

The Cost of Marine Fishery Management in Eastern Canada: Newfoundland 1989/90 to 1997/98¹

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Abstract. Defining the fisheries management role of government as the process beginning with stock assessment, running through fisheries management proper, and concluding with surveillance and enforcement, this paper describes the marine fisheries management process in Newfoundland and itemizes the associated expenditures.

Keywords: fishery management, Newfoundland, Canada

1. Introduction

Fisheries management is pervasive, justified by economic theory and the current political concern with ecological biodiversity. Alternative forms of fisheries management require different degrees of government intervention. Well-planned individual transferrable quota (ITQ) systems require less invasive governmental action than do input control methods, where the latter may, for instance, require controls on fishing technologies, vessel types, season lengths, trip limits, etc. Yet, problems under ITQ systems, such as "high grading", the potentially fatal discarding of smaller, lower quality fish for more remunerative larger fish, may lead to greater enforcement costs than do other management techniques. It should be useful to evaluate the costs of alternative management regimes. It should particularly be useful to evaluate such costs since, in fisheries modelling, they are generally considered as transaction costs, too minor to be included in the model. However, as will be seen, these costs can be substantial.

There has been an on-going debate among fisheries economists over the ability of governments to capture common property rents, and of the propriety of their doing so. Fishermen realize rents/profits by catching and selling common property -- fish. Nations are increasingly attempting to advance in this area by charging fishing firms and fishermen user fees. It would be interesting to know what, precisely, are the costs of fisheries management, costs that might be recovered from the rents. If the costs of management actually exceed the rents that are being protected by the management, does it make sense to continue to manage the fishery? We only raise the question here; we do not attempt to answer it.

Finally, it would be useful to apply the costs of fisheries management to evaluate the efficiency of management regimes in different countries.

The goal of this paper is to provide a time series, from fiscal year 1989/90 to 1997/98, of estimates of the recurring costs of managing the fisheries of Newfoundland, Canada's easternmost province. Such data could form the basis for the three types of economic analysis mentioned.

Over this period of time the details of the fishery management process in Newfoundland have varied but, in the absence of a major shift to ITQs, the process has not changed fundamentally. In fact, as we shall see, the cost of fisheries management has remained remarkably stable during our period of interest. The costs discussed are for the most part those incurred by the Newfoundland Region of Canada's Department of Fisheries and Oceans (DFO) in the management of marine commercial fisheries. These data are supplemented by statistics concerning expenditures in Newfoundland by the National Capital Region of DFO and by provincial agencies.

The centerpiece of the paper is Table I where the data are presented. In Section 2 the fisheries management process is described. Section 3 discusses the format and contents of Table I. Results are presented in Section 4 while, for comparative purposes, more highly aggregative fisheries expenditure data are discussed in Section 5. The paper ends with a brief concluding note.

1. A longer, annotated version of this paper is available from the authors.

2. The Fisheries Management Process

Fisheries management is viewed here as a three part process: first, there is scientific assessment of the volume, size, and age class distribution of the stock of the controlled fishery; second, there is the process of setting total allowable catches (TACs), preparing rules and regulations related to the TACs, licensing vessels and fishermen, and disseminating the rules and procedures for the coming year's fishery; and third, there is enforcement, essentially a policing operation.

Stock Assessment

Inputs to the stock assessment process include data from the previous year's commercial fishery, research results from survey vessels, results of port sampling, the results of test "sentinel" fishing in closed fisheries conducted by selected commercial fishermen, and commentary by other interested and knowledgeable parties such as academics and representatives of fish processing and trawler firms.

Early in the stock assessment process, meetings of DFO personnel with representation from the public (industry, union, and academy) are held to consider the environmental/ecosystem perspective affecting the region's fisheries. Working from DFO research documents, such topics as the physical and biological oceanographic environments, the results of larval and juvenile fish surveys, and population trends in a variety of commercial and non-commercial fish and shellfish species, seabird, and marine mammals are considered. Additional working papers, such as a report on oceanographic conditions, are the ultimate results of these meetings.

