The evolution of management in Canada's offshore scallop fishery

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1. INTRODUCTION

For 40 years, the Canadian offshore scallop fishery operated as a competitive fishery. At its height, 76 vessels greater than 19.8 m (65') in length were licensed to fish by ten companies. After 30 years of operation, overcapacity was recognized and the first effort controls were introduced by government in the form of limited entry. Between 1984 and 1986, three events changed the course of the offshore scallop fishery and paved the way for self-governance. Those events were: (a) the International Court of Justice (ICJ) decision that awarded Canada the Northeast portion of Georges Bank, (b) the implementation of a trial Enterprise Allocation programme and (c), the permanent separation of the inshore and offshore scallop fleets from common fishing grounds. Since 1986, the offshore scallop fleet modernised and rationalised its capacity to match the available resources. Offshore scallop stocks have been rebuilt and, to the degree possible, landings have stabilized over time. Through government-industry cooperation and increased self-governance, costs to government have been reduced while the role of industry has increased in the areas of science, management, enforcement and decision-making.

* The comments contained herein do not reflect the official policy of Department of Fisheries and Oceans.

PHOTO 1
Offshore scallop freezer vessel

Designed in Norway and built in Spain, the Atlantic Leader is 134'LOA and 964 tons. The vessel is powered by a Caterpillar 3606 1950 kW hp engine with a 968 kW Caterpillar 3508 auxiliary. The vessel is a member of the Canadian Offshore Scallop Industry Mapping Group.

2. DESCRIPTION

2.1 Overview

The offshore scallop fishery was established after 1945 in response to the growing demand for scallops. The offshore fleet's primary fishing ground is Georges Bank, but other banks such as Browns, German and Sable–Western are also important. The fleet must fish more than 12 miles from shore and cannot fish in the Bay of Fundy north of the 43° 40′ parallel.

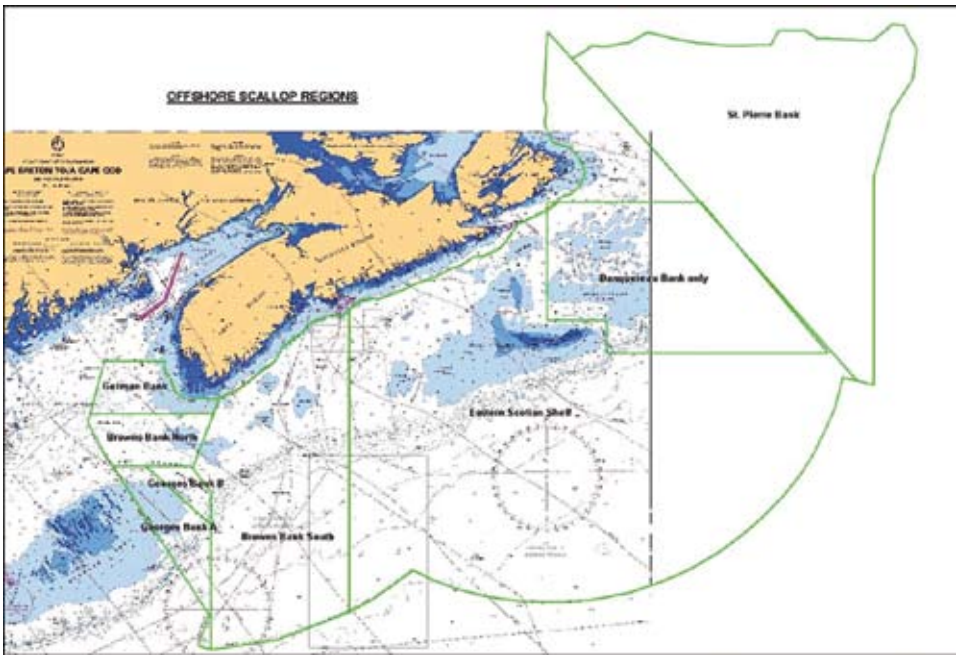
Currently, the fleet consists of 25 vessels of 27 m (88') to 43 m (141') in length. These vessels fish by towing scallop rakes (drags) along the seabed. Most vessels are capable of towing two steel rakes at a time; each rake is approximately 5m (15') wide. Of the 25 vessels, four have on-board freezing technology. Three of the four freezer vessels have been recently joined the fleet (see Photo 1). Freezer vessels have 28 crew members and remain at sea roughly 28 days a trip. The remainder of the vessels in the fleet have 17 crew members with trips usually lasting 10 to 12 days. The fishery operates 12 months a year and scallops are landed in five ports in Southwest Nova Scotia (Lunenburg, Riverport, Liverpool, LaHave and Meteghan). The vessels are owned by six companies and most of these companies own the plants that process the scallops. Scallop meats are shucked on board and either frozen or kept fresh on ice. Onshore, the scallops are further processed and repackaged in fresh, frozen or roe-on product forms. The United States (US) is the major market for Canadian scallops, taking about 75 percent of sales.

