

License to Krill

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Small shrimp make a big splash for Earth's ocean and climate health. Now industrial fishing is threatening krill's survival — and our own.



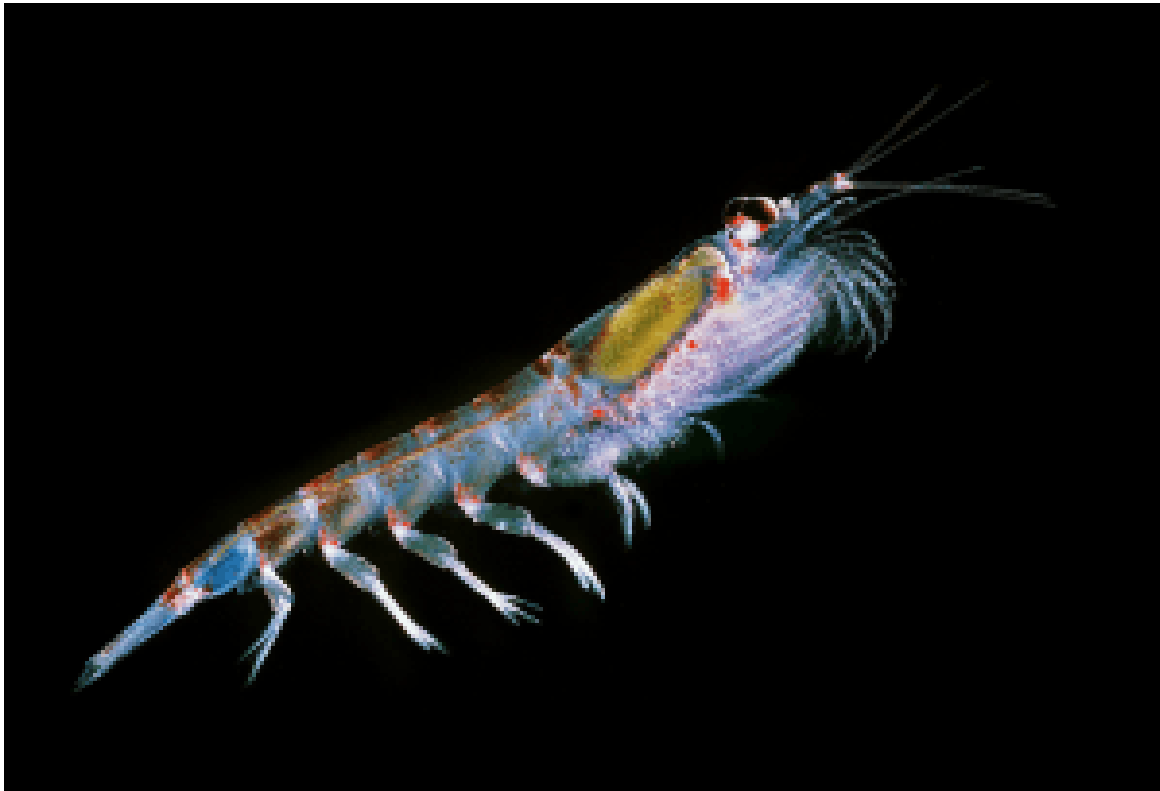
Each Antarctic krill weighs a single gram. National Oceanic and Atmospheric Administration, Sophie Webb.

Krill are the most abundant animals on the planet. They store carbon, feed the world's largest creatures, and — when they swarm together — give the Southern Ocean a red tint that's visible from space. Most consumers know krill from somewhere else: their medicine cabinet. As a new health fad sweeps the market, scientists are urging consumers to read the fine print. Krill-based industries are driving marine life to starvation. Side effects include: exacerbating climate change.

The Southern Ocean surrounding Antarctica is home to the largest krill fishery in the world. Since the 1970s, industrial-scale fishing operations and disappearing sea ice have

depleted Antarctic krill populations by 80 percent. To make matters worse, krill decline plays a significant role in driving global climate change.

With over 700 trillion individuals in the Southern Ocean alone, krill form a vital carbon sink. As they graze on carbon-rich phytoplankton, krill excrete their waste deep in the water column. That's right: krill poop sinks. And as it does, CO₂ is removed from the atmosphere where it contributes to global warming and settles deep in the ocean where it's stored for generations.



Krill poop sinks — contributing to carbon drawdown.

