

An underwater photograph showing a fishing net filled with various fish, including what appear to be Atlantic cod. The net is dark and tangled, with fish of different sizes and colors (silvery, brown, and white) caught within it. The water is a deep blue-green color. The text 'full nets, empty' is overlaid on the top half of the image. 'full nets,' is in a large, bold, black serif font, and 'empty' is in a large, bold, white sans-serif font with a light blue gradient and a drop shadow.

# full nets, empty

Bottom trawling  
entraps endangered  
Atlantic cod in  
the Gulf of Maine.  
In contrast, Pacific  
cod are thriving  
in Alaska.





# Oceans

**Dietitians say most of us need to eat more seafood. Marine biologists say voracious overfishing harms our health, destroys our oceans and threatens the very air we breathe. A SELF editor goes all the way to Alaska to end her fish confusion—and yours.** By Sara Austin

**t**wo days shy of the summer solstice, Balboa Bay gleams in endless variations of silver and gray. The oyster-colored water laps against the rocks of Korovin Island, about 5 miles off the Alaska Peninsula, the state's westward-stretching tail. The land looks barren from a distance, but as the fishing vessel *Alaska Dawn* pulls into a cove, I spot emerald moss and waterfalls as high as the buildings I left behind in New York City.

"We get to see this every day—and see it with our family," says Melanie Rotter, gesturing to the view from the wheel room of the boat she helms with her husband, John. "We've seen whales swim right up to the side of the boat. We know we are blessed." Rotter was seven months pregnant the first time she went out on this boat, and she's spent every summer since on the water, her seven sons and stepsons joining the crew as each one turned 12.

Nearby, sea hawks circle and dive. "That means the fish are here," Rotter says as we maneuver toward a smaller three-man boat. These fishermen are "setnetting"—they've sunk a long, rectangular wall of mesh in the water, snagging fish by the gills as they swim through. They've hauled in hundreds of wild salmon: the giant kings sold at high-end restaurants, deep-red sockeye beloved by foodies, and runty pinks and chum destined for cheaper outlets. Although aiming for salmon, they've also brought up Pacific cod, brown-spotted, fat and wriggling on the floor of the boat. The



*Alaska Dawn* is what's known as a tender vessel, because she collects catches throughout the day from boats like this three-person craft and delivers them to the processing plant in nearby Sand Point.



**FROM THE WATER** Snagged in below-water nets, fish get scooped up by this tiny boat on Alaska's Balboa Bay.



**TO THE DECK** A tender boat collects the fish; the salmon are sold and the cod thrown back.

The Rotters will bring the salmon to the docks. But the cod have a different fate: After setting aside a few in a cooler for dinner, the Rotters will throw the rest into the sea, dead. Although the family has a license to catch salmon, their boat isn't licensed for cod. Under Alaska's sustainable-fishing rules—some of the strictest in the world—boats are not allowed to sell both of these precious species. It's heartbreaking to discard a bunch of fish no one will eat, but the alternative is worse: If fishermen could sell anything, they would have incentive to catch everything, and fish would disappear. The theory is that only unbreakable rules like these can prevent the overfishing that has brought the ocean elsewhere to the brink of an eco-catastrophe.

What would happen if fishermen were free to grab up whatever they liked, whenever they liked? We don't have to speculate: With 4.3 million vessels worldwide netting 90 million tons of catch each year, the numbers of large fish—including cod, flounder, swordfish and tuna—have dropped by 90 percent in the past five decades. And if practices don't change, up to 90 percent of *all the fish in the ocean* could be gone by 2048, a study by 14 leading marine biologists in the journal *Science* reported in 2006.

Already on some reefs, "there are literally no fish in sight," says Stephen Palumbi, Ph.D., coauthor of the *Science* study and professor of biology at Stanford University. Off the coast of the Philippines, for example, fishermen in dugout canoes scrounge for fish the size of a 50-cent piece to have for dinner. "And those areas exist all over the world," Palumbi says, "where people rely on fish for their existence and the water is stripped bare."

Even if you're not a seafood fan, you have reason to worry. Fish are more than food, Palumbi explains; they are a key player in the delicate marine ecosystem. "When you rip out one part of the ecosystem, there is a cascade of ripple effects, and that is what destabilizes the oceans," he says. If you kill too many fish, for example, you may end up awash in algae, which fish eat, or you could throw off the natural mix of pathogens in the water.

On both U.S. coasts, bacteria-laden water has forced beach closures. Towns in Florida and Texas have been beset by a neurotoxic red algae that scalds human lungs, sending residents fleeing when it washes ashore. In the Bering Sea, East China Sea and Gulf of Mexico, swarms of jellyfish have appeared, possibly because they no longer have to compete with other fish for food, which is in part due to overharvesting, says Monty Graham, Ph.D., senior marine scientist for the Dauphin Island Sea Lab in Alabama.

