

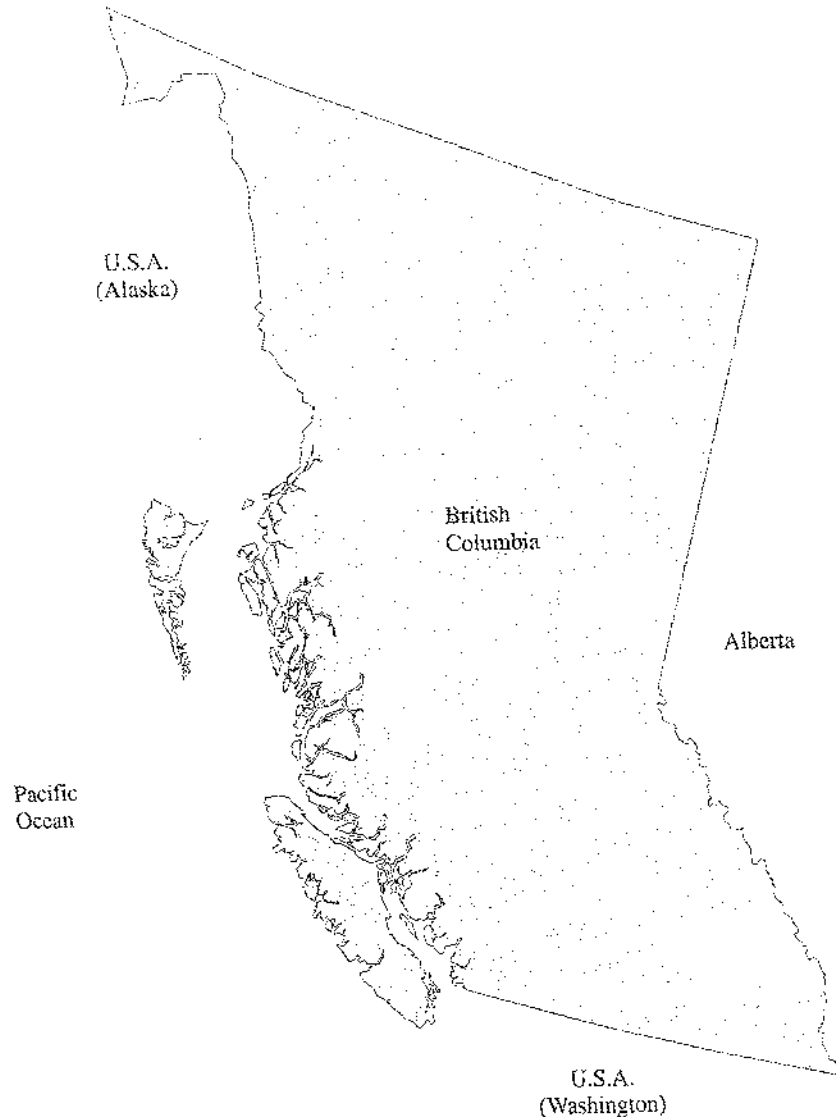
Preview: The Canadian Pacific Salmon Fishery

The product of policy analysis is advice. Specifically, it is advice that informs some public policy decision. Policy advice comes in many forms, but to give you the flavor of advice-giving we begin with an example that illustrates many of the concepts and ways of organizing policy analysis that you will encounter in this book, which provides the foundational tools for analyzing a wide range of policy problems.

Imagine that you have been asked by the new minister of the Department of Fisheries and Oceans to conduct an analysis of the commercial "small boat" salmon fishery in the Province of British Columbia. Does the current Canadian federal policy promote effective management of the fishery? The minister wishes you to help him answer this question by assessing current policy in comparison with possible alternative policies.

The term "small boat" fishery is used to distinguish this fishery from the commercial aquaculture salmon fishery, which is regulated by the provincial, rather than the federal, government. The minister has instructed you to consider the salmon sports fishery only to the extent that it directly affects on the commercial fishery (another analysis is examining the larger trade-offs between the commercial and sports fisheries). The minister has also instructed you to ignore, for the purposes of this analysis, negotiations with the United States over the division of salmon stocks between the two countries (again, a separate analysis of this issue has been commissioned). He has instructed you to treat the current law on the native salmon food fishery as a given, but does not wish to preclude you from considering policy alternatives that might transfer to the aboriginal community a greater share of the commercial fishery harvest.

As the minister hopes to propose any new policy initiatives early in his term, he has given you one month to produce your analysis. Although you are new to the ministry, and therefore have no background in fisheries, your training as a policy analyst should enable you to gather relevant information quickly from already available research and organize it effectively to provide a useful answer to the minister's question. An example of the sort of report you might produce follows.



B.C. PACIFIC SALMON FISHERY

Prepared for
The Right Honourable David Anderson,
Minister of Fisheries and Oceans
April 1998

EXECUTIVE SUMMARY

The salmon fishery of British Columbia faces serious challenges. The evidence suggests that, as currently organized, the fishery represents a net drain on the wealth of Canada. This will remain the case for the foreseeable future, in spite of reforms instituted in 1995 through the Mifflin Plan. While some of the problems associated with the fishery can be attributed to inherent market failures, most are attributable to ineffective, or indeed counterproductive, government interventions. Although the current regime probably does not threaten the viability of most salmon runs, it does endanger some of the smaller runs and subspecies, especially coho. On balance, it is desirable to replace the current regulatory regime with one based on quotas allocated to incumbent fishers.

This analysis examines four policy alternatives: (1) the status quo policy; (2) harvesting royalties, license auction, and buy-back; (3) river-specific auctioned monopolies (with site auctions on the Fraser), and (4) individual transferable quotas. All four alternatives are evaluated in terms of their ability to meet the following goals: efficiency (primarily reduce rent dissipation, the unnecessary expenditure of resources to secure the catch), preservation of the fishery (primarily maximize the number of viable river runs), equitable distribution of the economic value of the harvest (to current license holders, to aboriginal fishers, and to taxpayers), and administrative feasibility. On the basis of this evaluation, the minister should move toward the adoption of an individual transferable quota scheme.

Experience in other countries over the last decade suggests that an individual transferable quota scheme would largely eliminate rent dissipation (although it is not the lowest cost method of catching salmon), would preserve the fishery (provided share catches rather than fixed quotas are utilized), and would be equitable to relevant groups. Effective administration of the quotas would probably be the greatest challenge. But, again, a careful study and assimilation of other countries' experiences (especially New Zealand's and Iceland's) suggest that transferable quotas can be feasibly administered.

Introduction

Commercial fisheries around the world appear to be threatened by mismanagement.¹ The near-total collapse of the East Coast cod fishery dramatically illustrated to the federal government and, indeed, to all Canadians the risks of mismanagement: losses to the Canadian economy, personal hardship to those in the industry, and the fiscal impacts of adjustment expenditures by the government. Does current policy provide an adequate basis for effective management of the British Columbian small-boat salmon fishery? Do any alternative policies offer the prospect for better management?

The British Columbian Salmon Fishery

The West Coast commercial salmon fishery is an important Canadian industry, especially for the province of British Columbia. The average value of the commercial salmon harvest over the last twenty-two years has been approximately \$260 million (in 1995 Canadian dollars).² The fishery, if effectively managed, has the potential to generate benefits considerably in excess of the costs required to harvest the fish. This value is known as economic, or scarcity, rent. However, mismanagement of the fishery can potentially dissipate some, or even all, of this rent by encouraging too much investment in fishing effort. The evidence suggests that dissipation of economic rent is a common worldwide phenomenon.³ Indeed, mismanagement combined with other misguided policies could lead to social costs in excess of total economic rent.⁴ To what extent are potential rents from the British Columbian salmon fishery being dissipated?

