The Ecological Role of IFQs in U.S. Fisheries

A Guide for Federal Policy Makers

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IFQs AND THE ENVIRONMENT

For years, the management of U.S. fisheries has relied on regulatory controls—gear restrictions, shortened seasons, and the like—to prevent overfishing. Unfortunately, this approach promotes an "unsustainable 'race for fish'" that leads to "serious resource conservation problems in many U.S. fisheries" (U.S. Commission on Ocean Policy 2004, 244). Just over 40 percent of the 215 U.S. fish stocks scientists assessed in 2003 are overfished or are being fished unsustainably (National Marine Fisheries Service [NMFS] 2004a).

A related ecological problem is the discarding of bycatch, which results when fishermen unintentionally catch, injure, or kill marine life. Worldwide, scientists estimate that fishermen discard 25 percent of what they catch (Pew Oceans Commission 2003).[1] Scientists are also concerned over bottom trawls and dredges that degrade sensitive habitat and marine communities along the seafloor (Dayton, Thrush, and Coleman 2002), although the total extent of the damage they cause is unknown.

In recent years a viable alternative to the traditionally managed fishery has emerged. Individual fishing quotas (IFQs), also called individual transferable quotas (ITQs), allow each quota holder to catch a specified percentage of the total allowable catch (TAC) set each season by fishery managers. IFQs have ended the destructive race for fish where they have been adopted, and they have begun to address the ecological problems caused by the present system. Worldwide, at least 100 marine species are under IFQ management, including four in the United States.

Despite IFQs' successes, critics in the United States have raised questions about the possible deleterious effects of IFQs on marine ecology. A frequently cited concern is that because IFQs slow the pace of fishing, fishermen may have more time to high-grade; i.e., discard less marketable, lower-value fish in the hope of catching more marketable, higher-value fish. If the discarded fish are not likely to survive, high-grading poses a severe environmental problem.

The seminar on which this booklet is based addressed both the environmental benefits that come from the adoption of IFQs and the objections to IFQs that have been raised on environmental grounds. We shall see that IFQs offer a dramatic change for fisheries and resolve problems that previously seemed intractable.

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Stopping Overfishing and Rebuilding a Fishery

> "[IFQs] created the incentives for the lobster industry to protect a fishery from further decline and to accelerate and manage the expected stock rebuild."
>
> — *Daryl Sykes**
> Executive Officer
> New Zealand Rock Lobster Industry Council Ltd.

As Daryl Sykes states succinctly, IFQs transformed the East Gisborne rock lobster fishery off New Zealand by changing the incentives of the fishermen. Before IFQs, the fishery was suffering from adverse environmental impacts, mismanagement, and years of overfishing. In 1990, fishery participants were allocated IFQs. Following a familiar pattern,[2] IFQs immediately did what previously seemed impossible—they prevented the actual overall harvest from exceeding the desired overall harvest, a necessary step in halting overfishing.

The overall harvest target itself, however, had to be significantly reduced if the lobster stock was to recover fully. In 1992, IFQ holders—the industry—decided to carry out their own initiative to restore the rock lobster stock. The initiative, which was approved by the Ministry of Fisheries, included a 50 percent reduction in the total allowable commercial catch and the establishment of closed seasons to remove lobster traps during spawning periods, partly to reduce the high incidence of lobster theft.

The industry also imposed on itself a minimum-size restriction for male lobsters. This raised the price of the catch and softened the economic hardship from the reduction in the total allowable commercial catch. Now, less catch would be taken but at a higher average price per ton. In addition to completely funding stock research and assessment, the industry fully funded the costs of developing and promoting the initiative to the Ministry of Fisheries.

The result of this initiative was "immediate and spectacular," says Daryl Sykes. The population of East Gisborne rock lobster made a dramatic recovery through the mid-1990s.

The industry soon discovered that its strategy was incomplete, however. Few restrictions existed on recreational or traditional indigenous fishermen who harvest lobster for noncommercial use. With more lobsters in the ocean, these fishermen caught more, and the government did little to control their harvest. Eventually, the increases in lobsters brought about by industry initiatives were more than offset by the rise in noncommercial harvest. The lobster stock declined again, reaching another low by 2002.

