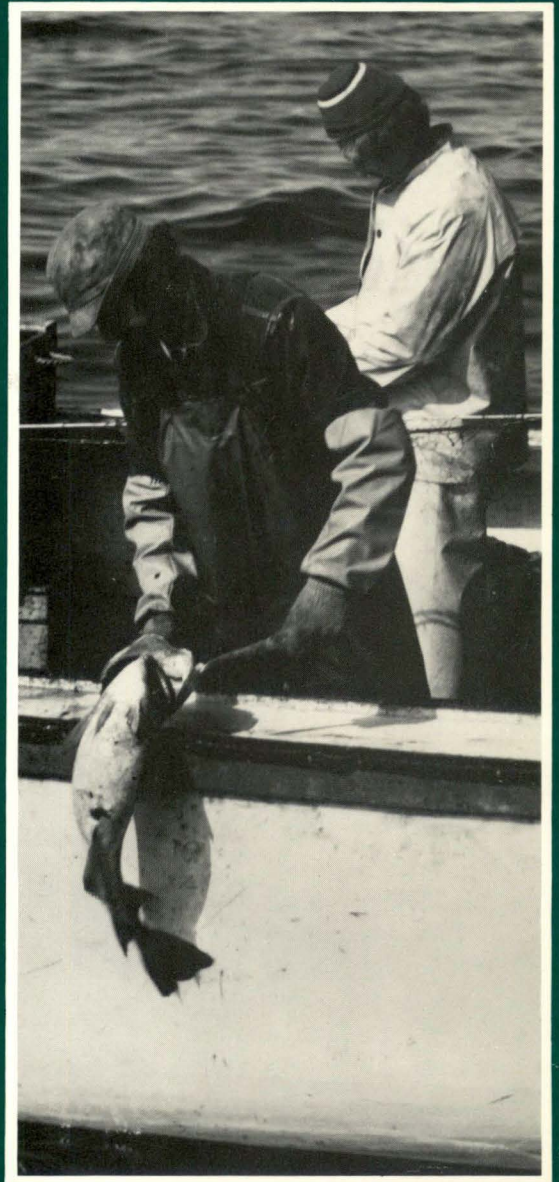




# Policy for Canada's Atlantic Fisheries in the 1980's

A Discussion Paper



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FISHERIES IN THE 1980's  
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Since the publication of the "Policy for Canada's Commercial Fisheries" in 1976, the fishing industry has undergone dramatic changes. The extension of jurisdiction to 200 miles in January 1977 has helped to considerably improve the prospects for Canada's Atlantic fisheries. Although the industry today is not without some difficulties, it can through prudent management and the cooperation of fishermen, processors and governments, offer the prospect of a fair and decent livelihood for thousands of Canadians for years to come.

Yesterday's problem was one of insufficient volume; today's problem is one of insufficient discipline: expectations and appetites must be tailored to the resource available.

During the past year, the Department of Fisheries and Oceans has conducted an intensive review of existing policy governing the Atlantic fisheries. Extensive consultations have been held with fishermen, processors and provincial governments. This Discussion Paper represents an updating of the 1976 policy document to take account of the changed circumstances, and the views expressed through the consultations.

Several major initiatives have already been launched by my Department, including a restructuring of the system of licensing fishermen, establishment of the new Gulf Region, implementation of the Quality Improvement Program, and export licensing. These and other initiatives are brought together in this comprehensive statement of the proposed direction of Atlantic fisheries policy for the 1980s.

This document is a Discussion Paper rather than a final statement of policy, and is designed to stimulate comment and discussion. It would be helpful if your comments could be directed in writing to the Regional Director General in your area. Officials of my Department intend to arrange further consultations with all sectors of the industry on the various issues raised in this Discussion Paper.

Roméo LeBlanc  
June 1981

## EXECUTIVE SUMMARY

Since the issuance of the 1976 "Policy for Canada's Commercial Fisheries", there have been major changes in the circumstances affecting the fishing industry. Largely as a result of Canada's extension of fisheries jurisdiction to 200 miles in January 1977, the prospects for Canada's commercial fisheries have greatly improved. Recent expansions in harvesting and processing capacity are such that the limits of growth are being approached. In 1979 DFO launched a review of fisheries policy involving extensive consultations with all sectors of the fishing industry. This position paper represents an update of the 1976 policy paper with respect to Atlantic fisheries and charts some new directions for the 1980's.

The major policy directions are summarized below by subject area (for further details, see Chapter IV).

### A. Resource Management:

Resource assessment in support of the annual resource management process will be strengthened to increase the accuracy of stock estimates and projections. Greater emphasis will be placed upon longer term research, particularly into interactions among fish species (e.g. cod/capelin, squid/groundfish).

Fo.1 will continue to be the principal reference point for scientific advice on the level of harvest. As a general rule no TAC will be set above that reference level but in certain instances, (e.g. northern cod and southern Gulf cod), TACs will continue to be set below that level in order to provide for stock rebuilding, larger average size of fish in the catch, improved catch rates and greater stability of catches.

A combination of controls on catch levels and fishing effort with use of other measures such as closed areas and size limits where appropriate will be pursued as the most effective means of achieving resource management objectives.

Regulations will be streamlined and minimized to the extent compatible with achievement of fisheries management objectives. The emphasis in enforcement will be placed on deterrence of violations through a combination of (1) increased maximum penalties, and (2) greater use of forfeiture of catch and licence suspension, both for the foreign and domestic fleets. At the same time, co-management mechanisms, such as those employed in the P.E.I. and N.B. lobster fisheries, will be encouraged.

B. Resource Harvesting:

In the 1980's resource harvesting policies will aim at increasing the economic viability and stability of the Atlantic commercial fisheries.

In accordance with international law, Canada will determine its harvesting capacity and make available to foreign fleets the surplus, i.e. the difference between a reasonable TAC and Canadian requirements. In return benefits will be obtained for Canadian fishermen through special treatment by NAFO in allocations from straddling stocks and stocks beyond 200 miles and through commercial benefits involving the sale of Canadian fish products.

