

From Penguins to Polar Bears }

The Impacts of
Climate Change

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Birds of Flight



Wandering albatross



South Polar skua



Atlantic puffin

The Arctic and the Antarctic are home to an array of remarkable seabirds from the graceful Snow petrel and the magnificent Wandering albatross in the southern hemisphere to the charismatic Atlantic puffin in the north.

These seabirds forage in the open ocean and breed along coastlines. They have developed survival mechanisms to adapt to their harsh and rapidly changing environments. For example, in Antarctica, Snow petrels and Southern fulmar skip reproduction during years when sea ice conditions are low.

Artist Aurélie Lebrun du Puytison portrays the Southern fulmar in the painting, *Return to the Sea*.

Some seabirds in East Antarctica shift their breeding season in relation to changing sea ice conditions and food availability like the South Polar skua.

As the world's climate continues to change, researchers at Woods Hole Oceanographic Institution (WHOI)

are studying the effects of a shifting environment on these seabirds.

One such species, the Wandering albatross, can glide on wind currents over the open ocean for more than 3,500 kilometers (2,175 miles). However, wind patterns have become stronger and have shifted poleward over the past two decades. In a recent paper published in *Science*, researchers have observed that Wandering albatross have followed this new wind pattern and have been able to fly faster and forage for food in a shorter amount of time. In addition to finding that the birds have increased in mass by more than 1 kilogram, the birds have also been able to raise more chicks. This positive trend, however, may not last if wind conditions continue to shift as predicted by climate change models.

This incredible and beautiful flight is depicted in the stunning watercolor, *This Wind that Carries Me*.

The effects of wind on albatross populations remain unknown. To better assess the impact of future climate

change, WHOI researchers are studying the foraging behavior of Wandering and Black-browed albatross populations. In early April, Black-browed albatross migrate from a breeding colony on Kerguelen Island in the southern Indian Ocean to Tasmania, where they spend the winter. In October, they return to the breeding colony.

On the other side of the world lives the Atlantic puffin. The Atlantic puffin is a versatile, resilient migratory seabird that can fly and swim.

Photographer Chris Linder and painter Aurélie Lebrun du Puytison depict the unique beauty of these birds.

One of the challenges the Atlantic puffin faces is the increasing difficulty to forage for its primary food source, herring. As fish populations are diffused and displaced in warmer ocean temperatures, the amount of herring has declined.

Steve Kress, the director of the Audubon Project Puffin, has begun observing Atlantic puffins perishing from starvation along the east coast of the North Atlantic, eliciting grave concern for the future well-

being of these beautiful seabirds. In collaboration with researchers at WHOI and the National Oceanic and Atmospheric Administration (NOAA), he is working to better understand and predict the impact of climate change on fishes and birds, and to protect puffin populations on the East Coast of North America.

Understanding the current and future ecological consequences of climate change is an overarching question for researchers at WHOI in their efforts to inform conservation strategies and policy decisions to ensure the future prosperity of these magnificent seabirds.

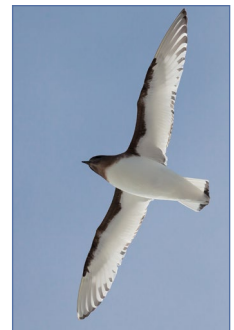
Author Neila Columbo is a freelance journalist and editor who writes about climate science as well as an array of subjects related to environmental and international global development. Originally from Boston, Massachusetts, she completed graduate studies in international political economy at Institut 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.



Black-browed albatross



Snow petrel



Antarctic petrel