilities or through public viewing is not a threat to populations. Sport harvest of polar bears in Canada is discussed in the harvest section below. For purposes of population assessment, no distinction is made between harvest uses for sport or subsistence purposes. Take associated with defense of life, scientific research, illegal take, and other forms of take are generally included in harvest management statistics so this section also addresses all forms of take including bear-human interactions.

Overview of Harvest

Polar bears historically have been and continue to be an important renewable resource for coastal communities throughout the Arctic (Lentfer 1976, p. 209: Amstrup and DeMaster 1988, p. 41; and IUCN 1999, p. 257 Table 14.1). Polar bears and polar bear hunting remain an important part of indigenous peoples' myths and legends and polar bear hunting is a source of pride, prestige, and accomplishment. Polar bears provide a source of meat and raw materials for handicrafts, including functional clothing such as mittens, boots (mukluks), parka ruffs, and pants (Nageak et al. 1988, p.6; Marine Mammal Commission 1995, p. 18).

Prior to the 1950s, most hunting was by indigenous people for subsistence purposes. Increased sport hunting in the 1950s and 1960s, however, resulted in population declines (Prestrud and Stirling 1994). International concern about the overall status of polar bears resulted in biologists from the five polar bear range nations forming the Polar Bear Specialist Group (PBSG) within the IUCN Species Survival Commission (SSC) structure (IUCN 1999, p. 262). The PBSG was largely responsible for the development and ratification of the 1973 International Agreement on the Conservation of Polar Bears (1973 Agreement) (Prestrud and Stirling 1994, p. 114) (see Section D—Adequacy of existing regulatory mechanisms below for details).

Harvest Management by Nation

Canada

Canada manages or shares management responsibility for 13 of the world's 19 polar bear populations (Kane Basin, Baffin Bay, Davis Strait, Foxe Basin, Western Hudson Bay, Southern Hudson Bay, Gulf of Boothia, Lancaster Sound, Norwegian Bay, M'Clintock Channel, Viscount Melville Sound, Northern Beaufort Sea, and Southern Beaufort Sea) Wildlife management is a shared responsibility of the Provincial and Territorial governments. The Federal government (Canadian Wildlife Service) has an ongoing research program and is involved in management of wildlife populations shared with other jurisdictions, especially ones with other nations (e.g., where a polar bear stock ranges across an international boundary). To facilitate and coordinate management of polar bears, Canada has formed the Federal Provincial Technical Committee for Polar Bear Research and Management (PBTC) and the Federal Provincial Administrative Committee for Polar Bear Research and Management (PBAC). These committees include Provincial, Territorial, and Federal representatives who meet annually to review research and management activities.

Polar bears are harvested in Canada. All human-caused mortality (i.e., hunting, defense of life, and incidental kills) are included in a total allowable harvest. Inuit people from communities in Nunavut, Northwest Territories (NWT), Manitoba, Labrador, Newfoundland, and Quebec conduct hunting. In Ontario, the Cree as well as the Inuit can harvest polar bears. In Nunavut and NWT, each community obtains an annual harvest quota that is based on the best available scientific information and monitored through distribution of harvest tags to local hunter groups, who work with scientists to help set quotas. Native hunters may use their harvest tags to guide sport hunts. The majority of sport hunters in Canada are U.S. citizens, and in 1994 an amendment to the MMPA was made to allow these hunters to import their trophies into the United States if the bears had been taken in a legal manner from approved populations.

The Canadian system has resulted in tight controls on the size of harvest and high quality harvest reporting. It allows reduction of quotas in response to population declines resulting from over-hunting (PBSG 1995, p. 11). In 2004, existing polar bear harvest practices became questionable when Nunavut identified quota increases for 8 populations, 5 of which are shared with other jurisdictions (Lunn et al. 2005, p. 3). Quota increases were largely based on indigenous knowledge (the Nunavut equivalent of traditional ecological knowledge) and the perception that some populations are increasing from historic levels. Nunavut did not coordinate these changes with adjacent jurisdictions that share management responsibility for populations that range between the two jurisdictions. This action resulted in an overall increase in the quota from 398 bears in 2003–2004 to 507 bears in 2004–2005 (Lunn et al. 2005, p. 14, Table 6).

Greenland

The management of polar bear harvest in Greenland is through a system introduced in 1993 that allows only full-time hunters living a subsistence lifestyle to hunt polar bears. Licenses are issued annually for a small fee contingent upon reporting harvest during the prior 12 months. Until 2006, no quotas were in place but harvest statistics were collected through Piniarneq, a local reporting program (Born and Sonne 2005 in PBSG 2006, p. 137). In January 2006, a new harvest monitoring and quota system was implemented (Lønstrup 2005 in PBSG 2006, p. 133). Annual quotas are determined in consideration of international agreements, biological advice, user knowledge, and consultation with the Hunting Council. Part of the quota may be used for sport hunting (Lønstrup 2005 in PBSG 2006, p. 133).

Norway

Norway and Russia share jurisdiction over the Barents Sea population of polar bears. Management in Norway is the responsibility of the Ministry of the Environment (Wiig 1995, p.110). The commercial, subsistence or sport hunting of polar bears in Norway is prohibited (Wiig 1995, p.110). Bears may only be killed in self-defense, protection of property, and ''mercy'' kills and kills must be reported and recorded (Gjertz and Scheie 1998, p. 337).

Russia

The commercial, subsistence or sport hunting of polar bears in Russia is prohibited. Some bears are killed in defense of life, and a small number of cubs are taken annually for zoos. Despite the 1956 ban on hunting polar bears in Russia, illegal harvest is occurring in the Chukchi Sea region and elsewhere where there is limited monitoring or enforcement of this prohibition (PBSG 1995, p. 9; Belikov et al. 2005 in PBSG 2006, p. 153). There is also a significant interest in re-opening a subsistence hunt by indigenous people in Russia. The combined ongoing illegal hunting in Russia and legal subsistence harvest in Alaska is a concern for the Chukchi Sea polar bear population, which may be in decline (USFWS 2003, p.1). Full implementation of the Agreement between the United States of America and the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population (Bilateral Agreement) is attended to rectify this situation, but such implementation has not yet occurred (Schliebe et al. 2005 in PBSG 2006, p. 75). Accordingly, we have not relied on implementation of the Bilateral Agreement in our assessment of the threat of overutilization to polar bears. (see International Agreements and Oversight section below).

United States

Polar bear subsistence hunting has been done by Alaska Natives for centuries (Lentfer 1976, p. 209). Polar bear hunting and the commercial sale of skins took on increasing economic importance to Alaskan Natives when whaling began in the 1850s (Lentfer 1976, p. 209) Trophy hunting using aircraft began in the late 1940s. In the 1960s, State of Alaska hunting regulations became more restrictive, and in 1972 aircraft-assisted hunting was stopped altogether (Lentfer 1976, p. 209). Between 1954 and 1972, an average of 222 polar bears was harvested per year, resulting in a decline in polar bear populations in Alaska (Amstrup et al.1986, p. 246).

Passage of the Marine Mammal Protection Act (MMPA) in 1972 established a prohibition on the sport or commercial hunting of polar bears in Alaska. However, within the MMPA a provision allows for continued harvest of polar bears by coastal dwelling Alaska Natives for subsistence and handicraft purposes. The MMPA also prohibits the commercial sale of any marine mammal parts or products except those that have been significantly altered into handicrafts or clothing by Alaska Natives. Currently, the subsistence harvest of polar bears by Alaska Natives, provided it is conducted in a non-wasteful manner, cannot be restricted unless a population is designated as depleted (i.e., below the optimum sustainable population level). The ability to avoid depletion through cooperative management agreements between Alaska Native Organizations and the Service to regulate subsistence take is an amendment to the MMPA that has been proposed, yet remains to be adopted. The Service cooperates with the Alaska Nanuuq Commission, a non-profit organization that represents interests of Alaska Native polar bear users, to address polar bear subsistence harvest issues. In addition, for the Southern Beaufort Sea population, hunting is regulated voluntarily and effectively through an agreement between the Inuvialuit of Canada and the Inupiat of Alaska (Brower et al 2002) (see International Agreements and Oversight section below). The harvest is monitored by the Service's marking and tagging program. Illegal take or trade is monitored by the Service's law enforcement program.

The MMPA was amended in 1994 to provide for the import into the United States of sport-hunted polar bear trophies legally taken by the importer in Canada. Prior to approving a polar bear population for import of such trophies, the Service must find that Canada has a monitored and enforced sport-hunting program consistent with the 1973 Agreement on the Conservation of Polar Bears (1973 Polar Bear Agreement) and that the program is based on scientifically sound quotas ensuring the maintenance of the population at a sustainable level. Currently, six populations are approved for import of polar bears trophies (62 FR 7302, February 18, 1997; 64 FR 1529, January 11, 1999; 66 FR 50843, October 5, 2001).

Harvest Summary

A thorough review and evaluation of past and current harvest, including other forms of removal, for all populations has been described in the Polar Bear Status Assessment (Schliebe et al. 2006a). The Status Assessment is available on the Service's Marine

Mammal Web site located at: *http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm.* Table 2 provides a summary of harvest statistics from the populations and is included herein as a reference. The total harvest and other forms of removal were considered in the summary analysis.

Five populations (including four that are hunted) have no estimate of potential risk from overharvest, since adequate demographic information necessary to conduct a population viability analysis and risk assessment are not available (Table 1). For one of the populations, Chukchi Sea, severe overharvest was suspected to have occurred during the past 10–15 years, and anecdotal information was that the trend of population size was believed to be in decline (Aars et al. 2006, pp. 34–35). The Chukchi Sea, Baffin Bay, Kane Basin and Western Hudson Bay populations may be being overharvested (Aars et al. 2006, pp. 40, 44–46). In other populations, including East Greenland and Davis Strait, substantial harvest occurs annually in the absence of scientifically-derived population estimates (Aars et al. 2006, pp. 39, 46). Considerable debate has occurred regarding the recent changes in population estimates based on indigenous or local knowledge (Aars et al. 2006, p. 57) and subsequent quota increases for some populations in Nunavut (Lunn et al. 2005, p. 20). Increased polar bear observations along the coast may be attributed to changes in bear distribution due to lack of suitable ice habitat rather than to increased population size (Stirling and Parkinson 2006). Additional inventories are needed to reconcile these differing interpretations.

