SUMMARY OF POLAR BEAR MANAGEMENT IN ALASKA
2005/2006

Report to the Canadian Polar Bear Technical Committee
Inuvik, Canada
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submitted by

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Listing of Polar Bears as a Threatened Species Under the Endangered Species Act

The U.S. Fish and Wildlife Service (FWS) Polar Bear Program has spent much of 2007 responding to a petition filed in 2005 initially by the Center for Biological Diversity (CBD), and later joined by the Natural Resources Defense Council and Greenpeace, Inc., requesting that polar bears be listed as a "threatened" species under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). On February 9, 2006, the FWS determined that the petition presented sufficient information to initiate a more thorough status assessment of polar bears world-wide. The Service was sent a Notice of Intent to sue by the petitioners for failing to issue a 12-month finding within one year from receipt of the petition. In response a stipulated settlement agreement was made on June 27, 2006 between the Service and the petitioners that a 12-month finding would be submitted by 27 December, 2006. The proposed rule to list polar bear as a threatened species was published in the federal Register on January 9, 2007 and is available at: http://alaska.fws.gov/fisheries/mmm/polarbear/pdf/Polarbear_proposed_rule.pdf.

Following publication of the proposed rule the Service opened a 90-day public comment period and held three public hearings (Anchorage, AK; Barrow, AK; and Washington, D.C.) to solicit scientific information on taxonomy, distribution, habitat, and threats to polar bears. More than 600,000 comments were received. In addition, the Service solicited reviews from 14 individuals that were experts in one or more of the following fields of study; polar bear biology and population dynamics, Arctic ecology, climatology, Arctic sea ice dynamics, specific geographical regions where the polar bears occur, and Traditional Ecological knowledge (TEK).

The U.S. Geological Survey (USGS) was asked by the Secretary of the Interior to analyze scientific data and develop models to assist the Service in understanding the current and future status of polar bears with respect to the listing decision. On September 7, 2007 the USGS provided the Service nine administrative peer-reviewed reports, http://www.usge.gov/newsroom/special/polar_bears which integrated studies on the population dynamics, habitat use, and climate model projections to forecast the potential effects of the climate change on polar bear populations. USGS enlisted the assistance of experts in polar bear biology, statistics, modeling, and sea ice dynamics from around the world in this effort. The new information on polar bears provided in these reports was of two basic types:

1. **New analysis of observational data** on polar bears, including updated information on the current status of 3 of the world's 19 subpopulations of polar bears as defined by the Polar Bear Specialists Group of the International Union for the Conservation of Nature and Natural Resources. To assist in this process, the 19 polar bear populations were subdivided into four Ecoregions based on current knowledge of the use of the sea ice habitat by different populations and the current and projected sea ice conditions. Because each of the 3 subpopulations represented a distinct ecological region, understanding their status helps provide insight into the current status of polar bears rangewide.

2. **Projections or forecasts** of the future distribution and abundance of polar bears in the rest of the 21st century, given changes expected in future sea ice conditions.

A summary of the results of these 9 reports is provided below:

New analysis of observational data included further examination of recent trends and status of polar bear populations in the Southern Hudson Bay, Northern Beaufort Sea, and Southern Beaufort Sea. The Northern Beaufort Sea population appears to currently be stable (Stirling et al. 1999). Condition of polar bears in the Southern Hudson (SH) Bay population has declined over the past 25 years (Obbard et al. 2007). Though survival of bears in this population was also found to have declined between 5-7%, this decline was not statistically significant. The authors of this report concluded that the SH population may not be in decline, but that bears in this population may be under increased stress due to changing ice conditions.

Results from two studies of polar bears in the Southern Beaufort Sea (Regehr et al. 2007; Rode et al. 2007) documented relationships between the decline in the availability of sea ice and metrics of population status. A statistically significant decline in the Southern Beaufort Sea population has not been documented, but the recent population estimate of 1526 bears is down from the previous estimate of 1800 in 1986 (Regehr et al. 2006). Additional evidence that adult and cub survival is affected by annual sea ice conditions (Regehr et al. 2007) and that the growth and size (e.g., skull size or body length) of males and females has declined over the past 25 years (Rode et al. 2007) suggests that this population may be declining as a result of nutritional limitations associated with declines in sea ice habitat availability. Using the results of Regehr et al. (2007), a report by Hunter et al. (2007) projected a decline in the size of the Southern Beaufort Sea polar bear population if the frequency of poor ice years (i.e., longer open water periods and lower ice concentrations) increases in the future as projected. Bergen et al. (2007) also projected that changing ice conditions would affect female access to den sites by increasing the distance they have to travel to access denning habitat by 16 km/year.

Models of future sea ice conditions were evaluated by DeWeaver (2007) to determine the best models to use for assessing future impacts on polar bears. The top 10 models that exhibited the best fit to observed sea ice conditions were then used by Durner et al. (2007) to determine trends in the availability of sea ice to polar bears and predict future ice habitat availability. Durner et al. (2007) concluded that optimal sea ice habitat available to polar bears declined by 6.2% in Southern Beaufort Sea and approximately 12% in the Chukchi Sea between 1985-1995 and 1996-2006. The decline in the Southern Beaufort Sea was not statistically significant, but a similar continued level of decline is anticipated over the next 50 years. The most dramatic declines in availability of polar bear ice habitats have occurred during the summer. Durner et al. (2007) projected that summer sea ice habitat will decline by 42% by mid-century across the Arctic. As a result of the observed and projected continued loss of sea ice habitat, Amstrup et al. (2007) concluded that "Projected changes in future sea ice conditions, if realized, will result in loss of approximately 2/3 of the world's current polar bear population by the mid 21st century. Because the observed trajectory of Arctic sea ice decline appears to be underestimated by currently available models, this assessment of future polar bear status may be conservative."

Following the release of the nine administrative reports, the Service opened a 30-day comment period to allow the public to review the USGS reports and respond to the new information. The technical comments and responses to those comments on the USGS reports are available at: http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm.

The new information provided by the USGS reports and concerning previous warming events, adaptation, climate change, and polar bear ecology were added to the final draft rule which was submitted to Washington. D.C. on December 14, 2007. Currently the rule is being reviewed by the Secretary of Interior. It is expected that a decision on the listing will be made in February 2008.

International Treaties and Conventions

U.S./Russia Bilateral Agreement

On December 9, 2006, Congress signed into law the implementing legislation for the *Agreement between the United States of America and the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population*, originally signed by the U.S. and Russia in 2000. However, no funding has been allocated for fiscal year 2008 and 2009. The primary purpose of the Agreement is to assure long-term conservation of this population using the best biological information available. Now that implementing legislation is in place, the joint commission, consisting of a government and native representative from each country, can be established. The joint commission will be responsible for the design, coordination, and evaluation of management and research activities. This will now allow both the United States and Russia to formally address polar bear harvest issues, including the establishment of hunting quotas. High harvest levels, in combination with increasing environmental change in the region, make enactment of the *Bilateral Agreement* a high priority for polar bear conservation.