2.2 History from 1970 to 1989

In the early 1970s, the offshore scallop fishery had excessive catching capacity. In 1973, limited entry was introduced and the fishery was restricted to 76 offshore licences (vessels greater than 19.8 m [65'] in length). In 1977, Canada and the US had each declared a 200-mile fishing zone. The result was that Canadian access to Georges Bank was limited to a zone disputed by Canada and the US. Previously, Canadian vessels had often fished as far southward as the Great South Channel. By the late 1970s, much of the fleet, which consisted of wooden vessels, was reaching the end of its useful life span. However, reduced profitability and the uncertainty over which country would finally have jurisdiction over what parts of Georges Bank delayed any serious actions by vessel owners to replace the fleet.

Competitive fishing by both the Canadian and US scallop fleets continued in the disputed zone and grew more intense until 1984, when the International Court of Justice (1984) established an international boundary in the Gulf of Maine. The Northeast portion of Georges Bank (acknowledged to be the most productive area of the Bank for scallops) was awarded to Canada. Figure 1 shows the scallop fishing areas. Because of the intensive fishery prior to the Court decision, Canadian scallop landings

FIGURE 1
Offshore scallop fishing areas



from Georges Bank were less than 2 000 t of meats in 1984, the lowest on record. The ICJ boundary decision cleared the way in Canada for serious discussions to develop and implement a management strategy to rebuild and maintain offshore scallop stocks as well as to address the orderly replacement of the ageing fleet.

A series of discussions in 1984-85 between industry and the Offshore Scallop Advisory Committee (OSAC) led to significant conservation measures, including a larger minimum size limit and a restrictive total allowable catch (TAC). Industry unanimously supported a TAC as all parties recognised that size limits alone would not rebuild the stocks given the high levels of fishing mortality (up to 80 percent).

It was generally accepted by the industry that a fully-replaced fleet of 76 vessels could not be economically viable. According to an economic model developed by Gardner-Pinfold Consulting Economists (1983), a much smaller fleet of 30 to 35 vessels could harvest the resource more efficiently and profitably. Similarly, a 1985 DFO report (Nelson, 1985) determined that the optimal fleet size could be in the range of 39 to 44 vessels. By fall 1985, the ten companies holding offshore scallop licences had identified the Enterprise Allocation (EA) concept as the preferred method to achieve stock rebuilding, stabilized landings and fleet rationalization. However, vessel captains and crews rejected the EA because it threatened employment levels. The captains and crews proposed more effort control mechanisms (closed winter seasons, 16 day maximum trip length and reductions in trip limits from 30 000 lbs to 14 000 lbs) to achieve essentially the same objectives. Internally, DFO supported the EA option as the better path to fleet rationalization. DFO organized further discussions between vessel owners and crew. DFO ultimately recommended an experimental implementation of EAs, conditioned on a workable and affordable enforcement programme and administrative rules. By June 1986, following eight more months of discussions between DFO, the vessel owners and crew representatives, agreement was reached on implementing a three-year experimental EA programme to run from 1 January 1986 to 31 December 1988.

Since 1978, the inshore scallop fleet, based primarily in the Digby area, had annual access to Georges Bank at 2.9 percent of the previous year's offshore scallop catch.

That fleet proposed an increased allocation of at least 500 t on Georges Bank (or 12 percent of the 1986 TAC). Members of the offshore fleet feared that long term access to Georges Bank by the inshore fleet, particularly at the levels requested, would result in a serious depletion of stocks and the collapse of the experimental EA programme. The inshore fleet access issue was resolved on 30 October 1986, when the Minister, following extensive regional consultations and agreement between inshore and offshore representatives, announced the permanent separation of the inshore and offshore fleets at the 43° 40′ parallel near Yarmouth. The offshore fleet was restricted from fishing waters of the Bay of Fundy north of 43° 40′. The inshore fleet was phased off Georges Bank over two years, from 1987 to 1988.

A review of the trial EA programme was conducted by OSAC during the final three months of 1988. The general consensus of OSAC was that the trial EA programme had contributed to the objectives of the Offshore Scallop Management Plan. A wider range of year classes was appearing in the stock that would continue to assist the stabilization of the fishery over time. All members concluded that the trial programme had contributed to increased economic benefits to the fishermen, vessel owners, shore workers and the Canadian public and that all those engaged in the fishery were better off than they would have been had the fishery remained competitive. With the exception of the Nova Scotia Fisherman's Association (representing crews of one company), OSAC members recommended that the EA programme continue. However, crew representatives strongly recommended trip length restrictions, maximum trip limits and season catch limits, because they wished to address working environment issues such as length of time spent at sea on fishing trips. Crews also expressed concerns over the degree to which fleet downsizing would occur in the future. Vessel owners countered that trip limits were inappropriate under an EA because they prevented efficient harvesting plans. Vessel owners argued that these issues would be more appropriately addressed in labour/management negotiations.

