

## Rights-based vs. competitive fishing of sea scallops *Placopecten magellanicus* in Nova Scotia

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### Abstract

Management techniques in two sea scallop *Placopecten magellanicus* fisheries in Nova Scotia are compared and contrasted. In one, traditional management methods are used to protect the stock from overexploitation. In the other fishery, enterprise allocations in the form of quota shares are used to mimic property rights. Over the past decade, the fleets' reactions to stock conditions have been dramatically different. It is argued that the evidence supports a quasi-property management regime, though other factors are at play as well.

**Keywords:** Fishery management, allocation system, quota regulations, fishing rights, fishing effort, scallops, *Placopecten magellanicus*, Georges Bank, Bay of Fundy, NW Atlantic.

*Les droits d'accès de la pêche de Placopecten magellanicus en Nouvelle Écosse.*

### Résumé

Les techniques de gestion de deux pêcheries de *Placopecten magellanicus* en Nouvelle Écosse sont comparées. Dans l'une, des méthodes traditionnelles sont utilisées afin de protéger le stock d'une surexploitation. Dans l'autre cas, des quotas alloués et partagés entre les entreprises ou armements sont utilisés, formes de droits de propriété. Durant la dernière décennie, les réactions des flottilles aux conditions du stock ont été profondément différentes. La gestion d'un régime de quasi-propiété est argumentée bien que d'autres facteurs entrent en jeu également.

**Mots-clés :** Gestion des pêches, quota, droits de pêches, effort de pêche, *Placopecten magellanicus*, Nouvelle Écosse, Canada.

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## INTRODUCTION

This set of two short case histories is intended to compare and contrast management in two sea scallop *Placopecten magellanicus* fisheries on grounds adjacent to western Nova Scotia. In the first case, an inshore scallop fishery is described which is managed almost exclusively by traditional methods of input control. The second example is an offshore fishery which has evolved from management of fishery input

to management by individual quotas in the form of enterprise allocations<sup>1</sup>.

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1. An enterprise allocation is a catch quota allocated to a licence holder who may utilize one or more vessels to catch the quota. Individual quotas (IQ) or individual transferable quotas (ITQ) are similar to EAs but are based on quotas allocated to individual boat licences.

## CASE 1 – BAY OF FUNDY SCALLOP FISHERY, “FULL-BAY” FLEET

### Fishery overview

There are some 324 Canadian inshore<sup>2</sup> vessels licensed to fish sea scallops in the Bay of Fundy, between Nova Scotia and New Brunswick (fig. 1). Only 99 of these have “full-Bay” licenses permitting them to fish throughout the Bay. The others are generally smaller vessels whose licenses restrict them to specific parts of the Bay. The full-Bay fleet catches over 80% of the total Bay of Fundy scallop catch, much of it in the grounds near Digby from which other inshore fleets are excluded. This case history will refer only to the full-Bay fleet to minimize detail and confusion in comparing inshore management to the offshore regime. The inshore scallop fishery is a limited-entry fishery, not restricted by catch quotas.

This inshore fleet consists of boats from 13 to 20 metres in length, gross tonnage from 27 to 100, based in ports from Yarmouth to Digby, Nova Scotia. The gear consists of drags constructed with steel rings

hung in sets along a steel frame and dragged along the bottom from the starboard side of the vessel. While originally a day-trip fishery, vessels now make trips of 4-5 days' duration, often fishing around the clock. The crew consists of a skipper and 3 to 5 others (extra shuckers are taken when catches are heavy). As in many fisheries, there has been a trend from independent owner-operators of vessels towards multi-vessel owners with hired skippers. The product is shucked on board and only the meat (muscle) is landed and sold to local processors who wash and package it before shipping most of it fresh to central Canada or the eastern U.S. The fishery employs about 400-500 in harvesting and a smaller number in processing plants.

Scallop beds in this area have been commercially fished since the 1920s. In the 1970s and 1980s the fleet expanded its fishing area to more distant grounds, eventually including Brown's and Georges Banks outside the Bay of Fundy. Conflict with the offshore fleet led to an agreement in 1986 which called for permanent separation of the inshore and offshore fishing grounds, phasing out inshore operations offshore, and also requiring effective conservation measures in the inshore fishery to sustain an economically viable industry.