US/Russia Polar Bear Technical Meeting for the Chukchi/Bering Seas Polar Bear Population, Anchorage, Alaska, 7-9 August 2007

The FWS, in cooperation with the World Wildlife Fund, developed a grant agreement to fund Russian scientists to conduct a polar bear survey during fall 2006/spring 2007 when polar bears occur along the Chukotka coast of Russia. As in other parts of their range, polar bears are becoming increasingly common in coastal areas during late summer and fall months. Monitoring coastal habitat is necessary for assessing its importance to polar bears and for minimizing bear-human conflicts. To facilitate collaborative projects an *ad hoc* meeting of technical specialists from the United States and Russia met in Anchorage to discuss future management, research, and conservation needs for the Chukchi/Bering Seas polar bear population. The primary challenge discussed by the group is the lack of population information (status and trends) to support determination of a sustainable harvest as called for by the US/Russia Bilateral Agreement. A list of guiding principles and recommendations from this meeting are summarized below and will be shared at the first meeting of the Joint Commissioners. The minutes from this meeting are available upon request from the U.S. Fish and Wildlife Service, Marine Mammals Management Office.

Participants exchanged information and provided technical input concerning research and management needs and background information for planning and managing the subsistence harvest in Alaska and Russia. Overall discussions focused on population dynamics and vital rates, the assumptions and merits of different survey methods, and various approaches used to determine sustainable harvest levels.

The group developed a list of guiding principles that pertain to all the recommendations:

- Develop and implement systematic and repeatable long term monitoring;
- Build scientific capacity and involvement with the Native community;
- Support research on principle prey species (coordinate with appropriate agencies);
- Continue support for ecological monitoring through local programs and smaller scale projects, such as food habit studies.

Research and conservation/management priorities follow. The research and conservation priorities were considered of equal importance and are currently not ranked within each section.

Long-term Research Goals:

- Determine a population estimate
- Determine vital rates and ecological processes that drive them - This information can be collected using mark/recapture methods
- Population delineation – New information need to determine the current distribution particularly with respect to the western boundary of the Chukchi Sea and the changing sea ice conditions
- Determine seasonal distribution (is one segment of the population more susceptible to harvest?)
- Determine essential terrestrial and sea-ice habitat

Short-term Research Goals (do immediately):

- Initiate Mark/Recapture pilot studies in Alaska and Russia – Goal is to collar 40 adult female polar bears – 20 in Alaska 20 in Russia
- Conduct risk analysis for harvest allocation – Using a range of population estimates and vital rates, develop a range of options, from *no harvest* to various allowable levels of harvest, and the associated risks and assumptions for each option (i.e. population estimate and selected vital rates)
- Conduct feasibility studies for conducting mark/recapture and aerial surveys. Currently a feasibility study is being conducted for aerial surveys. Information from initial mark/recapture pilot studies may be used in this effort.

Conservation/Management Priorities:

- Continue polar bear patrols to reduce bear human conflicts – need to facilitate and exchange of information between Russia and the United States
- Continue to monitor bears along the coast using both ground-based and aerial methods. Develop methodology and protocols for conducting coastal surveys to maximize effort.
- Maximize data obtained from harvest monitoring, provide training and involve all affected Native groups
- Establish an international (US/Russia) advisory group to meet annually to summarize, discuss, and develop research and management priorities – Use PBTC as a model.
- Evaluate anthropogenic impacts (i.e. oil and gas, shipping)
- Determine and evaluate quota allocation, enforcement, and monitoring protocols

Range States Meeting

In June 2007, a meeting was held in West Virginia by the Parties to the 1973 international Agreement on the Conservation of Polar Bears. The meeting was held to consult on and discuss common issues of concern, prioritize opportunities for continued collaboration, identify future action items, and consider ways to approach circumpolar polar bear conservation. Although the Polar Bear Specialist Group has met at regular intervals since passage of the 1973 Agreement, The Parties had not held a government-to-government meeting since 1981.

Each delegate presented a "country report"; among the issues discussed were: sport harvest, subsistence harvest, import/export of polar bear parts and products, polar bear research and monitoring, and bear-human interactions. The Parties identified opportunities for collaboration in the management of specific shared populations relative to status surveys, harvest quotas, and management plans. The Parties agreed to enhance coordination of management activities and form a government-to-government working group to meet periodically to assess progress of issues discussed at this meeting and further implementation of the 1973 Agreement.

Harvest Summary

The total Alaska harvest of polar bears by Native subsistence hunters from June 2006 to July 2007 was 67 bears which was comprised of 37 males, 21 females, and 9 with sex unknown (Table 1). The sex ratio of known-sex bears harvested during 2006/2007 was 64% male and 30% female. If the nine bears, for which sex was unknown, were designated as females then the percentage of females in the 2006/2007 harvest would be 45%. The quota of 80-82 bears, split evenly between the United States and Canada, is based on a 2M:1F sex ratio and thus no more than 33% of the harvest should be female. Sex was reported for 86% (58/67) of the harvest in 2006/2007. The harvest from the Chukchi/Bering Sea population declined from the 1980s ($\bar{x}$ = 92.1, SE=16.4, n=10) to 47% in the 1990s ($\bar{x}$ = 49.0, SE=7.4, n=10) and continues to decline (2000/2007, $\bar{x}$ = 45.4, SE=7.2, n=7). Although the harvest has declined from the Chukchi/Bering Sea population, the proportion of the statewide harvest from the Chukchi/Bering Sea during 2006/2007 (48/67) was similar to the long-term average in 1980s and 1990s ($\bar{x}$ = 66%).

Information on the population dynamics of the Chukchi/Bering Sea population are poorly known thus it is not known whether this decline in the harvest reflects a true population decline. Changes in the duration, extent, movement, and thickness of the sea ice due to climatic changes may be having adverse affects on both of the Alaskan polar bear populations. Changes in the minimum sea ice extent in the Arctic between the periods 1979-1989 and 1990-2000 were greatest in the northern Chukchi and southern Beaufort seas (Comiso, 2003, Journal of Climate 16:3498-3510). On August 16-17, 2007, Arctic sea ice surpassed the previous single-day (absolute minimum) record for the lowest extent ever measured by satellite; sea ice extent had fallen below the 2005 record low absolute minimum and was still melting (NSIDC Arctic Sea Ice News, August 17, 2007). On September 16, 2007, the five-day running mean sea ice extent reported by NSIDC, was 4.13 million sq km (1.59 million sq mi), an all-time record low and a 23 percent reduction from the previous record minimum reported in 2005 (Stroeve et al.

2007). At the end of the melt season (September 16, 2007), sea ice extent was 39 percent below the long-term average from 1979 to 2000 (see Figure 4) (NSIDC Press Release, October 1, 2007). Although we do not have current data on recruitment, survival, and recent movements as we do in the Southern Beaufort Sea, it is thought that the Chukchi/Bering Sea population may be declining due to changing ice conditions in the Arctic combined with the current harvest levels which include the legal, unrestricted harvest in Alaska and the ongoing illegal, substantial harvest in Russia. The harvest decline noted in recent years from western Alaska may also be due in part to a decline in the number of active polar bear hunters from Native hunting villages. Global warming could also affect the seasonal availability and accessibility of polar bears to hunters in both populations due to changes in the sea ice extent and the formation of the pack ice.

