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Input controls vs. rights-based management: the political economy of fisheries management in Atlantic Canada

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Abstract

This paper examines the Canadian experience with quota managed fisheries, reviewing institutional structures and approaches. It begins with a review of management objectives following the extension of jurisdiction and traces the nature and rationale of changes. The specific measures used to achieve objectives are examined from a theoretical and practical perspective. The measures fall into two broad categories: conventional input controls: vessel and gear restrictions; and, output controls: tradable and non-tradable enterprise/individual quotas.

The experience indicates that input controls are largely ineffective in constraining effort. These measures fail to address the common property characteristics of the resource and consequently failed to blunt the incentives for share maximization and increased capitalization. These in turn lead to overfishing and misreporting, thereby undermining management objectives. Output controls in the form of individual tradable quotas fare better in constraining effort. They lead to fleet rationalization and improved quality and flow of raw material to processing facilities. But they may also lead to highgrading and discarding, as quantity incentives give way to unit-value incentives under the rights-based regime.

Some of the early failures and more recent successes of policy are outlined, lessons are drawn and suggestions made about future directions.

Keywords: Fisheries management, quota regulations, fisheries policy, Canada.

Le contrôle de l'aménagement par des droits d'accès : économie politique de la gestion des pêches dans les eaux atlantiques du Canada.

Résumé

Cet article rend compte de l'expérience canadienne de gestion des pêches par quota, en faisant la critique des approches et structures institutionnelles. Il débute par une analyse des objectifs de la gestion concernant l'extension des juridictions et il retrace la nature et la raison d'être des changements. Les mesures spécifiques utilisées pour atteindre les objectifs sont étudiées tant du point de vue théorique que pratique. Les mesures se classent dans deux grandes catégories : les contrôles conventionnels comme par exemple les restrictions portées sur les engins de pêche ou les bateaux; et, le contrôle de la production : quotas de pêche individuels par entreprise commercialement cessibles ou non.

L'expérience montre que les contrôles de la puissance de pêche et des engins de pêche sont largement inefficaces dans le contrôle de l'effort de pêche. Ces mesures négligent en fait les caractéristiques propres à une ressource en propriété commune et par conséquent ne réussissent pas à réduire les incitations pour une maximisation du profit et une capitalisation accrue. Ceci conduit à une situation de surpêche et à de mauvais report de l'effort et de ce fait à une dévalorisation des objectifs de la gestion. Les contrôles des captures sous forme de quotas individuels commercialement cessibles conduisent à un meilleur contrôle de l'effort. Ils mènent à une rationalisation et à une amélioration de la qualité et des flux de matières premières pour les industries de traitement. Ils peuvent conduire également à des stratégies favorisant le premier choix et le rejet, puisque l'incitation aux quantités débarquées laisse la place, sous un régime de droits d'accès, à une incitation à la valeur unitaire produite.

Quelques-uns des premiers défauts et des plus récents succès des politiques viennent en appui des leçons que l'on peut tirer et des suggestions sont faites pour de futures directions.

Mots-clés : Gestion des pêches, quota, politique des pêches, Canada.

INTRODUCTION

Canada's Atlantic groundfish fisheries are experiencing a crisis of unprecendented proportions. Its most notable feature is the sharp decline in abundance of northern cod, for some 400 years the mainstay of the northwest Atlantic fisheries (*fig.* 1). Canada's Department of Fisheries and Oceans (DFO) imposed an indefinite moratorium on the northern cod fishery in 1992. Stocks of several other groundfish species in the Gulf of St. Lawrence and along the Scotian Shelf have also declined precipitously, resulting in a suspension of fishing in all but two areas. These measures, forcing the tie-up of thousands of vessels and the closure of hundreds of processing plants in the Atlantic Provinces and Quebec, have led to the unemployment of tens of thousands of industry workers. These workers and their fishery-dependent communities face a bleak prospect for the foreseeable future.

Scientists are unable to explain the decline in stocks with certainty. One view is that recruitment trends and stock size are linked primarily to large-scale environmental events and that these trends have been amplified by fishing pressure. The predominant view is that excessive fishing mortality is chiefly to blame.

Excessive fishing mortality was to a certain extent *inadvertent*, with allowable catch advice based on an inadequate biomass model, misleading research data and short and unreliable data series. When these matters came to light in 1988, it became apparent that actual levels of fishing mortality of northern cod since 1977 had been at least double those projected. It seems that much of the stock growth after 1977 was attributable to earlier favourable recruitment levels (Harris, 1990). The scientific basis for advice on other stocks suffered from some of the same shortcomings, and also led to generally higher than projected levels of fishing mortality throughout the 1980s (Pinhorn and Halliday, 1990; Angel *et al.*, 1994).