¹One recent review of the state of commercial fisheries concludes: "The world's fisheries face the crises of dwindling stocks, overcapitalization, and disputes over jurisdiction. The catch has fallen in all but two of the world's 15 major fishing regions." R. Quentin Grafton, Dale Squires, and James E. Kirkley, "Private Property Rights and Crises in World Fisheries: Turning the Tide?" *Contemporary Economic Policy*, Vol. 14, no. 4, 1996, pp. 90-99, at p. 90.

²Richard Schwindt, Aidan R. Vining, and Steven Globerman, "Net Loss: A Cost-Benefit Analysis of the Canadian Pacific Salmon Fishery," Working Paper, SFU-UBC Centre for the Study of Government and Business, Vancouver, 1998.

³Jeffrey Sachs and Andrew Warner, *Natural Resource Abundance and Economic Growth*. (Cambridge, Mass.: Harvard Institute for International Development, 1995).

⁴Robert T. Deacon, "Incomplete Ownership, Rent Dissipation, and the Return to Related Investments," *Economic Inquiry*, Vol. 32, no. 4, 1994, pp. 655-83; Schwindt, Vining, and Globerman, "Net Loss: A Cost-Benefit Analysis of the Canadian Pacific Salmon Fishery."

ECONOMICS OF THE FISHERY: THE OPEN ACCESS CASE

It is useful to contrast the current state of the salmon fishery with what would likely occur if it were to operate as an unregulated resource. In the unregulated fishery, we assume that individual fishers cannot be excluded from access to fish until the fish are actually appropriated in the process of fishing—in other words, there is competitive "open access" and a "law of capture" applies. An open access salmon fishery can be best understood and analyzed as a public goods problem—one in which the good is rivalrous in consumption (if one individual captures and consumes a salmon that particular fish is not available to any other individual), but in which exclusion is not economically feasible. Extensive theoretical and empirical research on open access resources in general, and on fisheries in particular, characterize the consequences of open access: Most importantly, too much of the resource will be harvested from the social perspective.⁵ Fishers will find it in their individual self-interest to fish until the costs they see of catching an additional fish (their marginal costs) just equal the price of the fish (their marginal benefits). Their individual efforts, however, increase the marginal costs of all other fishers by reducing the stock of fish available for catching.

Before the arrival of Europeans open access of the salmon fishery as just described may not have presented an economic problem because supply exceeded demand at zero price. It is certainly plausible to posit that there was a native fishery in the distant past before the arrival of Europeans in which salmon were essentially "free goods" so that the catches of individuals did not increase the marginal costs borne by other fishers. In such circumstances, the indigenous peoples of the Northwest coast would have been free to exploit the salmon fishery fully without depleting the resource in any meaningful economic sense.⁶

There is, however, considerable historical evidence that, even before the European incursion, increasing demand for fish had moved much of the native salmon fishery beyond the status of a free good. However, rather than allowing an open access situation to arise, the indigenous population had developed a system of private and common property

⁵For the seminal theoretical articles, see: H. Scott Gordon, "The Economic Theory of a Common-Property Resource: The Fishery," *Journal of Political Economy*, Vol. 62, 1954, pp. 124-42; Anthony D. Scott, "The Fishery: The Objectives of Sole Ownership," *Journal of Political Economy*, Vol. 63, no. 2, 1955, pp. 116-24.

⁶For historical evidence, see Robert Higgs, "Legally Induced Technical Regress In the Washington Salmon Fishery," pp. 247-279 in Lee J. Alston, Thrainn Eggertsson, and Douglass C. North, eds., *Empirical Studies in Institutional Change* (New York: Cambridge University Press, 1996).

ownership.⁷ The Northwest coast native salmon fishery was generally a terminal, or river, fishery that caught fish in an efficient manner using weirs and traps.⁸ Most importantly, the fishery was efficient in a temporal sense; the indigenous population had both the incentives and social organization to allow sufficient spawning fish through to replenish the stock.⁹

The influx of the non-indigenous Europeans, who were in practice not subject to the extant indigenous property rights, created an open access regime. Not only were the new users not excluded from the river-mouth fishery, they also introduced technology that allowed them to leapfrog native riverine fisheries by fishing in the open sea.¹⁰ This leapfrogging created an open access environment, and it introduced less cost-effective fishing methods. One estimate is that in the 1930s, traps in neighboring Washington state were approximately two-thirds more cost-effective than the emerging small-boat fishery, and that, without the interception fish by the small-boat fishers, the traps could have been five-sixths more cost-effective.¹¹ The history of the regulation of the fishery makes clear that the incentive to leapfrog with new technology has remained strong.

A BRIEF HISTORY OF GOVERNMENT REGULATION OF THE FISHERY

The history of the salmon fishery has been well documented.¹² For purposes of this analysis, it is sufficient to review briefly four eras of policy development: the early fishery, the Sinclair Report/Davis Plan, the Pearce Commission, and the Mifflin Plan.

⁷Anthony Netboy, *Salmon of the Pacific Northwest: Fish vs. Dams* (Portland, Or.: Binfords and Mort, 1958); Russell L. Barsh, *The Washington Fishing Rights Controversy: An Economic Critique* (Seattle, Wa.: University of Washington Graduate School of Business Administration, 1977).

⁸Richard Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History," in Helmar Drost, Brian Lee Crowley and Richard Schwindt, *Market Solutions for Native Poverty* (Toronto, Ont.: C. D. Howe Institute, 1995), 98-152; Higgs, "Legally Induced Technical Regress in the Washington Salmon Fishery."

⁹Higgs, "Legally Induced Technical Regress in the Washington Salmon Fishery."

¹⁰See also Fay G. Cohen, *Treaties on Trial, The Continuing Controversy over Northwest Indian Fishing Rights* (Seattle, Wa.: University of Washington Press, 1986); Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History."

¹¹Higgs, "Legally Induced Technical Regress in the Washington Salmon Fishery," pp. 273-74.

¹²Some of the important sources include: Sol Sinclair, *Licence Limitation—British Columbia: A Method of Economic Fisheries Management*, (Ottawa: Department of Fisheries, 1960); Alex G. Fraser, *Licence Limitation in the British Columbia Salmon Fishery* Technical Report Series No. PAC/T-77-13, (Vancouver, B.C.: Dept. of the Environment, Fisheries and Marine Services, 1977); Richard Schwindt, "Public Policy and the Pacific Salmon Fish-

Early History: Open Access

By the 1880s, there were already signs of overfishing in British Columbia, especially on the Fraser River. This paralleled problems experienced on the Columbia and Sacramento Rivers.¹³ It appears that open access had begun to lead to reductions in returning stocks. Licenses were introduced, but as much for their revenue potential as to deter entry. In 1887, the first formal attempts were unsuccessfully made to restrict entry. The first restrictions on entry were made in 1908, but new licenses were issued in 1914, and limitations on licences were suspended completely in 1917. Effective entry restrictions were not implemented again until the late-1960s.

