

U.S. Fish and Wildlife
Polar Bear Program Annual Report
2016



USFWS Photo by Susanne Miller

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Introduction

The U.S. Fish and Wildlife Service (Service) has primary management responsibility for polar bears in Alaska. The objective of the Service's Polar Bear Program is to ensure that polar bear populations in Alaska continue to be healthy, functioning components of the Bering, Chukchi, and Beaufort Sea ecosystems. The Service's conservation activity is largely mandated by the Marine Mammal Protection Act (MMPA) and by the Endangered Species Act (ESA). The U.S. is also a member of international treaties and agreements calling for coordinated polar bear conservation.

Polar bears occur in 19 subpopulations throughout the seasonally and permanently ice-covered marine waters of the northern hemisphere, in Canada, Denmark (Greenland), Norway, Russia and the United States. The U.S. is in the range of two subpopulations: the Chukchi Sea (also referred to as the "Alaska-Chukotka" subpopulation) and the Southern Beaufort Sea. Polar bear subsistence harvest in the Chukchi Sea subpopulation is managed jointly by the U.S. and Russia under the U.S.-Russia Bilateral Agreement on the Conservation of the Alaska-Chukotka Polar Bear Population (US-Russia Bilateral Agreement). The US-Russia Bilateral Agreement, signed in 2000 by government representatives of the U.S. and Russia, identifies goals to improve polar bear conservation and safeguard the cultural and traditional use of polar bears by Native peoples. The U.S.-Russia Bilateral Agreement establishes a Commission that oversees the conservation of the Chukchi Sea subpopulation, conservation of its habitat, and regulates sustainable use by Native people. The Commission is charged with a number of tasks, including the establishment of an annual take limit for the subpopulation. To assist in carrying out its tasks, the Commission formed a Scientific Working Group (SWG). The SWG provides recommendations to the Commission which then determines annual take limits by consensus.

The subsistence harvest of polar bears in the Southern Beaufort Sea subpopulation is managed voluntarily by Alaska Natives in the U.S. under a user-to-user agreement, the Inuvialuit-Inupiat Polar Bear Management Agreement in the Southern Beaufort Sea (I-I Agreement), which was signed in 1988 and reaffirmed in 2000 by the Inuvialuit Game Council, and the North Slope Borough Fish and Game Management Committee. The I-I Agreement provides for annual quotas, hunting seasons, protection of bears in or during construction of dens, females accompanied by cubs-of-the-year and yearlings, collection of information and specimens to monitor harvest composition, and annual meetings to exchange information on the harvest, research, and management. The I-I also establishes a Joint Commission to implement the I-I Agreement, and a Technical Advisory Committee, consisting of biologists from agencies in the U.S. and Canada involved in research and management, to collect and evaluate scientific data and make recommendations to the Joint Commission.

This report summarizes activities of the Service's Marine Mammal Management Polar Bear Program for the calendar year of 2016. This report supports the Polar Bear Program's primary objective: to ensure that polar bear populations in Alaska remain a healthy, functioning component of the Bering, Chukchi, and Beaufort Seas ecosystems.

Mortality

Reported Polar Bear Mortality

In 2016, a total of 33 polar bear mortalities were reported (Table 1). This includes 29 bears killed for subsistence purposes from eight communities, and four polar bears killed in defense of life (Tables 1, 2). 2015 polar bear mortalities included 13 bears reported as harvested for subsistence purposes from four communities and two killed in defense of life in 2015 (Tables 1, 2). Additional reports for bears harvested in 2016 are expected to be submitted and will be reported in the 2017 annual report.

Table 1 shows the number and type of reported human-caused polar bear mortality over the last ten years (2007-2016). Of the 453 bears reported as removed, 270 bears were reported as male, 98 as female, and the sex was reported as unknown or was not reported for 85 bears. The majority of mortalities occurred in spring (March, April, and May) (Figure 1). In addition to the 453 reported bear mortalities from human causes, six bears were reported with unknown causes of death; three were reported in 2012, two in 2013, and one in 2014. Nine bears were reported as having died from natural causes from 2007 to 2016.

Reported annual polar bear harvest by Alaska Natives averaged 39 bears for the period from 2007 to 2016 (Figure 2), and ranged from 13 bears (in 2015) to 74 bears (in 2012). Hunters must make every effort to increase tagging compliance in order to meet the terms of the U.S.-Russia Bilateral and I-I Agreements.

Table 1. Number and type of reported human-caused polar bear mortalities in Alaska, 2007-2016.

Removal Type	Year										TOTAL
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Subsistence	62	36	21	21	55	71	51	22	13	29	381
Defense of life	-	1	4	3	2	2	6	-	2	4	24
Defense of property	3	-	-	-	1	1	4	-	-	-	9
Defense of life and property	3	3	5	3	3	8	-	-	-	-	25
Research mortality	-	-	1	-	-	-	-	-	-	-	1
Industry	-	-	-	-	1	-	-	-	-	-	1
Struck and lost	-	-	-	1	-	3	1	2	-	-	7
Zoo collection	-	-	-	-	1	-	1	-	-	-	2
Euthanized	-	1	-	-	-	-	-	-	-	-	1
Defense of life (by non-Natve Alaskan)	-	-	-	-	-	-	-	2	-	-	2
TOTAL	68	41	31	28	63	85	63	26	15	33	453

Table 2. Reported polar bear harvest by Alaska Natives, by community, in Alaska, 2015-2016.

Community	Polar Bears (Number)			Total
	Female	Male	Unknown	
2015				
Barrow	0	3	0	3
Kivalina	0	1	0	1
Point Hope	0	3	1	4
Wainwright	0	4	1	5
Total	0	11	2	13
Percent	0	85	15	N/A
2016*				
Barrow	2	7	0	9
Gambell	0	2	0	2
Kaktovik	1	0	0	1
Little Diomedede	0	2	0	2
Nuiqsut	0	0	2	2
Point Hope	1	4	0	5
Shishmaref	0	1	0	1
Wainwright	1	2	4	7
Total	5	18	6	29
Percent	17	62	21	N/A

* Additional harvest reports from 2016 are expected and will be reported in the 2017 annual report.

