

Pikas



A pika.

Pikas (PIE-Kuhz) are small mammals. They live in cool and moist rocky areas near the tops of mountains in the United States and Canada. Pikas need cool temperatures to survive. Because they have thick fur, it's difficult for them stay cool when the weather gets hot. As global temperatures rise, many mountain animals, such as the pika, may move up mountains to higher elevations or live further north in an attempt to find habitats that are cool enough. That's because temperatures are generally cooler far from the equator and at higher elevations. But if pikas already live near the tops of mountains, they can't climb much higher to find cooler temperatures.

Pikas, who live in rocky mountaintops, are not known to move across non-rocky areas or to move long distances. Many of the rocky areas where they live are not close to other rocky areas.

This means it will be difficult or impossible for pikas to move to another area if climate change makes their homes too warm.

During the warmer months when food is available, pikas gather and store food for the winter. As global temperatures rise, gathering food will be harder for pikas because their thick fur causes them to overheat easily as they run around.

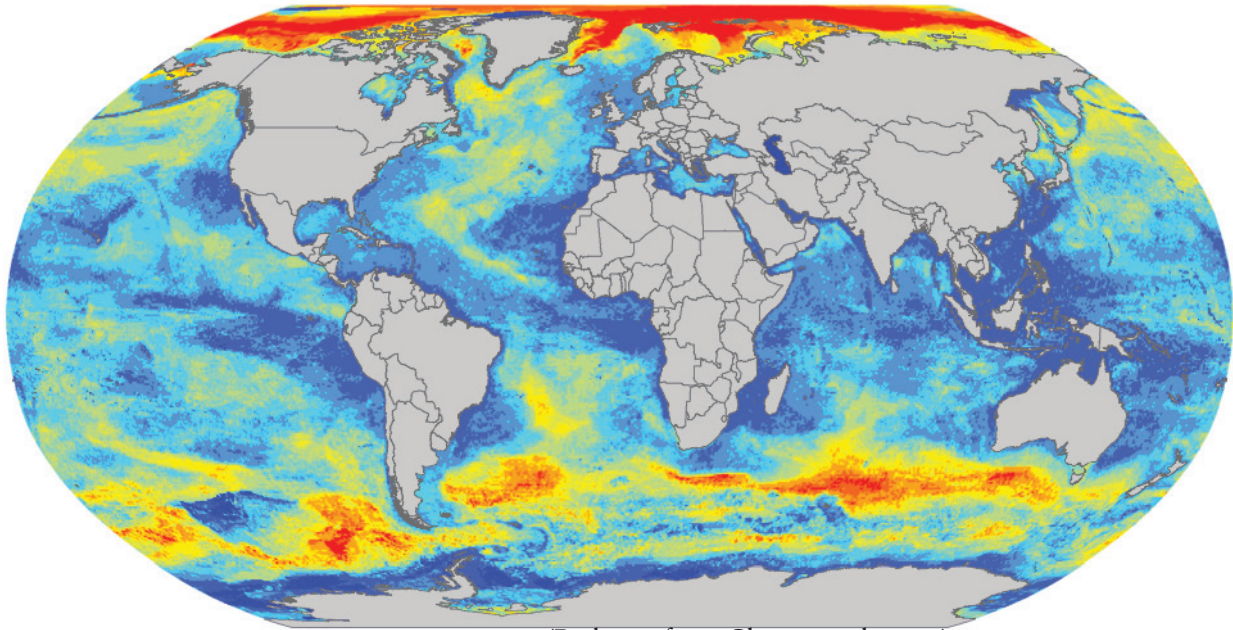
The good news is that pika populations in the Sierra Nevada are doing very well, even with rising temperatures. Sierra Nevada pikas seem to be able to find enough cool places. The bad news is that in other areas, pikas seem to be dying off. According to research by Dr. Erik Beever, climate change may have been one cause of pika populations becoming extinct in some parts of the Great Basin during the 1990s. During that time, pikas disappeared from 7 out of the 25 areas that were studied.



Pikas live in the Sierra Nevada and Great Basin mountains.

