

Introduction

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Today, only a few years after the collapse of the Atlantic cod stocks, the evidence that the Pacific salmon fishery is facing a similar crisis is overwhelming. Conservation and the fleet's economic viability are now at stake. The federal government's solution is to implement yet another program of fleet reduction and license restriction in an effort to reduce the total number of fish caught by Pacific fishermen. There is no evidence, however, that this plan will solve the long-term problems plaguing the industry. If the Pacific salmon is not to suffer the fate of the Atlantic cod, an alternative to the government's solution must be found.

Fortunately, there is an alternative. Fisheries managers in Iceland, New Zealand, and many other countries around the world have come to understand that poor economic performance, depleted stocks and overcapitalized fleets are a direct result of the way in which property rights are handled in fisheries. To solve many of the problems that now face the BC salmon fishery, managers around the world have abandoned bureaucratic management that regulates the amount of effort that goes into fishing in favour of "individual transferable quotas" (ITQs), a system that grants fishermen rights to a quantity of fish *before* they are caught.

This book will suggest that a change in policy is needed in order to promote the conservation of salmon and to eliminate costly subsidies to the fishing industry by the taxpayer. There are four sections. First, a fisherman and a fisheries manager address

the question of whether individual transferable quotas could be used to foster improved salmon management. In the second section, the authors present examples of experience with ITQ management in fisheries in British Columbia, Iceland, and New Zealand. The third section proposes a plan for a pilot project applying individual quotas (IQs) to the Pacific salmon industry. In the fourth section, it is suggested that quotas are not so much a radical solution as the first step in the evolution of stronger property rights for the protection and conservation of fisheries.

Symptoms of a serious problem: the current state of the salmon fishery in British Columbia

The federal department of Fisheries and Oceans (DFO) has a mandate to manage salmon resources for the people of Canada. Their conservation goals include "to conserve and protect . . . fish stocks and habitat for future generations." Their management goals include ensuring the best use of the resource and "maximizing the financial, cultural, and aesthetic benefits to the people of Canada" (DFO 1992). These are noble and worthy goals. But depleted stocks, unresolved conflicts between sports, commercial and aboriginal fishers, and an industry that needs continual subsidization to stay in business all indicate that we have not yet found a way to achieve those objectives.

Conservation

The federal government's recent record on conservation reveals an alarming trend. In 1994, over two million fish did not make it to the Fraser River spawning grounds. A review of the case of the disappearing fish led to the conclusion that 12 more hours of commercial fishing would have wiped out the province's most important sockeye run. In 1995, there was a disparity of 6.9 million between the 10.7 million pre-season forecast and the 3.8 million fish estimated actually to have made the post-season Fraser River sockeye run. The predictions for 1996 were so bad that the Pacific Salmon Revitalization Plan was implemented. (This is commonly referred to as the "Mifflin Plan," after Fred Mifflin, the current minister of Fisheries and Oceans.) The poor returns in 1996 meant closures and new restrictions on commercial fishermen as well as reduced fishing opportunities for sports and aboriginal fishers.

Another alarming indicator of a conservation crisis is the loss in biodiversity of salmon stocks. According to Carl Walters, a fish biologist at the University of British Columbia, there has been "a

profound reduction, by 50 percent or more since 1950 for all salmon species, in the number of populations that you would have to look at to see most of the production" (Walters 1995: 9). The decline and extinction of many small salmon populations means there are fewer remaining stocks. This is not just a matter of numbers. A smaller gene pool is more vulnerable to disease and to changes in ocean conditions.

Economic viability of the industry

The evidence is clear that the fishing industry is facing an economic crisis as both the conservation crisis and competition from farmed salmon intensify. In 1994–95, approximately \$3.4 million was generated from commercial salmon license fees while the department of Fisheries and Oceans spent about \$49 million managing the salmon fishery (DFO 1995: 2). The taxpayer subsidized the management of the fleet to the tune of \$45.6 million. Rather than reaping some of the benefits from the resource held in its name, the public must pay for that privilege. But the subsidies do not stop there.