Because healthy ecosystems have healthy repair mechanisms, robust fish stocks can help the ocean defend itself—from natural disasters, oil spills, even the worst of global warming. (Man-made carbon pollution makes oceans more acidic, but some fish excrete a carbonate that may offset this effect.) "Affecting the ecosystem's resilience could have very large consequences, especially given how much the oceans control our climate and that they provide us with well over 50 percent of the oxygen we breathe," says Sheila Bowman, senior outreach manager for Monterey Bay Aquarium Seafood Watch in Monterey, California.

Despite the stakes, the fishing industry is emptying our oceans. Governments the world over subsidize commercial-fishing operators to the tune of \$29 billion, even in areas where there is virtually nothing left to catch. And as wild fish vanish, the industry turns to fish farms that in some cases pollute water, contaminate food with chemicals and give seafood huge doses of antibiotics, perhaps increasing the odds that you'll be exposed to a drug-resistant superbug.

Just as Americans are urged to eat more fish—8 or more ounces per week, according to USDA guidelines released this year—overfishing has emerged as the next great environmental crisis. But what can one health-conscious, green-loving person do about it? I went 4,000 miles, boarding biplane and boat, to find out.

**In Sand Point**, population 976, rows of ramshackle houses, painted bright blue, green and purple and topped with corrugated metal, ring the hills above the port and processing plant. Everyone seems to have multiple jobs: The owner of the coffee shop can sell you a cell phone plan in a pinch and also inspects salmon down at the plant. I'm here at the invitation of the Alaska

## eat fish! (without the guilt)

**You buy grass-fed beef, organic chicken and cage-free eggs. Now do your part for the oceans with these tips from Sheila Bowman of SeafoodWatch.org.**

**Ask the experts.** Project FishMap, an app for iPhone and Android, helps you find restaurants and markets with sustainable fish. There, seek advice from your waiter or the fish-counter staff.

**Carry a cheat sheet.** Build your own knowledge with pocket guides from SeafoodWatch.org or BlueOcean.org that name the most sustainable, least contaminated fish, including sushi.

**Downsize.** Make an effort to eat fewer big fish and more tasty but tiny mussels, anchovies (add them to tomato sauce) and sardines (grill with a coat of olive oil).



**Look at labels.** Check packaging for watchdog ratings or the blue label of the Marine Stewardship Council. You'll find it at Whole Foods, Target, Wal-Mart and other major grocers.

**Supplement smartly.** Fish oil pills might be made from shark and other species that are contaminated or overfished. Try flax oil or seek out pills made from sustainable fish such as wild salmon. Consult EDF.org for a guide to brands with the fewest contaminants.

**Embrace variety.** Remember, there are not unlimited fish in the sea. You can get health-helping omega-3 fatty acids from many foods, including nuts, greens, flax and fortified eggs.



**THEN TO YOU** Packaged at the dockside plant, the fillets sell at high-end grocery stores.

Seafood Marketing Institute, a public-private partnership between the state and its seafood industry.

Halfway up the hill is a small white cottage with a falling-down sign: ALASKA SH AND GAME. Inside, I meet Aaron Poetter, area management biologist for the Alaska Department of Fish and Game. Poetter's job is to count not only what fish are caught but also those that get away. On a dry-erase board, he keeps daily counts of "escapement"—salmon that have eluded fishermen's nets and, after years at sea, made it back to the place they were spawned.

Despite its modest quarters, the department uses state-of-the-art technology to count returning fish, including aerial surveys, genetic studies and a fish weir, a checkpoint that traps and delays salmon so monitors can count them as they pass through. Only if escapement goals are being met does Poetter give the green light to fishermen to drop their nets. He makes the call—and more than once, an angry fisherman has stormed through his door with fists raised, ready to argue it.

Seven state, federal and international agencies regulate and enforce rules designed to keep fish stocks from collapsing in Alaska as they have elsewhere in the world. Authorities strictly limit licenses to fish salmon; in Sand Point, families have passed down these precious papers for generations. Boats may be only a certain size, so they can't haul in too many fish at once, and gear must be designed to limit catches. Some gear is outright banned in waters the state controls. Fisherman can't use bottom trawlers, which are huge, heavily weighted nets that scrape and destroy the ocean floor like a bulldozer; or longlines—up to 50 miles or more of baited hooks that indiscriminately kill seabirds, turtles, dolphins and whales.

On the *Alaska Dawn*, some of the choicest sockeye are set aside for a nonprofit effort to promote sustainable fishing in the area. Sold under the label Aleutia, these fish get special handling: The crew puts them on ice right away, helping the fish taste fresh and extending shelf life by up to three days. At the dock, fish are handled one by one rather than roughly tossed, and inspectors give them an extra once-over at the processing plant to make sure they aren't bruised or missing scales. The fillets will be sold at high-end retailers such as Whole Foods and Town & Country Markets, as well as by mail order at AleutiaSeafood.org. Aleutia puts all the profits back into the community to support programs that protect coastal resources.