Domestically, long-term allocation plans are being developed to provide all sectors of the industry with a greater degree of certainty with respect to future catch shares.

The Department will continue and where necessary extend licensing regimes designed to limit entry into the commercial fisheries.

The policy of encouraging independent ownership of fishing vessels will be maintained and strengthened, with particular emphasis on the small vessel fleet.

With respect to foreign arrangements, current policy permits Direct Sales where potential catches are surplus to the processing and marketing capability of Canadian industry or where Canadian processors will not buy

from Canadian fishermen at an acceptable economic return to fishermen. Whether such arrangements continue in future will be dependent upon the extent to which the Canadian industry is able to provide adequate markets for underutilized species such as mackerel at an acceptable economic return to fishermen, as determined by negotiations between fishermen and buyers.

Two major changes to the Atlantic licensing system are being implemented in 1981: (1) Commercial fishing licences will be issued in distinct categories to distinguish between those who are dependent upon the fishery for their livelihood, either as operators of fishing units or helpers, and those who fish while having concurrent employment outside the fishery; (2) Local licensing allocation and appeal committees, consisting primarily of fishermen will be established to deal with appeals registered by those who are dissatisfied with their categorization. In addition, these committees will advise the Department in future on such questions as who should receive new licences, participation requirements for licence holders and related matters.

Two specific policies relating to the size of the offshore groundfish fleet and the application of freezer and factory/freezer technology will be maintained for the foreseeable future. The offshore groundfish fleet can grow no larger than its current size. Essentially, vessels can fish or be replaced if they have been active in the groundfish fishery in 1976 or later. New replacement guidelines are being developed to better match harvesting capacity to the available resource.

The policy on freezer and factory/freezer vessels which provides that freezer trawlers may be acquired as replacement for existing groundfish trawlers but may not exceed 200 feet LOA or fillet traditional species at sea, will be maintained.

The current policy of restricting foreign control of domestic fishing licences to the level of 1973 will be maintained.

In 1981 the sector management approach for smaller vessels will be further developed, with implementation envisaged for 1982. The larger vessel fleet would continue to be managed on an Atlantic wide basis but within a specific share in each sector.

C. Processing, Quality and Marketing:

The thrusts in the processing and marketing areas will be renewed emphasis on creating conditions that foster industry viability and stability.

The Department intends to work closely with other federal departments and with provincial governments to ensure that any assistance programs are harmonized to provide a better match between available resources and harvesting and processing capacity. In many instances, existing harvesting and processing capacity are in excess of that required for optimum utilization of the available resource.

One of the major thrusts of the Department in the early 1980's will be a program to upgrade fish quality. Following extensive consultations with fishermen's organizations, the Department has embarked on a major Quality Improvement Program comprising the following elements: vessel certification, quality protection on board vessels, dockside grading, unloading, dockside handling and transportation to plants, in-plant quality control and final product grade standards.

With respect to markets, the Department will be taking steps to foster orderly marketing. Specifically, the Department is initiating an export licensing system linked to final product grades in order to improve the performance of the Canadian industry in export markets. This system will eventually require all exporters, or groups of exporters, to obtain export licences prior to engaging in international trade.

D. Fisheries Development:

There will be a major shift in the Department's fisheries development efforts during the 1980's. Development will be based not upon the "expansionist" development philosophy of the 1970's but rather will concentrate upon competitiveness, efficiency and extracting more value domestically from a limited resource. Recent expansions in harvesting and processing capacity are such that the limits to physical growth are being approached. Development initiatives will focus on the following themes: Quality enhancement, productivity of vessels and plants, energy efficiency, and resource enhancement.

E. Resource Management Process:

The Department intends to strengthen the consultation mechanisms for Atlantic fisheries to provide for a streamlined decision-making system with particular reference to annual discussions on TACs, allocations and regulations for all fisheries.

F. Fishermen Involvement in Fisheries Management:

Additional steps will be taken by the Department to involve fishermen more directly in the management of the fishery. Consideration is being given to the concept of Sector Management. This would provide for a greater degree of decentralization to sector managers of authority for management of the small vessel fisheries. This would provide for greater flexibility in management to meet local social and economic objectives and for fishermen to have a greater say in the management of the fisheries of their area.

The setting up of the new Gulf Region will provide a better focus within the Department for the management of those fisheries and also enable fishermen to have a more effective say in the management of the Gulf Fisheries. Also major changes in the approach to licensing on the Atlantic coast will provide an opportunity for more effective participation by fishermen in fisheries management. Steps are being taken to set up Licensing Committees which will be composed primarily of fishermen.

## I. INTRODUCTION

In 1976 the federal government issued a document entitled "Policy for Canada's Commercial Fisheries" which set forth some new directions for fishery management and development primarily aimed at the rebuilding of Canada's commercial fisheries. Since 1976 there have been major changes in the circumstances affecting the fishing industry, particularly in Atlantic Canada. Largely as a result of Canada's extension of fisheries jurisdiction to 200 miles in January 1977, the prospects for Canada's commercial fisheries have greatly improved. The 200-mile limit and stringent conservation measures by Canada have brought about rapid stock rebuilding which has resulted in significantly improved catch rates and enhanced economic prospects for Canada's Atlantic fishing fleets. Canada has become the world's leading exporter of fish products.

While there remain some underutilized species, and some stocks not yet fully rehabilitated, and also some real potential for enhancement/culture it is nevertheless clear that recent expansions in harvesting and processing capacity are such that the limits to growth are being reached and future development will have to concentrate on competitiveness, efficiency and extracting more value domestically from a limited resource. In light of these changing circumstances, the Department of Fisheries and Oceans decided in the summer of 1979 that a comprehensive review of fisheries policy should be undertaken to update the policy paper of 1976. As part of this policy review, an Atlantic Fisheries policy review has been carried out to establish an integrated consistent approach to issues affecting Atlantic Fisheries management in the 1980s.