In 2003, the industry once again decided to act to rebuild the stock of rock lobsters—this time backed by a more comprehensive strategy. In addition to reducing the commercial catch target and instituting closed seasons, it implemented a new area-harvest arrangement in which fishing pressure would be more evenly distributed throughout the fishing grounds to prevent localized depletion. The following year an intensive stock monitoring program was started: For 38 days, observers tagged and released 6,000 lobsters sampled from the catch. In addition, the industry instituted an adaptive response program that allows it to take corrective actions a full season earlier than if it followed the normal process through the Ministry of Fisheries. Alongside the industry's efforts, the government promulgated new harvest controls on nonindustry harvesters and pledged to enforce them. Sykes says that once full lobster recovery is achieved, prospects are very good that the stock will remain healthy.

Quota owners in New Zealand invest in conservation to increase the value of their quotas. The quotas are a highly liquid asset that reflects the value of future earnings from the resource, and those quotas are secure and durable. Two sure ways to increase their value are to eliminate overcapacity and to change the status of a depleted stock to one that is abundant (Newell, Sanchirico, and Kerr 2002).

In addition, well-functioning markets for quotas work against some factors that promote overfishing, such as excessively high TACs, cheating on quota, and fish theft. Fishermen holding quotas tend to want TACs set conservatively; they report cheaters among their ranks; and they become vigilant in preventing fish theft by outsiders. If fish stocks become depleted, quota values will fall, and no quota owner wants this to happen.

Elsewhere in New Zealand, where IFQs are secure and durable, industry-led conservation efforts like the one described for rock lobster are being carried out in a host of different fisheries.[3] They all involve collaborative efforts by quota holders to invest in marine research, to conduct stock assessment, and, with government backing, to develop and enforce their own fishing regulations.

Eliminating Regulation-induced Waste of Fish

> "We're killing a million pounds of snapper every year while the fishery is *closed*."
>
> —*Wayne Werner**
> Commercial Fisherman
> Gulf of Mexico Snapper Fishery

In many of today's fisheries, the problem of discard mortality is so severe that stock recovery may be next to impossible. Yet the problem often stems from the regulations themselves. A case in point is the commercial red snapper fishery in the Gulf of Mexico.

The red snapper resource is significantly overfished for the usual reason—a management system that has unwittingly encouraged intense, short-season races, sometimes called derbies, among fishermen (Gulf of Mexico Fishery Management Council 2004).[4] The fishery, a prime candidate for IFQs, exemplifies the environmental damage that is being wrought by current regulations. One reason for the decline of red snapper is mortality from discarded fish.

The length of the snapper season contributes to discard mortality in snapper. The season has been shrinking steadily for the last 14 years. The short season, in conjunction with a frenzied effort to maximize one's share of the catch, leaves little or no leeway for choosing when to fish. Captain Wayne Werner, quoted above, routinely goes out fishing in bad weather. In 2001, he was caught in a tropical storm that sank a vessel. When his father was sick, Wayne had to leave his side to go fishing because it was his only chance to secure a catch.

Before this derby began in the early 1990s, commercial fishermen caught red snapper and other reef species together in the multi-species fishery throughout the year. Now, fishery closures on snapper last from nine to ten months each year. When the snapper fishery is closed, fishermen turn their attention to other reef fish species, placing pressure on these stocks. Some, like vermillion snapper, are also severely overfished.

During the long closure on red snapper, fishermen are not able to avoid them as they target other species, simply because red snappers are the most common fish in the reef fish fishery. An extraordinary number of snapper are thrown back because they are caught out of season, and many are thrown back dead. When they are brought up from extreme depths, the radical change in pressure can kill them.

Within the snapper season, the 2,000-pound catch limit of snapper imposed per fishing trip (called a trip limit) results in more snapper being thrown back when the limit is exceeded during a trip. Like season length, the allowable poundage per trip has been steadily shrinking over the last 14 years, forcing fishermen to throw back still more snapper. Additional snapper are discarded during the season because they do not meet the minimum size to be legally landed. The minimums have been raised several times in recent years in an effort to extend the season.