Not every corner of the Alaskan fishing industry is so idyllic. At a different processing plant, I saw giant tanks of dead

# what to order tonight?

These fish are endangered: If you love them, swap them for these equally tasty alternatives. You'll give your favorite fish a chance to rebuild its numbers in the wild.

## 10 FISH TO THROW BACK

## 10 TO TRY INSTEAD

**Japanese yellowtail** Japanese farms put yellowtail, aka amberjack, in polluting net cages and use wild fish as feed.

**U.S. yellowtail snapper** It's caught with eco-friendly hook-and-line gear in the South Atlantic.



**Imported shrimp** Farms use antibiotics and other chemicals; harmful bottom trawling nabs wild shrimp.

**U.S.-farmed shrimp** Thanks to strong environmental laws, homegrown shrimp cause less pollution.

**Chilean sea bass** (aka Patagonian toothfish) It's threatened by illegal fishing.

**Alaskan sablefish** (aka black cod) It has a buttery texture akin to sea bass.

**Atlantic bluefin tuna** A monster of the sea, it has been overfished nearly to extinction.



**Wahoo** A relative of tuna and mackerel, this game fish may grow fast enough to withstand fishing pressure. Eat sparingly due to mercury.

**Albacore tuna** (sometimes called white tuna on cans) Most is caught with longlines, which can kill sea mammals.

**"Pole and troll" tuna** Look for these words, indicating friendlier fishing methods, on menus or can labels.

**Atlantic salmon** Endangered in the wild; most varieties are farmed, producing fish with many more contaminants.

**Alaskan wild salmon** It is hailed as one of the world's best-managed fish.

**Atlantic cod** This cod is overfished, and U.S. and Canadian fishermen catch it mainly by using destructive bottom trawling.

**Pacific cod** It is caught in Alaskan waters using gear certified by the Marine Stewardship Council.

**Eel** Sorry, sushi lovers: Most freshwater eel comes from farms that pollute and harm wild eels.



**American lobster** It's a similarly rich treat, and there's a glut, so prices are dropping.

**Red grouper** Although populations are healthy in the Gulf of Mexico, they're depleted in the Atlantic off the southern United States.

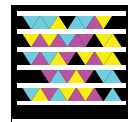
**U.S.-farmed barramundi** It's raised in recirculating inland tanks, which prevents escape and pollution.



**Orange roughy** It's caught by trawlers that destroy the ocean floor.

**U.S.-farmed tilapia** This fish is also raised in environmentally sound tanks. (Chinese tilapia is not; avoid it.)

Sources: Blue Ocean Institute in Cold Spring Harbor, New York; Environmental Defense Fund in New York City; Monterey Bay Aquarium Seafood Watch in Monterey, California



### HOOK YOUR SMART FISH SHOPPING LIST

Not sure which fish you can feel free to eat? We'll help you navigate. Snap the icon at left with your smartphone and you'll get our top (er, bottom) 10 list and the sustainable alternatives for easy reference at the market or table.

Get the free app for your phone at <http://gettag.mobi>.

pollack sitting in refrigerated seawater for days. These would later be smashed into fish stick bits or, in the case of the worst-quality fish, turned into surimi (imitation crab) by a decidedly inorganic process that resembled running the pollack through an industrial washing machine. But although the process is not always pretty, Alaskans' efforts to protect their fish seem to work on the whole, confirms Daniel Pauly, Dr.rer.nat., professor of fisheries and zoology at the University of British Columbia Fisheries Centre in Vancouver.

"Alaska is lauded for good reasons as an example of proper management, but there are very few places where this is true," says Pauly, who is also principal investigator of the Sea Around Us Project, funded by the Pew (continued on page 162)

## Full nets, empty oceans

(continued from page 161) Charitable Trusts. “Furthermore, the United States imports an immense quantity of seafood from countries that don’t have any management of resources.” Nearly 85 percent of fish eaten by Americans is imported from places like China, Ecuador and Indonesia, which flout fishing limits and use destructive methods such as bottom trawling. Americans gorge on imports—including shrimp, eel and many kinds of tuna—that are endangered species in the wild. An all-you-can-eat seafood menu is as much of a horror to Pauly as serving up panda paws.

**Salmon is a case in point.** The vast majority eaten in the United States is not caught by people like the Rotters; Atlantic salmon, as opposed to the Pacific salmon caught in Alaska, has been so decimated in the wild that if you eat it, it surely came from a farm in British Columbia or Norway. These facilities raise fish from eggs in open-net cages, pens set up in the ocean that crowd in up to a million fish.

