

## The Bizarre and Inspiring Story of Iowa's Fish Farmers

*Can farmers in Iowa help save the world's seafood supply?*

By [Maddie Oatman](#) | Wed Jan. 4, 2017 7:00 AM EST

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**Title Image:**

# A FISH OUT

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seafood supply?

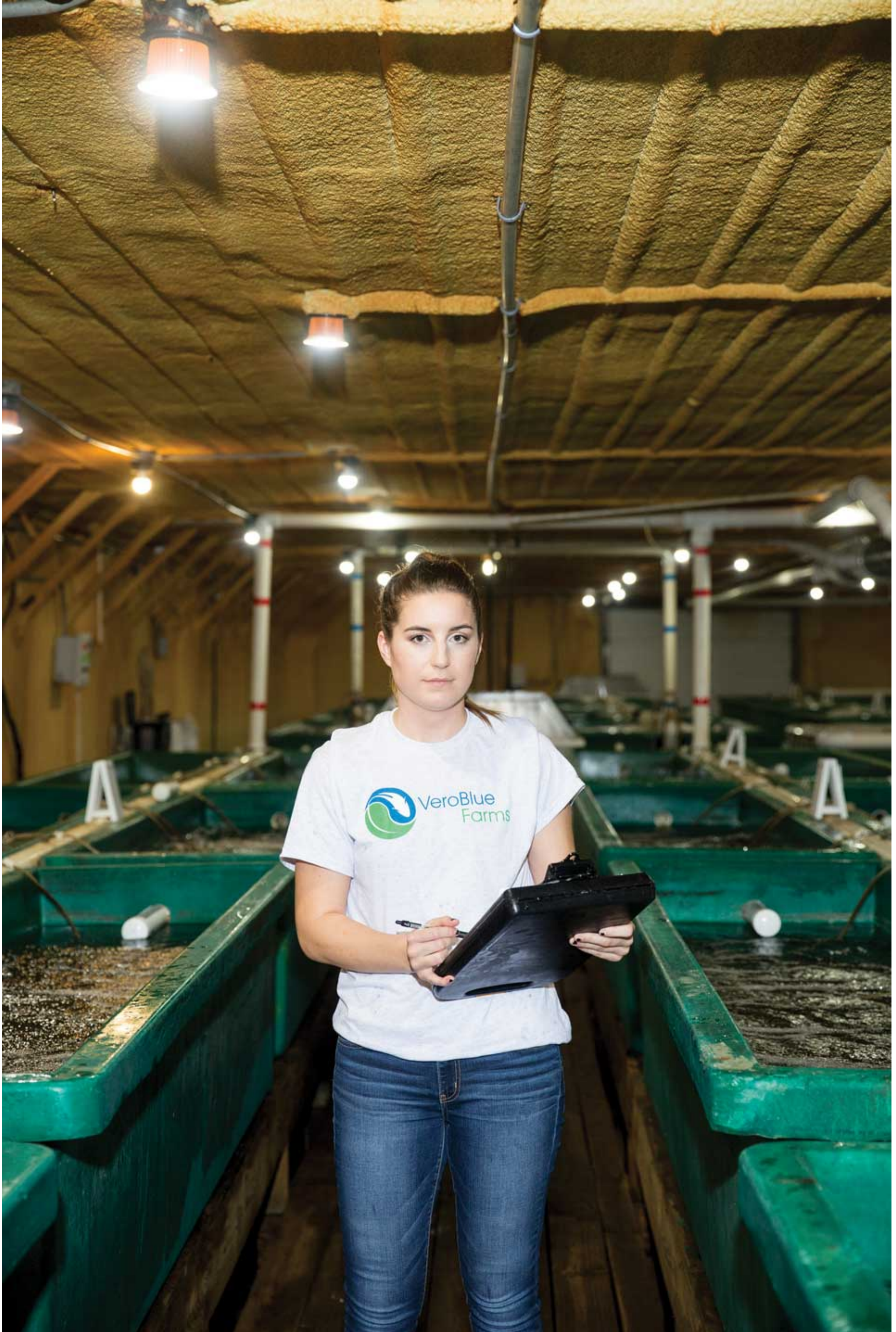


**Title Image Credit:**

Photos by Ackerman + Gruber

**By mid-October**, harvest is in full swing in central Iowa. Giant green combines crawl through rows of withered corn until well after dusk as Webster City's farmers hurry to gather their crops before the first freeze sets in. The stiff, pale bodies of dead hogs pile up in dumpsters along gravel roads, waiting to be rendered. Geese sail south in wavering Vs, and the maple trees on the banks of Brewer Creek flare crimson.