Scallop catches increased to record levels in 1989 because of an unparalleled recruitment pulse off

2. In Atlantic Canada, the term “inshore” usually refers to fisheries utilizing vessels less than 20 m in length.

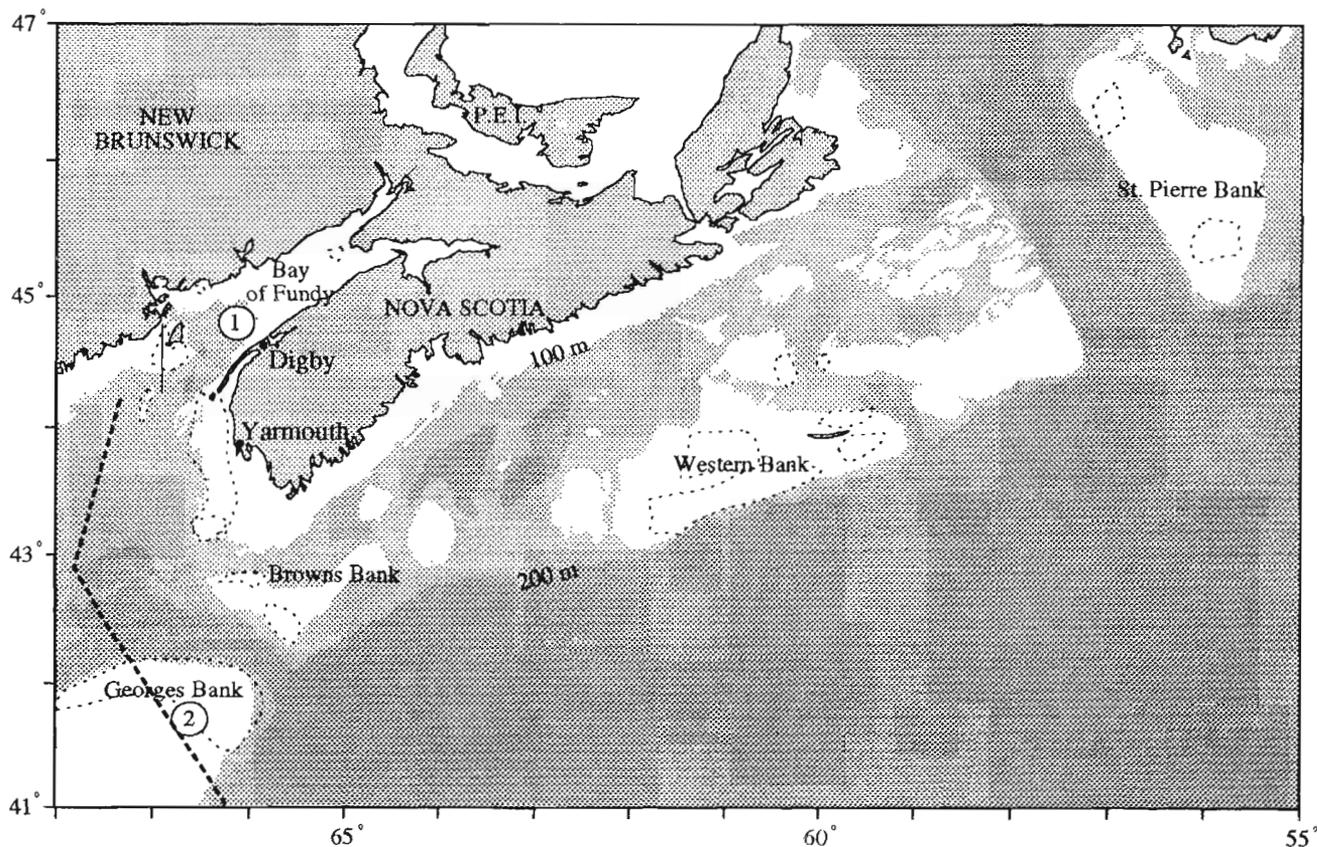


Figure 1. – The Bay of Fundy and Georges Bank.

Table 1. – Bay of Fundy scallop fleet (full-Bay licenses).

	1985	1986	1987	1988	1989	1990	1991	1992
No. licenses	96	96	99	99	99	99	99	99
No. specialists*	58	44	46	67	90	75	68	77
Catch by specialists(t)	5 460	3 799	7 846	20 265	30 580	16 646	12 645	14 540
Catch by others	629	982	2 219	4 499	2 034	3 465	2 149	690
Total fleet catch**	6 089	4 781	10 065	24 764	32 614	20 111	14 794	15 230
Total fleet sales***	9 346	7 353	13 484	27 894	33 655	21 800	17 053	20 838
Average tonnes/specialist	94	86	171	302	340	222	186	189
Average sales/specialist	\$143,185	\$132,051	\$230,286	\$337,174	\$350,129	\$240,604	\$212,102	\$257,653
Price (\$/lb meat)	5.78	5.79	5.04	4.24	3.89	4.08	4.34	5.15

\* Specialists: >80% of earnings from scallops, and minimum of \$10,000 sales.

\*\* catch in tonnes, live weight.

\*\*\* Sales to first buyer, in \$'000.

