

# Commercial Overfishing and Property Rights

By Paul J. Radomski

## ABSTRACT

Management of many commercial fisheries includes a struggle to avoid overfishing. Natural resource agencies fail in this struggle when the application of biological, sociological, or philosophical sciences fails. In addition, they fail because they underestimate the pervasiveness of greed and the power of commerce, not because they lack good intentions. Current strategies to manage commercial fishing include extending property rights for fish harvests. The objective of this paper is to stimulate debate on the need—and consequences—of extending property rights to wild, exploitable fish populations as opposed to granting harvest rights. The question is, If property rights for fish were awarded to nonfishing, nongovernmental entities that then sell fishing rights to harvesters and help manage fish stocks, would this system be more likely to produce sustainable harvests and benefits? Strategies to achieve sustainable wild fish benefits are many and diverse. Should we explore extending property rights for fish to nonharvesting entities as another possible strategy for managing some commercial fisheries?

**T**he failure of commercial fisheries management has severe ecological, economic, and social costs. If we value wild, exploitable fish populations, then it is time for adaptive management. In U.S. coastal waters, 23% of fish stocks are overfished, and approximately half the marine stocks have population levels below those needed to achieve their full potential sustainable yields (National Marine Fisheries Service 1996). While human population continues to grow, and the demand for fish continues to increase, critical habitats are being degraded. Commercial fishing is changing rapidly, and resource agencies are eager to develop new ways to conserve wild fish stocks.

The world's fisheries are in crisis. Of the 200 commercial fisheries monitored by the Food and Agriculture Organization of the United Nations (FAO), 1 in 3 is depleted or heavily overexploited (Weber 1995). The U.S. Magnuson-Stevens Fisheries

Conservation and Management Act defines *overfishing* as "a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis." From cod (*Gadus morhua*) to walleye (*Stizostedion vitreum*), commercial fishing has depleted fish populations throughout the world. Lake trout (*Salvelinus namaycush*) has been commercially overfished in Lake Superior (Coble et al. 1990). Shoal Lake, a 64,000-acre lake in Ontario, was intensively fished by sport anglers and five commercial operations, causing the collapse of the walleye population (Anonymous 1992). In Minnesota, Rainy Lake and Red Lakes walleye populations were overfished by the 1980s (Minnesota Department of Natural Resources [DNR] 1997). The causes of overfishing are many and diverse, but the root reasons need to be reexamined. Martin (1995:8), of the Newfoundland Inshore Fisheries Association, shared his interesting perspective on the once-great cod fishery that recently collapsed due to commercial overfishing. He blamed the collapse on "corporate greed, union betrayal, political cowardice, and, yes, a science that got lost somewhere along the way."

Harvesting a portion of a fish population to some threshold level can occur for the benefit of humans without jeopardizing the self-sustainability of the population. Threshold levels may be defined by egg production, population density, fishing mortality rates, or adult biomass (Mace 1994; Myers et al. 1994). These thresholds, which may be based on sophisticated mathematical models and empirical evidence, are just estimates—estimates that may be risky, overly conservative, or wrong (Oreskes et al. 1994). What is known for certain is that when the harvest rate exceeds the rate of population replacement from natural reproduction, the exploited population will decline and eventually collapse. The question is, Why do so many commercial fisheries end up overharvested?

Natural resource agencies have noble fisheries management objectives. The goal of the Minnesota DNR, defined by statutes, is to protect and enhance fishery and aquatic resources for their long-term recreational, ecological, aesthetic, and economic benefits to the state, with commercial fisheries managed to produce optimum yields while not harming associated sport fisheries

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(Minnesota DNR 1994). U.S. statutes for fisheries management require achieving optimum yield but provide for the prevention of overfishing through adoption of a precautionary approach. *Optimum yield* is defined as the yield that provides the greatest benefit to the country, or the maximum sustainable yield reduced for economic, social, or ecological concerns. But can optimal yield be computed accurately with the worth of wild fish unknown? Maximum sustainable yield is difficult to correctly estimate without collapsing the fishery (Hilborn and Walters 1992). The science of determining optimum or safe yields is still in its infancy; as proof, calculations have not included maternal effects on reproduction success (Trippel 1998). In addition, the economics of sustainable yield are hard to calculate (Atkinson 1982), and its principles are in early development (Wilson 1998).