Based on the results of the earlier stages of the process, DFO then prepares Stock Status Reports (SSR) for each commercial and regulated species. Thus, there will be separate SSRs for northern cod, St. Pierre Bank cod, caplin, Atlantic salmon, lobster, skate, and all other controlled fisheries. The stock status reports are released and distributed to the public after being approved for release by senior DFO officials.

Fisheries Management -- Plans

Fisheries management, *per se*, refers to the process of developing management plans for each fishery, following the publication of the SSR. Once the plan is adopted, it must be disseminated and implemented. Symbiotically associated with these processes, are the licensing and certification procedures.

For groundfish, the SSRs are referred to the Fisheries Resource Conservation Council (FRCC), an appointed interprovincial body consisting of members of the public (fishermen, fish processors, academics) and with representation from the provincial and federal governments. The FRCC holds public hearings and prepares recommendations for the Minister of Fisheries and Oceans regarding TACs and other general conservation measures relating to such aspects of the fisheries as the protection of juvenile fish and spawning areas. The report of the FRCC is released to the public at the same time that it goes to the Minister. The Minister, on advice from senior officials, and possibly after further consultation with the industry, either accepts the advice of the FRCC, or modifies it, and announces the TACs and any associated regulations. FRCC expenses, which are paid from the Ottawa office of DFO, appear in Table I.

For species over which the FRCC has no jurisdiction (e.g., the snow crab fishery, now the most lucrative of Newfoundland's fisheries), the SSRs are reviewed by DFO staff in consultation with species advisory committees. For crab, there are more than a dozen area fleet advisory committees, for others, only one per species. These committees are chaired by a DFO official and include the DFO fishery managers, fishermen selected by their union, processors, marine biologists and, where relevant, representatives of aboriginal groups. Until 1996/97 DFO paid the expenses of the advisory committees. Since then, industrial and union representatives have had to pay their own way. DFO circulates "discussion points" to advisory committee members in advance of the meetings, and minutes subsequent to them. These advisory committees do not hold public meetings, as does the FRCC. The DFO officials, if they have sufficient confidence in the data, then recommend suitable TACs. For politically sensitive species (e.g., crab and shrimp) and for fisheries for which new licenses are to be issued, the Minister approves and announces the management plans. For interregional fisheries, such as those in the Gulf of St. Lawrence which overlap the Laurentian, Maritimes and Newfoundland Regions,² the management plans are approved at the Assistant Deputy Minister level. For local, single region, fisheries such as those in Newfoundland for sea urchins and scallops, the plans are approved by the Regional Director General. For northern shrimp, another highly lucrative fishery, DFO is now in the third year of a three

2. DFO is divided into regions for operational purposes. The current regions are Newfoundland, Maritimes (Nova Scotia, New Brunswick and Prince Edward Island), Laurentian (Quebec), Central and Arctic, Pacific (British Columbia) and National Capital (Ottawa headquarters).

year fisheries management plan during the life of which there have been interim regional reviews of the stock but no annual SSRs. In April 1999, DFO announced a similar three year Crab Management Plan, but the TAC foreseen in the 1999 plan for the year 2000 had to be abandoned because of declining stocks.

Fisheries Management -- Licensing

Licensing policies cover the registration of vessels and vessel replacement rules, individual fishermen's certification, and specific species fishing licenses.

Virtually every vessel used in the Newfoundland fishery must be registered with DFO. When a fishery is open for new vessels, registration is obtained by paying a fee and supplying data on the vessel's characteristics. Replacement vessels are permitted, subject to strict limitations. In recent years, the Newfoundland groundfishery (mostly subject to moratoria) has had a freeze on new vessels. Vessel registrations are renewed annually either by mail or at DFO area offices for a fee of \$50. In 1999, DFO started a pilot project to permit fishermen to pay for their renewed federal licenses at banks. In 1999, there were 30 registered offshore vessels (defined as being 65' or longer), 958 registered inshore vessels of between 35' and 64', and 10,256 registered small inshore boats of under 35'.