Between the end of World War I and the 1950s, pressure on the stocks increased both from new entrants and increased investments in capital and labor by both incumbents and new entrants. The growing problem of overcapitalization had long been recognized. The 1917 report of the B.C. Commissioner of Fisheries noted "the solution of this problem would not seem to be found in encouraging or permitting the employment of more capital or more labor than can efficiently perform the work. . . . If the cost of production becomes too great all hope of advantage to the public as consumers will disappear."¹⁴

The Sinclair Report/Davis Plan

With pressure on the stocks continuing to mount, the federal government commissioned Sol Sinclair, an economist, to provide a detailed report on the fishery and make recommendations. Sinclair identified three policy alternatives: creating exclusive property rights to the resource through a monopoly; using taxes to discourage overcapitalization; and closing entry.¹⁵ In spite of these recommendations, the federal government was reluctant to stop entry: "a policy of restricted entry would run counter to the popular notion that participation by any citizen in the fishery was a natural right."¹⁶ Rather than face the politically

ery's Harvesting Crisis," in Tom Gunton and John Richards, eds., *Resource Rents and Public Policy in Western Canada* (Halifax, N.S.: Institute for Research on Public Policy, 1987), 215-48; Daniel Boxberger, *To Fish in Common: the Ethnohistory of Lummi Indian Salmon Fishing* (Lincoln, Neb.: University of Nebraska Press, 1989); Richard Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History"; Higgs, "Legally Induced Technical Regress in the Washington Salmon Fishery."

¹³See Fraser, *Licence Limitation in the British Columbia Salmon Fishery*.

¹⁴Quoted in Fraser, *Licence Limitation in the British Columbia Salmon Fishery*, p. 5.

¹⁵Sinclair, *Licence Limitation—British Columbia: A Method of Economic Fisheries Management*, pp. 101-106.

¹⁶Don DeVoretz and Richard Schwindt, "Harvesting Canadian Fish and Rents: A Partial Review of the Report of the Commission on Canadian Pacific Fisheries Policy," *Marine Resource Economics*, Vol. 1, no. 4, 1985, pp. 5-23, at p. 130.

unpopular reality, governments chose to restrict fishing incrementally, especially through restrictions on fishing times and locations: "Resource rents were dissipated as before, but the danger of physical exhaustion of the stocks was lessened."¹⁷ The other alternatives were even less politically popular, as they would directly harm incumbents—the most organized and vocal group. In 1968, license limitation was introduced under the Davis Plan (named after the then-minister of fisheries) to little opposition: "incumbents vessel owners generally approved of the plan . . . the revocation of rights provoked no public outcry . . . the interest group adversely affected (potential participants) was dispersed, unorganized, and undoubtedly incapable of calculating the loss."¹⁸

The Davis Plan also included the first effort to reduce the size of the fleet by a voluntary buy-back. But this aspect of the plan suffered from a "vicious circle" syndrome that has also affected subsequent voluntary buy-back efforts: The buy-back raises the market value of all remaining licenses (the anticipated fishing effort reduction "capitalizes" into the remaining licenses); this, in turn, raises the cost of the buy-back and quickly exhausts the buy-back budget. Clearly, even after the buy-back, there remained many more than the number of vessels that would maximize rent.¹⁹ A final important consequence of the Davis Plan was that it effectively "froze" vessel types to seine, gillnet, troll, and gillnet-troll boats, which have very different capabilities and efficiencies.

Apart from failing to eliminate excess incumbent boats, the Davis Plan's Achilles' heel was that it did nothing to curb further overcapitalization unrelated to entry. Indeed, it worsened the problem. Incumbents were now relatively fixed in number and therefore only had to compete with each other for the rents. They did this by replacing older boats with newer ones and purchasing ancillary technology, a process known as *capital-stuffing*. This is a widely occurring problem in fisheries with entry restrictions.²⁰ The buy-back was somewhat effective through most of the 1970s as salmon prices rose, but landed values dropped substantially between 1978 and 1983. New entrants who gained access by purchasing licenses from incumbents found themselves facing a financial crisis (many "old" incumbents who had held licenses when the Davis Plan was implemented could retire on their windfall gains). These conditions led to another commission in 1982, known as the Pearse Commission.

¹⁷Ibid., p. 131.

¹⁸Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History," p. 106.

¹⁹See Pearse, *Turning the Tide*; also see Diane P. Dupont, "Rent Dissipation in Restricted Access Fisheries," *Journal of Environmental Economics and Management*, Vol. 19, no. 1, 1990, pp. 26–44.

²⁰Ralph E. Townsend, "Entry Restrictions in the Fishery: A Survey of the Evidence," *Land Economics*, Vol. 66, no. 4, 1990, pp. 359–378.

The Pearse Commission

The Pearse Commission, after extensive hearings, again noted the disastrous state of the fishery: "the economic circumstances of the commercial fisheries are exceptionally bleak . . . [and] . . . there is growing concern about the precarious condition of many of our fish stocks."²¹ In spite of this situation, Pearse pointed out the primary problem was *not* the size of the harvest, which had remained relatively stable for approximately fifty years, whether measured in terms of number of fish or landed weight. The combination of restricted openings, gear restrictions, riverine protection, and salmon enhancement were generally succeeding in protecting the viability of the stocks. However, Pearse argued that the catch was still considerably below the potential sustainable yield. This was partly because of degradation of fish habitat by the forest industry and other developments subject to provincial jurisdiction.

The Pearse Commission concluded that previous efforts to limit boat length and tonnage alone had not successfully restricted capital-stuffing: "when one or more inputs in the fishing process are restricted, the capacity of the fleet can continue to increase by adding other unrestricted inputs."²² While regulators could conceivably continue to place more input dimensions under restriction, "such restrictions would have to be so numerous and diverse (covering vessel size, power, crew, time spent fishing, gear for finding, catching and holding fish, and so on) that they would be virtually impossible to administer and enforce."²³

The Pearse Commission recommendations are comprehensive and complex. The most important recommendation was that royalty taxes be imposed on the salmon catch: "a realistic portion of revenues derived from commercial fisheries should now be directed away from excess catching capacity toward recouping these costs to the public, reducing bloated fleets and enhancing the resource."²⁴ Note that although the distributional consequences of the tax are emphasized in this quote, such a tax would also be efficiency-enhancing because the revenues that would now go to government previously represented economic waste. Thus, such a tax both preserves and transfers the rent. The commission recommended that a royalty rate of between 5 and 10 percent of the gross value of the harvest be imposed on buyers (that is, mostly on the fish processors). The report did not discuss the incidence of this royalty tax, but subsequent analysis suggests that

²¹Pearse, *Turning the Tide*, vii.

²²Ibid., p. 83; see also R. B. Rettig, "License Limitation in the United States and Canada: An Assessment," *North American Journal of Fisheries Management*, Vol. 4, no. 3, 1984, pp. 231–48.

²³Pearse, *Turning the Tide*, p. 83.

²⁴Ibid., p. 93.

it would be spread among foreign consumers, domestic consumers, processors, and fishermen.²⁵

Pearse also recommended reducing the fishing capacity of the fleet by approximately 50 percent by buying back licenses and by auctioning licenses for ten-year periods. All existing licenses would expire after ten years. The major features of the proposed auction were as follows: In the first year, ten-year licences representing 10 percent of the target capacity of the fleet would be competitively auctioned. In each of the nine subsequent years, a further 10 percent would be auctioned. During the first ten-year period, only existing license holders would be allowed to bid. Bids would be in sealed envelopes and would be ranked from the highest offer downward. The bid value of the lowest accepted bid would determine the price to be paid by all successful applicants. Each license would specify the gear, vessel capacity, and zone from which fish could be taken. Bids would be expressed in dollars per ton of vessel capacity sought. No individual or corporation would be allowed to acquire new licenses if, as a result, they would hold more than 5 percent of the total available licenses. Finally, during the initial ten-year period, incumbent fishermen could sell their license to a buy-back authority at market value.