In sum, regulation-induced snapper discards amount to more than two million pounds each year—a huge amount in a fishery that lands just 4.5 million pounds a year (NMFS 2004b, 26). Many discarded fish are thrown back dead. Typically, the dead fish are not accurately accounted for in evaluating the health of the stock.

With IFQs, managers can directly control the catch, and this leads to a reduction in bycatch, as illustrated by the experience of the Alaska halibut fishery. Prior to IFQs, the Alaska halibut fishery was a prime example of derby-style management, characterized by short seasons and trip limits. A season that at one time took several months was tightened to two to three 24-hour periods a year.

The short halibut seasons resulted in a large amount of halibut bycatch in the Alaska sablefish fishery, another fishery with short seasons. Halibut and sablefish fisheries use similar gear and have overlapping fishing grounds. With halibut fishing lasting only a few 24-hour periods a year, a lot of halibut caught by sablefish fishermen during the longer sablefish season had to be discarded. Anecdotal evidence from observers at sea indicates that a lot of the discarded halibut did not survive because the pace of fishing was too hectic for fishermen to handle it properly.

The situation improved dramatically when IFQs were adopted in both fisheries in 1995. The two seasons now largely coincide and last eight months a year. This gives fishermen plenty of time to choose when to fish, such as when weather conditions are good or when fish demand is up. In the absence of 24-hour halibut derbies, fishermen lose or abandon a lot less gear. A 2004 study shows that the amount of halibut wasted at sea due to lost or abandoned gear has declined by 80 percent.[5]

In addition, the new seasons have made it worthwhile for sablefish fishermen to purchase IFQs for halibut, allowing them to keep and record most of the halibut they catch while fishing for sablefish. This change has resulted in a dramatic decline in the amount of halibut bycatch, says Greg Williams, a biologist with the International Pacific Halibut Commission. He estimates that halibut discard mortality in the sablefish fishery has fallen nearly 80 percent from the 2.2 million pounds of halibut that were wasted annually in the sablefish fishery.[6]

Wayne Werner argues that the enormous waste of red snapper could be easily prevented if the snapper fishery, like the halibut and sablefish fisheries off Alaska, adopted IFQs. IFQs for snapper would not only allow managers greater precision in controlling the total catch, they would allow managers to eliminate seasonal closures, trip limits, and minimum size limits—regulatory strategies that have proven to do more environmental harm than good.

Mitigating Fleet Impacts

> "Overcapacity in fisheries is a fundamental problem contributing to high bycatch and habitat damage."
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> —*Pamela Baker**
> Fisheries Biologist
> Oceans Program
> Environmental Defense

Another crucial ecological role for IFQs is in reducing fleet excesses and their environmental impacts. Shrimp fishermen in the Gulf of Mexico have to contend with increasing competition from imported farmed shrimp while also racing against fellow Gulf shrimpers. They must also cope with measures designed to lessen their impact on the Gulf's rich marine environment. Shrimping is done by bottom-trawling, a method of fishing in which a vessel tows from one to four nets weighted down and held open by doors so that the nets will entrap bottom-dwelling shrimp. Unless precautions are taken, bottom-trawling has the potential for high bycatch and extensive habitat damage.

There are a variety of ways to mitigate the impacts of trawling. One way has been through U.S. fishery laws that require specific techniques to avoid bycatch. Shrimpers attach turtle excluder devices (TEDs) and bycatch reduction devices (BRDs) to their shrimp nets to minimize catching, injuring, and killing other species. These devices have helped spare marine life, including overfished red snapper and endangered sea turtles.[7]

Another approach is through zoning, such as the gag grouper protection zone of the west coast of Florida. There, fishing for all species is banned much of the time to prevent accidental capture of grouper, especially during spawning and, in the case of male grouper, after spawning.[8] Complying with these mandates is a significant accomplishment. Improvement of gear should continue, and hot spots—sensitive areas—should be avoided. But gear modifications and zoning are only part of the solution.

There is strong evidence that too many shrimp boats operate in the Gulf of Mexico. Too many boats and too much gear increase interactions with habitat and increase bycatch. In one study, two economists estimated that one-third of the fleet of more than 16,000 vessels operating in the Gulf in 1988 could have efficiently harvested the same amount of shrimp (Ward and Sutinen 1994).