In contrast to the Chukchi Sea harvest, overall harvest levels in Alaska from the Southern Beaufort Sea have remained relatively constant since 1980 at 36 bears per year (SD=11.7, n=27). Recent evidence including reduction in population estimates from1800 to 1526 (Regehr et al. 2006), decreased survival of cubs, and decreased weights and skull measurements in adult males, suggests that the Southern Beaufort Sea population is declining. Therefore it is important to adopt a conservative approach to managing the shared Alaskan polar bear populations. Conservative management practices may include establishment of quotas for those villages that harvest from the Chukchi/Bering seas population, a reduction in the sustainable harvest levels for the Southern Beaufort Sea population, and designation of critical habitats. Changes in harvest limits would be decided by U.S.-Russia Bilateral Commission for the Chukchi/Bering Sea population and by the Inuvialuit/Inupiat Commission for the Southern Beaufort Sea.

Polar bears were harvested in every month except June (Table 2). Hunters in western Alaska, from Point Lay to St. Lawrence Island, typically harvest bears after December since bears moving southward with advancing pack ice are not available in this area until later in the season. The high harvest in January, which consists mostly of bears taken from the Chukchi/Bering Sea population, is indicative of the timing and availability of polar bears to hunters in western Alaska. Since 1980, significantly more bears have been harvested in the fall (October - December) in the Southern Beaufort Sea than in the Chukchi Sea (X^2=174.4, df=2, p<.0001).

Ages from the teeth collected from the 2006/2007 harvest (32/67) have not yet been aged and thus we are reporting on the ages from the 2005/2006 harvest. The mean age of females ($\bar{x}$=9.8 years, SD=5.7, n=11) and males ($\bar{x}$ = 7.2 years, SD=5.4, n=19) in 2005/2006 was within the 95% confidence interval of the long term average (since 1980) of 7.2 years (n=569) and 6.6 years (n=1027), respectively (Table 3a). A comparison of the sex and age of the harvest for each Alaskan polar bear population is presented in Tables 3b and 3c. The age class composition determined from first premolar cementum annuli age estimates for 2005/2006 was 64% adult, 13% sub-adults, and 23% cubs (Table 4). In 2005/2006 there was an increase in the number of adults and cubs taken compared to the two previous years when there was a higher than normal harvest of subadults. The long-term (since 1980) age composition of the harvest is 51% adult, 32% subadult, and 17% cubs. Overall the mean ages of both males and females in both populations have remained fairly consistent (Table 5, Table 6). Analysis of sex/age data can be complicated due to hunter selectivity and year to year variation in the availability of different age and sex classes. Small sample sizes prevented meaningful results from an analysis of the proportion of bears ≥10 yrs of age in the Alaska harvest, even when using three-year running averages to smooth some of the

annual variation. Comparison in the age and sex composition of the harvest can be a useful tool for assessing the effects of the harvest. This emphasizes the importance of getting close to 100% compliance with respect to submission of location, age, sex information and samples from the harvest.

The proportion of the harvest for which premolar teeth were obtained during 2006/2007 was 48% (32/67). Since the implementation of the MTRP regulations in 1988, premolar teeth have been collected from approximately 56% of the harvested bears. Collecting complete and accurate harvest age information is fundamental for management decisions and improvement in reporting is needed. Implementation of the following requirements in 2002/2003 have to date not resulted in increased compliance in tagging requirements: 1) A letter of appreciation and a complimentary knife are provided to hunters that provided complete harvest information by the U.S. Fish and Wildlife Service and the Alaska Nanuuq Commission; 2) increased law enforcement; 3) increased payment to the village MTRP taggers for tagging harvested bears, and 4) more frequent visits to the villages by biologists. This under-reporting is part of a continuing trend that is occurring in Alaska. The teeth are used to accurately age harvested bears and this information is critical for understanding harvest demographics as well as trends in the population. **Improvement in harvest reporting is needed!** This issue was raised during the June 2006 North Slope Borough-Inuvialuit Game Council (NSB-IGC) meeting. Several additional ideas were suggested for improving reporting, including: 1) increase coordination through whaling captains (many polar bears taken during whaling activities); 2) develop radio announcements; radio talk shows etc. to increase awareness of the importance of reporting harvest information; 3) provide tagging kits to primary hunters (in addition to existing taggers) so they are available in the field at the time a bear is taken; and 4) develop community posters and brochures showing five-year harvest information to educate people how harvest information is used. The FWS kindly requests that **the Alaska Nanuuq Commission's helps make hunters aware that if you take a polar bear, you must have it tagged within 30 days, and a pre-molar tooth must be provided for aging.** Providing accurate, timely harvest data will help promote sustainable management of Alaska's polar bear populations. If at all possible, please also encourage hunters to provide samples for the ongoing Bio-monitoring Program.

In 1994 polar bear harvest certificates were modified to include a section as to whether a polar bear was taken as part of the normal subsistence hunt or in defense of life and property (DLP). The number of bears taken in defense of life and property, based on 3 year running averages, since 1994 has risen steadily from about 3 per year, to about 12 in 1998, and has remained at about 10 in recent years (Figure 1). Eleven bears were reported to have been taken in defense of life and property in 2006/2007. This apparent increase could be a result of either an increase in reporting by hunters and/or an increase in the amount of time polar bears from the Southern Beaufort Sea and Chukchi Sea populations spend on land and not feeding during the fall open water period. Changing sea ice conditions appear to be affecting the amount of time polar bears spend on shore which could result in an increase in the number of bear-human interactions in coastal villages. The increased use of the coastal habitats by polar bears during the fall in recent years is supported by information from local residents in coastal villages in northern and western Alaska.

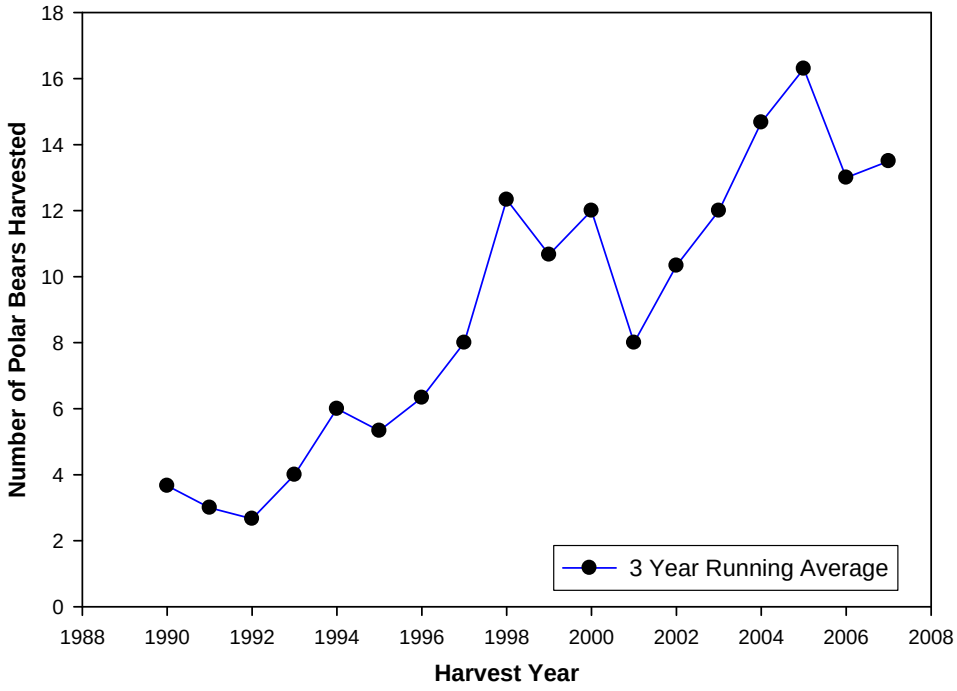

Figure 1. Number of polar bears taken in defense of life and property since 1988.

