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# Dying Wildlife on a Warming Planet

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*If fish decline, so does a food source for humans and the water birds that feed on fish, and as insect pollinators decline, so do our crops and the plants around us.*

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The emaciated polar bear, a sorry remnant of magnificence, raiding garbage cans in an iconic, even infamous photo, is one consequence of global warming. As the September (2019) *National Geographic* cover story displays depressingly, Arctic ice collected over winter is sparser, thinner, and now disappears completely during summer in parts of Canada. If the effects of global warming are staring us in the face, then only the woefully or willfully ignorant—like Trump—can ignore them.

One more aspect of warming on Arctic ice has been reported recently. As we know, two-thirds of an iceberg lies under water. As sea water warms, melt increases and scientists have made measurements to discover that submerged parts of icebergs and glaciers entering the sea are melting significantly more than was previously believed, contributing to rising sea levels.

Researchers are warning that permafrost collapse in the Arctic is releasing nitrous oxide, methane, and carbon dioxide. The store is vast: nearly 1,600 billion tonnes of carbon lies trapped in the frozen soils of the permafrost region as a result of decaying organic matter over millennia. That is almost double the quantity in the atmosphere.

The environmental costs of global warming appear in yet other unexpected ways. A new paper in *Science* reports the threat to coral reef reproduction. Free-spawning marine species synchronize spawning as a way to ensure reproduction. In this way the gametes developed are so numerous that some escape their predators, ensuring species survival. Global warming is now affecting this reproductive synchrony, threatening coral reef recovery.

Rising ocean temperatures impact fish, plankton and crustaceans, in turn affecting the creatures that feed on them. So now sea birds, like the puffin, are struggling to stay alive. These are striking birds with black and white plumage, bright orange legs and feet, and, during the mating season, orange beaks. This past May, it was estimated that between 3,150 and 8,500 puffins starved to death in the Bering Sea, their emaciated bodies washing ashore on the Pribilof Islands, some 300 miles west of mainland Alaska. Prior to the mass deaths, there was a documented period of elevated sea surface temperatures in the eastern Bering Sea according to scientists. The unfortunate result was a shift in zooplankton composition and in forage fish distribution, both food sources for the puffin.

In Iceland, too, puffins are in trouble. Researchers discovered that thousands of puffin chicks had died from starvation in the summer of 2018. It turns out rising ocean temperatures have pushed cold-water fish farther north leaving the baby pufflings with little to eat. The International Union for the Conservation of Nature (IUCN) has categorized the Atlantic puffin (*Fratercula arctica*) as vulnerable on its red list.

Rising ocean temperatures are also affecting food availability and the habitat of many Arctic creatures, including the walrus, polar bear, gray whale, arctic fox, and ice seal. Some are starving to death, some wandering long and far in search of food. Polar bears rely on sea ice to hunt seals at their breathing holes. When the sea is not covered in ice, breathing holes become unnecessary as the seals can come up anywhere for air, and are no longer easy for polar bears to snatch up. The World Wildlife Fund has reported a 40% drop in number of the southern Beaufort Sea polar bears between 2001 and 2010. Worse still, scientists forecasting global polar bear populations estimate a high probability that 30% of polar bears worldwide will be gone by 2050.

Declining sea ice is also harming seals. Baby harp seals lie on the ice during their fragile first few weeks of life. Without a thick and stable span of ice, seal pups may drown or be crushed by broken ice. In 2007, a then surprising 75 percent plus of pups died due to thin ice conditions; in 2010, nearly all. "Some years, when there's poor ice in a given pupping ground, essentially all of the pups don't make it," says Duke marine biologist David Johnston. As temperatures continue to rise, seal survival becomes precarious.