The general policy review has focused on the following sets of issues:

- (a) the consultative and decision-making process;
- (b) resource management;
- (c) primary sector problems;
- (d) productivity and efficiency;
- (e) marketing; and
- (f) intergovernmental considerations and other matters.

The approach taken in the Atlantic policy review exercise has been to consult fishermen, processors, and other interested groups and organizations in all five provinces, to determine their stance on major issues of concern to them. All groups were invited to submit written presentations as well. Provincial governments were invited to participate in these consultations, in order that both levels of government be aware of the position taken by the private sector groups on the issues under review. These information-gathering consultations, in addition to ongoing consultations in numerous Government/Industry Committees and several Government/Industry seminars, have formed the basis for this Atlantic policy position paper.

This position paper deals primarily with Atlantic aspects of fisheries policy. The general scenario of fisheries and the Department's mandate are briefly outlined in Chapter II. The next Chapter (III), covers the major policy areas of most concern on the Atlantic Coast. This chapter draws heavily on the consultation meetings, various fisheries seminars of the last year or so, and general fishery management principles and concepts that have become an accepted part of the Atlantic fisheries scene. Chapter 4 outlines the various policy thrusts, directions and actions which the Department is taking, plans to take or will consider.

## II. GENERAL BACKGROUND

### A. The Fisheries

Fisheries have always been important to Canada and of special importance to the Atlantic regional economy. In 1979, primary fisheries produced 1.2 million metric tonnes, with a landed value of \$490 million which, when processed, gave products valued at over \$1.1 billion. Total employment in the Atlantic industry amounts to almost 70,000 fishermen and plant workers. Present investment includes about 31,000 vessels, valued in excess of \$495 million, and 600 processing plants.

Canada is now the world's largest exporter of fish in terms of value, with exports valued at more than \$1.3 billion in 1979. Sport-fishing is also big business, with about 6 million anglers, one-sixth of whom are visitors, spending another \$1.2 billion annually in directly-related goods and services.

The Department's role is to act on behalf of all Canadians, within the framework of government social and economic policy, as the steward of Canada's fishery resources and the aquatic habitat upon which these resources depend. The Department exercises its stewardship function to husband these resources and provide for their "best use" for all Canadians, in so doing often affecting income distribution. The stewardship function is exercised through development of strategies and programs based on scientific, social and economic information, through enforcement regimes to assure compliance with regulations, and through a variety of financial incentives and industrial support programs.

With respect to fisheries management, departmental programs and strategies cannot be designed in isolation from policies adopted by other federal departments, by provincial governments, or without taking into account international obligations, developments in other sectors of the economy or in international markets. In particular, department programs and

strategies are significantly affected by other federal responsibilities, such as DREE assistance programs, tax policies, unemployment insurance programs, foreign policies and environmental policies.

The principal difficulties with respect to fisheries management stem from the common property nature of the resource (there being no arrangements for proprietary tenure over the resource, as there are in agriculture, forestry, hydrocarbons, or minerals), and the resultant tendency toward debilitating competition in the industry. In most industries, competition involves price forces that determine profit margin and share of the market and lead to greater efficiency, in terms of costs per unit output. These competitive forces are in play in the fishing industry, but sometimes have the opposite result of reducing efficiency. In the primary sector, because of finite raw material supplies available to fishing enterprises, investments made by one enterprise to improve efficiency impinge on the efficiency and earnings of others. To remain profitable, each of the other enterprises must make additional investments, and the net result is higher overall cost and lower net returns. The same holds true to some extent in the processing sector as processors compete for a fixed supply of fish, leading to over-capacity and lower returns.

These tendencies to over-investment can be exacerbated when public assistance is available in the form of capital and operating subsidies as well as income supplemental measures. In fact, results of subsidization are not always improvements of economic conditions in the fisheries, but rather perpetuation of a depressed state of affairs that generates demands for continued assistance.

Moreover, commercial fisheries are based on natural wild resources. Therefore, they are subject to wide natural fluctuations and uncertain forecasts of supply. These factors can be only partly compensated by resource management measures.

Another often critical factor is the common property nature of the fish habitat resource base itself. Other industrial activities, such as forestry, transportation and energy development, utilize the same areas where fish are spawned, reared or harvested. These activities frequently

conflict with the department's responsibility for preservation and enhancement of fish habitat. Under such circumstances, the department's stewardship function is exercised through regulatory interventions, consultation and negotiation and by maintaining public awareness of the implications of loss or degradation of fish habitat.

As a high proportion of Canadian fish products is exported, market factors are a vital element in decision-making. Critical areas include the quality, quantity and size of fish harvested and processed and positions adopted in international negotiations on the trade in fisheries products (including cases where Canada or its negotiating partner links trade questions with access to stocks occurring wholly or partially within the Canadian zone).

Currently, the limited fishery resource is shared amongst various user groups, taking into consideration such factors as size of vessels, gear types, and historic performance. In this process, following extensive consultation with the parties involved, priority is given, in a particular area, to those who lack the mobility to harvest the resource in more distant waters. Where the resource can sustain additional effort, more entry is allowed into the fishery. Otherwise, limited entry policies are in force and in some cases, measures are taken to reduce the number of participants.

The industry can support much needed employment in small coastal communities. While it cannot be expected to provide the sole means to solve localized problems of unemployment and low incomes caused mainly by low labour mobility and few alternative employment prospects, the fishery has a vital role to play in maintaining and enhancing the viability of coastal communities and strengthening the rural fabric of Atlantic Canada.

#### B. Departmental Mandate and Policy Objectives

Federal jurisdiction over sea coast, inland fisheries and public harbours is set out in the British North America Act. The exercise of this mandate has evolved through judicial interpretation and federal-provincial agreements.