The Newfoundland Region of DFO no longer has an individual fishermen's registration. In 1996 this role was passed to the Professional Fish Harvesters' Certification Board, an agency established by provincial legislation but whose certifications are accepted by DFO. The old full time/part time distinction was abandoned and replaced with the ranks of "Apprentice Fish Harvester", "Professional Fish Harvester - Level I" and "Professional Fish Harvester - Level II". Even though certification requires mandated courses and sea time, most certified fishermen have been "grandfathered" in. For grandfathering into Level II Certification, a fisherman had to have fished full time for seven qualifying years and had a minimum of \$3,000 (and 75% of reported earned income) from fishing during three of the last four years of his qualifying period. The Board became fully functional only in 1996 and the figures shown in Table I are revenue figures, not costs. Revenues, \$50 per registrant per year, have exceeded costs, but the Board was established by provincial legislation as a private, non-profit corporation and it has considered its costs to be confidential.

For the inshore sector, the basic management concept now revolves around the idea of the "core" enterprise. Core fishermen's status is granted by DFO to individuals who are heads of enterprises, have Level II

provincial certification, hold key licenses (in Newfoundland: licenses for groundfish, caplin, lobster, snow crab, scallop, shrimp, or any species for which a purse seine is used), and are committed to and dependent on the fishery. The dependency criterion was satisfied when a small boat fisherman (<35' vessel length) earned a minimum of \$5,000 in fishing income, or a fisherman with a 35'-65' vessel earned a minimum of \$10,000, for two out of the last three years of his qualifying period. A core fisherman, as the head of an enterprise, cannot sublet his position as skipper to someone else; absentee operations are forbidden. As a consequence, therefore, core fishermen are permitted to register only one vessel of 35' or more. For reasons of illness, or temporary absence, a relief skipper can substitute but except for a few land-based operators who have been grandfathered into the system, the holder of the core license is expected to be the active skipper of the boat.

DFO's intention is to strictly limit the number of core enterprises in Newfoundland. New entrants to core status must purchase the core certification from a current holder. DFO's only role in the transfer process between fishermen is to check on the qualifications of the purchaser and to register the transfer. The price paid for a core certification transfer between private individuals is not recorded by DFO. A total of 5,450 core licenses were issued. By April 2000, DFO had reached its goal of reducing this number to 4,500 through core license buybacks. In a recent round of DFO core license buybacks, the average price of a surrendered core license was \$101,500. When a core license is purchased by DFO, the total number of core licenses drops by one; the license is not reissued.

With fishermen's certification under provincial jurisdiction and core status under federal jurisdiction, difficulties will almost certainly arise when individuals who hold federal core status lose, for whatever reason, their Level II certification. Presumably, the now disqualified core fisherman either will hold onto his now unusable core status in anticipation of reestablishing his qualification, or he will sell his core certification. To date, there are no formal rules governing this situation.

The final set of licenses are those that authorize fishing for specific species. These licenses are now only issued to fishermen registered with the Certification Board. Traditionally, these licenses were available for nominal fees. Inshore groundfish licenses still cost only \$30 for the year but for fisheries under enterprise allocations, such as the high value snow crab fishery, fishing license fees are set on a per ton basis. For snow crab, the fee in most areas is \$58.50 per ton of assigned quota for the license year and can cost several thousand dollars, not refundable if the catch

or its value fall below anticipations. Fishing licenses are renewed in the same manner, and in the same mailing, as are vessel registrations.

The license also is accompanied by up to three schedules: one specifying dockside monitoring conditions, one concerning on-board observers, and one specifying which data must be returned to DFO. For the now very valuable crab fishery, there are three classes of licenses. "Full time" license holders are generally fishermen who entered the crab fishery when it first started in the 1970s. In 1998, there were 71 full time crab licenses. "Supplementary" crab licenses were issued first in 1985 in response to a collapse in certain groundfish stocks. There were 766 supplementary licenses in 1998. Finally, "temporary" licenses for small boats (<35') were issued in number (2,450 in 1998) after the peak season of 1995, when both catches and unit values of crab were exceedingly high. At the time when temporary licenses were issued, the crab fishery was changed from a "competitive" fishery where fishermen could catch as much as they could, subject only to an overall TAC, to an individual (enterprise) quota (IQ) system in which each fisherman is allotted a share of the TAC, the share being determined by the participants in the fishery. Prior to 1995, the only IQ fisheries in the Newfoundland Region were those conducted by large offshore groundfish vessels (introduced in 1982) and certain herring vessels. To these have been added IQ systems for crab, shrimp, clam and certain scallop fisheries.