TABLE 2.—POLAR BEAR HARVEST STATISTICS, ADAPTED FROM THE PBTC STATUS TABLE

Population	Aerial survey/M–R		5 yr mean kill		3 yr mean kill		1 yr mean kill		Identified permitted harvest [b]	Estimated maximum sustainable yield [c]	Observed or predicted trend [d]	Status [e]
	Number (year of estimate)	±2 SE	Actual removals	Likelihood of decline (next 10 years) [a]	Actual removals	Likelihood of decline (next 10 years) [a]	Actual removals	Likelihood of decline (next 10 years) [a]				
Southern Beaufort Sea	1500 (2006)	1000–2000	57.8	No Estimate	59.3	No Estimate	44	No Estimate	81	84	Decline	Reduced.
Northern Beaufort Sea	1200 (1986)	133–2097	36.2	No Estimate	38	No Estimate	36	No Estimate	65	56	Stable	Not reduced.
Viscount Melville	161 (1992)	121–201	4.4	5.6%	4.7	6.5%	5	6.8%	7	10	Increase	Severely reduced.
Norwegian Bay	190 (1998)	102–278	2.6	70.5%	2.7	73.1%	4	84.4%	4	9	Decline	Not reduced.
Lancaster Sound	2541 (1998)	1759–3323	74	67.0%	79	74.0%	87	80.6%	85	119	Stable	Not reduced.
M'Clintock Channel	284 (2000)	166–402	3	2.5%	1	1.0%	2	1.8%	3	13	Increase	Severely reduced.
Gulf of Boothia	1528 (2000)	953–2093	45.8	3.3%	48.3	4.3%	66	12.9%	74	72	Increase	Not reduced.
Foxe Basin	2197 (1994)	1677–2717	97.2	14.0%	96	12.1%	97	13.1%	106 + Quebec.	108	Stable	Not reduced.
Western Hudson Bay	935 (2004)	791–1079	44.8	99.9%	46.3	99.9%	43	99.9%	62	44	Decline	Reduced.
Southern Hudson Bay	1000 (1988)	784–1216	36.6	0.1%	36.7	0.1%	27	0.1%	25 + Ontario, Quebec.	47	Increase?	Not reduced.
Kane Basin	164 (1998)	94–234	10.8	99.9%	10.3	99.9%	11	99.9%	5 + Greenland.	8	Decline	Reduced.
Baffin Bay	2074 (1988)	1544–2604	216.8	99.9%	251.7	99.9%	252	99.9%	105 + Greenland.	72	Decline	Reduced.
Davis Strait			64.8	12.9%	67.3	17.1%	70	18.9%	46 + Greenland, Quebec, Labrador.	77	Stable	Not reduced.
East Greenland	Unknown		70	No Estimate					50	No Estimate	Data Deficient	Data Deficient.
Barents Sea	3000 (2004)										Data Deficient	Data Deficient.
Kara Sea											Data Deficient	Data Deficient.
Laptev Sea	800–1200 (1993).										Data Deficient	Data Deficient.
Chukchi Sea	2000 (1993)		43–AK. Unk # in Chukotka.	No Estimate	Unknown	No Estimate	43++	No Estimate	Unknown	Unknown.	Data Deficient	Data Deficient.

[a] Presented is the proportion of simulation runs using the RISKMAN model and vital rates presented in natural survival and recruitment tables resulting in any decline after 10 years of simulation, assuming minimum 2M:1F in the harvest. One-minus this value represents the proportion of simulations resulting in population increase.

[b] The identified permitted harvest includes the maximum harvest that is presently allowed by jurisdictions with an identified quota.

[c] The estimated maximum sustainable yield (MSY) is based on a meta-analysis of the 1990s that assumed mean reproduction and survival for polar bears across their range in Canada (given information available at the time). MSY = N * 0.0156/Pr[F], where N = total population number, 0.0156 is a constant derived from a meta-analysis to estimate survival and recruitment rates for Canadian polar bears, and Pr[F] = proportion of the harvest that is female (assumed to be 0.333, i.e., 2M:1F sex-selective harvest).

[d] Observed or predicted status as suggested by PVA results and, where vital rates are not sufficient for analysis, anectodatal information.

[e] Current status relative to probable historic numbers.

Bear-Human Interactions

Polar bears come into conflict with humans when they scavenge for food at sites of human habitation, and also because they occasionally prey or attempt to prey upon humans (Stirling 1988, p.182). ''Problem bears'' are most often sub-adults, because they are inexperienced hunters and because their feeding habits include more scavenging than adult bears (Stirling 1988, p. 182). Following sub-adults, females with cubs are most likely to interact with humans, because females with cubs are likely to be thinner and hungrier than single adult bears, and starving bears are more likely to interact with humans in their pursuit of food (Stirling 1988, p. 182). For example, in Churchill, Manitoba, Canada, an area of high polar bear use generally, the occurrence of females with cubs feeding at the town's garbage dump in the fall increased during years when bears came ashore in poorer condition (Stirling 1988, p. 182). Other factors that may influence bear-human encounters include increased land use activities, increased human populations in areas of high polar bear activity, increased polar bear population size, and earlier polar bear departure from ice habitat to terrestrial habitats.

Increased interactions and defense kills may occur under predicted climate change scenarios (Derocher et al. 2004, p.169). Direct interactions between people and bears in Alaska have increased markedly in recent years and this trend is expected to continue (Amstrup 2000, p. 153). Since the late 1990s, the timing of complete ice formation in the fall has occurred later in November or early December than it formerly did (which was in September and October), resulting in an increased amount of time polar bears spend on land, which consequently increases the probability of bear-human interactions occurring in coastal villages. Adaptive management programs focusing on the development of community or ecotourism based polar bear-human interaction plans that include polar bear patrols, deterrent and hazing programs, efforts to manage and minimize sources of attraction, and programs to educate residents of polar bear behavior and ecology are needed and should be developed in the future.

Conclusion for Factor B

Polar bears are harvested in Canada, Alaska, Greenland, and Russia. Active harvest management programs are in place for populations in Canada, Greenland, and Alaska. Principles of sustainable yield are instituted through harvest quotas or guidelines; other forms of removal, such as for defense of life, are considered through management actions by the responsible jurisdictions. Hunting or killing polar bears is illegal in Russia although an unknown level of harvest occurs. While overharvest occurs for some populations, laws and regulations for most management programs have been instituted to ensure harvests result in healthy and sustainable populations. These actions are largely viewed as having been successful in reversing wide spread overharvests by many jurisdictions that resulted in population depletion during the period prior to signing of the multi-lateral 1973 Agreement on the Conservation of Polar Bears (Prestrud and Stirling 1994) (Discussed further in Factor D). For the internationally-shared populations in the Chukchi Sea, Baffin Bay, Kane Basin, and Davis Strait, conservation agreements have been developed (United States-Russia) or are in development (Canada-Greenland). These agreements have not yet been implemented and therefore are not being relied upon in our evaluation of Factor B.

We conclude that harvest, increased bear-human interaction levels, defense of life take, illegal take, and take associated with scientific research programs are occurring regionally for some populations. However, we find that overutilization as a singular factor does not threaten the species throughout all or a significant portion of its range. Continued harvest and increased mortality from bear-human encounters or other forms of mortality, however, may become a more significant threat factor in the future for polar bear populations experiencing nutritional stress or declining population numbers as a consequence of habitat change. The PBSG 2006 (Aars et al. 2006) through resolution urged that a precautionary approach be instituted when setting harvest limits in a warming Arctic. Continued efforts are necessary to ensure that harvest or other forms of removal do not exceed sustainable levels and thus do not threaten the species in the foreseeable future.

C. Disease and Predation

Disease

Except for the presence of trichinella larvae, the occurrence of diseases and parasites in polar bears is rare compared to other bears. Trichinella has been documented in polar bears throughout their range and although infestations can be quite high they are normally not fatal (Rausch 1970, p. 360; Dick and Belosevic 1978, p. 1143; Larsen and Kjos-Hanssen 1983, p. 95; Taylor et al. 1985, p. 303; Forbes 2000, p. 321). Although rabies is commonly found in Arctic foxes, there has been only one confirmed instance of rabies in polar bears (Taylor et al. 1991, p. 337). Morbillivirus has been documented in polar bears from Alaska and Russia (Garner et al. 2000, p. 477; C. Kirk, University of Alaska, Fairbanks, pers. comm. 2006). Antibodies to the protozoan parasite, *Toxoplasma gondii*, were found in Alaskan polar bears; however, it is not known if this is a health concern for polar bears (C. Kirk, University of Alaska, Fairbanks, pers. comm. 2006).

It is unknown whether polar bears are more susceptible to new pathogens due to their lack of previous exposure to disease and parasites. Many different pathogens and viruses have been found in seal species that are polar bear prey (Duignan et al. 1997, p. 7; Measures and Olson 1999, p. 779; Dubey et al. 2003, p. 278; Hughes-Hanks et al. 2005, p. 1226), so the potential exists for transmission of these diseases to bears. As polar bears become more stressed, they may eat more of the intestines and internal organs than they do presently, thus increasing their potential exposure to parasites and viruses (Derocher et al. 2004, p. 170; Amstrup et al. 2006b, p. 3). In addition, pathogens may expand their range northward from more southerly areas under projected climate change scenarios (Harvell et al. 2002, p. 60).

Intraspecific Predation

Intraspecific killing has been reported among all North American bear species (Derocher and Wiig 1999, p. 307; Amstrup et al. 2006, p. 1). Reasons for intraspecific predation in bear species is poorly understood but thought to include population regulation, nutrition, and enhanced breeding opportunities in the case of predation of cubs. Although infanticide by male polar bears has been well documented (Hansson and Thomassen 1983, p. 248; Larsen 1985, p. 325; Taylor et al. 1985, p. 304; Derocher and Wiig 1999, p. 307), it is thought that this activity accounts for a small percentage of the cub mortality.

Cannibalism has also been documented in polar bears (Derocher and Wiig 1999, p. 307; Amstrup et al. 2006b, p. 1). Amstrup et al. (2006b, p. 1) observed three instances of cannibalism in the southern Beaufort Sea during the spring of 2004 involving two adult females—one an unusual mortality of a female in a den and another a yearling. This is notable because, throughout a combined 58 years of research, there are no similar observations. Active stalking or hunting preceded the attacks, and both of the killed bears were eaten. Adult males were believed to be the predator in both attacks. Amstrup et al. (2006b, p. 3) indicated that in general a greater portion of polar bears in the area where the predation occurred were in poor physical condition compared to other years. The authors hypothesized that changes would be expected to occur first in more southerly areas, due to significant ice retreat (Skinner et al.1988, p. 3; Comiso and Parkinson 2004, p. 43; Stroeve et al. 2005, p. 1). Adult males may be the first to show the effects of nutritional stress since they feed little during the spring mating season and enter the summer in poorer condition than other sex/age classes. Derocher and Wiig (1999 p. 308) documented a similar intra-specific killing and consumption of another polar bear in Svalbard, Norway, which was attributed to relatively high population densities and food shortages. Taylor et al. (1985, p. 304) documented that a malnourished female killed and consumed her own cubs, and Lunn and Stenhouse (1985, p. 1516) found an emaciated male consuming an adult female polar bear.

The potential importance of cannibalism and infanticide for polar bear population regulation is unknown. However, given our current knowledge of disease and predation, we do not believe that these factors are currently having population level effects.

Conclusion for Factor C

Although disease pathogen titers are present in polar bears, no epizootic outbreaks have been detected. Although there are limited indications that intraspecific stress through cannibalism may be increasing, population level effects are not believed to have resulted. We find that disease and predation (including intraspecific predation) do not threaten the species throughout all or a significant portion of its range. Potential for disease outbreaks or increased mortality from cannibalism warrants continued monitoring and may become a more significant threat factor in the future for polar bear populations experiencing nutritional stress or declining population numbers.

D. Inadequacy of Existing Regulatory Mechanisms

Regulatory mechanisms directed specifically at managing threats to polar bears exist in all of the range states where the species occurs, as well as between (bilateral and multilateral) range states. There are no known regulatory mechanisms effectively addressing reductions in sea ice habitat at this time.

International Agreements

International Agreement on the Conservation of Polar Bears

Canada, Denmark (on behalf of Greenland), Norway, the Russian Federation, and the United States are parties to the Agreement on the Conservation of Polar Bears (1973 Polar Bear Agreement) singed in 1973; by 1978 the Agreement was ratified by all parties. The 1973 Polar Bear Agreement requires the parties to take appropriate action to protect the ecosystem of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns, and to manage polar bear populations in accordance with sound conservation practices based on the best available scientific data. The 1973 Polar Bear Agreement relies on the efforts of each party to implement conservation programs and does not preclude a party from establishing additional controls (Lentfer 1974, p.1).