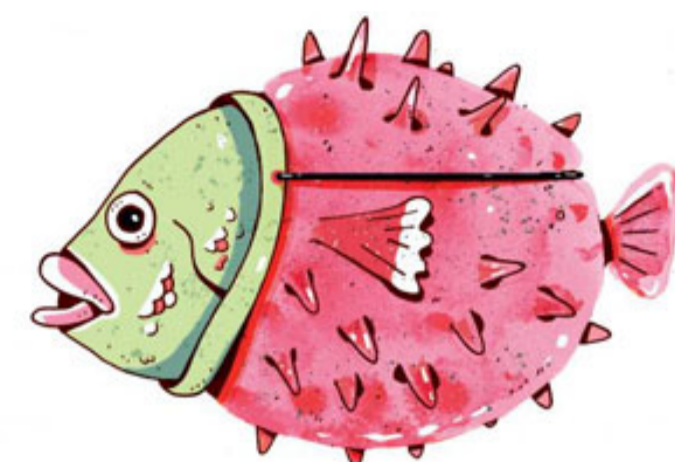
A few miles outside of town, in a squat white barn that used to house hundreds of sows, a different sort of harvest has kicked into gear. Grace Nelson, 22 and tan with ombré hair, stands alert, clipboard in hand, watching her co-workers hustle to transfer fish from tanks to a flatbed truck bound for Colorado.



Their neighbors raise hogs and cattle, sow soybeans, and tend pumpkin patches and orchards now sagging with apples. But five years ago, the Nelsons—a third-generation Iowa farming family—turned to raising fish. Hundreds of thousands of silvery barramundi, to be precise. Part of a hearty species that's roughly the size of coho salmon and has flesh the flavor of red snapper, the Nelsons' barramundi start their lives in their native Australia. Seventeen days after spawning, they are flown in plastic bags of water to central Iowa, where they spend their adolescence swimming against a current pulsing through rectangular tanks on the Nelsons' farm. Barramundi easily tolerate many environments and have a flexible diet, attributes that led *Time* in 2011 to call them "just about perfect" as a farmed species. Once the fish reach nearly two pounds, they'll be shipped live to seafood markets and restaurants across the country, or filleted, flash-frozen, and sent to food distributors like Sysco.

The Nelsons' operation is so intriguing that in 2014, a pair of Canadian investors named Keith Driver and Leslie Wulf acquired it, changing the name to VeroBlue Farms. (Vero means "true" in Latin.) With the Nelsons still in charge of the day-to-day operations, VeroBlue aims to become North America's biggest land-based fish farm and the largest domestic producer of barramundi, raising as much as 10 million pounds every year—more than twice as much as anyone else.

Some scientists and ocean advocates believe we need more fish farms like this one: A 2015 World Wildlife Fund [report](#) [2] revealed that half of all marine vertebrates have been wiped out since 1970 because of pollution, climate change, and industrial fishing. According to the United Nations' Food and Agriculture Organization, about [30 percent](#) [3] of the world's wild stocks are fished at biologically unsustainable levels, and research by acclaimed French marine biologist Daniel Pauly [suggests](#) [4] the real figure could be more like 45 percent.



[1]

[Fishy Story: Our Faux Fish Problem](#) [1]

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## Here in Iowa, they know how to grow protein. That's all we're doing—growing protein.

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That's prompted experts at the US National Oceanic and Atmospheric Administration (NOAA) and the Department of Health and Human Services' Dietary Guidelines Advisory Committee to embrace farmed varieties. "If responsibly developed and practiced, aquaculture can generate lasting benefits for global food security and economic growth," the director general of the UN Food and Agriculture Organization [declared](#) [3] in 2014. "Here in Iowa, they know how to grow protein," Driver, the president of VeroBlue, recently told a group of investors. "That's all we're doing—growing protein." The difference, suggests Paul Greenberg, author of the seafood bible *Four Fish*, is that when it's done right, aquaculture presents "a real opportunity to change the footprint of our protein."