In February 1989, a draft of *The Enterprise Allocation Programme in the Canadian Offshore Scallop Fishery* was forwarded to the Minister. DFO recommendations accompanying the draft were: (a) that the EA programme be renewed based on industry advice and the success of the experimental programme and (b), that the regulations on trip catch limits, trip duration and related restrictions, be revoked with the option of applying these restrictions by licence condition if required for conservation reasons and in consultation with OSAC. In June, the Minister approved the 1989 Offshore Scallop Management Plan and the continuation of the EA programme for an indefinite period, subject to the review provisions contained within the EA document itself.

2.3 Regulations after introduction of enterprise allocations

Table 1 shows a timeline of fishery regulations for the scallop fishery since implementation of EAs. The rules within the fishery continued to evolve and implementation of the EA programme did not lead to deregulation. Further regulations to define specific fishing areas with closed times, which were implemented as conditions of individual fishing licences, were deemed necessary to better define the fishing privileges under the EA programme. To promote stock rebuilding and to ensure the integrity of TAC's and individual EA's, stricter measures were implemented for shell height restrictions, lower meat counts, hail requirements, prohibition on transshipping and requirements to weigh scallops on landing. Amendments also increased licence fees. Table 2 lists government licence fees.

Although a number of regulations were officially revoked, the same basic restrictions were re-established as conditions of the EA licences. For example, the requirements for 100 percent industry-funded dockside monitoring, log books, release of bycatches, to fish only one scallop fishing area (SFA) a trip and to install and maintain an electronic monitoring system, are all conditions of the EA licences. The notable exception was

TABLE 1
A timeline of regulations in the offshore scallop fleet

1986	1. Scallop Fishing Areas (SFAs) were treated and closed fishing times established for each area. 2. Offshore scallop vessels >19.8 m (65′) in length were prohibited from fishing in the Bay of Fundy north of 43° 40′ and from fishing inside the outer boundary of the Territorial Sea. 3. A 33 per 500-gram average meat count was in effect for all SFA's. (Variation orders were used annually to adjust this count in certain SFA's.) 4. The average count is determined on the basis of eight or more samples of meats, each sample weighing 500 grams or more. 5. Offshore vessels were restricted: a) to trip limits of 13,700 kg (30 000 lb) and b), quarterly limits not to exceed 82 200 kg (181 000 lb) 6. Offshore vessels could not fish for more than 12 consecutive 24-hour periods. 7. It was prohibited in any SFA to have scallop drags onboard a vessel unless that vessel was authorized to fish for scallops in that area at that time, or the scallop drags had to be unshackled and stowed.
1987	1. Vessel classes for nine offshore scallop licence holders were introduced and closed times established for each vessel class in each of the SFA's. 2. The regulations which prohibited offshore scallop vessels from fishing in the Bay of Fundy north of 43° 40′ and from fishing inside the outer boundary of the Territorial Sea were revoked. But the same restrictions were implemented as a condition of the EA fishing licences. 3. Licence fees were increased (essentially doubled). 4. A definition for "shell height" was introduced. 5. A 45 per 500-gram average meat count was specifically implemented for SFA 25 (Eastern Scotian Shelf). 6. Any scallops caught and retained or found on board a vessel were deemed to have been caught in the SFA area in which the vessel was authorized to fish. 7. It was prohibited to have on board a vessel any scallops caught in SFA 27 (Georges Bank) unless the shell height was 105 mm or greater. 8. Offshore scallop vessels were required 'to hail' to a fishery officer 12 hours before a vessel arrived at port: a) the port where the scallops would be landed and b), the time when scallops would be landed. 9. It became an offence to land at a port or time different than that hailed unless by permission of a fishery officer. 10. A fishery officer could direct that scallops not be landed until they were first inspected and it became an offence not to comply with the fishery officer's direction. 11. Transshipping of scallops to another vessel was prohibited. 12. Offshore scallop licence holders were required to weigh all scallops caught in SFA's 26 and 27 (Browns/ German banks and Georges Bank) at the time of landing.
1989	1. Offshore vessel classes were revoked from the regulations but implemented as a condition of the fishing licence.
1991	1. The regulations restricting fishing trips to a maximum of 12 days duration and establishing trip limits of 13 700 kg (30 000 lb) of meats, and quarterly limits of 82 200 kg (181 000 lb) of meats were revoked.
1993	1. It was prohibited in any SFA, other than SFA 26 and 27 (Browns and German banks and Georges Bank), to have scallop drags onboard a vessel unless that vessel was authorized to fish for scallops in that area at that time, or, the scallop drags had to be unshackled and stowed. 2. In SFA 27 (Georges Bank) it was prohibited to have scallop drags on board a vessel unless the vessel was authorized to fish for scallops in that area at that time even if the drags were unshackled and stowed.
1996	1. Licence fees were amended and the new fee based on $547.50 a tonne of scallop meats allocated (previous fees were based on the number of vessels eligible to licensed by each company).

