



# SEA BEAR UNDER SIEGE

Polar Bears and Climate Change in Alaska





## DEFENDERS OF WILDLIFE

Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

Rodger Schlickeisen, President  
Jamie Rappaport Clark, Executive Vice President

## ACKNOWLEDGEMENTS

Author: Marybeth Holleman  
Editor: Kate Davies  
Photo Editor: Charles Kogod  
Art Director: Jen Lee

© 2010 Defenders of Wildlife  
1130 17th Street, N.W.  
Washington, D.C. 20036-4604  
202.682.9400

## COVER PHOTO:

A polar bear stands on a submerged iceberg in Alaska's Beaufort Sea.

© Steven Kazlowski/NPL/Minden Pictures



# TABLE OF CONTENTS

SUMMARY .....	2
INTRODUCTION: The Bad News Bears.....	6
BEAR OF THE SEA: Range and Status	
Polar Bears of the World.....	8
Alaska’s Polar Bears .....	9
Chukchi Sea Population.....	9
Southern Beaufort Sea Population .....	10
BEAR UNDER SIEGE: Climate Change Impacts	
Disappearing Sea Ice.....	12
Declines in Ice Thickness and Cover .....	12
Longer Melt Seasons .....	12
Predictions of an Ice-free Arctic .....	14
Changes in Polar Bear Behavior .....	14
Altered Diet and Starvation .....	15
Long-distance Swimming and Drowning .....	16
Ranging Farther Inland and Increased Contact with Humans.....	17
Changes in Polar Bear Demographics .....	17
Shifting Distribution.....	18
Declining Stature and Body Mass .....	18
Increased Fasting.....	18
Altered Denning Areas.....	19
Lower Reproductive Rates .....	19
Decreased Cub Survival.....	19
Population Decline.....	19
BEAR UNDER SIEGE: Other Risk Factors	
Oil and Gas Development .....	20
Shipping and Other Commercial Activities .....	20
Hunting.....	21
Human-Bear Interactions .....	23
Contaminants.....	23
BEARING RESPONSIBILITY: What We Can Do To Help Polar Bears	
Top Priority: Curb Climate Change.....	24
Recommendations: 10 Things We Can Do Now .....	24
CONCLUSION: Do It–Now .....	32
ENDNOTES.....	34



## SUMMARY

THEIR ARCTIC HABITAT in full meltdown mode, polar bears have become the real bad news bears: Reports of drowned, starving and stranded bears, cannibalism and other aberrant behavior, and dire forecasts for their future just keep coming.

Scientists concur that the Arctic meltdown is a direct result of climate change caused by the greenhouse gases that continue to build up in the atmosphere as we burn fossil fuels and raze our forests. In 2005, the International Union for the Conservation of Nature's Polar Bear Specialist Group proclaimed climate change a major threat to polar bears worldwide. In 2008, the U.S. Fish and Wildlife Service declared the polar bear in Alaska threatened, the first listing under the Endangered Species Act chalked up primarily to climate change.

Often touted as the world's largest terrestrial carnivores, polar bears are actually marine mammals that spend most of their lives at sea. Atop the ice that covers the Arctic Ocean—the ice that is thinning and shrinking at an alarming and accelerating rate—these bears of the sea hunt for seals, mate and move between resting and denning areas.

Almost certainly, the Beaufort Sea and Chukchi Sea, where Alaska's polar bears live, will be ice-free for extended periods in the summer—perhaps even the entire summer—within the next five years. Winter sea ice extent and thickness will also continue to decline.

Documented changes in polar bear behavior and demographics indicate that these ice-loss trends are already having serious impacts on polar bears in Alaska as they expend more energy

moving about their fragmented habitat and more time without seals—the fat-rich dietary staple that disappears along with the ice. Add to the picture other risk factors like oil and gas development, increased shipping and commercial activity in previously ice-bound waters and more frequent interactions with humans as starving bears venture into coastal communities, and it is clear: Polar bears are a highly stressed and imperiled species that need our help to survive. The good news for these bad news bears is that there are some things we can do to help them.

The good news for these bad news bears is that there are some things we can do to help them.



### TOP PRIORITY: REDUCE GREENHOUSE GAS EMISSIONS

Global climate change is the principal cause of the loss of polar bears' sea-ice habitat and the only way to stop it is to reduce global greenhouse gas emissions and related pollutants. Increasing effort must be directed at reducing these emissions and promoting new energy-efficient technologies and renewable energy alternatives. In addition, destructive deforestation, which accounts for one-sixth of global greenhouse gas emissions, must be reduced.

Even if atmospheric greenhouse gas concentrations were drastically reduced today, given the level of pollution already in the atmosphere, climate change



© RALPH LEE HOPKINS/NATIONAL GEOGRAPHIC STOCK

will continue for decades to come. Meanwhile, there are things we can—and should—do immediately to help polar bears survive the Arctic meltdown.

### **RECOMMENDATIONS: 10 THINGS TO DO NOW TO HELP POLAR BEARS**

---

1. Fully protect polar bears under the Endangered Species Act (ESA) by rescinding the blanket exemption in the current listing that excludes activities outside of Alaska that cause greenhouse gas pollution from being considered harmful to polar bears.
2. Protect current polar bear habitat as well as the places that will be essential to their adaptation and survival as sea-ice disappears, such as the high Arctic of eastern Canada and western Greenland—areas scientists predict will be ice-free for the shortest periods.
3. Protect the polar bear's prey base, which includes ringed, bearded, ribbon and spotted seals, Pacific walruses—all currently proposed for ESA listing—as well as Arctic cod and other sea-ice fish seals eat.

**A polar bear leaps between ice floes in its quest for seals, the fat-rich staple of its diet.**



**A polar bear, dependent cub at her side, waits for a seal to come up for air at an opening in the ice.**

4. Address additional polar bear risk factors—oil and gas development, commercial shipping, hunting and trade in polar bear parts—with the following actions:
  - Suspend all new Arctic oil and gas development until appropriate measures to protect polar bear populations and their sea-ice habitat are in place. In addition, institute a permanent moratorium on energy exploration and development in the Beaufort and Chukchi seas, where Alaska’s polar bears live, and in the Arctic National Wildlife Refuge, where many of them den in winter.
  - Allow shipping and related coastal development and activities to proceed in areas newly opened by sea-ice loss only after adequate polar bear protections are in place.
  - Eliminate trophy hunting throughout the Arctic and reduce other hunting pressure on declining polar bear populations while still accommodating native subsistence needs. Also take steps to address poaching, such as implementing voluntary monitoring and establishing reward programs for information leading to convictions.



- Continue to push the U.S. proposal to list polar bears under the Convention on International Trade in Endangered Species (CITES) Appendix I, which prohibits all commercial trade in polar bear skins, claws and other parts. (The polar bear is currently listed in Appendix II, which allows regulated commercial trade.)
5. Initiate or expand prevention and response programs in Arctic coastal communities to keep people and polar bears safe as bears are forced to spend longer periods on land. Prevention programs include community education, bear-resistant food storage and waste disposal procedures and oversight of ecotourism ventures that promote polar bear watching. Response programs include polar bear patrols and rapid-response measures for dealing with bears that come too close and temporary holding facilities and plans for dealing with problem bears. And to help evaluate and prioritize mitigation efforts, establish an international database on interactions between polar bears and people.
  6. Directly intervene to help polar bears in dire circumstances through efforts such as supplemental feeding of starving bears with the remains of bowhead whales and other subsistence-hunted animals; rescuing malnourished bears, moving them to rehabilitation facilities and eventually relocating them; working with zoos to develop plans for accepting polar bears unable to make it in the wild and to establish polar bear gene banks and captive-breeding programs to preserve the polar bear's diverse gene pool should climate change claim entire populations.
  7. Amend the U.S. Arctic Policy National Security Directive issued in the last days of the Bush administration to minimize or prohibit industrial and military activities across the Arctic basin and sufficiently address the issues related to the protection of polar bears and their sea-ice habitat.
  8. Ratify the United Nations Convention on the Law of the Sea to give the United States a role in negotiating multilateral policy on issues in the Arctic that affect polar bears.
  9. Engage international nongovernmental and intergovernmental institutions in collaborative efforts and enter into binding agreements to protect and enhance all polar bear populations. The Range States, the international group representing the United States and the other four countries where polar bears are found, has made important resolutions on polar bears; none of them are binding.
  10. Improve and expand polar bear research and monitoring to ensure that all efforts to help polar bears adapt to climate change are based on sound science. Priorities include developing better methods for tracking polar bears and increased monitoring of all polar bear populations for demographic and behavioral changes and impacts on the Arctic ecosystem and food web.

“What seemed crazy three years ago is not considered crazy now.”

Given the grim prognosis for polar bears, especially in Alaska, our response must be faster, more creative and more ambitious than we ever anticipated. As Charles Monnett, a federal marine mammal ecologist who has been involved in regular aerial surveys of the Arctic for more than a decade, puts it: “The question that needs to be asked by scientists, government agencies and conservation organizations is this: 50 years or so from now, if polar bears are gone from the United States as predicted, what will we wish we had done? And then we need to do it—now. What seemed crazy three years ago is not considered crazy now.”

## INTRODUCTION:

### The Bad News Bears

LESS THAN A DECADE AGO, most populations of polar bears were considered healthy, even growing. The first report of drowned bears came in 2004, followed by an onslaught of scientific reports of summer sea ice shrinking and winter sea ice thinning—prime polar bear habitat disappearing. As the sea ice has reached record lows, the reports have become all the more frequent and alarming: polar bears swimming miles from shore; bears in search of food ranging farther inland than ever recorded; polar bears drowning or starving; hungry and desperate bears resorting to cannibalism.

In May 2008, forced into action by a lawsuit filed by the conservation community, the U.S. Fish and Wildlife Service (FWS), citing the threat of climate change, officially listed polar bears as threatened under the Endangered Species Act. In its listing, FWS predicted that populations of two-thirds of the world's polar bears will decline within the next 45 years.

Adding to the bad news for polar bears is the mounting evidence that climate change is happening more quickly and forcefully than projected and the increasingly dire predictions of catastrophes like hundreds of the world's polar bears drowning at once when fragmented summer ice far offshore breaks up beneath them. Clearly, urgent action is needed to give polar bears a fighting chance.

This report is about giving this Arctic sentinel species and largest of the living bears that chance. It summarizes the current status of polar bears and predicted trends for polar bear populations and their Arctic sea ice habitat in our warming world, with an emphasis on Alaska's polar bears. It also examines the already documented impacts of climate change on polar bears and the additional threats they are facing that only make matters worse. Most important, this report proposes a plan of action—10 recommendations for protections, precautions, collaborations, research and creative solutions we can act on now to help our sea bears under siege—polar bears struggling to survive the Arctic meltdown.







**A sow and cub go with the floes in the Chukchi Sea off Alaska's National Petroleum Reserve.**

## BEAR OF THE SEA: Range and Status

AS ITS SCIENTIFIC NAME, *Ursus maritimus*—sea bear—suggests, the polar bear is a marine mammal, not a land mammal like its closest cousin, the brown bear. Over thousands of years, polar bears evolved away from life on land to such an extent that they now depend primarily on habitat that is literally melting away beneath them: Arctic sea ice.

Polar bears spend much of their lives far from land on the Arctic ice pack, hunting, mating, denning with their young and resting during open-water periods. Individual polar bears can travel thousands of miles per year following the seasonal advance and retreat of sea ice in search of prey. They feed almost entirely from the sea ice, taking ringed, ribbon and bearded seals that surface at breathing holes or climb out onto the ice. Although they are excellent swimmers, as befits their marine mammal status, polar bears are not usually successful catching seals in open water, so sea ice is a critical hunting platform.

Sea bears are found throughout the Arctic Circumpolar Basin (Figure 1), not evenly distributed but concentrated along the sea-ice edges. At these edges, currents and winds interact to form the continually melting and refreezing matrices of ice patches where seals are abundant and accessible. Polar bears also eat walrus, seabirds, carrion, berries and vegetation, but, as the most carnivorous of bear species, they rely almost entirely on the fat of ice-dependent seals.