The Departmental mandate for fisheries management, fisheries science, fishing and recreational harbours, oceanography and hydrography flows from the Department of Fisheries and Oceans Act and the schedule of statutes assigned to the Minister attached thereto, including the Fisheries Act, the Fisheries Development Act, the Fish Inspection Act, the Fishing and Recreational Harbours Act, the Costal Fisheries Protection Act, and enabling statutes respecting two Crown corporations and several international conventions.

Under the Department of Fisheries and Oceans Act, the Minister is also charged with the co-ordination of the policies and programs of the Government of Canada respecting oceans.

The department's strategic objectives in its fisheries management activities flow from its more general responsibilities, within the framework of the government's social and economic policies, goals and priorities, to assure:

- the comprehensive husbandry and management of Canada's fisheries base, through the protection, rehabilitation and enhancement of individual fish stocks and the aquatic habitat upon which these resources depend;
- the "best-use" of fisheries resources through a variety of measures affecting when, where, how and by whom these resources are harvested, processed and marketed to obtain "optimal social-economic benefits";
- an adequate hydrographic survey and chart production program to enable hydrographic charts and other publications to be produced for safe navigation in Canadian waters;
- the acquisition of the necessary knowledge base on oceanic processes and environments to support activities related to defence, marine transportation, the exploitation of offshore energy resources, and management of the fishery resource and its aquatic habitat;

- the provision of a national ocean information service;
- the provision and administration of a national system of harbours in support of commercial fishing vessels and recreational boating.

The strategic objectives of the Department's fisheries management programs are:

- to maintain fishery resources at levels which will generate the maximum continuing economic and social benefits, by conducting appropriate research on the factors controlling the distribution and abundance of fish species, including biological and fishery interactions, and applying the results to maintain, restore and augment their productivity, and by preserving, through limiting adverse impacts of alternative uses, and improving the habitat;
- to create the conditions necessary for the viable and stable commercial fishing sector and improved incomes, through regulation of harvest levels and by implementing licencing and allocation measures and through research, development assistance and quality programs;
- to support both the primary and secondary sectors, through international negotiations and identification of market opportunities and by implementing quality improvement measures;
- to increase the ability to estimate the production, distribution and abundance of fish species including the study of interactions among ecosystem components;
- to take best advantage of recreational fishing opportunities;
- to provide for the rights of Indians and Inuit in their subsistence fisheries.

### III. MAJOR POLICY AREAS AND ISSUES

The review of Atlantic fisheries policy issues concentrated primarily on the following major areas: resource management, resource harvesting, processing, quality and marketing, fisheries development, cost recovery and the overall fisheries management process. The discussion of these areas, which follows here, covers a variety of principles, conclusions and rationales which were enumerated during the consultations, in other fora such as the Northern Cod, Squid, Gulf Groundfish and Herring Seminars, or which have become accepted as basic tenets of overall fisheries management. The following sections will, therefore, contain a variety of conclusions which lead to the statements of policy thrusts, directions, or actions contained in the next chapter.

#### A. RESOURCE MANAGEMENT

Historically fishery management has focused primarily on the biological aspects of the fisheries, concerned primarily with the protection and conservation of fish stocks. It is now clear that if fisheries are to make their fullest contribution to society, social, economic, political and environmental factors must be incorporated into the management process. Resource management broadens the concept of fishery management to include alternative uses of (aquatic) resources and habitat and resolution of alternative use conflicts.

Resource Management can be defined as including both stock and habitat management.

##### (i) Stock Management

###### (a) Setting the Level of Harvest

The strategies and options that can be followed in setting the level of harvest include the following which are phrased in terms of target fishing mortality rates (F). If fishing on a stock is carried out at a constant

fishing mortality rate, then, during a short time interval, the amount of fish caught is proportional to the number of fish in the stock times the fishing mortality rate times the length of the time interval. The rate of fishing mortality, together with biological factors, determines the annual catch and stock levels. Figure 1A illustrates the implications of alternative fishing mortality rates on stock biomass and Figure 1B illustrates the corresponding catch implications.

F<sub>MSY</sub> - This is defined as the level of fishing mortality associated with the Maximum Sustainable Yield (MSY). In theory it is therefore the level of fishing mortality which produces the greatest physical yield on a long term basis. Although in theory this level of fishing mortality should produce the MSY catch, in fact it has recently been shown by studies on one particular stock that fishing at this level of mortality can lead to stock collapse. This is particularly the case if the fishery is not closely regulated since fishing to obtain the maximum physical yield inevitably results in over-runs and exceeding the  $F_{MSY}$  at times, thus increasing the probability of stock collapse. In any event, catch rates will be low, sizes of fish will be small, biomass and particularly spawning biomass will be low and the fishery will tend to be unstable because of fewer ages in the commercial stock and the subsequently greater effect of recruitment fluctuations on catch. These factors all have economic implications and together with the biological dangers make this an undesirable strategy.

F<sub>MAX</sub> This is the level of fishing mortality which produces the greatest yield from each recruit entering the commercial fishery. It is highly sensitive to the changes in growth rate and fishing gears (e.g. mesh size) and in many cases is almost impossible to detect on the flat-topped yield curves typical of most species.

