

research snapshot

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Polar Bears Are Threatened by the Effects of Climate Change

What is this research about?

In 2008, polar bears were listed as “Threatened” under the US Endangered Species Act because of the dangers posed by climate change. Although temperatures are increasing around the globe, arctic ecosystems are being particularly hard hit by climate warming. One of the main challenges in conservation biology is predicting how ecosystems and species will respond to future climatic conditions. Conservation biology is a study of Earth’s biodiversity. It aims to protect species, their habitats, and ecosystems from degradation and extinction. This research looks at the impact of climate change and melting sea ice on polar bears. Polar bears use sea ice as their primary habitat and rely on the ice as a platform from which to hunt seals, travel, and mate. In areas where the sea ice melts completely in the summer, polar bears are forced to move on shore. Without access to seals, the bears are forced to fast and rely on their stored fat for energy. As climate change has progressed in recent decades, sea ice breakup has happened earlier in the spring and freezeup has occurred later in the fall. As a result of these trends in sea ice, polar bears currently have:

- Less time to feed on seals and build up fat stores
- Longer fasting periods on shore
- A greater chance of coming into conflict with humans
- Potentially more difficulty finding a mate

What you need to know:

The rapid warming of the Arctic caused by climate change is negatively affecting polar bears. This research proposes an accurate method of predicting polar bear population abundance under climate change. This will aid with proactive conservation measures.

Reduced ability to get food combined with higher energy demand may result in decreasing polar bear body condition, declining population sizes, and an increased risk of extinction of the species.

What did the researchers do?

The researchers aimed to build a model that would accurately predict changes in polar bear populations under future climate conditions. The model specifically looked at how changes in sea ice may affect survival and the reproductive success of polar bears.

The researchers used mechanistic models to describe how animals are affected by changes in their environment. They developed formulas that described polar bears’ energy intake and ability to find mates under different sea ice conditions. The goal was to apply these findings to population demographic models. Such models would predict population abundance under future climate conditions.

What did the researchers find?

The ecological impacts of climate change are difficult to predict because observed and predicted environmental conditions differ greatly. As a result, few data are available to tell us how populations might change under future conditions. Based on their mechanistic models, the researchers estimated that 3-6% of adult male polar bears in Western Hudson Bay would die of starvation before the end of 120 day onshore fasting period. If the fasting period was to increase to 180 days, the number of adult males dying of starvation would increase to 28-48%. The researchers also found that habitat fragmentation could reduce the mating success of polar bears. This implies that climate warming puts polar bears at a greater risk of extinction. Previous models used to predict population changes in polar bears do not directly account for these factors. The researchers propose a more accurate method for finding polar bear mating and survival rates under future climate conditions.

How can you use this research?

This research may be used by policy makers and conservation biologists to improve conservation measures for polar bears. The methods of this research can be applied to other species that may be negatively affected by climate change.

Further research is needed on the amount of energy used for reproduction and growth in polar bears. More data in these two components of the mechanistic model would facilitate predictions about polar bear abundance under climate change.

Studies of seal population abundance are needed in order to make a polar bear-seal predator-prey model. This is important because changes in seal populations due to climate change will affect polar bears. More research is also needed on the mechanistic links between habitat characteristics, prey population dynamics, and polar bear energy intake.

About the Researchers

Peter K. Molnár is a Postdoctoral Fellow at Princeton University. Andrew E. Derocher is a Professor in the Department of Biological Sciences at the University of Alberta. Gregory W. Thiemann is an Assistant Professor in the Faculty of Environmental Studies at York University. Mark A. Lewis is a Professor in the Department of Mathematical and Statistical Sciences; and the Department of Biological Sciences at the University of Alberta.

thiemann@yorku.ca

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Keywords

Climate change, Dynamic energy budgets, Ursus maritimus (polar bear), Population viability analysis, Starvation, Mechanistic models

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kmbunit@yorku.ca

www.researchimpact.ca

