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Predator fish in oceans on alarming decline, experts say

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Over the past 100 years, some two-thirds of the large predator fish in the ocean have been caught and consumed by humans, and in the decades ahead, the rest are likely to perish, too.

In their place, small fish such as sardines and anchovies are flourishing in the absence of the tuna, grouper and cod that traditionally feed on them, creating an ecological imbalance that experts say will forever change the oceans.

"Think of it like the Serengeti, with lions and the antelopes they feed on," said [Villy Christensen of University of British Columbia's Fisheries Centre](#). "When all the lions are gone, there will be antelopes everywhere. Our oceans are losing their lions and pretty soon will have nothing but antelopes."

This grim reckoning was presented at the [American Association for the Advancement of Science's annual meeting Friday](#) during a panel that asked the question: "2050: Will there be fish in the ocean?"

The panel predicted that while there would be fish decades from now, they will be primarily the smaller varieties currently used as fish oil, fish meal for farmed fish and only infrequently as fish for humans. People, the experts said, will have to develop a taste for anchovies, capelins and other smaller species.

That the oceans are being overfished has been documented before, and the collapse of species such as cod and Atlantic salmon is also well-known. The new research attempts to quantify the overall decline in larger fish, based on data from more than 200 ecological systems studied since 1880. Those results were then modeled across the globe.

One startling conclusion: More than 54 percent of the decrease in large predator fish has taken place over the past 40 years.

"It's a question of how many people are fishing, how they are fishing, and where they are fishing," Christensen said. A majority of the catch, and now of the decline, involves East Asia, which has witnessed dramatic overall economic growth.

In describing the likely explosion of small fish, Christensen's team differed with a 2006 report in the journal *Science* that warned of an ocean without fish for humans by mid-century.

But they say that absent predators, the fisheries will be out of balance and more subject to mass die-offs from disease and from boom-and-bust cycles that, over time, can lead to algae or bacteria blooms that take the oxygen out of the waters and make them uninhabitable.

Jacqueline Alder from the U.N. Environment Program suggested that the number of fishing boats and days they fish have to be restricted.

"If we can do this immediately, we will see a decline in fish catches. However, that will give an opportunity for the fish stocks to rebuild and expand their populations," she said.

In an effort to stabilize some fish populations, national and international organizations and governments have placed quotas on the yearly catches of some species and have banned the taking of endangered fish entirely in some areas. Some regulations have also been placed on the kind of netting and trawling that can be used in sensitive areas.

But the fishing fleets are growing in size and sophistication, said University of Tasmania scientist Reg Watson. "Humans have always fished," he said. "We are just much much better at it now."

Examining 2006 catch results, his team found that 76 million tons of commercial seafood were hauled in - which he said equates to 7 trillion individual fish.

Watson said fishing activity has been growing quickly over the past several decades, with increasingly more energy and effort exerted to bring in equal or smaller catches. Nations also are paying substantial subsidies to their fishermen, he said, especially in East Asia.

"It looks like we are fishing harder for the same or less result, and this has to tell us something about the oceans' health," he said. "We may, in fact, have hit peak fish at the same time we are hitting peak oil."

Yet demand is growing fast, again most dramatically in East Asia. According to International Food Policy Research Institute research fellow Siwa Msangi, the rise in demand is largely being driven by China. Almost 50 percent of the increase in the world's fish consumption for food comes from Eastern Asia, and "42 percent of that increase is coming from China itself," he said.

"China is a driver of both the demand and the supply side. That is really why the management issue becomes so important," Msangi said. "Projections about future fish populations decline further, however, when coupled with forecasts about the impact of climate change," which is expected to warm the oceans considerably.

"Our study indicates indeed we may get a double whammy from climate change," said Christensen. "Higher water temperatures are going to mean fewer fish in the ocean and less plant life for them. This will be especially true in the tropical areas."

Oceans, he said, are increasingly being treated like farms, but the effort cannot be successful on a large scale. Intensive farming on land requires antibiotic treatments and pesticides to make up for the loss of a balanced ecosystem. In aquaculture, the same is true, and raising salmon or tilapia also requires importing tons of fish meal and fish oil from smaller species.

Christensen gave an example of the kind of dynamics he expects to see more and more in the oceans. Some years ago, a huge sardine fishery off Namibia in southern Africa crashed because of overfishing and a related drop in oxygen in the waters. When the sardines are depleted, he said, generally anchovies move in. Both can be consumed, but sardines bring a much higher price and so are preferred.

With so many anchovies and so few sardines, fishing fleets decided to work toward greatly reducing the anchovy population in the expectation that the sardines would come back. But instead of sardines, the fish that moved into the niche was the bearded goby - which is inedible for humans and eats up the ocean food that might one day again have supported sardines or anchovies.

"Nobody," Christensen said, "can control the ocean."