Theoretically, the yield per recruit never decreases to zero with increased fishing mortality even to infinity indicating that no matter how hard one fishes in theory, one never catches the last fish. However, the yield per recruit concept does not consider the stock-recruitment relationship at all and, in actual practice, fishing at levels above  $F_{max}$  will lead to a

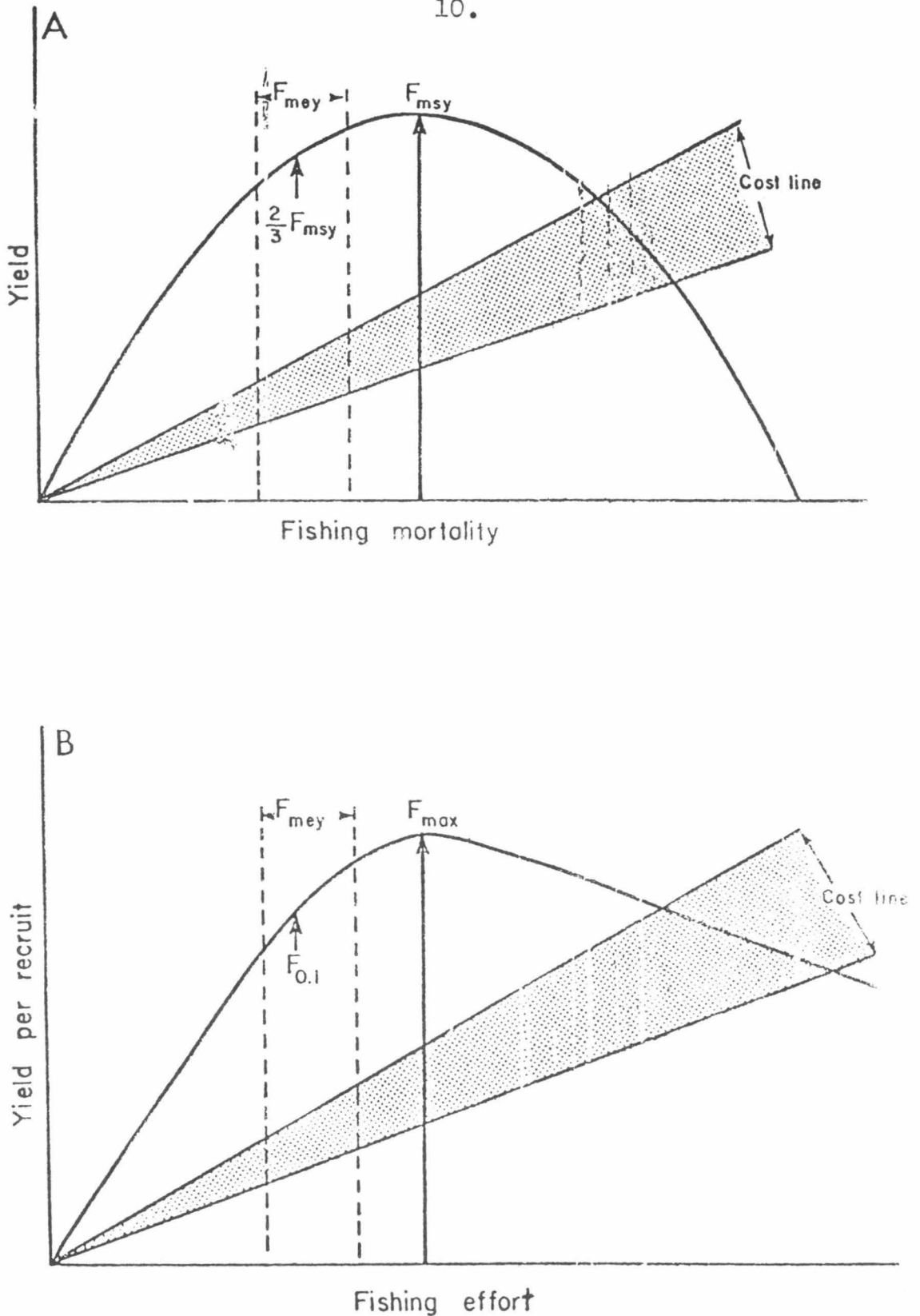


Figure 1. The most commonly used yield curves illustrating some strategy options. The cost lines are given as a range to emphasize the point that the precise location of "maximum economic yield" on the yield curve varies with costs.  $F_{MEY}$  points outside the range illustrated are also possible. A. General production type curve with  $F_{MSY}$  and  $\frac{2}{3} F_{MSY}$  illustrated. B. Yield-per-recruit type curve with  $F_{max}$  and  $F_{0.1}$  illustrated.

spawning biomass so low that recruitment will be impaired and result in stock collapse.  $F_{\max}$  and  $F_{\text{MSY}}$  are related via the stock-recruitment curve and are not necessarily the same depending on the relative shapes of the stock recruitment and yield per recruit curves. The dangers of fishing at  $F_{\max}$  relative to some lower level are the same as for fishing at  $F_{\text{MSY}}$  and the biological and economic disadvantages of low spawning biomass, smaller fish, lower catch rates and less stability pertain to  $F_{\max}$  fishing as well as  $F_{\text{MSY}}$  and also make this an undesirable strategy.

$F_{0.1}$  - This is defined as the level of fishing mortality at which the increase in yield (marginal yield) by adding one more unit of fishing effort is 10% of the increase in yield by adding the same unit of effort in a lightly exploited stock. The long term yield by fishing at  $F_{0.1}$  is about 80-90% of that obtained by fishing at  $F_{\max}$  or  $F_{\text{MSY}}$  depending on the shape of the yield curve. However, the fishing effort necessary to take this long term yield is substantially less than necessary to take the long term yield at  $F_{\max}$  or  $F_{\text{MSY}}$ , and, in most cases, is about two-thirds. Consequently, the catch rate at  $F_{0.1}$  will be substantially higher, the sizes of fish considerably larger, and the fishery will be considerably more stable than at  $F_{\max}$  or  $F_{\text{MSY}}$ . There are, therefore, considerable economic advantages to fishing at this lower level in that fish will be less expensive to process because of the larger size of fish, and the fishery will be more stable because of the larger biomass thus leading to more stable supply to markets. From the biological point of view, there will be less risk of recruitment failure and hence stock collapse since the spawning biomass will be larger. Also quota over-runs will not likely result in fishing mortality exceeding  $F_{\max}$  and  $F_{\text{MSY}}$  as could most certainly occur at the higher levels of fishing mortality, given the lack of precise control on quotas.  $F_{0.1}$  is not a unique point and one could similarly define  $F_{0.05}$ ,  $F_{0.2}$ ,  $F_{0.3}$ , etc. It is simply an internationally accepted level of fishing below  $F_{\max}$  or  $F_{\text{MSY}}$  dictated by the practical experience of stock decline by fishing at or above  $F_{\max}$ . From both an economic and biological viewpoint, this is a desirable type of strategy, especially for stocks that are rebuilding. This reference point has been used for most groundfish stocks in the Canadian Atlantic since 1977.