Another illustration comes from National Marine Fisheries Service figures on the U.S. shrimp industry. Fishermen spent about 185,000 fishing-days (a measure of fishing effort) to land about 130 million pounds of shrimp (tails only) in 1967. They spent nearly 310,000 fishing-days to land 150 million pounds of shrimp (tails only) in 2001 (NMFS 2004c). So shrimpers, using superior vessels and technology, trawled for 45 percent more fishing-days in 2001 than in 1967 to harvest a roughly equivalent amount of shrimp.[9]

A good option for eliminating the fleet excesses in the Gulf shrimp fishery is through transferable IFQs. Because IFQs can be bought and sold among fishermen, the problem of fleet overcapacity and corresponding excess fishing effort dissipates as more efficient fishermen buy out those ready to retire or pursue other work.

Transferable IFQs helped solve overcapacity (and other problems) in the Mid-Atlantic surf clam fishery off New Jersey. From 128 vessels in 1990, the fishery downsized to 50 in 1997.[10] Even though the fishery has fewer participants, many small quota holders remain. The habitat of the Atlantic surf clam has benefited as well. Eric Powell, Director of the Haskin Shellfish Laboratory at Rutgers University, points out that fleet consolidation has allowed participants to do a better job of targeting areas with a high abundance of clams, thereby minimizing the area that is swept by dredges each year.[11]

Both Gulf of Mexico shrimpers and the marine environment stand to benefit from IFQs. Shrimpers should like the results because bycatch is reduced with no mandated gear changes. Shrimpers can also save money because with less destructive competition for available shrimp they can trawl shorter times for a higher yield. Costly trip limits and time-of-day restrictions can be eliminated as well.

The marine environment benefits because with fewer boats come fewer trawls in the water, meaning fewer run-ins with bycatch species and habitat. Overfishing is less likely and shrimpers can target trawling more carefully.

Objections to IFQs

The chief objection to IFQs on ecological grounds is the claim that they will encourage the practice of high-grading, throwing out the unwanted fish, which can result in significant mortality. By giving fishermen more time to fish, the argument goes, they will have more time to throw out fish. However, there is little indication that high-grading in IFQ fisheries is any more of a problem than it is in traditional management programs. Such programs can just as easily force high-grading through minimum size limits on landed fish, trip limits, and short fishing seasons. The incidence of high-grading does not appear significant in most IFQ fisheries. Claims that IFQs aggravate high-grading in Iceland's IFQ fisheries are overstated, according to economist Ragnar Arnason (1994), a leading expert on Iceland's fisheries. Where it does appear, monitoring and enforcement have been weak (Grafton 1996, 164). In the few U.S. federal fisheries with IFQs, high-grading is insignificant (NRC 1999, 108–109).

Another concern is that IFQs allocated for single species may make it more difficult to address broader ecological concerns. The allocations "do not consider the needs of the ecosystem (for example, food for predators)," warns the Marine Fish Conservation Network (n.d., 2). However, in all managed fisheries, managers and scientists are supposed to take into account ecological factors when setting the total allowable catch (TAC) for a species targeted in a fishery. If new information proves that the allowable catch is set too high and that more fish should be available for prey (or for some other ecological purpose), then managers should lower it. Each fisherman's allowable poundage for the season would be reduced proportionally based on quota share held (expressed as a percentage of TAC).

The more species covered by IFQs, the more likely fishermen will take into account the multi-species effects of fishing. In New Zealand, where IFQs now cover about 100 species, fishermen in different fisheries are working together to conserve multiple species and their habitat in a given area. In Tasman Bay, for example, scallop, oyster, and finfish fishermen coordinate the timing, location, and extent of their harvests. This approach has lowered fishing costs and fishing impacts such as disturbance to the seafloor from oyster dredging (Arbuckle and Metzger 2000, 21).

Those who question the ecological value of IFQs often argue that marine reserves are a better way to protect fish and its habitat. Closed areas, in theory, can provide a number of benefits: conservation of biodiversity and habitat, improvement of scientific knowledge, education, enhancement of recreational opportunities, and provision of existence values.