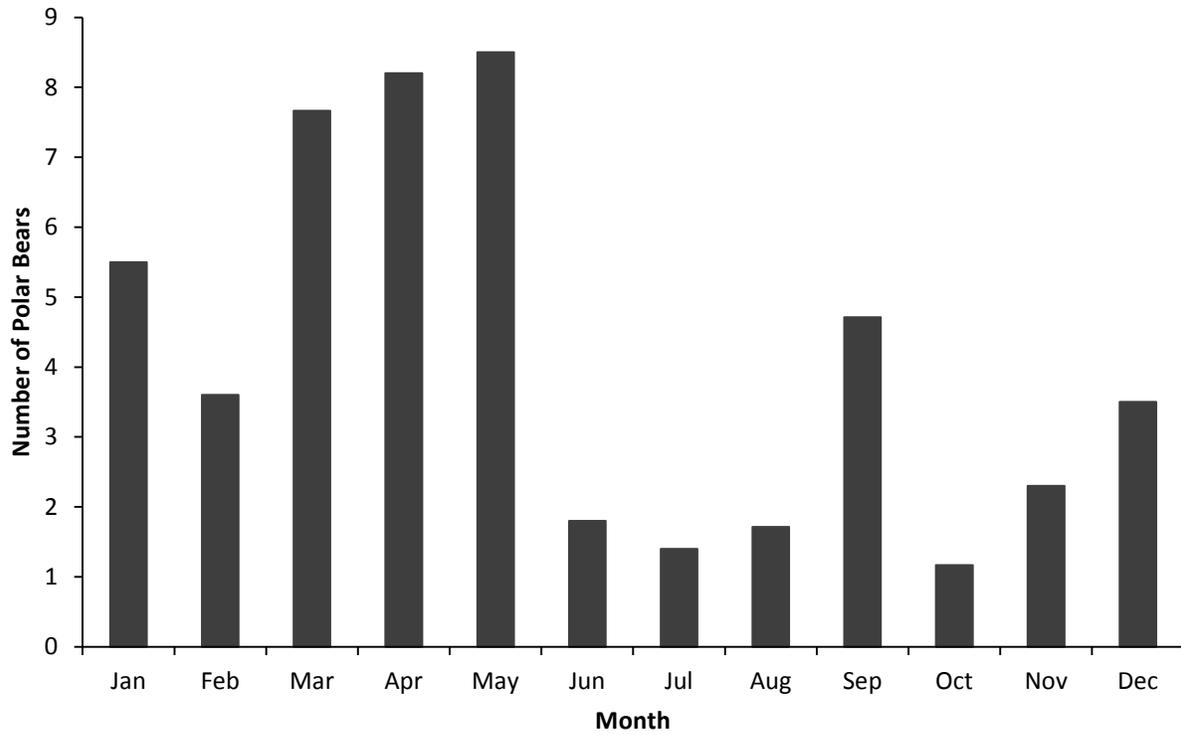


Figure 1. Average reported human-caused polar bear mortality in Alaska, by month, 2007-2016.

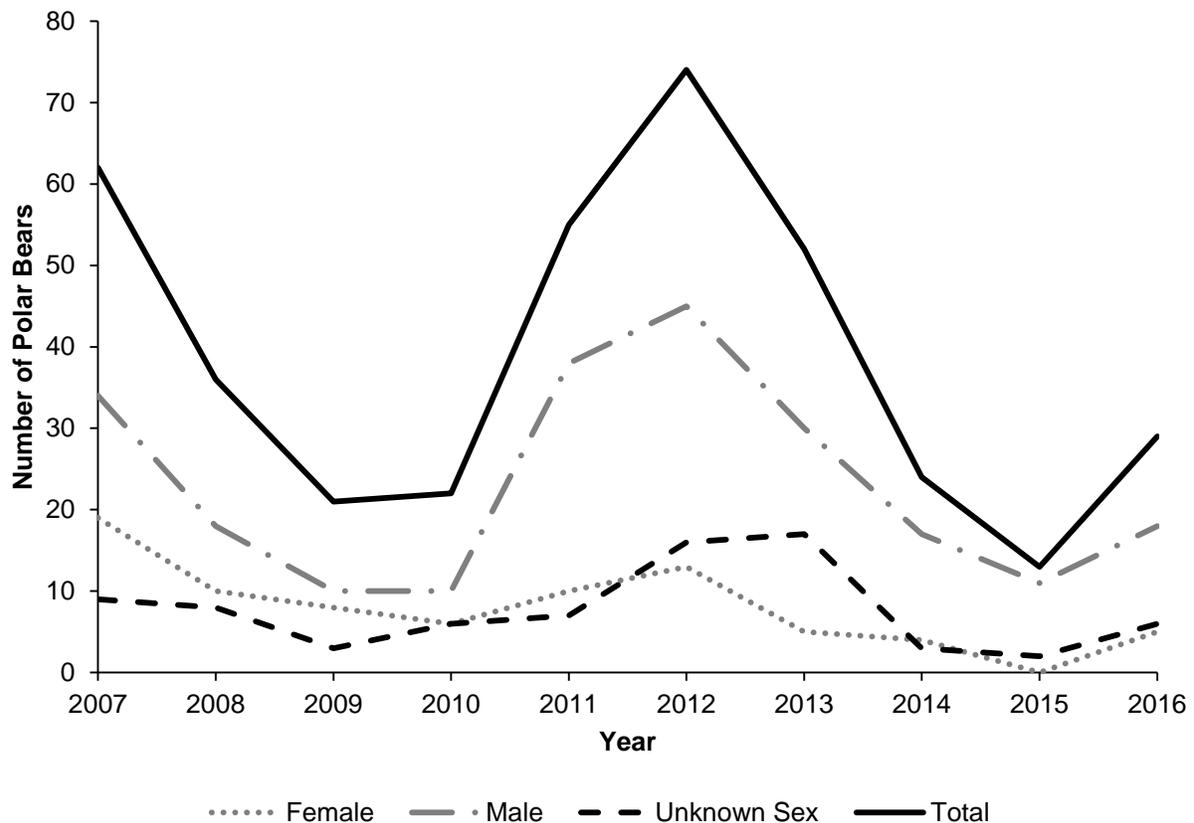


Figure 2. Reported polar bear harvest by Alaska Natives, 2007-2016.