Farming, or aquaculture, would in theory seem a way to protect ocean life. But that’s not how it works in practice. In close quarters, the fish often become infested with bacteria and parasitic sea lice. And when farmed salmon escape, as they frequently do, their infections can spread to wild fish, a 2007 *Science* study found.

Many fish and shrimp farms, especially in the developing world, combat the buildup of pathogens in fish with huge doses of antibiotics, leading the bacteria to develop resistance to the drugs. And because seawater and sediment are a soup of germs—fish, animal and human—fish pathogens may be transferring this antibiotic resistance to the germs that attack humans, including *E. coli* and salmonella, says Felipe C. Cabello, M.D., professor of microbiology and immunology at New York Medical College in Valhalla, who reviewed the threat in *Environmental Microbiology*. “Heavy antibiotic use in aquaculture needs to be reduced drastically and replaced with improved sanitation,” he says.

Compared with wild salmon, farmed salmon also contain more than five times the wallop of chemicals such as PCBs, dioxins and the flame retardants known as PBDEs—all industrial pollutants that elevate your risk for cancer, according to a series of studies led by Ronald Hites,

Ph.D., distinguished professor at the School of Public and Environmental Affairs at Indiana University in Bloomington. The problem comes from what farmed fish eat: In the wild, young salmon munch mostly on krill; because these shrimp-like creatures are tiny, they contain few industrial pollutants. Farmed salmon eat pellets made from fish further up the food chain that have more PCBs and other chemicals. (Wild salmon also get their red color from krill; farmed salmon are naturally off-white and get theirs from the chemical additives canthaxanthin and astaxanthin. Yum?)

I’m tempted to decide that no farmed fish will cross my lips. But of course, the issue is complicated. Salmon farmers stand by the safety and healthfulness of their product and practices. “Farmed fish can be terrific or dreadful depending on the conditions under which they are raised and what they are fed,” says Marion Nestle, Ph.D., Paulette Goddard professor in the department of nutrition, food studies and public health at New York University. U.S.-farmed tilapia and arctic char, for example, do not use the net-cage method and are eco-friendly and low in contaminants. Yet Chinese-farmed tilapia earns an “avoid” rating from Seafood Watch. As for salmon, Nestle says, “If you don’t know where it comes from, eat other fish.”

**But which other fish?** The choices are overwhelming and the labeling inconsistent and even outright fraudulent. “The fish sections of supermarkets are the Wild West, where anything goes,” Nestle says. “Most consumers haven’t got a clue about telling one fish from another, and sellers take full advantage. This is one place where you need to find a seller you trust.” To start: Seafood Watch recently introduced Project FishMap, an app for iPhone and Android that allows you to search among (and add to) a million restaurants and markets where users have located sustainable seafood.

Even at these spots, don’t be shy about asking where your meal came from (U.S. product is often a better choice than imported) and how it was caught (ask for ocean-friendly methods like “troll and pole,” versus bottom trawling or longlines). Seek out local seafood at your farmers’ market, where you may be able to quiz the fisherman himself. And you can go

to SeafoodWatch.org or BlueOcean.org to download or order apps and pocket guides that help you choose sustainable fish, including what to order at the sushi bar.

But meaningful change might come only when we persuade companies to care about the provenance of the fish they sell. “What really works is shaming the big wholesalers,” Pauly says. “Then those companies influence the producers.” In part because of pressure from activists and customers, markets (including Whole Foods, Target and Wal-Mart) now label seafood according to recommendations from watchdog groups, or they feature the blue label of the Marine Stewardship Council, an independent certifier of sustainable wild fish. The council has its critics, including the Pew Charitable Trusts, which argues that the group has certified questionable fisheries, including Alaskan pollack. But the MSC says fish don’t get its approval without broad scientific consensus from 200 experts over the course of two years of study. Its system isn’t perfect, it seems, but it’s also not nothing.

When in doubt, Bowman says, eat lower on the food chain—which is usually a healthier practice anyway due to lower contaminant levels. That means fewer predators such as tuna, swordfish, salmon and eel and more small guys like sardines, anchovies and mussels. When the big fish bounce back, it can be a tipping point that restores the entire ecosystem. “The ocean is still a productive place, and we get a huge amount of food out of it,” Palumbi says. “If you protect it even the tiniest little bit—if everyone makes choices that are a little smarter—you get incredible returns on your investment. It blooms with productivity and life.”

It’s impossible to make the ideal choice every time. But we can try to make *better* choices. I learned in Sand Point that I can’t claim to love fish unless I also respect them, in part by supporting people who feel the same. On my last night, the fish I’d seen on the decks of the *Alaska Dawn* were grilled and served at a banquet that drew perhaps half the town. I devoured the meal as I sat with a tableful of women who talked about the thousands of fish they’d caught and cooked out on the water. “Everything amazing we see out here,” Melanie Rotter had told me on her boat, “I don’t take it for granted.” None of us should. ■