

Can Farmed Fish Feed The World Without Destroying The Environment?

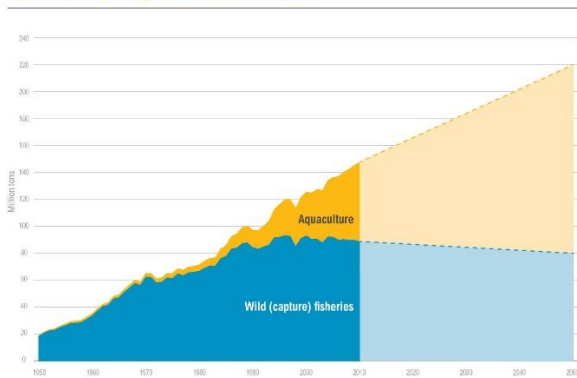
June 6, 2014 12:27 PM ET by MAANVI SINGH

We Americans love our fried shrimp, our sushi and our fish sticks. And a lot of other people around the world count on fish as a critical part of their diet, too. According to the Food and Agriculture Organization, fish now accounts for almost 17 percent of the world's intake of protein — in some coastal and island countries it's as high as 70 percent.

To keep up with the world's growing population and its appetite for seafood, we can't just rely on wild fish. Already, we're getting more of it from aquaculture.

And that farmed fish production will have to more than double by 2050 to meet demand, according to a report by the World Resources Institute. The potential environmental implications of that are pretty daunting.

Aquaculture Is Expanding to Meet World Fish Demand

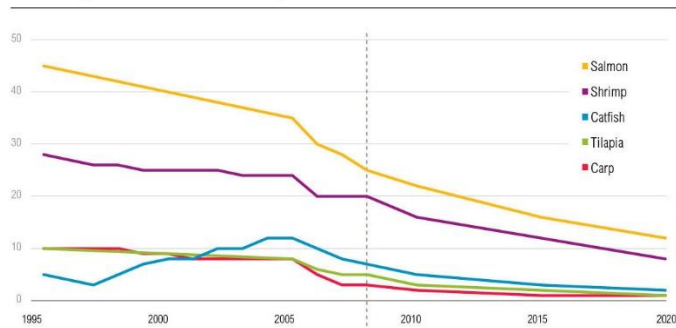


Sources: Historical data 1950–2010: FAO, 2014, "FishStatL." Roma: FAO. Projections 2011–2050: Calculated at WRI, assumes 10 percent reduction in wild fish catch between 2010 and 2050, and linear growth of aquaculture production at an additional 2 million tons per year between 2010 and 2050.

See www.wri.org/publication/improving-aquaculture for full paper.

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Figure 9 | The aquaculture industry has reduced the share of fishmeal in farmed fish diets (percent of fishmeal in fish feed)



Note: Fishmeal use varies within and between countries; the figures presented are global means. Data represent observations between 1995–2008, and projections for 2009–2020.

Sources: FAO (2014b), Tacon and Metian (2008), Tacon et al. (2011).

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"The world's oceans and rivers and lakes are fished to their limit," says Richard Waite, a researcher with WRI. So the aquaculture industry has to step up, he says. "But if [aquaculture] were to more than double, and we don't improve the sector's efficiency, its environmental impact will double as well."

But if it's done right, aquaculture can grow without taking a major toll on the environment, the WRI researchers say.

Fish and shellfish are already among the most eco-friendly sources of animal protein, Waite tells *The Salt*. They don't emit anywhere near the amount of greenhouse gases that cows do, and most farmed fish convert feed into edible meat very efficiently.

Producing an additional 80 million tons of farmed fish per year by 2050, Waite says, would be much easier on the planet than producing an additional 80 million tons of beef. So sustainable farmed fish may be a great way to help feed the world's poor, the report says.

But large-scale aquaculture can have significant environmental consequences. It can take a lot of wild fish to feed certain farmed fish. And when tons of fish are crowded together, they create a lot of waste, which can pollute the ocean. Fish farms can also be breeding grounds for disease. Plus, shrimp farming in Indonesia is at least partly responsible for the region's declining mangrove forests.

It doesn't have to be that way, the researchers say. "There's a lot the industry can do to become more efficient," Waite tells us.

Some are trying to boost efficiency by building fish factories on land, as NPR's Dan Charles reported in April.

Re-evaluating what we feed farmed fish will also help a lot, Waite adds. Over the past 20 years, farms have greatly reduced the amount of fish meal they use in their feed, the report finds. As we've noted, a few salmon farms in South Africa are replacing fish meal with fly meal to take fish farms' pressure off the oceans.

And while fish farmers will naturally want to become more efficient and productive, since it makes them more money, Waite says, it also helps when governments provide incentives to adopt sustainable practices.