Marking, Tagging, and Reporting Program Review

With the assistance of local taggers in Alaska’s communities, the Service’s Marking, Tagging, and Reporting Program (MTRP) receives, tracks and analyzes data and samples on polar bears harvested by Alaska Natives during subsistence activities. Receiving accurate and timely harvest data helps the Service to sustainably manage Alaska’s polar bear populations, allows for documentation of traditional subsistence use, and provides information for monitoring the health and status of polar bears in Alaska. This information is critical to enabling the Service and partners to manage polar bears and human activities for continued subsistence opportunities.

The Alaska Department of Fish and Game (ADFG), the Alaska Nanuuq Commission (ANC), and the Service conducted a review of the Service’s Alaska-Chukotka polar bear subpopulation harvest database compiled by the MTRP. The review identified needed polar bear harvest reporting improvements and provided recommendations to enhance effective implementation of the US-Russia Bilateral Agreement and co-management between the Service and ANC. The final report was published as an ADFG Wildlife Technical Bulletin in late 2016 (Schliebe et al. 2016). For more information on the MTRP, please contact Brad Benter.

Research and Monitoring

Fall Coastal Surveys in the Southern Beaufort Sea

Fall coastal surveys for polar bears along the northern Alaskan coastline, between Barrow, Alaska, and the Alaska/Canada border, were conducted by the Service between 2000 and 2014. Since 2014, the Service has analyzed those data to estimate the weekly number of polar bears on shore in fall; identify annual trends, if any, in the number of bears on shore; and determine which factors influence the number and distribution of bears along the coast. Final results suggest:

- The mean annual number of polar bears onshore during the study was 140 (95% C.I.; 127 – 157).
- The number of polar bears on shore each week was strongly related to sea ice conditions; with more bears on shore when ice return dates were later.
- Distribution of polar bears on shore was affected by sea ice conditions, presence of barrier islands, and presence of subsistence-harvested whale carcasses. Polar bears tended to occur in greater numbers in areas with whale remains, more barrier island habitat, and earlier dates of sea ice return in fall.

The Service submitted the final analysis for peer review in December 2016, and anticipates a final publication available in 2017. There are no plans for a coastal survey in 2017. The Service is currently discussing, based on the current study results and information needs, whether to continue fall coastal surveys in future years, and if so, the level of effort that will be required to obtain the desired information. For more information please contact Ryan Wilson.

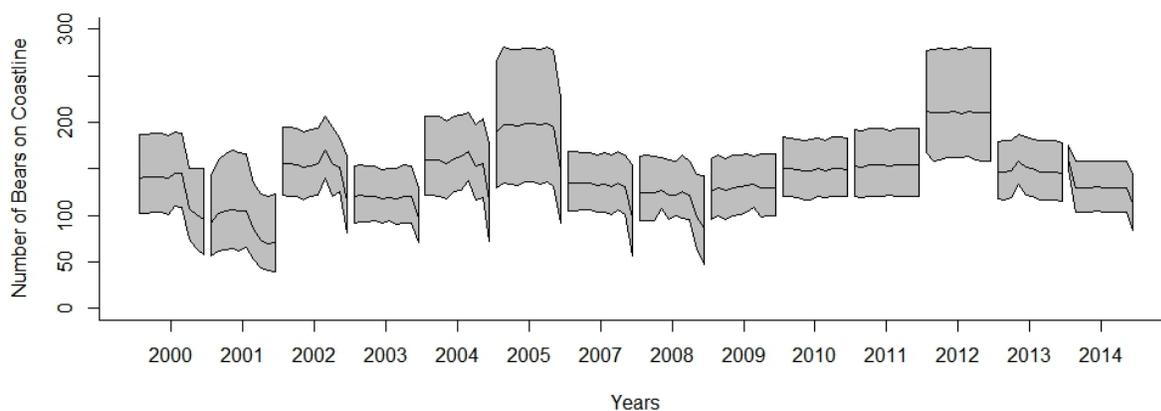


Figure 3. Weekly (late August through late October) population size estimates of polar bears along the coastline of northern Alaska, from Barrow, Alaska to the Canadian Border, 2000-2014, excluding 2006.

Chukchi Sea Polar Bear Study

Accurate scientific information is needed for management and conservation of the Chukchi Sea subpopulation of polar bears. The Chukchi Sea subpopulation inhabits the Bering, Chukchi, and eastern Siberian seas, located west of Alaska. The Service and collaborators reinitiated research on the Chukchi Sea subpopulation in 2008. Focal areas of study include nutritional condition, health, and feeding ecology; distribution and habitat use; and population dynamics (e.g., reproductive and survival rates). Spring 2016 marked the seventh year of fieldwork for this project. We captured, collected information from, and released 71 polar bears on the sea ice between the communities of Point Hope and Shishmaref, from March 21 to April 26, 2016. We expanded geographic sampling to north of the Lisburne Peninsula by using the Cape Lisburne Long Range Radar Site as a fuel depot, to increase sampling of bears that may use habitats in the Chukchi Sea 193 Lease Sale Area. Open water and poor ice conditions limited our ability to work north of the Lisburne Peninsula. We deployed 14 Global Positioning System and three Argos satellite system radio collars on adult females, which are designed to drop off after one year. We also deployed eight small ear-mounted satellite tags, four small glue-on satellite tags, and 15 geolocation tags. Similar to observations in previous years and published findings (Wilson et al. 2014), research in 2016 indicated that the offshore area between Point Hope and Shishmaref is important habitat for the Chukchi Sea polar bear subpopulation.

