



FACTSHEET

Effects of climate change on polar bears

Background

The polar bear (*Ursus maritimus*) is the world's largest species of bear and the largest land predator. There is a great difference in size between male and female polar bears, with the males (350-800 kg) weighing more than twice as much as the females (150-300 kg). Their body weight varies considerably during the season - especially female bears which can often double in weight between early spring and late summer. Compared to other bear species, the polar bear has a relatively small, long and narrow head, smaller and shorter fur-covered ears, and shorter, more powerful claws. Its longer predatory teeth and sharper molars have helped polar bears adapt to the arctic climate and its almost exclusively carnivorous lifestyle. The polar bear is the youngest species of bear and is closely related to the brown bear (*Ursus arctos*) and grizzly bear (*Ursus arctos horribilis*).

The polar bear is a formidable predator and ranks at the top of the arctic food chain.



Polar bear (*Ursus maritimus*). Churchill, Manitoba, Canada.

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Ecology

The polar bear is a formidable predator and ranks at the top of the arctic food chain. Its most common prey are the ringed seal (*Phoca hispida*) and the bearded seal (*Erignathus barbatus*). However, the polar bear is an opportunist when it comes to food, and it will eat other available prey when presented with the opportunity. Young walruses (*Odobenus rosmarus*), Greenland seals (*Phoca groenlandica*), hooded seals (*Cystophora cristata*), beluga whales (*Delphinapterus leucas*) and narwhals (*Monodon monoceros*) may also be included in their diet out on the sea ice where its main hunting grounds are located. On land the polar bear may also catch reindeer (*Rangifer tarandus*), the young and eggs of sea birds and geese, as well as the carcasses of whales that have been washed ashore. Polar bears can also eat berries, grass and seaweed, which they obtain by diving.



Polar bear prey: Walrus (*Odobenus rosmarus*). Svalbard, Norway

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In the wild, polar bears normally live to be 20-30 years old. Both males and females mature at the age of four to five years. Females often give birth to their first litter of cubs when they reach maturity, while males do not usually start mating until they are between eight to ten years old. Mating takes place in April-May, but delayed implantation (the fertilised egg stops developing at an early stage) means that foetal development does not commence until September-October.

During late autumn, females go into hibernation and remain there for approximately four months. At about the beginning of January, between one and three cubs are born (depending on the mother's age and condition). The newborn cubs are extremely small, weighing only about half a kilo, but they grow rapidly due to the high fat content of their mother's milk. The cubs stay with the mother until they are two-and-a-half years old. The cub infant mortality rate is high and can exceed 70%. Only about a third of cubs reach the age of two.

Distribution and population status

The polar bear is a circumpolar species and is found in arctic regions where there is access to sea ice throughout much of the year. Polar bear populations are found in Canada, Alaska (USA), Greenland, the Russian Arctic, the Norwegian Arctic and on the ice surrounding the North Pole.

The global population of polar bears consists of roughly 20,000-25,000 individuals spread between 19 sub-populations. However, polar bears wander across enormous distances, so there are no major genetic differences between these populations. The distribution of polar bears in their habitat is far from even and is highly dependent on the availability of their prey. In the central areas of the polar icecap there is only very limited access to prey, and the density of polar bear populations is thus considerably lower there than in the productive areas in the bordering zones.

On Svalbard, polar bears live mainly in areas where there is sea ice, and most of them are therefore found along the eastern coast and in the fjords in the north. The most important hibernation areas on Svalbard are located on the islands of Kongsøya, Svenskøya, Edgeøya, Nordaustlandet and Hopen. However, because the sea ice is retreating as a result of climate change, polar bears have stopped hibernating on Hopen. This is an indication of the fact that these hugely important hibernation areas are under direct threat from global warming.

In 2006 the polar bear was categorised as being vulnerable (VU) on the IUCN's (the World Conservation Union) Red List. Because of the polar bear's specialisation for living on the marine sea ice, it is particularly vulnerable to large-scale changes in its habitat. A low reproduction rate and a long generation time means that this species is poorly equipped for tackling rapid changes in its habitat like those currently being experienced in the Arctic.

Climate change and arctic habitat loss

The area covered by sea ice has decreased considerably during the last fifty years. 2007 was a record year in this respect and the extent of the sea ice during the summer has not been lower since measurements started in 1979 (Figure 1).