F<sub>MEY</sub> - This is defined as the fishing mortality producing the maximum economic yield and is usually the point on the yield curve where the difference between the value of the catch and the cost of catching is maximum. Its relationship to F<sub>0.1</sub> will vary from stock to stock depending on the shape of the yield curve but it will generally also be less than F<sub>max</sub> or F<sub>MSY</sub>. Although several attempts have been made to define precisely this point for given stocks, it has proven impossible with the multi-national nature of the fishery. At present, however, with a large number of solely or almost solely Canadian fisheries, the F<sub>MEY</sub> point may be definable. Even within the Canadian Fleet, the F<sub>MEY</sub> point may be different for different segments of the fleet and may vary annually with fluctuations in markets and costs of catching. Managing under an F<sub>MEY</sub> strategy implies a more comprehensive on-going economic data base than at present exists within the Department of Fisheries and Oceans. Also this strategy implies a greater degree of government control than is at present the case since not only would the department be managing the total removal from the resource by various sectors but also when and where different fleets will catch different stocks and species to achieve their F<sub>MEY</sub> level. If the F<sub>MEY</sub> point could be defined and provided it were low enough to accommodate the biological concerns of fishing at or near F<sub>MSY</sub> of F<sub>max</sub>, this might be a desirable strategy.

"Pulse Fishing" - This is usually defined as fishing a given stock hard when the biomass is highest due to good recruitment and fishing at a lower level or even ceasing fishing when the biomass is low due to poor recruitment. This type of pulse fishing can really only be effective when a large year-class can be fished selectively from other year-classes to prevent depletion of especially older fish (spawning stock) caught with the fish of the larger year-class. Non-selective pulse fishing occurred in 3NO cod in 1967 and 1968 and caused some of our problems today in that stock.

Pulse fishing, of course, can take another form, that of fishing a biomass in response to market fluctuations and not necessarily in response to year-class fluctuations. This can be such that even when biomasses are large, market conditions may dictate fishing less of a given species and vice versa.

With pulse fishing, it is necessary that all effort be mobile and therefore capable of being deployed quickly onto other stocks in periods of low levels of fishing on particular stocks. Also, it is a prerequisite that other stocks capable of absorbing the displaced effort exist at the correct time and place. This will entail a high degree of pre-planning involving not only stock forecasting, but also fleet forecasting and market forecasting to enable a detailed game plan to be constructed and closely followed for several years at a time.

This type of fishing may be able to take advantage of market opportunities available, alternative species, etc., but it will not always be possible especially in areas of immobile gear and if not very closely regulated could easily lead to total stock collapse. Also, conflicts will arise in areas of offshore mobile fisheries and inshore immobile fisheries on the same stock in that even if the off-shore sector could be directed to other areas and stocks during period of low abundance, immobile fisheries could not. In general this is not a viable strategy for Canada's Atlantic fisheries although it might be appropriate in particular situations.

Minimum Spawning Biomass - Since the ultimate aim of fisheries management is to allow fishermen to catch an amount of fish which will maximize economic and social benefits within the biological constraints of the stock, it follows that in theory the catch in each year could be at the level which leaves just enough spawning biomass to ensure adequate recruitment. However, the weakness in this strategy is that for no fish stock has it thus far been possible to define this level of critical spawning biomass. Thus fisheries scientists have advised and fisheries managers recently have managed on the basis of fishing at the  $F_{0.1}$  level which allows a large enough spawning biomass to prevent biomass-related recruitment failure. That is, the spawning biomass is maintained at a level high enough to ensure that this critical spawning biomass is never approached. This is particularly important in stocks where large fluctuations in recruitment occur (e.g. some of the pelagic stocks) since biomass fluctuates rather widely in such circumstances and the danger of cycling down below the critical biomass is greater. Some species are in

fact managed under this strategy (e.g. some salmon stocks) in that commercial catches are regulated to allow a defined escapement for spawning purposes. However, until the critical spawning biomass can be precisely defined for marine stocks, this will not be a viable strategy.

Forage Fish - In the past, stocks have essentially been managed in isolation from one another with little regard for the interaction between species. Total allowable catches (TAC's) have been set on predators and prey alike without formally incorporating the interaction between species because of lack of knowledge of such interactions. There have been some exceptions to this; for example, the TAC's for capelin have from the beginning been set below the estimated sustainable yield for capelin so as to allow for their importance in cod diet. In future, however, management of all species will need to consider these interactions. For example, if the strategy is to manage a predator species (e.g. cod) to allow for its rebuilding, prey stocks (e.g. capelin) will have to be managed to allow sufficient food for the ever-increasing predator biomass. This may involve underexploiting the prey stocks to allow the surplus food for the predators. On the other hand, a prey fishery could be considerably more valuable than a predator fishery in which case some predator yield may have to be sacrificed in the long-term to fully exploit the prey species. These species interactions and their role in fisheries management will be the object of intensive research in the near future, research which has just commenced during the past couple of years.

Short-Lived Species - These can be defined as species for which an age group or year-class, contributes to the fishery for only one or two years. The extreme example is squid, individuals of which are available to the fishery for only one season. Others are capelin and sand-lance. These species are likely to be highly variable in abundance and are important forage fish for other important commercial species, particularly cod. Silver hake also contribute to the fishery for only 2 or 3 years and share the characteristics of high variability. However, there is reason to believe that this species has a potential longevity of 8-10 years and that a more stable fishery could be attained at lower exploitation rates.