Using data from this research project, a study describing changes in habitat selection patterns of polar bears in the Chukchi Sea was recently published (Wilson et al. 2016). Several other analyses are in preparation, including assessments of changes in fasting status of bears while on ice, and estimates of population abundance and vital rates (see *Chukchi Sea Demographic Analysis*). The Service and its collaborators plan to continue this project in 2017 subject to funding availability. For more information, please contact Eric Regehr.

Chukchi Sea Demographic Analysis

Estimates of demographic parameters are required for management and conservation of the Chukchi Sea subpopulation, including identification of a sustainable harvest level under the U.S.-Russia Agreement. The Service, U.S. Geological Survey (USGS), and partners have analyzed data collected during live-recapture research on the Chukchi Sea subpopulation conducted during the periods 2008-2011, 2013, and 2015-2016. The core data consist of 421 physical captures collected during springtime sampling in the U.S. portion of the Chukchi Sea region between the Seward and Lisburne peninsulas; and movement data from 107 radiocollars and 77 ear-mounted or glue-on satellite tags. Auxiliary data that were analyzed in the same modeling framework include search effort from helicopter tracklogs, information on whether bears denned successfully (obtained from radiotelemetry data), spring-time weaning status of two-year-olds, and litter size distribution of yearlings.

The goals of the analysis were to estimate abundance and vital rates (e.g., recruitment, survival) and/or related indices for this subpopulation. Challenges included relatively small sample sizes, the fact that the U.S.-based sampling area did not cover the entire geographic range of the Chukchi Sea subpopulation, and movement of animals in and out of the sampling area within and among years (i.e., temporary emigration). To address these challenges we developed a multi-event, integrated capture-recapture model that was based on the polar bear life cycle and

included “un-observable states”, which allowed us to model the movement of bears with respect to the sampling area and thus reduce potential bias in estimated parameters. Density estimates (bears/km²) were derived for the sampling area and then extrapolated to larger geographic areas of interest (e.g., the management boundaries of the Chukchi Sea subpopulation) based on indices of habitat use derived from resource selection functions. The model was developed using custom software in a Bayesian framework to increase flexibility and allow integration of multiple data sources, which is not possible using packaged software (e.g., Program MARK). Estimating abundance is one of the most challenging aspects of wildlife research, and the results of this analysis are characterized by large uncertainty and caveats. Nonetheless, it represents the first quantitative estimates of demographic parameters for the Chukchi Sea subpopulation, derived using methods designed to mitigate the problems associated with previous capture-recapture studies that had a similar sampling design. The Service and partners are planning to publish findings from this analysis in 2017. For more information, please contact Eric Regehr.

Instrument-Based Aerial Surveys for Ice Seals and Polar Bears

The National Marine Fisheries Service, in collaboration with the Service and other partners, conducted instrument-based aerial surveys for ice seals and polar bears in U.S. portions of the Chukchi Sea region in spring 2016. Surveys consisted of 25 flights totaling 15,720 km (9,768 mi) of search effort in Alaska. Concurrent surveys were flown by a Russian research team in Russian portions of the Chukchi Sea region. This study did not involve physical capture of animals or rely on direct human observation of marine mammals. Rather, data were collected remotely via an array of thermal cameras on which marine mammals show up as “hot spots”, and high-resolution digital cameras that can subsequently determine the species of animal. Preliminary results suggest that images from the thermal-digital camera combination, when processed using automated software, successfully detected approximately 75% of the polar bears on the surface of the sea ice. Therefore, based on a study design analysis that was completed prior to the surveys (Conn et al. 2016), it is likely that the instrument-based approach will provide a useful estimate of abundance for the Chukchi Sea polar bear subpopulation. Results from this effort are expected to be published in 2018 or 2019. For more information, please contact Eric Regehr.

Bear Den Detection Study

The Arctic Landscape Conservation Cooperative-sponsored and Service-supported snow-drift modeling project for polar bear dens concluded in 2016. In 2015, we published a paper (Liston et al. 2015) describing the results of the project. This project developed a denning habitat model that mimics the physical interactions of snow, wind, terrain, and ground cover and forecasts where and how snow will drift later in the season. This predictive model will be an additional tool to aid the Service with prediction and identification of potential den habitat prior to industrial activity. A “freeware” application of the model designed for use by managers and the public is currently under development. The Service facilitated an initial two-day development workshop in February, 2016, and another was held in August 2016 to finalize the model and distribute it to interested parties.

The Service, in cooperation with ADFG and the University of Alaska Fairbanks, is supporting efforts to use FLIR-equipped (forward looking infrared) unmanned aircraft systems (UASs) to

optimize den detection techniques. A graduate student is currently using a UAS to test, refine, and improve detection techniques on both radio-collared and unmarked polar bears. While evaluating the feasibility of UASs, they will further analyze the effects of weather conditions and snow characteristics on the probability of detection using this technique. Testing is scheduled during the winter of 2016-2017. For more information, please contact Craig Perham.

Collaborative Polar Bear Studies on Wrangel Island

During 2016, a pilot study was conducted on Wrangel Island by members of the Wrangel Island State Nature Reserve and the Service to evaluate feasibility of conducting polar bear surveys. Objectives of the first year of this cooperative study included:

- a. Establish a working relationship between Russian and U.S. colleagues.
- b. Evaluate polar bear body condition in autumn.
- c. Evaluate activities of polar bears on land (for example, resting or feeding).
- d. Gather field data on characteristics of observed polar bears: sex and age composition of animals encountered, family group composition (including their sex, age, and reproductive status).
- e. Assess areas for placement of hair snare stations, possible biopsy darting and capture locations.
- f. Train inspectors to identify bears by age and sex to help with consistent field information gathering in future surveys.