How did a family from Webster City, a bucolic town about 75 miles north of Des Moines and 1,000 miles from the nearest ocean, get the idea to farm fish? On a break from manning a booth at Iowa's annual Pork Congress in 2009, Mark Nelson—co-founder of [the aquaculture venture](#) [5], along with his cousin Jeff—noticed a diagram of a feed dispenser rigged above a pool of tilapia. His mind flashed to his family's barn, which had sat empty since the family quit raising hogs when the market soured the year before. "It just sort of clicked," he remembers. Why not fill it with fish tanks? Mark and Jeff, who at the time were in their mid-50s, spent the next three years researching aquaculture systems and retrofitting the sow barn. In 2012, they began selling hybrid striped sea bass to a distributor in Minneapolis. Soon, they switched to the heartier barramundi, supplying Minnesota restaurants as well as Hy-Vee grocery stores. (Jeff still runs the family's conventional farm down the road, where he harvests corn, hay, and soybeans and fattens hogs for market.)



Photo by Ackerman + Gruber

The Nelsons were betting on math. They knew that one pound of beef [can require](#) [6] six pounds of grain and 1,800 gallons of water to produce; a pound of pork might take four pounds of grain and about 600 gallons of water. But one pound of barramundi requires just one pound of grain and up to seven gallons of water. Because the fish's native rivers in Australia frequently dry up, the barramundi have also adapted to survive close together in billabongs with low levels of oxygen—as if primed to prosper in tanks. When fully grown, they fetch \$4 to \$5 a pound, while ground beef averages [\\$4.20](#) [7] and pork averages [\\$3.70](#) [7]. "You look at that stuff and it's like, okay, this is a good way to go if we're going to continue to feed the world," says Mark.

The Nelsons are fussing over Jeff's broken combine the day I arrive in Webster City, so VeroBlue's Driver, an energetic 41-year-old with close-cropped strawberry blond hair,

gives me a brisk tour of the barn. We don plastic muck boots and swish our soles in a milky antimicrobial mixture sitting in trays on the floor of each doorway. Inside, the air is hot and moist, smelling more like a damp forest than a seafood market. Down a long corridor, we pass tanks and filters that transform water drawn from the local aquifer—smelling of sulfur and red with manganese and iron—into clear and fish-friendly water. Water from the tanks is continuously pushed through filters where beneficial bacteria convert excess ammonia into nitrates. Most of the water is recirculated back into the tanks, and concentrated wastewater flows into a lined lagoon behind the barn, eventually bound for the irrigation systems that water the Nelsons' crops. (Unlike hog manure, this filtered fish waste doesn't pollute—there's much less volume, and the concentrations of nitrates are significantly lower.) And once the company grows bigger, Driver says, it will recycle virtually all the fish excrement into fertilizer.



**VeroBlue President Keith Driver catches a barramundi from one of the Nelsons' tanks.** Photo by Ackerman + Gruber

The Nelsons bought this unique water recirculation system, called Opposing Flows, from an inventor in Maryland named Rick Sheriff, who back in the 1980s designed a [simple, elegant setup](#) [8] that uses air blowers to simultaneously circulate and oxygenate the water. The current also churns up fish poop, creating a self-cleaning tank. Most enclosed aquaculture rigs rely on ozone and pumps to circulate the water. By cutting out those two elements, Sheriff suspects that Opposing Flows uses 8 times less energy and costs 10 times less to run than competing systems. And low overhead is key: The United States' only other land-based barramundi operation, [Australis](#) [9], couldn't compete with cheaper ocean-based barramundi farms in Southeast Asia, so it moved the majority of its production to Vietnam. Grace Nelson calls Opposing Flows the family's "secret sauce."

Driver leads me into a long "grow out" room, which holds two dozen 10,000-gallon tanks painted dark green to mimic the color of a riverbed. Teenage barramundi—11 inches long—cluster under the surface of churning water kept at 82 degrees. Banks of lights put the fish through six sunrises and sunsets each day, a trick to keep them feeding and growing faster. When the lights turn on, they know lunch will drop from plastic containers hanging over the tanks. Pellets made from ground fish meal, chicken byproducts, and wheat are quickly snatched up, helping the barramundi swell from 1.4 ounces to two pounds in mere months, a growth spurt that would take them a year in nature.