Ocean Fishes

Higher air temperatures are causing the ocean to get warmer. Places that usually have cool water are warming up. Areas in the tropics that are usually warm are becoming even warmer. A 2009 study predicted that by 2050, large numbers of ocean fishes will move from tropical seas toward cooler water. Many may go as far north as the Arctic and as far south as the Southern Ocean Basin near Antarctica. The study also predicts that some ocean animals, especially cold-water fish, could go extinct because other fish moving into their areas will compete for the same food.

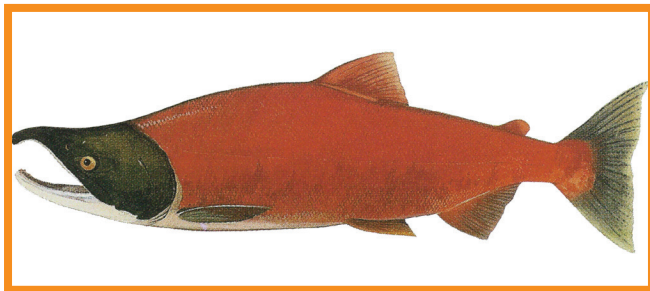


(Redrawn from Cheung et al, 2009.)

Red areas on this map show regions where fish will be moving to by 2050.

The scientists who conducted this study used data from a variety of sources to make their predictions. They used data from fishing records and computer models, which helped them predict the movements of different fish species under different climate change scenarios.

For several years, people who manage fish populations thought overfishing and the equipment used to catch fish were the only big problems facing fish populations. But this study suggests that even if we completely stop fishing, we will still see a big loss of fish in ten years, including some fish that people commonly eat, such as sockeye salmon and Atlantic cod.



A Sockeye salmon.



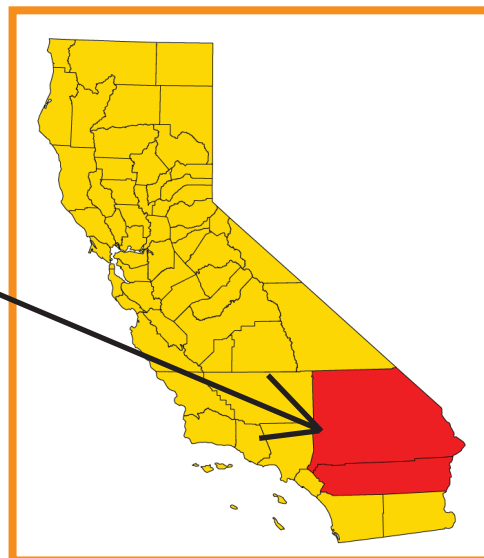
An Atlantic cod.

Land Plants in the Santa Rosa Mountains

With climate change, some areas will become wetter and some dryer. Many areas will become warmer, but some places will actually become cooler. As the climate changes, many plants will no longer be able to survive where they live now. Many plants spread to new areas when their seeds are moved by animals or by the wind. The seeds may land in an area where the plants can't survive, but some may also land in areas where they can survive, even if that type of plant has never lived there before. This is just what is happening in Southern California's Santa Rosa Mountains.



Plants that used to live lower on the mountain slopes now live higher up in the Santa Rosa Mountains.



Plant species in the Santa Rosa Mountains have shifted to new areas very quickly. Plant species that once lived lower down on the mountains are now growing at higher and higher elevations. Since 1977, 90 percent of the types of plants scientists studied are now growing about 213 feet higher up the mountain. They are no longer growing lower down the mountain where scientists used to find them.

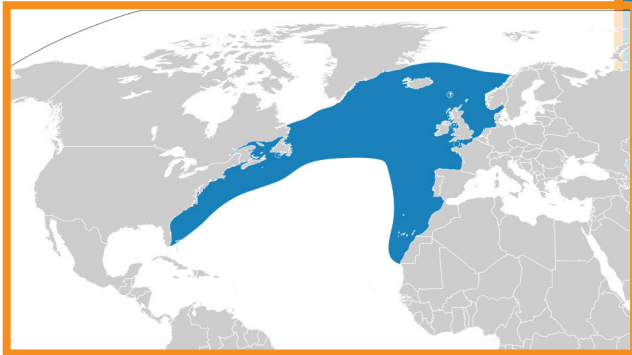
Scientists who study plants do not know if the climate will change too quickly for some plants to survive. Based on the evidence, it looks like many plants will move to different areas to survive the changes in their habitats, but some will not be able to move fast enough to survive the changes.