### POLAR BEARS OF THE WORLD

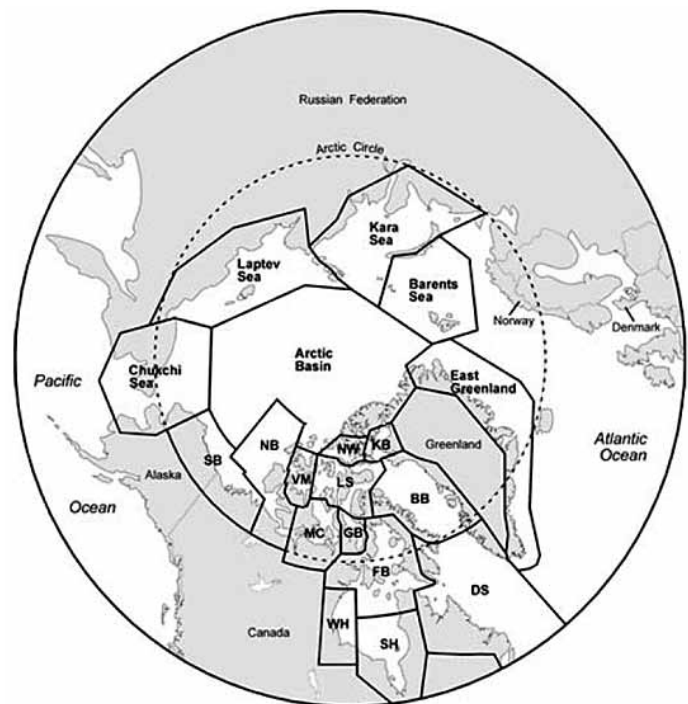
Biologists estimate the total worldwide polar bear population, which they have divided into 19 subpopulations, at between 20,000 and 25,000.<sup>1,2</sup> However, the mixed quality of data, recent population trends and projected reduction of habitat due to climate change and other stressors indicate much room for error.<sup>3</sup> Most signs indicate the total number of polar bears in the world is at or below 20,000 and diminishing.

The boundaries of the 19 subpopulations are relatively loose, because individual polar bears range over hundreds, sometimes thousands, of miles. In recent years, the boundaries have become even less distinct as shrinking summer sea ice causes polar bears to venture farther inland in search of food.<sup>4</sup>

The status and predicted trends for polar bear subpopulations (Table 1) are quickly changing in our warming climate. In 2005, the International Union for the Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG) designated five subpopulations “declining.” Just four years later at their summer 2009 meeting, the PBSG determined that three more polar bear subpopulations were in a state of decline.<sup>5</sup>

**FIG. 1: Distribution of Polar Bear Populations in the Arctic Circumpolar Basin**

SOURCE: IUCN PBSG 2010



BB	Baffin Bay	NB	Northern Beaufort Sea
DS	Davis Strait	NW	Norwegian Bay
FB	Foxe Basin	SB	Southern Beaufort Sea
GB	Gulf of Boothia	SH	Southern Hudson Bay
KB	Kane Basin	VM	Viscount Melville Sound
LS	Lancaster Sound	WH	Western Hudson Bay
MC	M'Clintock Channel		

**TABLE 1. Polar Bear Subpopulations: Size, Status and Trends**

SOURCE: IUCN PBSSG 2010

POPULATION	NUMBER (year of estimate)	STATUS	CURRENT TREND
Arctic Basin	Unknown	Data deficient	Data deficient
Baffin Bay	2,074 (1997)	Data deficient	Declining
Barents Sea	2,650 (2004)	Data deficient	Data deficient
Chukchi Sea	Unknown	Reduced	Declining
Davis Strait	2,142 (2007)	Not reduced	Declining
East Greenland	Unknown	Data deficient	Data deficient
Foxe Basin	2,197 (1994)	Data deficient	Data deficient
Gulf of Boothia	1,592 (2000)	Not reduced	Stable
Kane Basin	164 (1998)	Reduced	Declining
Kara Sea	Unknown	Data deficient	Data deficient
Lancaster Sound	2,541 (1998)	Data deficient	Declining
Laptev Sea	800-1,200 (1993)	Data deficient	Data deficient
M'Clintock Channel	284 (2000)	Reduced	Increasing
Northern Beaufort Sea	1,202 (2006)	Not reduced	Stable
Norwegian Bay	190 (1998)	Data deficient	Declining
Southern Beaufort Sea	1,526 (2006)	Reduced	Declining
Southern Hudson Bay	900-1,000 (2005)	Not reduced	Stable
Viscount Melville Sound	161 (1992)	Reduced	Declining
Western Hudson Bay	935 (2004)	Reduced	Declining

## ALASKA'S POLAR BEARS

Two of the world's 19 polar bear subpopulations—Chukchi Sea and Southern Beaufort Sea—are found in Alaska, the only place in the United States they occur.

As in most of their range, these bears remain on the sea ice nearly year-round, spending only short periods of time on land. Less than 10 percent of the bears in one Alaska radio-tracking study were found on land, and the majority of these were females and cubs in maternal dens in winter,<sup>6</sup> where they typically are at that time of year.

Alaska's polar bear populations were among the several that by the early 1970s had been decimated by decades of unsustainable sport hunting and trapping.

They began to recover after the 1972 Marine Mammal Protection Act banned all but subsistence hunting of polar bears in the United States and the 1973 Range States Agreement on the Conservation of Polar Bears, entered into by Canada, Denmark/Greenland, Norway, Russia and the United States—the countries where polar bears are found—banned trophy hunting in Alaska.

That unrestricted trophy hunting alone had so reduced their numbers underscores how vulnerable polar bears are to anthropogenic (human-caused) impacts.

### Chukchi Sea Population

The polar bears of the Chukchi Sea spend their lives on the ever-shifting ice pack of the 230,000 square-



mile sea that laps the western shores of Alaska and the eastern shores of Chukotka, Russia, including Wrangel Island. These bears migrate north with the ice in summer and south with the ice pack in winter. Until recent years, the Chukchi Sea was ice-free only about four months of the year.

Based on extrapolations from aerial den surveys in 2002, this subpopulation is estimated at 2,000 bears, or nearly 10 percent of the world population.<sup>7</sup> Since this population straddles two countries and there is little reliable data on its status and trends, the PBSG does not consider this a reliable estimate (Table 1).<sup>8</sup> With its southernmost location, this region has been experiencing one of the highest rates of sea-ice loss in the Arctic,<sup>9</sup> and researchers suspect that Chukchi polar bears are already suffering significant declines.

Most scientists agree that the Chukchi subpopulation increased with passage of the 1972 Marine Mammal Protection Act, which ended sport hunting of polar bears in the United States. There is concern

that overharvesting in Russia is affecting the population, and the U.S.-Russia Polar Bear Commission, the body charged with setting subsistence hunting harvest limits, recently agreed to adjust it to a more sustainable level.<sup>10</sup>

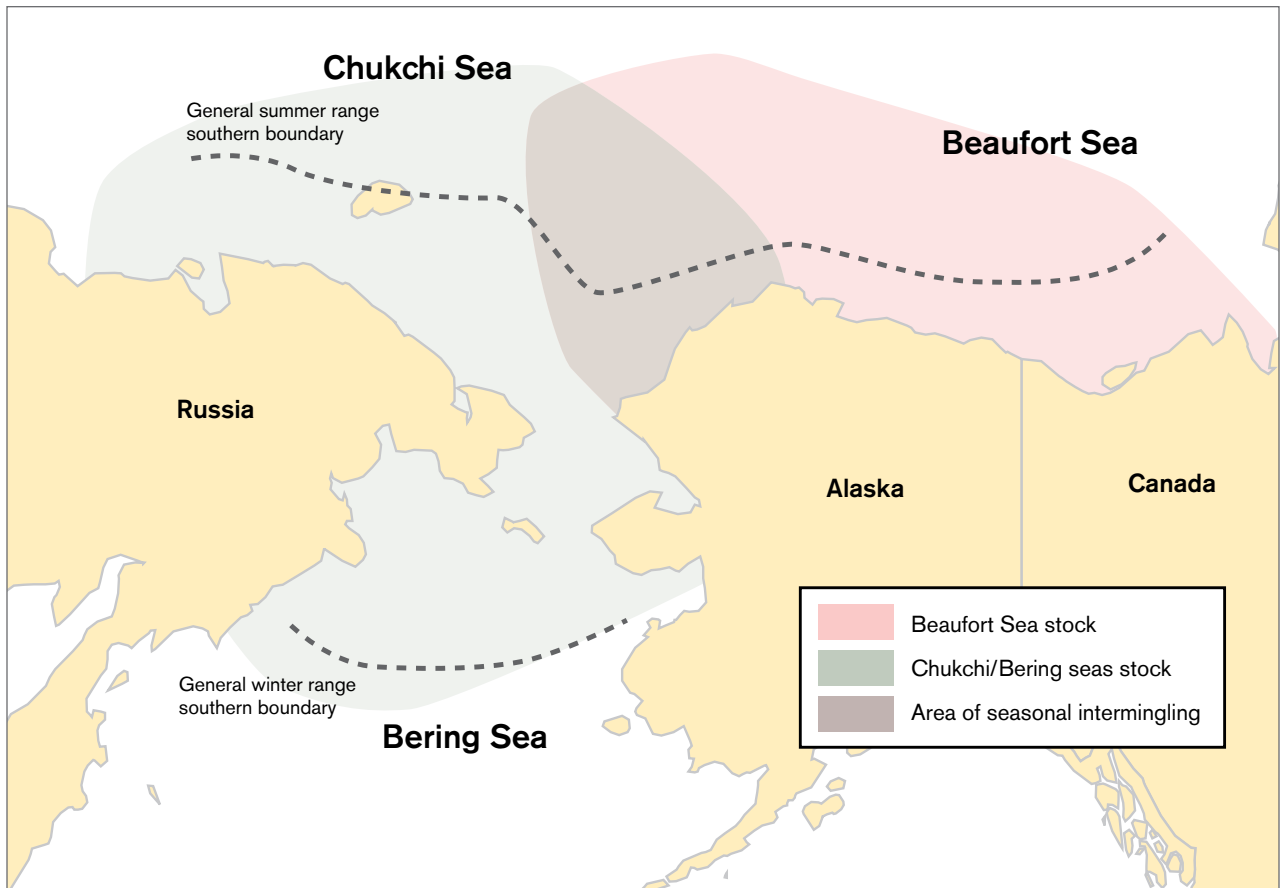
In its 2009 rule listing polar bears as threatened under the Endangered Species Act, the U.S. Fish and Wildlife Service states that the Chukchi population status is unknown, but almost certainly declining. More recent conclusions confirm that these bears are indeed declining at one of the fastest rates of any subpopulation.<sup>11</sup>

### Southern Beaufort Sea Population

The range of the Southern Beaufort Sea polar bears includes Alaska's coastline and offshore waters from Point Hope east to Banks Island and the Baille Islands in Canada. These polar bears overlap with the Chukchi bears along Alaska's coast from Point Hope to Point Barrow.<sup>12</sup> They also range farther

**FIG. 2: Polar Bear Habitat Distribution in Alaska**

SOURCE: USFWS





**A cub nestles under its mother on pack ice in the Beaufort Sea off the Arctic National Wildlife Refuge, an important denning area for Alaska's polar bears.**

north into the Arctic Basin and the Northern Beaufort Sea.

The Southern Beaufort Sea polar bear population is even more susceptible to changes from shrinking sea-ice because it is among the few polar bear populations known to use pack ice and shore-fast ice for denning.<sup>13</sup> Most of these bears follow the ice edge, traveling hundreds of miles to stay with the ice pack as it advances into the Bering Sea and to the Arctic coast in winter and retreats in summer, reaching its smallest extent in September. In summer, their primary habitat is pack ice, a discontinuous sheet of annual and multiyear ice adrift in constant motion from wind and currents. Although Alaska's polar bears have a large home range, they regularly return to the same feeding, denning and mating areas.

Based on an intensive mark-recapture study conducted from 2001 to 2006 and predicted sea-ice trends, the PBSG concluded that the southern Beaufort Sea polar bear population is declining.<sup>14</sup>

The declining status of polar bear populations in Alaska and elsewhere is underscored by dire predictions of accelerated sea-ice loss and growing evidence that polar bears worldwide are already experiencing more difficulty surviving in their melting environment. With their selective diet of ice-dependent seals, specialized sea-ice habitat and low reproductive rate (females do not mate until they are at least four years old and have only one or two cubs that typically stay with them for more than two years), polar bears already live on the edge. Climate change is pushing them over it.

## BEAR UNDER SIEGE: Climate Change Impacts

ARCTIC SEA ICE is melting at an alarming rate, and climate change is to blame. The overwhelming scientific consensus is that the elevated Arctic air temperatures, heat retention in open water and incursions of warm water into the Arctic basin that are causing the meltdown are the direct result of human-induced rises in greenhouse gases.

At their July 2009 meeting, the IUCN Polar Bear Specialist Group (PBSG) reaffirmed the conclusion reached when they last met in 2005: The greatest challenge to the conservation of polar bears is ecological change in the Arctic resulting from climatic warming. Rising air temperatures and decreases in permafrost, snow cover, glaciers and sea ice are part of this change that threatens polar bears and their critical ice habitat. Between the PBSG meetings in 2005 and 2009, declines in the extent of sea-ice cover had accelerated, with unprecedented retreats in 2007 and 2008.<sup>15</sup> The disappearing act continued in 2009 and 2010.<sup>16</sup> Meanwhile, scientific evidence of the impacts of climate change on polar bear habitat, habits, distribution, numbers and other behavioral and demographic effects is also piling up.