Digby. This recruitment pulse has contributed to record landings from 1989 to the early 1990s; however, little new recruitment has been observed in this area since (Kenchington *et al.*, 1995a, b). Good recruitment on other scallop beds has helped ease the fleet's return to normal harvests. Table 1 summarizes the recent history of catches by this fleet. Not all boats are active in any year as many are also licensed to fish groundfish by otter trawl.

In table 2, some basic costs and revenues are summarized (Anon., 1986, 1989). As these numbers are based on sample surveys of the specialist fleet, results may vary somewhat from the whole-fleet landings records covered in table 1. The determination of profits for an owner-operator of a vessel is somewhat arbitrary, depending on the income assigned to his earnings as a skipper. Clearly, in 1986 little was left for return on investment. Due to the prevalence of double-crewing (two shifts of crew to fish 24 hours a day) during the boom of 1989, the \$120,000 owner-skipper average income in that year would in many cases compensate two skippers. By 1992, revenues per sea-day were 20% lower than in 1989 implying that a considerable drop in net earnings occurred after the 1989 survey.

## Biology

Scallops occur in concentrations on "beds" where conditions are favourable but recruitment is sporadic both in numbers and location. There are a number of such beds in the Bay of Fundy, some more productive than others. The extent to which a particular stock regenerates itself is unknown. As scallop larvae spend part of their early lives high in the water column, they may be transported from outside the Bay on tides and currents. A large settlement and survival of scallop spat occurs from time to time. Reproductive

maturity occurs at three years and the life span can exceed twenty years. The average age of exploitation of scallops is three or four years.

Catch quotas are not used to manage this fishery. Biologists' advice to management has been directed towards predicting catches one year in advance and attempting to optimize the age at which scallops are fished rather than the number. Models suggest maximum yield would be achieved fishing larger scallops, but the industry has not been willing to accept the required increase in minimum size.

## Management

The Inshore Scallop Advisory Committee (ISAC) is made up of fishermen, processors, and provincial and federal government advisors. It meets several times

Table 2. – Economic indicators\* (full-bay scallop fleet).

(Averages per vessel)	1986	1989
Fish and scallop sales	\$176,538	\$381,446
Operating and maint. costs	\$45,728	\$101,849
Crew share (ex. skipper)	\$52,860	\$116,330
Fixed costs and depreciation	\$33,320	\$43,525
Return to owners and skippers	\$44,630	\$119,742
Investment in boat	\$202,708	\$248,336
Scallop catch (kg)	\$101,777	\$363,744
Avg. no. in crew (ex. skipper)	2.2	4.2
Revenue per day	\$1,605	\$2,192
O and M per day	\$416	\$585
O and M + crew per day	\$896	\$1,254
Earnings/crew member/year	\$24,027	\$27,698

\* From sample surveys of specialist vessels.

a year to review the status of the fishery, to discuss problems, and to advise the Department of Fisheries and Oceans (DFO, the federal department responsible for management) on management or other issues. The Inshore Scallop Management Plan (Anon., 1993a) states that management of this fishery is aimed at taking advantage of strong year classes, and protecting weak year classes from overfishing. The following management measures are used in the inshore scallop fishery:

- limited entry of vessels to the fishery;
- fishing seasons (fish beyond 8-mile box May-October, to save nearest grounds for winter fishing);
- meat counts (maximum number of scallops per 500 g);
- minimum shell heights;
- gear restrictions (width of gear, ring size);
- vessel replacement size rules;
- scallop licenses cannot be split from groundfish licenses.

Inshore scallop fishermen recently have lobbied for changes to their management plan. Some have proposed a plan to enable fishing the scallop beds on a rotating basis, keeping some areas closed while effort concentrates on others. Not surprisingly, they would also like to have access to an offshore zone which has served as a buffer separating inshore from offshore fleets and to have a share of quotas on offshore banks. Setting a total allowable catch (TAC) has been discussed but there seems no strong wish to institute quota management. Individual quotas are not on their agenda at present.

Also under review is a proposal to institute a minimum meat weight regulation applicable to each scallop. This is intended to complement the shell size limit. Enforcement of meat counts has been so problematic in this fishery that it is not an effective management measure.

## IMPACTS OF THE MANAGEMENT REGIME

### Resource conservation

This resource, in the absence of a total allowable catch, is vulnerable to excessive fishing effort by a competitive fleet when stocks are at low levels. This is tempered somewhat if some recruitment of young scallops is from offshore stocks instead of local ones. Heavy fishing will, in that case, affect the distribution of catches over time, and may reduce the total yield, but it will not necessarily permanently damage the stock.