The 1973 Polar Bear Agreement is viewed as a success in that polar bear populations recovered from excessive harvests and severe population reductions in many areas (Prestrud and Stirling 1994). At the same time, implementation of the terms of the 1973 Polar Bear Agreement vary across the member parties. Efforts are needed to improve current harvest management practices, such as restricting harvest of females and cubs, establishing sustainable harvest limits, and controlling illegal harvests (PBSG 1998, pp. 47–48). In addition, a lack of protection of key habitats by member parties, with few notable exceptions for some denning areas, is a weakness (Prestrud and Stirling 1994, p. 118).

IUCN/SSC Polar Bear Specialist Group

As previously mentioned, the Polar Bear Specialist Group (PBSG) operates under the IUCN Species Survival Commission (SSC). The PBSG was formed in 1968 and contributed to the negotiation and development of the 1973 Polar Bear Agreement. The PBSG meets periodically at 3-to 5-year intervals in compliance with Article VII of the 1973 Polar Bear Agreement; said article instructs member parties to conduct national research programs on polar bears, particularly research relating to the conservation and management of the species and, as appropriate, coordinate such research with the research carried out by other parties, consult with other parties on management of migrating polar bear populations, and exchange information on research and management programs, research results, and data on bears taken. The PBSG first evaluated the status of all polar bear populations in 1980. In 1993, 1997, and 2001 the PBSG conducted circumpolar status assessments of polar bear populations, and the results of those assesments were published as part of the proceedings of the relevant PBSG meeting. The PBSG conducted its fifth polar bear status assessment in June 2005.

The PBSG also evaluates the status of polar bears under the IUCN Red List criteria. Previously, polar bears were classified under the IUCN Red List program as: ''Less rare but believed to be threatened-requires watching'' (1965); ''Vulnerable'' (1982, 1986, 1988, 1990, 1994); and ''Lower Risk/Conservation Dependent'' (1996). During the 2005 PBSG working group meeting the PBSG re-evaluated the status of polar bears and unanimously agreed that a status designation of ''Vulnerable'' was warranted. The PBSG based this reevaluation on projected changes in sea ice on polar bear distribution and condition including effects on reproduction and survival.

Inupiat-Inuvialuit Agreement for the Management of Polar Bears of the Southern Beaufort Sea

In January 1988, the Inuvialuit of Canada and the Inupiat of Alaska, groups that both harvest polar bears for cultural and subsistence purposes, signed a management agreement for polar bears of the southern Beaufort Sea. This agreement, based on the understanding that the two groups harvested animals from a single population shared across the international boundary, provides a joint responsibility for conservation and harvest practices (Treseder and Carpenter 1989, p. 4; Nageak et al. 1991, p. 341). Provisions of the agreement include: annual quotas (which may include problem kills); hunting seasons; protection of bears in dens or while constructing dens, and protection of females accompanied by cubs and yearlings; collection of specimens from killed bears to facilitate monitoring of the sex and age composition of the harvest; agreement to meet annually to exchange information on research and management and to set priorities; to agree on quotas for the coming year; and prohibition of hunting with aircraft or large motorized vessels and of trade in products taken in violation of the agreement. In Canada, recommendations and decisions from the Commissioners are then implemented through

Community Polar Bear Management Agreements, Inuvialuit Settlement Region Community Bylaws, and NWT Big Game Regulations; in the United States this agreement is implemented at the local level. There are no Federal, state, or local regulations that limit the number or type (male, female, cub) of polar bear that may be taken. Adherence to the agreement's terms in Alaska is voluntary, and levels of compliance may vary. However, Brower et al. (2002) analyzed the overall effectiveness of this agreement and found that it had been successful in maintaining the total harvest and the proportion of females in the harvest within sustainable levels. The authors noted the need to improve harvest monitoring in Alaska and increase awareness of the need to prevent overharvest of females for both countries.

Agreement Between the United States of America and the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population

On October 16, 2000, the United States and the Russian Federation signed a bilateral agreement for the conservation and management of polar bear populations shared between the two countries. The Agreement between the United States of America and the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population (Bilateral Agreement) expands upon the progress made through the multilateral 1973 Polar Bear Agreement by implementing a unified conservation program for this shared population. The Bilateral Agreement reiterates requirements of the 1973 Polar Bear Agreement and includes restrictions on harvesting denning bears, females with cubs or cubs less than one year old, and prohibitions on the use of aircraft, large motorized vessels, and snares or poison for hunting polar bears. The Bilateral Agreement does not allow hunting for commercial purposes or commercial uses of polar bears or their parts. It also commits the parties to the conservation of ecosystems and important habitats, with a focus on conserving polar bear habitats such as feeding, congregating, and denning areas. The Russian government has indicated that it is prepared to implement the Bilateral Agreement. On December 9, 2006, the Congress of the United States passed the ''United States—Russia Polar Bear Conservation and management Act of 2006.'' This Act provides the necessary authority to regulate and manage the harvest of polar bears from the Chukchi Sea population, an essential conservation measure. However, the Act does not provide authority or mechanisms to address ongoing loss of sea ice.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty aimed at protecting species at risk from international trade. CITES regulates international trade in animals and plants by listing species in one of its three appendices. The level of monitoring and control to which an animal or plant species is subject depends on which appendix the species is listed in. Appendix I includes species threatened with extinction which are or may be affected by trade; trade of Appendix I species is only allowed in exceptional circumstances. Appendix II includes species not necessarily now threatened with extinction, but for which trade must be regulated in order to avoid utilization incompatible with their survival. Appendix III includes species that are subject to regulation in at least one country, and for which that country has asked other CITES Party countries for assistance in controlling and monitoring international trade in that species.

Polar bears were listed in Appendix II of CITES on July 7, 1975. As such, CITES parties must determine, among other things, that any polar bear, polar bear part, or product made from polar bear was legally obtained and that the export will not be detrimental to the survival of the species, prior to issuing a permit authorizing the export of the animal, part or product. The CITES does not itself regulate take or domestic trade of polar bears, however, through its process of monitoring trade in wildlife species and requisite findings prior to allowing international movement of listed species and monitoring programs, the CITES is effective in ensuring the international movement of listed species does not contribute to the detriment of wildlife populations. All polar bear range states are members to the CITES and have in place the Convention required Scientific Management Authorities. The Service therefore has determined that the CITES is effective in regulating the trade in polar bear, or polar bear parts or products, and provides conservation measures to minimize the threats to the species.

Mechanisms To Regulate Sea Ice Recession

Regulatory mechanisms directed specifically at managing threats to polar bears exist in all of the range states where the species occurs, as well as between (bilateral and multilateral) range states. There are no known regulatory mechanisms effectively addressing reductions in sea ice habitat at this time.

Domestic Regulatory Mechanisms

United States

Marine Mammal Protection Act of 1972, as Amended

The MMPA (16 U.S.C. 1361 *et seq.*) was enacted in response to growing concerns among scientists and the general public that certain species and populations of marine mammals were in danger of extinction or depletion as a result of human activities. The goal of the MMPA is to protect and conserve marine mammals so that they continue to be significant functioning elements of the ecosystem of which they are a part. The MMPA set forth a national policy to prevent marine mammal species or population stocks from diminishing to the point where they are no longer a significant functioning element of the ecosystems.

The MMPA places an emphasis on habitat and ecosystem protection. The habitat and ecosystem goals set forth in the MMPA include: (1) Management of marine mammals (inclusion of polar bears) to ensure they do not cease to be a significant element of the ecosystem to which they are a part; (2) protection of essential habitats, including rookeries, mating grounds, and areas of similar significance ''from the adverse effects of man's action;'' (3) recognition that marine mammals ''affect the balance of marine ecosystems in a manner that is important to other animals and animal products'' and that marine mammals and their habitats should therefore be protected and conserved; and (4) directing that the primary objective of marine mammal management is to maintain ''the health and stability of the marine ecosystem.'' Congressional intent to protect marine mammal habitat is also reflected in the definitions section of the MMPA. The terms ''conservation'' and ''management'' of marine mammals are specifically defined to include habitat acquisition and improvement.

The MMPA includes a general moratorium on the taking and importing of marine mammals, which is subject to a number of exceptions. Some of these exceptions include take for scientific purposes, for purpose of public display, subsistence use by Alaska Natives, and unintentional incidental take coincident with conducting lawful activities. The Service, prior to issuing a permit authorizing the taking or importing of a polar bear, or a polar bear part or product, for scientific or public display purposes submits each request to a rigorous review, including an opportunity for public comment and consultation with the U.S. Marine Mammal Commision, as described at 50 CFR 18.31. In addition, in 1994, Congress amended the MMPA to allow for the import of polar bear trophies taken in Canada for personal use providing certain requirements are met. Import permits may only be issued to U.S. hunters for trophies they have legally taken from those Canadian polar bear populations the Service has approved as meeting the MMPA requirements, as described at 50 CFR 18.30. The Service has determined that there is sufficient rigor under the regulations at 50 CFR 18.30 and 18.31 to ensure that any activities so authorized are consistent with the conservation of this species and are not a threat to the species.

Take is defined in the MMPA to include the ''harassment'' of marine mammals. ''Harassment'' includes any act of pursuit, torment, or annoyance which ''has the potential to injure a marine mammal or marine mammal stock in the wild'' (Level A harassment), 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'' (Level B harassment).

The Secretaries of Commerce and of the Interior have primary responsibility for implementing the MMPA. The Department of Commerce, through the National Oceanic and Atmospheric Administration (NOAA), has authority with respect to whales, porpoises, seals, and sea lions. The remaining marine mammals, including polar bears, walruses, and sea otters, are managed by the Department of the Interior through the U.S. Fish and Wildlife Service. Both agencies are ''* * * responsible for the promulgation of regulations, the issuance of permits, the conduct of scientific research, and enforcement as necessary to carry out the purposes of [the MMPA]''.

U.S. citizens who engage in a specified activity other than commercial fishing (which is specifically and separately addressed under the MMPA) within a specified geographical region may petition the Secretary of the Interior to authorize the incidental, but not intentional, taking of small numbers of marine mammals within that region for a period of not more than five consecutive years (16 U.S.C. 1371(a)(5)(A)). The Secretary ''shall allow'' the incidental taking if the Secretary finds that ''the total of such taking during each five-year (or less) period concerned will have a negligible impact on such species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses * * *''. If the Secretary makes the required findings, the Secretary also prescribes regulations that specify (1) Permissible methods of taking, (2) means of affecting the least practicable adverse impact on the species, their habitat, and their availability for subsistence uses, and (3) requirements for monitoring and reporting. The regulatory process does not authorize the activities themselves, but authorizes the incidental take of the marine mammals in conjunction with otherwise legal activities described within the regulations.

Similar to promulgation of incidental take regulations, the MMPA also established an expedited process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals where the take will be limited to harassment (16 U.S.C. 1371(a)(5)(D)). These authorizations are limited to one-year and as with incidental take regulations the Secretary must find that the total of such taking during the period will have a negligible impact on such species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses. The Service refers to these authorizations as Incidental Harassment Authorizations.

Examples and descriptions of how the Service has analyzed the effects of oil and gas activities and applied the general provisions of the MMPA described above to polar bear conservation programs in the Beaufort and Chukchi seas follows. These regulations include an evaluation of the cumulative effects of oil and gas industry activities on polar bears from noise, physical obstructions, human encounters, and oil spills. The likelihood of an oil spill occurring and the risk to polar bears is modeled quantitatively and factored into the evaluation. The results of previous industry monitoring programs, and the effectiveness of past detection and deterrent programs that have a beneficial record of protecting polar bears as well as providing for the safety of oil field workers are also considered. Based on the low likelihood of an oil spill occurring and the effectiveness of industry mitigation measures within the Beaufort Sea region, the Service has found that oil and gas industry activities have not affected the rates of recruitment or survival for the polar bear populations.