Pearse acknowledged that the proposal to reduce fishing capacity by 50 percent was greater than apparent excess capacity. But he argued that "many underestimate the *potential* capacity of the fleet unencumbered by many of the restrictions on time, location and gear that have been imposed to constrain fishing power."²⁶

None of the major Pearse Commission recommendations relating to the salmon fishery were implemented.

1996: The "Mifflin Plan"

At the end of 1995, the size of the fleet was much as it had been in 1982 at the time of the Pearse Commission. In 1982, there had been 4,470 extant salmon licenses, in 1995 the number was 4,367.²⁷ However, fishing power had increased enormously over this period because of continued capital-stuffing. In March 1995, the then minister of fisheries summarized the problem succinctly: "a fundamental cause of the increased difficulty in managing the salmon fishery is that the size of the fleet has remained static while its fishing power has increased dramatically."²⁸ The fishing power of the fleet meant that the major mechanism

²⁵DeVoretz and Schwindt, "Harvesting Canadian Fish and Rents: A Partial Review of the Report of the Commission on Canadian Pacific Fisheries Policy."

²⁶Pearse, *Turning the Tide*, p. 111.

²⁷Schwindt, Vining, and Globberman, "Net Loss: A Cost-Benefit Analysis of the Canadian Pacific Salmon Fishery."

²⁸Brian Tobin, "Statement in Response to the Report of the Fraser River Sockeye Public Review Board," (Montreal: March 7, 1995).

available for protecting fish stocks was strong restrictions on the period in which the fishery was open. While this approach generally protected the viability of stocks, for many river runs there was little margin for error given the immense fishing capacity that could be deployed. This, in turn, put tremendous pressure on marine scientists in the Department of Fisheries and Oceans (DFO) to get their estimates of specific run sizes right. Many marine biologists feared that one or more runs were vulnerable: "Our current fishery . . . will very likely go the same way as [the] Atlantic Canada [cod fishery] within the next few decades if profound steps are not taken to restructure and protect it."²⁹

In March 1996, the federal government introduced the Pacific Salmon Revitalization Strategy, now generally referred to as the Mifflin Plan, after the then-incumbent minister of DFO. The plan proposed to reduce the fleet in two ways. First, \$80 million was allocated to a voluntary license buy-back program. Under this buy-back, the total fleet was reduced by 1,173 vessels, or approximately 27 percent of the extant capacity. Second, area licensing was imposed, consisting of two geographic regions for seine vessels and three regions for gillnet and troll vessels. Current license holders had to select one geographic area. However, they could "stack" licenses by purchasing them from other license holders. The Mifflin Plan did not address other aspects of capital-stuffing. For example, seine vessels that in the past were only capable of making four "sets" a day are now able to make over twenty-five sets a day.³⁰ Area licensing can be seen as a further attempt to reduce congestion externalities, but given the large number of vessels remaining in each area, it will probably only have a small and short-term impact.

The Mifflin Plan represents the current salmon fishery regime. The next section of this report summarizes the evidence on the current state of the fishery, and projects probable impacts of the Mifflin Plan in the future.

THE CURRENT AND EXPECTED STATE OF THE FISHERY

Will the Mifflin Plan eliminate, or even substantially reduce, rent dissipation? Will it adequately protect salmon stocks? The Mifflin Plan has clearly resulted in a short-run reduction in capacity. Yet experience suggests that the remaining incumbents will be tempted into a new round of capital-stuffing. In order to assess the current state of the fishery, it is useful to ask: What is the economic cost of current levels of rent dissipation, and how might the Mifflin Plan mitigate it?

²⁹Carl Walters, *Fish on the Line* (Vancouver, B.C.: David Suzuki Foundation, 1995) at p. 4.

³⁰R. Quentin Grafton and Harry W. Nelson, "Fisher's Individual Salmon Harvesting Rights: An Option for Canada's Pacific Fisheries," *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 54, no. 2, 1997, pp. 474-82.

Fortunately, a cost-benefit analysis of the British Columbian salmon fishery has recently been completed and can serve as a basis for answering these questions.³¹ The analysts estimate annual costs and benefits for specific elements of the fishery: value of the harvest, harvesting costs of participants in the industry, government expenditures on management, enhancement, and enforcement, and unemployment insurance payments. They estimate the *net present value* (NPV), a measure of the stream of net benefits of the fishery expressed in terms of an equivalent amount of current consumption, under various assumptions, using a twenty-year time horizon and a (real) discount rate of 8.3 percent.

The analysts assume that the fishery is being managed close to its maximum sustainable yield (this is a "conservative" assumption as current catches may actually be somewhat lower). Their first estimate of the NPV of the fishery assumes no Mifflin Plan. Under one assumption, unemployment insurance (UI) payments are treated as a cost of the fishery and under another assumption they are treated as not relevant.³² Depending on whether unemployment insurance payments are treated as an opportunity cost of the fishery, the NPV of the fishery is either -\$675 million (UI not included) or -\$1,263 million (UI included). Under either assumption, the NPV is *negative* indicating net social losses in terms of current consumption equivalents.

What might be the impact of the Mifflin Plan, in terms of its impact on the NPV of the fishery? Mifflin is primarily a buy-back plan, but it also increases locational constraints. One optimistic assumption is that boat retirements will go straight to "the bottom line" and stay there; in other words, the boat retirements will represent capital permanently removed from the fishery. The authors of the cost-benefit study present a number of alternative estimates of the impact that Mifflin might have on both private and public costs. They estimate that if private costs are reduced by 25 percent (approximately equivalent to the percentage of the fleet that has been retired under Mifflin) and public costs remain the same, then the NPV would be -\$60.5 million.³³ This is a significant improvement over the pre-Mifflin NPV, but it is still negative and indicates net economic losses from operation of the fishery. But for reasons described above, this is an optimistic scenario if history is any guide to the future. There are still private rents, and expected private rents are increased (because of the fleet reduction). There are a number of reasons for this: the presence of significant sunk costs,³⁴ attractiveness of the

³¹Schwindt, Vining, and Globberman, "Net Loss: A Cost-Benefit Analysis of the Canadian Pacific Salmon Fishery."

³²*Ibid.*, Table 8.

³³*Ibid.*, Table 9.

³⁴Among the most significant sunk costs are salmon-fishing expertise (Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History") and, in current world fishing conditions, fishing boats (David G. Terkia, Peter B. Doeringer and Philip

fishing lifestyle,³⁵ the cyclical nature of salmon harvests which holds out the hope of future "bonanzas," the heterogeneity of fishing skills,³⁶ and the presence of implicit government subsidies. As a result, the industry will remain attractive to most participants. Incumbents are likely to engage in a new round of capital-stuffing. A plausible scenario is that only a 5 percent reduction in private capital will be achieved and that public costs would only be reduced 10 percent. In this case, the analysts estimate that the NPV, again negative, is -\$380 million. These costs should be compared to the potential benefits of an efficiently organized fishery. The analysts suggest (consistent with the evidence presented earlier) that the fishery, even organized as a small-boat fishery, could be fully exploited with approximately half the extant resources. If the fishery could be managed in this way, and assuming that public costs declined proportionally, the analysts estimate that the NPV of the fishery would be \$544 million—a positive, rather than negative net present value as results under current policy.³⁷

It is useful to have some handle on the sources of rent dissipation in thinking about policy alternatives. Analysis based on 1982 harvest figures suggests that fleet composition is probably the major source of rent dissipation, with excess boats second, and other margins of input substitution third.³⁸ The Mifflin Plan does not directly address the first or third issues. It makes some progress toward reducing the number of excess boats, with more troll and gillnet boats retired in the buy-back than the more efficient (in terms of effort-to-catch ratio) seiners. Nevertheless, incremental reform that does not substantially alter, or eliminate, boat types will not be able to realize the largest potential rent gains.