### DISAPPEARING SEA ICE

With the exception of interannual variations in Arctic sea ice caused by the changes in atmospheric pressure and wind patterns known as “Arctic oscillation,” sea ice has been declining over the past 40 years. This trend is clearly documented in the scientific literature and is also a recognized part of the “traditional ecological knowledge” of the Inupiaq people who live along the Arctic coast.<sup>17,18</sup>

Several scientific synthesis studies, including the 2005 *Arctic Climate Impact Assessment* and the 2007 report of Intergovernmental Panel on Climate Change (IPCC), confirmed that the rate of ice loss is accelerating.

#### Declines in Ice Thickness and Cover

For polar bears, rapidly shrinking and thinning ice means a loss of thick, reliable winter ice and extensive summer ice cover.

Arctic sea ice goes through a normal cycle of summer melting and refreezing during the winter months, but the overall ice coverage has become younger and thinner during its dramatic decline. Since the 1970s, ice thickness has decreased an estimated 42 percent, and ice cover has contracted an estimated 8.7 percent per decade.<sup>19</sup>

Record declines in Arctic sea-ice cover are being set each summer. The three lowest years since records began in 1979 were 2010, 2008 and 2007.<sup>20</sup> In both 2007 and 2008, the lost ice area was 722,000 square miles below normal.<sup>21</sup> Arctic-wide, 2009 summer sea ice in June and July was trending toward a contraction

as severe as in 2007, when the record low for summer ice coverage—1.65 million square miles—was set, but winds in August moved the ice over a slightly larger area, making 2009 only the fourth-lowest summer sea-ice extent on record.<sup>22</sup>

In the Chukchi Sea, however, open water in 2009 was the most extensive in recorded history. At the end of September 2009, when the ice pack began to reform in the rest of the Arctic, the Chukchi Sea still had near-surface temperatures between 3 and 5 degrees Celsius and had not begun to refreeze.<sup>23</sup> This late-season turnaround is indicative of ice cover that is thin, loosely packed and highly vulnerable to winds and melting.

Ice extent for September 2010 was the third-lowest in the satellite record for the month, behind 2007 (lowest) and 2008 (second-lowest). The linear rate of decline of September ice extent over the period 1979 to 2010 is now 81,400 square kilometers (31,400 square miles) per year, or 11.5 percent per decade relative to the 1979 to 2000 average.<sup>24</sup>

The oldest (five or more years) and thickest ice has also vanished almost entirely in the Arctic. Less than 23,000 square miles of old ice remained in September 2010, less than a third of what typically lingered at summer’s end in the 1980s.

#### Longer Melt Seasons

Warmer air temperatures—about 12 degrees Celsius above normal in autumn—are lengthening the melt season by an average of one or two days per year.

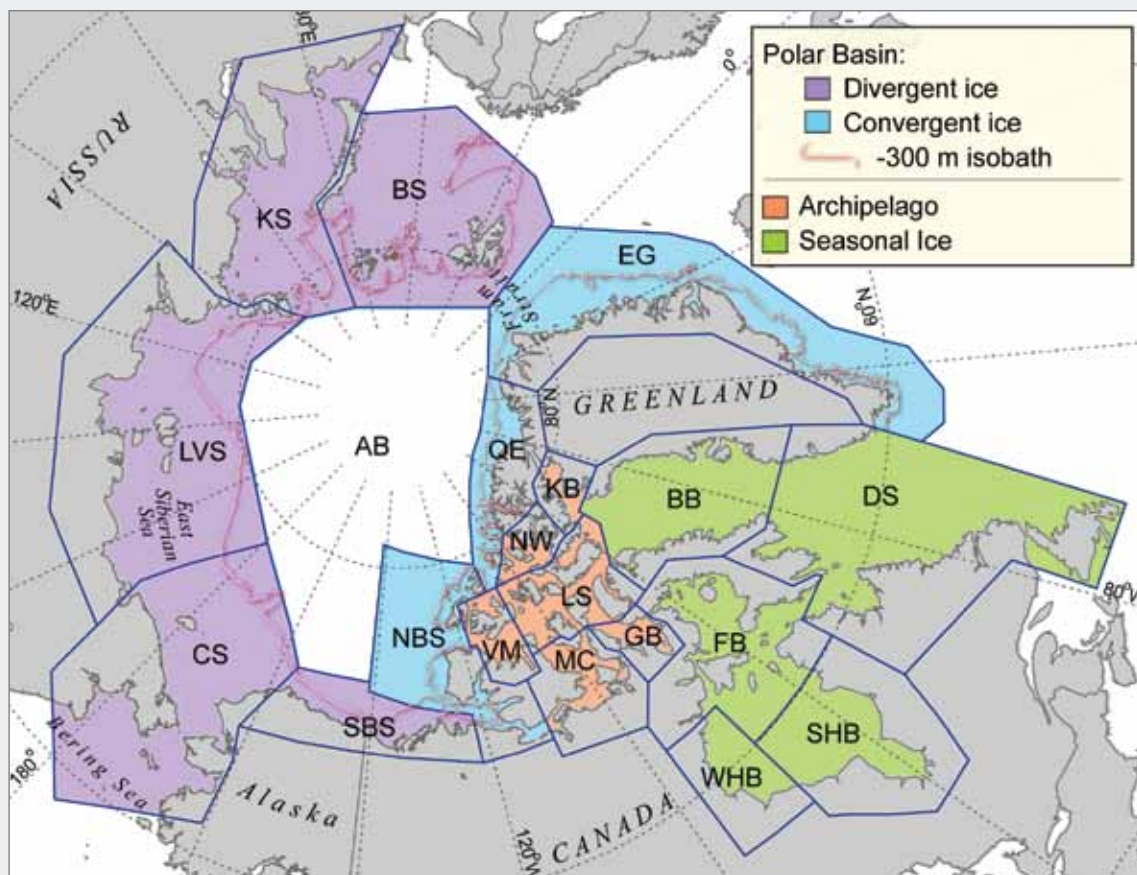


## POLAR BEAR ECOREGIONS: Mapping Polar Bear Populations by Sea-Ice Type

To better understand the relationships between shrinking sea ice and declining polar bear populations, the U.S. Geological Survey (USGS) divided the world's polar bear habitat into four ecoregions (colored areas on map below) defined by the type of sea ice on which polar bears are found.<sup>24</sup>

1. Seasonal Ice Ecoregion (green). Thirty percent (about 7,200) of the world's polar bears are found in this southernmost range, which includes Western Hudson Bay (WHB), Southern Hudson Bay (SHB), Foxe Basin (FB), Davis Strait (DS) and Baffin Bay (BB). In this ecoregion, the sea ice melts completely in summer, leaving bears to spend months on shore, often fasting for up to several months at a time.
2. Archipelago Ecoregion (orange). Twenty-one percent (about 5,000) of the world's polar bears inhabit these islands and channels in the Canadian Arctic, which includes the Gulf of Boothia (GB), M'Clintock Channel (MC), Lancaster Sound (LS), Viscount Melville Sound (VM), Norwegian Bay (NB) and Kane Basin (KB). In this ecoregion the bears remain year-round on multiyear and shore-fast ice, the frozen sea that stays attached to land.
3. Convergent Ecoregion (blue). Nine percent (about 2,200) of the world's polar bears live in this ecoregion comprising East Greenland (EG), Queen Elizabeth (QE) and Northern Beaufort Sea (NBS), where sea ice formed elsewhere accumulates and collects against the shoreline. The bears found here are on ice year-round.
4. Divergent Ecoregion (purple). Home to 40 percent (about 9,500) of the world's polar bears, this area has a high amount of annual sea ice. Subpopulations here, which include Alaska's Chukchi Sea (CS) and Southern Beaufort Sea (SBS) polar bears, as well as the Laptev (LVS), Kara (KS) and Barents (BS) seas, typically stay on ice year-round, migrating with the pack ice.

USGS scientists evaluated the Northern Hemisphere sea-ice projections for each of these ecoregions and their potential impacts on future distribution of polar bear populations. Where sufficient data exist, most populations in the archipelago and convergent ecoregions are considered stable, but populations in the seasonal ice and divergent ecoregions—home to 70 percent of the world's polar bears, including all of Alaska's bears—are declining along with their sea ice. They concluded that “projected changes in future sea ice conditions, if realized, will result in loss of approximately two-thirds of the world's current polar bear population by the mid 21st century.” They also noted “the observed trajectory of Arctic sea ice decline appears to be underestimated by currently available models, so this assessment of future polar bear status may be conservative.”



SOURCE: USGS

Open water that appears earlier in the season absorbs more heat from the sun throughout summer, further warming the water and promoting more melting. In a self-reinforcing feedback loop known as the “albedo effect,” the dark open water absorbs more sunlight, causing more ice melt, more absorption of solar energy and even more warming.<sup>25</sup>

The combination of shorter winters with increasingly warmer air temperatures in the Arctic and black carbon, a soot particle produced by incomplete combustion of fossil fuels and biomass,<sup>26</sup> is also contributing to the rapid melting of Arctic sea ice. Black carbon is considered the second- or third-largest warming pollutant and believed to be responsible for more than 50 percent of the warming detected in the Arctic between 1890 and 2007.<sup>27</sup> Black carbon soot darkens the ice and snow, making it absorb rather than reflect sunlight and thus vulnerable to increased melting.<sup>28</sup>

### Predictions of an Ice-free Arctic

Some researchers project that the Arctic is heading toward a new “super-interglacial” condition more extreme than any natural interglacial warming period over the past 800,000 years. Although the rate of ice loss may vary, all climate models predict a continued warming of the Arctic and decline in sea ice throughout this century. While previous predictions held that summer sea ice would disappear by 2040, more recent studies and observations of accelerating warming and ice loss have led to predictions that the Arctic Ocean could be ice-free in summer as early as 2013.<sup>29</sup>

**A male polar bear carries the head of a cub it killed and ate south of Churchill, Manitoba, Canada. Cannibalism among polar bears stranded on land without seals to sustain them has recently been reported in Alaska.**



© REUTERS/IAIN D. WILLIAMS

Almost certainly, the Beaufort and Chukchi seas will be ice-free for extended periods in summer within the next five years. Winter sea ice extent and thickness are also predicted to continue declining. Both trends will have enormous impacts on polar bears, as their sea-ice habitat will essentially be gone for extended critical periods.

Worldwide, remnant polar bear populations are expected to cling to survival in three refugia: the Canadian High Arctic, Greenland and perhaps Russia’s Wrangel Island. Unfortunately, Alaska’s polar bears will almost certainly face a very different future. As the distance between ice and land grows in summer and fall, polar bears in Alaska will have two choices: stay on land or go out with the ice. Bears that go out with the ice will eventually face the catastrophic loss of all summer sea ice leading to the loss of great numbers of polar bears in one disastrous event.<sup>30</sup> Bears that stay on land will face a host of other stressors and risks. Neither the onshore nor offshore bears will feed efficiently in the summer, and the ones that attempt to swim between shore and ice will be at increased risk of drowning.

In addition to these dire predictions, there is multiplying evidence of changes in polar bear behavior and demographics that indicate polar bears are already experiencing difficulty surviving in our warming world.

### CHANGES IN POLAR BEAR BEHAVIOR

In the past, their relative isolation from human activity and commercial development has protected polar bears. With the notable exception of the bears in Churchill, Manitoba, on Canada’s Hudson Bay, most polar bears spend the majority of their lives out on the sea ice, well away from human activity and observation. Reports of unusual sightings of polar bears far to the south of their normal range are evidence of a highly stressed species searching for food.

Even more disconcerting are the reports of unusual mortalities. Previously, incidents of researchers finding dead polar bears were so rare that no data were kept. Now emaciated polar bear carcasses are being found washed ashore and drowned polar bears are being reported offshore.<sup>31, 32</sup>





### Altered Diet and Starvation

The reproductive success of the polar bear's primary prey—ringed, bearded and ribbon seals—requires adequate spring ice. With increased rain-on-snow events, reduced snow cover and earlier ice breakup in the spring, ice seal lairs are decreasing and suitable pupping, resting and molting habitat is lacking, causing these seal populations to decline.<sup>33</sup> Not only are there fewer seals, but those remaining are more difficult for polar bears to reach—because seal distribution is changing and sea ice is less available as a platform for hunting.

Most polar bears feed on seals seasonally, primarily in spring and early summer. The rest of the year, they typically fast or subsist on other, less nutritious foods. While polar bears are able to fast for several months, they can only do so if there are sufficient numbers of seals to consume before and after fasting. In areas where seal numbers have declined, polar bear numbers have also declined.<sup>34</sup> Polar bears, however, are also somewhat opportunistic feeders, so as seals become harder to find, they are now resorting to other prey.