General operating conditions in specific authorizations include the following: (1) Protection of pregnant polar bears during denning activities (den selection, birthing, and maturation of cubs) in known and confirmed denning areas; (2) restrictions on industrial activities, areas, time of year; and (3) development of a site-specific plan of operation and a site-specific polar bear interaction plan. Additional requirements may included: pre-activity surveys (e.g., aerial surveys, infra-red thermal aerial surveys, or polar bear scent-trained dogs) to determine the presence or absence of dens or denning activity and, in known denning areas enhanced monitoring or flight restrictions, such as minimum flight elevations. These and other safeguards and coordination with industry have served to minimize industry effects on polar bears.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires Federal agencies to consider the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet this requirement, Federal agencies conduct environmental reviews, including Environmental Impact Statement and Environmental Assessments. NEPA does not itself regulate polar bears, but it does require full evaluation and disclosure of information regarding the effects of contemplated Federal actions on polar bears and their habitat.

Outer Continental Shelf Lands Act

The Outer Continental Shelf Lands Act (43 U.S.C. 331 et seq.) (OCSLA) established Federal jurisdiction over submerged lands on the Outer Continental Shelf (OCS) 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 that could adversely impact the Coastal Zone are subject to Federal consistency requirements under terms of the Coastal Zone Management Act, as noted below. OCSLA also mandates that orderly development of OCS energy resources be balanced with protection of human, marine and coastal environments. The OCSLA does not itself regulate the take of polar bears, although through consistency determinations it helps to ensure that OCS projects do not adversely impact polar bears or their habitats.

Coastal Zone Management Act

The Coastal Zone Management Act [16 U.S.C. 1451 et seq.) (CZMA) was enacted to ''preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation's coastal zone.'' The CZMA 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 CZMA applies to polar bear habitats of northern and western Alaska. The North Slope Borough and Alaska Coastal Management Programs assist in protection of polar bear habitat through the project review process. The CZMA does not itself regulate the take of polar bears.

Alaska National Interest Lands Conservation Act

The Alaska National Interest Lands Conservation Act (16 U.S.C. 3101 et seq.) (ANILCA) created or expanded National Parks and Refuges in Alaska, including the Arctic National Wildlife Refuge (NWR). One of the establishing purposes of the Arctic NWR is to conserve polar bears. Most of the Arctic NWR is Federally designated Wilderness, and is therefore off limits to oil and gas development. The coastal plain of Arctic NWR (Section 1002 of ANILCA designated lands), which provides important polar bear denning habitat, does not have Wilderness status; oil and gas development could be authorized by an Act of Congress. The ANILCA does not itself regulate the take of polar bears, although through its designations has provided recognition and various levels of protection for polar bear habitat. ANILCA also designated other lands for management by other Federal agencies. In the case of polar bear habitat, the Bureau of Land Management is responsible for vast land areas on the north slope including the National Petroleum Reserve, Alaska (NPRA). Habitat suitable for polar bear denning and den sites have been identified within NPRA. The Bureau of Land Management (BLM) considers fish and wildlife values under its multiple use mission in evaluating land use authorizations and prospective oil and gas leasing actions. Provisions of the MMPA regarding the incidental take of polar bears on land areas within U.S. jurisdiction continue to apply to activities conducted by the oil and gas industry on BLM lands.

Marine Protection, Research and Sanctuaries Act

The Marine Protection, Research and Sanctuaries Act (33 U.S.C. 1401 et seq.) (MPRSA) was enacted 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.'' The MPRSA does not itself regulate the take of polar bears, although it operates to protect the quality of marine habitats that polar bears rely upon.

Canada

Canada's constitutional arrangement specifies that the Provinces and Territories have the authority to manage terrestrial wildlife, including the polar bear, which is not defined as a marine mammal in Canada. The Canadian Federal Government is responsible for CITES-related programs and provides both technical (long-term demographic, ecosystem, and inventory research) and administrative (Federal/Provincial Polar Bear Technical Committee, Federal/Provincial Polar Bear Administrative Committee, and the National Database) support to the Provinces and Territories. The Provinces and Territories have the ultimate authority for management, although in several areas, the decision-making process is shared with aboriginal groups as part of the settlement of land claims. Regulated hunting by aboriginal people is permissible under Provincial and Territorial statutes (Derocher et al. 1998, p. 32) as described in Factor B.

In Manitoba most denning areas have been protected by inclusion within the boundaries of Wapusk National Park. In Ontario, some denning habitat and coastal summer sanctuary habitat are included in Polar Bear Provincial Park. Some polar bear habitat is included in the National Parks and National Park Reserves and territorial parks in the Northwest Territories, Nunavut, and Yukon Territory (e.g., Herschel Island). Additional habitat protection measures in Manitoba include restrictions on harassment and approaching dens and denning bears, and a land use permit review that considers potential impacts of land use activities on wildlife (Derocher et al. 1998, p. 35).

Canada's Species at Risk Act

Canada's Species at Risk Act (SARA) became law on December 12, 2002, and went into effect on June 1, 2004 (Walton 2004, p. M1–17). Prior to SARA, Canada's oversight of species at risk was conducted through the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) which continued to function under SARA and through the Ministry of Environment. The Committee evaluates species status and provides recommendations to the Minister of the Environment, who makes final listing decisions and identifies species-specific management actions. SARA provides a number of protections for wildlife species placed on the List of Wildlife Species at Risk, or ''Schedule 1'' (SARA Registry 2005). The listing criteria used by COSEWIC are based on the 2001 IUCN Red List assessment criteria (Appendix 3). Currently, the polar bear is designated as a Schedule 3 species, ''Species of Special Concern,'' awaiting re-assessment and public consultation for possible up-listing to Schedule 1 (Environment Canada 2005). A schedule 3 listing under SARA does not include protection measures. A schedule 1 listing under SARA may include protection measures.

Intra-Jurisdiction Polar Bear Agreements Within Canada

Polar bears occur in the Northwest Territories (NWT), Nunavut, Yukon Territory, and in the Provinces of Manitoba, Ontario, Quebec, Newfoundland, and Labrador (see Figure 1). All 12 Canadian polar bear populations lie within or are shared with the NWT or Nunavut. The NWT and Nunavut geographical boundaries include all Canadian lands and marine environment north of the 60th parallel (except the Yukon Territory), and all islands and waters in Hudson Bay and Hudson Strait up to the low water mark of Manitoba, Ontario, and Quebec. The offshore marine areas along the coast of Newfoundland and Labrador are under Federal jurisdiction (Government of NWT). Although Canada manages each of the 12 populations of polar bear as separate units, there is a complex sharing of responsibilities. While wildlife management has been delegated to the Provincial and Territorial Governments, the Federal Government (Environment Canada's Canadian Wildlife Service) has an active research program and is involved in management of wildlife populations shared with other jurisdictions, especially ones with other nations. In the NWT, Native Land Claims resulted in Co-management

Boards for most of Canada's polar bear populations. Canada formed the Federal-Provincial Technical and Administrative Committees for Polar Bear Research and Management (PBTC and PBAC, respectively) to ensure a coordinated management process consistent with internal and international management structures and the International Agreement. The committees meet annually to review research and management of polar bears in Canada and have representation from all Provincial and Territorial jurisdictions with polar bear populations and the Federal Government. Beginning in 1984, the Service as well as biologists from Norway and Denmark, have participated in annual PBTC meetings. The annual meetings of the PBTC provide for continuing cooperation between jurisdictions and for recommending management actions to the PBAC (Calvert et al. 1995, p. 61).

The NWT Polar Bear Management Program (GNWT) manages polar bears in the Northwest Territories. A 1960 ''Order-in-Council'' granted authority to the Commissioner in Council (NWT) to pass ordinances to protect polar bear, including the establishment of a quota system. The Wildlife Act, 1988, and Big Game Hunting Regulations provide supporting legislation which addresses each polar bear population. The Inuvialuit and Nunavut Land Claim Agreements supersede the Northwest Territories Act (Canada) and the Wildlife Act. The Government of Nunavut passed a new Wildlife Act in 2004 and has management and enforcement authority for polar bears in their jurisdiction. Under the umbrella of this authority, polar bears are now co-managed through wildlife management boards made up of Land Claim Beneficiaries and Territorial and Federal representatives. The Boards may develop Local Management Agreements (LMAs) between the communities that share a population of polar bears. Management agreements are in place for all Nunavut populations. The LMAs are signed between the communities, regional wildlife organizations, and the Government of Nunavut (Department of Environment) but can be over-ruled by the Nunavut Wildlife Management Board (NWMB). In the case of populations that Nunavut shares with Quebec and Ontario the management agreement is not binding upon residents of communities outside of Nunavut jurisdiction. Regulations implementing the LMAs specify who can hunt, season timing and length, age and sex classes that can be hunted, and the total allowable harvest for a given population. The Department of Environment in Nunavut and the Department of Environment and Natural Resources in the NWT has officers to enforce the regulations in most communities of the NWT. The officers investigate and prosecute incidents of violation of regulations, kills in defense of life, or exceeding a quota (USFWS 1997). Canada's inter-jurisdictional requirements for consultation and development of LMA's and oversight through the PBTC and PBAC have resulted in conservation benefits for polar bear populations. Although there are some localized instances where changes in management agreements may be necessary, these arrangements and provisions have operated to minimize the threats to the species throughout a significant portion of its range. The Service analyzed the efficacy of Canada's management of polar bears in 1997 (62 FR 7302) and 1999 (64 FR 1529) and determined, at the time, that the species was managed by Canada using sound scientific principles and in such a manner that existing populations would be sustained. Generally we find that Canada continues to manage polar bears in an effective and sustainable manner. However, as discussed above (see Harvest Management by Nation) the Territory of Nunavut has recently adopted changes to polar bear management that may place a greater significance on indigenous knowledge than on scientific data and analysis. In instances where improvements are necessary, because of the regional or localized nature of the activities, we find the actions also do not threaten the species throughout all or a significant portion of its range. The Service will continue to monitor polar bear management in Canada and actions taken by the Nunavut Government.

Russian Federation

Polar bears are listed in the second issue of the Red Data Book of the Russian Federation (2001). The Red Data Book establishes official policy for protection and restoration of rare and endangered species in Russia. Polar bear populations inhabiting the Barents Sea and part of the Kara Sea (Barents-Kara population) are designated as Category IV (uncertain status); polar bears in the eastern Kara Sea, Laptev Sea and the western East-Siberian Sea (Laptev population) are listed as Category III (rare); and polar bears inhabiting the eastern part of the East-Siberian Sea, Chukchi Sea, and the northern portion of the Bering Sea (Chukchi population) are listed as Category V (restoring). The main government body responsible for management of species listed in the Red Data Book is the Department of Environment Protection and Ecological Safety in the Ministry of Natural Resources of the Russian Federation. Russia Regional Committees of Natural Resources are responsible for managing polar bear populations consistent with Federal legislation (Belikov et al. 2002, p. 86).