If excessive fishing mortality (overfishing) was to some extent inadvertent, it was also inevitable, the result of a cycle of mutually reinforcing factors including structural weakness of the industry, ineffective and often contradictory management measures and expansionary social and economic policy. During the late 1970s and early 1980s, these

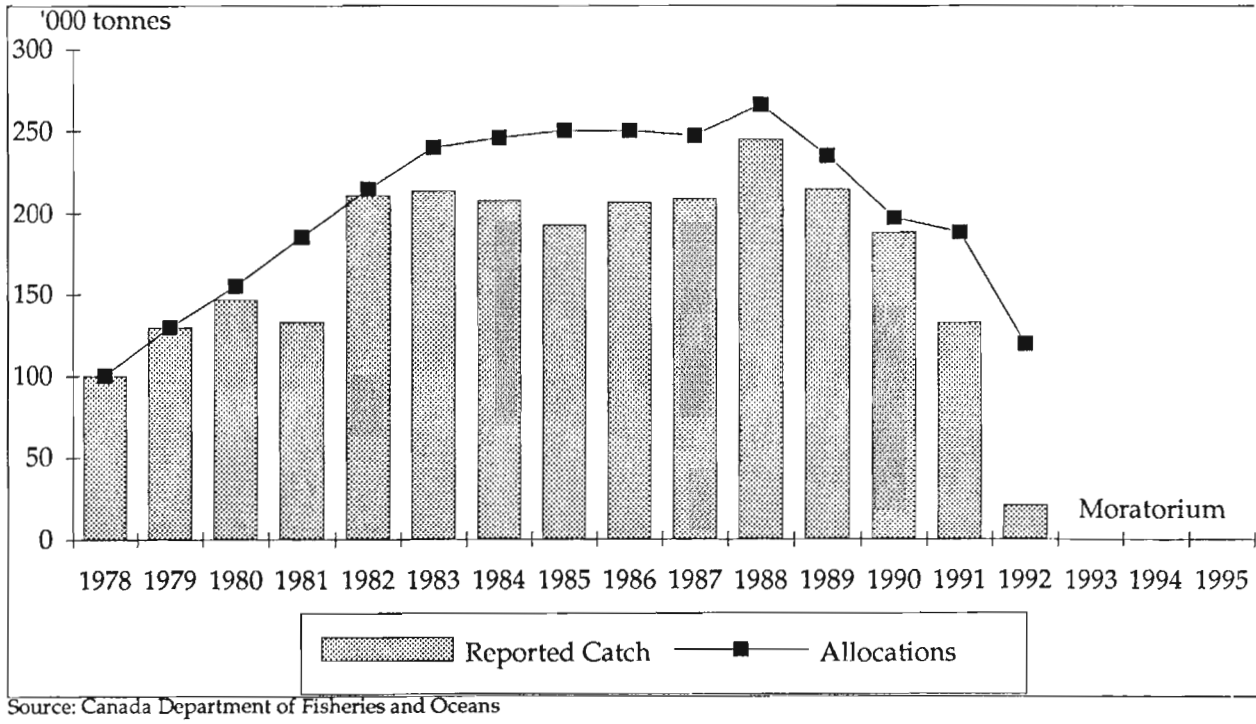

Figure 1. – Canadian allocations and reported catches of cod in NAFO Divisions 2J, 3KL.

factors combined to induce and sustain an expansion of the fishing industry beyond the real carrying capacity of the resource base (Cashin, 1993): the number of fishermen increased by one-third, processing plants and plant workers by almost two-thirds. The number of vessels remained relatively stable thanks to closed entry, but the average size and level of technological sophistication of vessels increased markedly, leading to substantially greater harvesting capacity.

This paper traces the post-1977 history of Canadian fisheries management against the backdrop of its social and economic context. It begins with a review of management objectives following the extension of fisheries jurisdiction. The specific measures used to achieve objectives, input and output controls, are examined and contrasted. The discussion concludes with some of the main lessons to emerge and observations about what appears to be needed for the future.

A HISTORY OF CRISES

Chronic instability

Consistently low incomes and financial instability are enduring characteristics of the Atlantic fishing industry. They result from substantial overcapitalization and fragmentation in both the harvesting and processing sectors – in the familiar expression, too many vessels and plants chasing too few fish.

These hallmarks of structural weakness can be traced largely to the combined forces of allocation and licencing policy since extension of jurisdiction, and to social policy aimed at maintaining coastal communities in the face of limited alternative sources of employment and income. However well-intentioned these policies might have been, they worked systematically to undermine the viability of the fishing industry and threaten the sustainability of the resource base.

The industry has faced several crises over the past 25 years. The current one is clearly the most serious because the immediate cause is the collapse of groundfish stocks, notably northern cod, the largest and most important in Atlantic Canada. In 1967, 1974, 1981 and 1988, weak markets precipitated a downturn. The downturns reached crisis propositions in 1974 and 1981 because of other factors: declining fish stocks and rising fuel costs in 1974; high interest rates, substantial debt, increased international competition and adverse exchange rate adjustments in 1981 (Kirky, 1982).

The collapse of major segments of the industry was prevented in these and other instances through substantial financial support from government. Hundreds of millions of dollars of direct and indirect assistance have poured into the industry since 1974. But rather than attempt to address the roots of the structural weakness and turn the industry into a net contributor to the Canadian economy, successive governments have avoided tough decisions and chosen to let the industry limp from crisis to crisis. This approach reflects implicit faith in resource management, considerable optimism about resource potential and a failure to find alternative sources of employment for the thousands involved.

Though structural weakness and financial instability are most often associated with groundfish, overcapitalization and excessive numbers of participants are common to most fisheries. Even in the main crustacean fisheries, lobster and crab, harvesting incomes would be higher and the processing sector financially stronger if less capital were applied.