There has been a dramatic decline in the income of the salmon fleet due to poor salmon returns, overcapitalization and the fall in salmon prices due to the increased supply of both wild and farmed fish on world markets. This decline in income translates into increases in Employment Insurance (EI) payments to fishermen. Since 1980, there has been an increase in the number of claims and in the amount paid out in benefits. In 1994, despite changes to the Employment Insurance act that, by increasing qualifying periods and reducing the length of benefit periods, made it more difficult to receive benefits, 6,530 fishing claims were allowed. The amount paid out was \$63.7 million (DFO 1995: 4). Estimates from Human Resources Development Canada indicate that \$1.85 is paid out for every \$1 in premiums collected in the Pacific Region fishing sector.

The problem with salmon management in British Columbia

The basic problem that fisheries managers face is that fish are a common property resource. Fish do not belong to anyone until they are caught and so there is incentive to catch as many fish as possible before someone else claims them. This means that although sports, aboriginal, and commercial fishers care deeply about the long-term viability of the resource, they do not face any

short-term incentives to conserve. If a fisherman lets a fish go, he has no guarantee that that fish will make it up a river to spawn. Rather, it is likely that another fisherman will catch it.

There is, of course, no conservation problem as long as fishing power is low enough that a sufficient number of fish will escape up the rivers to spawn. But, as the number of people who want to fish increases and the technology that they use improves, future harvests become threatened. In 1969, DFO tried to deal with this problem by limiting the number of licenses issued. Since then, management has focused on effort restrictions—limiting the number of opportunities to fish and restricting the equipment used to fish—in an attempt to control the number of fish caught. The Mifflin Plan, announced in March of 1996, is simply an attempt to renovate this exhausted strategy. In addition to buying back licenses, the plan reduces the area that a license holder may fish and requires that he use only one type of gear (seine, gillnet or troll).

The reason that buying back licenses, gear restrictions, and other forms of effort controls have failed to protect stocks and create an economically viable industry is that they control the number of fish caught indirectly rather than directly. Effort controls are ineffective because fishermen find ways to circumvent them. For example, when length limits were imposed on boats in an attempt to reduce the number of fish a boat could take in, boats with wider and deeper hulls came into use. When fisheries managers reduce fishing opportunities, commercial fishers respond by increasing the capability of their boats to catch fish quickly. Thus, effort controls only reduce the number of fish caught temporarily. As fishermen circumvent restrictions and technology improves, fisheries managers are forced to buy back licenses and increase the restrictions on effort. Fishermen are then compelled to overcapitalize: they spend extra money equipping boats with gear that does not increase the total catch but does increase the competitiveness of the individual fisher over other fishermen. In the commercial salmon fishery, capital costs have increased dramatically while production, although highly variable, has remained below one hundred thousand tonnes.¹

1 Commercial salmon landings since 1951 have tended to remain between 50,000 and 100,000 tonnes. In 1985 and 1986 landings slightly exceeded 100,000 tonnes. The capital value of the fleet increased by a factor of 3.6 between 1969 and 1988 (DFO 1992).

In most industries, we value competitiveness since it means firms try to lower their costs; this, in turn, gives consumers better products at lower prices. There are no such gains in the fisheries, however, where competition takes the form of "racing," i.e. increasing the effort to catch fish before another fisher can claim them. From an economic standpoint, this is extremely inefficient since the extra money spent racing does not add to the total number of fish caught but merely increases the costs of fishing.

In addition to wasting resources and not providing any conservation incentives, racing for the fish makes fishing more dangerous, as fishermen take unnecessary risks by fishing or travelling during inclement weather in an effort to make the most of the reduced fishing opportunities available. According to the Canadian Coast Guard Rescue Co-Ordination Centre in Victoria, in 1993 there were 378 marine incidents involving commercial fishing vessels and 13 lives were lost. In 1994, 14 lives were lost; in 1995, 11 lives were lost.

