Catch Shares Management

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Catch share systems may be an improvement over traditional fisheries management, but there are problems.

The Alaskan halibut fishery in the early 1990s was an intense, adrenaline-soaked sprint. Fishing was permitted during just a few 24-hour windows. Two thousand boats might race to sea at once, each crew working madly to land a full year's catch in a day. Boats were overloaded with fish, and lives were lost: Nine workers drowned during derby fishing in Alaska during 1991 and 1992. In their hurry, fishers damaged creatures they were not targeting and lost much of their long-line gear, leaving thousands of baited hooks on the seafloor that imperiled halibut and other fish after the season had ended. When the catch was landed, the market was flooded with a year's worth of halibut at once, reducing its value.

Then, in 1995, regulators abruptly ended the race for Alaskan halibut. The season expanded to months instead of days, and the value of the catch rose as fishers landed a steady supply of fresh halibut. Fishing accidents and fatalities dropped sharply. All of this was accomplished using a management system called individual transferable quotas (ITQs), a form of catch shares management under which individual fishers or associations are given rights to a set percentage of the total catch.

This new approach to fisheries management is used increasingly in the United States and around the world. It's clear that catch shares can end the dangerous and wasteful race to fish, but the idea remains controversial. Fishers working in small, mom-and-pop operations fear that catch shares will push them out of business. Proponents depict catch shares as a superpolicy, able to halt overfishing, revitalize coastal communities, and restore depleted fish stocks in a single bound. But critics say nothing is that simple. While catch share systems have important economic benefits, they can also carry real problems, and their biological impacts remain unknown.

A crew member dresses a halibut during an International Pacific Halibut Commission stock assessment survey. The North Pacific halibut fishery is often cited as a catch share success story. The new management approach, implemented in the 1990s, has halted the race for fish. Yet unregulated leasing of quota causes serious problems in the British Columbia fishery. Photograph: Courtesy of the International Pacific Halibut Commission.

Shrinking stocks and property rights

Humanity's boundless appetite for seafood threatens fish stocks around

BioScience 60: 780–785. © 2010 Sharon Levy. ISSN 0006-3568, electronic ISSN 1525-3244. All rights reserved. doi:10.1525/bio.2010.60.10.3

the globe. Historical records show that heavily fished species, such as North Atlantic cod, have become progressively scarcer—and the average size of a caught fish smaller—over the last century. An influential analysis by Boris Worm and colleagues, published in *Science* in 2006, found that about 27 percent of the world's fisheries had collapsed by the year 2003; they projected that the same fate awaits fish populations worldwide unless we change our ways.

Before the move toward catch shares, US regulators tried all sorts of strategies to control fishing pressure, limiting the seasons and days on which fishers could go to sea, the gear that could be used, and the amount of fish that could be caught. Fishers found creative ways to work around such limits: If boats of a certain length were excluded, fishers used wider boats to hold more catch. If managers then limited boat width, fishers installed bigger motors to allow them to make more trips to the fishing grounds faster. The end result of the accelerating race to fish was that both fish populations and fishing profits shrank.

NOAA, the National Oceanic and Atmospheric Administration, is now considering a policy to encourage the implementation of more catch share systems in US fisheries. It's a controversial proposal. Catch shares are such a political hot potato that despite the apparent success in Alaska's halibut fishery, Congress imposed a moratorium on new systems from 1996 to 2002.

The catch shares concept grew from a model published by economist H. Scott Gordon in 1954. Gordon asked "why fishermen are not wealthy, despite the fact that the fishery resources of the sea are the richest and most indestructible available to man." He concluded that the problem was a competitive race for fish that wasted potential profits, one that arose because nobody held property rights to wild fish. Although Gordon's faith in the inexhaustible bounty of the sea now seems quaint, his ideas about the importance of property rights in fisheries are still taken very seriously.

Bering Sea walleye pollock landed in Alaska account for one-third of all US fish harvests. The fishery has been managed under a catch share system since 1999. Photograph: Courtesy of Ed Melvin.