Squid are unique in the management problems they represent. Biological knowledge of stock dynamics is presently the limiting factor on management options and the present objective is to stabilize exploitation rate at about 40% within each season which theoretically allows adequate spawning escapement. With development of biological knowledge, other options may become possible. If, for example, the stock-recruitment relationship was known, management could be based on minimum required spawning escapement. This would allow, on average, much higher yields but these would be highly variable possibly producing market gluts and famines. This would also require varying amounts of fishing effort in different years implying a high degree of flexibility in fleet operations. Should it also prove that squid have a greater adverse affect on finfish production through predation on larvae and juveniles than they have a positive affect as prey for adult finfish, this would support the minimum spawning escapement approach as this approach also implies minimum standing stock during the squid feeding season. However, this is predominantly a small mesh fishery with by-catch problems in relation to juvenile groundfish and the higher squid yields are likely to imply higher by-catches and hence lower yields from groundfish resources (unless jigging is favoured over trawl and trap fisheries). The knowledge required to exercise these kinds of policy options is unlikely to be available for a considerable number of years and present options are strictly limited.

Mixed Fisheries - There are several classes of mixed fisheries. The true by-catch fishery is one class of mixed fishery, the most important being by-catches in small mesh gear fisheries. The silver hake-squid fishery in which there are significant by-catches of juvenile cod and haddock is a good example. Unrestricted, this fishery would prejudice the very existence of commercial fisheries for adult cod and haddock. Season, gear type, mesh size, and area restrictions have been placed on this fishery with positive results in terms of improved escapement of juvenile cod and haddock. This apparent success has been aided by the fact that there are a relatively small number of large vessels engaged in the fishery and a high enforcement priority has been placed on controlling them particularly through use of observers. Implicit in the Canadian approach had been the

decision that some small loss of cod and haddock yields is acceptable to allow full utilization of silver hake and squid and conversely that the cost of prosecution of these fisheries should be increased to minimize loss of cod and haddock yields. In other words, a potentially satisfactory trade-off appears to have been achieved, although the precise economics have not been worked out, in a situation where the solutions are enforceable.

In a purely Canadian context, e.g. redfish by-catches in shrimp fisheries, a similar approach might be taken to the extent that the solutions are enforceable. However, effective management is the art of the possible and the constraints on management must be realized.

Another class of mixed fishery problem can be illustrated using the cod-plaice fishery in the southern Gulf of St. Lawrence (Div. 4T) although there are many examples. In this case, cod is the prime species but plaice is fished in conjunction with cod, their relative importance varying with the availability of cod. The cod quota is caught first, but the fishery for plaice cannot continue without catching cod as a by-catch. While allowance could be made for this by closing the directed cod fishery before the full quota was caught, a directed plaice fishery is not economically viable. Measures could be taken to extend the cod fishing season by, for example, trip limits.

However, such measures have invariably resulted in discard problems. The alternatives include closure of the best fishing areas (or seasons) for fishing cod but these have high enforcement costs and legislate inefficiency into the fishery. The remaining alternative is to close the plaice fishery as well as the cod fishery and leave the plaice resource underexploited. When more than two species are fed into this equation, the complexity of the problem becomes enormous. Construction of equally complex management plans does not offer a solution - enforcement costs are high in relation to benefits - how high remains to be demonstrated.

Complexity breeds misunderstanding and dissatisfaction within the industry, misreporting and resultant deterioration of statistical systems. There is a direct relationship between the quality of statistics and the complexity of the management system they can support.

The solution appears to be to accept suboptimality. This requires the Department to make decisions on the degree of over-exploitation it will allow for key resources and when that level is reached, effect closure of fishing for all resources in particular management areas. Some resources will be under-utilized and some seasonal vessel tie-ups and plant closures may be required. The solution to this problem must rest in the hands of the fishermen requiring a planned and cooperative approach on their part.

There are cases where optimal utilization of a primary species results in over-exploitation of a secondary species: e.g. plaice in the cod fishery on St. Pierre Bank. In such cases, and where there is reasonable scientific confidence that over-exploitation of the secondary resource will not result in damage to its reproductive potential i.e. the stock will not be driven to commercial extinction, planned over-exploitation of the secondary resource is a viable management option.

#### (b) Stock Management Tools

Discussed here are the values of particular management measures in relation to control of fishing mortality (F) on stocks. These measures can be applied for reasons other than the control of F but this is not discussed in detail.

Mesh Size and Size Limit Regulations - These are primary tools for influencing the size and age distribution of catches. They are normally used to restrict the catch of small fish, allowing these fish to realize their growth potential, and hence increase the total yield from the resource. Mesh size regulations have proved of value in groundfish fisheries, particularly in reducing discards of commercial species of unmarketable size. However, since the optimum mesh size varies among

species, and also within species depending on the exploitation rate, this is an imprecise tool. It is also difficult to enforce unless possession of small-mesh gear aboard is forbidden.

Size limit regulations are workable when the species regulated school by size e.g. herring, and fishermen can distinguish small fish before capture. However, these tend to be special cases and for most species size limits are likely only to result in higher discards at sea and hence to be detrimental.

Size limits have been used as a back-up for mesh size regulations i.e. the mesh regulations can be enforced indirectly by applying a size limit regulation at the time of landing. This enforcement advantage can, of course, be dissipated if the regulation results in higher discarding at sea.

Catch and fishing effort controls - These are the primary tools for controlling the overall level of fishing on the resource and hence the yield from it. Thus, these are the management measures which form the cornerstone of fisheries control. They can be used independently or together.

Catch quota regulations can provide accurate management control in simple single species fisheries. The requirement of this control is an accurate, real-time statistical reporting system. Such simplicity is rare, particularly in groundfish fisheries. In mixed fisheries not all species yields can be optimized and very complex combinations of catch quotas, by-catch regulations, fleet component catch suballocations, and closures are required to approximate overall optimality. This creates difficulties for enforcement activity and generates economic inefficiencies.

