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Widely-used measure of ocean health flawed

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CAPTION

By Ed Melvin/Washington Sea Grant

Since the publication of a landmark paper in 1998, the health of the oceans' fisheries has often been measured by what's called a "mean trophic level" of catch. But now a new study suggests that that the standard may, in fact, not give an accurate representation of what's alive in the deep.

Trophic level refers to where something is on the food chain. A one on the trophic scale would be algae that produce food from the sun. Two are fish that eat plants, such as carp. Three would be fish that eat smaller fish, such as sardines and anchovies, while four would be large carnivores such as tuna, shark and cod,

The idea of MTL presented in the *Science* paper in 1998 was that you could use the mean of high-on-the-food-chain fish to lower-on-the-food-chain fish caught to estimate how marine populations were doing over. Using catch data from around the world, the researchers found that if say, a given area used to have a MTL of 3.2 and it suddenly dipped to 2.1, something was up.

Now an international team led by Trevor Branch, a University of Washington fisheries scientist in Seattle, using a massive analysis of seafood catch data, say their numbers show that the mean trophic level measure actually doesn't give a good picture of how marine populations were doing.

"The main point to take from this is when you look at catches as a measure of the ecosystem, it turns out that catches are no better than flipping a coin, to see how the ecosystem is doing," Branch says.

While the indicator worked fairly well if everything in a given area was being harvested equally, when one species or part of the food web was disproportionately fished, its ability to predict how the overall system was doing broke down, their research, published in Wednesday edition of the journal Nature, shows.

"This is important because that measure is the most widely adopted indicator by which to determine the overall health of marine ecosystems," says Branch. An example – it's used by the United Nation's Convention on Biological Diversity to measure of global marine diversity.

What the *Nature* paper found instead was that "it doesn't seem in the actual ecosystems that predators or prey are disappearing," says Branch.

However Daniel Pauly, a fisheries professor at the University of British Columbia in Canada and one of the authors on the 1998 *Science* paper, says the *Nature* paper is flawed. He says that what's actually changed is that as near-shore fishing areas have been over-exploited, boats have had to move farther and farther offshore to find fish in new, previously unfished areas.

That explains why the numbers of high-on-the-food-chain fish stay high, because those populations haven't yet been denuded, he says.

"From 1950 to 1980, the area fished expanded by one million square kilometers per year. In the 1980s the expansion increased to three million square kilometers. That's' almost one million square miles a year," says Pauly.

Branch responds that he and colleagues "complied the most comprehensive set of scientific trawl surveys and (fish) stock assessments that gives us a direct measure of what's going on the ecosystems." This, he believes, provides a better and more direct measure of how ecosystems are doing than the MTL.

Pauly contends it's something of a dispute between fisheries scientists who are concerned that increased overfishing will eventually empty the sea of fish and leave nothing but jellyfish and plankton, as the 1998 paper suggested, and those who believe newer programs are resulting in a move towards sustainability.

Branch notes that a paper out last year found that about while two-thirds of fisheries are below absolute biomass levels "that you'd want them to be at," because harvest rates have been reduced, about two-thirds of fish stocks are "at a place they can be rebuilt."

Pauly responds that "in fisheries there are people who are about the industry and people who care more about conservation and this has bred a certain animosity between then."

The controversy is likely to be played out in journals for the coming years. But, as Stephanie Hampton, of the National Center for Ecological Analysis & Synthesis at the University of California, Santa Barbara said in a release, it's exactly how science is supposed to work. "Refining scientific concepts is a process of iterative testing. This group accelerated the call-and-response dialog that normally occurs among scientists."

By Elizabeth Weise

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