Protecting a way of life

Ironically, many fishermen do not look at the competitive race for the fish in the way that economists do. Commercial fishing is an exhilarating form of high-stakes gambling and competing against other fishermen is part of the game. The free-for-all hunting lifestyle passed on from generation to generation partly explains why the argument for subsidies to "protect the way of life" carries so much weight in the fishing industry. Both the public and the fishermen themselves see the profession as one of the last vestiges of a hunter-gatherer society. For many fishermen, the buy-back and restrictions on fishing areas remain more attractive than alternatives such as individual quotas because they allow the thrill of the chase. Controls are unsuccessful for the same reason that they are popular; they do not eliminate the race for fish. In fact, controls add to the complexity of the race as, to stay ahead, fishers have to find new ways to circumvent the restrictions on their efforts.

But, the way of life in the fishery must change. Protecting the way of life in the fishery does not come without costs; it occurs at the expense of taxpayers and consumers. This is a luxury we do not afford most industries. Although quotas would fundamentally change the nature of the fishing game, the game is bound to change, whether or not quotas are introduced, since the current

path is not sustainable and in the end, no fish will mean no fishing industry at all. One only has to look at Newfoundland and the collapse of the North Atlantic cod stocks to see the dangers of trying to maintain a way of life and maximize employment at the expense of a natural resource.

A promising solution: ITQs

Although there are variations in the way quota systems are set up, the basic idea is to give participants a right to a portion of the total allowable catch (TAC). The total allowable catch is the total number of fish that can be harvested in a season without harming the resource. An ITQ system is a move towards allowing those who benefit directly from the industry to have a claim to the fish before they are caught. Once the total allowable catch is set, fishermen know how many fish they can catch, either in poundage or number of fish. The initial allocation of quotas is usually done through a formula that captures historical catch and commitment to the fishery.

Under a quota system, since the individual fisher knows ahead of time how many fish he is allowed to catch, he is not competing with other fishermen and there is no race for the fish. This has several important implications.

- 1 Quotas eliminate inefficient capitalization. Instead of working towards maximizing the ability to catch lots of fish in a short period of time before other fishers catch them, fishermen can concentrate on maximizing their profits by increasing the quality of their catch and keeping their costs low.
- 2 Quotas usually mean fishermen can get better prices for their catch as they can spend less time on the fishing grounds and more time marketing their product. In addition, the longer fishing seasons that usually go with quotas mean that fish can be landed over a longer period of time and sold fresh rather than frozen. Fresh fish sell for higher prices.
- 3 The reduction in fishing costs, the result of not having to spend money to race to catch fish, increases fishermen's incomes and saves resources.
- 4 Directly setting a limit on the number of fish that each fisherman can take is a better way to conserve resources than indi-

rectly limiting the number of fish caught through effort controls. Giving each fisherman a direct stake in the industry also gives them an incentive to conserve fish.

- 5 A system of individual transferable quotas can create an economically viable fishery. Since the quota shares can be bought and sold, the most efficient fishers will acquire more fishing rights. Less efficient fishers will be compensated and the taxpayer will no longer be asked to help fund buy-back programs.
- 6 Fishing seasons are safer under a quota system. Because fishermen are guaranteed a portion of the catch, they do not have to fish in dangerous weather conditions.
- 7 Once an initial quota allocation has been made, there is a market mechanism to resolve disputes between sports, commercial, and aboriginal fisheries. These sectors can buy quotas from each other. Thus, if the sports fishery wants more rights, they can buy them from commercial fishers. This will show where the highest value lies, and will eliminate the current highly political fight over fishing rights. It also means that, when land claims are settled, if aboriginals are to be allocated a bigger share, the government will have to buy that share rather than re-allocate without compensation from other sectors as has been done in the past.

Although individual quotas have been successful in other fisheries, many have wondered whether it would be possible to manage the complex Pacific salmon fishery under such a system. Before addressing this question specifically, it will be instructive to take a broader view. The idea of assigning property rights to solve the common-property problem has been successful not only in other fisheries but also in other industries. For example, the city of Los Angeles developed an emissions-trading program to reduce air pollution. The program tackles a very complicated problem; it covers many pollutants across many industries. The carefully designed system has made assigning property rights to the air, something that was previously thought impossible, a successful, cost-effective, way to reduce pollution. The system is far more efficient than previous regulations and, in 1995, the greater Los Angeles region enjoyed the cleanest air on record (Broadbent 1996: 14). This suggests that the complexity of the salmon

fishery does not make a quota system impossible, though it does require that the program must be carefully designed. Creating a quota system for the complex Pacific salmon fishery may be more challenging than it is for other fisheries, but it is also more exciting. If a quota system can be successfully designed for Pacific salmon, then there is no reason that individual quotas cannot work for all fisheries.