In spite of the introduction of area licensing, the Mifflin Plan is also unlikely to protect vulnerable fishing runs adequately, especially if there is renewed capital-stuffing. There will still be huge capacity hovering

L. Moss, "Labor Stuckness in Offshore Fishing," *Land Economics*, Vol. 84, no. 1, 1988, pp. 73-82).

³⁵Indergjit Singh, Lyn Squire, and John Strauss, eds., *Agricultural Household Models: Extensions, Applications, and Policy* (Baltimore, MD: The Johns Hopkins University Press, 1986; De Alessi, Louis, "Form, Substance, and Welfare Comparisons in the Analysis of Institutions," *Journal of Theoretical and Institutional Economics*, Vol. 146, no. 1, 1990, pp. 5-23; David Feeney, Susan Hanna, and Arthur F. McAvoy, "Questioning the Assumptions of the 'Tragedy of the Commons' Model of the Fisheries," *Land Economics*, Vol. 72, no. 2, 1996, pp. 187-205.

³⁶John R. Boyce, "Using Participation Data to Estimate Fishing Costs for Commercial Salmon Fisheries in Alaska," *Marine Resource Economics*, Vol. 8, no. 4, 1993, pp. 367-94; additionally other fishers may attribute the returns to highly skilled fishers as luck—encouraging them to remain in the fishery.

³⁷Schwindt, Vining, and Globberman, "Net Loss: A Cost-Benefit Analysis of the Canadian Pacific Salmon Fishery."

³⁸Dupont, "Rent Dissipation in Restricted Access Fisheries."

over particular runs. The number of salmon can vary greatly from year to year, from area to area, and from species to species—sometimes by twenty- or thirty-fold. Under these conditions, incorrect volume and escapement estimates by the Department of Fisheries could be catastrophic for preservation of runs.

POLICY GOALS

What policies should govern the Pacific salmon fishery? An answer to this question requires the specification of policy goals that provide an appropriate basis for comparing current policy with possible alternatives. The preceding discussion of problems inherent in the status quo immediately suggests two important goals.

First, although the salmon fishery is a potentially valuable resource, because of rent dissipation it is currently a net drain on the wealth of the people of British Columbia and Canada. A primary policy goal, therefore, should be *economically efficient use* of the fishery. The primary criterion for measuring progress toward this goal is *reduction of rent dissipation*.

Second, the current policy poses a risk to the preservation of salmon runs. Most Canadians place a positive value on preserving the fishery for multiple uses and future generations. *Preservation of the fishery* should therefore be a policy goal. The primary criterion for measuring progress toward this goal is the *maximization of the number of viable runs*.

Third, the costs and benefits of the fishery should be fairly distributed among important stakeholders. *Equitable distribution* should be a policy goal. Fairness requires that current license holders, who have made investment decisions based on a reasonable expectation that current policy will continue, receive explicit consideration. As current license holders, who may or may not themselves be fishers, are likely to be highly attentive to proposed policy changes and very vocal in opposition to changes they view as harmful, considering their interests is likely to contribute to the political feasibility of any policy alternative, an instrumental value beyond fairness itself. Aboriginal peoples have cultural, economic, and constitutionally protected stakes in the use of the salmon fishery. Any policy change should at least protect their interests. As alternative policies have implications for government revenues and expenditures, fairness to Canadian taxpayers should be a concern. Although the federal government is just now getting its fiscal house in order, it still faces a large accumulated debt that burdens Canada with one of the worst ratios of national debt to gross domestic product among industrialized countries. Therefore, reducing subsidies from taxpayers to the fishery, or even capturing some fishery rent for the public treasury, is desirable. These considerations suggest the following criteria for assessing progress toward achieving an equitable distribution: *fairness to current license holders, fairness to aboriginal fishers, and fairness to taxpayers*.

Fourth, any policy should be administratively feasible so that it can actually produce its intended benefits. Therefore, *administrative feasibility* should be a policy goal. The criteria used for assessing administrative feasibility include: *ease of enforcement* to ensure that regulations are followed; and *flexibility* to allow the policy to accommodate the dynamic and cyclical nature of salmon stocks.

It is important to note that these goals often conflict. For example, while allowing small salmon runs to be extinguished might be consistent with economic efficiency, it would conflict with the goal of preserving the fishery. Therefore, selecting the most socially desirable policy involves making tradeoffs among the goals.

SOME NEW WAYS OF ORGANIZING THE SALMON FISHERY

The analysis presented in the remainder of this report compares the status quo policy to the following three alternatives:

The Pearse Commission Proposal: Harvesting Royalties, License Auction, and Buy-Back

This alternative recycles the Pearse Commission recommendations. Specifically, it includes a royalty tax of 10 percent, the ten-year rolling license auction, and the 50 percent buy-back as described above. The length of the fishing season would be adjusted through opening restrictions to achieve the salmon total annual catch (TAC) as currently set by DFO officials. The Pearse Commission also proposed providing financial assistance to the native population to further participation in license purchases (\$20 million over five years) and a ban on licenses that were held by native fishing corporations from being sold to non-natives. Although never implemented, many fisheries experts regard the Pearse Commission recommendations as exemplary.

Modified Schwindt: River-Specific Auctioned Monopolies (with Site Auctions on the Fraser)³⁹

Under this alternative the right to catch all salmon entering each river system would be auctioned for a period of twenty-five years. During the last five years, incumbents would only be allowed to catch the same average number of fish as in the first five years of their tenure. The small boat fishery would be bought out and disbanded. Auction winners

³⁹Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History," proposes river-specific terminal fisheries. But he does not propose an auction; rather he essentially proposes giving the fishery to the native population. He does not discuss the Fraser River specifically.

would almost certainly adopt fish traps and weirs, the lowest cost method of catching salmon.⁴⁰ Current incumbents of the small boat fishery would receive compensation for their withdrawn licenses from the government equal to license market value plus a 50 percent premium. It is proposed that payments would be annualized over fifteen years; the payments would include interest at market rates. Compensation necessarily has some element of arbitrariness. The rationale for a level of compensation greater than license value is that market value would fully compensate marginal fishers (who, with the payments, would be indifferent between staying in or leaving the fishery), but not fishers who would not be willing to sell at market prices (whether because of superior skill, utility from the fishing lifestyle, or other reasons). Natives would receive 30 percent of the monopolies as against their current (approximate) 19 percent of commercial fishing licenses. Fish hatcheries (except on the Fraser) would be included in the auction price; purchasers would have the right to continue using them or closing them down.