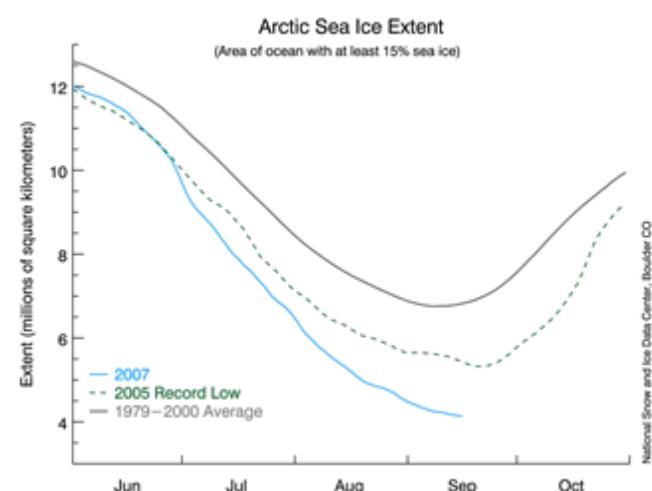


Figure 1: Extent of the sea ice during the summer of 2007 compared to the record year of 2005 and the long-term average for 1979-2000. Taken from the National Snow and Ice Data Center.

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This picture is even more dramatic when analyses of future changes in the Arctic are taken into account. Models showing the consequences of climate change on the extent of the sea ice have been created by the U.S. Geological Survey. The sea ice covering or near the continental shelf is the preferred habitat for polar bears. Here there is a high biological rate of production and good access to prey compared to the deep sea area in the central polar basin. The survey concludes that the greatest reduction in preferred habit occurs during the spring and summer. Sea ice habitat loss could amount to almost 70% towards the middle of this century. Since several of these models under-estimate the observed sea ice reduction, the authors regard the results as being conservative. Previous studies have documented similar trends, with a substantial increase in the average temperature in the Arctic, substantial reductions in the extent of sea ice during the summer and a reduction in sea ice age and thickness.

Climate change and its consequences for polar bears

Loss of habitat is the greatest threat to biological diversity, and 85% of the species on the 2006 Norwegian Red List are threatened by changes in habitat. Highly-specialised species appear to be the most vulnerable. The polar bear is one such species, and the extent and sustainability of sea ice is essential for its survival. A substantial reduction in sea ice - particularly during the summer - will make productive ocean areas far more inaccessible for polar bears, forcing them to move to mainland areas or relatively unproductive arctic waters. This could reduce individual survival rates and affect the species in the long term. However, our knowledge about the direct connections between the loss of current preferred habitats and population changes is extremely limited.

The extensive habitat of the polar bear means that the different populations live under extremely diverse conditions. In the southernmost areas, sea ice melts away during

the summer forcing the bears to move onto land for long periods of time each year. Hudson Bay is the best example of such conditions, while the bears in Foxe Basin, Davis Strait and Baffin Bay also remain on land for part of the year when the sea ice in these areas thaws. Other populations live under the harshest and coldest climatic conditions that exist, where the sea ice is present all year round. This applies to the northern areas of Canada and Greenland. In other areas, polar bears live in the pelagic regions of the polar basin (i.e., areas linked to the open sea where there are huge seasonal variations in the ice cover and the bears follow the ice edge despite the fact that this results in long-distance seasonal movements). Movements northwards of up to 1,000 km during the summer are not uncommon from the areas around the Bering Strait where the sea ice extends a long way southwards during the winter. The polar bear's habitat is therefore adjusted to accommodate regional conditions and it can be vast in areas where there are large seasonal and annual variations in the ice cover, while it is much smaller in those regions where conditions are more stable.



Glacier front and calving. Svalbard, Norway.
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A substantial reduction in the extent of sea ice during the summer will undoubtedly have a negative impact on polar bears which will suffer from a reduced habitat, primarily during the summer and autumn. Bear populations will accumulate in areas that do not currently appear to have an ecologically sustainable basis for present-day numbers.

Effects of climate change on polar bears

Scientists estimate that if current forecasts are correct about the future extent of sea ice, then two-thirds of the polar bear population will become extinct by 2050.

Conclusion

Polar bears are a highly specialised species living primarily by catching seals from the sea ice. At the same time, polar bears are opportunists when it comes to their diet and they have the ability to wander across huge geographical distances in order to find good hunting grounds. A substantial reduction in the extent of the sea ice during the summer will undoubtedly have a negative impact on polar bears. Based on extremely conservative forecasts about the future extent of the sea ice, scientists have estimated that two thirds of the polar bear population could become extinct by 2050. If the sea ice continues to retreat at the speed witnessed during the last few years, the situation will become even more critical.

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polar bears move
across the Arctic.

This factsheet and others in a series related to climate change impacts on the arctic environment were made possible through the generous support of NorACIA. The factsheet series can be found on the Internet at: <http://www.panda.org/arctic>



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