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We're killing the oceans. Is it too late to save the seas that sustain us?

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International Desk

I meet world-renowned undersea photojournalist Brian Skerry at Legal Seafoods, across from the New England Aquarium, where he's the explorer in residence.

He orders a chicken Caesar salad.

"I refrain from eating much seafood due to environmental concerns," he explains, before launching into a depressing litany of problems facing the world's marine ecosystems.

"I have to remain optimistic, because I do believe there's always hope," says Skerry, who spends more than half of every year underwater, diving with harp seals in the Gulf of Saint Lawrence and green sea turtles in Kiribati. "That said, it's very discouraging what I'm seeing."

What he's seeing are oceans in crisis, their health potentially at a tipping point: gratuitously destructive overfishing, endangered underwater "big game" (100 million sharks killed each year), dying coral reefs, and subtle but potentially catastrophic shifts that are almost certainly due to climate change.

Once upon a time, North Atlantic right whales were so plentiful that, as one Pilgrim wrote in his log book, "a man could almost walk across Cape Cod Bay upon their backs." It wasn't too long ago, either, that Atlantic cod teemed so thick in Boston Harbor one could simply toss a net into the water and pull up a writhing, silvery haul.

Today, there are barely 400 North Atlantic right whales left on the planet. Ocean scientists say that Atlantic cod has been fished down to the last 10 percent of its population, and that those stocks may never be restored. Much of that degradation has taken place in only 50 years or so, since the advent of mechanized fishing.

But it's not just ruthless whaling and foolhardy fishing practices that are plaguing the world's oceans. Underwater, things are bad all over — from the acidifying Atlantic to the Great Pacific Garbage Patch. A perfect storm of climate change, pollution, and rapacious global fishing practices has the potential to gravely imperil Earth's oceans and their intricate, highly sensitive ecosystems.

In Daniel Pauly's September *New Republic* cover story — title: "Aquacalypse Now"— the author, leader of the Sea Around Us Project at the University of British Columbia, reports that, in just the past half century, humans have "reduced the populations of large commercial fish . . . by a staggering 90 percent." He contends, consequently, that "eating a tuna roll at a sushi restaurant should be considered no more environmentally benign than driving a Hummer or harpooning a manatee."

The recent documentary *End of the Line*, meanwhile, delivers an alarming ultimatum: change the way we fish or the seas will be barren of seafood by 2048 — their empty waters patrolled only by the ghostly forms of ectoplasmic jellyfish.

That dire vision has been vehemently disputed. But there's little doubt that the seas have seen better days. What to do about it, however — especially in New England, the economy and culture of which have for centuries been inextricably tied to the water — is a complex and contentious issue. Different fisheries have different needs, prognoses, and environmental and economic prerogatives that must be balanced — a process made more difficult by extremists and pragmatists on both sides.

In the meantime, these issues are playing out in the midst of a severe recession, which has raised tensions in the fishing community. Earlier this summer, a lobsterman was charged with elevated aggravated assault after shooting a man in the neck following a territorial dispute on the remote Maine island of Matinicus. This past month, a couple hundred

fishermen gathered in front of the National Marine Fisheries Service in Gloucester to protest a planned revision of regulatory rules; one worried angler held aloft an effigy of National Oceanic and Atmospheric Administration (NOAA) head Jane Lubchenco lynching a fisherman.

Against this backdrop of environmental doomsaying and economic calamity, the Obama administration is trying to wade its way through not just tricky fisheries-management concerns, but every other issue affecting America's waters — offshore wind energy and oil exploration, tidal power, shipping lanes, coastal erosion, aquaculture — as it works to enact a comprehensive new ecosystem-based Ocean Policy Task Force.

On the international front, the hugely anticipated United Nations Climate Change Conference in Copenhagen next month— even as pessimistic officials seek to tamp down expectations of any binding treaty — will make ocean protection a key component of discussions. There's also the question of whether the United States will finally sign on to the long-standing United Nations Convention on the Law of the Sea, which would commit us to international standards for stewarding the ocean's natural resources.