Section 1: can individual quotas solve the salmon crisis?

In his paper on the question of quotas for salmon, **Paul Sprout**, the Director of Fishing Operations with the department of Fisheries and Oceans, explains how, under *any* system, biology and the number of stakeholders make the Pacific resource one of the most challenging fisheries in the world to manage. He raises important questions about allocation, management, and enforcement that need to be resolved before the introduction of a quota system to the Pacific salmon fishery. He emphasizes that the important question is whether “a salmon IQ system, warts and all, better meets the department’s objectives of conservation, economic viability, and partnership than the present system of management?”

Ken Erikson provides a fisherman’s insight into why individual quotas solve many of the problems facing the West Coast fishery. Though he suggests answers to some of the questions that Paul Sprout raises in his paper, Erikson also points out that there is a serious intersectoral allocation problem in the fishery. Because they have no direct control over the management of the fishery, commercial fishermen have lost historical allocations of chinook and coho to the sports fishing sector. As recreational fishing continues to increase in popularity, it is likely that the allocations to this sector will continue to grow. One of the important features of a transferable quota system is that the market rather than the political arena becomes the forum for solving allocation disputes. In terms of securing allocations of an appropriate number of fish, this system is preferable for all parties.

Section 2: actual experience with individual quotas

This section provides compelling evidence in favour of ITQs from several international fisheries as well as from the BC halibut fishery. The papers by Tom McClurg and Birgir Runolfsson illustrate the experience with quotas in New Zealand and Iceland, two of the first countries to implement ITQs.

Iceland

Birgir Runolfsson's description of the Icelandic experience with individual quotas supports the hypothesis that quotas would improve salmon management. Many of Iceland's fisheries recovered from overcapitalization and declining stocks after the introduction of quotas. For example, since the introduction of quotas to the failing herring industry, catches and technical efficiency have increased *tenfold*.

One objection to introducing quotas to the salmon fishery is that, since it is a mixed-stock fishery, use of quotas may exacerbate the problem of "high-grading," i.e., the discarding of less valuable catch. The demersal fishery in Iceland, however, is also a mixed-stock fishery and, according to Runolfsson, there is little evidence that high-grading has increased since the introduction of the vessel quota to that fishery in 1984.

In British Columbia, one of the biggest obstacles to changing fisheries policy is the concern that increasing the efficiency of the fishing industry will reduce employment. In his paper on the regional and social impact of ITQs, Runolfsson addresses that concern: "Although the increased efficiencies of the fisheries through the ITQ system are likely to decrease employment for fishers and in industries that are suppliers for the fishing vessels, employment in other industries should increase. The increased rent in the fisheries and therefore higher income of those in the industry should create demand for other domestic services and industries." He concludes that, although employment in the fisheries may decrease, there is reason to expect that total employment will increase. He also argues that the quota system out-performs effort restrictions as far as regional impact is concerned, arguing that a small town can secure catch and employment by purchasing quota. This security is unavailable under a system of effort controls.

New Zealand

New Zealand's experience with ITQs has also been favourable. **Tom McClurg** explains how the introduction of the Quota Management System to New Zealand's main commercial fisheries changed management incentives. McClurg appraises the incentives faced by bureaucrats and rights holders since the introduction of quotas in 1986, and discusses the importance of the initial design of the system. He also explains how quotas can help

resolve intersectoral allocation: "One of the consequences of the application of a rights-based approach to fisheries management is that it has a ripple effect through fisheries users. The clarification of the rights of one sector soon compels the examination of the rights and claims of other sectors." In New Zealand the allocation of ITQ property rights provided an opportunity to settle Maori fishing claims. He concludes that despite a period of flux during the introduction of quotas, they have been a success. Since their introduction, the industry has been profitable, showing unparalleled levels of investment and finding increased availability of fish. There is widespread agreement in New Zealand that more fisheries should be managed under the quota system.