the removal of restrictions on fishing trip length, trip catch limits and quarterly catch limits in 1991, over the objections of union and non-union crews. The cost of dockside monitoring is estimated to be Can$40 000/yr ((Barrow, Jefferson, Eagles & Stevens 2001)

TABLE 2
Annual licence fees for scallop fisheries, Eastern Nova Scotia

Area	Fee (C$)
16	580
23,29, 30	30
28C, 28D	640
28A, 28B, 28C & 28D	6500
All other areas	100

http://www.canlii.org/ca/regu/sor86-21/part253317.html

3. SELF-GOVERNANCE IN THE OFFSHORE SCALLOP FISHERY

3.1 Overview of governance

Fisheries management in Canada can be described in terms of seven high-level service functions. Figure 2 is a networked view of management and the interdependencies of the functions. Two are planning functions: strategic planning and operational planning. Two are research functions in natural and social sciences. Three are operational implementation of the management plan: fisheries

FIGURE 2
Fisheries management functions

entitlement administration, enforcement and monitoring.

Up to the mid and late 1980s, all of these functions were performed and/or funded entirely by the government in Canada. The commercial fishers enjoyed access to most resources and paid nominal licence fees. During the 1990s, responsibility to perform or fund some of these functions was shifted to industry. This change was introduced through management plans on a fishery-by-fishery basis. This change has proceeded further in some fisheries than in others. Typically, fisheries with the strongest possibilities for rights-based management had the incentives to accept more management responsibility and costs. The offshore scallop fishery was an example of one such fishery.

In 1996, the government also increased commercial licence fees. The approach charged higher rates to more lucrative fisheries. In fisheries where the average annual landed value a licence was less than Can$50 000 over the 4-year period 1990–1993, the licence fee charged was 3 percent of that average landed value. In fisheries where the average annual landed value a licence exceeded Can$50 000, the licence fee was 5 percent of that average landed value. Offshore scallop licence fees were in the latter category.

We now examine how self-governance in the offshore scallop fishery has evolved in each of the seven management functions since management of the fishery became rights-based in 1986.

3.2 Strategic policy planning

This function establishes the policy and planning parameters within which fisheries will be conducted, including the development of regulations, creation of support institutions and definition of the objectives and strategies to be applied in the fishery management plans.

The shift from a competitive fishery to an EA fishery in 1986 led members of the industry to take a more active role in management. One of the first actions by industry was to develop the *Enterprise Allocation Programme in the Canadian Offshore Scallop Fishery* document ("EA document", which can be found in a slightly updated form in DFO [2000]). That EA document, submitted to, and approved by, the DFO has remained the cornerstone of the fishery for 17 years. From a strategic planning

perspective, the EA document:

i. outlined the need for new regulatory initiatives;
ii. maintained the Offshore Scallop Advisory Committee (OSAC) as the primary consultative mechanism;
iii. established the goals and objectives for the fishery; and
iv. defined how the goals could be achieved through implementation of TAC's and EA's.

3.3 Fishery operational planning

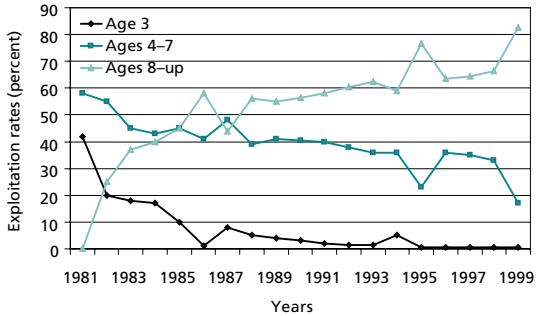
This function supports the development of seasonal harvesting plans. It defines quotas, quantities, seasons, areas, input controls, reporting requirements and other parameters related to harvesting activity

Each offshore scallop (EA) licence holder participates on the OSAC along with union and crew representatives. In this forum, industry recommends annual TACs, seasons and meat counts for each of the eight offshore scallop fishing areas (SFAs). But the industry has moved well beyond simply providing advice and recommendations to DFO on these matters. The industry has now taken on an active role in several areas of scallop management.