North Atlantic Right Whales

North Atlantic right whales live in the Atlantic Ocean along the coast of North America, from Nova Scotia to Florida. They can be up to 55 feet long and weigh up to 70 tons. There were once thousands of North Atlantic right whales, but today there are only about 300 to 400. Humans killed most of them through whaling and commercial fishing in the 1700s and 1800s. Right whales are considered to be endangered and have been protected from human harm since the 1930s. However, they are still threatened because of climate change.



above: A North Atlantic right whale mother and calf.
left: Areas highlighted in blue show the North Atlantic right whales' habitat.



The problem is that because of changing ocean currents, there's not as much zooplankton. Zooplankton are tiny ocean animals and they are an important food for right whales. Right whales feed on zooplankton when they find the zooplankton in big groups in the ocean.



above: Right whales eat tiny zooplankton. One of the larger types of zooplankton is Northern Krill, usually about 3 centimeters long (a little longer than an inch).

These groups of zooplankton have been getting smaller and even disappearing. When there isn't enough zooplankton to eat, female whales can't give birth to healthy calves or make enough milk to feed them. Even if adult whales can survive for a few years with less food, they won't be able to have babies. If ocean currents continue to change and zooplankton groups continue to get smaller, right whales will lose their main food source and could become extinct.

Sea Turtles

Female sea turtles come out of the water onto beaches to lay their eggs. They dig a deep hole in the sand to make a nest, lay their eggs in the hole, and then cover the eggs with sand. The sea turtle then swims back out to sea, leaving the eggs to hatch by themselves. The sand keeps the eggs at a constant temperature and protects them from most predators. Sea turtles return to the same beach to nest, year after year. They come onshore to lay their eggs in warm areas of the world, including Florida, Georgia, and Texas in the United States.



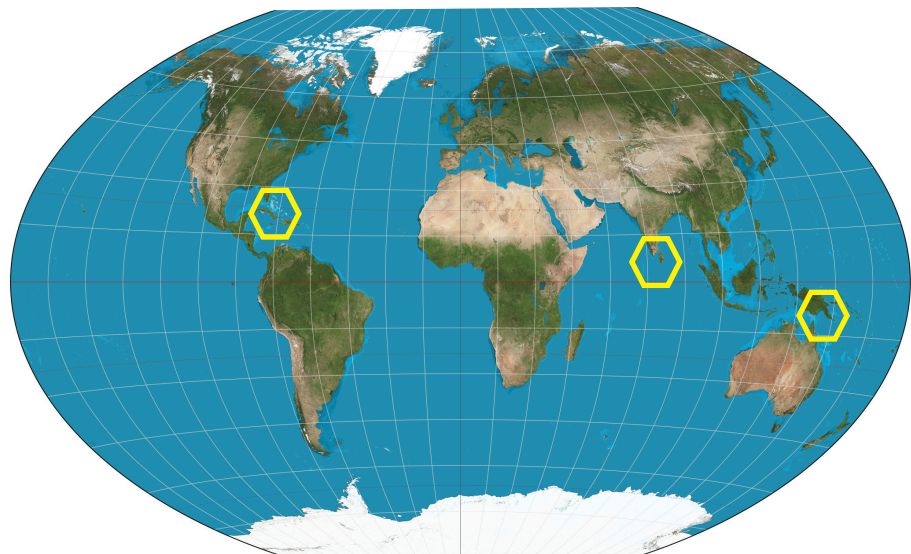
These are three effects of climate change that affect sea turtle eggs:

Sea Level Rise and Nesting Locations. As the sea level rises, beaches where sea turtles lay their eggs may become covered in water, so sea turtles will not be able to make their nests in those places any longer.

Rising Air Temperatures and Egg Survival. As the air temperature rises, the sand where the eggs are incubating will get warmer. If the sand temperature rises above 34°C (93°F), the sea turtle eggs won't survive.

