

Deep-sea trawling can include bycatch and harm coral, so some activists want it banned. Monty Rakusen/Getty Images/Cultura RF

Long before it lands on a restaurant menu, Chilean sea bass takes quite a journey to arrive on land. To catch these deep-sea dwellers, fishers usually drag nets along the ocean floor a quarter of a mile, or more, beneath the ocean's surface \Box — a form of fishing called bottom trawling.

The United Nations Food and Agriculture Organization tries to keep tabs on bottom trawling, which rakes in juvenile fish and lots of other ocean species that are not the desired catch, depleting future fish stocks. It asks member countries to adhere to quotas and report fishing statistics.

But recent research, published in the journal *Frontiers in Marine Science*, suggests that millions of tons of fish caught in deep-water trawl nets have gone unreported in the last 50 years.

UN FAO data shows that deep-sea bottom trawls \Box — fishing 1,300 feet below the ocean's surface and deeper \Box — caught 14 million tons of fish between 1950 and 2015. Meanwhile, during the same time period, reconstructed data shows "an estimated 25 million tons of fish that were extracted, but not included in any of the fisheries

statistics," says Maria Palomares, a researcher at Sea Around Us, a research initiative at the University of British Columbia in an email.

That's almost double the amount actually reported.

The Sea Around Us numbers are so much higher because they include fish species that FAO reports leave out, as well as bycatch — non-target species swept up in dragnets.

It took more than 15 years to piece together this picture of the deep-sea catch, Palomares says. She and her team began their work with FAO or national fishing data as a baseline for a given region and time period. Then, they scoured that information for gaps — missing species, gear types, or areas. Using interviews with fishers, historical archives and sometimes even photographs of trophy fish to fill in the data set, they arrived at this larger estimate of fish that left the ocean.

Of the unreported catch, about half the fish were likely sold or eaten, while the other half were thrown away, she says.

For Palomares, whether the fish became meals or went to waste, it's important to know how much extra fish left the ocean without being factored into population counts. Accurate fishing data is essential to keeping fish stocks sustainable, she says.

Iván López, the director of Spanish fishing company Pesquera Ancora, trusts the UN FAO data. And he isn't sure that a historical reconstruction is the best way forward — he'd prefer to focus on the current industry rather than past numbers. López' company abides by regulations set up to make sure trawl ships report all of their catch. "We have fully documented fisheries now; inspections when you get to land; cross-referencing of invoices and sales," López says. "We are a very well-controlled industry." López's company mainly trawls for cod in shallower waters than Palomares studied, but their nets can approach 1,300 feet deep at times.

Off the West Coast of the U.S., there are fisheries that trawl at depths between 1,300 and 1,500 feet for fish like Dover sole and sable fish, says John DaVore, an officer of the Pacific Fishery Management Council who focuses on bottom-dwelling fish. But bottom trawling is banned in the deepest waters off the West Coast, anywhere below 4,200 feet, to protect unexplored habitats, he says.

Limiting trawling at greater depths, where fish grow slowly and live a long time, Palomares says, is important, since deepwater populations are sensitive. Chilean sea bass, or patagonian toothfish, begin reproducing at about 10 years old, so it takes a population a long time to recover from overfishing. Orange roughy, another deep-sea fish, has been known to live long enough to celebrate its 149th birthday \Box — but it only starts to reproduce in the second or third decade of its life.

There's also the ecological cost of dragging gear across the ocean floor. Trawling doesn't just threaten fragile populations, she says, it also scrapes up anything in its path \Box — sponges, anemones, corals. "The whole bottom becomes a wasteland," she says.

Frédéric Le Manach, scientific director at BLOOM, an organization focused on fishing sustainability, wants to ban deep-sea trawling. He thinks the environmental costs

outweigh any benefits to deep-water bottom trawls (Le Manach did not directly work with Palomares on this study; BLOOM director Claire Nouvian did).

Historically, suppliers ramped up bottom trawling in search of novel fish products, Le Manach says. "They developed deep-sea bottom trawling because it was a way to create a new market, to catch fish that nobody else had on their shelves," he says.

Government subsidies offset costs so that these operations could continue, even when they weren't profitable due to high fuel costs, Le Manach says.

And deep-sea trawling doesn't account for all that much fish. Even including the extra unreported catch Palomares predicts, her work shows that deep-sea bottom trawling provided less than 0.5 percent of all fish caught over 65 years.

That small contribution to the market is all the more reason to end the practice, Le Manach says. "It's nothing in terms of volume or in terms of value," he says. "So it would be very easy to stop [deep-sea] bottom trawling."

The last few years have seen more momentum for bans on bottom trawling. The Pacific Fishery Management Council voted on April 9 to protect an additional 136,000 square miles of ocean off the West Coast, prohibiting bottom trawl gear in new areas. "That's in addition to a number of habitat areas that were closed off previously," DaVore says. Most of that area, he says, is ocean that's around 1000 feet deep. In 2016, the European Union banned bottom trawling below 2,600 feet in Central-East

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