Polar Bear Management Agreement, Southern Beaufort Sea

The 2006/2007 harvest for villages of the North Slope party to the management agreement with the Inuvialuit, was 19 polar bears; 8 males, 5 females, and 6 of unknown sex (Table 1). No bears were harvested in March to June (Table 2). The sustainable yield estimate for this population is based on a harvest of two males to each female. If the 6 unknown bears were assigned as females, as in customary in the Northwest Territories, Canada, the harvest of females would have been 58% which exceeds the recommended harvest guidelines by 25%.

The sex composition harvest of known-sex animals in 2006/2007 was 61% (8/13) male and 38% (5/13) female. The age class composition, based on ages from previously aged bears 2005/2006 (n=5), was 40% (2/5) adults, 20% (1/5) sub-adults and 40% (2/5) cubs. Hunter estimated age class composition for the 2005/2006 harvest season (n=29) was 55% adults, 31% subadults, and 14% cubs. The long-term (since 1980) age class distribution of polar bears is 48% adults, 39% sub-adults, and 13% cubs. Since 1988/1989 teeth have been collected for ageing from 38% of the subsistence harvest in the Southern Beaufort Sea population. During 2006/2007 teeth were collected from 10% (2/19) of the bears and complete sex information was provided for 68% (13/19) of the harvest.

Polar Bear Monitoring Activities at Barter Island

In 2007 FWS continued with two ongoing studies at Barter Island: 1) Feeding Ecology Study: the purpose is to increase understanding of polar bear foraging patterns along the Beaufort Sea coast of Alaska during the fall open water period, and 2) Interaction Study: the purpose is to document interactions among polar bears, brown bears and humans to minimize dangerous bear-human interactions and to learn more about intra-specific social hierarchy among polar and brown bears.

Polar bear abundance. In 2007, monitoring occurred September 7-29. As in previous years we continued to conduct whole island counts twice daily to estimate the number of bears in the Barter Island area. To compare numbers among all study years (2002-2007), we used data between September 7-26, the core monitoring period that was surveyed each year. Overall, the number of polar bears in 2005-2007 decreased compared to 2002-2004. The minimum, maximum, and mean numbers of bears in 2005-2007 was 0, 37, and 20, respectively, compared to 3, 65, and 36 in 2002-2004. Results are illustrated in Figure 2.

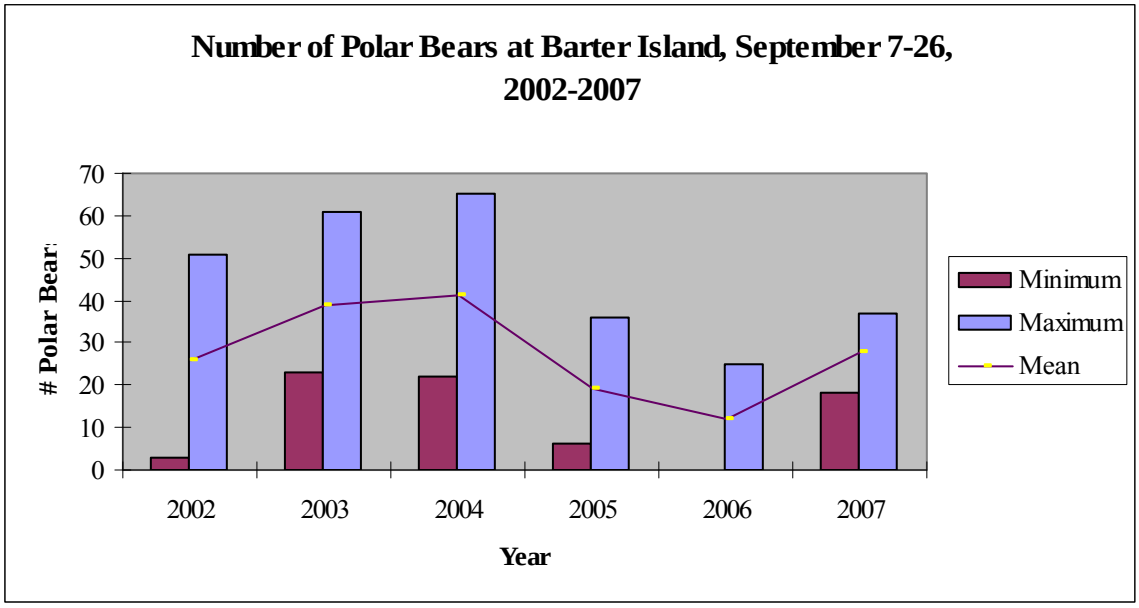

Figure 2. Minimum, maximum, and mean numbers of bears observed at Barter Island, Alaska, 2002-2007.

Use of feeding site. Numbers of bears using bowhead whale remains at the study's feeding site were also lower in 2005-2007, reflecting the lower numbers observed during whole island counts. In 2005-2007, the highest density continued to occur at night (note that the "day" time period was not monitored because results from 2002-2004 indicated that few bears were observed during this time period (average of <1 bear/scan). Table 5 summarizes the number of polar bears/scan observed during dawn, dusk, and night in 2002-2007.

Age/sex composition. In 2002-2007 the age/sex composition of polar bears observed at the feeding site were as follows: 14% mothers, 24% dependent cubs, 32% single adult bears, 10% sub-adults, and 20% bears of unknown age/sex (Figure 3). Caution must be used in interpreting results for single adults, sub-adults and bears of unknown age/sex, since the relatively high proportion of the latter could explain the increase in adults illustrated in Figure 3. However, family groups (mothers and their dependent cubs) were readily identified and rarely, if ever, classified as "unknowns"; therefore, they can be used as an index to examine trends. We noted that the proportion of dependent cubs declined over the study period from 32% in 2002 to 12% in 2007. This apparent decline cannot be considered a population trend for the southern Beaufort Sea (SBS) sub-population of polar bears because polar bears observed at Barter Island constitute a small (<10%) proportion of the overall population (Schliebe et al. in review). However, the decline is consistent with recent trends reported in Regehr et al. (2006) of a decline in litter size of SBS bears during 2001-2006.