The survey, conducted using all-terrain vehicles, occurred between 28 September and 16 October, 2016, and covered more than 1,000 km. During the survey 179 polar bears were recorded, including 52 adult males, 16 adult females, 3 adults of unknown sex, 3 sub adults of unknown sex, and 36 bears of unknown sex and unknown age. This also included 27 family groups (9 groups of a female and one cub-of-the-year; 10 groups of a female and two cubs-of-the-year; 3 groups of a female and one cub older than one year; and 5 groups of a female and two cubs older than one year).

Of those that could be identified, 75% of the individual animals were classified as having a body condition of “3,” 24% of the individuals were classified as having a body condition of “4,” and 1% was classified as having a body condition of “2.” The bear with a body condition of “2” appeared to be either sick or injured as it did not move when passed. We also recorded one dead cub-of-the-year on Brutch Spit (not included in count); the cause of death was unknown.

During the survey, the majority of the bears (52%) were observed resting. The majority of those expressing motion (46%) – walk, run, climb, and swim were possibly reacting to our presence. Two bears were observed feeding, and both were eating something old, not fresh. One was feeding on a piece of old walrus skin, while we could not identify the food source of the second bear.

We plan on additional years of collaborative work on Wrangel Island with the Reserve and the All-Russian Research Institute of Nature Protection in order to provide critical information on the ecology and status of the A-C polar bear population. For more information, please contact Craig Perham or Eric Regehr.

Reducing Human-Bear Conflicts

Incidental and Intentional Take Program

Under the Incidental and Intentional Take Program, citizens or groups covered by incidental take regulations, such as oil and gas operators, may apply for a Letter of Authorization (LOA), which, if granted, allows for incidental “take” (as defined under the MMPA) of polar bears during authorized activities. Prior to issuance of an LOA, the Service requests companies submit, with the Service’s assistance, if necessary, a plan of cooperation. Most “take” resulting from industry interactions with polar bears is limited to short-term changes in bear behavior (e.g., a bear may avoid or investigate an area of industry activity). The LOAs include measures to minimize such impacts; examples include proper management of “attractants” (such as food and garbage) or placement of a “no activity” one-mile buffer around known dens. At present, regulations for incidental take related to oil and gas activities are in effect in the Chukchi Sea region until 2018. New regulations for the Beaufort Sea region were promulgated in August 2016 for a five-year period.

Directed take (also referred to as intentional harassment or deterrence) authorization is requested when bears may need to be deterred from human-use areas. An example of this type of take is the North Slope Borough’s (NSB) Polar Bear Patrol Program, funded by the Service. The NSB’s program works with coastal communities to deter bears. A similar program exists in the oil field areas.

For both incidental and intentional take activities, LOAs include monitoring and reporting requirements. Monitoring and reporting results provide a basis for evaluating current and future impacts of activities on bears. In 2016, the Service issued 239 incidental take LOAs to oil and gas companies for marine, terrestrial, and on-ice activities in the Beaufort Sea region and two incidental take LOAs for offshore environmental study activities in the Chukchi Sea. The Service also issued 19 intentional take authorizations. Monitoring data are not yet available for 2016.

During the most recent five-year period for which data are complete (2010 to 2014), the oil and gas industry reported a total of 1,234 observations of 1,911 polar bears. Of the 1,911 bears observed, no incidental (disturbance) take of bears were reported for 81 percent of the bears (1,549 bears). Of the remaining 362 bears observed, incidental takes were reported for 78 bears. The oil and gas industry reported intentional takes by deterrence activities for 260 bears. Effects were unknown for 23 bears, and one lethal take of a bear occurred as a result of industrial activity. For more information, please contact Christopher Putnam.

Polar Bear Deterrence Trainings

The Service works with partners to conduct polar bear training programs, such as polar bear

awareness and safety, polar bear deterrence, and train-the-trainer programs. In 2016, the Service conducted eight training courses, with a total of 73 participants. Fifty-two students attended six polar bear deterrence training courses and 21 students completed two separate train-the-trainer courses. The Service published a polar bear deterrence train-the-trainer manual in 2016. The manual will be incorporated into polar bear safety and deterrence trainings and will help establish a polar bear deterrence training standard for Alaska. The manual will be available on-line in 2017. For more information please contact Craig Perham or Christopher Putnam.

Oil Spill and Emergency Response

Oil Spill Response

The Service recently completed the *Oil Spill Response Plan for Polar Bears in Alaska* (OSR Plan; U.S. Fish and Wildlife Service 2015) to provide guidance to Service employees and anyone else who would be involved in polar bear response during an oil spill in Alaska. The OSR Plan includes information on preventative measures to keep bears out of oil, such as early detection and deterrence, as well as guidance on treatment of oiled bears, such as washing and holding protocol. Appendices include information on collecting carcasses; location/inventory of equipment and supplies; and a list of potential holding facilities and response partners that could be called upon to assist. In 2016, The Service conducted an annual trip to Prudhoe Bay in cooperation with response partners to inventory polar bear response equipment and supplies, and to practice mobilizing equipment such as the polar bear holding cages (Figure 4), washing tables, and culvert traps. For more information, please contact Susi Miller.

Emergency Response

In 2016, the Service responded to reports of a polar bear wearing a tight (and potentially injurious) collar in Kaktovik. This same bear was sighted in 2015, but the Service was unable to conduct a response. In August, the Service, along with staff from the USGS, Environment and Climate Change Canada, a local veterinarian, and the Native village of Kaktovik, successfully captured the bear and removed the collar. For more information, please contact Michelle St. Martin.



Figure 4. Alaska Clean Seas (an industry-sponsored oil spill response organization), Alaska Zoo, and Service staff work together to practice mobilizing polar bear holding and transport cages.