In several fishing areas, recruitment is sporadic and, in deeper waters growth is slow. Annual stock assessments are not possible for all fishing areas particularly for those that are considered marginal. An innovative approach to management of these areas has developed. Industry and the DFO have agreed to a protocol that sets small TACs for short incremental periods. On German Bank, for example, a 200 t TAC is established for each 6-week period commencing 1 June to 15 November. If, at the end of the first 6-week period, meat counts and catch rates have been maintained at certain levels, another 200 t TAC is assigned. To make this system work, industry must provide timely catch and effort data to the DFO prior to the expiry of each incremental period. When catch and effort data do not support a further TAC increment, the DFO must be confident that fishing will cease immediately. Formal closing of a scallop fishing area through the variation order process takes several days and requires formal notification of the order to each licence holder. To make the system feasible, industry voluntarily ceases fishing upon receipt of a fax from the DFO. To date, there has been no incident of non-compliance with this protocol.

A second major strategy of the industry is to avoid areas with high concentrations of juvenile scallops, whether identified by industry or through DFO surveys. To protect these areas, each EA licence holder voluntarily instructs its captains not to fish these areas. This approach is timely and saves administrative costs for the DFO by eliminating the need for variation orders. Figure 3 shows the increase in the average age of scallops captured over the past twenty years. It is clear that the implementation of protection measures by the DFO and the industry have largely contributed in increasing the average age at capture, which permits results in harvests of larger scallops and conservation of the resource.

FIGURE 3
Georges Bank exploitation rates for different age categories



The offshore scallop plan is adaptive in nature and its fine-tuning is a regular occurrence. Harvesting strategies may change throughout the season in response to markets, weather conditions, recruitment pulses, catch rates, meat sizes and so forth. The fishing plan must be able to accommodate some changes on a timely basis without the need

to seek consensus at formal OSAC meetings. Adjustments to the length of periods between incremental TACs, minor adjustments to interim TACs and meat count and shell height changes are often handled by fax. All six companies (licence holders) are represented by the Seafood Producers of Nova Scotia (SPANS). The Executive Director of SPANS, on behalf of all six companies, makes the request for changes to DFO. An industry request for change is faxed to each member of OSAC with a science and management recommendation. Non-response by a specific date means acceptance and a revised fishing plan is prepared and faxed to each OSAC member.

3.4 Social and economic analysis

This function conducts research on the performance of enterprises and of the industry as a whole. It addresses all aspects of the economic, social and business climate in the country and abroad that could have an impact at the strategic or fishery specific level. It provides timely analysis of the impact of management options. This function is primarily performed internally by companies for their own business purposes. Companies seek to maximize returns by adjusting their fishing to the market (time of year, size and product form of highest demand).

Since implementation of the EA programme, the industry has continued to streamline its operations. Through purchases, the number of companies has decreased from nine to six. Fleet rationalization and modernization continues. In the past five years, three new vessels with freezing capacity were added to the fleet as replacements for older vessels. Freezer vessels provide flexibility in product form (fresh and frozen), have improved product quality and provide a more comfortable and safer working environment. Considerable benefits have accrued to this industry since it assumed more management responsibility in 1986. Although these changes occurred gradually over time, the social cost was the loss of over 700 jobs to this sector (crew and onshore workers).

3.5 Resource research and analysis

This function involves research on marine resources and their ecosystems to understand ecosystem dynamics and to assess fisheries resources. Scientists and members of the industry provide regular evaluations of the status of marine resources (fish stocks), make recommendations on harvest levels and assess the impact of various fisheries management and conservation measures.

The offshore scallop industry plays its second major role in this area. Under a Joint Project Agreement (JPA), industry provides a scallop fishing vessel complete with crew to conduct two 10-day surveys annually under the direction of DFO's offshore scallop assessment biologist. The contribution by licence holders to this JPA is Can$520 000 annually.

During the past five years, most licence holders have also entered into a series of JPAs with the Canadian Hydrographic Service to carry out seabed mapping on Georges Bank, Browns Bank and German Bank. Computer software programming provided a 3-dimensional image of the bottom and identified the type of substrate. Offshore scallop vessels are now able to target fishing on particular substrates where scallop concentrations are known to be greatest (pea gravel). Benefits include reduced fishing time, fuel savings, savings in loss and repair of gear and ecosystem protection. It is estimated that as much as two thirds less dragging occurs on these banks as did previously – see, for example, the significant increase in catch per unit effort on Georges Bank beginning in 2000 (Figure 6). Further benefits occur in the form of less bottom contact and, in some cases, no contact at all when the scallop substrate is poor. Selectivity in dragging has led to important reductions in bycatch.

Scientific information has played a key role in rebuilding scallop stocks and stabilizing landings since 1986 and industry members recognize the value of good scientific advice. To ensure the provision of scientific information, licence holders

recently entered into a JPA to assure with the long-term succession planning to replace the current DFO stock assessment biologist. The annual contribution by licence holders to succession planning under this JPA is Can$47 000.

3.6 Fishing entitlements

This function supports the needs of fishers and vessel owners to register and be licensed for entitlements to fish and to receive fishing allocations in accordance with seasonal harvesting plans. This includes transfer of those entitlements between companies and any resulting revocation or suspension of entitlements.