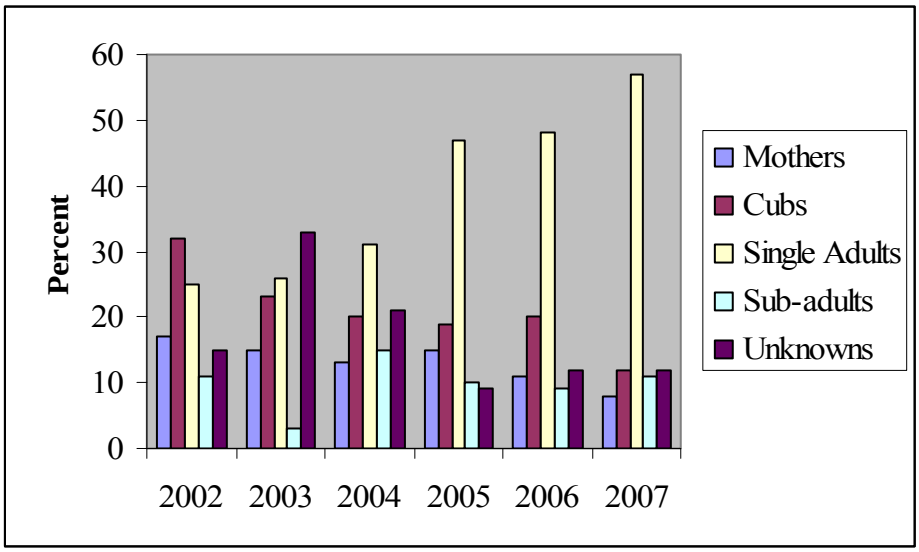

Figure 3. Age/sex proportions of polar bears observed at the Barter Island feeding site, 2002-2007. Mothers = adult females accompanied by dependent cubs; cubs = dependent bears up to 2.5 years of age; sub-adults = single bears 2.5-5 years of age; adults = single bears 5 years and older; unknowns = bears of unknown sex or age.

Activity patterns. Similar to previous years, polar bears appeared to be inactive during day, using Bernard Spit and Drum Island primarily to rest; bear numbers at the feeding site increased during dawn/dusk and were highest at night. Polar bears continued to encounter brown bears at the feeding site. We will be examining the presence of brown bears as a potential factor affecting polar bear density at the feeding site.

During this study, polar bear abundance at Barter and Cross islands constituted a small (< 10%) proportion of the SBS population's estimated 1,526 bears. Schliebe et al. (in review) found that the spatial distribution of bears on shore was not related to carcasses alone, as evidenced by the fact that polar bear abundance varied at Barter and Cross islands despite the consistent availability of hunter

harvested whale carcasses at these locations. Schliebe et al. (in review) also found that abundance of polar bears along shore increases as the distance to ice of 50% concentration recedes from shore, and that ringed seal density (highest near Barter Island) may affect the spatial distribution of polar bears once on shore.

Polar Bear Interaction Study

The annual congregation of bears near Kaktovik has in recent years attracted a growing number of people who wish to view polar bears in a relatively accessible location. One of the primary management goals of the Fish and Wildlife Service for polar bears is to ensure their safe coexistence with humans. This involves identifying and minimizing potentially dangerous bear-human interactions. However, one of the difficulties in understanding and managing polar bear-human incidents in Alaska is that, to date, they have been poorly documented. To better understand how polar bears respond to other bears and humans at the bone pile, we initiated a study in 2005 to record overt reactions by polar bears, which we defined as "an event during which one or more bears respond overtly to the presence of humans or another bear" (Egbert and Stokes 1976). Such reactions may include aggressive or submissive behaviors, such as changes in body position, yawning, salivating, huffing, lip-popping, loud vocalizations, fleeing, charging, and contact (Herrero et al. 2005). For purposes of this study, overt reactions do not include a bear reaction that includes vigilant behavior alone (e.g. bear stops feeding and becomes vigilant in response to a human behavior, then returns to feeding). When overt reactions occurred, we documented the time of occurrence, number, age, sex of bears involved, the reaction distance, and the outcome. If the interaction involved humans, we also noted conveyance type (ATV, truck, boat, etc.) and the conveyance speed, and use of lights or noise. This study also allowed us a unique opportunity to observe and record interactions between polar and brown bears; to the best of our knowledge, this gathering of brown and polar bears is unique and has not been documented elsewhere.

We have not had a chance to complete analysis of data collected in 2005-2007; however a few preliminary findings are highlighted below:

- In 2006-2007, the feeding site was visited by vehicles on average 2-3 times per hour; highest visitation was between 9 p.m. and midnight (avg. 4-5 vehicles/hour); lowest human visitation was between 3:00-6:00 a.m.
- 3-4 brown bears per year (2005-2007); they tended to visit after midnight (because fewer humans present?)
- Polar bears initiated more interactions with humans than brown bears did; most initiated by family groups and sub-adult polar bears and were investigative vs. aggressive
- No approaches of humans/vehicles by adult male polar bears
- Of aggressive interactions that occurred (involving contact, charges, vocalizations, etc.), most were initiated by brown bears
- More difficult to reliably observe brown bears because they frequently appeared to react/avoid spotlights and headlights.

In summary, the potential for polar bear-human interactions to increase exists. Kaktovik is in the process of developing a bear-human interaction plan and **we encourage other villages to strategize on how to minimize conflicts with bears.** It is important to note that polar bears may be increasingly nutritionally stressed when on shore, especially if they remain on shore for extended periods of time. We respectfully seek help from the Alaska Nanuuq Commission representatives and the North Slope Borough to get the message out to all village residents that: 1) because of changes in the sea ice habitat, bear use of shore may increase for longer periods of time (if freeze-up occurs later); these bears may be dealing with increased environmental stress, including lack of food; 2) everyone should make an effort to minimize attractants in villages and prevent polar bears from associating humans with food as this can later result in dangerous bears; and 3) efforts to deter/haze polar bears from villages (rather than shoot them) should be encouraged. Please remind hunters that mothers with cubs and denning bears are the most important part of the bear population and care should be taken to avoid shooting these animals.

Fall Coastal Surveys in the Southern Beaufort Sea

In the fall of 2007, US Fish and Wildlife Service continued aerial surveys of polar bears on the barrier islands and coastline of the Southern Beaufort Sea. Surveys were conducted between Sept 18th and October 19th. A maximum of 77 bears, including dependent young, were observed on Oct 2nd and 3rd between Barrow and the Canadian border.

Fall aerial survey data that was collected each year between 2000 and 2005 has now been analyzed and written up in a publication that is currently under-going peer-review prior to publication in a scientific journal. Results of this analysis were that:

1. Land use in the fall by polar bears in the Southern Beaufort Sea was higher during years when the pack ice retreated further from shore than in years when the pack ice was closer to shore. Yearly variation in land use by polar bears was also related to the density of ringed seals in offshore areas during this time.
2. Bears that came to land occurred primarily within 15 km of subsistence-harvested bowhead whale carcasses. Over 65% of bears observed on land occurred at Kaktovik. The distance to the sea ice decreased and the density of ringed seals offshore increased from west to east along the coastline. Thus, in most years Kaktovik is located closer to the pack ice and may also provide polar bears access to ringed seals earlier when landfast ice forms than other areas of the coast.
3. On average, less than 4% of the Southern Beaufort Sea polar bear population came on land in the fall. A maximum of 8% of the population was observed on land during the study.
4. Polar bears left land for the sea ice once landfast ice formed and the pack ice was within 100 km of the coastline. Thus, the duration of time they spend on land in the fall is related to the length of the fall open-water period.

Polar Bear Bio-monitoring Program

Samples from all sex and age classes continue to be collected in Alaska for contaminant analysis, genetic analysis, food habitat studies, assessment of physiological parameters, and long term archival through the Alaska Marine Mammal Tissue Archival Project (AMMTAP). Alaska samples were also provided to a

circumpolar contaminant study recently conducted to document spatial and temporal trends organic and metal contaminants in polar bears throughout the Arctic.

