

From Penguins to Polar Bears }

The Impacts of
Climate Change

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Polar Mammals

Wholehearted Courage in the Polar Regions

Polar Bears

A model of pure beauty and perseverance in the Arctic, the polar bear is an intrepid force to be reckoned with. Yet its fate rests in a fragile balance as it contends to survive in a vastly changing world.

As global temperatures continue to rise, the Arctic sea-ice habitat, essential to polar bears' existence, continues to diminish. Dr. Hal Caswell of the Woods Hole Oceanographic Institution (WHOI) and his research team are studying how climate change in the Arctic is dramatically affecting polar bear breeding, survival, and population growth. Dr. Caswell and his team have found as the Arctic Ocean becomes more ice-free during summer months, their breeding and survival rates are declining below the threshold needed to maintain the population. With some climate studies suggesting the Arctic may experience ice-free summers by the year 2050, scientists project polar bear populations may decline by two-thirds. Other threats to the polar bear include oil exploration and drilling in its habitat and the decline of its primary prey—Ringed seals.

These factors are further complicated by an already low reproductive rate. Polar bears begin breeding when they are five or six years old; female polar bears breed every three years, giving birth to only one or two cubs.

This is depicted in Aurélie Lebrun du Puytison's beautiful watercolor painting of a polar bear and her cub resting entitled *Insouciance*.

The consequences of climate change are complex and the implications are often interdependent.

The Center of Biological Diversity is leading efforts to ensure polar bears remain protected under the Endangered Species Act in the hope that dramatic changes in the Arctic can be mitigated in time to preserve the vulnerable fate of polar bears.

Seals

With a charming sensibility as fin-footed waddlers, seals make their homes in both the Arctic and Antarctic. While each have unique characteristics and behavior patterns, they share many commonalities—their time is spent mostly exploring the ocean for food, yet sea ice is equally important to their survival as it is where they rest, breed, and care for their pups.

Arctic sea ice has significantly contracted during the last decade. Climate models predict with the continuing decline of sea ice, conditions may become inhabitable for seals. Reduced snowfall is a significant concern for Ringed seals as breeding occurs in snow dens, where seal pups spend the first few weeks of life, protected from harsh conditions and predators such as polar bears. Ringed seals produce one pup per year, and increasing snow melt and less snowfall are forcing young seal pups out into the world before they are truly able to survive on their own.

In 2012, the National Oceanic and Atmospheric Administration (NOAA) listed the Ringed seal and Bearded seal as threatened species under the Endangered Species Act due to the dramatic effects of melting sea ice and reduced snowfall. The Spotted seal has yet to be extended such protection. Other threats to seals include polar bears, disease, and the consequences

of human activity such as commercial fisheries, shipping activities, and oil exploration in the Arctic.

Du Puytison's painting entitled *Blind Faith* depicts the Antarctic Weddell seal, which, like its Arctic relatives, is imperiled by changing sea ice conditions.

Walruses

Tusked, whiskered, and socially astute, walruses are considered a stalwart of the Arctic region. Although excellent swimmers, like their fellow Arctic inhabitants, walruses rely on sea ice formation near the Arctic shores to breed, hunt, and, in effect, to sustain and live.

Walruses are known to inhabit areas near shallow water as they are only capable of diving to depths of approximately 300 feet. As the ocean warms farther north in the Beaufort and Chukchi Seas intruding upon their traditional habitat, walruses are now forced to swim extraordinary distances to seek out sea ice to rest in between underwater dives as they forage for food such as mollusks, clams, crabs, and other invertebrate animals on the seafloor.

Nursing walrus mothers will customarily leave their young on sea ice for brief periods of time to dive for food, soon returning to feed and care for them. However, researchers have found walrus mothers now have to swim farther from shore to search for sea ice, and at times are forced to abandon their young when waters are too deep in which to dive.

WHOI biologist Dr. Carin Ashjian has observed firsthand the challenge they face due to diminishing sea ice conditions. "The young cannot forage for themselves and are dependent on their mothers' milk for up to two years," she said.

Scientists project if walruses cannot adapt to caring for their young in shallow waters without available sea ice as a resting area between dives to the seafloor to forage for food, the walrus population in the Arctic may experience an unprecedented decline.

Humpback Whale

The Humpback whale is a truly majestic animal of the sea—they can grow to about 39 to 50 feet and weigh

nearly 80,000 pounds. Hunted by whalers to near extinction in the 19th century until a moratorium was enacted in the 1960s, Humpback whale populations are now resurging in the waters around Antarctica, as well as historical breeding migration routes in Central and South America, southern Africa, Australia, and New Zealand. Traditionally, Humpback whales will spend summer months in Antarctica feeding on krill, and then migrate northward in the autumn to breed.

Photograph by Chris Linder entitled *A Playful Stretch of One's Tail* captures a humpback whale at its summer feeding grounds in Antarctica.

Scientists report delayed Antarctic winters and less sea ice due to climate change could affect Humpback whales' migration patterns.

Dr. Michael Moore, director of the WHOI Marine Mammal Center, studies mortality rates of marine mammals and reports Humpback whale carcasses are increasingly observed along the coast of Antarctica, often emaciated, which suggests a lack of food sources. Dr. Moore underscores within the context of climate change, there are a multitude of interconnected issues facing Humpback whales that require further study. Additional stressors include disease, noise pollution, fishing gear entanglement, and ship strikes.

The International Union for Conservation of Nature currently lists Humpback whales in the category of "least concern," although they are still protected under the U.S. Endangered Species Act.

Author Neila Columbo is a freelance journalist and editor who writes about climate science as well as an array of subjects related to environmental and international global development. Originally from Boston, Massachusetts, she completed graduate studies in international political economy at Institut Barcelona d'Estudis Internacionals in Barcelona, Spain in 2009. The following year, she received a journalism fellowship with United Nations Environment Programme Ambassador Yann Arthus-Bertrand in Paris, France. She continues to work between the U.S. and Europe as a journalist dedicated to covering the science of climate change.