These are about 1,500 spawning streams in British Columbia. The only river system in British Columbia where it will be impossible from a practical standpoint to sell rights to a single monopolist is the Fraser River. The Fraser accounts for approximately 63 percent of the sockeye, 23 percent of the chum, 63 percent of the pink salmon, 15 percent of the coho and 66 percent of the chinook catches originating from Canadian Pacific waters.⁴¹ Sockeye (approximately 30 percent of the total catch) and Pink (approximately 48 percent of the total catch) are most important species from a commercial fishery perspective by a considerable margin. While there are other important rivers for particular species (e.g., the Skeena accounts for approximately 12 percent of Pacific sockeye runs), no other single river presents insurmountable "single owner" problems. On the Fraser, the government would determine the optimal number of trap sites and auction them separately. This would potentially generate a whole new series of open effort problems. This should be dealt with a fixed quota on the Fraser and the auction of rights to a percentage share of the annual catch.⁴² The annual total quota would continue to be determined by federal fish biologists and would be converted to site-specific annual volume quotas based on percentage ownership.

⁴⁰Some analysts have argued that in-river fish are inherently lower quality than those caught out to sea, but this is unlikely to be an issue with modern technology (Schwindt, "The Case for an Expanded Indian Fishery: Efficiency, Fairness, and History").

⁴¹Pearse, *Turning the Tide: A New Policy for Canada's Pacific Fisheries*, Appendix D.

⁴²The rationale for a "percentage share" regime rather than a "volume/weight" regime is the same as for share rather than quantity ITQs, see below.

Individual Transferable Quota Scheme

One widely recommended regime for fisheries are individual transferable quotas (ITQs). ITQs are now widely used in New Zealand, Iceland, Australia, South Africa, the United States, and Canada.⁴³ Specifically, they have been used with some evidence of success in both the British Columbian halibut fishery⁴⁴ and the British Columbian sablefish fishery.⁴⁵ A recent volume published by the Fraser Institute considers ITQs among several possible alternatives for improving the British Columbian salmon fishery.⁴⁶ A tremendous amount has been learned over the last decade from the experiences in New Zealand and Iceland as to the appropriate structure of ITQs in fisheries with high stock variability.⁴⁷

ITQs would be allocated to percentage shares of the salmon TAC. Government biologists would continue to predict the TAC and would have the power to adjust it throughout the harvesting season. Fixed quotas offer more certainty and, therefore, value to fishers, but allocation of shares rather than a number or weight of fish ensures that fishers bear the risks associated with the large temporal fluctuations in the salmon harvest.⁴⁸ The fishery would remain a small boat fishery. Once allocated, quotas would be transferable to other incumbents or to potential new entrants. The quotas would be allocated to incumbents in the small boat fishery based on previous average catch history.⁴⁹ The government would also collect a tax from each share owner based on the amount of quota held rather than on fish caught. It is proposed that this fee amount to at least 5 percent of the value of the TAC. While it is

⁴³Grafton, Squires and Kirkley, "Private Property Rights and Crises in World Fisheries: Turning the Tide?"; see also R. Quentin Grafton, "Individual Transferable Quotas: Theory and Practice," *Reviews in Fish Biology and Fisheries*, Vol. 6, no. 1, 1996, pp. 5-20.

⁴⁴Keith E. Casey, Christopher M. Dewees, Bruce R. Turris, and James E. Wilen, "The Effects of Individual Vessel Quotas in the British Columbia Halibut Fishery," *Marine Resource Economics*, Vol. 10, no. 3, 1995, pp. 211-30.

⁴⁵Grafton, "Individual Transferable Quotas: Theory and Practice."

⁴⁶Laura Jones and Michael Walker, eds., *Fish or Cut Bait!* (Vancouver, B.C.: The Fraser Institute, 1997).

⁴⁷See John H. Annala, "New Zealand's ITQ System: Have the First Eight Years been a Success or Failure?" *Reviews in Fish Biology and Fisheries*, Vol. 6, no. 1, 1996, pp. 43-62; also Ragnar Amason, "On the ITQ Fisheries Management System in Iceland," *Reviews in Fish Biology and Fisheries*, Vol. 6, no. 1, 1996, pp. 63-90.

⁴⁸For a full discussion of the trade-offs between shares and fixed quota under ITQs, see Carl Walters and Peter H. Pearse, "Stock Information Requirements for Quota Management Systems in Commercial Fisheries," *Reviews in Fish Biology and Fisheries*, Vol. 6, no. 1, 1996, pp. 21-42.

⁴⁹For example, see Amason, "On the ITQ Fisheries Management System in Iceland," p. 73.

not possible to explain all the details of this alternative here, it would operate very much like the current New Zealand regime, which is explained in detail elsewhere.⁵⁰

A Comparison of the Alternatives

The four alternatives described in the previous section of this report are now compared against the four goals presented earlier: economic efficiency, preservation, equity, and administrative feasibility.

Status Quo: The Mifflin Plan

Efficiency: The status quo will perform very poorly in terms of efficiency, especially over the longer-term. Over time, increased capital-stuffing will compensate for any short-term benefits in terms of capacity reduction. Within five years, there will probably be little difference in capacity compared to Pre-Mifflin. At best, there would be approximately a net 5 percent decrease in capacity. Therefore, in net present value terms, Mifflin will turn out to be essentially no different from the pre-Mifflin status quo from an efficiency perspective.

Preservation: This is probably the most difficult consequence of the status quo policy to predict. Much depends on specific decisions made by DFO biologists. The outcome could range from "poor" (where small, variable stocks are continually under threat) to "reasonable" where these stocks are protected. However, it is impossible to be optimistic under the status quo because of the tremendous fishing power that will continue to "hover" at every opening river and the continued incentive to "race to fish." Any miscalculation by DFO, whether by the biologists, by more senior officials succumbing to political pressure, or from enforcement difficulties, could lead to small-run extinctions.⁵¹ Thus, at best, the status quo must be rated as medium on this goal.

Equity: In one sense, the status quo can be thought of as being very generous to incumbents: It provides them with de facto property rights to the resource at almost nominal prices. On the other hand, as the rent is largely dissipated, this is not the "bargain" it seems to be. The situation is approximately the same for native fishers. The current system, however, is very inequitable to taxpayers: As documented earlier in

⁵⁰For a detailed description (and analysis) of the New Zealand model, see Annala, "New Zealand's ITQ System: Have the First Eight Years been a Success or Failure?" Also see Laura Jones, "A Pilot Project for Individual Quotas in the Salmon Fishery," in Jones and Walker, eds., *Fish or Cut Bait!*, pp. 115-24.

⁵¹On these problems in the Atlantic fishery, see A. Bruce Arai, "Policy and Practice in the Atlantic Fisheries: Problems of Regulatory Enforcement," *Canadian Public Policy*, Vol. 40, no. 4, 1994, pp. 353-64.

the analysis, rather than collecting resource rents, taxpayers end up paying a large net subsidy to the fishery.

Administrative Feasibility: The status quo has some advantage in terms of administrative feasibility, especially as it has largely been in place for a number of years. The major administrative weakness of the status quo is the inability to protect weak stocks. However, this has been somewhat improved by the introduction of area licensing that reduces excess fishing capacity at particular river openings.