**Special lights help the barramundi grow faster.** Photo by Ackerman + Gruber

The surface of the tank froths like a gurgling hot tub, so Driver asks technician Joe Rezek to grab a fish so I can take a closer look. He stands on the wooden platform parallel to the tank, leans over the railing, and scoops out a football-sized barramundi. The fish is nickel-colored, with an underbite and a sharp, webbed dorsal fin that calls to mind prehistoric creatures. In the wild, barramundi eat insects, shrimp, other fish, and, according to the [Australian government](#) [10], even baby crocodiles; they've been tracked traveling upward of 380 miles and can live [20 years](#) [10]. At about five years old, they migrate from rivers to coastal estuaries, shift from male to female, and spawn. The fish in Rezek's hand flops violently before Rezek dunks it into an ice bath, where it disappears under the chalky slurry, a dark splotch that writhes for a moment before stilling.

Mark and Jeff Nelson say aquaculture is what kept their kids down on the farm. Grace, Mark's daughter, had been studying education at Iowa State University, on the road to becoming a teacher, when the fish experiment started to take off. "I was like, 'Oh my gosh, hold up,'" she says. "I could see where this is going, and I was like, 'I can't not be a part of it.'" For Grace and her sister, Kelsey, along with Grace's boyfriend and various in-laws and cousins, the excitement and financial opportunity of a new industry beckoned. And unlike hog farming—which involves handling powerful animals, enduring the stench of toxic manure, and then managing a gruesome slaughter—aquaculture is mostly just waiting for fish to grow. "I felt like I had to shower 14 times before I got that smell off me," Grace says of hog farming. Now, "I can come in here, do chores, go home and freshen up, and go to church."



[11]

[Eat a Sardine, Save a Salmon](#) [11]





VeroBlue is hoping the Nelsons' neighbors will see the appeal of switching from hogs to fish. Already, about 150 local farmers have expressed interest in installing tanks in their barns. And in the fall of 2015, the company bought a 270,000-square-foot warehouse in downtown Webster City for \$2.5 million. The space once housed an Electrolux washing-machine factory that shuttered in 2011, with a loss of [500 jobs](#) [12]. With its "[urban](#) [[13](#)][farm](#), [13]" which opens in January, VeroBlue has promised to introduce 150 new jobs in a town of 8,000 people. The company has started construction on a hatchery, too, so it no longer has to import fry from Australia. Scaling up, says Mark Nelson, will be key to the company's long-term success. Big-name grocers, he says, "don't want to talk to me unless I can produce so many thousands of pounds of fish a week."

That's a tall order, according to Randy Cates, owner of the first offshore fish farm in the United States. Cates believes land-based aquaculture alone will never meet the skyrocketing demand for seafood; he once compared the practice to "growing corn on a barge in the middle of the ocean."

Indeed, one challenge on a landlocked farm is getting enough water to make sea creatures feel at home. The Nelsons' operation uses a whopping 15,000 gallons of water a day. But Driver points out that much of that is reused to irrigate the Nelsons' cornfield. And luckily for the Nelsons, their water source, the Jordan Aquifer, is the state's most productive source of groundwater—despite the fact that farmers and businesses drew 24 billion gallons from the aquifer in 2013, more than a 50 percent increase from the 1970s. VeroBlue's new facility will include a wastewater treatment plant that will recycle up to 90 percent of its water, further minimizing its dependence on the state's groundwater.

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## Barramundi require a third of the feed that salmon do—yet they're just as nutritious.

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In addition to the water concerns, there's also the carbon emissions associated with keeping water flowing within tanks day in and day out.

Steven Gaines, the dean of the [Bren School](#) [14] of Environmental Science & Management in California, studies the environmental footprints of food. He estimates that with the current mix of power sources in the United States, land-based fish farms create half the emissions of beef, one of the most carbon-intensive foods on the planet. VeroBlue plans to install solar panels on its new facility eventually, but for now it draws its power from the grid.