The extent of regulations to protect against overexploitation depends on the species exploited, environmental constraints on the species, the intensity and efficiency of harvest, and the need to hedge against ecosystem disturbances. Some species of fish are more vulnerable than others to population collapse from exploitation, and fisheries managers have proposed a variety of strategies to mitigate the root causes of overfishing—from limiting the number of commercial fishers (Van Meir 1969) to regulating against successive reduction in gillnet mesh size (Berkes and Gonenc 1982). Uncertainty of ecosystem changes from high exploitation of a common species may prompt additional restrictions and management strategies, especially as consequences of predator removals and species interactions are better understood (Pauly 1994).

The objective of this paper is to stimulate debate on the value of awarding property rights for fish to nonfishing organizations or individuals who aim to sell fish to harvesters or those with fishing rights and to manage the fisheries

resource for long-term profit. I start with my views on the causes of overfishing. They may appear relatively naive since I believe the causes are simple. Many economic and biological theories explain overexploitation, but overfishing problems are solved by understanding human nature and interactions. Human interactions in these situations are extensive, culturally moderated, genetically predisposed, and at this time unpredictable, but simple nonetheless.

### Causes of overharvesting

Overfishing has at least three root causes. First, more demands are being placed on fish populations. For example, as the demand for food increases, prices of fish rise, and harvest increases to improve supply (Keen 1991). Second, the current economic system creates strong incentives to overharvest since everything is subject to the market but the value of wild fish (Munro et al. 1998). Third, greed exerts a force stronger than individual and societal objectives of conservation and sustainability. This almost-universal human fault drives people to exploit the first two conditions. The interaction between the last two root causes, economics

and greed, could be called *commercialization*. The objective of commercialization is to maximize profits for those engaged in the business. In Minnesota, fisheries are to be managed for the benefit of current and future citizens; therefore, fisheries policies must address all interests, not just interests of the fishers. Without community or government regulation, conservation depends on the collective attitudes of commercial fishers. They may take a short-term view and harvest to collapse for immediate profit, or they may take a long-term view and harvest at a level that conserves the stock for future harvest and profit. The actions of commercial fishers might not be in the best interest of society. Berkes (1985) cites commercialization as one of the major factors underlying the tragedy of overfishing in inland lakes and rivers by citizens of local communities, and both self- and government regulation become more difficult as human populations increase.

Many complex secondary causes of overfishing lend themselves to regulation: technology, gear, government policies and subsidies, and agency structure, to name a few. Technology, including sonar, global positioning systems, and other



Red Lake Archives

Workers processing fish at the plant of the Red Lake Band of Chippewa Indians, Red Lake, Minnesota. With the collapse of the walleye fishery the plant is now idle.

devices, allow fishers to locate schooling fish easier. Improved net technology has increased catchability. Government policies can attract more commercial fishers into the business even after the point of diminishing returns. Open access, which some consider the crux of the overfishing problem, allows entrepreneurs to enter at will. Government subsidies may support overcapitalization by commercial fishers, or elected officials might grant subsidies when fishers fail financially, thereby maintaining a state of overcapitalization. Canada has paid billions of dollars in the past several years to support former Newfoundland fishers and fish workers while the cod fishery is closed. Government policies and subsidies may favor large-scale commercial fishers over traditional small-scale ones, thus contributing to overcapacity and overfishing.

