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A break across the Larsen C Ice Shelf as seen from a NASA research aircraft in November. NASA

Ice Shelf Collapse Highlights Need for Expanded Marine Protections

BY ANNE USHER

In July, after weeks of separating at a rate of 30 feet a day, an iceberg bigger than Delaware broke free from the Antarctic Peninsula and began slowly drifting into the Weddell Sea. The trillion-ton iceberg is among the largest ever to sever from the continent.

It's the third area since 1995 to break from the Larsen Ice Shelf, which lines the northeastern coast of the peninsula and is named for Norwegian explorer and whaler Carl Anton Larsen, who led an expedition to Antarctica in the late 1800s. The three shelves, including a 2002 break that removed a part of the shelf that had existed for more than 10,000 years, have disintegrated in a southerly progression from the peninsula's tip. July's came in the area known as Larsen C.

Like all ice shelves, Larsen C floats on the water, so the iceberg's break-off will have a negligible effect on sea level rise. But these floating platforms of ice block the continent's glaciers in. If these ice shelves collapse, the glaciers can flow into the ocean, contributing significantly to sea level rise. Larsen C does not hold back a great deal of land ice, but researchers are concerned about Thwaites Glacier in West Antarctica, which could raise sea levels by 10 feet if it collapsed.

While there is no definitive proof that climate change caused the Larsen C break, which shrank this shelf by more than 12 percent, rising ocean temperatures are making the ice shelf it broke away from more vulnerable to such fissures. Scientists report that new cracks are forming. The remaining ice sheets covering much of Antarctica are also thinning, and modeling shows that if the current rate of warming continues, the ice sheets could undergo catastrophic melting.

Melting ice sheets will have another effect, beyond sea level rise: They will release enormous amounts of freshwater into the sea—which, scientists say, will alter the Southern Ocean's currents that carry critical nutrients to the rest of the world's seas.

One way to blunt the effects of warming waters in Antarctica—and help ocean ecosystems build more resilience—is to expand the number of marine protected areas (MPAs) in the region. This would protect thousands of marine species, including Antarctic krill—tiny shrimplike crustaceans at the center of the Southern Ocean food chain that store up to 23 million tons of carbon, equivalent to that produced by 35 million cars per year, in the deep ocean. Penguins and whales feed on krill, whose numbers have dropped an estimated 80 percent since the 1970s in the wake of warming waters, a decline in sea ice, and an increase in commercial fishing.

The Pew Charitable Trusts, together with partners in the Antarctic and Southern Ocean Coalition, is encouraging the Commission for the Conservation of Marine Living Resources to create this MPA network, which it committed to doing in 2009, by 2020. In October 2016, the commission's 25-member body took the first step by establishing the Ross Sea MPA—the largest on the high seas.

Andrea Kavanagh, who directs Pew's global penguin conservation program, says the commission's next step should be to designate MPAs in East Antarctica, the Weddell Sea, and the Antarctic Peninsula.

"Extending the MPA networks across the Southern Ocean would help protect krill—and the millions of

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penguins, whales, and other species that feed on them," Kavanagh says. She noted this would also give marine species more protection as they migrate, breed, and forage.

Stronger MPA networks are especially critical to easing some of the outside pressures—such as commercial krill fishing—on Antarctica's wildlife, giving it more time to adapt as sea ice disappears. In one region, Pew marine fellow Yan Ropert-Coudert found that 26,000 breeding pairs of Adélie penguins lost all of their chicks during two recent breeding seasons, which the scientist attributes to their changing climate.

Extensive MPA networks, Kavanagh says, "would help mitigate the effects of warming in the Antarctic and create a better future for wildlife and all who rely on a healthy global ocean."