### Fishing effort

In figure 2 it appears that fishing effort, at least since 1986, has closely tracked catch rates. Catch rates would be expected to vary more or less in proportion to abundance so that constant effort by a stable fleet should be able to harvest a stock within its normal range of density. Two features of the management of this fishery enabled a sharp increase in effort in 1988. One was the lack of catch (or effort) quotas which could have been used to distribute the catch over a number of years. The other was a limited-entry condition not sufficiently tight to prevent a doubling of the full-time (specialist) fleet during this period. While the number of licenses remained at 99, the number of active vessels concentrating on the scallop fishery increased from 46 in 1987 (a peak year for groundfish prices) to 90 in 1989. Had limited entry been totally absent, however, effort could have been much higher and the stock bonanza over much sooner than it was.

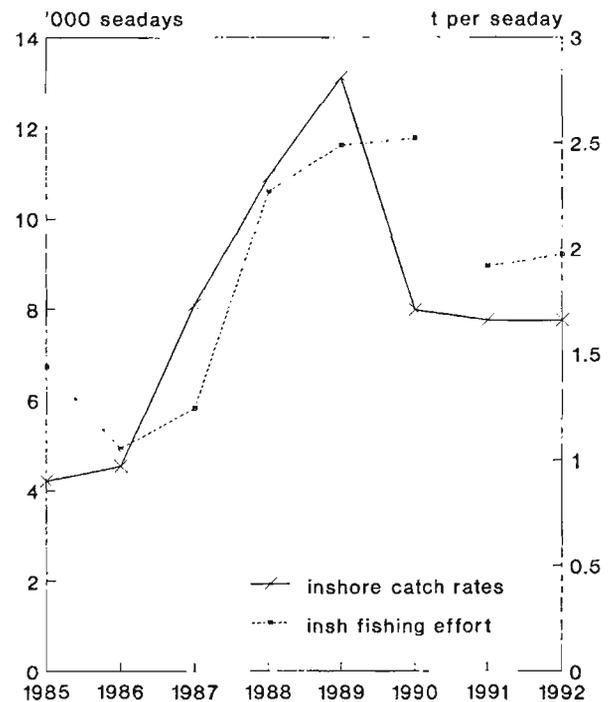


Figure 2. - Fishing effort in seadays, and catch per seaday in the inshore scallop fishery.

It must be allowed that the 1988-1990 boom in this fishery was outside the previous range of experience, that the productive beds grew in area as well as density, and that fishermen feared and eventually witnessed significant levels of natural mortality of mature scallops. The additional effort may have been

warranted though many of the benefits went to the dual-license fleet who left the groundfish fishery to participate in the boom.

### Fishing capacity

Individual license holders in the scallop fishery may have less incentive than groundfish draggers to overinvest in capacity. With a defined and controlled gear size, excess towing power is of little use. Hold capacity need not be large for the stowage of only scallop meats. Boats of 16.8 m in length are usually considered adequate to accommodate crew and provide space for shucking. In spite of relatively lax replacement rules governing growth in vessel size over time, there is no evidence that newer boats differ in length, gross tonnage, or horsepower from older vessels in this inshore fleet.

Many license holders in the full-Bay scallop fishery also hold groundfish licenses on the same vessels. These dual license holders historically have moved their vessels from one fishery to the other depending on relative catch rates and prices. The latent capacity in the licensed fleet was largely exposed in the boom of 1989 as most of the dual scallop-groundfish boats were enticed by the scallop bonanza. A big increase in effort from 1987 to 1989 was partly achieved by the practice of double-crewing boats to keep them fishing while crews rested. This practice has been maintained by some operators in spite of the much lower catch rates and the added expense to the license holder of hiring extra crew and maintaining the vessel.

The introduction of individual transferable quotas (ITQs) in the inshore groundfish dragger fleet in 1991 may have had some impact on fishing effort and capacity for scallops. With ITQs in the groundfish fishery, owners are able to lease or sell their groundfish quota to other vessels and put their scallop-licensed vessels into full-time scalloping. In spite of this incentive to stay, the numbers of "specialist" scallopers decreased from 90 in 1989, to 77 in 1992 as catch rates dropped.

The limited-entry aspect of this fishery offered some benefits to its participants by excluding others when catch rates were very high in the late 1980s. But as the scallop resource ebbs, the competitive fishery management system gives license holders no means to reduce harvesting capacity except by dropping out of the fishery. License transfers are permitted but since there is no advantage to a fisherman to hold a second license on a single boat, license transfers only serve to move licenses among vessels or owners. This does not reduce capacity or increase average earnings in the fishery. This inability to rationalize fishing capacity is a dilemma common to most common-property, input-managed commercial fisheries.

Landings in 1992, though well below the peak, were still about double the 1980-1987 average. All 99 licensed vessels cannot survive a return to that earlier

level of earnings. The options are more limited than they were in the early 1980s due to more restricted access to and general scarcity of groundfish.

### Allocation

Another common characteristic of fisheries based on licenses in a competitive fishery is the approach to entry and participation. The licensing authority, and the participants themselves, do not always seem to recognize the extent to which each new entrant dilutes the value of the others' licenses. Typically, this fishery continues to have difficulties confronting limitations on its growth by accepting neither quotas nor geographical boundaries.