Government fisheries management agencies also have been implicated in fishery collapses. Fisheries professionals have questioned the role of political interference in governmental management decisions that may have contributed to fishery collapses. Hutchings et al. (1997) assert that the command-and-control model of government results in the stifling of scientific communication and the suppression of scientific uncertainty. Command-and-control or hierarchical chains of command generally are weak at transmitting information through an organization. As information moves up the chain of command, the complexity in the message tends to get removed, and bad news is poorly expressed. Hutchings et al. (1997) also assert that a political institution that both conducted and controlled scientific investigations makes poor decisions about sustainable harvest of fish stocks. Not surprisingly, government agencies that respond like politicians have difficulty controlling overharvest. Drucker (1989) states that government agencies perform poorly if their responsibilities are to satisfy different users with different values. Agencies under intense political pressures could lose focus and become paralyzed by controversy, with agency heads citing scientific uncertainty of

fish population status to undermine fisheries scientists and present materials to the public that support political interests. In this scenario, risk-averse management recommendations proposed by fisheries biologists may be compromised or subjugated and replaced with controversy-averse recommendations by agency heads.

Overfishing occurs when the application of biological, sociological, or philosophical sciences fails. Wilson (1998) believes there is a trend toward fragmentation of the sciences, resulting in consilience of knowledge (i.e., the coming into agreement of generalizations from widely different inductions). This takes place when one class of facts coincides with an induction obtained from another field of science. Wilson stated that solutions to environmental problems will come from the intersection of environmental policy, social science, ethics, and biology. However, philosophical and ethical issues are rarely debated, or perhaps more correctly, the ethical debate is waged in currency or jobs. Biological issues include designing good stock assessment programs to collect and analyze reliable data on abundance, natality, mortality, and growth. Richards and Maguire (1998) note that the science of fisheries management is dominated by the science of population dynamics. Fisheries managers have focused on these biological issues for good reason (Ricker 1975; National Research Council 1998), but social issues relating to resource exploitation are just as critical. These social issues are difficult to understand and include human nature, culture, economics, and individual and social behavior.

If we were to apply Hardin's (1968) "tragedy-of-the-commons" model to Minnesota lakes, it would mean that unrestricted or poorly regulated activities could bring ruin to all. Just as a corporate business professional might benefit from polluting the waters with industrial waste, a commercial fisher might benefit tremendously from overfishing. Hardin (1968:1,244) states, "The individual benefits as an individual from his ability to deny the truth even though society as a whole,

of which he is a part, suffers." He also noted that our challenge was to invent and legitimize corrective feedbacks to conserve natural resources. Historically, government control and regulations have been the corrective feedback mechanism used for most fisheries. Berkes et al. (1989) have shown the benefits of community-control or self-regulation by fishers in achieving sustainable harvests. However, Berkes (1985:201) observes that "community control over the fishing effort appears to be very difficult to achieve in commercial fisheries in general.... if a given stock is not overexploited, this is probably related to insufficient market demand rather than to community-level controls." To reduce overexploitation, Hardin and Baden (1977) assert that access to the commons should be restricted, or the commons should be privatized. Fisheries managers have developed policies on the basis of these perceived solutions.

The "tragedy-of-the-commons" model, however, is simplistic, deterministic, and fragmentary (Feeny et al. 1990). Communities have harvested fish sustainably from the commons (Berkes 1986). McCay and Jentoft (1998) submit that tragedies occur from community failure (inadequate social bonds and structure) as much as government and market failures (imperfect property rights). Scott (1993) notes that fishers have difficulty self-governing because collectives usually restrict their rule-making to the easier issues of gear and fishing location and avoid the difficult issues such as monitoring total harvest. Scott (1993:194) states that "fishermen have not so far cooperated by restricting individual catches or by spending money to protect or enhance the stock because doing so not only requires nonexistent information but also requires their agreement on the distribution of the burdens."