Polar bear hunting has been totally prohibited in the Russian Arctic since 1956 (Belikov et al. 2002, p. 86). The only permitted take of polar bears is catching cubs for public zoos and circuses. There are no data on illegal trade of polar bears, and parts and products derived from them, although considerable concern persists for unquantified levels of illegal harvest that is occurring (Belikov 2002, p. 87). In the Russian Arctic, Natural Protected Areas (NPAs) have been established that protect marine and associated terrestrial ecosystems, including polar bear habitats. Wrangel and Herald Islands have high concentrations of maternity dens and/or polar bears, and were included in the Wrangel Island State Nature Reserve (zapovednik) in 1976. A 1997 decree by the Russian Federation Government established a 12-nautical mile (nm) marine zone to the Wrangel Island State Nature Reserve; the marine zone was extended to 24-nm by a decree from the Governor of Chukotsk Autonomous Okruga (Belikov et al. 2002, p. 87). The Franz Josef Land State Nature Refuge was established in 1994. Special protected areas are proposed for the Russian High Arctic including the Novosibirsk Islands, Severnaya Zemlya, and Novaya Zemlya, however, because they have not yet been designated, these areas are not considered in our evaluation of the adequacy of existing regulatory mechanisms. Within these protected areas, conservation and restoration of terrestrial and marine ecosystems, and plant and animal species (including the polar bear), are the main goals. In 2001, the Nenetskiy State Reserve, which covers 313,400 hectares (774,428 acres), and includes the mouth of the Pechora River and adjacent waters of the Barents Sea, was established. In May 2001, the Federal law ''Concerning territories of traditional use of nature by small indigenous peoples of North, Siberia, and Far East of the Russian Federation'' was passed. This law established areas for traditional use of nature (TTUN) within NPAs of Federal, regional, and local levels to support traditional life styles and traditional subsistence use of nature resources for indigenous peoples. This law and the Law ''Concerning natural protected territories'' (1995) regulate protection of plants and animals on the TTUNs. The latter also regulates organization, protection and use of other types of NPAs: State Nature Reserves (including Biosphere Reserves), National Parks, Natural Parks, and State Nature Refuges. Special measures on protection of polar bears or other resources may be governed by specific regulations of certain NPAs. Outside NPAs, protection and use of marine renewable natural resources are regulated by Federal legislation, Acts of the President of the Russian Federation, regulations of State Duma, Government, and Federal Senate of the Russian Federation, and through regulations issued by appropriate governmental departments. The most important Federal laws for nature protection are: ''About environment protection'' (1991), ''About animal world'' (1995), ''About continental shelf of the Russian Federation'' (1995), ''About exclusive economical zone of the Russian Federation'' (1998), and ''About internal sea waters, territorial sea, and adjacent zone of the Russian Federation'' (1998) (Belikov 2002, p. 87).

Norway

According to the Svalbard Treaty of February 9, 1920, Norway exercises full and unlimited sovereignty over the Svalbard Archipelago. The Svalbard Treaty applies to all the islands situated between 10° and 35° East longitude and between 74° and 81° North latitude, and includes the waters up to four nautical miles offshore. Beyond this zone, Norway claims an economic zone to the continental shelf areas to which Norwegian Law applies. Under Norwegian Game Law, all game, including polar bears, are protected unless otherwise stated (Derocher et al. 2002b, p. 75). The main responsibility for the administration of Svalbard lies with the Norwegian Ministry of Justice. Norwegian civil and penal laws and various other regulations are applicable to Svalbard. The Ministry of Environment deals with matters concerning the environment and nature conservation. The Governor of Svalbard (Sysselmannen), who has management responsibilities for freshwater-fish and wildlife, pollution and oil spill protection and environmental monitoring, is the cultural and environmental protection authority in Svalbard (Derocher et al. 2002b, p. 75). Polar bears have complete protection from harvest under the Svalbard Treaty (Derocher et al. 2002b, p. 75).

Approximately 65 percent of the land area of Svalbard is totally protected, including all major regions of denning by female bears; however, protection of habitat is only on land and to 4 nautical miles offshore. Marine protection was increased in 2004 when the territorial border of the existing protected areas was increased to 12 nautical miles (Aars et al. 2006, p. 145). Norway claims control of waters out to 200 nautical miles and regards polar bears as protected within this area.

In 2001, the Norwegian Parliament passed a new Environmental Act for Svalbard which went into effect in July 2002. This Act was designed to ensure that wildlife is protected, with exceptions made for hunting. The regulations included specific provisions on harvesting, motorized traffic, remote camps and camping, mandatory leashing of dogs, environmental pollutants and on environmental impact assessments in connection with planning development or activities in or near settlements. Some of these regulations were specific to the protection of polar bears, e.g., through enforcement of temporal and spatial restrictions on motorized traffic and giving provisions on how and where to camp to ensure adequate bear security (Aars et al. 2006, p. 145).

In 2003, Svalbard designated six new protected areas, two nature reserves, three national parks and one ''biotope protection area''. The new protected areas are mostly located around Isfjord, the most populated fjord on the west side of the archipelago. Another protected area, Hopen, has special importance for denning bears and is an important denning area (Aars et al. 2006, p. 145). Kong Karls Land is the main denning area and has the highest level of protection under the Norwegian land management system. These new protected areas cover 4,449 km^2 (1,719 mi^2) which is 8 percent of the Archipelago's total area, and increase the total area under protection to 65 percent of the total land area (*http://www.norway.org/News/archive/2003/200304svalbard.htm*).

Denmark/Greenland

Under terms of the Greenland Home Rule (1979) the government of Greenland is responsible for management of all renewable resources including polar bears. Greenland is also responsible for providing scientific data for sound management of polar bear populations and for compliance with terms of the 1973 Agreement on the Conservation of Polar Bears. Regulations for the management and protection of polar bears in Greenland that were introduced in 1994 have been amended several times (Jensen 2002, p. 65). Hunting and reporting regulations include who can hunt polar bears, protection of family groups with cubs of the year, prohibition of trophy hunting, mandatory reporting requirements, and regulations on permissible firearms and means of transportation (Jensen 2002, p. 65). In addition, there are specific regulations which apply to traditional take within the National Park of North and East Greenland and the Melville Bay Nature Reserve. A large amount of polar bear habitat occurs within the National Park of North and East Greenland. During the fall of 2000, the Greenland Home Rule Government signed an agreement with the Government of Nunavut concerning shared populations. Greenland introduced a quota system which took effect on January 1, 2006 (Lønstrup 2005, p. 133)

Conclusion for Factor D

Our review of the regulatory mechanisms in place at the national and international level demonstrates that the short-term, site-specific threats to polar bears from direct take, disturbance by humans, and incidental or harassment take are, for the most part, adequately addressed through range state laws, statutes, and other regulatory mechanisms. As decribed under Factor A, the primary threat with the greatest severity and magnitude of impact to the species is loss of habitat due to sea ice retreat, however there are no known regulatory mechanisms currently in place at the national or international level effectively adressing threats to polar bear habitat.

E. Other Natural or Manmade Factors Affecting the Polar Bear's Continued Existence

Contaminants

Understanding the potential effects of contaminants on polar bears in the Arctic is confounded by the wide range of contaminants present, each with different chemical properties and biological effects, and the differing geographic, temporal, and ecological exposure regimes impacting each of the 19 polar bear populations. Further, contaminant concentrations differ with age, sex, reproductive status, and other factors. Contaminant sources and transport, geographical, temporal patterns and trends, and biological effects are detailed in several recent Arctic Monitoring and Assessment Program (AMAP) publications (AMAP 1998; AMAP 2004a; AMAP 2004b; AMAP 2005). Three main groups of contaminants in the Arctic are thought to present the greatest potential threat to polar bears and other marine mammals:

Petroleum hydrocarbons, persistent organic pollutants (POPS), and heavy metals.

Petroleum Hydrocarbons

The principal petroleum hydrocarbons include crude oil, refined oil products, polynuclear aromatic hydrocarbons, and natural gas and condensates (AMAP 1998, p.661). Petroleum hydrocarbons come from both natural and anthropogenic sources. The primary natural source is oil seeps. Anthropogenic sources include activities associated with exploration, development, and production of oil (well blowouts, operational discharges), ship and land based transportation of oil (oil spills from pipelines, accidents, leaks, and ballast washings), discharges from refineries and municipal waste water, and combustion of wood and fossil fuels. In addition to direct contamination, petroleum hydrocarbons are transported from more southerly areas to the Arctic via long range atmospheric and oceanic transport, as well as by north-flowing rivers (AMAP 1998 p. 671).

Polar bears are particularly vulnerable to oil spills due to their inability to thermoregulate and to poisoning due to ingestion of oil from grooming and/or eating contaminated prey (St. Aubin 1990, p. 237). In addition, polar bears are curious and are likely to investigate oil spills and oil contaminated wildlife. Although it is not known whether healthy polar bears in their natural environment would avoid oil spills and contaminated seals, bears that are hungry are likely to scavenge contaminated seals, as they have shown no aversion to eating and ingesting oil (St. Aubin 1990, p. 237; Derocher and Stirling 1991, p. 56).

The most direct exposure of polar bears to petroleum hydrocarbons comes from direct contact with and ingestion of oil from acute and chronic oil spills. Polar bear range overlaps with many active and planned oil and gas operations within 40 km (25 miles) of the coast or offshore. To date, no major oil spills have occurred in the marine environment within the range of polar bears; however spills associated with terrestrial pipelines have occurred in the vicinity of polar bear habitat and denning areas (e.g., Russia, Komi Republic, 1994 oil spill, *http://www.american.edu/ted/KOMI.HTM*). Despite numerous safeguards to prevent spills, smaller spills do occur. The MMS (2004, pp. 10, 127) estimated an 11 percent chance of a marine spill greater than 1,000 barrels in the Beaufort Sea from the Beaufort Sea Multiple Lease Sale in Alaska. An average of 70 oil and 234 waste product spills per year occurred between 1977 and 1999 in the North Slope oil fields (71 FR14456). The largest oil spill (estimated volume of approximately 201,000 gallons) from the North Slope Oil fields in Alaska to date occurred on land in March 2006, resulting from an undetected leak in a corroded pipeline.

Spills during the fall or spring during the formation or breakup of ice present a greater risk because of difficulties associated with clean up during these periods and the presence of bears in the prime feeding areas over the continental shelf. Amstrup et al. (2000a, p. 5) concluded that the release of oil trapped under the ice from an underwater spill during the winter could be catastrophic during spring break-up. During the autumn freeze-up and spring break-up periods it is expected that any spilled oil in the marine environment would concentrate and accumulate in open leads and polynyas, areas of high activity for both polar bears and seals (Neff 1990, p. 23), resulting in oiling of both polar bears and seals (Neff 1990, pp. 23–24; Amstrup et al. 2000a, p. 3; Amstrup et al. 2006a, p. 9). Increases in Arctic oil and gas development coupled with increases in shipping and/or development of offshore and land-based pipelines increase the potential for an oil spill to negatively affect polar bears and/or their habitat. Any future declines in the Arctic sea ice may result in increased tanker traffic in high bear use areas (Frantzen and Bambulyak 2003, p. 4) which would increase the chances of an oil spill from a tanker accidents, ballast discharge, or discharges during the loading and unloading the oil at the ports.

Although there is a low probability that a large number of bears (e.g., 25–60) might be affected by a large oil spill, the impact of such a spill, particularly during the broken ice period, could be significant to the polar bear population (Amstrup et al. 2006a, pp. 7, 22; 65 FR 16833). The number of polar bears affected by an oil spill could be substantially higher if the spill spread to areas of seasonal polar bear concentrations, such as the area near Kaktovik, in the fall, and could have a significant impact to the Southern Beaufort Sea polar bear population. It seems likely that an oil spill would affect ringed seals the same way the *Exxon Valdez* oil spill affected harbor seals (Frost et al. 1994a, pp. 108–110; Frost et al. 1994b, pp. 333–334, 343–344, 346–347; Lowry et al. 1994, pp. 221–222; Spraker et al. 1994, pp. 300–305). As with polar bears, the number of animals killed would vary depending upon the season and spill size (NRC 2003, pp. 168–169).