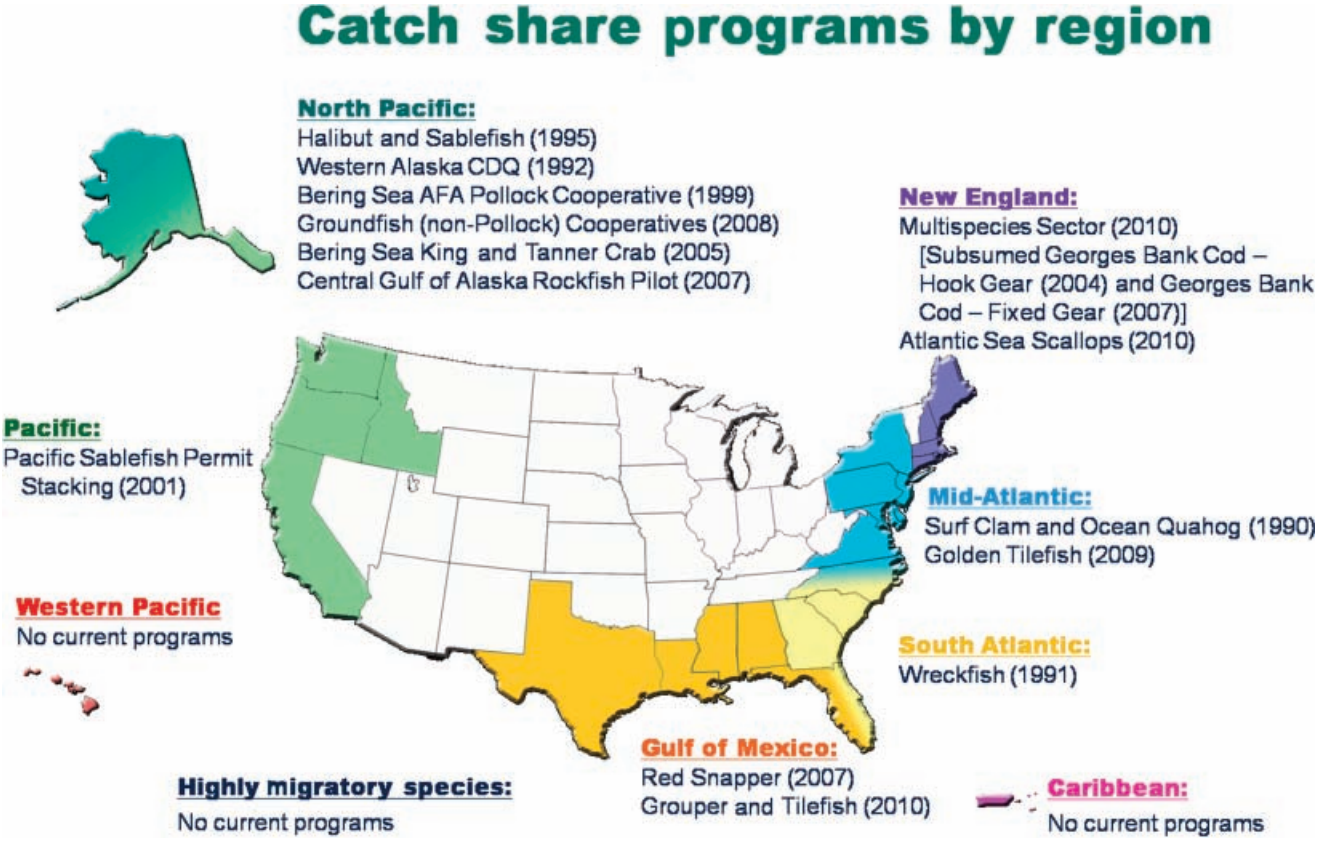
This aspect of catch shares policy is especially controversial. Under federal law, the fish swimming in US waters belong to the public and cannot be owned by any individual until they are caught. Critics argue that existing catch share programs have nonetheless given away permanent rights to wild fish.

Proponents claim that holding a long-term share of the quota gives fishers a powerful incentive to conserve the resource. The idea is that fishers are more willing to accept short-term limits on catch—needed to allow depleted stocks to recover—if they know they will be the ones to benefit in the future. The nonprofit Environmental Defense Fund, which has long lobbied for catch share programs, refers to such systems as "incentive-based management." Donald Leal, of the Property and Environment Research Center, writes that "without private property rights to fish stocks, fishermen have little incentive to conserve.... The good news is that solutions, based on free market principles, exist."