Each company must renew their EA licence annually. The fee for the licence to engage in offshore scallop fishing is based upon the tonnage of scallops allocated multiplied by Can$547.50 per tonne of allocation. The fee to register these vessels is Can$50 a vessel. So if the offshore scallop TAC is 6 000 tonnes of meats, the licence fees for that year would total Can$3 285 000 plus Can$50 for each vessel registered to fish. Each licence specifies the vessels that can be used in fishing and each vessel must be registered with DFO as a commercial fishing vessel. Licence holders are eligible to have any number of vessels, up to the maximum licensed before 1986. In 2003, only about 25 of 76 eligible vessel licences were used. Also, each person fishing on board an offshore scallop vessel is required to be registered as a commercial fisher, at an annual fee of Can$50.

Temporary EA transfers are permitted within season. Although temporary transfers require approval by DFO, it is the responsibility of individual companies to track their catches against their EAs for each fishing area. At the end of each fishing year, DFO quota monitoring officials and EA company staff reconcile catches. Overruns are handled in the following manner:

i. In the case of a 1 percent overrun or less, that amount is deducted from the following year's quota.
ii. In the case of an overrun exceeding 1 percent, twice that amount is deducted from the following year's quota.

3.7 Catch and effort monitoring

This function provides timely, accurate data related to the use of entitlements and the fulfilment of harvesting plans. Under licence conditions, companies are responsible:

i. To pay 100 percent for dockside monitoring (DMP) of all scallop landings (weights) by an independent third party funded by industry.
ii. In lieu of observers, to install an approved electronic vessel monitoring system (VMS) that provides hourly signals to DFO during all fishing trips.
iii. To provide accurate catch and effort information to DFO at the conclusion of each fishing trip.

In addition to these requirements, licence holders entered into another JPA with DFO that provides port sampling of catches from each fishing trip (meat counts). The annual cost to licence holders for this JPA is approximately Can$90 000.

3.8 Protection and enforcement

This function monitors compliance with regulations and management plans and takes necessary action against violators. It includes the adjudication of guilt and the imposition of penalties.

Protection and enforcement is primarily a DFO role. The DFO conducts at-sea surveillance using both offshore patrol vessels and aircraft. These insure that the boundaries between inshore and offshore areas and the Canada-US line are respected. Fishery officers conduct routine boarding at sea, carry out routine inspections and perform meat counts on shore. The DFO also conducts audits on dockside monitoring and on the VMS data.

Industry's role in this function is more passive, but nevertheless important. Installation of VMS provides a higher degree of confidence that offshore scallop vessels are only fishing in the SFA for which they are authorized to fish on a particular trip. This ensures the integrity of all TACs is maintained, as landings from each vessel can be attributed to a specific SFA. Because of this improved confidence level, the DFO can allocate less at-sea surveillance time to monitor offshore management areas.

Offshore scallop vessels are prohibited from retaining incidentally caught species like groundfish. To ensure the best possible survival rates of these species, companies have provided written instructions to captains and crews to treat bycatches as a priority and to release them immediately.

Compliance within the offshore scallop industry is high. There has been little in the way of violations noted or charges laid in the past decade, with two exceptions. Fishery officers apprehended crew members on separate occasions removing scallops in the middle of the night from vessels that had been offloaded earlier in the day. Captains and some crew members were stealing the scallops from the company, hiding them onboard the vessel until the dockside monitor left, offloading the scallops under cover of darkness and selling them. DFO laid charges, convicted the captains and assigned the weight of the illegal scallops to each company. The companies responded by improving security, firing the captain in one case and firing the captain and entire crew in the other case. Active industry support for compliance is a clear deterrent for any individual who might consider violating the rules.

Under the port sampling JPA, the DFO is provided meat counts from each scallop fishing trip. Meat counts have not been an enforcement issue with this fleet for years. Stocks have been rebuilt and consist of multiple year classes. The industry focus has been removing fewer animals, with a higher average size, to reach their quota. At one point, the DFO sampled upwards of 50 percent of offshore scallop landings. Because of the port sampling JPA and recent fishing trends, the DFO has been able to reduce the number of meat counts taken by fishery officers to less than 10 percent.

4. EVALUATION OF ENTERPRISE ALLOCATION OBJECTIVES

4.1 Enterprise allocations objectives

The shift in the Canadian offshore scallop fishery from a competitive fishery to a rights based (EA) fishery in 1986 had three major objectives:

i. to ensure conservation and restoration of the resource;
ii. to the degree possible, stabilize annual landings over time; and
iii. to provide increased economic benefits for fishers, vessel owners, shore workers and the people of Canada.

We will discuss briefly our evaluation of how well these objectives were met.

