

# Climate Change Brings Risk of More Extinctions

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BLACKWATER NATIONAL WILDLIFE REFUGE, Md. -- *Third in a monthly series*

What has gone missing here is almost as spectacular as the 8,000 acres of swampy wilderness that remain. And that makes it [Chesapeake Bay](#)'s best place to watch climate change in action.

Visitors can see ospreys gliding overhead, egrets wading in the channels and Delmarva fox squirrels making their unhurried commutes between pine trees.

But then the road turns a corner, and Blackwater's marsh yields to a vast expanse of open water. This is what's missing: There used to be thousands more acres of wetland here, providing crucial habitat for creatures including blue crabs and blue herons. But, thanks in part to rising sea levels, it has drowned and become a large, salty lake. "If people want to see the effects" of Earth's increasing temperature, refuge biologist Roger Stone said, "it's happening here first."

But not just here. Around the world, scientists have found that climate change is altering natural ecosystems, making profound changes in the ways that animals live, migrate, eat and grow. Some species have benefited from the shift. Others have been left disastrously out of sync with their food supply. Two are known to have simply disappeared.

If warming continues as predicted, scientists say, 20 percent or more of the planet's plant and animal species could be at increased risk of extinction. But, as the shrinking habitat at Blackwater shows, the bad news isn't all in the out years: Some changes have already begun. "This is actually something we see from pole to pole, and from sea level to the highest mountains in the world," said Lara Hansen, chief climate change scientist at the [World Wildlife Fund](#), a private research and advocacy group. "It is not something we're going to see in the future. It's something we see right now."

The temperature increase behind these changes sounds slight. The world has been getting warmer by 0.2 degrees Fahrenheit every decade, a [U.N.](#) panel found this year, in part because of carbon dioxide and other human-generated gases that trap heat in Earth's atmosphere.

By nature's clock, the warming has come in an instant. The mechanisms that helped animals adapt during previous warming spells -- evolution or long-range migration -- often aren't able to keep up. Scientists say that effects are beginning to show from the Arctic to the [Appalachian Mountains](#). One study, which examined 1,598 plant and animal species, found that nearly 60 percent appeared to have changed in some way.

"Even when animals don't go extinct, we're affecting them. They're going to be different than they were before," said David Skelly, a [Yale University](#) professor who has tracked frogs' ability to react to increasing warmth. "The fact that we're doing a giant evolutionary experiment should not be comforting," he said.

Some of the best-known changes are happening near the poles, where the air and the water are warming especially quickly. As they do, sea ice is receding. For some animals, this has meant literally the loss of the ground beneath their feet.

Polar bears, for instance, spend much of their life on the Arctic ice and use it as a hunting ground for seals. When ice on [Canada's](#) western Hudson Bay began to break up earlier -- three weeks earlier in 2004 than in 1974 -- the effect was devastating. The bear population fell by 21 percent in 17 years. Shrinking ice has also been blamed for cannibalism among polar bears in the waters off [Alaska](#), something scientists had not seen before 2004. This month, a [U.S. Geological Survey](#) report predicted that two-thirds of the world's polar bears could die out in 50 years.

Walrus, too, rely on the ice; mothers stash their calves on it, then dive down to feed on the ocean floor. When ice recedes from prime feeding areas, mothers and calves can get separated.

In 2004, [University of Tennessee](#) professor Lee W. Cooper was off the north Alaskan coast when he saw about a dozen calves swimming toward his boat. His theory: The calves, alone and desperate without ice nearby, thought the boat might be a large iceberg.

There was nothing the scientists could do to help, Cooper said. "I think they were doomed."

Other changes have been less deadly, but they show centuries-old patterns shifting. Scientists have noticed changes in the timing of seasonal migrations, presumably caused by the earlier onset of warm weather.

In some cases, migrating animals suddenly find themselves out of rhythm, missing the weather conditions or the food they need. In parts of the [Rocky Mountains](#), American robins arrive two weeks earlier than they used to -- and often discover the ground snow-covered and little food to be found.

In other cases, an animal's entire territory that shifts, as old habitats become too warm. In many cases, this means a move north. In others, it means a move up.

The American pika, a small rodent that lives on the slopes of mountains in the western United States, can overheat when temperatures hit 80 degrees. Over the past century, these creatures have kept climbing, reaching new ranges that can be 1,300 feet up the slope.

In some cases, there is no escape. In [Costa Rica's](#) Monteverde Cloud Forest, a famous region that is kept damp by fog and mist, climate change has brought more variable weather and less of the clouds that some animals need.

Two amphibian species -- the golden toad and the Monteverde harlequin frog -- have not been seen since the late 1980s. These may be some of the first extinctions linked to climate change, said cloud forest researcher Alan Pounds. "It's been an interesting puzzle to work on," Pounds said. "But, at the same time, very alarming and frightening."

At the Blackwater refuge, it is rising waters, not rising temperatures, that are eliminating habitat. A quirk of geology means that water rises especially fast here: Paradoxically, the land in this area is sinking as [North America](#) slowly unbends from the weight of glaciers during the last ice age.

Add that to the effect of melting polar ice, and scientists expect that most of the marsh will become open water by 2030. When it goes, there could be a shortage of habitat for the Eastern Shore's marsh animals and migratory birds, said Stone, the refuge biologist.

"Birds will return for spring migration, and they'll be looking for territory, and there just won't be enough territory to go around," he said.

So what happens then?

"They'll . . ." he paused, looking for the right word, ". . . die. They'll disappear."

Not all animals, of course, will suffer. There are examples of creatures that are thriving in a warmer world. Fish such as pollock and pink salmon have begun moving into now-warmer Arctic waters. In the northern woods of North America, some tick species are making it through the winter in record numbers.

Livestock herds might increase in a warmer world, an analysis by the [Agriculture Department](#) found. That's because food crops such as corn and rice could become harder to grow if the fields dry out, leaving more land for grazing. Researchers say that, even if all greenhouse-gas emissions were shut off today, the gases already in the atmosphere will cause Earth to warm for years to come. But, many say, it's still imperative to reduce these emissions to head off even more warming.

"Unfortunately, it takes a generation or two to turn this supertanker around," said Stephen Schneider, a professor at [Stanford University](#), talking about the climate change already in progress. But still, he said, it is important to start trying. "What we're looking at is a planetary environmental train wreck if we don't start some compromising here."


Already, some are trying to make it easier for wild animals to adjust. In [Australia](#), conservationists are trying to set aside a north-south cordon of open land so animals can move if they need to. In the western United States and Canada, environmentalists are trying to create a similar corridor between [Yellowstone National Park](#) and the [Yukon Territory](#).

Overall, scientists say, the news of climate change will not be bad for all animals. But, they say, that's cold comfort for the rest -- and for humans, as well, if it means that we watch some of the planet's most beloved species decline or disappear.

"Yeah, the earth will recover," said Scott Wing, who studies the biology of previous eras at the [Smithsonian Institution](#). But, he said, "would you have wanted to be one of the dinosaurs when the asteroid hit? No."

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