Two new reports summarizing trace element concentrations in Alaska were published in 2007 (Kannan et al. 2007 and Rush et al. 2007). In the study comparing the two Alaskan populations (Kannan et al. 2007) mercury concentrations were significantly higher in the Southern Beaufort Sea population than in the Chukchi Sea population whereas silver, bismuth, barium, Copper, and tin were higher in the Chukchi Sea population. This data suggests that the sources of contaminants may be different between the northern Southern Beaufort Sea population and the western Chukchi Sea population. In the second study looking at regional differences between Canada, Greenland, and Alaska, mercury and selenium were highest in the Southern Beaufort Sea population and lowest in the Greenland and Hudson Bay populations. Copper and molybdenum were highest in Alaska when compared to Canada. The highest concentrations of vanadium were found in the Alaska and the Hudson Bay, Canada populations. Overall the geographical relationships have changed little in time since the earlier work in the 1980s (Norstrom et al. 1986).

The following observations/scientific findings have been reported in the last few years, making bio-sampling increasingly important for polar bear conservation:

- Decrease in the population size of the southern Beaufort Sea (SBS) stock of polar bears (down from 1800 to 1526 bears) (Regehr et al. 2006)
- Decrease in body condition in SBS polar bears (Regehr et al. 2006)
- Decrease in survival of cubs-of-the-year in SBS polar bears (Regehr et al. 2006)
- Decrease in polar bear skull size in SBS polar bears (Regehr et al. 2006)
- Observations of bear drownings in the Beaufort Sea region (Monnett and Gleason 2006)
- Incidents of prime age bears found dead (ASC and FWS unpublished data)
- Observations of intra-specific predation/cannabilism (Amstrup et al. 2006).

These factors combined indicate that bears may be having a harder time surviving, possibly because of environmental changes. Whatever the reason, it is becoming increasingly important to monitor certain parameters of polar bear health such as body condition, etc. The FWS and ASC are now working in cooperation with the North Slope Borough (NSB) to coordinate efforts to obtain carcasses of bears that have died of apparent natural causes. Carcasses will be examined to assess body condition (signs of starvation) and the presence of diseases in polar bears, as well as to store samples for future studies. Results from these examinations are important for understanding what environmental stressors may be causing polar bear deaths. **If you or someone in your community finds a dead bear, if possible, please photograph and measure the animal, note its location, age/sex, and body condition, and call the FWS at 1-800-362-5148 to report it.** The FWS and partners will collect the carcass (or certain parts) if possible.

Marine Mammal Protection Act Amendments

Marine Mammal Protection Act Re-Authorization

As background, the Marine Mammal Protection Act (MMPA) of 1972 created a moratorium on take of all marine mammals. However, an exception was granted to allow take by coastal dwelling Alaska Natives for subsistence purposes or for creating authentic articles of native handicraft. Harvests could only be regulated if populations were declared depleted or the harvest is wasteful.

In 2003, an amendment package was submitted to Congress after negotiations among the FWS, Alaska Native community, National Marine Fisheries Service (NMFS), and the Marine Mammal Commission. No action has occurred to date, and none is expected to occur during the 2008 legislative session. The amendment package includes language that proposes to: 1) develop authority to regulate harvest of marine mammals prior to depletion through cooperative agreements between the FWS, NMFS and Alaska Native organizations; 2) clarify inconsistencies in the current legislation and address marine mammal/fisheries interactions; 3) address marine mammal strandings; 4) streamline permitting requirements; and 5) address the definition of take by harassment.

Co-Management

The Alaska Nanuuq Commission (ANC) was formed in 1994 to represent Alaska Native hunters concerning issues related to the conservation and subsistence uses of polar bears. The ANC consists of representatives from 15 villages from northern and western coastal Alaska. The ANC executive committee conducted a phone poll on October 4, 2007 to choose a replacement for Charles D.N. Brower on the Joint Committee that was established by the U.S./Russia Polar Bear Bilateral Agreement. The Executive Committee chose Charles H. Johnson to represent the Alaska Nanuuq Commission and Enoch Oktollik as the alternate for the Joint Commission. The annual meeting was held in Nome, Alaska on January 17-18, 2008. Members of Association of Traditional Mammal Hunters of Chukotka (CHAZTO-Russian Acronymn) attended the annual meeting in January.

Co-Management Operations

Charlie Johnson, chairman of IPCoMM, met with members of IPCoMM to review the MMPA language and to pass a resolution asking the Alaska Federation of Natives to support full funding of the Alaska Native Organizations, which includes the Alaska Nanuuq Commission, under section 119 of the MMPA. Full funding for the ANC was not provided in 2007. Charles Johnson, Executive Director of the ANC, participated in two meetings with Shell Oil Company to discuss mitigation and adverse impacts on marine mammals from planned seismic and exploratory drilling in the Chukchi Sea during 2007.

U.S./Russian Polar Bear Bilateral Treaty

The Executive Director and representatives from CHAZTO met at the annual ANC meeting in Nome, Alaska, and finalized the Agreement between the Native Peoples of Alaska and Chukotka.

Incidental Take Program

The MMPA allows for incidental, non-intentional take of small numbers of marine mammals during specific oil and gas activities. The FWS administers an Incidental Take Program that allows for polar bear managers to work cooperatively with oil and gas operators to minimize impacts of their activities on polar bears. Incidental take regulations have been issued since 1993 in the Beaufort Sea. The regulations typically extend for a five year period and the current regulatory period for the Beaufort Sea is 2006 to 2010. The five year regulatory duration is to allow FWS (with public review) to periodically assess whether the level of activity continues to have a negligible impact on polar bears and their availability for subsistence uses.

During 2007, in the Beaufort Sea region, sixteen Letters of Authorization were issued to oil and gas companies for marine, terrestrial, and on-ice activities between Barrow and Kaktovik (Figure 4). Seven companies observed 321 polar bears from 177 sightings (Figure 5). The highest number of bears was recorded in August, where 90 sightings totaling 148 bears were observed. The number of bears seen include repeat sightings of some bears. Sightings of bears has increased from previous years due to a combination of variables – an increased number of bears using the terrestrial habitat, as well as increased compliance and monitoring of industry projects, especially during August and September. The FWS evaluates LOAs with special attention to mitigating impacts to polar bears, such as limiting industrial activities around barrier island habitat, which is important for polar bear denning, feeding, resting, and seasonal movements.

Oil and gas activities continued in the Chukchi Sea region during 2007. The FWS issued one short term (1-year) incidental harassment authorization (one seismic exploration activity). This activity was conducted during the open water period, hence monitoring and mitigation measures were geared primarily towards walruses as few polar bears were present in the Chukchi Sea at this time.

In addition, the FWS received a petition from the oil and gas industry to develop longer term incidental take regulations for the Chukchi Sea region for the period of 2008-2012. The FWS is in the final stages of promulgating regulations. The regulations are expected to be in place prior to the open-water season when continued oil and gas exploration will occur in the Chukchi Sea. The FWS continues to work with oil and gas companies to improve polar bear monitoring and mitigation procedures within and around the North Slope oil and gas fields to limit disturbance to bears and subsistence uses. These include polar bear awareness programs, such as safety training and deterrence training; guidance with industry community plans of cooperation; and creating train-the-trainer curriculum for both polar bear deterrence and polar bear den detection surveys.