There is anecdotal evidence of quota holders responding as the property-rights hypothesis predicts they will. Participants in fisheries for New Zealand rock lobster, Canadian sablefish, and Tasmanian abalone lobbied regulators for a decrease in total allowable catch (TAC) at times when wild populations were stressed; they later benefited from recovery of the stocks. Yet in other cases, holders of catch shares do push for higher harvest rates than are recommended by scientists, or they attempt to take more than their allotted quota. In August 2008, for example, agents with the National Marine Fisheries Service (NMFS) announced a fraud investigation of a factory ship in the catch share–regulated Bering Sea pollock fishery. By tampering with its scale and falsifying records, the NMFS alleges, the ship harvested more than its allotted quota of pollock. Stories can be found of quota holders acting for immediate, selfish gain as well as long-term conservation. There is little solid evidence that catch shares do indeed shift fishers' mindsets toward stewardship, or that private property rights need be part of effective catch share programs.

The biology of catch shares

In 2008, *Science* published a widely cited report that found a connection



This map charts the locations of existing catch share management programs in the United States. Additional catch share programs, including one for West Coast groundfish, are in the planning stages. Graphic: Courtesy of NOAA.

between the implementation of catch shares management and the health of fish stocks. The authors, led by economist Chris Costello, of the University of California, Santa Barbara, used data from more than 11,000 fisheries worldwide, including 121 managed under catch share programs. Applying the same measure of collapse used by Worm and colleagues two years earlier—that a fishery in which landings have been reduced to 10 percent of peak historic levels is considered collapsed—they found that systems under catch share management were half as likely to buckle as those under more conventional management. Tweaking Worm's earlier projection that major fisheries worldwide would be defunct by the middle of the 21st century, Costello and colleagues suggested that most stocks could be rescued through catch shares management. Costello subscribes to the belief that property rights motivate stewardship and compares quota rights to the ownership of real estate: A homeowner, he points out, will put far more effort into maintaining his house than a renter. *Science* ran a news story on the study, headlined "Privatization Prevents Collapse of Fish Stocks, Global Analysis Shows."

But the Costello study can't support that kind of sweeping conclusion. "I always caution people about reading too much into our results," says John Lynham, an economist and marine ecologist at the University of Hawaii, and one of Costello's coauthors. The researchers found a correlation between the switch to catch shares and a decline in the likelihood of fishery collapse, but they don't have enough information to establish a cause-effect relationship. A multitude of other factors affect fishery landings, including shifts in climate and ocean currents. In some cases, such as New Zealand, which switched all its fisheries to ITQs in 1986, no catch limit was in effect at all prior to the start of catch shares management. So the increase in landings that came with catch shares may be due to the enforcement of a sustainable catch limit rather than catch share–inspired stewardship.

In a study of fish-stock biomass in 20 fisheries worldwide before and after the implementation of ITQ systems, Cindy Chu, of Trent University in Ontario, Canada, found that overall, the rate of population decline slowed with the implementation of catch shares. Some fish populations grew under ITQ management, whereas others held steady or declined. The biological changes

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http://blogs.edf.org/edfish/
www.nmfs.noaa.gov/sfa/domes_fish/catchshare/index.htm

associated with ITQ management are highly variable and depend on the health of a fish population prior to the start of a catch share system, the setting and enforcement of an appropriate TAC, and the management style of neighboring nations harvesting from shared stocks.

In an attempt to directly test the idea that catch share programs lead to improved stewardship, biologist Tim Essington, of the University of Washington, Seattle, studied indicators of fish population health in 15 North American fish stocks before and after the implementation of catch share management. He examined population biomass, harvest rates, the proportion of the catch that was discarded (a wasteful practice that can affect population status), and compliance with catch quotas. Some fish stocks became more abundant, whereas others—notably Newfoundland cod—declined sharply even under catch shares. The clearest trend to emerge was that landings and fish populations stabilize under catch shares. Fishers in such systems meet, but rarely exceed, their allotted quotas. This is a real and significant improvement over the race to fish. The common thread that runs through his, Costello's, and Chu's work, says Essington, is the finding of fewer drastic swings in fish populations under catch shares. "Populations don't become more or less abundant on average, but the extreme fluctuations go away," he says. Thus, there are fewer population collapses. But the question of stewardship incentives, and why some catch share programs succeed while others fail, remains unanswered.

