

Arctic marine mammals on thin ice

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The loss of sea ice due to climate change could spell disaster for polar bears and other Arctic marine mammals. The April Special Issue of Ecological Applications examines such potential effects, puts them in historical context, and describes possible conservation measures to mitigate them. The assessment reflects the latest thinking of experts representing multiple scientific disciplines.

Sea ice is the common habitat feature uniting these unique and diverse Arctic inhabitants. Sea ice serves as a platform for resting and reproduction, influences the distribution of food sources, and provides a refuge from predators. The loss of sea ice poses a particularly severe threat to Arctic species, such as the hooded seal, whose natural history is closely tied to, and depends on, sea ice.

The Arctic undergoes dramatic seasonal transformation. Arctic marine mammals appear to be well adapted to the extremes and variability of this environment, having survived past periods of extended warming and cooling.

“However, the rate and scale of current climate change are expected to distinguish current circumstances from those of the past several millennia. These new conditions present unique challenges to the well-being of Arctic marine mammals,” says Sue Moore (NOAA/Alaska Fisheries Science Center).

Climate change will pose a variety of threats to marine mammals. For some, such as polar bears, it is likely to reduce the availability of their

prey, requiring them to seek alternate food. Authors Bodil Bluhm and Rolf Gradinger (University of Alaska, Fairbanks) note that while some Arctic marine mammal species may be capable of adjusting to changing food availability, others may be handicapped by their very specific food requirements and hunting techniques. Species such as the walrus and polar bear fall under this category, while the beluga whale and bearded seal are among those who are more opportunistic in their eating habits and therefore potentially less vulnerable, at least in this regard.

Using a quantitative index of species sensitivity to climate change, Kristin Laidre (University of Washington) and colleagues found that the most sensitive Arctic marine mammals appear to be the hooded seal, polar bear, and the narwhal, primarily due to their reliance on sea ice and specialized feeding.

Shifts in the prey base of Arctic marine mammals would likely lead to changes in body condition and potentially affect the immune system of marine mammals, according to Kathy Burek (Alaska Veterinary Pathology Services). She and fellow researchers point out that climate change may alter pathogen transmission and exposure to infectious diseases, possibly lowering the health of marine mammals and, in the worst case, their survival. Changing environmental conditions, including more frequent bouts of severe weather and rising air and water temperatures, also could impact the health of Arctic marine mammals.

The effects of climate change will be compounded by a host of secondary factors. The loss of ice will open the Arctic to new levels of shipping, oil and gas exploration and drilling, fishing, hunting, tourism, and coastal development. These, in turn, will add new threats to marine mammal populations, including ship strikes, contaminants, and competition for prey.

Timothy Ragen (US Marine Mammal Commission) and colleagues

describe how conservation measures may be able to address the secondary effects of climate change, but that only reductions in greenhouse gas emissions can—over the long-term—conserve Arctic marine mammals and the Arctic ecosystems on which they depend.

Source: Ecological Society of America

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