Oil Spill Modeling

In 2016, the Service initiated a study to determine the potential effects of oil spills in the Chukchi and Beaufort Seas during autumn. The Service contracted with RPS-ASA to perform the spill simulations at four sites in the Beaufort Sea where oil production occurs, and four sites in the Chukchi Sea where production may occur in the future. Simulations at Beaufort Sea wells were for a discharge of 4,800 barrels/day from an underwater pipeline release, for six days, and for a period of 50 days following the spill. Alternatively, simulations in the Chukchi Sea allowed for an underwater ‘blowout’ with a 30-day release of 25,000 barrels/day, and for a period of 75 days following the spill. The model predicted the probability that different areas of the ocean and coastline were oiled for all scenarios (Figure 5) and the location and density of oil during each day of the simulation. Data derived from this study are currently being used to determine how much polar bear habitat would likely be affected by an oil spill in each region, and how many bears might be exposed to oil if a spill were to occur. This information will be useful for planning purposes on how to respond to an oil spill, how large of a response might be needed, and where resources might be best deployed. The simulation component of the study was completed in June 2016 and the Service expects to complete an assessment of the potential

impact to polar bears by mid-2017. For more information, contact Ryan Wilson.

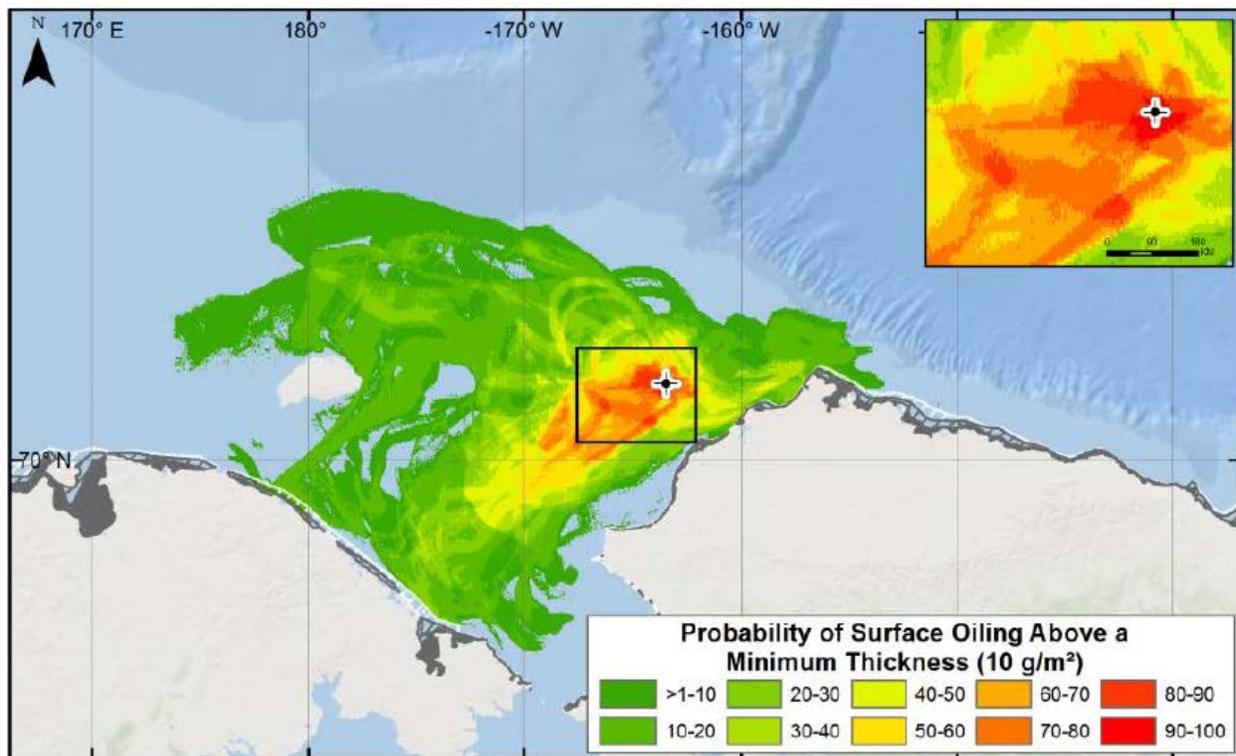


Figure 5. The probability of surface oiling of a thickness greater than or equal to 10g/m² after a 45-day release period at a hypothetical well in the Chukchi Sea.

Community-Based Conservation

Kaktovik

The Service's Polar Bear Program has been conducting community-based conservation activities at Kaktovik (on Barter Island) annually during the fall open water period since 2002. The overall goals are to monitor bears that come to shore and aggregate near the community, and to minimize human-bear conflicts. In recent years, growing tourism has resulted in an increasing need for the Service's Arctic National Wildlife Refuge to manage boat-based polar bear viewing on Refuge waters surrounding Kaktovik. In 2016, the Polar Bear Program and Arctic Refuge conducted field work based in Kaktovik from August 25 to October 14, 2016; results are summarized below.

Biological Monitoring

During the core monitoring period (September 7-26) we observed a minimum, maximum, and average of 30, 71 and 45 bears respectively from twice-daily counts (Figure 6). We observed at least ten family groups, two of which had triplet cubs-of-the-year. Lone adult male, female, and sub-adult bears were also observed, as well as one cub believed to be an orphan. The multi-year

(2002-2016) average number of bears counted per day during the core monitoring period is 30 bears. Fifty-one bears were present as early as August 17, 2016, and 38 bears were still present on October 13, 2016. Local residents reported that about 10 bears remained in the area until mid-November, most of which were family groups and sub-adult bears. These observations are similar to recent scientific findings (Atwood et al. 2016) that polar bears in the Beaufort Sea are arriving earlier on shore, increasing their length of stay, and departing later back to sea ice.