The Pacific walrus population is in decline with only 129,000 animals left. Due to climate change, the floating summer ice that walruses used to haul themselves upon to rest is now way up north. Consequently the animals are swimming ashore and taking to land in huge numbers. Unfortunately their feeding grounds are far away from shore, forcing a 250 mile round trip. In addition to exhaustion from traveling long distances and food scarcity, walruses also face threats from being on the beach in vast crowds. In 2014, 35,000 walruses were seen together on the shore near Point Lay, Alaska. The animals, which can weigh as much as 1.5 tons, can be frightened easily by loud noises like airplanes, causing stampedes and mass deaths by trampling, especially of young calves – as many as 500 in one incident. If ice continues to diminish, their future looks bleak.

Then there are the gray whales. Their favorite crustacean is the amphipod – a small flat morsel with segments and antennae resembling a grasshopper. These lipid-rich crustaceans are devoured by whales in bulk. Over the past 30 years, as currents have warmed and sea ice has melted, amphipod populations have declined in the Bering Sea whale feeding area. As a result, gray whale mothers and babies have had no choice but to swim north through the Bering Strait and far into the Arctic Ocean in search of an alternate food supply. They are so hungry they are eating krill and mysid shrimp, but as it takes an enormous quantity to match the calories of lipid-rich amphipods, the whales remain hungry.

The North Atlantic right whale, a species federally classified as endangered, is also affected by the rising ocean temperatures. The Smithsonian reports that right whales eat more than 2,000 pounds each day, mostly copepods. Their favorite copepod, the *Calanus finmarchicus*, has dramatically declined because some of the deep waters of the north Atlantic have warmed almost 9 degrees Fahrenheit since 2004, forcing right whales to migrate elsewhere in search of food. Several right whales have been found dead in Canadian waters in recent months, and a sixth dead whale was found in the Gulf of St. Lawrence in July of this year. The steep rise since 2010 in the deaths of these whales from

shipping vessel strikes as well as entanglement with fishing gear is attributed to the animals moving into new and unexpected areas where speed restrictions for vessels are not in place. With some 400 right whales left (out of 500 in the early 2000s) and about 100 breeding females, the species may face extinction if these trends continue. Researchers are hoping to use satellite technology to detect whales in new territory, allowing for faster responses in moving fishing nets and large vessels.

Creatures large and small face threats from melting ice. Lemmings are like hamsters of the tundra—small, furry rodents with faces and whiskers as adorable as the childhood pet. In winter, northern Norway lemmings burrow under the snow for insulation and protection from prey. During good snow seasons, they reach population peaks and their young prosper. But in Norway in recent years, rising temperatures are causing repeated thawing and icing periods resulting in poor snow conditions for the lemmings. The resulting altered and reduced population cycles mean lemmings are no longer reaching population peaks.

The arctic fox relies on lemmings as a primary food source, and scientists believe lemming decline has contributed to sharp declines and breeding failures in the arctic fox population of Norway. Arctic foxes also face threats from the red fox, a larger more aggressive animal, which historically lived south of the arctic fox habitat. Due to climate change and warming of the Arctic, however, the red fox is encroaching on arctic fox areas. Warming is also converting the tundra to shrublands, a habitat the red fox desires. The poor arctic fox faces loss of habitat, decreased food availability, increased competition for food, and possible displacement by the red fox. And with the Arctic continuing to warm, these changes will only become more extensive. Small wonder then that the arctic fox often has to travel long and hard to find food. One female captured all our hearts as it traveled 3,500 km from Norway to Canada in 76 days, its remarkable journey including 1,512 km on sea ice.

These few examples demonstrate the impact of global warming on diverse forms of life—from coral reefs and lemmings to the right whale. We learn that changes in plankton and tiny crustaceans can starve a giant whale and diminishing ice cover can cause polar bears to lose their primary food source, and we begin to register the intimate interconnectedness in the web of life. Human well-being too is tied to this chain of life. If fish decline, so does a food source for humans and the water birds that feed on fish, and as insect pollinators decline, so do our crops and the plants around us. A study suggests that 40% of insect species are in decline. And the U.S. and Canada have lost three billion birds since 1970. In this anthropocene age, humans are not rapacious owners but stewards of our planet, holding it in trust for succeeding generations. It is what the young led by Greta Thunberg are forcefully making clear to their elders.

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