Along the coast of Chukotka in Russia, Chukchi

region polar bears are starting to hunt walrus on new haul-outs not previously used by walrus.<sup>35</sup> Walrus, also adversely affected by sea-ice loss, are being forced to congregate onshore in large numbers. In mid-September 2009, when the summer sea ice was at its lowest extent, about 3,500 walrus congregated on Alaska's Icy Cape—only the second time such numbers had been recorded onshore rather than on the edge of the sea ice. Within days, an apparent stampede caused the deaths of more than 130 walrus, primarily calves and yearlings.<sup>36</sup>

Polar bears have also been observed hunting caribou on the Norwegian archipelago of Svalbard and in Russia, and occasionally taking birds and eggs. Growing numbers of polar bears are congregating around marine mammal carcasses along Alaska's Arctic coast, especially after the fall subsistence hunt for bowhead whales.

Scavenging whale carcasses and hunting land mammals and walrus do not offer the predictability of hunting for seals on the ice nor the nutritional value of seals. In some cases, the energy costs to polar bears forced to travel to scavenge or hunt alternative

**A walrus herd rests on a chunk of pack ice during spring breakup in the Chukchi Sea. A lack of floating ice over the past few summers has forced these massive animals ashore in such huge numbers, young walrus have been trampled to death.**



prey are much higher than the nutritional benefits that prey offer. In most northern terrestrial areas, the food available to polar bears is low in both nutritional quality and in availability.

When alternate prey resources are insufficient, bears have even fewer choices. A graphic example of what happens when a carnivore at the top of the food chain loses its primary food source occurred during 2004, when USGS researchers in Alaska's Southern Beaufort Sea observed three incidents of polar bear cannibalism—the first ever recorded in several decades of observation.<sup>37</sup>

Finally, some bears are simply faced with starvation. Historically, once polar bears survived their first year of life, mortality by starvation was virtually unheard of, but this, too, is changing. In 2006, three adult females and a one-year-old cub were found dead; all were depleted of fat stores, indicating they had starved to death.<sup>38</sup> What makes this all the more significant is that these were prime-age females and a yearling—bears that usually have high survival rates.

### Long-distance Swimming and Drowning

Polar bears typically swim short distances across open leads (stretches of open water within fields of sea ice) or between shore and ice, but they are not evolutionarily adapted to swim long distances. If waters are calm and the bears are in good condition, they are easily able to swim 10 to 15 miles. While there are some reports of bears swimming up to 100 miles from sea ice, such long swims are rare. The longest documented swim was in 2008, when a radio-collared female bear swam about 400 miles from shore to the ice edge, losing her two cubs in the journey. Rough seas and poor physical condition make longer swims more deadly. And cubs, with their smaller stature and body weight, are even less able to survive long swims.

In both the Chukchi and Southern Beaufort seas, polar bears have been observed swimming in open water many miles from land or ice pack. For example, in the Chukchi Sea in August 2008, nine polar bears were spotted swimming in open water, 15 to 65 miles from shore. The bears were all swimming north,

**A polar bear swims underwater, propelled by its huge, oarlike webbed feet and insulated from the frigid sea by a thick layer of fat beneath its fur.**



toward the ice pack, the majority of which was more than 300 miles offshore.<sup>39, 40</sup>

Drowned polar bears have also been found, at sea and on shore, perhaps the most gripping evidence of the species in crisis. In September 2004, U.S. Minerals Management Service researchers found the bodies of four polar bears that had drowned while attempting to swim between shore and distant sea ice in the Beaufort Sea after a big storm—the first multiple drowning observed in 16 years of aerial surveys.<sup>41</sup> For the previous 15 years, only 12 of 315 polar bears had been observed swimming in open water, and no dead polar bears had been reported. But in 2004, in addition to the four carcasses spotted floating in open water, another 10 polar bears were seen swimming in open water. The researchers flew only 11 percent of the study area, so it is likely the number of bears drowned in this single event was many times the observed number.<sup>42</sup>

In 2006, one exhausted and one dead polar bear were found stranded in Svalbard, Norway, after swimming in rough seas.<sup>43</sup> In July 2008, the emaciated carcass of an adult male polar bear was found on a beach near Wainwright on the Arctic coast of Alaska.<sup>44</sup> Unfortunately, in the vast and remote Arctic, most polar bear drownings go unobserved and unreported, and many more are expected as summer ice continues to contract and thin.

### Ranging Farther Inland and Increased Contact with Humans

As the sea-ice platform disappears and with it opportunities to hunt seals, polar bears are moving inland in their quest for food. Consequently, they are showing up in places where they have never been seen before. Some documented examples in Alaska include a solitary polar bear spotted 200 miles from ice in Fort Yukon in March 2008,<sup>45</sup> and a bear observed trying to catch ducks 60 miles inland in the summer of 2007.<sup>46</sup>

Polar bears expend twice as much energy walking on land as other bear species.<sup>47</sup> When they are stranded on land for longer ice-free periods, they are forced to range farther in search of food, expending precious energy and coming closer to human communities to scavenge. Tired and hungry, they take more risks by frequenting town dumps, subsistence food caches, even pet food left outside. In the



**A polar bear takes in the scents at the Churchill, Manitoba, town dump. The dump, now closed, was attracting bears relegated to land during ice-free periods in the Hudson Bay. With longer open-water seasons in the Chukchi and Beaufort seas, hungry polar bears are following their noses into Alaskan coastal villages.**

1970s, problem bear reports averaged 30 a year; in the past five years, these numbers have soared to 80 to 90 bears a year.<sup>48</sup> Most communities do not have the proper equipment or training in bear deterrence, so nuisance bears are usually killed.<sup>49</sup>

## CHANGES IN POLAR BEAR DEMOGRAPHICS

Scientists have been collecting demographic information on polar bears in western Hudson Bay at the southern limit of global polar bear range since 1981, and what they have observed serves as a warning of what is likely to come for polar bear populations worldwide.

In the past 50 years, with spring temperatures increasing, Hudson Bay ice has broken up several weeks earlier. This shortens the seal-feeding season for polar bears, thus extending their fasting period by at least a month. Already, nonbreeding bears fast for four months in late summer/early fall while the ice is out, and females in dens fast for up to eight months. However, fasting is only sustainable when polar bears accumulate high fat reserves during successful seal hunting seasons. With less access to seals and less time to build fat reserves, the body condition, reproductive success and survival rate of these Hudson Bay bears have diminished. From 1984 to 2004 alone, the number of polar bears along the western coast of Hudson Bay declined by 22 percent.<sup>50</sup> Other studies have also underscored the demographic impacts of climate change on polar bear populations.

### Shifting Distribution

The rapid loss of sea ice is changing the population boundaries of polar bears. In response to habitat loss, Chukchi Sea polar bears are moving west and north, and Southern Beaufort Sea polar bears are moving east and north. The numbers of bears ranging farther outside their population boundaries appears to be increasing: 45 percent of tagged polar bears ranged outside the Southern Beaufort Sea boundaries in 2008 compared to 33 percent in 2007. One female roamed 4,350 miles in one year alone.<sup>51</sup>

Alaska's polar bears, both the Chukchi and the Southern Beaufort populations, are being forced to split into two distributions—one migrates out with the ice pack and spends summer offshore, the other remains behind on land and spends summer onshore. In both Chukotka, Russia, and Alaska, increasing numbers of bears are remaining onshore for longer periods of time. Since 2004, shoreline surveys conducted by FWS have recorded 20 to 140 bears onshore earlier in summer.<sup>52</sup> Preliminary data from the 2009 open-water season, however, show few polar bears along Alaska's coasts, raising

**A polar bear waits for her cub to join her on an ice floe. More than just a convenient platform, sea ice is an integral and productive part of the Arctic ecosystem and the life it supports, from plankton and algae to fish, seals. Polar bears and marine birds.**



© DAISY GILARDINI/SCIENCE FACTION/CORBIS

concerns about greater population decline.

Bears radio-collared by FWS ranged farther west to Russia's Wrangel Island and farther north and offshore than normal, evidently seeking to avoid the vast open-water area in the Chukchi Sea. Nearshore aerial surveys in the summer and fall of 2009 observed only seven bears in historic habitat locations, fewer than in previous years.<sup>53</sup> Some bears were found congregating at Cross Island on the Beaufort Sea coast to forage on bowhead whale carcasses left by subsistence hunters. Observers on the 2009 U.S. Coast Guard/University of Alaska offshore sea-ice survey flight saw no polar bears either in the far offshore (75 to 300 miles) Chukchi Sea or on the icepack offshore (50 to 200 miles) in the Beaufort Sea.<sup>54</sup>

### Declining Stature and Body Mass

Changes in the stature and weight of individuals are early indicators of changes in entire populations.<sup>55</sup> Polar bears in Hudson Bay and the Southern Beaufort Sea are both thinner and smaller than in previous years. This is most significant and pronounced in cubs and yearlings, but is also documented for adult males at prime breeding age.

In the Southern Beaufort Sea, researchers have documented smaller skull measurements in both cubs and adult males, lower body weights in adult males,<sup>56</sup> and lower survival rates in adult females during years of reduced summer sea ice.<sup>57</sup> Another study documented declines in mass and body condition of subadult males, in growth of males and females, and in cub recruitment—all indicating an overall population decline.<sup>58</sup> Emaciated bears have also been reported from other regions, in particular the Chukchi Sea and Svalbard, Norway.

### Increased Fasting

Beaufort Sea polar bears usually reach their lightest weights in late March, and then gain the fat reserves necessary for survival and reproduction over the course of two or three months in spring by feeding on seal pups. Recent research showed that a third of all bears were fasting during April and May—a marked increase from previous data. During this critical spring feeding period, polar bears from all

sex, age and reproductive classes were more likely to be fasting in 2005 to 2006 than in 1985 to 1986.<sup>59</sup> Over a 20-year period, the number of undernourished bears had tripled.<sup>60</sup>

### Altered Denning Areas

Most polar bears den on land, regularly returning to the same sites. However, to facilitate shore denning, pack ice must drift close enough to shore or freeze in time for pregnant females to reach land in the fall. As the fall freeze-up is delayed, females either fail to reach denning sites or reach them later, expending much more energy and beginning the fasting and birthing period in a depleted state. This results in higher mortality of both sows and cubs.<sup>61</sup> Furthermore, decreased snowfall inhibits the formation of the snowdrifts needed for denning, and increased rain in late winter/early spring causes dens to collapse. In 1991, a sow and two cubs were crushed when their den collapsed after an early warming period in the Beaufort Sea.<sup>62</sup>

### Lower Reproductive Rates

Females need high fat reserves to successfully produce and raise cubs. Females in the Western Hudson Bay are losing so much weight that researchers predict bears will be unable to successfully reproduce within the next 15 to 25 years.<sup>63</sup> As more polar bear populations suffer from the effects of depleted food sources, this decreased reproductive success will likely become more widespread resulting in precipitous declines in polar bear numbers.

### Decreased Cub Survival

Females with lower fat reserves may abandon cubs and dens in search of food. Even after emerging from the dens, females of lower weight are not as able to provide for their cubs. In addition, with their lower body mass, the time cubs can survive icy waters (as little as 10 minutes) is far more limited than for healthy adults. As sea ice melts and the open-water distance from den to feeding area increases, cubs will not be able to make it.

In 2008, one collared female swam 400 miles in

## CATASTROPHIC MORTALITY EVENTS: Possibility of Mass Drownings Looms Large

Summer sea ice—particularly in the area where Alaska's polar bears live—is not a solid sheet of ice, but rather a discontinuous mix of ice and water. In recent years, summer ice coverage has been estimated at only 30 percent. Polar bears spend the majority of their time on the edge of this discontinuous sheet. If one of these ice platforms is carried away from the main body of pack ice by wind and currents and then disintegrates, polar bears could find themselves in open water hundreds of miles from either the shore or the main ice pack.<sup>68, 69, 70</sup> Preliminary 2009 tagging data support the concern that a large number of bears could drown should this happen. According to these data, some radio-collared bears were in mostly open water, the majority at the very edge of the pack ice. In the Chukchi Sea, this pack ice was hundreds of miles from shore where food availability is low.<sup>71</sup>

Documented polar bear deaths and population declines have, to date, been few in number compared with worldwide population estimates. The observed mortality represents only a small portion of the total as most deaths go undocumented due to the remote, offshore location of polar bear habitat, the long, dark Arctic winters and the lack of extensive surveys throughout much of the year. As the loss of sea ice habitat accelerates, however, large-scale, catastrophic mortality events are likely to occur and be noticed. The most probable are mass drownings of bears stranded far from shore on melting sea ice and large-scale starvation of bears both onshore and offshore. Such catastrophic events could claim hundreds of polar bears, a significant portion of the remaining population, in a matter of days or weeks.

nine days. Even though she lost 20 percent of her weight, she survived. Her cubs, however, did not.<sup>64</sup> Decreased cub survival has already been documented in the Southern Beaufort Sea, with a concurrent decrease in cub weight.<sup>65</sup>

### Population Decline

Scientists currently attribute the drop in polar bear numbers mostly to lack of access to sufficient food resources. It is now predicted, however, that summer sea ice may disappear completely within the next few years, perhaps as early as 2013.<sup>66</sup> When that happens, researchers warn of the potential for catastrophic mass drowning of polar bears offshore.<sup>67</sup> Bears that remained with the ice sheet will be left stranded in the open sea hundreds of miles from shore, so far away from places to rest and feed that they will not survive despite their strong swimming skills.