With the growth in the value of the crab and shrimp fisheries, species license fee revenues have increased almost tenfold from their 1995 figure of \$778,365. These funds accrue to the general revenue of the Canadian government and are not credited to DFO.

The inshore northern shrimp fishery has also experienced an enormous transformation. In 1994, there were only 58 licensed vessels of less than 65' in this shrimp fishery, all on the west coast of Newfoundland. In the last few years, this fishery has expanded to more than 300 vessels, from a localized competitive fishery with a \$30 license fee (in 1995) to an IQ fishery with license fees charged at \$66.50 per ton of assigned quota.

The fundamental philosophy of DFO has undergone a change. No longer does DFO see itself as managing inshore fishermen. Federal management is restricted to enterprises and to the fishery resource itself. Management of individuals has shifted to the province and to the owners of enterprises.

Surveillance and Enforcement

The "conservation and protection" program of DFO has five main components: aerial surveillance; ship surveillance; observer coverage; dockside inspection; and inland surveillance. DFO is also developing satellite tracking and hailing systems. At present, sealers and scallop fishermen must "hail", to DFO by fax, the amounts of their catches on a daily basis.

Surveillance and enforcement is a continuous process, aimed primarily at preventing violations rather than at catching violators. Coverage is therefore extensive. Aerial surveillance is used to locate fishing fleets, detect violators and provide deterrence by being constantly and visibly present. Planes are provided under contract by private operators and the Department of National Defence. Department of National Defence (DND) overflights are paid for by DND and do not appear in Table I. Most of these flights focus on the operations of vessels near or beyond the 200-mile extended fisheries control zone of Canada.

DFO has two large vessels under Newfoundland Region control that patrol primarily outside the 200-mile limit. There are about 400-500 boardings of foreign vessels for inspection each year. Before the *Estai* incident, in which a Spanish trawler was arrested by Canada beyond the 200-mile limit in 1995, there had been 30 armed boardings of foreign vessels. Shots have never been fired on board vessels; the only shots ever fired in anger in these operations were four salvos fired across the bow of the *Estai*.

At no charge to DFO, DND contributes 125 days of routine surface surveillance, using Annapolis Class destroyers, more modern Halifax Class frigates, and smaller vessels. Daily fuel and rations costs are \$15,155 for the destroyers, \$12,860 for the frigates and considerably less for the smaller vessels. These figures become much larger if all variable costs are added and even larger if vessel depreciation and maintenance are included. Given the 1997/98 distribution of days by vessel type and the 1998/98 repayment schedule, fuel and rations alone cost DND nearly \$1¼M (Canadian). These amounts are omitted from Table I.

Canadian Coast Guard fisheries management operations are incorporated into Table I, as are the costs of a number of small 19'-24' vessels used by DFO to patrol inshore waters.

Canadian observers are placed aboard all foreign trawlers fishing in Canadian waters. For domestic vessels, there is 100% coverage on shrimp trawlers, and 5-10% coverage on crab and other vessels. DFO is moving towards full cost recovery for observer operations; from 1996 snow crab fishermen were required to pay one-half cent per pound for 10% observer coverage. Only those observer costs actually paid by DFO are included in Table I.

A private company certified by DFO for the purpose provides dockside monitors at processing plants and at all designated groundfish landing sites. One of the changes instituted when the St. Pierre Bank cod fishery was reopened in 1997 after a moratorium was that the number of permissible landing locations was reduced by one-half from the original 130 sites. Prior to the moratorium there were no restrictions on where fish could be landed. Presumably the fishermen would truck the fish to the nearest fish plant for processing. With the reopened fishery, there was to be 100% dockside monitoring and the number of landing places were accordingly reduced. DFO originally wanted to restrict landings to only 30 sites. The final figure was worked out in negotiations with the fishermen's union. The dockside monitors are paid for by the fishermen themselves through a levy collected by the processor and these amounts are omitted from Table I. DFO inspectors conduct random inspections of landing sites and audit the private monitors who do the routine inspections. The goals of the dockside monitoring program are to improve the enforcement of regulations and to improve the quality of the data submitted to DFO. Also to improve data input to DFO, logs now are required for all vessels of greater than 35' and for any smaller vessels used to fish for crab. Included in the surveillance and enforcement figures shown in Table I are: (1) figures for inland surveillance of recreational fisheries, mainly conducted by seasonal fisheries river wardens at a cost of about \$1.5M, reduced by 25% since 1996; and (2) approximately \$1M expended annually for habitat enforcement. Neither set of expenditures relate to marine fisheries but are included because of the organization of the basic data set.