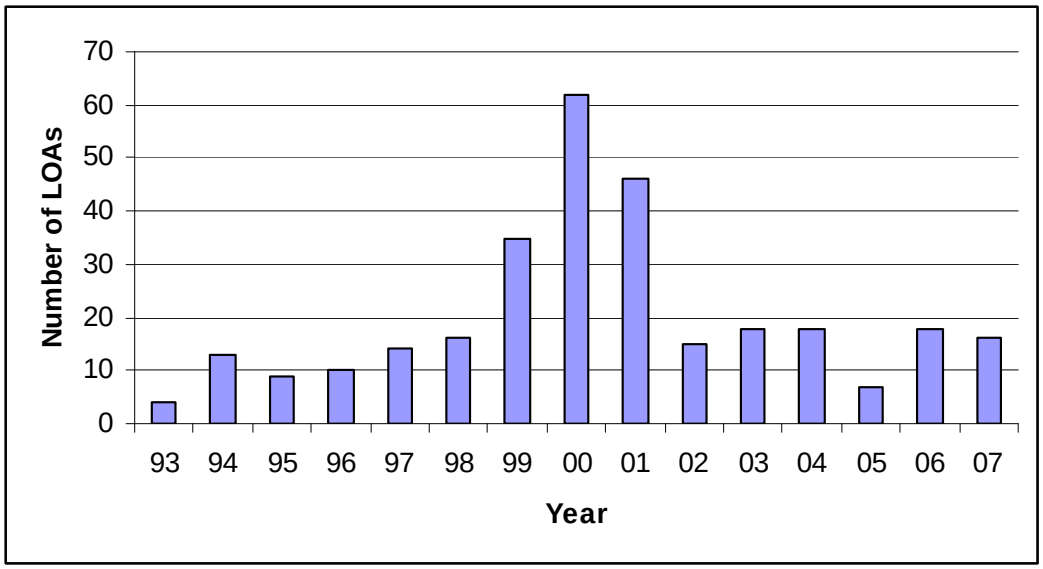

Figure 4. Number of Letters of Authorization (LOAs) issued for the oil and gas industry (1993-2007), North Slope, Alaska.

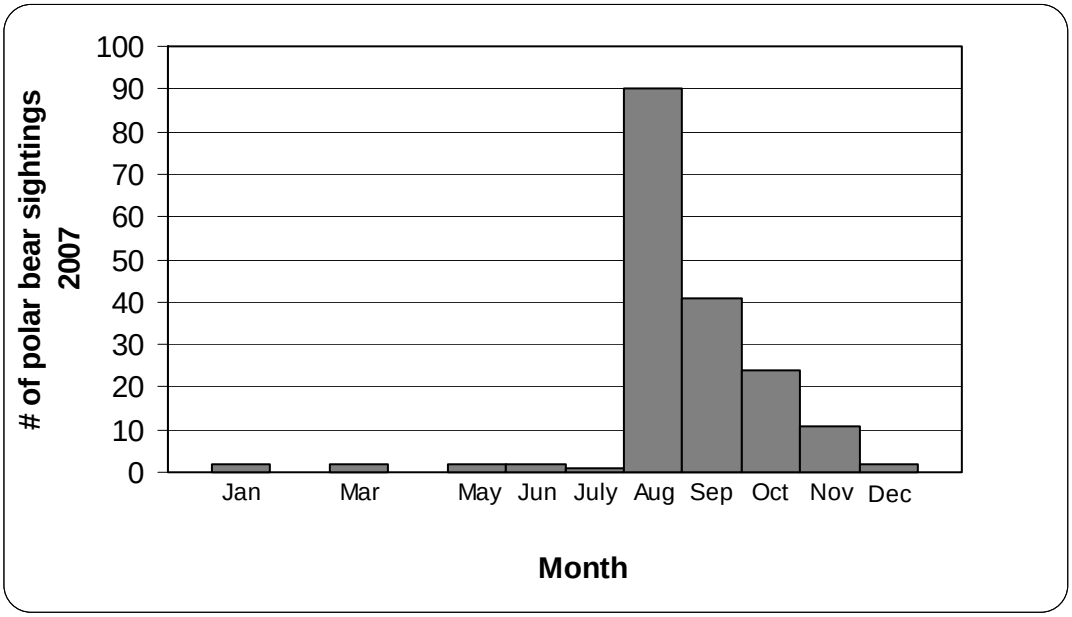

Figure 5. Number of polar bear sightings in 2007 from oil and gas industry monitoring reports, North Slope, Alaska.

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Table 1. Native subsistence polar bear harvest in Alaska by village for 2006/2007 harvest season.

Village	Male	Female	Unknown	Total
Kaktovik*	-	-	-	0
Nuiqsut*	-	-	1	1
Barrow*	7	5	4	16
Atqasuk*	1	-	-	1
Wainwright*	-	-	1	1
Prudhoe Bay	-	-	-	0
Point Lay	-	1	-	1
Point Hope	7	2	-	9
Kivalina	1	1	-	2
Nome	1	-	-	1
Shishmaref	2	-	1	3
Wales	2	1	-	3
Little Diomede	5	3	-	8
Savoonga	4	5	2	11
Gambell	7	3	-	10
Total	37	21	9	67
Percent	(55.2)	(31.3)	(13.4)	(100)

* Villages party to the NSB/IGC management agreement. Harvest season extends from July 1, 2006 to June 30, 2007.

Table 2. Monthly polar bear harvest, Alaska 2006/2007.

Village	Month												
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Kaktovik*	-	-	-	-	-	-	-	-	-	-	-	-	0
Prudhoe Bay	-	-	-	-	-	-	-	-	-	-	-	-	0
Nuiqsut*	-	-	1	-	-	-	-	-	-	-	-	-	1
Barrow*	1	1	2	-	1	5	2	4	-	-	-	-	16
Atqasuk*	-	-	-	1	-	-	-	-	-	-	-	-	1
Wainwright*	-	-	1	-	-	-	-	-	-	-	-	-	1
Point Lay	1	-	-	-	-	-	-	-	-	-	-	-	1
Point Hope	-	-	-	-	-	-	1	2	1	2	3	-	9
Kivalina	-	-	-	-	-	-	-	1	-	1	-	-	2
Kotzebue	-	-	-	-	-	-	-	-	-	-	-	-	0
Brevig Mission	-	-	-	-	-	-	-	-	-	-	-	-	0
Nome	-	-	-	-	-	-	-	-	-	-	1	-	1
Shishmaref	-	-	-	-	-	-	1	-	1	1	-	-	3
Wales	-	-	-	-	-	-	-	-	2	-	1	-	3
Diomede	-	-	-	-	-	3	2	-	1	2	-	-	8
Savoonga	-	-	-	-	-	-	2	-	6	1	2	-	11
Gambell	-	-	-	-	-	-	-	-	-	7	3	-	10
Total	2	1	4	1	1	8	8	7	11	14	10	-	67
Percent	(2.9)	(1.5)	(5.9)	(1.5)	(1.5)	(11.9)	(11.9)	(10.4)	(16.4)	(20.9)	(14.9)	(0.0)	(100)

*Villages party to the NSB/IGC management agreement. Harvest season extends from July 1, 2006, to June 30, 2007.

Table 3a. Mean age of polar bears harvested in Alaska, 2001-2006. Ages based on cementum annuli of the first premolar. N = Number of bears analyzed. M = Mean age. SD = Standard Deviation.

