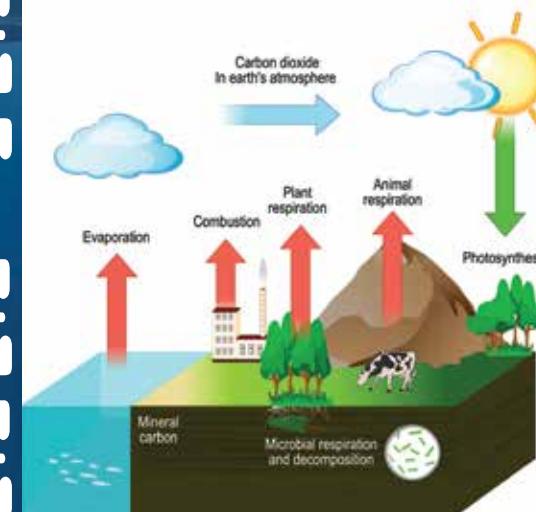




Phytoplankton



HOW DOES CLIMATE CHANGE AFFECT WHALES?

Climate change is making it harder for whales to find food and forcing them to swim farther or find new areas to call home. These problems will only worsen if we humans don't work together to cut CO2 emissions.

Tiny crustaceans such as copepods are moving away from waters warmed by climate change and heading north where it's still cool. North Atlantic right whales that feed on them must travel farther—which takes more energy. Right whales “are clearly working hard to figure out how to make a living in this new ocean,” says expert Andrew Pershing. “But the decline in the number of babies they are producing suggests that this is not easy for them.”

Meanwhile, as Arctic ice melts, people can access areas they couldn't easily get to before. Whales like belugas will experience more pollution and ship noise in places that used to be clean and quiet. For baleen whales, there will also be fewer krill—shrimp-like crustaceans—to eat in those areas, because krill rely on sea ice for shelter and microbial food sources in the winter.

To the south, in warmer waters, the places where some humpback whales mate and give birth will become too warm. They'll have to move to new locations.

Some whales are finding ways to start adapting to climate change, at least for the time being. For example, as the ice melts, orcas are venturing farther north in search of food. That isn't good news for belugas, though, as they now have a greater chance of becoming an orca's dinner!

Nora Nickum works on ocean conservation policy for the Seattle Aquarium. She lives on an island, and when she's not writing about whales, she's watching for them or wondering about them.

WHALES STAYED BATTLE AGAINST CLIMATE CHANGE

As sea levels rise and wildfires blaze, we know we must curb climate change. That will require dramatically cutting the carbon dioxide, or CO2, we're putting into the atmosphere from our cars, planes, factories, homes, and more. We also need to remove and trap, or sequester, some of what is already up there.

The largest animals on Earth, hidden beneath the waves, may seem like unlikely recruits in this effort. But they could be great allies.

Giant Climate Warriors

Carbon cycles through Earth's atmosphere and food web in various

forms. Animals (including humans) take in carbon when they eat food. They release much of it into the environment as they breathe or pass gas, but some stays in their bodies as they grow. Because whales are enormous and can live a long time, they store more carbon than other animals. More whales means more carbon sequestered in their bodies and less CO2 in the atmosphere trapping heat and warming our planet.

There's some scientific debate today over the exact numbers, but, according to researchers at the International Monetary Fund, a blue whale may sequester about 66,000 pounds (30,000 kg) of CO2 over the 85 or so years of its lifetime. By comparison, in one year, a large tree takes 48 pounds (22 kg)

of CO2 out of the atmosphere. So, by our calculation, to match the sequestering power of a blue whale, a tree would have to live 1,375 years.

Many whales don't just release that carbon back into circulation at the end of their lives. When smaller ocean animals or animals or plants on land get eaten or decay, some or all of their carbon returns to the atmosphere. In contrast, large whales can sink to the bottom of the sea when they die. There, the carbon stored in their carcass feeds deep-sea plants and animals and becomes part of the sediment. “If they die where it's deep enough, it will be out of the atmosphere perhaps for hundreds of years,” says Andrew Pershing, Director of Climate Science at Climate Central.

Tiny Allies

While the ocean's largest creatures are one key to solving the climate problem, so are their microscopic neighbors. And they're linked.

Tiny phytoplankton hanging out in the sea take in significant amounts of CO2. They process it using sunlight like plants on land do, and ultimately release oxygen.

Whales help the phytoplankton do their job and sequester more CO2. Whales find food deep in the ocean, then come up to the surface to breathe—and poop. Their poop contains iron and nitrogen. Whales migrate to other parts of the ocean, spreading their nutrients. It turns out these nutrients are exactly what phytoplankton need to grow and absorb more carbon! If there were more pooping whales, there'd be more phytoplankton capturing more CO2.

Room to Grow

There used to be at least four times as many whales on Earth as there are now. Industrial hunting of whales for products like lamp oil and meat peaked in the United States in the mid-1800s and globally in the early- to mid-1900s, killing off huge numbers. That mostly ended by the 1980s, but whales are still trying to recover while facing other threats.

If we protect whales today from getting tangled in fishing ropes or hit by ships and keep our ocean healthy so they have enough to eat, their numbers can increase. They'll help us in return by sequestering more carbon as they go about their lives—eating, migrating, pooping, and sinking to the ocean floor.