The cost of prosecutions for violations of fisheries regulations, borne by DFO, has been approximately \$750,000 per year, with \$400,000 for legal expenses and the remainder for ancillary expenses such as witness fees. DFO would like to develop a ticketing system much as is used for parking and other minor traffic violations for offenses with a maximum penalty of \$3,000, along with a Fisheries Tribunal system to apply sanctions to violators: license suspension, license forfeiture, quota reduction, shortening of the fishing season, and fines. With this system, licensed fishermen would not be prosecuted in the courts. Unlicensed violators of fisheries regulations would continue to have court trials since no fisheries sanctions can be

applied to them. These changes were incorporated into the new *Fisheries Act*, first introduced into the House of Commons in December 1995 but, in the face of spirited opposition, never enacted.

3. The Expenditure Table

Table I, which includes data for fiscal years 1989/90 to 1997/98, has a tripartite organization: resource assessment and related research; fisheries management and enforcement; and administrative support. Each of these classifications is decomposed into salaries, operating and maintenance expenditures, and capital expenditures, these breakdowns following the usage of DFO. Where possible, particularly with respect to vessel operations, fisheries management *per se* and surveillance and enforcement, the main subheadings are further divided.

The Atlantic Fisheries Adjustment Program (AFAP)

Following a brief recovery that started shortly before the 200-mile limit became effective in 1977, the northern cod catch of Newfoundland's inshore fishermen started falling after 1982. In response to their repeated claims that offshore trawlers were destroying the stocks and doubts raised by some DFO scientists concerning the quality of DFO's stock assessments, a blue-ribbon committee of fisheries biologists, chaired by Alverson, reviewed DFO's stock assessment procedures and concluded in late 1987 that there were serious deficiencies. Fish populations were much smaller than had been thought. Having set a northern cod TAC of 266,000 metric tons for 1989, DFO faced a drastic situation when, in the backwash of the Alverson report, its scientific review body concluded that a 1989 catch in excess of 125,000mt would endanger the stock. In response, in May 1990, DFO announced a 5-year \$584M (Canadian) program (AFAP) with the intention of rebuilding the stocks (partially through an expanded and improved science program), easing the movement of labor out of the fishery, and diversifying the local economy. A modest \$15M (US) of the AFAP expenditures appear explicitly in Table I.

Investigations of predator/prey relations, or the effects of climatic changes, are obviously important to fisheries management, but they are not part of the recurrent process of fisheries management (e.g., stock assessment). AFAP science expenditures are therefore omitted from Table I.

AFAP Fisheries Data includes such programs as processing observer data from commercial vessels, automating observer data, computerizing of foreign fishing catch estimates, and improving fisheries data reliability.

AFAP Surveillance and Enforcement includes such programs as increased observer coverage on trawlers (100% on northern cod vessels), increased inshore and offshore use of DFO patrol vessels, adding armed boarding capability for fisheries officers, increased dockside monitoring, and increased prosecution costs.

AFAP Professionalization and Certification of Fishermen relates to the development of a professionalization program.

The bulk of the AFAP expenditures listed in Table I seem to be little more than existing expenditures under a new heading. Only those AFAP expenditures that would otherwise fall within our rubric of fisheries management are included in Table I. The AFAP program, for instance, had an expanded science component to study such topics as inshore cod migration, cod food and feeding, plankton abundance related to cod production and caplin/cod interactions. These are science related to stock assessment but not part of the recurring stock assessment process. As such, they are omitted from Table I. For 1994/95, to take a sample year, we have omitted \$2,500,610 (Canadian) for AFAP/Scientific Research that appears in the accounts under the heading "Resource Assessment and Related Research".