Overcapitalization and policy prescriptions

Overcapitalization is not a recent phenomenon in the Atlantic fisheries. Moreover, it is not a problem now simply because of the resource crisis. It is the predictable (and predicted) result of our policies and approach to fisheries management and development. The words of the fisheries minister in 1973 when commenting on the expansion in the early 1970s should have set off alarm bells for policy makers and managers:

The trend towards expansion was encouraged by unprecedented high returns for fish and prospects for ane expanding share of the international catch under the ICNAF quotas. The prospects for increased fish catches by Canada in the future are good. But while we are asking our fishermen to go out and catch more fish, *we must plan for a controlled development of the fleet and avoid short-term over-capitalization which would dilute the benefits...* (Environment Canada, 1973).

Not a year had elapsed before the industry, particularly the groundfish sector, was in crisis. This triggered a detailed review of the problems facing the Atlantic fisheries. The review eventually emerged in 1976 as the *Policy for Canada's Commercial Fisheries* ("the Policy"). It not only addressed the immediate needs of the industry, but also established a framework for managing and developing the fisheries under extended jurisdiction. The proposed measures were intended to:

- promote optimal use of productive capacity;
- generally improve efficiency and competitiveness; and,
- remove structural and other rigidities.

The Policy explicitly recognized that extension of jurisdiction alone would not solve the industry's problems:

Many of the problems are inherent in the industry's structure. Too often the fishing industry has been unstable and self-debilitating, prone to crises, and providing an inadequate and nearly always insecure source of income to those who work in it (Environment Canada, 1976).

The Policy addressed a wide range of management and development issues, with emphasis on rebuilding stocks and industry reconstruction. The latter, the Policy stated,

... is inevitable. It will come about either in an orderly fashion under government auspices or through the operation of inexorable economic and social forces.

This statement should sound familiar. It anticipates by almost 20 years the same observations by the 1993 Task Force on Incomes and Adjustment in the Atlantic Fishery (the "Cashin Report"). The problems the Policy identified never really went away. In some ways they got worse. At best, management measures in the intervening years addressed symptoms, not causes.

Government adopted an interventionist agenda in 1976, not wishing to leave the future of the fishery to market forces. The Policy marked an important shift from the hitherto generally *laissez faire* approach (subsidies aside) taken to fisheries by the Canadian government. A greater level of involvement by government was regarded as essential due to the immediate problems facing the industry:

- overcapacity and the need to develop some means of controlling efforts; and,
- resource allocation among competing fishing interest.

In the late 1970s the main focus was on groundfish, though other fisheries, including lobster and herring, were also experiencing capacity difficulties.

FISHERIES MANAGEMENT UNDER EXTENDED JURISDICTION

Effort control

The effort problem was addressed mainly through input controls in the form of limited entry and gear restrictions. Through the late 1970s and early 1980s, entry to all major commercial fisheries was closed to additional entrants. Vessel replacement restrictions were introduced and made more stringent over the years. These were complemented by gear restrictions on nets and traps. And as effort continued to expand, managers resorted to closures and trip limits in order to extend seasons.

In the groundfish fishery, there were not only access and effort issues, but the question of how fish was to be distributed among competing users. This issue was addressed largely through allocation policy under the Atlantic Groundfish Management Plan ("the Plan"). In deference to the capacity reduction recommendations in the Policy, the Plan also adopted as one of its principles, "... the withdrawal of excess harvesting capacity in congested fleet segments". (DFO, 1978). This principle was dropped after 1980 since it was clearly not being applied.

While on the face of it, the Plan fulfilled DFO's need for a mechanism to allocate fish, it was also the instrument used by government to give effect to its policy of promoting the development of the inshore fisheries. This sector had been particularly hard hit by the resource decline following 20 years of foreign fishing off Canada's east coast.

The thrust of the inshore development policy is best summarized by the words of the fisheries minister in 1978:

Measuring the 200-mile limit as a belt from the coast, we must measure its benefits first of all in relation to those living on the coast. When we divide up those few million tons of fish, the coastal communities of inshore and nearshore fishermen must have first claim. ... Instead of starting with an offshore, large vessel development that cuts off future inshore growth, *we must build from the independent fleet up and from the coast out.* We must give the inshore and nearshore fishermen a greater and an assured amount of fish. As he begins making money, *he can move up to vessels that extend his mobility, increase his catches, and lengthen his working season* (LeBlanc, 1978; emphasis added).

While it is difficult to reconcile the latter part of this statement with the existing concerns about overcapacity (and the general tone of the 1976 Policy with respect to restructuring), the sentiment reflected in this statement would govern fisheries management and resource sharing for the next decade. It had a profound affect on allocation and licensing policy and, in turn, on investment in fleet and processing capacity.

The next five years were marked by sharp conflicts over allocations between the inshore and offshore sectors and within the various inshore gear sectors. Against the backdrop of capacity expansion, this served to destabilize the fishery, worsened the already difficult task of resource management, and by the early-1980s, had effectively undermined Canada's conservative difficult to set TACs at the $F_{0.1}$ level and control catches within the allocations (Angel *et al.*, 1994).

A 1981 review of licencing policy endorsed the concept of limited entry while recognizing that without more, it would be unable to constrain capacity growth and fishing effort. Several options for addressing the problem were reviewed including the then novel idea of controls on output (individual quotas) rather than input (vessels and gear). The use of individual quotas was gaining ground amongst fishery managers and academics as a more effective means of promoting economic efficiency. The concept was dismissed in the 1981 licencing policy review as an idea whose time had yet not come (Levelton, 1981). DFO concentrated on input controls, in particular, vessel replacement restrictions.