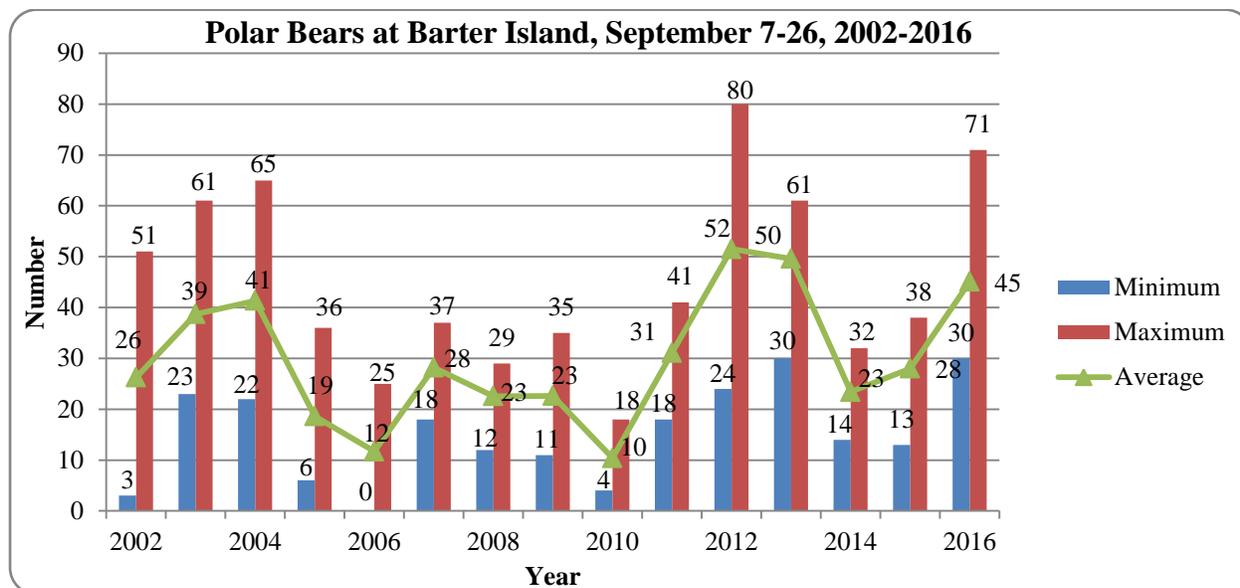


Figure 6. Polar bear counts at Barter Island, Alaska, during the core monitoring period from September 7 to 26, 2002–2016.

Polar Bear Patrols

Since 2010, the Service has been providing funding, training assistance, and on-the-ground support to the NSB Polar Bear Patrol program in Kaktovik. This program involves specially trained local residents who provide a critical safety function for their community and contribute to polar bear conservation by deterring bears from the village using non-lethal methods. Effective patrols helped to ensure that no bears were killed in conflict situations during the 2016 field season.

In April 2016, the Service trained six polar bear patrollers in the community of Wales to effectively deter polar bears from their community. This initiative was a joint effort between the ANC, the World Wildlife Fund, and the Service. The training was a continuation of a polar bear awareness and safety training course in Wales in July 2015 and a culmination of a year-long initiative to bring all cooperators together. The two-day training in 2016 included a classroom session, with information on bear biology, bear behavior, radio communication, safety, and a tabletop exercise, and field-based training scenarios. The training was well received and all participants requested more training.

Attractant Management

One continuing issue of concern is that polar bears are able to obtain food rewards within town when hunter-harvested subsistence foods such as marine mammal meat and blubber are openly stored in proximity to people's homes. Once bears become food-conditioned, it becomes more difficult for Polar Bear Patrol to keep them out of town. To help address this issue, four custom-made bear-resistant food storage lockers (Figure 7) were provided by Defenders of Wildlife in 2015 to facilitate the storage of subsistence foods in a manner that prevents bears from receiving food rewards. In 2016, Polar Bear Program staff met with the residents using the food storage lockers and learned that the lockers had been extremely effective at preventing bears from obtaining food rewards. An additional eight families signed up to try the food storage lockers in 2017; USFWS and Defenders of Wildlife are currently working on obtaining funding to construct and delivery the new food lockers prior to the 2017 bear season.



Figure 7. Bear resistant food lockers, donated by Defenders of Wildlife, are being tested by households in Kaktovik (Photo courtesy of Karla Dutton, Defenders of Wildlife).

Recreational Viewing

In 2016, eight commercial boat-operating businesses and 11 additional commercial guide companies received commercial use permits for guiding recreational viewers on Arctic Refuge waters surrounding Kaktovik. To pro-actively avoid potential negative impacts to polar bears

from recreational viewing, and to address visitor concerns about potential crowding while viewing polar bears, Arctic Refuge implemented a voluntary 30-yard distance buffer for boats viewing polar bears in 2016. Polar Bear Program staff continued to assist Arctic Refuge to “meet and greet” visitors; by working with the Kaktovik Youth Ambassadors to deliver polar bear safety and awareness information; and to provide input on the Refuge’s efforts to develop a comprehensive polar bear viewing management strategy that will address the significant increases in polar bear viewing that is occurring around Kaktovik.

Commercial Photography and Filming

Commercial photography and filming of polar bears can be conducted with permission from the appropriate landowner. Additionally, a Service-issued “take” permit is also required when any change to a bear’s natural behavior (i.e., disturbance) is expected as a result of the proposed activity. To obtain a “take” permit, an applicant must submit a detailed description of the proposed activity. The permit application is reviewed by the Service, and is also made available for public comment. Once issued, permits contain specific conditions that are designed to minimize disturbance to polar bears. In 2016, no new permits for commercial filming/photography of polar bears were issued.

For more information on community-based conservation activities at Kaktovik, please contact Susi Miller.