But with so many other big issues competing for people's attention, where does the ocean rank on the political hierarchy? And is it too late to hone sensible, science-based policies that will balance environmental and economic concerns to preserve these vast waters for generations to come? Or will we have killed the oceans by then?

Lions and tigers of the sea

Skerry, an Uxbridge native who shoots primarily for National Geographic, doesn't enjoy being the bearer of bad news. Still, there's no getting around it: "I've seen a lot of degradation in the ocean over my 32-year diving career."

Things are worse now, he says, than he's ever seen them. Just a couple weeks ago, for instance, Skerry returned from an assignment in Mexico. "The reefs were anemic. They were highly overfished. They consisted of a lot of dead coral, from warming and bleaching. They'd also sustained heavy hurricane damage" — frequent and severe hurricanes being harbingers of climate change — "and because they're stressed already, they don't have the ability to be resilient and rebound."

New England isn't doing too well, either, he says. "I remember in the late '70s and early '80s, I'd dive off of Rockport or Gloucester and ... see these huge schools of herring and pollock. You don't see that today. You just don't see it."

Skerry recognizes the Herculean efforts being made by the American fishing industry to comport with this country's stringent stock-rebuilding rules. But he's dismayed by some of the excessive and destructive fishing practices he's seen across the world. Among the worst, he notes, are those for catching shrimp.

"You take a net, and you scrape it along the bottom to catch shrimp. In the process, everything else — all the little stuff that lives on the bottom, the sponges and the coral and all the habitat for baby animals — you wipe all that out. To catch one pound of shrimp, we might kill 12 pounds of other animals that get thrown back into the sea [dead] as by-catch.

"If we did that on land — to catch a single deer you go through the forest and kill all the raccoons and squirrels and skunks and everything that lives there — people would be outraged. Yet you can do it in the ocean and nobody cares."

The issue, says Skerry, "that people have never really wrapped their heads around, is that seafood is wildlife. There are animals like giant bluefin tuna that used to be very plentiful here in New England. These are animals that have no terrestrial counterpart: they continue to grow their entire life. If we weren't so good at catching them, there would be 30-year-old bluefin that weigh a ton."

Instead, "we're way too good at catching them. So their stocks have plummeted over 90 percent [globally] in just the last 30 years. They're on the verge of extinction. These are animals that cavemen painted on their walls, that Plato wrote about, wondering about their travels through the Earth's oceans. Yet we're wiping them out. We would never be allowed to kill all the lions and tigers and grizzly bears."

Globally, locally

Bluefin are in trouble all over the world, most notably in the European Union, but here in the northwestern Atlantic, too, where the Gulf of Maine bluefin has declined markedly in both quantity and condition. Luckily, there are a few success

stories to offset those losses.

Often called "New England's own ocean," the Gulf of Maine is "widely regarded as being one of the 10 or 12 most productive marine ecosystems in the world," says John Annala, chief scientific officer at Portland's Gulf of Maine Research Institute (GMRI). "Because of the currents, the freshwater runoff, and relatively high nutrient loading, because the contrast in the water temperature is so great between winter and summer, then we get these really good phytoplankton blooms in the spring and the autumn that really drive the productivity."

Commercial fleets started taking full advantage of that fecundity in the mid-20th century, with advanced automated trawlers, radar, sonar, and GPS fish finders. Moreover, the waters were open to all comers. "When foreign boats were allowed to fish in US waters, through about 1976," says Annala, "... a number [of stocks] were severely depleted."

As such, the industry has been struggling in recent years to come to grips with a problem that festered for too long—severely curtailing fishing quotas and limiting time at sea in order to help replenish those decimated species.