Fleet separation

DFO took another important step in the late 1970s in defining industry structure: the introduction

of fleet separation (LeBlanc, DFO 1986). This policy (embodied in licencing regulations) essentially prohibited processing plants from owning and operating inshore fishing vessels. It was introduced to protect the interests of fishers; DFO's response to a perceived imbalance of power between plants and independent fishers.

Like other regulations, it was an attempt to maintain a certain structure and organize behaviour in a certain way. It succeeded in the sense that competition for raw material intensified to the benefit of fishers. But it also left processors with very little supply security and no means to control the timing and quality of raw material supply. The role that price plays in these respects in other industries (*i.e.*, rising and falling in response to the interplay of demand and supply, rewarding quality, etc.) is noticeably absent in the fishery.

The 1981-1982 crisis

By 1981-1982, the industry was again in crisis. The Task Force on Atlantic Fisheries (Kirby, 1982) explained the problem in terms of an "undisciplined expansion" in the number of fishermen, vessels and processing capacity following the extension of fisheries jurisdiction. DFO blamed industry for disorderly harvesting, and both industry and its lenders for excessive optimism leading to over-expansion. Industry and others blamed DFO for increasing the seasonality of the fishery through its allocation policy and for excessive regulation (MacDonald, 1984).

These, of course, were less causes of the crisis than symptoms of the underlying problem: an inability (or unwillingness) to resolve the common property characteristics of the fishery. DFO recognized this and had taken steps to address the problem in the trawler sector as early as 1980. This culminated in the introduction of a system of company quotas termed enterprise allocations (EA) in 1982, leading to several important adjustments in the sector including an end to competitive fishing, fleet rationalization, efficiency gains in processing, improvements in product quality and a reorientation away from supply- to market-driven operations.

Similar steps in the inshore sector were ruled out. They would have been inconsistent with policy at the time (as reflected in Ministerial statements and the approach to allocation flowing from them). Inshore expansion, not rationalization, continued to be the objective of policy.

INDUSTRY STRUCTURE, BEHAVIOUR AND PERFORMANCE

Overview

Intrying to understand why the fishing industry is overcapitalized and chronically weak, it is useful to examine it by looking first at the main factors affecting industry structure: nature, regulation, economics and social policy. By structure is meant the number and relative size of buyers (plants) and sellers (vessels), the nature of the relationship between them and entry and exit conditions. Structure, in turn, has a major influence on behaviour. Price-setting and investment behaviour are of particular interest, since these are the main determinants of financial performance.

Overcapitalized, supply-driven and financially weak

Figure 2 illustrates in schematic form the relationship among structure, behaviour and performance. It identifies the factors leading to overcapitalization in the harvesting and processing sectors in the post-1977 period. It also shows how this structure, though highly competitive, leads inevitably to a failure of the industry to be responsive to market demand except in the most general sense.

Harvesting sector

To see why this is the case, consider first the harvesting sector. The main capacity determinants are economic and regulatory, with support from social policy. In 1977 when Canada extended fisheries jurisdiction, virtually all fisheries were competitive. Fishers maximized income by maximizing their share of the catch. This led in the long run to investment in larger and more sophisticated vessels. Limited entry slowed the process briefly. Input controls were always one step behind the ingenuity of fishers to find ways around the regulations. Vessels were designed, not for harvesting efficiency, but for share maximization within the limits of regulatory restrictions.

As the level of actual capital outstripped viable capital, the race for fish intensified. This behaviour led to increased pressure on the resource in all fisheries, supply gluts (more sharply peaked landings), poor quality and shorter seasons. Poor financial performance was the inevitable result for all but the most aggresive (and successful) vessel owners. The fishery became increasingly dependent on unemployment insurance (UI) to support participants who could not make an adequate living from the resource. In some areas, UI payments exceed earnings from the fishery. That the program had become a form of income supplementation seems clear from the 1:12 ratio of premiums paid to benefits received (Commission of Enquiry on Unemployment Insurance, 1986).

Processing sector

Capacity growth in the processing sector came very much in response to the conditions of raw material supply. Biology and weather meant short, sharply peaked seasons in many areas. Capacity built to meet these seasonal peaks often lay idle much of the year. In competitive inshore fisheries, seasons became shorter,