The report recommends eating more seafood that's lower on the food chain. Tilapia, catfish, carp — as well as mollusks like oysters, scallops and clams — don't require as much feed. "Mollusks are the planet's most environmentally sustainable source of animal protein," Waite says. "They don't use any land, they don't use any freshwater and they actually clean up the environment around them."

Overall, Waite says, aquaculture doesn't have to be destructive. But it's also not a panacea for the environment or world hunger. "It can be done well or it can be done badly," he says.

Can A Fish Farm Be Organic? That's Up For Debate

November 20, 2013 11:52 AM ET by ALASTAIR BLAND

This year, Americans are expected to buy more than \$30 billion worth of organic grains, produce, coffee, wine and meats.

Some producers of farmed fish want the chance to get a cut of those profits, and retailers, who can charge a premium price for organic farmed fish, are with them. But an organic label for aquaculture is not coming easy.

For more than 10 years, the issue has been on the agenda of the U.S. Department of Agriculture's National Organic Program. But a planned meeting to discuss the matter in October was canceled by the federal government shutdown. Now federal officials are saying the final determination on the issue is at least six months away.

Among the groups closely eyeing the proceedings are environmentalists, who say fish farms shouldn't qualify for an organic label if they rely heavily on feed that can't be verified as organic. And they cite other problems on fish farms, including pollution and disease, that make them less sustainable than the typical organic farm.

"The problem is, organic rules are based on how you treat the soil. So how do you apply that to things like seafood?" says Patty Lovera, with Food and Water Watch.

To solve the problem of fitting fish farms into the same policy as land-based farms, federal regulators are simply rewriting the rules. The NOP — with help from the National Organic Standards Board, or NOSB, and its own Aquaculture Working Group — is now developing a set of guidelines that specifically address aquaculture. They would allow up to 25 percent conventionally grown material — specifically fishmeal — in the diets of farmed fish certified as organic. The plan would be to slowly scale this amount down over the years, though critics say they doubt this process would occur.

But this seems like too much to some consumer advocates.

"They're totally compromising the current United States standards [on organic certification]," says Urvashi Rangan, with the watchdog group Consumers Union.

Farmed salmon are typically fed fishmeal, a ground-up paste of anchovies, menhaden and other wild-caught species, some of which come from stocks that are rapidly declining. Under existing organic laws in the U.S., there is no way to certify these wild fish as organic.

To solve this, the federal government is proposing to allow fish farms to use meal only from "sustainable" fish species.

So what exactly does that mean? Miles McEvoy, the deputy administrator of the National Organic Program, tells The Salt that for now, the term "sustainable" remains undefined and unregulated.

The fishmeal question is likely to continue to be contentious for open-ocean fish farms. But inland fish farms could potentially be in a better position to abide by organic laws, says Zeke Grader, of the Pacific Coast Federation of Fishermen's Associations in San Francisco. "I think it's possible for there to be organically farmed fish, but they would have to be raised in completely closed, recirculating systems that don't touch the ocean," Grader says.

That's because some salmon farms with open-ocean pens have been infested with a marine parasite called sea lice, which scientists say has devastated certain wild salmon populations in British Columbia. (Representatives of Canada's salmon farming industry have disputed this claim.)

George Lockwood, chairman of the NOP Aquaculture Working Group, says the sea lice issue "is an unsubstantiated claim" against salmon farming.

Still, Lockwood says his group has recommended to federal regulators that organic salmon farms be required to undergo rigid environmental assessment to earn the USDA organic stamp — a more rigid assessment, he says, than the current standards for organic land-based livestock farms. Lockwood also points out that the European Union is already certifying some farmed salmon from countries like Ireland as organic.

Rangan at Consumers Union sees these moves as watering down the principles of organic agriculture.

"The NOP wants to grow the organic sector, and to do that they're just lowering the standards rather than require that producers meet them."

Can We Feed The World With Farmed Fish?

August 15, 2017 3:01 PM ET by ALASTAIR BLAND

For years, scientists and activists have sounded the alarm that humans' appetite for seafood is outpacing what fishermen can sustainably catch.

But new research suggests there is space on the open ocean for farming essentially all the seafood humans can eat. A team of scientists led by Rebecca Gentry, of the University of California, Santa Barbara, found that widescale aquaculture utilizing much of the ocean's coastal waters could outproduce the global demand for seafood by a staggering 100 times.

Their [paper](#), published Monday in the journal *Nature Ecology & Evolution*, could have significant implications for a planet whose human population is projected to reach 10 billion by 2050. Nearly every coastal country has the potential to meet its own domestic demand for seafood, "typically using only a minute fraction of its ocean territory," write the authors.