The Northern Cod Adjustment and Recovery Program (NCARP) and The Atlantic Groundfish Strategy (TAGS)

As the AFAP program was underway, the northern cod fishery experienced another crisis, leading to a total moratorium on commercial northern cod fishing in July 1992. The NCARP program, included, among other subprograms, cash payments to unemployed fishermen and fish plant workers, funds for an early retirement program, and a license buyback program. These programs are not directly related to fisheries management and are omitted from Table I. Again taking 1994/95 as an example, we have omitted under licensing and resource allocation sums of \$25,983 (Canadian) for "NCARP" and a further \$275,083 (Canadian) for the "Northern Cod Retirement Program". Under fisheries management/program support we have omitted figures of \$16,612 (Canadian) for "NCARP" and a further \$33,459,310 (Canadian) for "Payments -- Northern Cod Fishermen". The northern cod moratorium was originally set for two years after which, it was hoped, the northern cod stock would have recovered. That hope was overly optimistic. It was only in the summer of 1999 that the moratorium was relaxed slightly, with limited commercial and recreational catches permitted. After expiring in two years, NCARP was replaced by TAGS, a program with quite a similar purpose, although by now the moratoria had spread to most of Canada's Atlantic groundfish stocks and the funds were made available to fishermen throughout Canada's Atlantic provinces. From

the 1996/97 accounts, we have omitted \$977,825 (Canadian) for "Early Retirement -- TAGS" and \$25,897,434 (Canadian) for "License Retirement -- TAGS". Cash payments for fishermen and fish plant workers, which were charged to DFO under NCARP, under TAGS were transferred to another federal department, Human Resources Development.

In summary, while a limited value of AFAP expenditures were operational and appear in Table I, most AFAP and all NCARP and TAGS expenditures are excluded.

Under "Fisheries Management and Enforcement," expenditures are classified as relating to "Licensing and resource allocation" or "Surveillance and enforcement" whenever those allocations are clear. When the accounts present figures that cannot be classified in this way, they appear in Table I under a generic heading of "Fisheries management".

4. Results

To facilitate comparisons with figures for other jurisdictions, the expenditures in Table I are presented in United States dollars. Although the dollar figures are for fiscal years that run from April 1st to March 31st, the conversion factors shown are the average annual \$Canadian/\$US exchange rates for the first of the two calendar years straddled by the fiscal year.

Except for figures of \$49M for the AFAP years of 1990/91 and 1991/92, the Newfoundland Region's fishery management expenditures are remarkably stable, ranging from a low of \$39M to a high of \$45M for the entire nine year period from 1989/90 to 1997/98. However, we note that there were two major changes in the format of the accounts during our period. First, the figures for fiscal years 1989/90 to 1991/92 are less detailed than those for the years 1992/93 to 1996/97. Second, the organization of the accounts changed so drastically in 1997/98 that comparisons with the earlier years are difficult to interpret, and the apparent drop in expenditures for this year to \$39M is probably an artifact. Also included in Table I is the ratio for each year of the expenditures for fisheries management to the value of landings. These ratios range from 0.19 to 0.28 for "normal" years.

Catch History

Table I also presents figures for the total value of landings of groundfish, pelagics and shellfish for the calendar year at the start of the fiscal year (e.g., 1989 for comparison with expenditures for 1989/90). These figures, ranging from a high of \$238M (US) in 1990/91, falling to \$151M in 1993/94 but then rising to a new peak of \$245M

in 1995/96, are also remarkably stable given that we are concerned with a fishery that has suffered major closures over an extended period of time.

The explanation lies in the fact that, during this period, while cod landings (from all Newfoundland stocks) fell from \$120M (Canadian) to virtually nil, the value of shellfish, in the absence of predatory cod, rose dramatically, eightfold for snow crab and twofold for shrimp. In value terms, there has been a complete replacement of groundfish by shellfish. Fishing and fish processing techniques are different for shellfish than for groundfish, and the volume of shellfish is much lower, so there are still dramatically negative effects of the groundfish collapse on employment. Yet, in terms of the value of the harvest, there has been full compensation for the loss of groundfish.