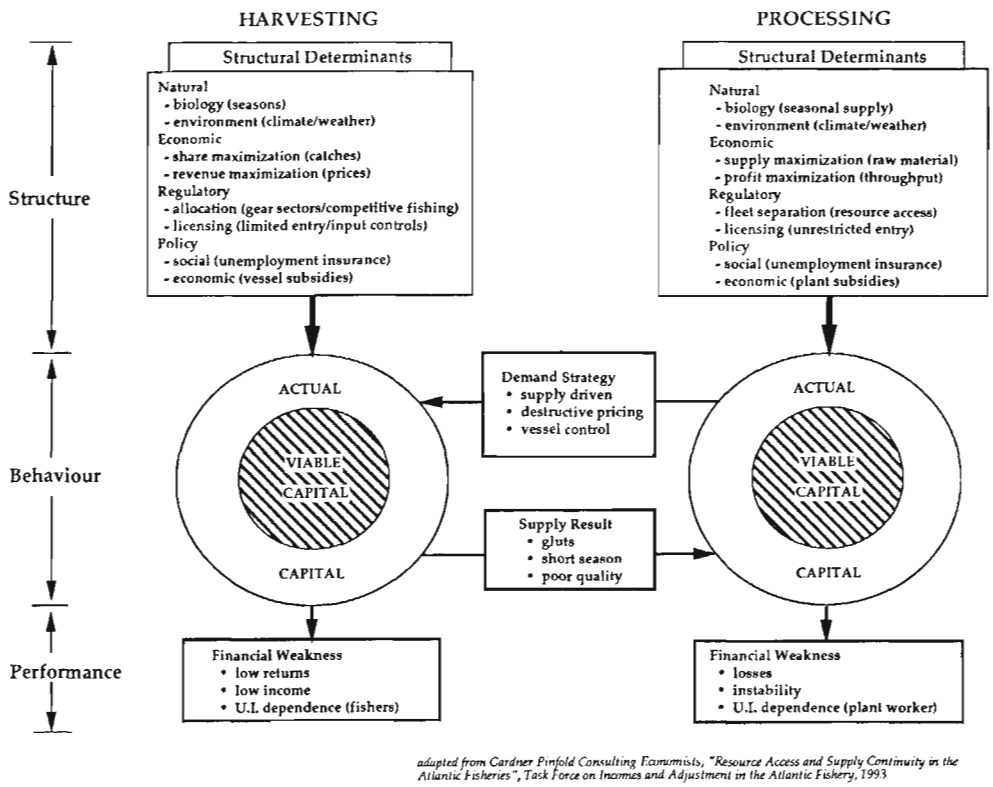

Figure 2. – Structure behaviour and performance in the fisheries of Atlantic Canada.

leading to even sharper peaks. Capacity was adjusted in response to each of these factors since no individual processor could afford the risk of turning vessels away.

Fleet separation policy contributed to the problem. It left processors with no security of access to raw material supply. It also meant established processors had to compete aggresively with each other and with newcomers for the loyalty of vessels. Financial assistance of one form or another allowed processing capacity to expand rapidly during the late 1970s and again in the mid-1980s. Grants and subsidies made uneconomic investments possible and provided the basis for preventing or forestalling the closure of unprofitable plants. Both contributed to redundant capacity and intensified the competition for raw material.

UI provides a substantial subsidy to the processing sector by allowing it to hold on to a large seasonal workforce which in many areas could not live on wages earned from fish processing alone. In an indirect way, this sustained industry capacity at a higher level than otherwise.

These factors combined lead inevitably to a curious approach to running a business. Instead of carefully assessing the market to determine what is demanded and what consumers are prepared to pay, processors are forced to look first for supply at whatever the shore price happens to be. At times this bears little relationship to what the market can bear, but merely reflects local competitive conditions. Price loses its meaning as a mediator between supply and demand; the industry is supply-driven.

It is worth reiterating that competitive fishing, not fleet separation, is the root cause of the industry's supply-driven approach. Before the introduction of individual quotas in the integrated trawler sector, processors faced the same difficulties (Gardner, 1993). Fleet separation creates its own set of problems and may worsen the supply-driven nature of the independent inshore sector, but competitive fishing is the fundamental cause. Moreover, it is not a problem limited to the groundfish fishery, but affects virtually all fisheries characterized by a race for fish.

THE POLITICAL ECONOMY OF FISHERIES POLICY

Abandonment of the 1976 Policy

The vision of a well-managed, restructured and viable fishery expressed in the 1976 Policy was not realized. This was partly because the management regime could not contain the expansionary forces that were unleashed with the extension of jurisdiction, and partly because the vision contained in the Policy was

subordinated to the socio-political realities of the late 1970s.

Within a year of the Policy apparently having been adopted, the agenda changed. While some of the words and principles survived to guide resource management, government's commitment to a restructured and viable industry did not. The focus shifted to broadening the basis of involvement. In pursuing this goal, the fisheries minister set in train measures which would effectively frustrate long-term resource management objectives and, ironically, undermine the very inshore recovery at which allocation and licensing policy were directed.

Expansionary allocation policy

Rebuilding the inshore relied heavily on a single policy instrument: groundfish allocation. It was buttressed by subsidy, income support and favourable licensing measures, but in essence, the approach would appear to have been based on the premise that the problems the inshore sector faced could be solved simply by providing it with access to more fish. Clearly, the hope was that resource abundance and allocations would grow fast enough, not just to absorb existing excess harvesting capacity, but to provide a basis for future growth. On the strength of this hope, nothing was done about the pressing structural problems identified in the Policy, except in a round about way to make them worse.

A failure to make difficult decisions

In the broadest sense, the recent history of fisheries management may best be characterized as a failure to make difficult decisions; of knowing what was in the long-term best interests of the fishery, but being forced by the exigencies of the present to develop inadequate short-term solutions; of addressing symptoms, not causes; of being reduced by circumstances to operate at the tactical, not strategic, level.

The 1976 Policy was the last major statement which contained a vision of what government wanted in terms of resource use and economic and social development. It saw an important role for the fishery in meeting economic and social objectives, but recognized its limitations and, even in the face of extreme optimism about increased resources, saw an acute need for rationalization. This vision was abandoned in favour of a growth policy, which, while well-intentioned and politically appealing, was short-sighted. It shifted the effective objects of management from stabilization and consolidation to expansion and dilution.