Some have been rebuilt, says Annala. "Hake, monkfish, mackerel, herring, bluefish. There have been quite a few success stories." That said, "some of the slower-growing species are not scheduled to be rebuilt until 2025 or sometimes as late as 2050."

Those include halibut, redfish, and some of the longer-lived flounder species. Meanwhile, says Annala, Gulf of Maine cod stock is "on the road to recovery," yet still not scheduled to be rebuilt until 2015 or so, 10 years ahead of when cod stocks in Georges Bank (the undersea shelf running from Cape Cod to Nova Scotia) are hoped to reach sustainable levels.

In the interim, that means agita for New England fishermen, forced to pay for the sins of the past.

In his *New Republic* story, Pauly describes a global "fishing-industrial complex" of corporate-owned fleets and lobbyists, "hiding behind the romantic image of the small-scale, independent fisherman." For the past half-century, he argues, these fleets have relentlessly scoured the seas.

"As the bounty of coastal waters dropped, fisheries moved further offshore, to deeper waters," he writes. "And, finally, as the larger fish began to disappear, boats began to catch fish that were smaller and uglier — fish never before considered fit for human consumption. Many were renamed so that they could be marketed: the suspicious slimehead became the delicious orange roughy, while the worrisome Patagonian toothfish became the wholesome Chilean seabass."

(A recent *Mother Jones* article had a particularly piquant description of a run-in with another of those renamed species: one couple dined upon "escolar" — actually a type of bottom-feeding snake mackerel — and not long after their meal found themselves frantically googling "anal seepage.")

Pauly singles out these huge fishing fleets, from "vertically integrated conglomerates, such as Taiyo or the better-known Mitsubishi" in Japan, as the prime culprits in the decimation of the world's fish populations.

But, says Bob Vanasse, executive director of the Project to Save Seafood and Ocean Resources, if the oceans are indeed plied by "floating factor[ies] with underpaid workers who use technology that was developed to fight wars, high technology that is deployed in a war-like fashion against fish" (as Pauly described commercial boats to NPR's Terry Gross), "I don't think they're in New Bedford."

While there are corporate-owned vessels operating in the Gulf of Maine and Georges Bank — especially out of southern New England — Annala says the region's fleet is comprised primarily of "very small companies that might own one or two boats, where the owner is either an active fisherman or an ex-fisherman."

Yet even as America struggles to manage its depleted stocks — and those independent fishermen are subjected to ever more draconian regulations — corporate overfishing continues at alarming rates in places such as the European Union and Asia, with governments showing little inclination to rein it in.

Perversely, at the same time, "we're importing 80 percent of our fish," says Vanasse. "We're being extremely cautious and conservative in what we allow our fishermen to take out of the water, but then we supplement our consumption

from countries that are known to be non-compliant. How is that a good thing?"

Rules of the game

New England fishermen are feeling the effects of this severe recession from all sides. "I'm ready to lose my home," one man said at that Gloucester protest, according to the Gloucester Daily Times. "I'm ready to lose everything."

The gathering was convened to express displeasure with some significant new changes under consideration: a new regulation scheme that's supported by groups like the Environmental Defense Fund, but opposed by many fishermen nervous about the potential impact on their livelihood.

The National Marine Fisheries Service, the NOAA division charged with stewarding sustainable fisheries, has indicated plans to move to a "catch shares" system, starting on May 1, in an effort to counter falling fish stocks.

Under these new rules, boats could elect to join so-called sectors, with each vessel allotted a quota of fish — based on their past catches — but with the stipulation that the sector can't surpass its combined quota, lest it be shut down. Boats aren't required to sign on to the system, however those that don't can plan on being allowed far fewer days at sea than they're already afforded (just 39 in most cases).

Supporters say they're the last best hope to forestall severe depletion — and keep the industry afloat, arguing that they'll encourage conservation, since the more that fish populations rebound, the more everyone will eventually get to catch.