4.2 Ensure conservation and restoration of the resource

Total Canadian offshore scallop catches were the lowest on record in 1984, less than 25 000 t round weight (Figure 4). Average catches in the last three years (2000–2002) have been about 73 000 t, despite a fleet reduction from 68 active vessels in 1986 to about 25 active vessels. A wider range of year classes is now found within the populations and the size at which scallops are removed has increased (millions fewer animals are harvested to attain the same TAC). Catch rates have been the highest on record for 2000–2002, double to triple those previously recorded on Georges Bank (Figure 5). In terms of hours towed annually, effort has decreased from a high of about 125,000 hours in 1979 to only about 25 000 hours in 2000–2005 (Figure 6). An internal review of the EA programme by the DFO in 1997 concluded that most industry members agreed that the conservation objective has been achieved.

4.3 To the degree possible, stabilize annual landings over time

From the start of the EA programme in 1986 to 2002, the total annual catch in the offshore scallop fishery has ranged from a low of approximately 32 000 t round weight to a high of approximately 75 000 t, or a ratio of about 2.3 to 1. During the period from 1967 to 1985, catches ranged from a low of approximately 22 000 t to a high of 102 000 t, or a ratio of about 4.3 to 1 (see Figure 5).

Much of the fluctuation from 1986 to 2002 was the result of low catches in 1995 and 1996, which were due to back-to-back year-class failures on Georges Bank in 1990 and 1991. Early detection of this situation and a rapid response by industry in reducing TAC levels may have contributed to a more rapid recovery. It seems that the landings stabilization objective has been achieved to the degree possible and this conclusion is supported by the industry.

FIGURE 4
Scallop catches (round weight tonnes) for all offshore scallop fishing areas

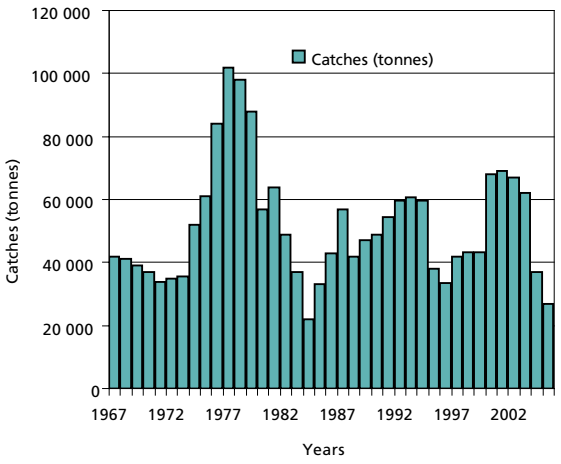
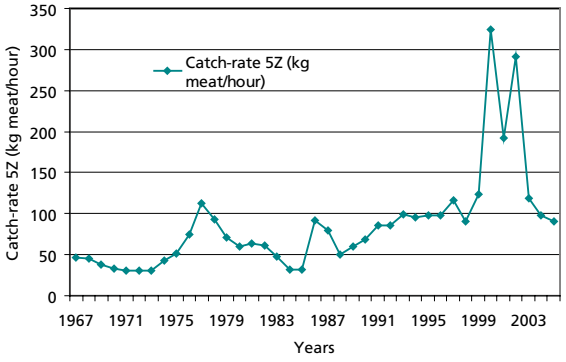


FIGURE 5
Annual scallop catch rates (kg meat/hour) for Georges Bank

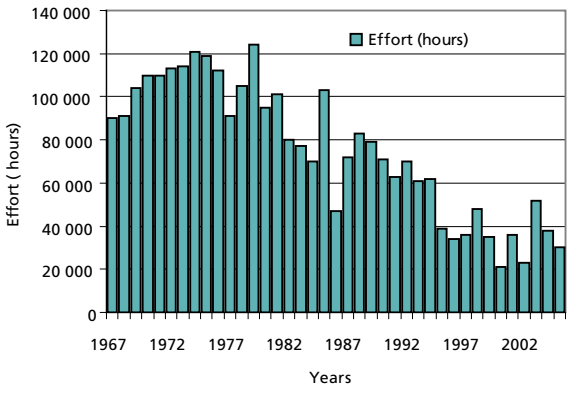


4.4 Increased economic benefits for fishers, vessel owners, shore workers and other Canadians

As discussed above, the EA programme has enabled vessel owners to use a smaller fleet of vessels to catch the available resource at reduced cost. Vessel owners continue to support the EA programme, so the expectations of vessel owners have been met.

The benefits to the people of Canada are less direct, but arguably also clear. The offshore scallop resource is healthy, thereby assuring a larger volume of product to consumers in Canada and Canada's principal trading partners. Licence fees paid for access have increased from just over Can$111 000 in 1986 to Can$5 000 000 in 2002, which represents in part an extraction of rents that benefits Canadian citizens. In addition to the licence fees, industry bears a substantial share of the costs of management. Licence holders pay for 100 percent of the dockside monitoring and provide approximately Can$650 000 to support research. On the other hand, regulatory activities by the DFO have increased and the costs of these activities may have increased. Fleet reduction was accomplished without the need for government funds for buy-outs, although the social costs for displaced human resources are unknown. Although employment has been reduced in this sector, those

FIGURE 6
Annual scallop effort (hours) for Georges Bank



who remain generate more personal income and pay more personal income taxes and corporate taxes (subject to prevailing capital gains provisions for fishermen)[1].