The Pearse Commission Proposal: Harvesting Royalties, License Auction, and Buy-Back

Efficiency: A major advantage of this policy alternative relative to the status quo is in terms of efficiency—it preserves some of the potential rent. The license buy-back would considerably reduce excess fishing capacity. Equally importantly, this regime would eliminate incentives (through royalties and the license auction) to begin another round of capital-stuffing to replace the retired capacity. As the Pearse Commission proposal retains the small boat fishery, it probably only has the potential to reduce fishing costs approximately halfway to their lowest potential level (i.e., costs under an efficiently organized terminal fishery). However, how much rent is preserved crucially depends on the extent to which the combination of royalty rate and auction actually extracts rents. A 5 to 10 percent royalty rate would not preserve and extract much of the rent, but the license auction, if competitive and appropriately designed, should preserve and extract most of it.⁵² This proposal would also encourage the gradual transfer of licenses to fishers who can exploit the resource most efficiently. The efficiency weakness of this alternative is that it takes the small boat fishery as a given, so that the harvest cannot be taken at lowest cost (similarly, see status quo above and ITQs below).

Preservation: A weakness of this alternative is that it can endanger specific fish stocks; in other words, it is not ideal in terms of resource conservation. A royalty tax is not ideal for this purpose. The reason is that a royalty tax is inherently a price mechanism rather than a quantity (restriction) mechanism. There are risks in using price mechanisms when there is uncertainty over stocks and the costs of being wrong are potentially high in terms of species, or subspecies, extinction.⁵³ Quantity mechanisms, such as the currently used opening restrictions retained in this alternative, lower the risk of catch "overshooting" that can threaten stock viability.

⁵²De Voretz and Schwindt, "Harvesting Canadian Fish and Rents: A Partial Review of the Report of the Commission on Canadian Pacific Fisheries Policy."

⁵³See Wallace E. Oates and Paul Portney, "Economic Incentives and the Containment of Global Warming," *Eastern Economic Journal*, Vol. 18, no. 1, 1992, pp. 85-98.

Equity: The major concession to existing fishers in the Pearse proposal was the ongoing buy-back of licenses. This would allow those who were prepared to leave the industry to avoid capital losses. Remaining fishers would have greatly reduced incentives to engage in overcapitalization because the government would be extracting the rent from the fishery—partly in royalties, but largely through the license auction. However, if the license auction process is reasonably competitive, all expected rents would be transferred to the government. It is remaining fishers who would suffer the loss of economic rents. There is some justice in this in that they are presumably those who get most utility from actually fishing. It may be this feature of the plan that explained its lack of political appeal.

Pearse proposed some financial assistance to natives to acquire licenses over a five-year period (see above). It is fair to say that perceptions have changed since 1982 as to what would be fair to natives and that many would now argue that Pearse's subsidy to the native population was low. The Supreme Court of Canada might well take that view. On the other hand, it would still place natives in a considerably better position than the status quo.

This alternative would generate extensive (new) government revenues (probably more through the auction than by the royalties) and might reduce government expenditures slightly. The reduced government expenditures should occur because fishing capacity would be reduced, thus reducing fleet monitoring costs. However, taxing on the basis of catch volume would require extensive monitoring of all boats—the incentives for "highgrading" and "quota-busting" (smuggling) would be much greater. (Highgrading is the discarding overboard of less valuable fish and the substituting of more valuable fish to stay within catch limits—it is individually rational, but socially wasteful.) Monitoring would be costly. In general, the taxpayers' position would be much improved. Estimating the exact size of the benefit is difficult, though, because auction receipts are difficult to predict.

Administrative Feasibility: This policy alternative is reasonable in terms of administrative feasibility. We know a great deal more about the practical issues involved in running public sector auctions than was known in 1982 at the time of the Pearse Commission.⁵⁴ The main administrative difficulty would be to discourage fish smuggling (to avoid royalty taxes). However, the threat of license loss should be the major deterrent to such behaviors.⁵⁵

Modified Schwindt: River-Specific Auctioned Monopolies (with Site Auctions on the Fraser)

Efficiency: The advantage of this alternative is that it is the lowest cost fish-catching regime and therefore offers the potential of being the most efficient—at least 50 percent lower cost than the small boat fishery alternatives. As owners would have long-term property rights, they would have the correct conservation incentives. It is important to emphasize that the term "monopoly" as used here is only a monopoly to a single river system and, therefore, does not imply the inefficiencies society would normally incur from monopoly supply of a good. This form of monopoly would be efficiency-enhancing because much of the open effort associated with the small boat fishery would be eliminated, without creating any effective market power. Indeed, even if a single owner controlled all of the British Columbian monopolies, he or she would be unable to exercise much monopoly pricing power, given that salmon are sold into a competitive, global market. (Provided, of course, government allows free trade in salmon.)

The weakness of this alternative from an efficiency perspective is that, as discussed above, it would not be possible to sell a single monopoly to the Fraser River. While the regime proposed for the Fraser should eliminate capital-stuffing, it would be difficult to provide individual owners with incentives to cooperate to maximize the economic value of the whole Fraser run.⁵⁶

Preservation: This alternative also is likely to do well in terms of resource conservation for rivers with single ownership. There are two reasons. First, the monopoly owners have strong and unambiguous incentives to maximize the NPV of their stocks. Second, information is clearer as to the link between escapement and specific stock preservation. It is not likely to be as effective on the Fraser.

Equity: Under this alternative, the small boat fishery is retired; on the face of it this does not look good for incumbent fishers. However, because this alternative is so efficient it offers the potential for considerable rent, presumably well in excess of the \$2 billion NPV estimated as being the best-case scenario under an efficiently-organized small boat fishery. Some of this rent could be used to compensate existing fishers. This could either be in the form of direct payments as described above or by offering them preferential bidding rights (for example, by allowing them to bid with 50-cent dollars).

⁵⁶Given, however, that there would be a fixed, relatively small number of license holders it should not be impossible, see Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990); and Elinor Ostrom and Roy Gardner, "Coping with Asymmetries in the Commons: Self-Governing Irrigation Systems Can Work," *Journal of Economic Perspectives*, Vol. 7, no. 4, 1993, pp. 93–12.

⁵⁴R. Preston McAfee and John McMillan, "Analyzing the Airways Auction," *Journal of Economic Perspectives*, Vol. 10, no. 1, 1996, pp. 159–75.

⁵⁵Rick O. Boyd and Christopher M. Dewees, "Putting Theory into Practice: Individual Transferable Quotas in New Zealand's Fisheries," *Society and Natural Resources*, Vol. 5, no. 2, 1992, pp. 179–98; Annala, "New Zealand's ITQ System: Have the First Eight Years Been a Success or Failure?"

This alternative allocates a fixed percentage of monopolies to aboriginals. It is, therefore, equitable to them relative to the status quo. The alternative would also enhance government revenues considerably, especially once small boat license holders have been reimbursed. Indeed, it would probably generate the largest benefit to taxpayers. The reason is that the river monopolies would be extremely valuable resources because they offer a low cost regime for catching the fish. Licences, therefore, should be auctioned for high prices; the total revenue from all river auctions should considerably exceed the total revenue from auctions of small boat fishery licenses as proposed by Pearse.

Administrative Feasibility: This is the weakest point of this alternative. This alternative is the most radical departure from the existing regime. It is extremely important that the auctions of rights be conducted effectively; these auctions would require extremely large capital investments by bidders. These capital requirements might reduce the extent of competition and consequently risk realization of rents for the treasury.