Rising Air Temperatures and Sea Turtle Sex Ratios. The temperature of the egg in the sand determines whether the turtle inside will be a male or a female. Eggs in warmer sand are females, and eggs in cooler sand are males. If the sand becomes warm enough, most turtles will be females—and in the future, that would make it difficult for females to find mates. Already, 90 percent of the Loggerhead Turtles that hatch in Florida are female.

above: A baby sea turtle.
right: Nesting areas vulnerable to sea level rise are highlighted in yellow.



Animals near the Poles



Polar bears.

Polar bears live in the Arctic and can be found all the way to the North Pole. Their main food source is ringed seals. Polar bears hunt ringed seals by standing on floating sea ice and waiting for a seal to come up through a hole in the ice. Polar bears also hunt seal pups, which live in burrows on the ice. It is becoming more and more difficult for polar bears to hunt seals because the number of seals is decreasing, and the sea ice on which the polar bears depend is melting.

So much sea ice is melting, that sometimes the polar bears have to swim as far as 60 miles to make it from one floating sheet of

ice to another. Pregnant polar bears give birth to their babies on sea ice and now that there is so little sea ice, they have to swim long distances to find ice, or to find land on which to give birth. Polar bears are strong swimmers, but these long swims are exhausting, and polar bear health and birth rates are declining.

The Arctic is also home to the Pacific walrus. Very recently, up to 200 dead walrus were spotted on the shore of the Chuckchi Sea, on Alaska's northwest coast. Like polar bears, walrus use floating sea ice for resting, giving birth, nursing their babies, and protecting

themselves from predators.



Pacific walrus.

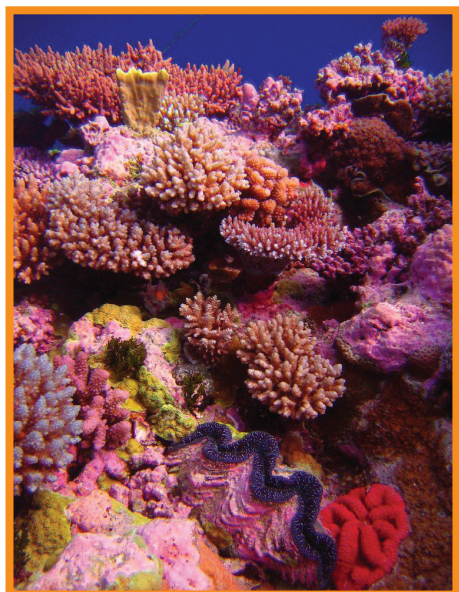
On the other side of the world, at the South

Pole, emperor penguins are also being affected by decreases in sea ice. Emperor penguins live on large sheets of ice in the Antarctic. Instead of building nests like most other birds, emperor penguins carry their eggs and small chicks in a large, warm pouch near their feet. After a few weeks, chicks can stand on the ice, but they are protected from the cold by their parents. If the sea ice melts before a chick can take care of itself, it might fall into the sea and die. The number of emperor penguins in some colonies has been steadily decreasing since the 1970s.



Emperor penguins.

Coral Reefs



Healthy coral.

Coral reefs are built by animals called corals that have a special type of colorful algae (AL-jee) that lives inside them. This algae makes its own food through photosynthesis, and at the same time it also provides some food for the coral. Scientific research has shown that if corals are exposed to lots of light at the same time that the water temperature warms up, the algae will start to leave the coral. The result is that the coral may not get enough nutrients to survive. This is called **coral bleaching** because the corals turn white when they lose their colorful algae. Coral bleaching and dying corals are becoming a bigger and bigger problem.

The good news is corals can recover from coral bleaching. The bad news is that they can only recover when the conditions that cause

the bleaching are reversed long enough for the corals to become healthy again and get new algae. Unfortunately, temperatures have been steadily rising, so corals may not get the much-needed break to become healthy again.



Bleached coral.

Another large problem for coral reefs is called ocean acidification. The world's ocean is becoming more acidic as more CO_2 is being absorbed by the ocean. Corals have a CaCO_3 (calcium carbonate) skeleton that gets built up over time and can form massive coral reefs. But corals have a much more difficult time building the reef when the water is acidic. Already, the growth rate of corals has slowed down because of ocean acidification.