Actually, it's likely that VeroBlue's biggest challenge isn't water or any technical problem—it's marketing. Elite chefs like The French Laundry's Thomas Keller and Top Chef's Rick Moonen have begun featuring barramundi on their menus, and meal-kit service Blue Apron [includes it](#) [15] in its dinners. Yet most foodies still consider farmed fish inferior to wild seafood. Aquaculture's poor reputation

stems from a long line of mistakes, says Corey Peet, a former aquaculture program manager at Monterey Bay Aquarium's [Seafood Watch](#) [16]. Southeast Asian farmers clear-cut hundreds of thousands of acres of mangrove swamps [to make way](#) [17] for dirty shrimp farms. Domestic farmed salmon have suffered [frequent outbreaks](#) [18] of disease and sea lice, and their waste often damages the surrounding ecosystem. And farmed salmon are typically fed large amounts of smaller fish like anchovies and herring—whose stocks are also [on the decline](#) [19]. One pound of salmon requires the fish oil wrung from five pounds of these forage fish. The barramundi raised in tightly controlled, indoor environments like the Nelsons' don't need antibiotics or hormones. They require a third of the feed to produce roughly the same quantity of healthy omega-3 fatty acids as some kinds of salmon. And recent innovations in the feed industry have slashed or even eliminated the amount of fish meal required to sustain farmed fish; [Skretting](#) [20], the company that makes the pellets used by VeroBlue, announced in the spring that it had developed a feed without fish meal. Other researchers are looking to nut waste, algae, or insect larvae as a replacement.

Whatever the challenges of farming fish, the fact is that aquaculture may be the oceans' last hope

for survival. "We're now in a situation where doctors and nutritionists are asking us to double our seafood consumption," says Michael Rubino, director of aquaculture at NOAA, referring to the recommendation by the [US Dietary Guidelines](#) [21] that people increase their seafood consumption to twice a week. "Where is all that seafood going to come from?" Rubino says. "So far, the choice we've made is to go elsewhere, rather than figuring it out at home." By pioneering the mass production of barramundi in the United States,



**The Nelsons' barramundi live in tanks meant to mimic a riverbed** Photo by Ackerman + Gruber

VeroBlue hopes to play a role in easing that strain, though Gaines points out that it's going to take a lot more than just VeroBlue to produce enough sustainable seafood to satisfy our ever-growing appetite. Land-based fish farms in the United States produce only a fraction of 1 percent of the 7 billion pounds of fish we'd need if every American ate as much fish as the government guidelines recommend.

On my last day at the farm, Driver hosts three potential investors for a lunch of barramundi, as well as trout and salmon, which the company also hopes to raise and sell. One man, an Australian who grew up eating barramundi, inhales three cornmeal-encrusted chunks and admonishes his colleagues for not consuming the oil-rich skin. After plates sit empty for several minutes, awaiting the salmon and trout courses, Driver grows impatient.

He enters the kitchen and discovers the problem—Rezek is struggling to carve a piece of coral-colored trout.

"Where's the salmon?" Driver asks.

"We butchered it trying to fillet it," Rezek says sheepishly.

We are, after all, 1,000 miles from the Atlantic and 1,500 miles from the Pacific. But if the rest of my visit is any indication, it likely won't take long before Iowa farmhands master the art of the fish fillet.

*This article has been revised.*



[22]

[Economies of Scale: Smart Ideas to Fight Fish Fraud](#) [22]

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**Links:**

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- [3] <http://www.fao.org/3/a-i3720e.pdf>
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- [6] <http://environment.nationalgeographic.com/environment/freshwater/embedded-water/>
- [7] [http://www.bls.gov/regions/mid-atlantic/data/AverageRetailFoodAndEnergyPrices\\_USandMidwest\\_Table.htm](http://www.bls.gov/regions/mid-atlantic/data/AverageRetailFoodAndEnergyPrices_USandMidwest_Table.htm)
- [8] <https://www.undercurrentnews.com/2015/01/30/seafood-entrepreneur-beyond-barramundi-in-americas-midwest/>
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- [11] <http://www.motherjones.com/tom-philpott/2011/11/sardines-salmon-fish-farms>

- [12] <http://www.npr.org/2013/04/08/176596732/iowa-town-braces-for-new-reality-in-factory-closures-wake>
- [13] <https://www.undercurrentnews.com/2016/03/04/iowa-barramundi-farmer-begins-major-expansion/>
- [14] <http://www.esm.ucsb.edu/>
- [15] <https://www.blueapron.com/recipes/seared-barramundi-with-collard-greens-fregola-sarda-shallot-agrodolce>
- [16] <https://www.seafoodwatch.org/>
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