Endangered Species Act

Polar Bear Conservation Management Plan

In 2008 the Service listed polar bears as threatened throughout their range under the Endangered Species Act (ESA) due to observed and projected declines in their sea-ice habitat associated with climate change (73 FR 28212). Both polar bear population size and range are projected to decrease in the foreseeable future. Consistent with the MMPA and ESA, the Service convened a Polar Bear Recovery Team to develop a draft Conservation Management Plan (Plan) for polar bears that outlines recovery criteria and to help guide management and research activities. The Service released the final Plan (USFWS 2016) in January 2017. For more information, please contact Jim Wilder.

Critical Habitat

In 2010, the Service designated critical habitat for the polar bear (75 FR 76086). On January 11, 2013, the U.S. District Court for Alaska issued a summary judgment in a lawsuit challenging the designation of critical habitat for polar bear (Oil and Gas Association v. Salazar, Case No. 3:11-cv-0025-RRB). This judgment vacated the critical habitat designation. On February 29, 2016, the Ninth Circuit Court of Appeals upheld the critical habitat designation (Alaska Oil and Gas Association v. Jewell, Case No. 13-35619), reversing the district court’s previous finding. Therefore, polar bear critical habitat as designated in 2010, has been restored. For more information, please contact Charles Hamilton.

5-Year Review

The Service is required to review the status of each federally-listed species every five years to evaluate whether the species should be delisted, reclassified, or if the species' classification should not change. The Service is currently developing a 5-year review for polar bears. The review will assess:

1. Whether new information suggests that the species is increasing, decreasing, or stable;
2. Whether existing threats are increasing, unchanged, reduced, or eliminated;
3. If there are any new threats; and,
4. If any new information or analysis calls into question any of the conclusions in the original listing determination as to the species' classification.

The Service concluded that the polar bear continues to meet the definition of threatened and recommends no status change at this time. In addition, the Service expects to release the review in January 2017. For more information, please contact Craig Perham.

Technical Reports and Peer Reviewed Publications in 2016

Atwood, T.C., E. Peacock, M.A. McKinney, K. Lillie, R. Wilson, D.C. Douglas, S. Miller, and P. Terletzky. 2016. Rapid environmental change drives increased land use by an Arctic marine predator. PLoS One 11:e0155932.

Conn, P.B., E.E. Moreland, E.V. Regehr, E.L. Richmond, M.F. Cameron, and P.L. Boveng. 2016. Using simulation to evaluate wildlife survey designs: polar bears and seals in the Chukchi Sea. Royal Society Open Science 3:150561.

Liston, G. E., C. J. Perham, R. T. Shideler, and A. N. Chevront, 2016: Modeling snowdrift habitat for polar bear dens. Ecological Modelling 320:114-134, doi:10.1016/j.ecolmodel.2015.09.010.

Regehr, E.V., Laidre, K., Akçakaya, H.R., Amstrup, S., Atwood, T., Lunn, N., Obbard, M., Stern, H., Thiemann, G. & Wiig, Ø. 2016 Conservation status of polar bears (*Ursus maritimus*) in relation to projected sea-ice declines. Biology Letters 12, doi:http://dx.doi.org/10.1098/rsbl.2016.0556.

Regehr, E.V., Wilson, R.R., Rode, K.D., Runge, M.C. & Stern, H. 2016 (In press) Harvesting wildlife affected by climate change: a modeling and management approach for polar bears. Journal of Applied Ecology.

Schliebe, S.L., B. Benter, E.V. Regehr, L. Quakenbush, J. Omelak, M. Nelson, and K. Nesvacil. 2016. Co-management of the Alaskan harvest of the Alaska-Chukotka polar bear subpopulation: How to implement a harvest quota. Wildlife Technical Bulletin ADF&G/DWC/WTB-2016015. Alaska Department of Fish and Game, Juneau.

USFWS. 2016. Polar bear (*Ursus maritimus*) conservation management plan, final. U.S. Fish and Wildlife Service, Region 7, Anchorage, Alaska.

Wilson, R. R., E. V. Regehr, K. D. Rode, and M. St. Martin. 2016. Invariant polar bear habitat selection during a period of sea ice loss. *Proceedings of the Royal Society B* 283:20160380.

Staff Contact Information

Several changes to the Ecological Services and Marine Mammals Management programs have occurred over the last two years. Current staff contact information is shown in Table 3.

Table 3. U.S. Fish and Wildlife Service’s Ecological Services and Marine Mammals Management staff contact information, Anchorage, Alaska.

Name	Title	Phone	Email
<i>Ecological Services</i>			
Mary Colligan	Assistant Regional Director	(907) 786-3505	mary_colligan@fws.gov
Jenifer Kohout	Deputy Assistant Regional Director	(907) 786-3687	jenifer_kohout@fws.gov
<i>Marine Mammals Management</i>			
Patrick Lemons	Chief	(907) 786-3668	patrick_lemons@fws.gov
Charles Hamilton	Special Assistant	(907) 786-3804	charles_hamilton@fws.gov
Jim Wilder	Lead, Polar Bear Program	(907) 786-3800	
Craig Perham	Biologist, Polar Bear Program	(907) 786-3810	craig_perham@fws.gov
Ryan Wilson	Biologist, Polar Bear Program	(907) 786-3830	ryan_r_wilson@fws.gov
Susanne (Susi) Miller	Biologist, Polar Bear Program	(907) 786-3828	susanne_miller@fws.gov
Eric Regehr	Biologist, Polar Bear Program	(907) 786-3913	eric_regehr@fws.gov
Bridget Crokus	Biologist, Polar Bear Program	(907) 786-3378	bridget_crokus@fws.gov
Michelle St. Martin	Biologist, Sea Otter Program	(907)-786-3857	michelle_stmartin@fws.gov
Christopher Putnam	Lead, Regulatory Program	(907) 786-3844	christopher_putnam@fws.gov
Brad Benter	Biologist, Marking, Tagging, Reporting Program	(907) 786-3980	brad_benter@fws.gov