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Research that makes waves

By Marilyn Smulders

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The research hit like a rock in calm waters. If current trends in habitat destruction and over-fishing continue, the world's fish and seafood populations could collapse within 50 years, warned the global study led by Dalhousie's Boris Worm.

In an analysis of scientific data going back to the 1960s and historical records over a thousand years, the researchers found that marine biodiversity—the variety of ocean fish, shellfish, birds, plants and micro-organisms—has declined dramatically, with 29 per cent of species already in collapse. The study was published in the journal *Science* in November of 2006.

"The image I use to explain why biodiversity is so important is that marine life is a bit like a house of cards," said Dr. Worm at the time.

"All parts of it are integral to the structure; if you remove parts, particularly at the bottom, it's detrimental to everything on top and threatens the whole structure.

"And we're learning that in the oceans, species are very strongly linked to each other— probably more so than on land

The study's alarming projections reverberated through the scientific community and attracted quite a bit of controversy. Critics said researchers overstated the threat and were unduly alarmist. Ray Hilborn, a professor of fisheries management at the University of Washington, said the study was "probably the most absurd prediction that's ever appeared in a scientific journal regarding fisheries."

Now, two years later, a new study published in the September edition of *Science* shows trends are potentially reversible with an innovative yet contentious fisheries management strategy called "catch shares."

Common in New Zealand, Australia and Iceland, catch shares guarantee each shareholder a fixed portion of a fishery's total allowable catch, set each year by scientists. Much like stock shares in a corporation, these shares can be bought and sold. Each share becomes more valuable when the fish population—and thus the total allowable catch—increases. With catch shares, every shareholder has a financial stake in the long-term health of the fishery.

"Under open access, you have a free-for-all race-to-fish, which ultimately leads to collapse," says lead author Christopher Costello, an economist at the University of California, Santa Barbara. "But when you allocate shares of the catch, then there is an incentive to protect the stock—which reduces collapse. We saw this across the globe. It's huma



Boris Worm is an assistant professor of marine conservation biology at Dalhousie University.

nature.”

The current study used the same dataset that researchers on the earlier study based their projection on—a global database of fisheries from the Sea Around Us Project that spans the years 1950-2003. Study authors Christopher Costello and Steven Gaines of the University of California, Santa Barbara and John Lynham of the University of Hawaii say they were motivated by the widespread global collapse predicted by Dr. Worm et al. to investigate possible solutions.

For Dr. Worm, there is both validation and hope in the new study.

“It shows we were right about our trend projections of increasing collapses of fish stocks,” he says.

“But it also provides some hope and a solution to work with in fighting the global fishery crisis. There are fisheries which are doing well because of rights-based management. It’s the silver lining we’ve been looking for. Now we need to implement these solutions more widely.”

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