"We need to make a distinction," says Lynham, "between the economic outcomes of catch shares and the debate over whether it leads to sustainable biological outcomes. That debate is still very much up in the air."

Who owns the fish?

Catch shares were designed not as a conservation measure but as a tool to increase the economic efficiency of fisheries. The goal, Lynham notes, is to produce the maximum total wealth at the least cost—a limited vision of efficiency that ignores issues of ecology and social justice. In every place catch shares have been implemented, some fishers have bitterly opposed the new system while others have embraced it. That pattern is appearing in New England, where troubled fisheries switched to a catch share system on 1 May 2010. "If you're in it, you think it's great," one fisherman told a reporter for *Nature*. "If you don't have any quota, you think it's terrible." The New England debate echoes a survey of Alaskan halibut fishers taken in the two years after the ITQ system was established. The percentage of respondents who saw the program as completely positive was about equal to the percentage who thought it disastrous. A respondent's view of ITQs was clearly related to the size of the quota he or she had obtained: The larger the quota a fisher held, the more likely he or she was to approve of the system.

In most catch share programs, quota shares are awarded to fishers on the basis of their catch histories. In many systems, quota holders are then free to lease or sell their quota shares. Adherents of free-market economics believe this arrangement will naturally lead to both maximum financial efficiency and better stewardship. The free-market vision of catch shares is summed up in an opinion piece by Geoffrey Heal and Wolfram Schlenker, which ran in *Nature* in October 2008. "Shares in a collapsed fishery are worth as little as shares in a collapsed bank," they wrote. "But shares in a thriving fishery command high prices and represent real wealth for their owners. Suddenly, fishermen have an incentive to preserve a fishery for the future." Ironically, the piece was published in the midst of a global wave of bank collapses, the fruit of an unregulated free market.

The real-world outcomes of unlimited trade in quota belie the theory that catch shares will always inspire stewardship of the resource. In British Columbia (BC), Canada, a growing number of ITQ programs have halted the race for fish. Quota leasing has created a new set of problems, however: In the BC system, the original recipients of quota shares hold them indefinitely and can lease them to other fishers for as much money as the market will bear. Many of these

Fishing boats at harbor in New England. A controversial catch share program for groundfish in the region was implemented in May 2010. Photograph: Courtesy of NOAA.

fortunate quota holders retire from active fishing and live off the income from quota leasing. The lease price for halibut and sablefish quota has soared since the ITQ program was established in 1992. Working fishermen have effectively become tenants, obligated to pay exorbitant rents for quota. In this situation, it's difficult to imagine how quota rights could inspire good stewardship since few quota holders are actually on the water.

The same problem exists in the Bering Sea crab fishery, where a catch share system was initiated in 2005. Crab fisherman Ian Pitzman acknowledges the benefits of the new program: He and his crew are no longer under pressure to fish during dangerous weather or sea-ice conditions. There's less waste, and fewer sea creatures are killed and discarded. But owing to a free trade in quota, lease fees now gobble up 70 percent of active fishers' profits. "Vessels, crews, and their families, as well as local vendors, must survive on the remainder," says Pitzman. "The argument was that the free market would sort this out. I suppose it has, although at a level many consider to be unsustainable."

To avoid creating a class of absentee quota owners, the Alaskan halibut and sablefish catch share program requires quota holders to be aboard active fishing boats and places other limits on trade in quota. A comparison of the BC and Alaska halibut fisheries, which harvest from shared stocks in the northeast Pacific, is instructive. The International Pacific Halibut Commission (IPHC), a regional management agency, kept fish populations stable for decades by setting and enforcing a total allowable catch based on data from at-sea surveys and landings. As fishing efforts intensified, the IPHC shortened seasons in both British Columbia and Alaska to control the take. By 1980, Alaska's once year-round fishery had been shortened to 65 days, but with 333 vessels working without individual catch limits, the total harvest was above the prescribed limit. By 1990, the season had shrunk to six days, but fishers put 100 additional boats to work and again took more than the allowed catch. In 1991, the season lasted for just two frantic, dangerous days.