Patricia Fiorelli, public-affairs officer with the New England Fishery Management Council (NEFMC), hopes the system will "be able to improve the likelihood that fishermen will survive while we're in a stock-rebuilding mode."

Glen Libby, a groundfisherman based out of Port Clyde, Maine, who's also chairman of the Midcoast Fishermen's Cooperative and a member of the NEFMC, argues that the catch-shares system will provide for sustainability and, hopefully, profitability.

"We've never had the ability to do our own processing and marketing and things like that," he says of his work for the Port Clyde Fresh Catch, Maine's first community-supported fishery. "If we could just build our market up enough, then we could be in pretty good shape."

"It's a new thing," he concedes. "People are usually nervous when there's something new coming along. But they weren't really satisfied with what we had before, either, so I don't know if this will be better or worse, but something had to be done."

Skeptics of catch shares fear the new rules will ultimately lead — as US Representative Barney Frank wrote recently in a letter to Lubchenco — to the "real threat of significant consolidation," putting many fishermen out of work as corporations swoop in to reap the spoils.

"The problem," says Brian Rothschild, professor of Marine Science at UMass Dartmouth, is that "some people will be limited out. Experience has shown that catch shares reduce the fleet, they reduce the number of fishermen, and the people who have been forced out have nowhere to go. The other side of it is those that are limited in, they can stand to make tremendous profits."

But for Libby, the sector system is "the best out of a lot of bad options. We have to meet the catch levels that are laid out by the law. A lot of guys wish it could go back to the way it was. But it just can't. We're not seeing a lot of fish up here — they're just not there."

Change and hope

Meanwhile, for all the hard work that's being done to remedy overfishing, it's climate change that could prove to be even more of an existential threat to the world's oceans.

"It's bordering on crisis," Rhode Island senator Sheldon Whitehouse tells the Phoenix. "You can look to the Arctic north and find the traditional sea ice melting away. You can look to the tropical south and see coral dying by the acre. You can

look to the temperate areas in between and see fisheries that have lasted for centuries in dire distress."

Whitehouse is one of the rare politicians who knows the meaning of the word "pelagic." (If you're wondering, it's "of or pertaining to the open seas.") And unlike most of his colleagues, Whitehouse speaks from experience. He's a long-time diver, and his wife is a marine scientist. That's afforded him a first-hand look at some worrisome changes in the region's waters.

"Not too long ago," he explains, "my wife and I were diving in Narragansett Bay for her experiments on winter flounder." (Winter flounder was long the dominant fishery there, but in recent decades the waters have gotten warmer.) "I think it's four degrees warmer, mean winter temperature, than it was 20 or 30 years ago, and the result has been that the winter flounder population has crashed. Now fishermen are catching more scup than winter flounder, which is a less desirable and less remunerative harvest for them. So they're seeing a very different bay than their fathers did."

Another potential disaster — "one of the biggest problems that's not yet on other people's radar," says Skerry — is ocean acidification. That's when an excess of carbon dioxide in the atmosphere, soaked up by the ocean, leads to a decrease in the water's pH level, stripping the sea of carbonate ions, which are crucial for calcification.

The result, says Skerry, is that it "wipes out things like coral reefs — anything with a calcium structure, including shellfish and these little mollusks that are consumed by a lot of other animals."

"If you wipe them out, the whole floor of the oceanic food chain collapses," says Whitehouse. "And we don't know what happens after that."

Nor do we want to. "The idea of ocean acidification is fairly new and the science is fairly young," says Annala. "Certainly, it's affecting warm-water areas much more quickly than cold-water areas, like the Gulf of Maine. But its impact on areas of coral reef could be quite staggering."

Could he ever see it adversely affecting local crustaceans, like lobsters and mussels — and potentially impacting the region's shellfish-aquaculture industry? "I think it's a medium- to long-term issue that bears investigation."