Persistent Organic Pollutants (POPS)

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, p. 2111; de March et al. 1998, p. 184; Proshutinsky and Johnson 2001, p. 68; MacDonald et al. 2003, p. 38). These compounds are transported via large rivers, air, and ocean currents from the major industrial and agricultural centers located at more southerly latitudes (Barrie et al. 1992; Li et al. 1998, pp. 39–40; Proshutinsky and Johnson 2001, p. 68; Lie et al. 2003, p. 160). The presence and persistence of these contaminants within the Arctic is dependent on many factors, including transport routes, distance from source and the quantity and chemical composition of the contaminants released to the environment. The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of persistent organic pollutants, including organochlorine (OC) compounds, relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels. The persistence and lipophilic nature of organochlorines increase the potential for bioaccumulation and biomagnification at higher trophic levels (Fisk et al. 2001, pp. 225–226). Polar bears, because of their position at the top of the Arctic marine food chain, have some of the highest concentrations of OCs of any Arctic mammals (Braune et al. 2005, p. 23).

The most studied POPS in polar bears include polychlorinated biphenyls (PCBs), chlordanes (CHL), DDT and its metabolites, toxaphene, dieldrin, hexachloroabenzene (HCB), hexachlorocyclohexanes (HCHs), and chlorobenzenes (ClBz). Overall, the relative proportion of the more recalcitrant compounds, such as PCB 153 and β-HCH, appears to be increasing in polar bears (Braune et al. 2005, p. 50). Although temporal trend information is lacking, newer compounds, such as polybrominated diphenyl ethers (PBDEs), polychlorinated naphthalenes (PCNs), perflouro-octane sulfonate (PFOS), perfluoroalkyl acids (PFAs), and perflourocarboxylic acids (PFCAs) have been recently found in polar bears (Braune et al. 2005, p. 5). Of this relatively new suite of compounds, there is concern that both PFOS, which are increasing rapidly, and PBDEs are a potential risk to polar bears (Ikonomou et al. 2002, p. 1886; deWit 2002, p. 583; Martin et al. 2004, p. 373; Braune et al.

2005, p. 25; Smithwick et al. 2006, p. 1139). Currently the polychlorinated dibenzo-p-dioxins (PCDDs), dibenzofurans (PCDFs) and dioxin-like PCBs are at relatively low concentrations in polar bears (Norstrom et al. 1990, p. 14).

The highest PCB concentrations have been found in polar bears from the Russian Arctic (Franz Joseph Land and the Kara Sea), with decreasing concentrations to the east and west (Anderson et al. 2001, p. 231). Overall there is evidence for recent declines in PCBs for most populations. The pattern of distribution of most other chlorinated hydrocarbons and metabolites generally follows that of PCBs, with the highest concentrations of DDT-related compounds and CHL in Franz Joseph Land and the Kara Sea, followed by East Greenland, Svalbard, the eastern Canadian Arctic populations, the western Canadian populations, the Siberian Sea, and finally the lowest concentrations in Alaska populations (Bernhoft et al. 1997; Norstrom et al. 1998, p. 361; Andersen et al. 2001, p. 231; Kucklick et al. 2002, p. 9; Lie et al. 2003, p. 159; Verreault et al. 2005, pp. 369–370; Braune et al. 2005, p. 23).

Polybrominated diphenyl ethers (PBDEs) share similar physical-chemical properties with PCBs (Wania and Dugani 2003, p. 1252; Muir et al. 2006, p. 449), and are thought to be transported to the Arctic by similar pathways. Muir et al. (2006, p. 450) analyzed archived samples from Dietz et al. (2004) and Verreault et al. (2005) for PBDE concentrations, finding the highest mean PBDE concentrations in female polar bear adipose tissue from East Greenland and Svalbard. Lower concentrations of PBDE were found in adipose tissue from the Canadian and Alaskan populations (Muir et al. 2006, p. 449). Differences between the PBDE concentrations and composition in liver tissue between the Southen Beaufort Sea and the Chukchi/Bering seas populations in Alaska suggest differences in the sources of PBDE exposure (Kannan et al. 2005, p. 9057). Overall, ΣPBDEs concentrations are much lower and less of a concern compared to PCBs, oxychlordane, and some of the more recently discovered perfluorinated compounds. PBDEs are metabolized to a high degree in polar bears and thus do not bioaccumulate as much as PCBs (Wolkers et al. 2004, p. 1674).

Although baseline information on contaminant concentrations is available, determining the biological effects of these contaminants in polar bears is difficult. Field observations of reproductive impairment in females and males, lower survival of cubs, and increased mortality of females in Svalbard, Norway, however, suggest that high concentrations of PCBs may have contributed to population level effects in the past (Wiig 1998, p. 28; Wiig et al. 1998, p. 795; Skaare et al. 2000, p.107; Haave et al. 2003, pp. 431, 435; Oskam et al. 2003, p. 2134; Derocher et al. 2003, p. 163). Currently it is not thought that present PCB concentrations are having population level effects. Organochlorines may adversely affect the endocrine system as metabolites of these compounds are toxic and some have demonstrated endocrine disrupting activity (Letcher et al. 2000; Braune et al. 2005, p. 23). High concentrations of organochlorines may also affect the immune system, resulting in a decreased ability to produce antibodies (Lie et al. 2004, pp. 555–556).

Metals

Numerous essential and non-essential elements have been reported on for polar bears and the most toxic and/or abundant elements in marine mammals are mercury, cadmium, selenium, and lead. Of these, mercury is of greatest concern because of its potential toxicity at relatively low concentrations, ability to biomagnify and bioaccumulate in the food web. Polar bears from the western Canadian Arctic and southwest Melville Island, Canada (Braune et al. 1991, p. 263; Norstrom et al. 1986, p. 195; AMAP 2005, pp. 42, 62, 134), and ringed seals from the western Canadian Arctic (Wagemann et al. 1996, p. 41; Deitz et al. 1998, p. 433; Dehn et al. 2005, p. 731; Riget et al. 2005, p. 312), have some of the highest known mercury concentrations. Wagemann et al. (1996, pp. 51, 60) observed an increase in mercury from eastern to western Canadian ringed seal populations and attributed this pattern to a geologic gradient in natural mercury deposits.

Although the contaminant concentrations of mercury found in marine mammals often exceed those found to cause effects in terrestrial mammals (Fisk et al. 2003, p. 107), most marine mammals appear to have evolved effective biochemical mechanisms to tolerate high concentrations of mercury. Polar bears are able to demethylate mercury and accumulate higher levels than their terrestrial counterparts without detrimental effects (AMAP 2005, p. 123). Evidence of mercury poisoning is rare in marine mammals, but Dietz et al. (1990, p. 49) noted that sick marine mammals often have higher concentrations of methylmercury, suggesting that these animals may no longer be able to detoxify methylmercury. Hepatic mercury concentrations are well below those expected to cause biological effects in most polar bear populations (AMAP 2005, p. 118). Only two polar bear populations have concentrations of mercury close to the biological threshold levels of 60 µg wet weight reported for marine mammals (AMAP 2005, p. 121), the Viscount Melville (southwest Melville Sound), Canada and the Southern Beaufort Sea (eastern Beaufort Sea) (Dietz et al. 1998, p. 435, Figure 7–52).

Shipping and Transportation

Observations over the past 50 years show a decline in arctic sea ice extent in all seasons, with the most prominent retreat in the summer. Climate models project an acceleration of this trend with periods of extensive melting in spring and autumn, thus opening new shipping routes and extending the period that shipping is practical (ACIA 2005, p. 1002). Notably, the navigation season for the Northern Sea Route (across northern Eurasia) is projected to increase from 20–30 days per year to 90–100 days per year. Russian scientists cite increasing use of a Northern Sea Route for transit and regional development as a major source of disturbance to polar bears in the Russian Arctic (Wiig et al. 1996, p. 23–24; Belikov and Boltunov 1998, p. 113; Ovsyanikov 2005, p. 171). Commercial navigation on the Northern Sea Route could disturb polar bear feeding and other behaviors and would increase the risk of oil spills (Belikov et al. 2002, p. 87).

Increased shipping activity may disturb polar bears in the marine environment, adding additional energetic stresses. If ice breaking activities occur they may alter habitats used by polar bears, possibly creating ephemeral lead systems and concentrating ringed seals within the refreezing leads. This in turn may allow for easier access to ringed seals and may have some beneficial values. Conversely, this may cause polar bears to use areas that may have a higher incidence of human encounters as well as increased likelihood of exposure to oil, waste products or food wastes that are intentionally or accidentally placed into the marine environment. If shipping involved the tanker transport of crude oil or oil products there would be some increased likelihood of small to large volume spills and corresponding oiling of polar bears as well as potential effects on seal prey species (AMAP 2005, pp. 91, 127).

The PBSG (Aars et al. 2006, pp. 22, 58, 171) recognized the potential for increased shipping and marine transportation in the Arctic with declining summer/fall ice conditions. The PBSG recommended that the parties to the International Agreement on the Conservation of Polar Bears take appropriate measures to monitor, regulate and mitigate ship traffic impacts on polar bear subpopulations and habitats (Aars et al. 2006, p. 58).

Ecotourism

Increasing levels of ecotourism and photography in polar bear viewing areas and natural habitats may lead to increased polar bear-human conflicts. Ecotourists and photographers may inadvertently displace bears from preferred habitats or alter natural behaviors (Lentfer 1990 p.19; Dyck and Baydack 2004 p. 344). Polar bears are inquisitive animals and often investigate novel odors or sights. This trait can lead to polar bears being killed at cabins and remote stations where they investigate food smells (Herrero and Herrero 1997 p. 11).

Conclusion for Factor E

Contaminant concentrations in most populations are presently not thought to have population level effects on polar bears. However, one or several factors acting independently or together, such as loss or degradation of the sea ice habitat, decreased prey availability and accessibility, and increased exposure to contaminants have the potential to lower recruitment and survival rates, which ultimately would have negative population level effects. Svalbard, East Greenland, and the Kara Sea populations, which currently have some of the highest contaminant concentrations and thus have the potential for population level effects, should be monitored closely.

Despite the regulatory steps taken to decrease the production or emissions of toxic chemicals, increases in hexachlorobenzene (HCB) and relatively new compounds such as PBDEs and PFOSs, are cause for concern. PBDEs, which may have impacts similar to already regulated chemicals such as PCBs, have increased in the last decade (Ikonomou et al. 2002, p. 1886; Muir et al. 2006, p. 453). PFCs remain the class of chemicals of most concern as we do not know how long it will take for voluntary phase-outs or bans to result in declines because of the widespread use of these compounds in consumer products (Braune et al. 2005, p. 5). More information is needed on the specific biological effects of many of these contaminants on Arctic marine mammals in order to assess the potential impact on polar bears, and their primary prey, ringed and bearded seals.

Increasing levels of ecotourism and shipping may lead to greater impacts on polar bears. The potential extent of impact is related to changing ice conditions and resulting changes to polar bear distribution. Such effects are difficult to quantify and need to be monitored.

We conclude that contaminants, ecotourism, and shipping as singular factors do not threaten the existence of the polar bear throughout all or a significant portion of its range. Potential for future impacts from these sources is a concern and warrants continued monitoring or additional studies. These factors may become a more significant in the future for polar bear populations experiencing nutritional stress or declining population levels.