The initial issuance of limited licenses for inshore scallops was based on historical participation in the fishery. Appeals by rejected applicants continued at various levels for years, as some early successful appeals encouraged others to follow that route. Licenses were also issued to pursue local fisheries in specific parts of the Bay of Fundy. Claims by these fishermen led to broadening their area of operation in conflict with the claims of the full-Bay fleet. Although the inshore fleet was separated from the offshore fleet's grounds by agreement in 1986, some illegal fishing trips still occur into offshore zones. A formal request from the inshore fleet to modify the 1986 deal due to "changed circumstances" was presented in 1993.

### Enforcement

With no catch quotas, monitoring the tonnage of scallops landed has not been a major problem. Some unreported landings of undersized scallops are suspected. Some fishermen refuse to complete fishing logs which would help in stock assessment. DFO patrol boats occasionally board scallopers to check for legal gear, shell size, proper fishing area, or any other violations. Enforcing closure lines and boundaries between fleets has at times been difficult, especially when catch rates are higher on the other side. A proposed division of the Bay into further fishing zones would undoubtedly be expensive to enforce. The current budgetary environment in DFO will probably require fishermen to pay for such enforcement, or drop the proposed new rules.

### Industry views

Scallop fishermen in this fleet are not looking for major changes in the management of their fishery. Like most fishermen who have not experienced rights-based fisheries first hand, the inshore scallop fishermen are uncomfortable with the concept. They continue to look to government to resolve problems in their favour by allowing access to more grounds and protecting current grounds from intruders or other claimants. While a few fishermen like to discuss issues from a long term perspective and to consider new ideas, the

majority tend to focus on the immediate problems and to tinker with small changes to existing management. Many fishermen in the region are frustrated with the inability of government to enforce fishing rules, and with the courts' refusal to punish violators in any meaningful way. Government is responding with efforts to allow only affordable, enforceable rules and to deal with violators outside the courts by attaching conditions to licenses. These conditions permit the use of administrative sanctions such as license suspensions for offenses.

## CASE 2 – THE NOVA SCOTIA OFFSHORE SCALLOP FISHERY

### Fishery overview

The offshore scallop fishery on the east coast of Canada is conducted primarily on Georges Bank off Southwestern Nova Scotia (fig. 1). Vessels in this fleet also have licenses to fish on several other banks on the Scotian Shelf and on the St. Pierre Bank, south of Newfoundland.

Offshore scallop draggers range in overall length from 25 to 45 m, powered by diesel engines of 400-1 800 horsepower. These vessels fish year round and typically make trips of 8 to 10 days' duration. Vessels tow two drags at the same time, one on either side of the ship. The standard offshore drag consists of a heavy metal frame, about 4 m wide, with a bag attached made of rope webbing and steel rings.

The offshore scallop fishery is currently prosecuted by 43 vessels operating from five ports in southwestern Nova Scotia. The fleet depends exclusively on scallops; vessels are not licensed for other species. All licenses are held by a half-dozen companies which land scallops at processing facilities to be marketed fresh or frozen. Seventy-five to eighty percent of the product is exported, mostly to the United States.

With a crew size of about 15, approximately 650 crew members are employed on the active vessels. Many others work on shore in servicing and maintaining these vessels and packaging and marketing the product. Crew members with some companies are union members working under contractual catch-sharing arrangements similar to the lay arrangements on non-unionized boats.

The Georges Bank resource has been increasing over the past several years partly due to strong 1988 and 1989 year classes. A downturn is probable once these year classes have passed through the fishery. Abundance, recruitment, and catch rates have all improved considerably from very low levels in the mid-1980s. Since the 1950s the Georges Bank fishery has seen two periods of high catches, followed by troughs (fig. 3) (Robert *et al.*, 1992). The current rising trend is not as dramatic as earlier ones and differs in that management by quota is attempting to stabilize

the catching of the naturally variable year classes of scallops. It will take more time to fully assess whether this will be successful.