Meanwhile, Annala is noticing other changes. "The Gulf of Maine receives a lot of water from the Labrador Current system," he says, "and depending on the strength of the Gulf Stream, varying amounts of this colder Labrador Current water is entrained into the gulf. That's becoming fresher and cooler as the Greenland ice cap melts."

Rothschild says that that "puddle of fresh water" floating atop the briny Atlantic "prevents the typical overturn of nutrients going up and down and recycling to make phytoplankton and zooplankton. If this is a recurring phenomena, it's going to change the productivity of the northwest Atlantic in ways that we don't know yet."

I ask Libby whether, from the stern of his groundfishing boat, he's noticed any strange changes that might be attributed to global warming. "Not being a scientist, I don't know," he jokes. "It's not very hot out there right now."

But he does tell a story with depressing implications. He remembers 30 or so years ago, when Maine's fish cutters went on strike. Consequently, his boat was grounded for about a week. "When we went back out, after just that one week off, some of the worst catches that day were like 10,000 pounds," he says. "Just massive, massive amounts of fish. Just a week off caused that to happen."

These days, he says, "the fleet is just a shadow of what it was, and has been for quite some time. Yet we're still not seeing any real recovery [in stocks]. So I don't know. Maybe there is some other factor involved?"

Watershed moment?

These are difficult issues facing the planet's waters. We're talking about three quarters of the Earth's surface — some corners of which still aren't well-explored. "All of these things are going on in varying degrees in varying places in the world's oceans," says Rothschild, "and they all have a different flavor to them."

And this part of the world, where the ocean is filled with so many species, and worth so much to so many, is especially tricky. "New England is the most difficult area in American fisheries," says Vanasse. "I think most everyone will tell you that."

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Despite all this layered complexity, and the hard realities of climate change and overfishing, Rothschild says he's "optimistic" that a way forward can be found that strikes a sustainable balance between environmental and economic necessities.

Part of what's needed, he says, is a better grasp of climate change, and more finely tuned science "to help us understand why stocks go up and down, either in connection with fishing, which they do sometimes, and independent of fishing, which they do sometimes."

(Some scientists, he adds by way of example, are "coming to believe that the collapse of the northern cod has an important environmental component.")

Annala, too, is hopeful — at least when it comes to the Gulf of Maine. "Federal and state agencies are moving toward a much more holistic, ecosystem-based approach," he says. "This region is likely to be held up as the model area in the US as far as managing marine resources."

The question, then, is whether other parts of the country and the world will follow suit.

Skerry favors sweeping protections that, in truth, probably won't find much support. He's been allowed to photograph marine reserves in New Zealand that are completely off-limits: no commercial or sport fishing, no collecting by scientists. He'd like to see many more like them — perhaps covering 30 percent of the oceans.

Even without drastic protections like those, Skerry says the Obama administration's gestures and rhetoric so far have been encouraging. "They get it," he says. "They understand. But the unfortunate reality is there's so much on their plate right now. People's retirement money is vanished and they're losing their jobs and we're gonna send another 40,000 troops to Afghanistan and there's terrorism . . . where do fish fall on that level of importance?"

As if to illustrate this point, staffers for US representative Ed Markey of Massachusetts and US representative Chellie Pingree of Maine — both of whom are Democrats and were endorsed in 2008 by the environmental group Ocean Champions — expressed their regrets when contacted for this story. It was a cause near and dear to their hearts, the explanations went, but the representatives were just too busy dealing with health care for an interview.

Ultimately, of course, the big push has to come from us. People need to make more informed decisions in the voting booth — and at the fish counter.

"The only way to create political will," says Skerry, "is there has to be an outcry from the grassroots level: 'I want my children to be able to see a bluefin tuna, or to see a codfish.'"

He sees his photographs, as disturbing as some of them are — flensed whales, heaps of dead by-catch — as ways to help to fight for that cause. "Most underwater photographers, historically, have only wanted to make beautiful pictures. I do, too. But I also want to be like a war photographer, and take pictures that are hard to look at — what people need to see."

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