## BEAR UNDER SIEGE: Other Risk Factors

WHILE THE LOSS OF SEA ICE and other impacts of climate change are the primary cause of declining polar bear populations, other risk factors exacerbate it and/or its impacts, creating an even more harmful cumulative effect.<sup>72</sup> These factors include oil and gas development and other commercial and human-related activities. As noted at a recent meeting of the Range States, the countries where polar bears are found that entered into an agreement in 1973 to protect sea bears and their habitat, “climate change amplifies such stressors and underscores the need for proactive and comprehensive management strategies.”<sup>73</sup>

### OIL AND GAS DEVELOPMENT

The greatest level of oil and gas exploration and development in polar bear habitat is currently in Alaska, with Canada and Russia also increasing exploration. Both onshore and offshore expanded leasing, exploration and development are planned or underway in the Chukchi and Southern Beaufort Sea regions.

Most experts agree that the greatest direct risk to polar bears from oil and gas development is major oil spills, because there is no proven method of cleaning up oil in broken sea-ice conditions. Oil spills would not only directly harm polar bears, but would also deplete their prey and contaminate their habitat. Even without an oil spill, some level of pollution from oil and gas activities is inevitable with more development and the associated increase in operational discharge of contaminated processing waters, cuttings and drilling muds into the Arctic Ocean from offshore platforms.

In addition, there is the indirect harm to polar bears posed by oil and gas exploration and development in the Arctic. Ice seals and walrus

...oil spills are the greatest direct risk to polar bears, because there is no proven method for cleaning them up in broken sea-ice conditions.

could be frightened off by noise and the presence of unfamiliar machinery and infrastructure, making it harder for polar bears to successfully hunt and leaving them even more susceptible to direct disturbance from oil and gas development as they become chronically stressed by the cumulative effects of shrinking habitat

and declining food sources. These stressed bears may abandon their dens before their cubs are ready to leave. They may relinquish hunting areas and have to expend more energy to find food away from oil and gas activities. In search of new food sources, they may enter areas of human habitation only to be killed as “problem” or “nuisance” bears.

Of course, the most damaging indirect effect of all comes from the combustion of oil and gas extracted from the Arctic environment that contribute to climate change, the root cause of diminishing polar bear habitat. All of the carbon extracted from the Arctic will eventually wind up in the biosphere as greenhouse gas pollution, compounding climate and ecosystem impacts.

### SHIPPING AND OTHER COMMERCIAL ACTIVITIES

As Arctic ice disintegrates in summer, new shipping lanes are opening. In the summer of 2007, the fabled Northwest Passage (across Canada) was essentially ice-free for the first time in history. In 2008, both the Northwest Passage and the Northern Sea Route (across Russia) were open simultaneously for the first time in recent history. In 2009, two German freighters transited the Northern Sea Route from Korea across Russia to Europe, carrying modules for a new power plant. Cargo of every kind, including oil from new Arctic and lower latitude fields, is likely to join an increase in tourism, commercial fishing and mineral exploration in

the newly-opened Arctic waters, right in the heart of polar bear habitat.

Already, Arctic countries, including the United States, Canada and Russia, are rushing to lay claim to these “new territories,” with little regard for the additional damage to wildlife and the environment such an influx of human activities might bring. For example, mining exploration and shipping routes run right alongside known polar bear denning areas in central Nunavut, Canada.<sup>74</sup>

The effects of increased shipping and the other commercial activities it supports are similar to that of oil and gas development: audio and visual disturbances to polar bears and their prey, pollution and the very real risk of major oil spills. Catastrophic oil spills can just as easily result from ships carrying other cargo—as happened with the 2004 *Selendang Ayu* grounding in Alaska’s Aleutian Islands. The large freight ships that may begin using Arctic routes carry millions of gallons of toxic heavy fuel on board.

## HUNTING

---

The 1973 Range States agreement on hunting of polar bears was intended to halt precipitous declines and get harvest levels under control. Unsustainable hunting has led to severe polar bear population declines in some areas, and reductions in hunting have resulted in population increases. Even in areas such as Baffin Bay, where the effects of habitat loss may not be as encompassing, overhunting may contribute to an irreversible decline.<sup>75</sup>

### Subsistence hunting

Polar bear hunting is not allowed under U.S. law except under specific circumstances such as for subsistence uses, which include traditional handicrafts from skins, claws and other body parts. (In other countries, direct hunting by native peoples can also include capture of live bears for zoos.) In places like Alaska’s Beaufort Sea, sustainable subsistence hunting has occurred for hundreds of years and continues to



**In this photo taken in 2006, a Prudhoe Bay oil field on Alaska’s North Slope still shows the effects of a 2002 spill of 267,000 gallons. Extreme weather conditions hamper cleanup operations and make oil and gas development in the harsh but sensitive Arctic a high-risk endeavor.**

© AP PHOTO/RICK BOWMER

**A Native Alaskan hangs polar bear skins on a drying rack in the village of Barrow. Native subsistence hunting is the only polar bear hunting allowed in Alaska.**



be a significant aspect of native culture.<sup>76</sup>

From 1987 to 2007, a reported 1,614 polar bears were taken for subsistence by Alaska Natives, 965 from the Chukchi region, 649 from the southern Beaufort Sea. Since these polar bear populations are also shared with indigenous communities in Russia and Canada, the combined subsistence take is undoubtedly greater. With polar bears suffering drastic declines in habitat, the standard of sustainable hunting will have to be periodically re-evaluated and adjusted, as it was recently for the population of an estimated 2,000 or fewer polar bears that ranges between Alaska and the Chukotka Peninsula on the extreme northeast tip of Russia. The U.S.-Russia Polar Bear Commission, the body of representatives from each nation's government and indigenous peoples created to set the annual harvest quota for sustainable subsistence hunting, recently set it at 58 bears.<sup>77</sup> This legal harvest will begin only after monitoring and enforcement systems have been established.

### Sport hunting

Several polar bear populations in other countries have been severely depleted by high sport hunting quotas, particularly in Canada, where a significant number of the hunters were American trophy hunters. Now that polar bears are listed under the Endangered Species Act, Americans can no longer legally import polar bear hides into the United States and the allowed sport take is expected to decline. In Alaska, the Marine Mammal Protection Act also protects polar bears by prohibiting "take." Take is defined as "to harass, hunt, capture, or kill, or attempt to harass, hunt capture, or kill any marine mammal." (The act includes specific exceptions, including a provision that allows Alaska Native subsistence use.)

Differences in hunting regulations for "shared" populations, such as the Baffin Bay population of western Greenland and eastern Canada, can lead to overhunting. The Baffin Bay polar bears "may simultaneously be suffering from significant habitat change



and substantial overharvest, while at the same time interpretations by scientists and local hunters disagree regarding population status.”<sup>78</sup>

Greenland and the government of Nunavut have both reduced harvest levels in response to documented declines in polar bear populations.<sup>79</sup> A primary resolution at the 2009 IUCN PBSG meeting focused on the Chukchi Sea population, and recommended that “effective conservation measures, including law enforcement to prevent illegal takes” be implemented “immediately.”

### Illegal hunting

Illegal hunting may occur throughout their range, but the polar bear population most at risk from poaching is the Chukchi Sea population in Russia. Most scientists agree that there is a substantial unrecorded loss of bears in Russia,<sup>80</sup> where poaching has soared due to the demand for bear parts for traditional Asian medicine, the strong domestic market for hides among the emerging elite class in Russia, and the lack of enforcement and government oversight.<sup>81</sup> Current estimates are that as many as 400 bears every year are poached in Chukotka.<sup>82</sup> The new subsistence hunting quotas that were recently set are expected to reduce poaching in Chukotka and help reduce the pressure on this population. As the summer ice pack shrinks, bears in the Chukchi Sea region are likely to be stranded on land for more of the year and even more vulnerable to poaching.

## **HUMAN-BEAR INTERACTIONS**

---

As more bears stay onshore for longer periods of time, they are encountering humans more frequently. Desperate for food, they are taking greater risks and entering human communities, attracted by garbage, pet food or subsistence caches. In Canada, Iceland and Alaska, encounters with humans are increasingly ending with the bears being shot. For most communities, any polar bear that comes too close is a problem bear, and killing it is the only response considered. However, some communities are working hard to prevent unnecessary polar bear deaths, notably Churchill, Barrow and Kaktovik.

In Barrow, for example, the North Slope Borough Department of Wildlife Management,

in cooperation with the Native Village of Barrow, maintains a polar bear deterrence program to protect coastal-dwelling communities from potentially dangerous interactions with polar bears. The department operates a year-round “on-call” patrol in Barrow, and provides seasonal logistical support and staffing to Kaktovik, Wainwright and Point Hope.<sup>83</sup> In 2008, when many polar bears were trapped on land near Barrow after a near-record low in summer sea ice, the department had to use nonlethal deterrence methods on a daily basis, and sometimes four to five times a day. Some bears were so exhausted from swimming long distances that they rested for several days on the beaches. To keep both bears and residents safe, department staff watched these bears around the clock.<sup>84</sup>

Along the Southern Beaufort Sea coast of Alaska, increasing numbers of polar bears are congregating for pre-winter feeding on the carcasses of bowhead whales taken by subsistence whalers. In the past, only a small percent of Alaska’s polar bears have visited these carcasses. From 2002 to 2004, for example, an average of just fewer than five percent of the 1,500 polar bears in the Southern Beaufort region fed from subsistence-harvested whale remains.<sup>85</sup> However, as more bears stay stranded longer on land in the fall and have less success in spring and early summer seal hunting, polar bears are becoming increasingly reliant on these whale bone piles. In 2007, 28 percent of all collared polar bears in one study fed on the whale bones at Kaktovik.<sup>86</sup> Most polar bears spotted in aerial coastline surveys by FWS are within 7.5 miles of Kaktovik.<sup>87</sup>

## **CONTAMINANTS**

---

Studies have shown that several marine species in Alaska’s waters have harmful levels of polychlorinated biphenyls (PCBs) and other persistent organic pollutants (POPs). Polar bears in other parts of the world have suffered health effects from POPs.<sup>88</sup> Monitoring thus far shows that Alaska’s polar bears have a relatively low contaminant load.<sup>89</sup> Given all the other stresses on polar bears, however, even a low level could affect polar bear population health. In addition, climate change may be altering the pathways of these pollutants into the Arctic.<sup>90</sup>



# BEARING RESPONSIBILITY

## What We Can Do to Help Polar Bears

AS LARGE, INTELLIGENT CARNIVORES at the top of their food web, polar bears are somewhat adaptable in coping with changes in their environment. Over the ages they have survived other warming periods in the Arctic, but none that has come as rapidly and unnaturally as the present one. Some scientists believe a certain number of polar bears will somehow adapt and survive the loss of their ice habitat.<sup>91</sup> Others point out that a species cannot be expected to undo in mere decades what has taken thousands of years of evolution and adaptation to develop.<sup>92</sup>

Whatever happens, polar bears will not “just lie down and die.”<sup>93</sup> They will try to find new food sources, new denning habitat and new ways of survival. As the species responsible for climate change and the crisis it has created for polar bears, it is up to us to do everything humanly possible to help them.

### TOP PRIORITY: CURB CLIMATE CHANGE

Global climate change is the principal cause of the loss of polar bears’ sea-ice habitat and the only way to stop it is to reduce global greenhouse gas emissions and related pollutants. Increasing effort must be directed at reducing greenhouse gas emissions and promoting new energy-efficient technologies and renewable energy alternatives. In addition, destructive deforestation, which is responsible for about one-sixth of global carbon emissions, must be reduced.<sup>94</sup>

While the long-term goal of lowering the emission of carbon dioxide and other greenhouse gases to reduce the impacts of climate change is crucial, the reduction of black carbon, the soot particles emitted by burning fossil fuels like coal and oil or biomass such as wood, can have an immediate effect on the reduction of sea-ice loss in the Arctic.

Black carbon reduction is something individuals can easily address and it quickly produces results for our health and our climate.<sup>95</sup> By 2030, black carbon emissions could be reduced by an estimated 50 percent.<sup>96</sup> Measures for cutting it using currently available technology include installing particle traps on exhaust pipes, reducing diesel emissions and upgrading cook stoves in Asian countries, the source of a large percentage of black carbon emissions. In the Arctic region, countries can improve their clean air legislation and policies to reduce additional pollutants from fossil fuels such as sulfates and other cooling aerosols.<sup>97</sup>

Even if atmospheric greenhouse gas concentrations were drastically reduced today, however, global warming would continue for decades to come because of the

pollution already in the atmosphere. Thus, while aggressively addressing climate change, we must immediately take direct actions, like those proposed in the recommendations outlined below, to protect polar bears.