As Cashin (1993) points out:

Paradoxically, concentration on management of the resource rather than on people and enterprises contributed to the collapse of the resource and the plight of the people. About 60 percent more people are claiming a place in the harvest than in the 1970s, despite limited entry. There is vastly more fishing power in the offshore, midshore and inshore sectors. Fish plants have nearly doubled in number, plant workers have increased by about 50 percent. And yet today, there are fewer groundfish than in the 1970s.

Kirby (1982) provided a good analysis of industry problems (including overcapacity). It presented a vision of what a restructured and viable industry would look like and suggested ways of achieving that vision. It recognized the limitations of the fishery to adequately support all its participants, but explicitly ruled out measures which would have removed capacity in the short run.

Among the three policy objectives outlined by Kirby (viability, employment and Canadianization of the industry), economic viability was given the highest priority. Employment maximization was accorded the second priority, a reversal from then current policy. But employment maximization was couched not in terms of consistency with economic viability, but rather in terms of adequate income from the fishery *including* fishery-related income transfer payments.

Though government acted on most of the Kirby recommendations, no action was taken for almost a decade on the one which was arguably central to meeting the viability objective: shifting away from a common property fishery to one characterized by harvesting rights. Action on this had been taken in the offshore sector in 1982. But in the inshore sector, no meaningful steps were taken until 1990.

RIGHTS-BASED FISHING

Problems in competitive fisheries

Assigning individual transferable quotas in otherwise competitive fisheries is intended to overcome the common property problem which leads in the short run to a race for fish, gluts, poor quality and short seasons, and in the long run to overcapitalization of fleets as fishers, behaving rationally, invest in harvesting capacity to gain an advantage over others. The net result is a waste of money, since the cost of fishing rises much faster than the revenue the fishery is able to generate.

As long as fisheries are competitive, fishers will be on this capitalization treadmill, always looking for ways to increase their share of the catch at the expense of others. Eventually, stocks are threatened as quotas are exceeded because vessel owners have to keep up payments on the capital they invested. The race for fish turns into a destructive race for money.

This picture is all too familiar in the Atlantic fisheries. It is not a problem just in the groundfish sector, but affects all fisheries where individual gains are possible by increasing fishing effort. So for example, in the competitive crab and lobster fisheries, often regarded as relatively passive because

of the gear used, effort and investment have increased substantially over the years in most areas: larger traps, a shift from wood to wire, better vessels and sophisticated electronics, more frequent trap-hauls, etc. The result is the same as in groundfish: short seasons, gluts and poor quality.

There is also intense competition amongst processors leading to destructive price competition, investment in capacity to meet seasonal peaks and substantial investments of time and resources in the pursuit of vessel loyalty, including ways of circumventing fleet separation policy. Competition and allocation policy have led to substantial overcapacity in the processing sector and a further intensification of competition for raw material.

In these circumstances, port markets do not function well. Processors are supply-driven, with very little control over the timing, quality and quantity of raw material. Prices in final markets have limited influence over activity in the fishery.

Rights-based fishing

A rigths-based approach (*e.g.*, in the form of individual transferable quotas, ITQs) offers potential solutions to these problems. The most obvious advantage of an ITQ system is that it changes the fisherman's incentive from share maximization to cost minimization. With a right to a specified quantity of fish, there is less incentive to race to catch it. Instead, fishermen have an incentive to minimize the cost of capturing the quantity they are entitled to.

Boat quotas and trip limits have also been tried. Both offer short-term relief from some of the symptoms of fleet overcapacity (*e.g.*, gluts), but do nothing to improve conditions in the long term. Boat quotas are not tradable; whether they are based on historic landings or some average quantity linked to vessel size/gear type, they offer no mechanism for cutting fleet capacity and improving harvesting efficiency. Trip limits are the most obvious admission of failure to maintain a balance between harvesting capacity and resource availability. They entrench inefficiency and generally lead to higher harvesting costs.

A vital first step in the direction of efficiency is to adopt a system of well-defined individual harvesting rights as the basis for resource access *in those fisheries where it makes sense.* This means abandoning competitive fishing with all its destructive implications. Experience suggests that adopting some form of individual rights would improve conditions in the fishery by:

- eliminating the race for fish with its short run quality and peak supply problems;
- providing fishers greater latitude in deciding when they will go to sea;
- promoting fleet efficiency by reducing the incentive for share-maximizing capital investment;
- reducing the regulation of technology by allowing fishers the right to select the best means of catching their quota;
- providing quota holders with an asset which can be sold when retiring from the fishery; and,
- allowing a market-determined pricing system to emerge in port markets which can influence the timing, quantity and quality of the catch.

Company quotas in the trawler fishery

A rights-based approach was introduced in 1982, following several years of increasingly intense competitive fishing for northern cod which saw the season for a growing quota reduced from sixteen weeks in the late 1970s to just seven weeks in 1981. The fishery was characterized by gluts, poor quality, idle vessels and early plant closures (Gardner, 1988). Traditional input controls including closed access, vessel replacement restrictions, quotas, gear restrictions and trip limits were ineffective in constraining effort.

The vertically integrated fishing companies were each assigned rights to fish fixed percentage shares of specified groundfish stocks, where rights were expressed in tonnage terms which could vary annually with the TAC. These company quotas, termed Enterprise Allocations (EA), could be traded within the fishing year, but were not permanently transferable. Nor were companies allowed the freedom to use the technology of their choice; by regulation EAs had to be fished using vessels over 30.5 m.