For the year 1995 alone, the price of snow crab was extraordinarily high. This fact accounts for the historically high landings figure of \$245M and the concomitant drop in the expenditure/landings ratio to a historic low of 0.16. This figure is anomalous, as is the figure for 1997/98, in the latter case because of expenditure data deficiencies.

5. Total DFO Expenditures

Table I ends with time series for total DFO expenditures for the Newfoundland and National Capital regions and for the entire department. While fishery management expenditures for Newfoundland never quite reach \$50M (US), total expenditures for the region never fall below \$79M. Management costs constitute only somewhat more than half of the total Newfoundland Region budget because of such DFO expenditure items as aquaculture and enhancement science, habitat assessment and related research, biological, physical and chemical oceanography, hydrography, resource and industrial development, fish plant inspection, international matters (excluding NAFO membership), National Capital Region expenditures on administration, assistance under the *Fisheries Improvement Loans Act*, net expenditures of the Canadian Saltfish Corporation, small craft harbours, salmon licence buyouts, and transfer payments to fishermen, all of which fall outside the ambit of our definition of fishery management.

Adding in all of those items which are omitted from Table I, the total Newfoundland Region expenditures were \$90M in 1991/92, rising dramatically to \$260M in 1992/93 and \$311M in 1993/94 before falling again to \$100M. These wide fluctuations in Newfoundland are mimicked by similar changes in DFO expenditures for the nation as a whole. The increases are primarily the results of extraordinary AFAP and NCARP expenditures (primarily

transfer payments to fishermen) along with the expenditures for the buyout of most of the commercial salmon licenses in Newfoundland. By 1994/95, each of these programs was being phased out.

The National Capital Region (NCR) expenditures are summarized here as well, because it would be reasonable to allocate these expenditures to the five regions where fishing actually occurs. The key point is that the NCR expenditures in each year amount to about \$100M (US), a share of which properly belongs to Newfoundland. This unknown share is omitted from Table I except for cases where Access to Information requests have resulted in the release of the Newfoundland component of these expenditures.

The large increases in the total DFO figures for Newfoundland, the National Capital Region and Canada from 1996/97 to 1997/98 are artifacts, reflecting the full integration of the Canadian Coast Guard data into the DFO accounts.

6. A Concluding Note

Using DFO documents and information generated by interviews with DFO personnel, we have described the fisheries management process in Newfoundland and have estimated the associated costs.

What emerges clearly from this analysis is the conclusion that not only are the costs of fisheries management in Newfoundland substantial, but the fishery, as structured in the 1990s, is never likely to generate the rents required to permit the government to completely recover the cost of management from the industry.

TABLE 1: ACCOUNTS OF NEWFOUNDLAND REGION, CANADIAN DEPARTMENT OF FISHERIES AND OCEANS STOCK ASSESSMENT, FISHERIES MANAGEMENT, ENFORCEMENT & REGIONAL ADMINISTRATION
FISCAL YEAR ENDS MARCH 31ST **UNITED STATES DOLLARS (,000)**

ITEM	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98
RESOURCE ASSESSMENT AND RELATED RESEARCH									
SALARIES & BENEFITS:									
Regular salaries & benefits	7,162	9,662	9,743	6,434	6,397	6,210	6,172	6,403	9,741
Ships' operations	---	---	---	1,899	1,604	1,737	2,696	2,923	---
Fisheries Resource Conservation Council					84	101	122	147	149
OPERATING:									
Regular operating and maintenance	8,813	9,363	11119	1,503	1,322	1,261	1,825	3,501	4,413
Ships' operations	---	---	---	4,526	3,815	4,495	1,354	1,493	---
Vessel maintenance	---	---	---	452	534	412	911	937	---
Observer program	---	---	---	---	---	---	8	---	---
AFAP/Fisheries data	---	---	---	12	4	---	---	---	---
AFAP/Surveillance and enforcement	---	42	---	---	---	---	---	---	---
AFAP/Certification & Professionalization	---	---	---	---	---	35	---	---	---
Fisheries Resource Conservation Council				16	662	794	677	614	492
Sentinel Fisheries							351	2200	2400
CAPITAL:									
Regular capital	879	1760	819	245	210	171	187	274	204
Vessel maintenance	---	---	---	402	146	185	385	19	---