Finding

We have carefully considered all scientific and commercial information available regarding the past, present, and future threats faced by the polar bear. We reviewed the petition, information available in our files, other published and unpublished information submitted to us during the public comment period following our February 9, 2006 (71 FR 6745) 90-day petition finding. In accordance with Service policies, peer review of the draft Status Assessment was sought from 12 independent experts in the fields of polar bear ecology, contaminants and physiology, climatic science and physics, and traditional ecological knowledge. Comments were received from 10 peer reviewers, and those comments were addressed in revisions to the draft Status Assessment. We also consulted with recognized polar bear experts and other Federal, State, and range state resource agencies. On the basis of the best scientific and commercial information available, we find that the listing of the polar bear as threatened under the Act throughout its range is warranted.

In making this finding, we recognize that polar bears have evolved to occur throughout the ice-covered waters of the circumpolar Arctic, and are reliant on sea ice as a platform to hunt and feed on ice-seals, to seek mates and breed, to move to feeding sites and terrestrial maternity denning area, and for long-distance movements. Under Factor A (''Present or threatened destruction, modification, or curtailment of habitat or range''), we find that the diminishing extent of sea ice in the Arctic is extensively documented. Further recession of sea ice in the future is predicted and would exacerbate the effects observed to date on polar bears. It is predicted that sea ice habitat will be subjected to increased temperatures, earlier melt periods, increased rain on snow events, and positive feed back systems. Productivity, abundance and availability of ice seals, a primary prey base, would then be diminished by changes in sea ice. Energetic requirements of polar bears would increase for movement and obtaining food. Access to traditional denning areas would be affected. In turn, these factors will cause declines in the condition of polar bears from nutritional stress and productivity. As already evidenced in the Western Hudson Bay and Southern Beaufort Sea populations, polar bears would experience reductions in survival and recruitment rates. The eventual effect would be that polar bear populations will continue to decline. Populations would be affected differently in the rate, timing, and magnitude of impact, but within the foreseeable future, the species is likely to become endangered throughout all or a significant portion of its range due to changes in habitat. This determination satisfies the definition of a threatened species under the Act.

Under Factor B (''Overutilization for commercial, recreational, scientific, or educational purposes'') we note that polar bears are harvested in Canada, Alaska, Greenland, and Russia, and we acknowledge that harvest is the consumptive use of greatest importance and potential effect to polar bear. Further we acknowledge that forms of removal other than harvest have been considered in this analysis. While overharvest occurs for some populations, laws and regulations for most management programs have been instituted to ensure harvests result in healthy and sustainable populations. If overharvest were to occur in the future and theaten populations the ability to recover populations through harvest reductions and the likely efforts of management entities to do so and to prevent the species from becoming endangered or threatened is highly probable. This ability differs markedly from the ability of management entities to recover habitat that has been lost as addressed in Factor A. Further, bilateral agreements or conservation agreements have been developed or are in development to address issues of over harvest. Conservation benefits from agreements that are in development or have not yet been implemented are not considered in our evaluation. We also acknowledge that increased levels of bear-human encounters are expected in the future and that encounters may result in increased mortality to bears at some unknown level. Adaptive management programs, such as implementing polar bear patrols, hazing programs, and efforts to minimize attraction of bears to communities, to address future bear-human interaction issues, including on-the-land ecotourism activities are anticipated. However, potential conservation benefits from management programs that may be needed and have not yet been developed or implemented are not being considered in our evaluation. We find that overharvest and increased bear-human interaction levels as a singular factor do not threaten polar bears throughout all or a significant portion of their range. Continued overharvest or increased mortality from bear-human encounters, however, may become more significant factors in the future for polar bear populations experiencing nutritional stress or declining population levels.

Under Factor C (''Disease and predation'') we acknowledge that disease pathogen titers are present in polar bears; no epizootic outbreaks have been detected; and intra-specific stress through cannibalism may be increasing, however population level effects are not believed to have resulted. We find that disease and predation as singular factors do not threaten polar bears throughout all or a significant portion of their range. Potential for disease outbreaks or increased mortality from cannibalism may become more significant factors in the future for polar bear populations experiencing nutritional stress or declining population levels. Both stressors warrant continued monitoring.

Under Factor D (''Inadequacy of existing regulatory mechanisms'') we find that the regulatory mechanisms in place at the national and international level are effective in addressing the short-term, site-specific threats to polar bears from direct take, disturbance by humans, and incidental or harassment take. These factors are, for the most part, adequately addressed through range state laws, statutes, and other regulatory mechanisms for polar bears. The ultimate threat to the species is loss of habitat; however, this is not currently addressed at the national or international level. We conclude that inadequate regulatory mechanisms to address sea ice recession are a factor that threatens the species throughout all or a significant portion of its range.

Under Factor E (''Other natural or manmade factors affecting the polar bear's continued existence'') we reviewed contaminant concentrations and find that in most populations contaminants are not determined to have population level effects. Also, despite regulatory steps to decrease the production or emissions of toxic chemicals, increases in some contaminants, including relatively new flame retardant by-product compounds, are of concern. We further evaluated increasing levels of ecotourism and shipping that may lead to greater impacts on polar bears. The extent of the potential impact is related to changing ice conditions, polar bear distribution changes, and relative risk for a higher interaction between polar bears and ecotourism or shipping. We find that contaminants, ecotourism, and shipping, while affecting or potentially affecting polar bears, as singular factors do not threaten the existence of the species throughout all or a significant portion of its range. However, the potential for future impacts from these sources may become more significant in the future for polar bear populations experiencing nutritional stress or declining population levels and warrant continued monitoring or additional studies.

Based on our evaluation of all scientific and commercial information available regarding the past, present, and future threats faced by the polar bear, we have determined that the polar bear is threatened by habitat loss and inadequate regulatory mechanisms to address sea ice recession. Other factors, particularly overutilization, disease, and contaminants, may become more significant threats to polar bear populations, especially those experiencing nutritional stress or declining population levels, within the foreseeable future.

Status Evaluation

The Act defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range.

Polar bear populations throughout the Arctic are being affected by changes in climate and sea ice habitat. The effects include earlier melting periods, increased rain on snow events, and positive feed back systems which amplify the decrease in the extent, timing and quality of sea ice. These changes will negatively impact polar bears by increasing the energetic demands of movement in seeking prey, redistributing substantial portions of populations seasonally into terrestrial habitats with marginal values for feeding, and increasing levels of negative bear-human interactions. Similarly we expect reductions in productivity for most ice seal species (decreasing availability or timing of availability for polar bears as food), composition changes of seal species in some areas, and eventually decreased levels of abundance. Reduced feeding opportunities will result in the reduced physical condition of polar bears and corresponding population-level demographic declines through reduction of survival and recruitment rates as have been manifested in Western Hudson Bay and the Southern Beaufort Sea populations, the 2 populations with extensive time series of data, and forecasted for other populations. Ultimately these inter-related events, factors, and effects will result in declines or continued declines for all populations. Not all populations will be affected evenly in the level, rate, and timing of impact, but within the foreseeable future time frame of this action, all populations will be either directly or indirectly impacted.

Given current population sizes (20,000–25,000), distribution and occurrence throughout its historical range, and the finding that not all populations would be affected evenly in the timing, rate and level of impact, we do not believe the species is presently in danger of extinction throughout all or a significant portion of its range. Nor do we believe, based on our review of all available scientific and commercial information, that threats facing polar bear present an emergency posing a significant risk to the well-being of the species. However, if at any time we determine that emergency listing of polar bear is warranted, we will initiate the emergency listing process. Based on our evaluation of the best available scientific and commercial information, however, we find that the polar bear is likely within the foreseeable future (as defined to be 45 years) to become an endangered species throughout all or a significant portion of its range based on threats to the species, including loss of habitat caused by sea ice recession and lack of effective regulatory mechanisms to address the recession of sea ice. Therefore, we propose to list the polar bear as threatened.

On the basis of our careful evaluation of the best available scientific and commercial information regarding the past, present, and future threats to the species as discussed above relative to the listing factors, we have determined that listing is warranted. This determination is supported by the significant current and projected rates of decline in the sea ice habitat essential to polar bear life history requisites and the inadequacy of existing regulatory mechanisms to address these threats. We have funded this proposed rule to list the polar bear, as it is the highest priority listing action for the Alaska Region. The Alaska Region generally has not faced the relatively heavy Listing Program workload experienced by several other Regions, and consequently was able to use the money allocated to this region for FY2006 to prepare this proposed rule.

Further, the analysis conducted for the polar bear status assessment and proposed rule has been a significant and jointly-coordinated effort of fiscal, intellectual, and other resources among the Service and the USGS, NASA, species experts, and experts in other fields such as contaminants. In addition, the scientific data used in this analysis and projections based on these data are subject to constant change. A delay in proceeding would result in significant expenditure of fiscal and other resources to collect additional data and conduct analyses. As such, we have determined that proceeding with the listing of the polar bear at this time is a responsible use of our fiscal and other resources and is justified given the nature of the scientific data involved and the significant declines in polar bear habitat.

Critical Habitat

Critical habitat is defined in section 3 of the Act as: (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. ''Conservation'' is defined in section 3 of the Act as meaning the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

The primary regulatory effect of critical habitat is the section 7(a)(2) of the Act requirement that Federal agencies shall insure that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of designated critical habitat.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, we designate critical habitat at the time a species is determined to be endangered or threatened. Critical habitat may only be designated within the jurisdiction of the United States and may not be designated for jurisdictions outside of the United States. Our regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent when one or both of the following situations exist—(1) The species is threatened by taking or other activity and the identification of critical habitat can be expected to increase the degree of threat to the species, or (2) such designation of critical habitat would not be beneficial to the species. Our regulations (50 CFR 424.12(a)(2)) further state that critical habitat is not determinable when one or both of the following situations exist: (1) Information sufficient to perform required analysis of the impacts of the designation is lacking, or (2) the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

Delineation of critical habitat requires identification of the physical and biological habitat features that are essential to the conservation of the species. In general terms, essential habitat features for the polar bear include annual and perennial marine sea ice habitats that serve as a platform for hunting, feeding, traveling, resting, and to a limited extent, for denning, and terrestrial habitats used by polar bears for denning and reproduction for the recruitment of new animals into the population, as well as for seasonal use in traveling or resting. The most important polar bear life functions that occur in these habitats are feeding (adequate nutrition) and reproduction. These habitats may be influenced by several factors and the interaction among these factors, including: (1) Water depth; (2) atmospheric and oceanic currents or events; (3) other climatologic phenomena such as temperature, winds, precipitation and snowfall; (4) proximity to the continental shelf; (5) topographic relief (accumulation of snow for denning); (6) presence of undisturbed habitats; and (7) secure resting areas that provide refuge from extreme weather and/or other bears or humans. Unlike some other marine mammal species, polar bears generally do not occur at high-density focal areas such as rookeries and haulout sites. However, certain terrestrial areas have a history of higher use, such as core denning areas, or are experiencing an increasing trend of use for resting, such as coastal areas during the fall open water phase for which polar bear use has been increasing in duration for additional and expanded areas. During the winter period, when energetic demands are the greatest, nearshore lead systems and emphemeral or recurrent polynyas are areas of importance for seals and correspondingly for polar bears that hunt seals for nutrition. During the spring period, nearshore lead systems continue to be important habitat for bears for hunting seals and feeding. Also the shorefast ice zone where ringed seals construct subnivean birth lairs for pupping is an important feeding habitat during this season. In Alaska, while denning habitat is more diffuse than in other areas where core high density denning has been identified, certain areas in northern Alaska such as barrier island, river bank drainages, much of the North Slope coastal plain, including the Arctic NWR, and coastal bluffs that occur at the interface of mainland and marine habitat receive proportionally greater use for denning than other areas in the past. Habitat suitable for the accumulation of snow and use for denning has been delineated on the north slope.

