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Can the World's Fisheries Survive Our Appetites?

By Bryan Walsh

Boris Worm, a marine biologist at Dalhousie University in Canada, made a startling prediction in the pages of *Science* in 2006: if overfishing continued at then-current rates, he said, the world would essentially run out of seafood by 2048. Worm's bold analysis whipped up controversy in the usually pacific world of marine science — one colleague, Ray Hilborn of the University of Washington, called the *Science* study "mindbogglingly stupid." But Worm held fast to his predictions: that the oceans had limits, and that marine species were declining so fast that they would eventually disappear.

Nearly three years later, Worm has joined with a wide assortment of international marine scientists — including Hilborn, after the two hammered out a truce that began on a NPR call-in show — to perform a more thorough census of the health of marine ecosystems. Their study published in *Science* on July 31 is the most comprehensive of its kind, combining data on fishery catch totals, stock assessments, surveys from scientific trawls and information from small-scale fisheries and models. "It was a bit like CSI: Fisheries," says Worm. "We looked for evidence of overfishing and where the practice was improving."

The two-year study, which broke the world's oceans into 10 major marine ecosystems, found improvement in half of them, where efforts to limit overfishing appeared to be working. But at the same time, the study found that 63% of the analyzed fish stocks worldwide were still in decline, and that exploitation will need to be reduced further if vulnerable species — like the rapidly disappearing Mediterranean bluefin tuna — are to avoid collapse. "The bad news is that this analysis confirms an increasing trend of species collapse in fisheries," says Worm. "The good news is that the driving of collapse — exploitation — has been declining in

many of the ecosystems where we have data. Some have really begun to limit overfishing."

Unsurprisingly, the regions where overfishing is being curbed tend to be areas that are well-off and well-governed, including Iceland, California and the Northeast Atlantic Shelf. That's heartening for those who like their fish sticks. Populations of cod and haddock in the Northeast Atlantic, once home to some of the richest fishing waters in the world, all but totally collapsed due to overfishing in the 1980s and 1990s, decimating the coastal towns' economy. The region, like several others, is beginning to recover, thanks to sustainable control measures like catch shares and no-take zones, which prevent overfishing. "We found that success stories in curbing exploitation had clear management with hard and fast rules that defined overfishing and sought to avoid it," says Michael Fogarty, an associate scientist at the National Oceanic and Atmospheric Administration and a co-author of the study. "We've witnessed a dramatic recovery in places in the Atlantic like Georges Bank."

The picture is less rosy in poorer parts of the world, especially along the African coast, where there are relatively few laws governing overfishing — and fewer still that are actually carried out. As developed nations tighten rules on their own fishing grounds, fishing fleets are moving to the developing world and carrying out the cycle of overfishing all over again. Though the study noted that there had been some success in getting small-scale fishermen to better manage their stocks, there is real concern that tropical fisheries could be exhausted. "It is possible to make constructive changes in fisheries even in difficult economic situations," says Tim McClanahan, a senior conservation zoologist with the Wildlife Conservation Society, who is based in Kenya. "But you have to work with communities on the ground."

The study also found that managing marine ecosystems for overall biodiversity, instead of just worrying about the status of catch populations, was even trickier, and required fishing to be further curtailed. Fishing at what is known as the maximum sustainable yield — the internationally accepted benchmark for safe catch limits — might be too high, and could still result in fish populations collapsing over time. Instead, maximum sustainable yield should be used as an absolute upper limit, rather than a target. Lowering catch limits further also benefits the marine ecosystem as a whole, maintaining biodiversity, rather than turning the oceans into a giant fish farm. "You can't have absolutely pristine ecosystems, and eat your fish,"

says Hilborn. "If maximum sustainable yield is your objective, then ecosystems are going to be affected."

On the whole, the new *Science* study comes as a relief to many marine observers — and seafood lovers — who had become accustomed to a string of uninterrupted bad news about the state of the oceans. Still, Worm cautioned that in the long run, seafood is far from safe. A rising global population, which increasingly hungers for sushi and other once rare marine delicacies — especially in growing countries like China — will continue to put pressure on fish populations. "When you go region by region, you can see some solutions emerging," says Worm. "But when you look at the whole world, the situation still looks pretty grim."