ITEM	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98
FISHERIES MANAGEMENT AND ENFORCEMENT									
SALARIES AND BENEFITS:									
Salaries: Fisheries management	---	---	---	523	---	---	---	---	12682
Salaries: Licensing and resource allocation	653	637	750	790	1,675	1,854	2,142	1,760	---
Salaries: Surveillance and enforcement	8,022	9,237	9,676	5,133	6,511	6,192	5,964	4,826	---
Salaries: Surveillance and enforcement/Ships' operations	---	---	---	3,842	3,668	3,321	3,489	3,062	---
Salaries: Surveillance and enforcement: Canadian Coast Guard/Fishery management operations	---	---	---	---	---	---	421	488	---
OPERATIONS:									
Regular operations and maintenance: Fisheries management	---	---	---	80	---	---	---	---	5,085
Regular operations and maintenance: Licensing and resource allocation	459	726	1,190	376	470	775	640	739	---
Professional Fish Harvesters Certification Board								608	571
Regular operations and maintenance: Surveillance and enforcement	6,911	5,445	4,193	2,000	1,755	2,075	2,524	3,047	---
Ships' operations: Surveillance and enforcement	---	---	---	882	794	751	1,013	1,243	---
Vessel maintenance: Surveillance and enforcement	---	---	---	891	1,033	735	622	732	---

ITEM	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98
Air surveillance: Surveillance and enforcement	2010	1875	1773	1670	1519	2028	1857	1577	1515
Observer program: Surveillance and enforcement	---	---	---	---	---	484	798	691	---
Canadian Coast Guard/Fishery management operations	---	---	---	---	---	---	133	177	---
AFAP/Fisheries Data: Surveillance and enforcement	---	901	586	596	480	449	---	---	---
AFAP/Surveillance and enforcement	---	1,446	2,795	2,825	2,798	1,213	---	---	---
AFAP/Certification & professionalization of fishermen	---	---	32	---	---	---	---	---	---
CAPITAL:									
Capital: Fishery management, including Coast Guard	---	---	---	28	---	---	7	13	324
Capital: Licensing and resource allocation	73	60	17	46	258	48	4	57	---
Capital: Surveillance and enforcement	427	1185	613	201	158	270	137	330	---
Vessel maintenance: Surveillance and enforcement	---	179	387	377	581	525	119	20	---
ADMINISTRATIVE SUPPORT									
SALARIES AND BENEFITS	3,009	3,533	3,197	3,234	2,911	2,434	2,577	3,381	---
OPERATIONS:									
Regular operating and maintenance	2,715	2,916	2,791	2,108	1,924	2,504	1,995	2,442	---

ITEM	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98
AFAP/Fisheries data	---	69	34	---	---	---	---	---	---
AFAP/Surveillance and enforcement	---	---	57	---	---	---	---	---	---
AFAP/Certification & professionalization of fishermen	---	---	---	17	84	1	---	---	---
Northwest Atlantic Fisheries Organisation	319	347	335	341	343	340	273	254	251
CAPITAL:									
Regular capital	318	1,422	350	406	108	201	76	633	---
EXCHANGE RATE CAN\$/US\$ (yrlly avg)	1.184	1.167	1.146	1.208	1.290	1.366	1.373	1.364	1.384
TOTAL FISHERIES MGMT EXPENDITURE	41770	49805	49457	41855	41848	41616	39532	44591	38550
VALUE: CATCH OF GROUND FISH, PELAGICS & SHELLFISH	220512	237568	223726	158718	150555	157887	244634	200926	219798
EXPENDITURE/CATCH	0.19	0.21	0.22	0.26	0.28	0.26	0.16	0.22	0.18
DFO EXPENDITURE: NEWFOUNDLAND REGION	80,703	95,757	89,655	260264	311374	100040	79,147	87335	118923
DFO EXPENDITURE: NATL CAPITAL REGION	95,952	98,452	107657	55,695	124370	119304	102741	119461	132494
DFO EXPENDITURE: NATIONAL TOTAL	580554	637285	616039	663623	799218	551526	506932	564011	829790