### Feedbacks in commercial fishing

Commercial fishers' responses to declining fish abundance can be risky to fish populations because commercial fishers are fishing for dollars, not fish. The optimal yield (pounds) per

recruit and the optimal profit per recruit may be mutually exclusive (Schaefer 1959; Djama and Pitcher 1997). Allen and McGlade (1987:165) state, "The evolution of the behavior of fishermen, if based on the short-term requirements of immediate profit and competitive advantage, will lead the system to collective disaster." Although commercial fishers understand the need for safe harvest levels, they also must think of their own short-term needs such as paying off loans and producing income (McGlade 1989). When fish populations and harvest rates decline, commercial fishers may respond with actions that put a fishery at greater risk of collapse. These actions include investing in more-efficient gear and technology, not complying with regulations, fishing longer and harder, underreporting harvest, high-grading, lobbying policy makers, buying out competitors, resisting increased regulations, harvesting before others, and requesting governmental or court action (e.g., subsidies, legal mandates).

Two strategies that attempt to reduce fishers' incentives to overharvest—individual transferable quotas (quota licenses) and collective ownership systems—have been effective. Both are controls on open access. Any rights awarded to quota holders are not property rights for fish since the fish are still common property. Individual transferable quota strategies give an individual commercial fisher access rights and harvest rights to part of the allowable catch. In some cases, fishers hold such rights for their entire fishing careers, and they can sell them in the open market with few restrictions. Collective ownership strategies result when quota holders form associations—transforming access rights to property rights for harvest. These strategies have many strengths (Pearse and Walters 1992; Pearse 1994). When fishers are allowed only part of the total harvest, they are restricted from further competing for the remaining resource. Thus, they look at ways to maximize the value of their harvest and minimize the costs to increase profit and improve their condition (Deweese 1998). With good

fishery management, the value of a transferable quota permit increases to include both existing and future profits (Huppert et al. 1996). Eliminating open access and establishing quotas reduce the race to harvest fish (Fujita et al. 1998). Without competition in a fishery, quota holders can cooperate. In addition, fishers gain legal rights that provide protection from outsiders, and governments benefit because regulations regarding harvest timing can be simplified. For a review of the economics and experience of governments using individual transferable quotas, see Grafton (1996).

### **With fish as common property, individual quota approaches still present conditions for unstable economic and political pressures.**

Additional benefits to these individual quota systems exist, but these approaches also have shortcomings (Deweese 1989; Pearse 1994). Setting up a quota system is often a problem. Some fishers resist change due to uncertainties in quota allocation and restrictions on future competition. These systems also require administration of a quota record system and an effective enforcement and monitoring program to reduce noncompliance. In addition, some question the ethics and fairness of establishing these systems in place of existing community-based systems (Davis 1996; McGinn 1998). Problems also may exist with mixed fisheries such as potential conflict between members of the system and sport anglers. Quota systems may promote consolidation of smaller operators and concentration of wealth and other social concerns (McCay 1995). These shortcomings may appear to be minor, but since such systems are new, complications may develop. In addition, these systems tend to evolve such that the association of quota holders acquires greater responsibilities as well as economic and political power. Will the evolution of these systems increase

the risk of overfishing? Could the formation of collectives and greater resource management responsibilities jeopardize fisheries resources? The biggest weakness is that the fish themselves are still common property, so individual fishers do not have strong incentives to stop the collective from cheating or taking risks. Therefore, government involvement is necessary to manage these systems; this should not be a problem if the appropriate agency is mostly apolitical. However, if it is political, then resource professionals can make poor decisions relating to the sustainable harvest of fish. The collective can treat overharvesting as an externality, shifting costs and consequences to the entire community (Atkinson 1982). In Minnesota the Red Lakes walleye fishery is an example of a failed collective ownership system. Commercial walleye gillnet fishing started in 1917 (Pereira et al. 1992), and the fishery recently collapsed after several years in which harvest consisted of one to two age-classes. Overfishing occurred because regulators allowed additional fishers access to the fishery, high quotas, and high harvests. The costs of this disaster are now being shared.