### RECOMMENDATIONS: 10 Things We Can Do Now

#### 1. Fully protect polar bears under the Endangered Species Act.

The polar bear is currently listed as a threatened species under the Endangered Species Act (ESA). However, a special rule created pursuant to Section 4(d) of the act exempts activities outside of Alaska that cause greenhouse gas pollution from being considered as “harm,” and therefore “prohibited take,” of polar bears. While not every activity that results in greenhouse gas pollution can be shown to directly harm polar bears, the cumulative effects of emissions do. Thus, this blanket exemption preventing the consideration of such impacts is unwarranted. Accordingly, the U.S. Fish and Wildlife Service (FWS) should rescind that portion of the 4(d) rule for polar bears and provide the species with the full protection of the ESA.

#### 2. Protect polar bear habitat.

In October 2009, FWS proposed designation of approximately 200,541 square miles as critical habitat as required by the polar bear’s threatened listing under the ESA. The designation recognizes that sea ice over and along the continental shelf is essential to the conservation of polar bears. While the reduction of greenhouse gases is the primary way to protect this



**A polar bear clammers onto an iceberg in the Beaufort Sea. With temperatures still rising and causing record declines in all measurable sea-ice parameters, scientists now believe a return to previous conditions in the Arctic is unlikely.**

habitat, sea ice will continue to contract for some time even once that goal is achieved. Therefore, critical habitat will have to be revised to include areas polar bears begin using as sea ice recedes, as well as places they could go that offer the best chances for adaptation and survival, such as:

- **Year-round habitat.** This includes current and possible future migration corridors and other areas in use throughout the year.
- **Seasonal habitat.** This encompasses onshore feeding areas where polar bears concentrate for short periods of time such as barrier islands and new walrus haul-outs such as Icy Cape.
- **Denning areas, especially the Arctic National Wildlife Refuge.** Polar bears exhibit high site fidelity, so as denning areas are identified buffer zones of several miles should be put in place to protect females and cubs from energy development and other disturbances during birthing and denning, when they are most vulnerable. The Arctic National Wildlife Refuge, the most important onshore denning habitat for Alaskan polar bears, will become all the more vital and should receive increased protection.

- **Areas projected to be ice-free for the shortest periods, the high Arctic of eastern Canada and western Greenland.** There are currently few human communities and industrial activities in these areas, but as sea ice disappears, new development opportunities could arise that result in the degradation of these critical refugia. Already, in fact, new tourism and industrial ventures are emerging. To protect these areas now and keep them free of human incursions, a forward-thinking conservation strategy should be developed as part of Arctic land-use planning done in collaboration with the governments and indigenous communities of Canada and Greenland.<sup>98</sup>

Other international mechanisms for habitat protection should also be instituted. For example, the Range States agreed that expanding protected areas can reduce the vulnerability of polar bears and any such expansion should consider long-term shifts in sea-ice conditions.<sup>99</sup> The parties should therefore identify and protect essential barrier islands, denning areas, feeding habitat and other places polar bears congregate in addition to corridors for migrating between summer- and winter-use areas.

### 3. Protect the polar bear's prey base.

The ice-dependent seals on which polar bears prey are also suffering from the effects of climate change. Efforts are underway to protect ringed, bearded, ribbon and spotted seals, as well as the Pacific walrus, under the ESA. In addition, take of seals and walrus should be monitored to ensure there are sufficient population levels to support polar bear energy needs. An assessment of Arctic cod and other sea-ice fish (prey for seals) should also be conducted, and further protections implemented as necessary to ensure the resilience of the entire Arctic food web.

### 4. Reduce other risk factors.

As polar bears endure high levels of stress from loss of habitat, it is imperative to reduce as many risk factors as possible that might compound the effects of sea-ice habitat, including:

- **Oil and gas development.** The plight of the polar bear is inextricably linked to the production and burning of fossil fuels. The direct impacts of oil and gas exploration and development add to climate change impacts and other factors affecting the survival of polar bears and their prey. Protection of polar bears, their prey and Arctic ecosystems should be weighed along with the projected benefits of oil and gas development when considering the development of additional oil and gas reserves in their habitat at all levels of the policy process in the Arctic.<sup>100</sup> Because the actual effects of oil and gas exploration on polar bears are relatively unknown and because polar bears are already suffering declines and stresses, energy development decisions should err on the side of caution, therefore:

*All new Arctic oil and gas development should be suspended until appropriate measures to protect polar bear populations and their sea-ice habitat are in place.*

In addition there should be a permanent moratorium on energy exploration and development in the Beaufort and Chukchi seas, where Alaska's polar bears live, and continued prohibition of drilling in the Arctic National Wildlife Refuge, an important winter denning site.

- **Shipping and other commercial activities.** Shipping and coastal development activities should only be allowed to proceed after adequate polar bear protection is in place. Icebreaker use in the Arctic, for instance, should be carefully reviewed before allowing it, because these vessels can hasten the shrinking of the remaining ice pack, destroy polar bear hunting and resting platforms and drive away seals. In addition marine diesel fuel is a source of black carbon.
- **Trophy hunting, illegal take and trade in polar bear parts.** With their low reproductive and recruitment rates, polar bears have always been more susceptible to overharvesting than most other Arctic species. Reducing hunting on declining populations will likely help maintain polar bear populations. All Arctic governments should seek to eliminate sport trophy hunting of polar bears wherever it occurs. However, with the understanding that a warming climate is also placing great stress on Arctic subsistence communities, all efforts should be made to accommodate the legitimate and sustainable subsistence activities of native peoples.
 

To address the illegal take of polar bears, a confidential reporting system should be established in Chukotka, Russia, that encourages anonymous reporting of poaching incidents by offering rewards for reports that lead to convictions. Volunteer ranger or warden programs should also be developed.

To curtail the trade in skins, claws and other parts, polar bears should be granted additional protections under the Convention on International Trade in Endangered Species (CITES).<sup>101</sup> The polar bear is currently listed in Appendix II of CITES, a designation that allows regulated commercial trade in polar bear parts. Listing polar bears on CITES Appendix I, which prohibits commercial trade, would reduce the pressure to overharvest. Commercial exports have only been allowed from Canada and Greenland in recent years, and exports from several of the populations in those countries have been restricted under various national and European Union-level

decisions due to overharvesting. A broad international restriction via Appendix I would provide the comprehensive protections polar bears need in face of the many other threats they must surmount to survive. The U.S. proposal to list polar bears on Appendix I rejected by the CITES parties at their meeting in March 2010 should be reconsidered.

### 5. Mitigate human-bear interactions through prevention and response programs.

As bears become more nutritionally stressed, they are increasingly seeking food in areas used or settled by humans. Arctic coastal communities have already seen a dramatic increase in the numbers of polar bears congregating along the coast in late summer and fall. These bears are often even more dangerous because they are hungry. But with declining polar bear populations, our approach to bears entering communities must shift dramatically from proclaiming them aberrant “problem” or “nuisance” bears and dispatching them. Instead, we should focus on protecting both humans and bears through prevention programs designed to keep bears away and response programs set up to quickly deal with bears that come too close.

Prevention programs include:

- **Community education.** Bear safety training for coastal residents and workers can help protect people and property and prevent unnecessary killing of polar bears. Some communities, such as Barrow and Churchill, are beginning to teach adults and school-age children general safety guidelines such as how to minimize attractants and avoid encounters with polar bears. Education efforts should be expanded to all Arctic coastal communities and inland communities like Fort Yukon where polar bears are starting to appear.
- **Safe food storage and waste disposal.** As climate change makes the permafrost less dependable in summer months, the ice cellars where Inuit, Yupik and Inuvialuit communities have traditionally stored subsistence food are failing. Alternative bear-resistant storage meth-

ods must be found, and several communities are currently testing some.

In Nunavut, Canada, some communities are storing meat intended for dog teams in metal shipping containers.<sup>102</sup> While these containers are not airtight and still attract bears by scent, the bears are generally not able to get at the food and may leave the area without associating humans with food. The effectiveness of this approach is still being evaluated.

In Churchill and other places, residents are trying simple wooden boxes and sheds. Bears can break into them and get to the food, but it buys time during which bears can be deterred.<sup>103</sup> Some northern villages have community freezers for subsistence meats and one, Kaktovik, is considering purchasing freezer vans for such use.<sup>104</sup> However, not everyone uses the freezers, and their capacity can be exceeded as the village’s human population increases. Metal lockers, smaller and cheaper than shipping containers, are also being tested as a food storage option for Alaska’s communities.

- **Managed disposal of subsistence harvest remains.** Carcasses from subsistence hunts, particularly the massive remains of bowhead whales after autumn hunts, are increasingly attracting bears. Communities from Barrow to the Nunavut region have explored different methods for safely disposing of carcasses. One

**Changing the CITES listing of polar bears from Appendix II to Appendix I would end the trade in polar bear parts and products like this rug.**



© GEORGE GUTENBERG/MOODBOARD/CORBIS



© FLIP NICKLIN/MINDEN PICTURES



**Tundra buggies full of tourists ogle polar bears in Churchill, Manitoba. With polar bears spending more time on vehicle-accessible land in Alaska, some coastal communities there are developing ecotourism operations.**

suggested model is the “bone-yard management program” successfully used in other areas. Under this program, livestock carcasses are removed from private property and taken to remote locations to provide a food source for bears a safe distance from human communities.<sup>105</sup> If transport options are available, catches can be processed away from communities or camps, leaving less residual scraps to attract bears.<sup>106</sup>

- **Ecotourism oversight.** Ecotourism and sight-seeing focused on polar bears are increasing. Alaskan Arctic coastal communities such as Barrow and Kaktovik are part of a small but growing ecotourism industry built on viewing polar bears as they forage on “bone piles,” the remnants of bowhead whale carcasses left on the shores of the southern Beaufort Sea from fall subsistence hunts.

As bears become stranded on land for longer periods of time and more ecotourism opportunities arise, it will become increasingly important to enforce regulations on observation distances and harassment. Harassing or disturbing polar bears is a federal violation under the Marine Mammal Protection Act. Tour operators are required to stay a sufficient distance from bears, but the noise and presence of vehicles even at a safe distance can potentially disturb bears.

Currently, oversight of these polar-bear-based ecotour operations is minimal, except

in Barrow, where tour operators must have a village-issued permit to travel and conduct business on Alaska Native lands. FWS polar bear biologists are currently working with the village of Kaktovik to develop ecotourism guidelines for polar bear viewing.

As the ecotourism industry grows, clear guidelines for tour operators throughout the state and ways to ensure compliance should be developed. International cooperation will also become necessary as open water attracts more tour operators.<sup>107</sup>

Response programs include:

- **Temporary holding facilities.** What to do with increasing numbers of “problem” or “nuisance” bears should be addressed. In Churchill, Manitoba, these bears are captured and moved to a temporary holding facility, where up to 25 bears can be held in cinder block cages for several months. Bears are given water, but not food, so that they will not associate human settlements with food sources. When the sea ice returns in the fall, bears are transported out to the ice and released.

Temporarily holding bears has worked extremely well in Churchill and is a model Alaskan communities could use. It would, however, require staff, funding and expertise to capture, hold and release live bears. This has not been considered feasible for Alaska as the program is relatively expensive and Alaska’s communities are much smaller than Churchill. The number of “problem bears” is also still fairly low, and they are usually dispatched by hunters for subsistence, or in defense of life or property.<sup>108</sup> With populations dwindling due to climate change, however, keeping bears alive may become preferable.

- **Polar bear patrols.** Coastal villages are seeing more bears on land for longer periods of time and these sightings are likely to increase. Nonlethal bear detection and deterrence programs have already been instituted in some communities. The North Slope Borough Department of Wildlife Management, an agency of the Native Village of Barrow, for example, maintains a polar bear deterrence program to protect coastal-dwelling communi-

ties from potentially dangerous interactions with polar bears. The department operates a year-round “on-call” patrol in Barrow, and provides seasonal logistical support and staffing to Kaktovik, Wainwright and Point Hope.<sup>109</sup>

These communities use vehicles and noise to chase bears out of town. If bears are not noticeably exhausted but fail to move, they use pyrotechnics (cracker shells). Bears too exhausted to move are placed on 24-hour surveillance and a safety perimeter is established to let the bear rest without human disturbance. State and federal funds should be used to refine such patrol and deterrence efforts and expand them to cover all coastal areas in polar bear country. As polar bears wander further inland in search of food, patrols should also be instituted in Fort Yukon and other interior villages.

- **Rapid response measures.** Plans at all levels of government should be set in place to respond when starving, exhausted or otherwise stressed polar bears unexpectedly appear on beaches or in communities. To date, documented changes in polar bear population parameters such as body mass, reproduction, survival rates have been gradual. With rapid ecological change, however, these parameters will change more quickly, requiring immediate action based on comprehensive response plans.<sup>110</sup>

Response plans should have provisions for advising residents on how to protect themselves and their property without taking lethal actions against bears. They should also contain official guidelines for rescuing, rehabilitating and relocating bears. Adequate resources should also be in place to run the programs.