British Columbia halibut

Closer to home, the BC halibut fishery has been successfully managed under quotas since 1991. **Paul Macgillivray's** paper discusses conditions in the halibut fishery before and after the introduction of quotas:² "Fisheries management in the 1980s was ineffective in controlling fishing effort, and the race for the fish resulted in very short seasons, unsafe fishing conditions, large quantities of by-catch being wasted, poor product quality, supply gluts and low landed prices." He assesses the individual quota program implemented in 1991 on the basis of biological management, economic efficiency, equity and distributional considerations, and administration and enforcement. The program has been successful in increasing the length of fishing seasons, improving fishing conditions, and improving product quality. Although employment has fallen, those who remain in the fishery are working longer and earning higher incomes. The strongest endorsement of the program comes from the fishermen themselves. When asked to vote on whether to continue the individual quota program, 91 percent of the halibut-license holders who responded, voted in favour of quotas.

Section 3: a quota pilot project for salmon

The paper in this section makes the transition from arguing theoretically about the merits of an ITQ system to proposing a plan to implement the policy on a trial basis for one sector of the commer-

2 The quota system implemented in the halibut fishery is the individual vessel quota (IVQ), which assigns a quota allocation to each fishing vessel.

cial fleet, the trollers. The ideas expressed in the paper reflect input from fishermen, academics, and consultants. The goal of the pilot project is to obtain more information about the benefits and feasibility of managing the salmon fleet under a quota system. Selecting trollers rather than ships using another type of gear for this project was logical because both industry and government have expressed interest in trying such a pilot project. If the pilot project were successful, it would be the first step towards managing the entire fishery under quotas.

Section 4: beyond quotas

Although individual quotas are now used to manage fisheries around the world, they remain controversial. Some argue that ITQs go too far towards extending property rights to harvesters; others think that quotas do not go far enough in establishing rights. The authors in the last section of the book offer some imaginative extensions of the pragmatic solutions to present problems offered by ITQs. They argue that ITQs are an intermediate step towards more secure property rights. **Elizabeth Brubaker** argues that while quotas are superior to weaker forms of property rights, they do not always go far enough along the property-rights spectrum and that, therefore, there can be problems with enforcement. She favours sole ownership either by individuals, communities, associations of rights holders, or corporations: "One of the strongest arguments for sole ownership is that it limits the opportunities for government interference in a fishery. Many quota systems maintain considerable government involvement . . . The government continues to set the total allowable catches, to manage fish stocks, to assign quotas, and to assume responsibility for environmental protection." Brubaker argues that fisheries will remain susceptible to political pressures until they are completely privatized.

The idea of privatizing the fishery thoroughly has, until recently, seemed a technological impossibility. But **Michael de Alessi** discusses how the technological frontier has changed. New technological developments are bringing us closer to being able to define rights over individual fish. He looks at the feasibility of private conservation and makes the case that it is becoming more practicable as emerging technologies increase the ability of owners to control marine resources: "If private property rights are allowed in the oceans, stewardship and technological innovation

will boom. Just as settlers in the frontier American West developed branding and fencing technologies to define and protect their property, sonar, satellites, tagging technologies, unmanned submersibles, artificial reefs, and aquaculture will allow owners of marine resources to do the same today. The challenge that lies ahead is to delineate control of the marine environment, creating owners who will be encouraged to conserve resources and to harness and develop the full potential of advances in technology."

A new direction for salmon management

Fishermen, fisheries managers, economists, and biologists from fisheries around the world now understand that effort-control management, the current approach used by the department of Fisheries and Oceans to manage salmon, is a failure. It does not provide any incentive to conserve fish and leads to higher fishing costs, lower product quality and unsafe fishing practices. This book makes it clear that there is a better alternative. Assigning property rights, under a system of individual quotas, to fish before they are caught lowers fishing costs, improves product quality, increases safety, and, most importantly, creates incentives to ensure that there are fish for future generations. There is no excuse for the current state of the salmon fishery, and there is no reason not to design and implement an ITQ system for salmon. If the department of Fisheries and Oceans is truly committed to maximizing the value of the fisheries for the people of Canada and ensuring the conservation of this resource for future generations, it is time to fish or cut bait.

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