### **Private ownership of a fish stock: a corrective feedback**

Individual quota management systems bring economic rationalization to commercial fisheries (Larkin 1988). Quota strategies control effective effort to produce economic efficiencies. Fishers can then make rational business decisions that improve the long-term profitability of their businesses. With fish as common property, however, individual quota approaches still present conditions for unstable economic and political pressures. These approaches are unstable because the costs of overharvest and stock collapse are still easily shifted to the entire community (e.g., if quota holders or members of a collective who have accumulated wealth and political power from the sale of their harvest wish to reduce their future personal loss, they can lobby for others to bear the costs of their actions). Others have suggested two future developments

to these systems—single-quota systems and collectives (essentially acting as sole owner) that both harvest and manage the resource (Scott 1993; Pearse 1994). Many other options are not being debated. One approach involves government awarding property rights for fish to nongovernmental organizations or individuals who have absolutely no harvesting rights and whose purpose would be to sell the business inputs (i.e., the fish) to fish harvesters or quota holders and to manage the fish stock for long-term profit and human gain.

This approach of giving property rights for fish to nonharvesting entities privatizes some of the allocation responsibilities. As a hypothetical example, fishery authorities responsible for the Red Lakes fishery in Minnesota could award property rights for walleye to either the hypothetical group called PAO (Proletarians Against Overharvest), to NEED (Natives using fish for Elementary Education and Development), or to Fish Incorporated. The awarded group would set the safe harvest quotas, sell fish to interested harvesters, work out regulations with harvesters, enforce quotas and rules, hire biologists and consultants, absorb bycatch costs, and conduct other management functions. The role of government in this system includes setting up the system using the open market, establishing equitable ground rules and standards that reduce overharvest incentives for both groups (harvester and fish owner), conducting independent scientific investigations, and providing oversight and advice to both groups as well as providing a court for justice when someone violates the rights of others. Mace (1993) notes that benefits of a property rights system can be sustained only with government control and public accountability since private managers have higher discount rates than the public. Private managers have higher discount rates because they are more influenced by their fears regarding future harvests and benefits. Therefore, the government must be strong and play an active role in this property rights system to ensure the system

is fair and enforced, and the fishery is maintained at a sustainable level.

Giving property rights for fish to nonharvesting entities would have several benefits. One benefit would be that the politics would become more complicated. For example, politicians working on behalf of powerful fish harvesters would have to influence both the governmental agency responsible for oversight and the fish owner. Another benefit is the addition of yet another organizational interest—the success of the organization

### **Extending property rights to nonfishing entities and privatizing a portion of fish management is not in the best long-term interest of wild, exploitable fish populations.**

owning the fish depends on the long-term existence of that resource. If fish are owned by a nonfishing organization, and their sole commodity is fish (current and future) swimming in an area, then the value of wild fish becomes defined by the market. The fish owner would have strong incentives to manage and allow harvest that is both efficient and sustainable. Townsend (1995) discusses the merits of fisheries self-governance based on the corporate structure. He concludes that the corporate structure is superior to the cooperative rule structure due to incentives from longer-term planning horizons and better defined rights. Additional benefits could be accrued if the nonharvesting fish property owner lived in the local fishing community or had a strong identity and history with the local community. Mangel et al. (1996) notes that giving property rights to a local owner or organization increases the motivation for conservation since the link between conservation actions and local benefits for those actions are more clearly seen and felt. Conflict between fisheries with access rights

and a fish owner would more likely promote productive learning or objective resolutions. Learning often depends on conflict among advocates (Lee 1993). Fish harvesters and fish owners may disagree on stock status and, through debate and conflict facilitated with less politics, improve stock assessment and safe harvest estimates. Lastly, it is possible that Hardin's (1968) recommendation of corrective feedbacks developed through "mutual coercion, mutually agreed upon" are better forged between nongovernmental groups. Individuals and private organizations might be better at formulating and enforcing rules that limit harmful behavior to each other than those constructed by or with governments.