Canadian and Alaskan polar bear scientists are currently working on a polar bear forecast system, a website that would provide real-time information on the location of radio-collared bears. Proponents claim that this early warning system could be used to alert community members of approaching bears in time to protect life and property.<sup>111</sup> However, there is some concern that this information could be used to track polar bears by illegal hunters.

In addition to prevention and response programs, a database of information on polar bear/human interactions should be established to help evaluate and prioritize mitigation efforts. The United States was given the lead on developing such a database at the 2009 Range States meeting in Tromso, Norway.<sup>112</sup>

## 6. Initiate direct interventions to help polar bears.

In the past, scientists have dismissed individual rescues and other direct-intervention efforts as unlikely to have a positive effect on the overall population. However, the extent and pace of climate change’s effect on our world is so unprecedented that scientists are rethinking what is feasible and worthwhile.<sup>113</sup> As polar bear numbers shrink along with the sea ice, every single bear becomes more important to the long-term viability of the population, and last-ditch interventions should be considered in concert with one another and in the context of the entire life cycle of polar bears and the seasonal cycles of their habitat. Interventions that should be considered include:

- **Shore rescue.** Polar bears are appearing onshore in poor, emaciated condition. In some cases, bears are too exhausted to move, for hours and even days, regardless of the attempts of wildlife officials to haze them away from human communities.<sup>114</sup> Rescuing bears from starvation may become necessary, and plans should be in place for where to take them, what to feed them and what food sources will be available to them if they are released. Using the proven methods for the capture and release of polar bears regularly employed by wildlife biologists and managers in Churchill and other communities, rescued bears could be moved to rehabilitation facilities and eventually relocated.
- **Zoos and gene banks.** The issue of where to relocate rescued and rehabilitated bears if they are not healthy enough to be released to the wild or if suitable habitat is not immediately available should be addressed. Some scientists have initiated conversations with zoo groups about worldwide capacities to hold bears temporarily or permanently.<sup>115, 116</sup> The Range



**A sow and her cubs scavenge a bowhead whale backbone on the coastal plain of the Arctic National Wildlife Refuge. Hungry polar bears are turning to these remains left by native subsistence hunters.**

States should also engage zoos and wildlife scientists in the critical issue of how best to preserve the polar bear's diverse gene pool should climate change claim entire populations. Captive breeding programs, the establishment of a gene bank with genetic samples collected from all current polar bear populations and creation of a database of gene sequences maintained in the GenBank at the U.S. National Center for Biological Information should all be considered to save the polar bear's populations and gene pool.

- **Supplemental feeding with subsistence remains.** Effectively disposing of the remains of bowhead whales and other subsistence-hunted animals not only protects communities, but can also offer a potential food source for starving or undernourished bears. Citing concerns over disease transmission, nutritional imbalance and habituation to humans, scientists generally agree that feeding wild animals is counterproductive and even dangerous. However, supplemental feeding may become necessary to ensure the survival of some land-based polar bears and it should be carefully evaluated as an emergency intervention measure.

Alaska Native communities should be

approached for ideas on providing remnant bowhead and other carrion for polar bears to feed on without endangering people. Whale hunters from the village of Nuiqsuit, 20 miles inland from Alaska's Arctic coast, for example, land bowheads on Cross Island in the Beaufort Sea. From there, they use oil company-donated barges, helicopters and trucks to transport the food to Nuiqsuit, leaving the remains behind on the island for the polar bears. This is expensive and energy-intensive, and likely not feasible for communities without significant financial support. These communities may, however, be able to do it on a smaller scale a few miles away from their villages. Carcasses of walruses, belugas and other animals that wash ashore could also be collected and transported to designated bear feeding areas located a safe distance away.

#### **7. Amend U.S. Arctic policy to address issues that impact polar bears.**

The U.S. Arctic Policy National Security Directive issued in the last days of the Bush administration should be revisited by the Obama administration. To the extent that this new policy does not sufficiently address the issues related to the protection of polar bears and their sea-ice habitat, the policy should be rewritten and reissued.

The overarching U.S. policy objective for the Arctic should be to protect the Arctic sea-ice ecosystem and the associated human communities, not to exploit it for short-term commercial (resource exploitation) and strategic gain. To accomplish this, a binding multilateral Arctic Treaty (similar to the existing Antarctic Treaty) should be developed with all Arctic nations. This treaty should seek to minimize or prohibit industrial and military activities across the Arctic basin, including all polar bear habitat, and to prioritize conservation of sea-ice habitat, the associated ecosystem and polar bear populations.

#### **8. Ratify the United Nations Convention on the Law of the Sea.**

The United Nations Convention on the Law of the Sea addresses many significant policy issues, such

as transit regimes, exclusive economic zones, continental shelf jurisdiction, seabed mining, resource exploitation, protection of the marine environment and settlement of disputes. It was agreed to in 1982 and entered into force in 1994, after ratification by 60 nations. The United States did not sign until 1994 and the Senate has yet to ratify it, putting the nation at a disadvantage in many aspects of multilateral policy negotiation in the Arctic, including polar bear conservation. Ratification of the Law of the Sea Treaty by the Senate, therefore, should be a priority.

#### **9. Engage international nongovernmental and intergovernmental institutions.**

The Range States, Arctic Council, Northern Forum, Inuit Circumpolar Conference, indigenous institutions in Arctic Alaska, IUCN Polar Bear Specialist Group, Nanuq Commission and national and international conservation organizations should engage in a collaborative effort for polar bear recovery that includes a crisis response component. Groups of which the United States is an official member, such as the Range States, should be encouraged to enter into binding agreements to protect polar bears. (The 2009 Range States meeting produced important resolutions, but none are binding.)

#### **10. Conduct more research and monitoring, using noninvasive methods whenever possible.**

To ensure that all efforts to help polar bears adapt to climate change are based on sound science, research and monitoring should be significantly expanded. Researchers will also have to consider the effects of capture, tagging and other intrusive stresses on individuals from declining populations and use these methods only on the smallest number of bears necessary to obtain statistically valid information.

## **TO DO LIST: Polar Bear Research Priorities**

---

- ✓ Design less intrusive methods for tracking both sexes of polar bears, such as the use of surgical implants instead of radio collars.
- ✓ Study population parameters, such as abundance, recruitment, survival and body condition.
- ✓ Conduct regular aerial surveys to estimate population sizes and locations, especially in the Chukchi Sea, for which little recent information is available.
- ✓ Develop a better understanding of the mechanisms reducing cub and adult bear survival, with a focus on mitigating them.
- ✓ Monitor vital signs, including contaminant loads and nutrition levels, of individual polar bears when possible.
- ✓ Monitor habitat use—especially in the Chukchi Sea population, which has experienced the greatest loss of sea ice—to determine changes and to see if bear populations are redistributing based on preferred habitat or are simply declining.
- ✓ Monitor all harvests (including estimates of illegal harvests) and set sustainable harvest rates on an international level based on population declines.
- ✓ Monitor foraging behavior to determine how dietary habits are changing and how to protect and enhance any new polar bear food sources.
- ✓ Identify and monitor adequate buffer zones for denning areas.
- ✓ Conduct general studies on the Arctic marine ecosystem to better predict how the marine food web will respond to climate change, particularly the effects of reduced ice cover on productivity, plankton, Arctic cod, ice seals and walrus.
- ✓ Track trends in coastal area use by polar bears, especially near villages and worksites.
- ✓ Devise and deliver the best methods for prevention, deterrence and other mitigations of human/bear interactions.
- ✓ Undertake a study of possible economic benefits of ecotourism in an effort to promote polar bear conservation and sustainable employment in remote coastal communities.
- ✓ Search offshore areas, particularly after severe storm events, for swimming, stranded and drowned bears.
- ✓ Determine the best methods for securing material for a gene bank and/or ovum/sperm bank. When feasible, collect such materials from all polar bears captured for research projects.



## CONCLUSION:

### Do It–Now

THE IMPACTS OF CLIMATE CHANGE are being felt more rapidly and severely in the Arctic than scientists predicted even just a few years ago.<sup>117</sup> Arctic sea ice contracted more in the four summers between 2007 and 2010 than at any time since satellite records have been kept, and a completely ice-free Arctic summer grows more likely each year. The plight of polar bears, especially in Alaska, is even more dire than originally predicted, and our response must be more rapid, more creative and more ambitious than we ever anticipated.

As one researcher put it: “The question that needs to be asked by scientists, government agencies and conservation organizations is this: 50 years or so from now, if polar bears are gone from the United States as predicted, what will we wish we had done? And then we need to do it–now. What seemed crazy three years ago is not considered crazy now.”<sup>118</sup>

**A pair of polar bears engages in a sparring match during a snowstorm. Friendly tussles are common, but stressed and hungry polar bears may become more aggressively competitive.**





## DEFENDING POLAR BEARS

---

Defenders of Wildlife recognizes that we need to give polar bears time and space. We can give them time by reducing greenhouse gas emissions as quickly as possible so that the duration of the current warming, with its open water and reduced sea ice, is as short as possible. We can give them space by protecting their feeding and denning areas, migration corridors, buffers and refugia from human activities and by helping to reduce human-bear interactions and disturbances.

Through public outreach Defenders is helping Americans see clearly what is at stake for polar bears and the Arctic ecosystem and developing the strong public constituency needed to push for polar bear protections and national and international efforts to reduce carbon emissions to reverse the melting of polar bear's Arctic sea-ice habitat. We are promoting alternative energy sources, energy efficiency and energy conservation and advocating policies to reduce black carbon (soot) emissions.

Defenders is championing proactive measures and tools to reduce human-bear conflicts and to ensure that the protection of polar bears and their Arctic habitat is a priority considered in every decisions made about development in the Arctic—from oil exploration to shipping. We are encouraging federal and state governments and all Arctic (Range State) governments to fully protect polar bears, immediately secure polar bear habitat and put recovery plans for polar bears in place. Defenders of Wildlife is completely committed to doing its part to help ensure the survival of the polar bear for future generations.

## ENDNOTES

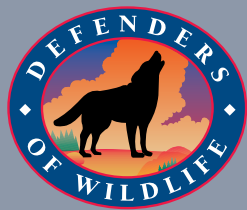
1. Aars, J., J.F. Lunn and A.E. Derocher, eds. Polar Bears: Proceedings of the 14<sup>th</sup> Working Meeting of the IUCN/SCC Polar Bear Specialist Group, Seattle, Washington, U.S.A. (IUCN, Gland, Switzerland and Cambridge, U.K., 2006), 189.
2. IUCN Polar Bear Specialist Group. *Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009*. <http://pbsg.npolar.no/en/meetings/resolutions/15.html#top3>.
3. IUCN Polar Bear Specialist Group. *15th meeting of PBSG in Copenhagen, Denmark 2009*. <http://pbsg.npolar.no/en/meetings/press-releases/15-Copenhagen.html>
4. Derocher, A.E. *Populations and sources of recruitment in polar bears: movement ecology in the Beaufort Sea*. Presentation at Eleventh Information Transfer Meeting of Minerals Management Service, Alaska OCS Region, U.S. and Canada Northern Oil and Gas Research Forum, Anchorage, AK. October. 29,2008.
5. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the Polar Bear Specialist Group in Copenhagen, Denmark 2009.
6. Amstrup, S.C. "Polar Bear," in *The Natural History of an Arctic Oilfield: Development and the Biota*, eds. J.J. Truett and S.R. Johnson (New York: Academic Press, Inc., 2000).
7. J. Aars, J.F. Lunn and A.E. Derocher, eds. *Polar Bears: Proceedings of the 14<sup>th</sup> Working Meeting of the IUCN/SCC Polar Bear Specialist Group* (2006).
8. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009.
9. Ibid.
10. "Arctic Wildlife Finally Benefits from U.S.-Russian Conservation Efforts," *America.gov*, July 20, 2010. <http://www.scoop.co.nz/stories/WO1007/S00368.htm>
11. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009.
12. State of Alaska (2008). [alaska.fws.gov/fisheries/mmm/stock/finalpbbeaufortsea.pdf](http://alaska.fws.gov/fisheries/mmm/stock/finalpbbeaufortsea.pdf).
13. Schliebe, S. and K. Johnson, "Determination of Threatened Status for the polar bear (*Ursus maritimus*) throughout its range." U.S. Department of the Interior, Fish and Wildlife Service, *Federal Register Final Rule 50 CFR Part 17, 2008*
14. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009.
15. Ibid.
16. Schliebe, S. and K. Johnson. "Determination of Threatened Status for the polar bear (*Ursus maritimus*) throughout its range." *Federal Register Final Rule 50 CFR Part 17, 2008*.
17. Ibid.
18. National Snow and Ice Data Center. Arctic Sea Ice News (2009). <http://www.nsidc.org/arcticseaiceneews/>.
19. National Snow and Ice Data Center. Sea Ice Index (2008). [http://www.nsidc.org/data/seaiice\\_index/](http://www.nsidc.org/data/seaiice_index/).
20. National Snow and Ice Data Center. Arctic Sea Ice News (2010). <http://www.nsidc.org/arcticseaiceneews/>.
21. Derocher, A.E., Presentation at the Range States Meeting, Tromso, Norway, 2009. <http://pbsg.npolar.no/export/sites/pbsg/en/docs/PBSG-ppt-Tromso.pdf>.
22. National Snow and Ice Data Center. Arctic Sea Ice News (2010). <http://www.nsidc.org/arcticseaiceneews/>.
23. Steiner, R.G., Professor and Conservation Specialist, University of Alaska, Anchorage, personal communication, December 2008.
24. Richter-Menge, J. and J.E. Overland, eds. Arctic Report CARD 2010. <http://www.arceic.noaa.gov/reportcard>.
25. Monge, M.A., B. D'Anna, L. Mazr, A. Giroir-Fendler, M. Ammann, D.J. Donaldson and C. George. "Light Changes the Atmospheric Reactivity of Soot," *PNAS Early Edition*, November 2009.
26. Shindell, D. and G. Faluvegi. "Climate response to regional radiative forcing during the 20th century," *Nature Geoscience*, 2 (2009):294–300.
27. Molina, M, D. Zaelke, K.M. Sarma, S.O. Andersen, V. Ramanathan and D. Kaniaru. "Reducing Abrupt Climate Change Risk Using the Montreal Protocol and other Regulatory Actions to Complement Cuts in CO<sub>2</sub> emissions." *PNAS Early Edition*. August 2009.
28. Ljunggren, D., "Arctic summer ice could vanish by 2013: expert," *Reuters News Service*, March 5, 2009, <http://www.reuters.com/article/environmentNews/idUSTRE52468B20090305>
29. Steiner, R.G., personal communication, December 2008.
30. Haecker, D., "Polar bears are the tip of the iceberg in climate change debate," *The Nome Nugget*, August 8, 2008.
31. Monnett, C. and J.S. Gleason, "Observations of mortality associated with extended open-water swimming by polar bears in the Alaskan Beaufort Sea," *Polar Biology* 29(2006):681-687.
32. Schliebe, S. and K. Johnson, "Determination of Threatened Status for the polar bear (*Ursus maritimus*) throughout its range," *Federal Register Final Rule 50 CFR Part 17, 2008*.
33. Stirling, I., "Polar bears and seals in the eastern Beaufort Sea and Amundssen Gulf: a synthesis of population trends and ecological relationships over three decades," *Arctic* 55 (2002):59-76.
34. York, G., Wildlife Biologist, World Wildlife Fund, Anchorage, AK, personal communication, November 2008.