Notwithstanding the limitations, the rights-based approach produced the desired effect in so far as it promoted efficiency and value-maximizing behaviour among the companies, not just at the harvesting stage, but also in processing operations:

- fishing was governed by market, not competitive considerations – this transformed the industry from supply – to demand-driven;
- an end to the race for fish meant gluts were eliminated, resulting in considerable improvements in quality and product mix;
- quality-enhancing investments in harvesting and processing capacity were made;
- the main companies reduced their multi-vessel fleets (by 15% between 1982 and 1987, a period of generally rising quotas) and were able to optimize vessel deployment; and,
- companies rationalized processing plants, allowing productivity gains.

Not all the changes could be regarded as positive. Among the most serious negative outcomes was high-grading – the practice of keeping the best fish and discarding the rest. This was a predictable result of the shift to the rights-based approach since the general short-run, revenue-maximizing incentive remains. It is achieved not through share maximization as in

a competitive fishery, but by maximizing the value of the right. How serious the practice was is not known (Harris, 1990). After 1987, the incidence of high-grading was curtailed with substantially increased observer coverage on vessels.

Company quotas in the offshore scallop fishery

The offshore fleet had grown rapidly during the 1960s and early 1970s, reaching 77 licenced vessels by 1973 when limited entry was introduced. The fishery is concentrated on the northeast peak of Georges Bank, grounds Canada shared with the U.S. fleet until 1984 when the International Court of Justice (ICJ) set the maritime boundary. With exclusive jurisdiction, Canada in 1986 established a TAC and introduced EAs for each of the 10 participating companies. The TAC complemented size restrictions which had become increasingly conservative since their inception in 1977 (though they had not been enforced during the intensive competitive fishery leading up to the ICJ decision).

By the time the ICJ had rendered its decision, stocks on Georges Bank had been heavily overfished by both Canada and the U.S. This coupled with poor recruitment cause Canadian landings to drop to less than one-sixth their 1977 peak level. The maritime boundary removed U.S. fishing pressure, but both inter-fleet and intra-fleet competition continued until EAs were introduced in 1986.

The adoption of a rights-based fishery has produced generally positive effects:

- reduction in fleet size from 77 to 38 vessels;
- reduced fishing effort, with increased and less variable CPUE;
- one of the few fisheries actually generating resource rents;
- gradual shift to industry-led management;
- improved conservation with 2-3 year classes fished;
- substantially improved harvesting economics and
- higher and steadier fishers' incomes (though reduced employment).

The major threat facing the offshore sector is competition for access to its grounds by a burgeoning inshore fleet. Access by inshore vessels had been closed in 1986 as part of the management regime. This effectively established one of the key efficiency enhancing property rights characteristics: exclusivity (that others are excluded from the resource). The absence of this feature impairs certainty and undermines the quality and value of the right.

General lessons

Experience in rights-based fisheries points to several benefits:

- There is less of a race for fish since quantities each vessel may catch are limited. This reduces gluts, improves quality and can lengthen seasons.
- The industry becomes market-driven once competitive fishing is eliminated. Without the pressure to maximize share, vessel owners are in a position to respond to prices when it comes to catch quality, quantity and timing. Processors are in a position to adjust prices to reflect their needs based on market conditions, paying premiums for higher quality and improved delivery. Port market prices begin to mean something.
- There is less pressure to invest in harvesting capacity. Instead, vessel owners look for ways of reducing unit harvesting costs. This is possible through vessel replacement or by buying additional quota to improve harvesting economics. Over time, capacity is reduced and overall harvesting efficiency improved.
- Vessel owners have an additional interest in the resource, provided rights are exclusive, durable and transferable. In other words, as soon as harvesters see ITQs as a long-lasting right and something of value, they should have an incentive to take an active role in management and enforcement (though this remains to be demonstrated, given the difficulties with high-grading). This incentive is likely to be stronger with fewer numbers of participants where a greater sense of resource "ownership" is present.

CONCLUDING OBSERVATIONS

We lack a realistic vision of what we want the fishery to be and what it can be

The 1976 Policy was the last major statement containing a vision of what government wanted in terms of resource use and economic and social development. It saw an important role for the fishery in meeting economic and social objectives, but recognized its limitations and, even in the face of extreme optimism about increased resources, saw an acute need for rationalization. This vision was abandoned in favour of a growth policy, which, while well-intentioned and politically appealing, was extremely short-sighted. It shifted the effective objects of management from stabilization and consolidation to expansion and dilution.

The 1982 Task Force, while technically an excellent analysis of the problems (including overcapacity), seemed to lack a clear vision of what it wanted the industry to look like in, say, ten years. It recognized the limitations of the fishery to adequately support all its participants, but explicitly ruled out measures which would have removed capacity in the short run. The end point of policy seemed to be the *status quo*,

with viability once again based largely on a forecast of increased resource abundance.

A decade later, the fishery is once again in crisis. It should also be viewed as an opportunity to once again develop a vision of what we want the fishery to look like in the long term. It should also be viewed as an opportunity to make some difficult decisions about resource distribution, allocation and licensing principles, harvesting capacity and harvesting technology.

An important element of any future policy must be a commitment to a sustainable fishery; one that is characterized by restraint and caution in setting limits on exploitation levels and by individual responsibility in accepting those limits. It also means a fishery where it is recognized that not all fishing methods and practices are acceptable. This means putting an end to discarding and the use of destructive gear and fishing methods.