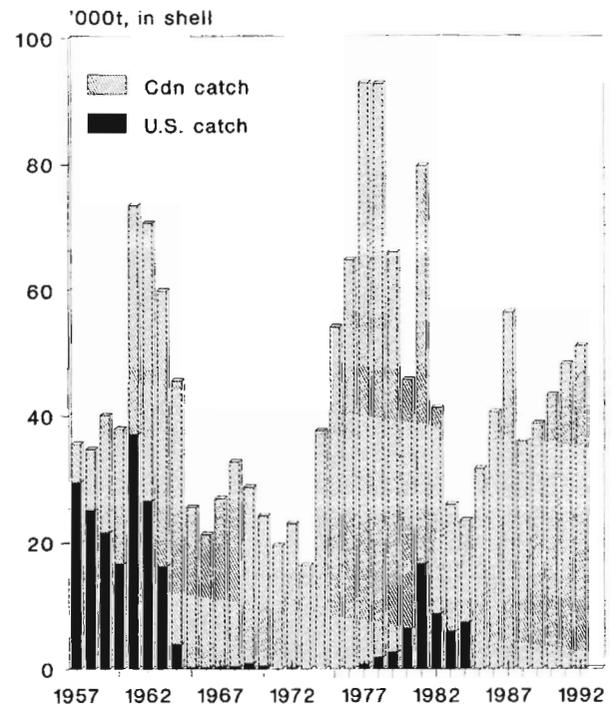


Figure 3. – Estimated Canadian and US scallop catches (tonnes, in shell) on eastern Georges Bank (NAFO subarea 5Zc). (Robert *et al.*, 1992).

There was no catch limit (total allowable catch, or TAC) set for this fishery prior to 1986. According to the management plan (Anon., 1993b), TACs were established at that time to: (i) ensure the conservation and restoration of the resource, (ii) try to stabilize annual landings over time, and (iii) provide increased economic benefits for fishermen, vessel owners, shore workers, and the people of Canada. A TAC is established annually for each of the major scallop stocks based on the best biological advice available at the time, taking into account the stated objectives.

Several significant events in the past twenty years have enabled the offshore scallop fleets to take control of their fishery. In May 1973, limited entry was introduced, and the fishery was restricted to 77 licenses to prevent over-capitalization. Although Canada declared a 200-mile fishing zone in 1977, much of the Georges Bank fishing area was still within the economic zones of both Canada and the United States. Landings from Georges Bank between 1977 and 1984 dropped from 13,000 t to 2,000 t, a combined result of overfishing and poor recruitment to the fishery. In October 1984, the International Court

of Justice established an international boundary in the Gulf of Maine awarding the productive northeast portion of Georges Bank to Canada.

In October 1986, an agreement was struck between the inshore and offshore scallop fisheries. The parties agreed to the permanent separation of the fleets at the 43°40'N latitude and the phasing out of the inshore effort on Georges Bank by 1988. This agreement facilitated the introduction of total allowable catches (TACs) and enterprise allocations (EAs) in the offshore fishery.

Until 1985, the primary conservation method had been size limits (meat counts). In June 1986, EAs and TACs were introduced on a three-year trial basis in the offshore scallop fishery, then made permanent in early 1990.

A Canada-U.S. Enforcement Agreement was signed in September 1991. Under this arrangement violators of the international fishing boundary will be prosecuted by their own governments. This has improved the effectiveness of enforcement efforts in Canada. It is no longer necessary to physically apprehend an offending vessel and tow it to a Canadian port.

### The enterprise allocation program

An enterprise allocation (EA) is a fixed percentage of the fleet quota allocated to an enterprise (a company, or family business with licenses) rather than to a single licensed vessel. This enables the enterprise to assign any of its boats to catch the quota and to retire unnecessary capacity it may own. In this fishery, the offshore fleet quota is the TAC in each of the offshore stocks as there are no allocations of these particular stocks to other fleets.

The EA in Canada does not convey ownership of the resource to the firms in the industry. Rather, the firms have licenses to harvest up to a specific quantity of scallops in a particular year. Under the old competitive fishery, licenses gave permission to harvest but without an upper limit on total catch. Catch was limited only by the maximum number of boats permitted and by other rules governing gear and minimum size of scallops. The benefit of having a defined catch ceiling accepted by each license holder is that he/she can then find the most efficient way to catch that limited amount.

Enterprise allocations (EAs) were introduced in the offshore scallop fishery in June of 1986 following consultations between DFO and the license holders through the Offshore Scallop Fishery Advisory Committee (OSAC). A review after three years indicated general support for the program from all quarters. While the offshore scallop fleet has seemingly moved to permanent management by EAs, the management plan retains some rules normally required to manage competitive fisheries:

– While recognizing explicitly that one of the major long term benefits of EAs is that each enterprise will naturally invest in the appropriate number, size, and

type of vessel to harvest its allocation efficiently, the EA plan has cautiously retained a set of restrictions governing the replacement of vessels. It has set a maximum LOA (length) for a replacement vessel at 44.8 m and a minimum LOA at 20 m (Anon., 1989)<sup>3</sup>.

– There are provisions in the EA plan (Anon., 1989) for allocating licenses and quota in the event of the collapse of the program or of the bankruptcy of one of the enterprises holding licenses.

– No one fishing enterprise may hold more than 50% of any specific scallop stock.

– Enterprise allocations in this fishery are not permanently transferable. In the event of the sale of a company, the Minister's permission is required to transfer the entire EA and all related licenses to the new owner.