35. Joling, Dan, "Scores of walrus carcasses spotted on coast," *Anchorage Daily News*, September 18, 2009.
36. Amstrup, S.C., I. Stirling, T.S. Smith, C. Perham and G.W. Thiemann, "Recent observations of intraspecific predation and cannibalism among polar bears in the Southern Beaufort Sea," *Polar Biology*.1007/S00300-006-0142-5 (2006 ).
37. Haecker, D., "Polar bears are the tip of the iceberg in climate change debate," *The Nome Nugget*, August 8, 2008.
38. National Oceanic and Atmospheric Administration, 2008 Field Report. [http://www.afsc.noaa.gov/NMML/cetacean/bwasp/comida\\_rpts/COMIDA2\\_Flight12\\_16Aug2008.pdf](http://www.afsc.noaa.gov/NMML/cetacean/bwasp/comida_rpts/COMIDA2_Flight12_16Aug2008.pdf).
39. Associated Press (2008) Anchorage Daily News, August 22.
40. Monnett, C. and J.S. Gleason, "Observations of mortality associated with extended open-water swimming by polar bears in the Alaskan Beaufort Sea." *Polar Biology* 29(2006):681-687.
41. Ibid.
42. Schliebe, S. and K. Johnson, "Determination of Threatened Status for the polar bear (*Ursus maritimus*) throughout its range," *Federal Register Final Rule 50 CFR Part 17, 2008*.
43. Haecker, D., "Polar bears are the tip of the iceberg in climate change debate," *The Nome Nugget*, August 8, 2008.
44. *Fairbanks Daily News-Miner*. <http://www.newsminer.com/news/2008/mar/28/polar-bear-killed-fort-yukon/>
45. Steiner, R.G., personal communication, December 2008.
46. Schliebe, S. and K. Johnson, "Determination of Threatened Status for the polar bear (*Ursus maritimus*) throughout its range," *Federal Register Final Rule 50 CFR Part 17, 2008*.
47. Derocher, A.E. *Populations and sources of recruitment in polar bears: movement ecology in the Beaufort Sea*, presentation at Eleventh Information Transfer Meeting of Minerals Management Service, Alaska OCS Region, U.S. and Canada Northern Oil and Gas Research Forum, Anchorage, AK. October 29, 2008.
48. York, G., personal communication, November 2008.
49. Regehr, E.V., N.J. Lunn, S.C. Amstrup and I. Stirling, "Effects of earlier sea ice breakup on survival of polar bears in Western Hudson Bay," *Journal of Wildlife Management* 71(8)(2007): 2673-2683.
50. Derocher, A.E., presentation at Eleventh Information Transfer Meeting of Minerals Management Service, Alaska OCS Region, October 29, 2008.
51. Polar Bear Information Transfer Meeting, hosted by U.S. Fish and Wildlife Service, Marine Mammals Management, in cooperation with U. S. Geological Survey and World Wildlife Fund, Anchorage, AK, July 22, 2009.
52. Bowhead Whale Aerial Survey Program and Chukchi Offshore Monitoring in Development Area (BWASP / COMIDA), 2009 surveys by National Marine Fisheries Service, National Marine Mammal Lab and Minerals Managements Service, [www.afsc.noaa.gov/NMML/.../flights\\_COMIDA\\_1-3.phb](http://www.afsc.noaa.gov/NMML/.../flights_COMIDA_1-3.phb)
53. Steiner, R.G., personal communication, December 2008.
54. Rode, K.D., S.C. Amstrup and E.V.Regehr, Polar Bears in the Southern Beaufort Sea III: stature, mass, and cub recruitment in relationship to time and sea ice extent between 1982 and 2006, U.S. Geological Survey 2007.
55. Regehr, E.V., N.J. Lunn , S.C. Amstrup and I. Stirling, "Effects of earlier sea ice breakup on survival of polar bears in Western Hudson Bay," *Journal of Wildlife Management* 71(8) (2007): 2673-2683.
56. Rode, K.D., S.C. Amstrup and E.V. Regehr, "Polar Bears in the Southern Beaufort Sea III: stature, mass, and cub recruitment in relationship to time and sea ice extent between 1982 and 2006," U.S. Geologic Survey 2007.
57. Ibid.
58. Cherry, S.G., A.E. Derocher, I. Stirling and E.S. Richardson, "Fasting physiology of polar bears in relation to environmental change and breeding behavior in the Beaufort Sea," *Polar Biology* (2008).
59. Ibid.
60. Derocher, A.E., N.G. Lunn and I. Stirling, "Polar bears in a warming climate," *Integrative and Comparative Biology* 44:163-176.
61. Schliebe, S. and K. Johnson. "Determination of Threatened Status for the polar bear (*Ursus maritimus*) throughout its range." *Federal Register Final Rule 50 CFR Part 17, 2008*.
62. Derocher, A.E., N.G.Lunn and I. Stirling, "Polar bears in a warming climate," *Integrative and Comparative Biology* 44:163-176.
63. Polar Bear Information Transfer Meeting, July 22, 2009.
64. Regehr E.V., S.C. Amstrup and I. Stirling, "Polar bear population status in the Southern Beaufort Sea," Report Series 2006-1117, U.S. Geological Survey.
65. Ljunggren, D., *Reuters News Service*, March 5, 2009.
66. Monnett, C., marine mammal ecologist, Anchorage, AK, personal communication, November 2008.
67. Monnett, C. and J.S. Gleason, "Observations of mortality associated with extended open-water swimming by polar bears in the Alaskan Beaufort Sea," *Polar Biology*, 29(2006):681-687.
68. Steiner, R.G., personal communication, December 2008.
69. Polar Bear Information Transfer Meeting, July 22, 2009.



70. Derocher, A.E., Professor, Department of Biological Sciences, University of Alberta, Canada and Chair, IUCN Polar Bear Specialist Group, personal communication, October 2008.
71. Derocher, A.E., Range States Meeting presentation, 2009.
72. Meeting of the Parties to the 1973 Agreement on the Conservation of Polar Bears, Tromsø, Norway March 17- 19, 2009, Outcome of Meeting, <http://www.polarbearmeeting.org/home/>
73. Derocher, A.E., Presentation at the Range States Meeting, 2009.
74. Amstrup, S.C., Senior Polar Bear Scientist, U.S. Geological Survey, Alaska Science Center, Biological Science Office, Anchorage, AK, personal communication, November 2008. (Since 2010, Senior Scientist, Polar Bears International.)
75. Ashley, N., Wildlife Biologist, Department of Wildlife Management, North Slope Borough, Barrow, AK, personal communication, November 2008.
76. "Arctic Wildlife Finally Benefits from U.S.-Russian Conservation Efforts," *America.gov*, July 20, 2010. <http://www.scoop.co.nz/stories/WO1007/S00368.htm>
77. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009.
78. Ibid.
79. Ibid.
80. Derocher, A.E, personal communication, October 2008.
81. York, G., personal communication, November 2008.
82. Ashley, N., personal communication, November, 2008.
83. Miller, S., S. Schliebe and K.Proffitt, "Demographics and behavior of polar bears feeding on bowhead whale carcasses at Barter and Cross Islands, Alaska, 2002-2004." *OCS Study MMS 2006-14*, Minerals Management Service, Anchorage, AK, 2006.
84. Ibid.
85. Derocher A.E. and G.W. Thiemann. "Populations and sources of recruitment in polar bears," *University of Alberta Annual Report, 2008*.
86. Polar Bear Information Transfer Meeting, July 22, 2009.
87. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009.
88. Miller, S., Wildlife Biologist, U.S. Fish and Wildlife Service, Marine Mammals Management Office, Anchorage, AK., personal communication, December 2008.
89. IUCN Polar Bear Specialist Group. Resolutions from the 15th meeting of the PBSG in Copenhagen, Denmark 2009.
90. York, G., personal communication, November 2008.
91. Derocher, A.E., personal communication, October 2008.
92. Amstrup, S.C., personal communication, November 2008.
93. Food and Agriculture Organization of the United Nations, *Forestry and Climate Change* (2010), <http://www.fao.org/forestry/climatechange/en>
94. Posadas, D., "Carbon credits should include soot reduction," *Inside Science*, March 31, 2010.
95. Cofala, J. M. Amman, Z. Klimont, K. Kupiainen and L. Hoeglund-Isaksson, "Scenarios of global anthropogenic emissions of air pollutants and methane until 2030," *Atmospheric Environment* 41:8486-8499 (2007).
96. Molina M, D. Zaelke, K.M. Sarma, S.O. Andersen, V. Ramanathan and D. Kaniaru, "Reducing Abrupt Climate Change Risk Using the Montreal Protocol and other Regulatory Actions to Complement Cuts in CO<sub>2</sub> emissions." *PNAS Early Edition*. August 2009.
97. Amstrup, S.C., personal communication, November 2008.
98. Meeting of the Parties to the 1973 Agreement on the Conservation of Polar Bears, 2009.
99. York, G., personal communication, November 2008.
100. Defenders of Wildlife, "Wildlife group seeks halt to polar bear trade," press release, Washington, D.C. August 31, 2009.
101. Medill, S., Wildlife Deterrent Specialist, Department of Environment, Government of Nunavut, Igloolik, NU, Canada, personal communication, December 2008.
102. Ibid.
103. York, G., personal communication, November 2008.
104. Medill, S., personal communication, December 2008.
105. Ibid.
106. Meeting of the Parties to the 1973 Agreement on the Conservation of Polar Bears, 2009.
107. Ashley, N., personal communication, November, 2008.
108. Ibid.
109. Derocher, A.E., Range States Meeting presentation, 2009.
110. Derocher, A.E, personal communication, October 2008.
111. Meeting of the Parties to the 1973 Agreement on the Conservation of Polar Bears, 2009.
112. Polar Bear Information Transfer Meeting, July 22, 2009.
113. Ashley, N., personal communication, November, 2008.
114. Polar Bear Information Transfer Meeting, July 22, 2009.
115. Derocher, A.E., presentation at Eleventh Information Transfer Meeting of Minerals Management Service, Alaska OCS Region, October. 29, 2008.
116. National Snow and Ice Data Center. Sea Ice Index (2008). [http://www.nsidc.org/data/seaice\\_index/](http://www.nsidc.org/data/seaice_index/).
117. Monnett, C., personal communication, November 2008.
118. Ibid.





DEFENDERS OF WILDLIFE  
1130 17th Street, N.W.  
Washington, D.C. 20036-4604  
202.682.9400  
[www.defenders.org](http://www.defenders.org)