Sex	2001/2002[a]			2002/2003[a]			2003/2004[a]			2004/2005[a]			2005/2006[a]		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Male	(45)	8.8	5.9	(17)	7.3	6.0	(16)	8.1	8.0	(15)	5.0	3.3	(19)	6.5	5.6
Female	(19)	7.9	7.3	(9)	5.3	2.4	(13)	5.2	5.1	(13)	7.4	4.7	(11)	9.8	5.7
Unknown	(2)	6.0	4.2	-	-	-	(3)	11.0	13.9	(1)	2.0	-	-	-	-

[a] Harvest season extends from July 1 to June 30.

Table 3b. Mean age of polar bears harvested in the Southern Beaufort Sea, Alaska, 2001-2006. Ages based on cementum annuli of the first premolar. N = Number of bears analyzed. M = Mean age. SD = Standard Deviation.

Sex	2001/2002[a]			2002/2003[a]			2003/2004[a]			2004/2005[a]			2005/2006[a]		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Male	(12)	6.5	5.2	(6)	7.3	7.7	(6)	6.2	7.8	(3)	3.3	3.0	(3)	1.0	2.0
Female	(3)	2.7	0.6	(5)	6.2	2.7	(9)	5.4	5.5	(6)	6.0	3.9	(2)	14.5	0.7
Unknown	(1)	9.0	-	-	-	-	(2)	15.0	17.0	-	-	-	-	-	-

[a] Harvest season extends from July 1 to June 30.

Table 3c. Mean age of polar bears harvested in the Chukchi/Bering Seas, Alaska, 2001-2006. Ages based on cementum annuli of the first premolar. N = Number of bears analyzed. M = Mean age. SD = Standard Deviation.

Sex	2001/2002[a]			2002/2003[a]			2003/2004[a]			2004/2005[a]			2005/2006[a]		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Male	(33)	9.6	5.9	(11)	7.4	5.3	(10)	9.3	8.2	(12)	5.4	3.4	(16)	7.5	5.5
Female	(16)	8.8	7.6	(4)	4.3	1.5	(4)	4.7	5.5	(7)	8.6	5.4	(9)	8.8	5.9
Unknown	-	-	-	(1)	3.0	-	-	-	-	(1)	2.0	-	(1)	2.0	-

[a] Harvest season extends from July 1 to June 30.

Table 4. Age class of polar bears harvested from Alaska, 2002-2007. Ages based on cementum annuli of the first premolar. Two year old bears are considered sub-adults after April 30. ( ) = Percentage of known age bears by harvest year.

Age Class	2002/2003[a]	2003/2004[a]	2004/2005[a]	2005/2006[a]	2006/2007[a]	Total
Adults (5+ yrs)	15(58)	12(38)	15(52)	19(64)		100(55)
Sub-adults (2.3-5 yrs)	7(27)	16(50)	10 (34)	4(13)	1(100)	54(30)
Cubs (0-2.3 yrs)	4(15)	4(12)	4(14)	7(23)		28(15)
Unknown Age	40	33	37	58	66	198
Total	66	65	66	88	67	352

[a] Harvest season extends from July 1 to June 30.

Table 5. Mean ages of male and female polar bears in the Southern Beaufort Sea since 1980/81. The averages are calculated for all bears (∃1 yrs) and for adult bears (∃ 5 yrs). N = Number of known-age bears analyzed. M = Mean age. SD = Standard Deviation. Harvest season extends from July 1 to June 30.

	Females						Males					
	≥1 year			≥ 5 years			≥ 1 year			≥ 5 years		
Season	M	SD	N	M	SD	N	M	SD	N	M	SD	N
1980-1982	9.6	4.8	7	10.8	3.8	6	6.4	4.2	8	8.6	3.8	5
1982-1985	6.8	4.6	28	10.2	3.8	15	4.9	3.6	42	8.5	3.4	16
1985-1988	6.6	5.0	18	9.5	4.4	11	6.1	5.9	27	13.4	4.6	9
1988-1991	6.6	5.0	8	9.8	5.6	4	7.2	5.9	43	10.9	5.5	24
1991-1994	7.8	6.2	17	11.8	4.9	10	7.2	7.1	34	12.9	6.7	16
1994-1997	7.4	8.6	16	15.2	10.3	6	7.5	6.6	26	11.3	6.5	15
1997-2000	6.5	4.9	8	12.0	3.4	3	6.8	4.5	21	9.4	4.4	12
2000-2003	5.0	3.2	11	8.5	2.6	4	6.6	5.5	23	10.1	5.5	12
2004-2006	6.7	5.4	17	12.0	3.7	11	5.6	6.3	9	11.0	9.6	3

Table 6. Mean ages of male and female polar bears in the Chukchi/Bering since 1980/81. The averages are calculated for all bears (∃1 yrs) and for adult bears (∃ 5 yrs). N = Number of known-age bears analyzed. M = Mean age. SD = Standard Deviation. Harvest season extends from July 1 to June 30.

	Females						Males					
	≥1 year			≥ 5 years			≥ 1 year			≥ 5 years		
Season	M	SD	N	M	SD	N	M	SD	N	M	SD	N
1980-1982	6.8	4.6	43	10.2	4.8	33	5.1	4.0	63	8.6	3.9	27
1982-1985	6.4	4.5	88	9.7	3.4	48	5.9	4.7	181	10.2	4.4	79
1985-1988	6.3	4.8	84	9.8	4.4	42	6.1	4.9	126	9.9	4.6	61
1988-1991	9.4	6.8	50	12.1	6.2	36	7.3	6.4	114	11.6	6.1	60
1991-1994	8.3	5.7	48	12.0	4.5	29	9.8	7.6	65	14.3	6.4	40
1994-1997	7.5	6.5	27	12.8	5.4	13	6.9	6.2	56	12.2	6.0	25
1997-2000	6.8	5.2	42	9.1	5.2	27	6.5	5.4	66	10.4	6.0	30
2000-2003	8.5	7.0	28	12.6	6.1	17	7.8	5.6	64	11.2	5.0	37
2004-2006	7.9	5.4	20	12.0	3.7	11	7.5	5.8	37	10.4	5.3	24

Table 7. Number of polar bears observed per scan (mean ± standard deviation; sample size in parentheses) at the Barter Island feeding site during dawn/dusk and night, 2002-2007.

Year	Dawn/Dusk[1]	Night	Annual Means
2002	3.37 ± 3.11 (17)	8.8 ± 5.4 (31)	6.88 ± 5.37 (48)
2003	3.4 ± 2.2 (14)	7.76 ± 5.98 (27)	6.27 ± 5.41 (41)
2004	3.15 ± 1.9 (22)	8.18 ± 3.32 (26)	5.87 ± 3.73 (48)
2005	0.52 ± 0.54 (16)	2.79 ± 1.83 (24)	1.88 ± 1.83 (40)
2006	1.25 ± 1.41 (20)	3.08 ± 2.09 (28)	2.32 ± 2.04 (48)
2007	1.23 ± 1.19 (17)	5.57 ± 3.71 (24)	3.77 ± 3.63 (41)
Time Period (Means)	2.15 ± 2.19 (106)	6.14 ± 4.71 (160)	

[1] Dawn = 6:00-9:00h., dusk = 18:00-21:00 h; night = 21:00-06:00 h.

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