– Temporary transfers of EAs within the fishing year are permitted.

– All or part of any allocation that cannot be harvested must be offered to the remaining active enterprises.

– Except in unusual circumstances an enterprise will not be authorized to transfer in excess of 25% of its EA for more than two consecutive years.

Still more restrictions apply to this fishery for conservation reasons. Fishermen and scientists agree that a TAC alone does not assure protection of the stock from fishing pressures. OSAC supports regulated meat counts as one of the most significant management tools, both as a useful conservation measure as well as for optimal harvest of year classes.

### Monitoring, enforcement, and penalty provisions

Companies are required to keep fishing logs with certain specified details and make them available to a fishery officer. Late in 1993, mandatory dockside weighing of all offshore scallop catches was instituted. Weighing is conducted by an independent company and paid for by the scallop license holders. This was initiated to conform to DFO policy on monitoring of EA and ITQ fisheries.

The EA plan has administrative penalty provisions for those requirements specified in license conditions rather than in regulation. The penalty for exceeding an allocation by 1% or less is a loss of the same amount from the next quota period. If the allocation is exceeded by more than 1%, twice the amount will be deducted from the next quota period.

3. This minimum size provision reflects a concern that utilization of an under-65 ft vessel in the EA fishery, on offshore fishing grounds, might set a precedent and open the door to the inshore fleet on these grounds. Although there are many EA and IQ fisheries in Canada, their unique status is not always recognized in policy decisions, which still often define fisheries by boat size and gear type.

## IMPACTS OF THE MANAGEMENT REGIME

### Conservation

While it is premature to attribute recent success (six consecutive years of increasing catches through 1993) to TAC management, the indicators are encouraging. As noted earlier, there were a number of changes in the fishery since 1984 including the international fishing boundary, EAs, and the TAC itself. All have contributed to rational harvesting of available stocks but have not necessarily bolstered recruitment.

### Fishing effort

As illustrated in *figure 4*, and in contrast to the experience in the inshore scallop fishery, fishing effort measured in sea-days has been decreasing since 1985 while catch rates have increased. This suggests a strong degree of control over the fishery, permitting participants to enjoy the benefits of increasing abundance without having it eroded by unnecessary effort. The results of this are evident in the increasing revenue per active fishing vessel (*table 3*).

The evidence supports the arguments which favoured the introduction of EAs. That is, that firms with individual quota allocations would deploy just enough fishing capacity to efficiently catch their allocations (Anderson, 1986) in a time pattern dictated by catch rates, prices, markets, and so on. The EA enabled licensed firms to profit from rational management of the TAC and they chose to build the biomass through conservative TACs, enabling stable or reduced effort as a matter of policy.

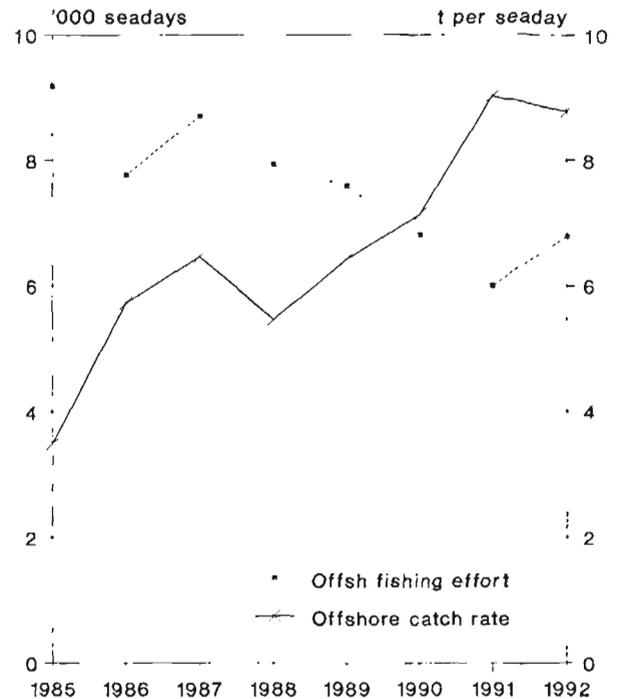


Figure 4. – Fishing effort in seadays, and catch per seaday in the offshore scallop fishery.

### Fishing capacity

Enterprise allocations have resulted in a reduction in vessels fishing the offshore scallop fishery. Fleet owners are able to make investment decisions about vessel replacement or renovation based on the requirements for an efficient harvest of the firm's share of the TAC. Of the 77 licenses issued and still valid,

Table 3. – Offshore scallop fleet.