We expect too much from the fishery and fisheries management

Fisheries management is asked to address regional economic problems and social and demographic issues, while at the same time pursuing resource conservation objectives. This is a classic example of the multiple objectives problem: using a single instrument (in this case, allocation) to meet multiple objectives. It does not work because too many compromises are necessary.

If we are genuinely interested in meeting economic and social objectives (*e.g.*, employment, income, community stability, etc.) then specific policies and instruments should be implemented. The fishery and fisheries management can make a contribution, but a limited one defined by responsible and efficient resource exploitation. That exploitation has not met these criteria is arguably more an indictment of economic policy for failing to provide alternative employment opportunities than it is a criticism of management for failing to adopt the right mix of instruments. Management has been constrained not to do so.

Fisheries management is also at odds with existing social programs including unemployment insurance. Given the lack of employment alternatives in the region, the terms under which UI is available in the fishery provides a powerful incentive for fishers to remain in the industry. The importance of UI has increased over the years. In 1981, UI benefits accounted for about 15% of the average fisher's income; by 1991, this had increased to just over 25%.

Allocation and licensing policies have served to destabilize the inshore sector and undermine resource management

Allocation and licensing policies have resulted in a level of inshore capacity that is a multiple of that needed to harvest the available resource.

From a financial perspective, a substantial part of the hundreds of millions of dollars invested in groundfish vessels and gear is redundant capital. This implies low average returns for the fleet (and a dissipation of any resource rents). Those fishers with highly leveraged investments are at considerable financial risk particularly with the decline in allocations over the past few years. This puts added pressure on vessel owners to fish aggressively and leads to overfishing, misreporting and demands for increased quota.

Resource management policy effectively guaranteed that the promise of abundance following extension of jurisdiction would not materialize

The promise of abundance should by now have a justifiably hollow ring. Not that the potential is not there; but that under competitive fishing conditions, the capacity that was launched on the premise guaranteed that the promise never materialized. This is very much the story of allocation policy since the extension of jurisdiction.

This is not to suggest that EAs or other forms of individual quotas are the solution for all sectors of the industry, nor that they are not without their own problems (including an increased need for enforcement). But they do offer an internal solution to one of the main sources of industry instability, overcapacity.

Fisheries management is doomed to failure unless fishermen clearly see the fishery as a collective interest to conserve rather than simply as an individual interest to exploit

It is inconceivable to outside observers that fishermen would willingly deplete the resource they depend on; effectively to mine rather than harvest. There are at least three reasons why individual and collective views diverge: competitive fisheries promote share maximization; fleet overcapacity induces aggressive fishing baheviour; and, promises of abundance promote indifference. Each was present during 1970s and 1980s and all contributed to the various crises.

To get to the heart of the competition problem it is essential to change incentives from share maximization to cost minimization through some form of harvesting right. This was achieved to good effect in the offshore sector through EAs. In the short run more orderly harvesting can be expected; fewer vessels and/or more efficient vessels and gear (a shift from mobile to fixed gear) can be expected in the long run, particularly if rights are transferable.

Even in the absence of harvesting rights, reducing the number or vessels or their effectiveness (through conversion, say, from mobile to fixed gear) would address some of the symptoms of aggressive fishing such as short seasons and poor quality because

individuals would have less fear that quotas would be rapidly caught. The smaller the numbers, the more likely that behaviour will become voluntarily collusive (*i.e.*, and promote conservation) instead of competitive. This might be promoted through area licensing (as is now the case with lobster) rather than individual quotas.

FUTURE DIRECTIONS

A decade after Kirby, the fishery is once again in crisis. The Cashin Report sums up the problems facing the industry accurately and succinctly as a vicious cycle of interacting elements: overdependence on the fishery, pressure on the resource and industry overcapacity. The problems are traced to:

- an expansionary social policy, where various forms of financial assistance are made available to individuals and companies to both induce them to enter the industry and inhibit their exit;
- resource mismanagement, both in terms of miscalculating abundance and failure to control effort; and,
- ordinary economic incentives to expand, but where gains by any one enterprise are made at the expense of another.

This diagnosis is fine as far as it goes, but a dimension is missing: the regulatory framework. A massive and complex array of regulations and policy measures was needed to channel activity to meet social, political, economic and resource objectives. The industry became very much a creature of administrative design; regulation was the glue holding it together.

Many regulations were introduced in response to earlier regulations that didn't work. Instead of building on initiative and creativity to foster efficiency, these were stifled in the interests of broadly-based social objectives. In the process, industry lost one of the most important features of any commercial environment: operating flexibility. This is particularly important in the fishing industry given the considerable degree of resource and market uncertainty.

The industry is once again at a crossroads. The Cashin Report makes 42 recommendations covering a wide array of issues. Among the most important is a planned and carefully balanced reduction in harvesting and processing capacity. This is a useful starting point for a renewed and restructured industry. But it is only that: a starting point. The Report is essentially silent on how capacity would be *kept* at sustainable levels once the resource recovers.

Without changes in the factors motivating capacity growth – chiefly, competitive fishing – the industry is doomed to repeat history. Moreover, without changes in the regulatory regime allowing greater security of access to raw material and permitting greater operating flexibility by all enterprises, there is little scope for optimism that the fishing industry will ever become a net contributor to the Canadian economy.

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