Much like forests, thriving krill can help store a lot of carbon. That makes disturbing the planet's krill stock an incredible risk. Scientists expect the loss of krill to upset the ocean's chemical cycling, as krill do the important work of transporting essential nutrients on their daily migrations through the water column. The loss of krill is not just a problem for the South Pole, however. Krill depletion would affect the whole planet's ocean and climate systems.

But as krill fisheries ramp up their yearly harvest, it seems these are gambles the industry is willing to take.

Small But Mighty

Antarctic krill each weigh in at a single gram. But together, these shrimp-like crustaceans swarm into dense clouds tens of kilometers wide and a hundred meters deep. Krill occupy an essential place in the food chain, making up a large percentage of the ocean's biomass: to the tune of 379,000,000 tonnes. To put that in perspective, the collective weight of all blue whales, the largest species in the animal kingdom, weighs in at less than 500,000 tons. Many beloved species, from blue whales to leopard seals to Adélie penguins, all depend on krill.

Krill play the role of “keystone species” in the Antarctic ecosystem. Without them, countless animals that depend on them directly for survival would die while shifting food webs out of balance. These effects can ripple out to other ecosystems whose food webs are intertwined across vast ocean scales.



Adélie penguins are among many species threatened by krill decline.

The word “krill” is Norwegian for “whale food.” And for good reason: they sustain the largest animal known to have ever lived on earth, the blue whale. High in protein, vitamin A, and omega-3 fatty acids, it's easy to see why krill is a great food source. Now, humans are increasingly keen on the diet. The total harvest of krill, about 150–200,000 tonnes a year, was historically used as food for aquaculture, livestock, and pet food. But recent pressure to harvest krill comes from a high demand for a new product: krill oil.

Krill Oil

The global market for Antarctic krill oil is booming. It's been successfully marketed as the "best" and "cleanest" alternative to fish oil. In 2022, 633 million USD worth of krill oil was traded on the global market. Demand is driven by older, wealthy populations in Europe and Japan, who buy krill oil to treat everything from heart disease to high blood pressure. Companies have eagerly jumped to supply these consumers. Their reach is only growing.



Krill Oil supplements are driving recent demand for the crustacean.

In 2020, vessels fishing in just one subarea of the Southern Ocean caught 446,783 tonnes of krill: the largest single-year harvest on record. More than half of them were harvested by the Norwegian fishing and biotech company Aker BioMarine: a company notorious for trapping and killing humpback whales in their massive krill-fishing nets. And other big players are only becoming more powerful.

Rushing for Gold

Like an international gold rush, wealthy ships compete at the start of the season to catch as much krill as possible before the limit is met. The annual krill cap is approached earlier every year, which impacts the rest of the food chain. Now, pressure is mounting as investors from nations like China and Russia pour money into efficient vessels each capable of processing tonnes more krill, to be sold on the global market.

To prevent exploitation, the international agency responsible for managing Antarctic fisheries have set “precautionary limits” on krill harvests. These limits are designed to protect predators, like penguins, that rely directly on krill. Problematically, these policies are based on historically unreliable population surveys, and it aims to preserve just enough krill to maintain a sustainable population.

But it's not enough. Predators of krill are starving to death. Studies have found that the food stress experienced by penguins is caused by intense overfishing in krill-abundant areas close to land that serve as penguin breeding grounds. Site location is a factor that such policies cannot account for. Many penguin populations are in sharp decline, and acute overfishing in their habitats is to blame.

Climate Change Triple Threat

Krill aren't just threatened by people, though. They are under attack from all sides. The loss of sea ice due to climate change has jeopardized krill spawning grounds while ocean acidification eats away at their delicate shells. These impacts on krill create a feedback loop, as problems reinforce themselves and become more severe. For example, fewer krill means less carbon drawdown, thereby accelerating ocean acidification and ice melt. Still, the krill fishing industry shows no signs of stopping. Some experts predict a 12 percent growth of the industry next year.

In 2018, international groups advocated for a marine reserve that would protect 1.8m square kilometers around the Weddell Sea. Such measures would greatly reduce the stress on local marine animals, while a ban on krill fishing would eliminate human competition with Antarctic species. But in 2020, those efforts were rejected. Public support for a marine protected area would go a long way to push governing agencies, environmental groups, and nations to take a stand for krill.

It's clear that krill are worth far more in the ocean than in a pill bottle. The benefits of omega-3 oil are dwarfed by the overwhelming costs to the planet of overfishing krill. If the problem of krill decline remains unaddressed, the world runs the risk of losing its most abundant species — along with the cuter, more beloved marine animals that depend on them. Krill's future is precarious, and so is ours. It's time to stand up for the little guy.