	1985	1986	1987	1988	1989	1990	1991	1992
No. licenses	77	77	77	77	77	77	77	77
No. vessels fishing	66	68	61	57	59	46	44	43
Total catch (t)	32 004	44 531	56 266	43 412	48 662	48 731	54 264	59 732
Catch per vessel	485	655	922	762	825	1 059	1 233	1 389
Landed value (\$'000)	39 919	55 737	69 983	45 854	47 271	49 806	52 297	61 314
Revenue per vessel (\$'000)	605	820	1 147	804	801	1 083	1 189	1 426
Days at sea	9 173	7 770	8 706	7 937	7 583	6 818	6 010	6 801
Days fished	7 590	6 237	6 686	6 874	6 795	6 031	5 406	6 250
Days fished/days at sea	0.83	0.80	0.77	0.87	0.90	0.88	0.90	0.92
Seadays per vessel	139	114	143	139	129	148	137	158
Catch per seaday (t)	3.5	5.7	6.5	5.5	6.4	7.1	9.0	8.8
Revenue per seaday (\$)	4 352	7 173	8 039	5 777	6 233	7 305	8 701	9 015
Price (\$/lb meat)	4.70	4.71	4.68	3.98	3.66	3.85	3.63	3.86

Note: catch data in tonnes, live weight.

only 43 are currently being used. The fleet in the mid-1980s included many old and barely seaworthy vessels. Since that time many of these have been replaced, increasing fishing capacity per vessel to some degree. However, the retirement of nearly half the fleet has more than outweighed that increase.

Although inter-enterprise permanent transfers of quota are not permitted, the average enterprise has about 10 licenses. Internal rationalization of capacity has been possible within these companies, providing many of the benefits which would have been possible only through transfers in a simple license quota or boat quota program.

### Allocation

The small number of vertically-integrated firms holding offshore licenses when EAs were introduced simplified the allocation of quota shares. The license holders worked out the details among themselves in consultation with DFO, unions, and the OSAC.

The territorial squabbles with the inshore fleet have been more difficult. The 1986 geographical split has been violated occasionally by inshore vessels venturing onto offshore grounds. Similar forays have occurred by American vessels across the international line. Recently inshore fleets are expressing renewed interest in obtaining access to parts of the offshore zone. Concessions to inshore fleets in the past have fuelled expectations of more concessions in future. This has been exacerbated to some extent by the success of the offshore EA program as it has brought a degree of financial prosperity to that fishery. The inshore perception is that the offshore sector can now afford to surrender some of its resource.

### Enforcement

The primary enforcement effort relating to this fishery is surveillance of the international boundary which crosses Georges Bank ("the Hague Line"). This involves both patrol vessels and aircraft, at considerable cost to DFO. Dockside weighouts of catches have very recently commenced at industry expense to conform with a policy requirement for dockside monitoring in all EA or similar programs.

## SUMMARY OF RESULTS OF INSHORE vs OFFSHORE

### Management

Figures 2 and 4 illustrate very different experiences in the two fisheries. Inshore effort was attracted from

the groundfish fishery by the high resource abundance in 1988, but much of it has stayed in scalloping despite declining annual returns per vessel. In the absence of a TAC, effort is determined by daily earnings in the fishery. So long as scallop dragging yields more income than the next best alternative, fishermen will continue fishing scallops.

Offshore harvesters, with secure catch shares, have set conservative TACs to build up the biomass<sup>4</sup>. This has resulted in increased catch rates which has enabled lower effort to catch the TAC. Lower effort implies reduced costs and higher net incomes.

Excess capacity is trapped in the competitive inshore scallop fishery. Limited entry in virtually all fisheries restricts movement from one to another. Fisheries management in Canada over many years has attempted to stabilize catches within individual fisheries. While many fishermen hold licenses for more than one species, many others have become specialized in a single fishery. A key missing element in this management regime is a mechanism to allow these fisheries (e.g. inshore scallops) to rationalize effort and investment. This is the single most important difference between EA or ITQ fisheries and competitive fisheries.

Without the ability to increase their incomes by better managing their own operations, competitive-fishery license holders seek improvement through campaigns to increase access to other fishing areas. Locally-restricted fleets want access to the entire Bay; the full-Bay fleet seeks access to offshore grounds and the American fleet encroaches on the Canadian side of Georges Bank.

Management differences cannot be claimed to be the cause of all the differences. The natural recruitment in the offshore may be better suited to active management through controls on catch and effort. The inshore is more prone to haphazard recruitment patterns and can only deal with what nature provides. The inshore competitive management, with neither TAC nor individual entitlements, could not effectively manage a good year class over time without complex effort controls which it does not have and which DFO could probably not afford to manage. The effort controls are built into the EA program with each enterprise managing its quota within the annual fishing plan and also having a major interest in the longer-term management of bumper year classes, and of the fishery in general.

4. Note that the practice of improving net earnings by building up the biomass through conservative TACs may not be possible in a fishery where the EA or IQ sector shares a TAC with a relatively large non-IQ or non-EA fishery.

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