Individual Transferable Quota Scheme

Efficiency: Provided that fishers are reasonably certain that they can "make" their quota using current levels of inputs, ITQs should reduce incremental overcapitalization incentives, although not congestion externalities at specific river openings. While, as yet, there have been no reported evaluations of ITQ fisheries based on actually realized costs and benefits, detailed reviews of both the New Zealand and Icelandic experiences with ITQs are now available. John Annala concludes that the efficiency impacts have been positive and that "the economic performance of the industry has improved."⁵⁷ Ragnar Arnason has similarly examined the impact of ITQs on the Icelandic fisheries. In general, he finds that total catches have increased and capital has been reduced—resulting in greatly improved "catch per unit effort."⁵⁸ Given that the small boat fishery would remain, and given the other factors discussed here, this alternative would reduce rent dissipation, but would not minimize it in the sense of utilizing the lowest cost technology.

Preservation: The evidence suggests that ITQs regimes have generally been successful at preserving and, in many cases, enhancing stocks. Resource conservation problems have occurred when TACs have been set too high: this is an endemic problem that has little to do with ITQs per se. In these cases, biological preservation (or recovery)

has remained a problem.⁵⁹ The salmon fishery is probably more vulnerable in this regard than most other fisheries where ITQs are being utilized (although some of these fisheries, such as the Icelandic capelin, also experience high stock variability). In many other fisheries, ITQs have been introduced in open-access contexts or other situations in which the resource was in serious danger and resource-conserving TACs needed to be set considerably lower than current catches.⁶⁰ This would not be the case in the salmon fishery because TACs would not have to be radically reduced.

Equity: Because the proposed regime allocates ITQs to incumbents at relatively low tax rates, this plan would be generous to those currently in the fishery. Given that rent dissipation would be considerably curbed, the rents would largely accrue to incumbents who would be considerably enriched. This has been the main criticism of the ITQ system in Iceland, where quota fees only amount to approximately 0.5 percent of estimated catch value: "Why, it is asked, should a relatively small group of fishing firms and their owners be handed, more or less free of charge, the extremely valuable property rights to the Icelandic fisheries?"⁶¹ The proposal here is a considerable improvement on the Icelandic regime, as it would introduce a 5 percent quota fee. (Although even this fee rate is still generous to incumbents, its advantage is that it would help make this alternative politically feasibility.)

This alternative does nothing for aboriginal fishers, except to the extent that they hold commercial fishing licences. Additionally, this alternative does relatively less for taxpayers as the only rents transferred to taxpayers would result from the 5 percent quota fee. It is not clear that current government expenditures would be reduced either, because of the potential for high administrative costs.

Administrative Feasibility: There is some disagreement on the administrative feasibility, and costliness, of ITQs. Both quota busting and highgrading are inherent to ITQs.⁶² However, John Annala, based on the New Zealand experience, considers one of the major gains from ITQs to be "minimal government intervention."⁶³ Quentin Grafton, on

⁵⁹Annala, "New Zealand's ITQ System: Have the First Eight Years been a Success or Failure?"; Arnason, "On the ITQ Fisheries Management System in Iceland," comments on the Icelandic cod TAC: "The catches have simply been excessive compared with the reproductive capacity of the fish stocks . . . [because] . . . the TACs have been set too high" (p. 83).

⁶⁰R. D. Francis, D. J. Gilbert, and J. H. Annala, "Rejoinder—Fishery Management by Individual Quotas: Theory and Practice," *Marine Policy*, Vol. 17, no. 1, 1993, pp. 64–66.

⁶¹Annala, "New Zealand's ITQ System: Have the First Eight Years been a Success or Failure?" p. 88.

⁶²Lee G. Anderson, "Highgrading in ITQ Fisheries," *Marine Resource Economics*, Vol. 9, no. 3, 1994, pp. 209–226.

⁵⁷Annala, "New Zealand's ITQ System: Have the First Eight Years been a Success or Failure?"

⁵⁸Arnason, "On the ITQ Fisheries Management System in Iceland," p. 77, p. 80, pp. 83–84.

Table 1.1 A Summary of Fishery Alternatives in Terms of Policy Goals

Goals	Criteria	Alternatives			
		Current Policy: Continued Implementation of the Milfin Plan	Harvesting Royalties and License Auction (Pearse Plan)	River-Specific Auctioned Monopolies (Schwindt Plan)	Individual Transferable Quotas to Current License Holders
Economically Efficient Use	Impact on Rent Dissipation	Poor—large negative net present value	Good—considerable improvement over status quo	Very good—major improvement over status quo, lowest cost technology	Good—considerable improvement over status quo
Preservation of the Fishery	Impact on the Number of Viable Runs	Very poor—high risks	Poor—continued risk for vulnerable runs	Good—very good except for Fraser River	Good (provided "share" quotas used)
	Fairness to Current License Holders	Nominally fair, but not so in practice because rent is dissipated	Good—generous to exiting fishers, but less so to remaining incumbents	Very good	Excellent
Equitable Distribution	Fairness to Native Fishers	Nominally fair, but not so in practice because rent is dissipated	Good	Good	Excellent for native incumbents
	Fairness to Taxpayers	Poor, large net costs	Excellent	Excellent	Acceptable, improvement over status quo
Administrative Feasibility	Ease of Enforcement	Medium—inherent difficulties offset by much experience	Low	High, except on Fraser	Medium, but requires close attention to incentives
	Flexibility	Low	Medium—good price flexibility	Medium—good price flexibility	Medium, with "shares" system

the other hand, concludes on the basis of a multi-country review that "An essential component to the success of ITQs, therefore, is adequate monitoring and enforcement."⁶⁴ The evidence from other countries suggests that these problems should be solvable in the salmon fishery.

EVALUATION AND RECOMMENDATION

The issues discussed in this section of the report are summarized in a simple matrix (Table 1.1) that presents policy alternatives on one dimension and the goals/criteria on the other. It should be stressed that these are predictions, based on the extant research, of how each of the alternatives would perform in terms of the stated goals/criteria. Of course the preferred alternative depends on how the minister weights the goals/criteria described above. But, as the minister has instructed me to make a recommendation, I do so based on the following comparisons.

Table 1.1 summarizes the major impacts described in the previous section. It is clear that all three alternatives are superior to the status quo in terms of almost all the goals and criteria. The River-Specific Auction Monopoly is the highest-ranked alternative in terms of reversing and eliminating rent dissipation because it would eliminate the small boat fishery and utilize the lowest-cost fishing technology. The Pearse Commission Proposal and ITQs probably do equally well in preserving rent, offering modest gains in the reduction of rent dissipation because they each maintain the small boat fishery. They would encourage license utilization by those who could exploit the resource most efficiently.

It is a close call in choosing between these three alternatives. My recommendation is that the minister adopt the ITQ scheme. It is especially important, however, that share quotas (rather than fixed number of fish or weight of fish) be adopted in the salmon fishery because of the cyclical stock variability. The major weakness of the particular ITQ scheme outlined here in terms of the posited criteria is that it does not generate a high degree of equity for taxpayers: Rent transfers are modest and reduced by monitoring and enforcement costs.

⁶³Annala, "New Zealand's ITQ System: Have the First Eight Years been a Success or Failure?" p. 46.

⁶⁴Grafton, "Individual Transferable Quotas: Theory and Practice," p. 18.

POSTSCRIPT AND PROLOGUE

The chapters that follow provide you with the concepts and tools to perform an analysis such as the one you have just reviewed. Not all policy analysis takes this form: It can be as informal as spoken advice in a corridor to a policymaker or as formal as a legislatively-required regulatory impact analysis. But all good policy analysis necessarily includes the sort of thinking that this report represents. Read on. Enjoy. Or, at least endure!