In practice, however, closing areas to fishing has fallen short of expectations in protecting fish stocks, largely because fishermen have increased their fishing in nearby areas (Coleman, Baker, and Koenig 2004). While marine reserves are an important tool in attaining ecosystem health, they do not solve the tragedy of the commons plaguing ocean fisheries, they simply force fishermen to relocate and concentrate their fishing effort. IFQs, combined with strategic use of marine reserves, offer a more formidable tool for ensuring a healthy marine environment.

Conclusion

IFQs have become well known for their ability to improve the economics of the fishery dramatically by eliminating the costly race for fish. But they do much more than that. This discussion has focused on the role of IFQs in improving the health of fish stocks and the broader marine environment.

Evidence from New Zealand's rock lobster fishery indicates that IFQs can be highly effective in rebuilding a depleted fishery. When they are secure and durable, as in New Zealand, IFQs foster strong incentives for fishermen to take the initiative in marine conservation. IFQs provide managers with a way out of the regulatory conundrum in which they are forced to use tools that do more environmental harm than good.

If adopted in the Gulf of Mexico snapper fishery, IFQs would end a regulation-induced waste of fish, as they have with the Alaska halibut and sablefish fisheries. Because they can be bought and sold, IFQs also solve the problem of fleet overcapacity—a problem that results in larger bycatch and greater impact on marine habitat than necessary. IFQs deserve a chance because they improve the marine environment as well as the lives of fishermen.

Notes

* *Speaker at luncheon seminar, "Examining the Ecological Benefits of Individual Fishing Quotas (IFQs) in Ocean Fisheries," Friday, April 23, 2004, the Senate Russell Office Building, Washington DC.*

1. Bocaccio, a formerly abundant groundfish off the West Coast, has plummeted by more than 95 percent since the late 1960s, the result of being overfished and caught as bycatch in other fisheries. Although bocaccio is no longer directly fished, scientists believe it could take at least a century to recover. See Garrison (2002, 217–21).

2. IFQs allow managers greater precision in controlling the overall catch. For example, prior to IFQs, actual harvests in the halibut fishery frequently exceeded the total allowable catch set by managers in four management areas under study. After IFQs were initiated in 1995, however, actual harvests no longer exceeded the total allowable catch in these areas. See Leal (2002, 18).

3. For further discussions, see Sharp (2004) and Townsend (2004).

4. Because management imposed a total allowable catch without allocating secure individual rights to the harvest, a derby or race to catch fish, ensued in 1992. Management has sought to combat its negative impacts via trip limits and other regulations.

5. Fish mortality due to lost or abandoned gear averaged 1,323,000 pounds a year in the four years prior to IFQs but only 273,750 pounds in the first four years under IFQs, an 80 percent decline in the amount of halibut wasted due to lost or abandoned gear. See Gilroy (2004, 55).

6. Information based on phone conversation with Greg Williams, December 22, 2004.

7. For example, the state of Texas estimates that 280 million pounds of bycatch were snared annually by shrimpers in

the mid-1990s, before bycatch reduction devices (BRDs) were required on nets. Studies since then indicate that BRDs have reduced bycatch by as much as half. See Anderson (2003).

8. Other restrictions are also in place. For example, roughly 17 percent of Texas's near-shore waters are off limits to shrimping to protect critical shrimp nursery areas. The amount of time shrimpers can trawl continues to be reduced. Gulf shrimpers are also required to tow no more than two nets within three miles from shore. See Anderson (2003).

9. This effort comparison is based on $((E_2-E_1)/E_1) \times 100\%$, where E_2 = 310,000 fishing days/150 million lbs. in 2001 and E_1= 185,000 days/130 million lbs. in 1967.

10. A host of fisheries have undergone reductions in fleet size under IFQs. They include the British Columbia halibut fishery, the Alaska halibut fishery, the Alaska sablefish fishery, the Australian southern bluefin fishery, the Icelandic herring fishery, the Icelandic capelin fishery, and the Netherlands flatfish fishery. See Leal (2002, 16).

11. Information based on a phone conversation with Eric Powell, September 15, 2004.

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