While information regarding important polar bear life functions and habitats associated with these functions has expanded greatly in Alaska during the past 20 years, in general the identification of specific physical and biological features and specific geographic areas for consideration as critical habitat is complicated and the future values of these habitats may change in a rapidly changing environment. The polar sea ice provides an essential conservation function for the key life history functions for hunting, feeding, travel, and nuturing cubs. That essential habitat is projected to be significantly reduced within the next 45 years, and some projections forecast complete absence of sea ice during summer months in shorter time frames. A careful assessment of the designation of critical marine areas will require additional time and evaluation. In addition, near-shore and terrestrial habitats may qualify as critical habitat; however a careful assessment will require additional time and evaluation. Therefore, there is a degree of uncertainty at this time as to which specific areas in Alaska might be essential to the conservation of the species and thus meet a key aspect of the definition of critical habitat. Consequently, the designation of critical habitat for the polar bear is not determinable at this time. In the Public Comments Solicited section of this proposed rule we specifically request information regarding critical habitat. If the listing of the polar bear becomes final, we will then consider whether to propose the designation of critical habitat.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing results in public awareness and conservation actions by Federal, State, and local agencies, private organizations, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is listed as endangered or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) requires Federal agencies to confer informally with us on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with us under the provisions of section 7(a)(2) of the Act.

Several Federal agencies are expected to have involvement under section 7 of the Act regarding the polar bear. The National Marine Fisheries Service may become involved, such as in instances if joint rule making for the incidental take of marine mammals is undertaken. The Environmental Protection Agency may become involved through its permitting authority for the Clean Water Act. The U.S. Army Corps of Engineers may become involved through its responsibilities and permitting authority under section 404 of the Clean Water Act and through future development of harbor projects. The MMS may become involved through administering their programs directed toward offshore oil and gas development. The Denali Commission may be involved through its potential funding of fuel and power generation projects. The U.S. Coast Guard may become involved through their deployment of icebreakers in the Arctic Ocean.

The listing of the polar bear would subsequently lead to the development of a recovery plan for this species. Such a plan will bring together Federal, State, local agency, and private efforts for the conservation of this species. A recovery plan establishes a framework for interested parties to coordinate activities and to cooperate with each other in conservation efforts. The plan will set recovery priorities, identify responsibilities, and estimate the costs of the tasks necessary to accomplish the priorities. It will also describe site-specific management actions necessary to achieve the conservation of the polar bear. Additionally, pursuant to section 6 of the Act, we would be able to grant funds to the State of Alaska for management actions promoting the conservation of the polar bear.

Section 9 of the Act, except as provided in sections 6(g)(2) and 10 of the Act prohibits take and import into or export out of the United States of listed species. The Act defines take to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct. However, the Act also provides for the authorization of take and exceptions to the take prohibitions. Take of listed species by non-Federal property owners can be permitted through the process set forth in section 10 of the Act. For Federally funded or permitted activities, take of listed species may be allowed through the consultation process of section 7 of the Act. The Service has issued regulations (50 CFR 17.31) that generally afford to species listed as threatened the prohibitions that section 9 of the Act establishes with respect to species listed as endangered. Furthermore, Section 4(d) of the Act provides that a special rule can be tailored to provide for the conservation of a particular threatened species. In that case, the general regulations for some of the section 17.31 prohibitions may not apply to that species. A special rule may be developed that contains specific prohibitions or exemptions, as necessary and appropriate to conserve that species.

The Act provides for an exemption for Alaska Natives in section 10(e) that allows any Indian, Aleut, or Eskimo who is an Alaskan Native who resides in Alaska to take a threatened or endangered species if such taking is primarily for subsistence purposes and the taking is not accomplished in a wasteful manner. Further, if it is determined that such taking materially and negatively affects the threatened or endangered species, regulations regarding taking may be prescribed. Non-edible by-products of species taken pursuant to section 10(e) may be sold in interstate commerce when made into authentic native articles of handicrafts and clothing. It is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Further, it is illegal for any person to commit, to solicit another person to commit, or cause to be committed, any of these acts. Certain exceptions to the prohibitions apply to our agents and State conservation agencies.

The Act provides for the issuance of permits to carry out otherwise prohibited activities involving threatened or endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22, 17.23, and 17.32. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in the course of otherwise lawful activities provided that certain criteria are met. For threatened species, permits are also available for zoological exhibitions, educational purposes, or special purposes consistent with the purposes of the Act. Requests for copies of the regulations on listed species and inquiries about prohibitions and permits may be addressed to the Endangered Species Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

It is our policy, published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify, to the maximum extent practicable at the time a species is listed, those activities that would or would not likely constitute a violation of section 9 of the Act and associated regulations at 50 CFR 17.31. The intent of this policy is to increase public awareness of the effects of the listing on proposed and ongoing activities within a species' range.

For the polar bear we have not yet determined which, if any, provisions under section 9, provided these activities are carried out in accordance with existing regulations and permit requirements, would apply. Some permissible uses or actions have been identified below:

(1) Possession, delivery, or movement, including interstate transport of authentic native articles of handicrafts and clothing made from polar bears that were collected prior to the date of

publication in the **Federal Register** of a final regulation adding the polar bear to the list of threatened species;

(2) Sale, possession, delivery, or movement, including interstate transport of authentic native articles of handicrafts and clothing made from polar bears that were taken and produced in accordance with section 10(e) of the Act;

(3) Any action authorized, funded, or carried out by a Federal agency that may affect the polar bear, when the action is conducted in accordance with an incidental take statement issued by us under section 7 of the Act;

(4) Any action carried out for scientific research or to enhance the propagation or survival of polar bears that is conducted in accordance with the conditions of a 50 CFR 17.32 permit; and

(5) Any incidental take of polar bears resulting from an otherwise lawful activity conducted in accordance with the conditions of an incidental take permit issued under 50 CFR 17.32. Non-Federal applicants may design a habitat conservation plan (HCP) for the species and apply for an incidental take permit. HCPs may be developed for listed species and are designed to minimize and mitigate impacts to the species to the greatest extent practicable.

We believe the following activities could potentially result in a violation of section 9 and associated regulations at 50 CFR 17.31 with regard to polar bears, however, possible violations are not limited to these actions alone:

(1) Unauthorized killing, collecting, handling, or harassing of individual polar bears;

(2) Possessing, selling, transporting, or shipping illegally taken polar bears or their parts;

(3) Unauthorized destruction or alteration of the denning, feeding, resting, or habitats used for travel that actually kills or injures individual polar bears by significantly impairing their essential behavioral patterns, including breeding, feeding or sheltering; and,

(4) Discharge or dumping of toxic chemicals, silt, or other pollutants (i.e., sewage, oil, pesticides, and gasoline) into the marine environment that actually kills or injures individual polar bears by significantly impairing their essential behavioral patterns, including breeding, feeding or sheltering.

We will review other activities not identified above on a case-by-case basis to determine whether they may be likely to result in a violation of 50 CFR 17.31. We do not consider these lists to be exhaustive and provide them as information to the public. You may direct questions regarding whether specific activities may constitute a violation of the Act to the Field Supervisor, U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, 101 12th Avenue, Box 110, Fairbanks, Alaska 99701.

Furthermore, the Act, similar to the MMPA, provides an exception to the prohibitions of take and import for Alaska Natives. These exceptions are based on the social, cultural and economic role marine mammals have played, and continue to play, in the lives of Alaska Natives. However, under both the Act and the MMPA, the Service, if warranted, may prescribe limitations on the taking or import of marine mammals by Alaska Natives. Should this proposed rule become final the Service will take such action, if appropriate, to ensure that any harvest of polar bears by Alaska Natives does not materially and negatively affect the species.

Regarding ongoing importation of polar bear trophies taken from approved populations in Canada into the United States, we anticipate conducting an evaluation of the merits of continuing the presently authorized imports. Under the MMPA Section 102—Prohibitions [Importation of pregnant or nursing animals; depleted species which includes those listed as threatened or endangered under the ESA] it is unlawful to import into the United States any marine mammal if the mammal was taken from a species or population stock that the Secretary has, by regulation published in the **Federal Register**, designated as a depleted species or stock. The exception to the general prohibition is under a permit for scientific research, or under a permit for enhancing the survival or recovery of a species or stock, issued under section 104(c) of the MMPA.

Peer Review

In accordance with our joint policy published in the **Federal Register** on July 1, 1994 (59 FR 34270), and based on our implementation of the Office of Management and Budget's Final Information Quality Bulletin for Peer Review, dated December 16, 2004, we will seek the expert opinions of at least five appropriate and independent specialists regarding the science in this proposed rule. The purpose of such review is to ensure that our warranted finding and proposed rule are based on scientifically sound data, assumptions, and analyses. We will send copies of this proposed rule to these peer reviewers immediately following publication in the **Federal Register**. We will invite these peer reviewers to comment, during the public comment period, on the specific assumptions and conclusions regarding the proposed listing. We will consider all comments and information received during the comment period on this proposed rule during preparation of a final rulemaking. Accordingly, the final decision may differ from this proposal.

Clarity of the Rule

Executive Order 12866 requires agencies to write regulations that are easy to understand. We invite your comments on how to make this proposal easier to understand including answers to questions such as the following: (1) Is the discussion in the **SUPPLEMENTARY INFORMATION** section of the preamble helpful in understanding the proposal? (2) Does the proposal contain technical language or jargon that interferes with its clarity? (3) Does the format of the proposal (groupings and order of sections, use of headings, paragraphing, etc.) aid or reduce its clarity? What else could we do to make the proposal easier to understand? Send a copy of any comments that concern how we could make this rule easier to understand to: Office of Regulatory Affairs, Department of the Interior, Room 7229, 1849 C Street, NW., Washington, DC 20240. You may also e-mail the comments to this address: *Exsec@ios.doi.gov.*

Executive Order 13211

On May 18, 2001, the President issued Executive Order 13211 on regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. The Service believes that the past record of cooperation demonstrated by oil and gas industry in complying with terms of Letters of Authorization through the Incidental Take program, Section 101(a)(5) of the Marine Mammal Protection Act, as well as active participation in monitoring the effects of exploration, production, and development activities on polar bears serves as a sound conservation practice. While the Service believes that the incidental take program will continue to operate effectively to result in a negligible affect to polar bears from industrial activities in the future, continued vigilance and compliance will be necessary for protection of the species. In addition, added protections afforded through Section 7 consultation required under the Act provide additional assurances to the protection of the species. This rule is not expected to significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action and no Statement of Energy Effects is required.

National Environmental Policy Act

We have determined that we do not need to prepare an Environmental Assessment and/or an Environmental Impact Statement as defined under the authority of the National Environmental Policy Act of 1969, in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and the Department of Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis.

References Cited

A complete list of all references cited in this proposal is available upon request. You may request a list of all references cited in this document from the Supervisor, Marine Mammals Management Office (see **ADDRESSES** section).

Author

The primary author of this proposed rule is Scott Schliebe, Marine Mammals Management Office (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) by adding an entry for ''Bear, polar'' in alphabetical order under MAMMALS, to the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
MAMMALS							
*	*	*	*	*	*	*	
Bear, polar	*Ursus maritimus*	U.S.A. (AK), Canada, Russia, Denmark (Greenland), Norway.	Entire	T		NA	NA.
*	*	*	*	*	*	*	

Dated: December 27, 2006.

H. Dale Hall,

Director, U.S. Fish and Wildlife Service.

[FR Doc. 06–9962 Filed 1–8–07; 8:45 am]

BILLING CODE 4310–55–P