5. DISCUSSION

The Canadian offshore scallop fishery is an example of an evolutionary process toward more self-governance, but with careful monitoring by the DFO. The following events have contributed to the success of this particular case:

i. the implementation of the Enterprise Allocation programme;
ii. the International Court of Justice decision to assign the Northeast section of George Bank to the Canada;
iii. the separation of the inshore and offshore fishery;
iv. the successive implementation of regulations in the fishery as seen in Table 1;
v. strong leadership within a small number of EA licence holders and their willingness to cooperate with DFO through partnership agreements;
vi. fleet rationalization and modernization, which largely resulted from the EA programme;
vii. a fishery that, once re-established, could generate sufficient rent to satisfy the demands of both the industry and DFO; and
viii. a flexible response by DFO.

The Canadian offshore scallop fishery started as nearly an open access fishery where government assumed all costs of science and assessment. It moved to a management style that involved the industry more, but which also expected more industry involvement in assessment and in-season management. The industry's role was increased through time in the areas of science, management, enforcement and decision-making. However, the industry still remains tightly linked to the DFO, compared to similar experiments in self-management elsewhere. The DFO retained a substantial discretionary power but still works closely with the industry. This may not be too surprising, since Canadian public managers may have a comparative advantage in fisheries science and stock assessment techniques that cannot be easily duplicated by others.

Enterprise Allocations provided the opportunity for industry to realise substantial economies in the harvest of the resource. These results are perhaps typical of individual quota programmes, of which EAs are a variant. But greater self-governance has enabled the industry to undertake initiatives that otherwise would have been impossible. Industry has been able to dramatically increase yield-per-recruit through a combination of formal closures and informal industry closures. Scallops of age eight or greater now account for 70 percent to 80 percent of harvest; age eight is probably near the age that maximises yield-per-recruit. The voluntary programme to stop harvest under the incremental opening programme enables the DFO to monitor and manage areas with limited assessment information. The recent investment in side-scan mapping is expected to reduce fishing effort by up to 50 percent, in addition to the 50 percent reduction already achieved under EAs.

The increased role of industry is apparent across all three functional areas of management: planning (Strategic Policy and Operational Planning); research (Social Economic Research and Analysis, Resource Research and Analysis) and operations (Fishing Entitlements, Catch and Effort Monitoring and Compliance & Enforcement). The role of industry in each of these functional areas is summarized below.

For the planning functions, the industry's role has evolved with the implementation of the EA programme and the DFO's policy shift to JPAs. The industry became more active in management through OSAC, which is still the link between the government and the industry for management advice. The degree of flexibility in the process of

[1] Marilyn Crook, IFQ Program Summary Series No. 3' on the following internet page: *http://www.lobsterconservation.com/canadianscallop/*

implementing plans is remarkable. Voluntary initiatives by industry have enabled the DFO to adopt plans that would have been impossible otherwise. The industry also has an important role in reporting data, which helps stock assessment and the recommendation of an appropriate TAC by the DFO.

The industry has played its largest role in the research functions. The industry is responsible for funding stock assessments with JPAs. This has allowed obtaining information on dynamics of the stock and seabed mapping, which permits improvements in terms of impacts on the stock and on the ecosystems. Those innovations also helped rebuild the stock and stabilise landings. The voluntary programme to avoid areas with small scallops, whether revealed by the DFO assessments or revealed by industry landings, has been important in increasing yields and harvest efficiency.

In the operational functions, the Fishing Entitlements are responsible for the rent extraction from the fishery. The enterprises are obligated to pay these fees for the renewal of their licences, as well as annual registration fees. In addition, under their licence conditions, owners are also responsible for monitoring and reporting their catches and effort. New technologies like VMS have been useful in that regard. The industry's role is more passive in areas of protection and enforcement. However, by respecting the designation of one SFA a trip and complying with the various rules and protocols, both written and informal, captains and crews help in the conservation of the resource.

The EA programme has been in place for eighteen years and appears to have been successful. The industry's role in the management has become more important. The industry has improved fishing methods, modernized its fleet and also has agreed to take part in JPA programmes related to management. Those functions have helped the conservation of the resource and the sustainability of the fishery. This type of management could be useful to guide similar fisheries in Canada or even worldwide. However, this particular case from Canada may be special, in that a potentially highly lucrative fishery under the leadership of a limited number of firms faced by a public agency that not only has strong skills in fisheries science, but also fairly broad discretionary powers.

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