This approach of giving property rights for fish to entities with no harvest rights has many shortcomings, in fact many of the same ones mentioned earlier with quota and collective systems. Fish owners with large debts may want to sell more fish than the sustainable yield (Fujita et al. 1998). In addition, control of the resource by government is reduced, which may hamper settlements of future conflicts caused by indirect consequences of fish harvest. Also, the approach may have unforeseen social side effects related to the accumulation of power and resources in the private sector, which have been noted for other quota systems (McCay et al. 1998).

### **Conclusion**

Extending property rights for fish to nonfishing entities might reduce the likelihood of overfishing for some fisheries. Eliminating open access might not adequately prevent overfishing in some situations. The efficacy of commercial fish management with fish as common property depends on aggressive governmental regulation and enforcement. Some fishers operate to avoid governmental punishment—a disincentive for operations that cause overfishing and harm society. The most compelling argument for extending property rights for fish and awarding them to nonfishing entities was made back in


1776 by Adam Smith in *The Wealth of Nations*. Smith believed that individuals pursuing their own interests with competition would produce societal benefits. Although a business that sells fish to fishers with access does not intend to promote the public interest, it does so by protecting and promoting its own security. Silk (1978:149) noted that market failures in protecting the broad public interest occur when side effects of commerce “are not reflected in the normal pricing process and not corrected by the responses of the market.” One reason overfishing is not corrected by the market is because of the substitution effect—supply and demand depend on the quantity of substitutes available. In a market economy with wild fish having no economic value, aquaculture and yields of fish further down the food chain grow as a result of market forces that collapse wild fish stocks.

Extending property rights to non-fishing entities and privatizing a portion of fish management is not in the

best long-term interest of wild, exploitable fish populations. Although some of the evidence suggests otherwise, additional strategies such as community-based management, fish reserves, and better government control of commercial fish harvesting industries could more effectively reduce overfishing. Self-governing cooperatives and collectives based on individual transferable quota systems, now without the burdens of allocation, could effectively manage for sustainable harvests (Scott 1993). Extending property rights to fish out of fear of abuses by collectives and cooperatives with harvest rights is unfounded, and it goes against the values of many cultures. Evolution of individual transferable quota systems to include comanagement, bankable quotas, population stewardship rights, and allocation of quotas to nonharvesters or the government (as with halibut and sablefish quotas in the North Pacific) are evidence of productive and creative thought at mitigating

the initial shortcomings (Jentoft 1989; Townsend 1992; Gavaris 1996). The potential benefits of productive learning from politic-free conflict between fishers and government are beginning to emerge within quota management strategies (Starr et al. 1998). In addition, who can say that a business autocrat is less influenced by politics than a government bureaucrat? Governments are in the best position to manage fish resources for their citizens and interests, and reducing their ability to allocate fisheries resources compromises management for the full benefit of the state or country. Which concept is more likely right, Smith’s or Hardin’s? The simplistic Smith-Hardin debate continues to rage with no convincing model winner—case studies exist on both sides and in the middle (McCay and Jentoft 1998). Private owners of fish populations may not manage for sustainable benefits. This has been clearly seen with private owners of land resources, in which U.S. farmers deplete their topsoil at alarming rates.

The same could happen with fish resources—fish owners could discount the future for immediate profits.

Rigorous social analyses and debate on the need and consequences of extending property rights to fish and how that extension could occur are needed. Fisheries managers are verifying if corrective feedbacks are adequate to reduce the chance of overfishing. From the number of overharvested fish populations, corrective feedbacks apparently have been insufficient for many commercial fisheries. Our personal biases on privatization and market economy incentives should not limit the scope of the intellectual debate; in fact, we need to better understand economic incentives and human nature to adapt our institutions (Hanna 1998). Strategies to achieve sustainable wild fish benefits are likely to be many and diverse, with unique regimes for each fishery. Lastly, incorporation of more social science into fisheries management would allow us to predict policy change consequences. As a fisheries manager trained in biology and not in sociology, I believe we need consilience now more than ever to help avoid overharvest. 

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