In their research, the scientists analyzed the potential of virtually every square mile of the ocean's surface for producing 120 different species of fish and 60 species of bivalves – that is, mussels, clams, oysters and scallops. They immediately eliminated ocean waters deeper than about 650 feet, since ocean aquaculture generally requires anchoring floating pens and cages to the seafloor. They sought out areas rich in dissolved oxygen and phytoplankton – essential for bivalves, which filter microscopic food from the water.

The researchers also excluded marine protected areas and regions where floating pens and cages might block shipping lanes and port entries or interfere with oil extraction.

They calculated that marine aquaculture could produce 16.5 billion tons of fish per year, or about 4,000 pounds per person.

"And we were being very, very conservative in our calculations," says co-author Halley Froehlich, a postdoctoral researcher at UC Santa Barbara.

Froehlich says it's not likely that aquaculture will be practiced in every feasible location. "And we certainly would never need so much production," she says. "That number was really an overestimate to show what the potential is."

Still, even with a downsized calculation using a much more realistic fraction of the ocean's surface, the numbers are impressive: The scientists' math shows that an area of water about the size of Lake Michigan – roughly 1/67th of a percent of the ocean's surface – could produce about 110 million tons of fish and shellfish per year. That's about the amount of seafood caught annually by commercial fishermen, and about five times the globe's current aquaculture production, Froehlich says.

While the production potential of aquaculture is clearly massive, such volumes of fish and shellfish could not be grown without costs. Aquaculture can offer environmental benefits – but only under certain circumstances, and there are many ways in which aquaculture can go wrong.

Salmon farming in British Columbia has been associated with declines in certain streams' runs of wild salmon, since a parasite called the sea louse that sometimes thrives amid densely raised farmed fish can attack wild fish. (The issue is a contentious one, and scientists, activists and fish farming lobbyists still disagree over how directly salmon farms have impacted wild salmon.)

Many aquaculture operations also rely on wild-caught fish as feed. This has driven overfishing in some places, like Peru, whose anchovy population has been. Shrimp farming operations in Southeast Asia have become notorious for destroying mangrove thickets and pouring harmful effluent into estuaries.

"So, we know and we've seen how aquaculture can be done incorrectly, and we're looking at the potential for improvements," Froehlich says.

Max Troell, a scientist at the Stockholm Resilience Centre, co-authored an essay published in the same issue of *Nature Ecology & Evolution* that analyzes Gentry's and Froehlich's findings.

"The work of Gentry and colleagues shows that space is currently not a limiting factor for the expansion of oceanic aquaculture," Troell writes.

But there are other constraints. Growing fish means feeding them, and this, Troell tells *The Salt* in an email, requires either catching wild fish or growing high-protein vegetable crops on land. Since these are products already consumed by people, Troell notes in his commentary piece, "reducing competition with human food resources will be key for sustainability."

In a [2014 paper](#) in the *Proceedings of the National Academy of Sciences*, Troell and several co-authors assessed aquaculture's potential to improve the resilience of the planet's food systems. In that paper they asked, "[D]oes continued growth in aquaculture enhance or undermine the potential of the global food system" to feed humanity?

The jury remains out on that question.

In an email interview, Troell tells The Salt that, if aquaculture production of fish is scaled up dramatically, "[t]he link to terrestrial feed sources will increase," and so will environmental impacts.

"For filter feeders like mussels, the story is different," he says.

Unlike fish, they don't need to be fed, since they filter naturally occurring nutrients and organic matter from the water.

This, says Troell, makes them "very beneficial species to scale up" in aquaculture.

Growing them could even be good for the environment. Froehlich tells The Salt that dense flotillas of shellfish pens could actually mitigate some types of pollution. For instance, such pens could be useful at river mouths, where nutrients from inland farmlands can cause algae blooms that, in turn, deplete the water's oxygen and create so-called "dead zones" – like the massive one that develops every summer in the Gulf of Mexico, thanks to polluted Mississippi River discharge.

Froehlich is continuing to study aquaculture's potential to sustainably feed the world, with some focus on different types of feed and how efficiently farmland can be used to help produce fish and shellfish. She notes that "fish are extremely efficient at converting feed material into body mass," and that some species can turn food into fat, bone, muscle and other tissue at a conversion ratio of nearly one to one. "That's a pound of feed in, and a pound of fish out," she notes.

Froehlich believes seafood consumption will eventually replace a considerable amount of land-based meat production, and she hopes to quantify the extent to which this could alleviate agricultural pressures on land and water resources.

"There's a discussion and a movement of people switching to pescatarian diets," she says. "So, we want to know, what will that translate into?"