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## Not so many big fish in the sea

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**Fewer big, predatory fish are swimming in the world's oceans because of overfishing by humans, leaving smaller fish to thrive and double in force over the past 100 years, scientists say.**



Birds perch on a fish trap offshore Curuca at the mouth of the Amazon River.

*Photograph by: PAULO SANTOS*

Big fish such as cod, tuna, and groupers have declined worldwide by two-thirds while the number of anchovies, sardines and capelin has surged in their absence, said University of British Columbia researchers.

Meanwhile, people around the world are fishing harder and coming up with the same or fewer numbers in their catch, indicating that humans may have maxed out the ocean's capacity to provide us with food.

"Overfishing has absolutely had a 'when cats are away, the mice will play' effect on our oceans," said Villy Christensen, a professor in the UBC Fisheries Centre who presented the research findings at the American Association for the Advancement of Science annual conference in Washington.

"By removing the large, predatory species from the ocean, small forage fish have been left to thrive."

The researchers also found that more than half (54 percent) of the decline in the predatory fish population has taken place over the last 40 years.

Christensen and his team examined more than 200 global marine ecosystem models and extracted more than 68,000 estimates of fish biomass from 1880 to 2007 for the study.

They did not use catch numbers reported by governments or fishing operators.

"It is a very different ocean that we see out there," said Christensen. "We are moving from wild oceans into a system that is much more like an aquaculture farm."

While the number of small fish is on the rise, the little swimmers are also being increasingly sought after for use as fishmeal in human-run fisheries, Christensen said.

"Currently, forage fish are turned into fishmeal and fish oil and used as feeds for the aquaculture industry, which is in turn becoming increasingly reliant on this feed source," he said.

The researchers said that despite the spike in small fish, the overall supply of fish is not increasing to meet human demand.

"Humans have always fished. Even our ancestors have fished. We are just much much better at it now," said UBC scientist Reg Watson.

Examining the 2006 numbers, 76 million tons of commercial seafood were reported, meaning about "seven trillion individuals were killed and consumed by us or our livestock," said Watson.

Watson said fishing efforts have been growing over the past several decades, reaching a collective point of 1.7 billion watts, or 22.6 million horsepower, worldwide that year.

In terms of energy use, that would amount to 90 miles (150 kilometers) of "Corvettes bumper to bumper with their engines revving," he said.

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

Seafood makes up a large part of the global human diet according to research fellow Siwa Msangi of the International Food Policy Research Institute, who said the rise in demand is largely being driven by China.

"Meat provides about 20 percent of the per capita calorie intake and of that... fish is about 12 percent," he said, referring to global figures.

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."

Jacqueline Alder from the United Nations Environment program suggested that the world needs to see a swift cut in the amount of fishing boats and fishing days in order to allow global fish stocks time to gain numbers.

"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.

Projections about future fish populations decline further, however, when coupled with forecasts about the impact of climate change.

"Our study indicates indeed we may get a double whammy from climate change," said Christensen. "In the sense that higher water temperatures... are going to mean there will be less fish in the ocean."