That same year the BC halibut fishery switched to a catch share system. Each participant could catch only so much fish for the year, and the incentive to rush no longer existed. By 1992, the Canadian halibut season was eight months long, and the harvested fish were sold fresh at a considerably higher price than those from the neighboring Alaskan fishery. There, the season lasted only a few days, producing a glut of fish that had to be frozen and sold at low prices. Season lengths and profits balanced out after a catch share system was implemented for Alaskan halibut in 1995. The lack of an unfettered free market in Alaskan halibut quota has not prevented that catch share system from working well in economic terms, ending the race to fish and stabilizing the flow of fish to consumers.

Alternative approaches

Seth Macinko, a former Bering Sea crab fisherman and now a professor of marine affairs at the University of Rhode Island, questions the widespread practice of gifting quota to established fishers, which he describes as "outrageous." If rights to fishing quota are to be leased, the money should return not to a few fortunate private individuals but to the public. "No one thinks we need to give free oil drilling rights to Exxon or British Petroleum, or let ranchers graze their cattle on public lands without paying a lease fee," says Macinko. "This whole conversation has been hijacked by property rights ideology. But the magic of catch shares lies in the fact that catches are assigned, so that there's no longer any reason to go out and race. Property rights have nothing to do with it."

The United Nations Human Rights Committee seems to agree. In October 2007, the committee ruled on a complaint brought by fishers who had lost out when quota was distributed in Iceland's catch share system. Iceland's government was found to have violated international law by awarding private individuals long-term rights

An Alaska fisher holds a king crab. Long the focus of an infamous and dangerous fishing derby, Bering Sea king crab came under catch share management in 2005. The new system halted the race for crab, but rapid inflation of quota lease prices enriches the fortunate few who were originally given the quota, while threatening to push many long-time participants out of the fishery. Photograph: Courtesy of NOAA.

to a public resource. The problem was not with catch shares but with the way the program was implemented: Allocated quotas not used by their original holders were sold or leased at market prices instead of reverting to the state for distribution to new quota holders. "The property entitlement privilege accorded permanently to the original quota owners...is not based on reasonable grounds," the committee wrote. Iceland's government is now considering buying back, or reclaiming without payment, all of its catch shares at a rate of 5 percent per year over 20 years. Once that is accomplished, other ways of handling quota allotment can be considered. One option would be for the government to rent out quota rights for a limited time, investing the resulting revenue in fisheries monitoring and conservation.

That approach has been used successfully in Namibia. The free-market form of catch shares adopted in the United States, Canada, New Zealand, and Iceland has tended to put fishing rights in the hands of a wealthy few, often absentee, quota holders. By contrast, Namibia has used catch shares to accomplish the opposite: stable fisheries in which local fishers and processors dominate. At the time of its independence from South Africa in 1990, ships from Spain, the Soviet Union, and other countries had long overfished Namibia's waters in the South Atlantic. Since then, depleted stocks have been rebuilt through the setting and enforcement of TACs. Quota shares are rented to individuals or companies for set periods of time, with lower quota fees offered to vessels carrying high percentages of Namibian crew. Nearly 14,000 Namibians now work as fishers or in processing plants; none did before independence. As of 2003, Namibians held 162 out of the 163 permits to access fisheries. They have not been transformed into selfless conservationists: Fishers in Namibia, like their counterparts in North American catch share systems, sometimes pressure government regulators to raise the TAC. On the other hand, Namibian fishers are closely monitored and seldom exceed their quotas.

It seems fisheries will become more sustainable if we can curb overharvesting and the high rates of gear loss and wasted bycatch that go along with the race to fish. To accomplish this, the real economic benefits of catch share systems must be disentangled from theories of free-market perfection. Fishery rights must be understood as a valuable public asset, one that need not be given away to reap the benefits of catch shares. Such changes might go far to end the bitter opposition catch share programs face in many fishing communities.

If Lynham had the power to design catch share systems, he says he'd keep quota rights in the hands of local people. "In my experience of visiting fisheries across the world, the people who live close to the resource and are actually harvesting it are the ones who care about it most," he says. That's the subjective opinion of one man, however well informed. But it's at least as credible as the idea that property rights will turn fevered competitors into careful stewards.

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