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## **Catching Big Mama Fish Curbs Ocean Fertility**

By Marah J. Hardt | November 6, 2014



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Fishing for snapper, mahi-mahi and trevally in the Maldives. (Credit: Canopus Maldives via Flickr)

Scientists recently confirmed what anglers have known for centuries—there's something special about a big mama fish.

The bigger the fish, the better the bragging rights—and often, the bigger paycheck or prize. For centuries, this has led anglers and fishers to selectively target the largest fish in a school. But a [new study](#) published in a special edition of *ICES Journal of Marine Science* reveals that going after the biggest fish in the sea—when those are the females—is kind of like killing the goose that lays the golden egg. Not a smart move if you want to keep seeing your favorite seafood on the menu.

Here's why: unlike us, the bigger a female fish, the more babies she can produce. In our species, all women are born with roughly the same amount of eggs—about 1 million—regardless of height or weight. This is not so in fish (and many other animals). Bigger females make more eggs—and thus make more babies—than smaller fish. A lot more.



A gravid female cod at the U.K.'s Macduff Aquarium. (Credit: Bruce McAdam via Flickr)

Affectionately known as BOFFFFs—big, old, fat, fecund, female fish—these individuals contribute far more to future generations than other members of the population. And they do so in multiple ways. Understanding and managing for that is key to sustaining fisheries around the globe. Here's why BOFFFFs deserve some disproportionate respect:

#### *Egg-making Factories*

Larger and older females can physically hold more eggs. Having done most of their growing, they can also put more energy into making eggs. In Hawai'i, for example, a bluefin trevally 27 inches-long can produce 84 times as many eggs as a fish half her length. This pattern holds across many species, including cod, herring and rockfish.

#### *No Lunch Box Let Downs*

Larger females are able to manufacture not just more eggs; they make bigger eggs, too. This means they pack their growing larvae with more energy reserves in the form of yolk, giving their growing babies a growth and development head start over larvae whose moms pack leaner lunch boxes.

#### *Older and Wiser*

Studies show that older (and wiser?) females spawn eggs in different locations and over longer periods of time than younger females, often starting their spawning sooner in the season. In those species that produce multiple batches, BOFFFFs produce higher numbers of batches over extended spawning seasons than smaller/younger females. This provides a kind of “bet-hedging” advantage, spreading risk over more diverse habitats and unpredictable environmental conditions than younger, smaller females who may only have resources to spawn a single batch of eggs, all at once, in one location—effectively putting all their eggs in one basket.

So, BOFFFFs are especially good at making more fish. Trouble is, they are also our favorite fish to catch. The type of fishing gear we use, such as nets that allow smaller fish to swim free while entrapping the larger individuals, often plays an important role. Targeting specific habitats can also lead to a disproportionate take of larger, older fish—like us, grown-up fish tend to hang out in different locations than juveniles or young adults. Trawls scraped along certain slopes or long-lines set at specific depths selectively remove the bigger fish.



Pair of 'omilu, or Bluefin Trevally (*Caranx melampygus*), cruising a coral reef along the French Frigate Shoals (Kanemiloha'i) within the Papahānaumokuākea Marine National Monument. (Credit: Lindsey Kramer/U.S. Fish and Wildlife Service)

The loss of BOFFFFs is bad news for next year's spawning cycle, but such size selective fishing has far graver consequences. In many cases, it shapes fish populations by selecting for fish that can mature and spawn at smaller sizes. In some cases, research has shown the selective pressure can be so strong that it actually changes the [genetic structure](#) of a population.

Imagine that every year, voracious aliens swooped down and preferentially scooped up the tallest people on the planet. The shorter you are at the time of attack, the better the chance of your survival. People who could mature at smaller heights would be able to survive and reproduce longer than leggy neighbors who were snatched up before having the chance to mate. Over time, humans would evolve to be shorter and shorter.

This is what is happening with fish. The problem is, with fish, smaller size means fewer babies, and often, reduced survival of larvae. Fewer surviving larvae mean fewer adults to spawn fewer fish. The cycle continues and is very hard to reverse—removing fishing pressure for a few seasons won't cut it. It takes a long time for such extreme effects to bounce back.

Instead, we better start paying more respect to the mamas that are producing the mother-loads of fish in the sea. We've got to manage as if [maternal effect](#) matters—because it does. The sooner we incorporate this reality into our management strategies, the sooner we'll start seeing more bigger fish—males and females—in the sea.



**About the Author:** Dr. Marah Hardt is a marine scientist and storyteller working to build a sustainable future for people and the sea. She is the Research Co-Director at [Future of Fish](#) and currently working on her first book, *Sex in the Sea* ([www.sexinthesea.org](http://www.sexinthesea.org)). Follow on Twitter [@Marahh20](#). [More »](#)

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