Fishing effort regulation in its simplest form applied to a single species fishery and a uniform fleet can provide as accurate control of fishing mortality as a catch quota. From an enforcement viewpoint, it is only necessary to establish the number of days each vessel has fished (or some

other effort measure). In mixed fisheries, optimal control of fishing effort directed to particular species is, in most cases, a practical impossibility. The greatest drawback to utilization of effort control alone to achieve detailed management objectives lies in the technical difficulties in formulating appropriate regulations. Estimation of relative fishing power of diverse effort units ranging from inshore vessels to factory trawlers is a difficult scientific problem. Given that these units change in efficiency over time, continuous monitoring is required involving collection of new and very detailed data on individual vessel performance and factors affecting efficiency.

A combination of catch and effort controls offers the most practical approach at this time. Gross control of fishing effort through licencing limitations of the total number of boats and/or fishermen of each type can be used to scale fleet capacity to resource availability. Specific catch quota controls can then be used more effectively for fine tuning as the disruptions and hardships created by gross overcapacity can be, to a large extent, avoided. Individual enterprise allocations which have been used to a limited extent in the herring and shrimp fisheries, are being considered as an additional method of control, with the primary emphasis on limiting the incentive to overinvest in a given fishery.

Closed areas/seasons and limitations on gear type - These measures are commonly used for reasons other than optimization of fishery yields through control of exploitation, e.g. to avoid gear conflicts (herring purse seiners vs. gillnets and weirs) or increase fish quality (groundfish gillnets). With regard to control of exploitation, these measures can form valuable adjuncts to other controls in specific situations. Each case must be looked upon on its merits.

#### (ii) Habitat Management

"Fish Habitat Management" is defined as those operational and scientific research activities directed by fisheries managers to protect fish habitat from alteration or destruction, to rehabilitate degraded habitats, to create new habitat, to enhance existing habitat, to prevent contamination of edible fish and to prevent or restrict any work or undertaking which

could impede or prevent fishermen from carrying out normal and lawful fishing activities. Taken together these activities become part of a comprehensive ecosystem and economic approach to meet fisheries production objectives.

(a) Habitat Research. This includes research into the physical and biological parameters influencing the characteristics of a particular part of the aquatic environment, defined either in geographical terms or by the distribution of a particular species or group of species. Of particular importance is sensitivity of the habitat to changes in these parameters, whether they be natural, or as a result of man's activities. Of equal importance is the ability to forecast the effects of such changes.

Some current examples of the types of alternative uses of the habitat are the disposal of industrial effluent, the changes created by industrial activities (e.g. nuclear plants, breakwaters, etc.) and commercial vessel traffic.

(b) Habitat Management Problems. The Atlantic Provinces each have unique habitat problems determined by the types and geographic locations of their fisheries in relation to pollutant sources and the locations and extent of other competing uses of the ocean fishing grounds, coastal zones, estuaries, rivers and lakes. The Atlantic Region's fish habitat problems may be categorized as follows:

- (i) Offshore Fisheries: Offshore oil and gas developments, oil disasters, bottom debris and closure of fishing areas are potential problems identified by the fishing industry. Ship source pollution and oil tanker disasters and ocean contaminants are also of importance.
- (ii) Coastal and Estuarial Fisheries: Shipping disasters such as the Kurdistan have affected fishing gear. Contamination of oysterbeds, lobsters and other fish by sewage, mine tailings contaminants (cadmium) and other industrial wastes is a problem.

Destruction of nursery and fish rearing areas is caused by causeways, tidal power, nuclear plants, port dredging and shipping activities. Some activities such as dredging also directly interfere with fishing gear. Fishermen have become more aware of the need to protect their interests in these situations.

- (iii) Anadromous and Freshwater Fisheries: Industrial pollution, stream alterations (500 applications per year in Maritimes region) and acid rain are the principal habitat impacts on the Atlantic salmon and freshwater fisheries. Potential impacts from forest spraying, agricultural practices, hydroelectric installations and other watershed projects also pose serious problems.

To date, two main strategic instruments have been used to manage and protect fish and fish habitat. (1) DFO enforcement of the Fisheries Act - (sections 20, 28, 31, 33), and (2) provision of advice and recommendations to other agencies such as EMR (offshore drilling) and AGR (forest spraying), DPW (dredging), Provincial Environment agencies (stream alterations and pollution issues), EPS (water pollution), MOT (coastal shipping) and External Affairs (acid rain).

The complexity of habitat management in the Atlantic regions is now recognized and the Department has embarked on a revitalization of its activities as part of an overall national DFO plan. The first step is the acquisition of new resources from government to increase Departmental capabilities and to meet new workloads in habitat protection areas such as marine offshore oil and gas developments. The Department's general approach to habitat management will involve increasing public and government awareness of the socio-economic value of fish habitat, promoting restoration of degraded habitats of importance of fisheries, and establishing joint plans and decision making processes aimed at prevention of further erosion of the habitat resource base.

## B. RESOURCE HARVESTING

The process of controlling the level of harvest in Canada's Atlantic fisheries and allocating access to the resource is a phenomenon introduced in the 1970's. Prior to extension of fisheries jurisdiction in January 1977, the major fisheries off Canada's Atlantic coast were managed by the International Commission for the Northwest Atlantic Fisheries (ICNAF). ICNAF first introduced Total Allowable Catch (TAC) controls in 1972. In a radical departure from established tradition, ICNAF at that time also introduced the concept of national allocations. In order to achieve agreement on such national allocations, complex formulae were developed, the so-called 40-40-10-10 rule. This was subsequently modified to take account of increasing coastal state demands.

This system of international controls was introduced at a time when the major fish stocks were in decline as a result of overfishing. Declining catch rates, coupled with soft markets, led to a major intervention by the Canadian government in 1974-75, the provision of \$200 million in temporary assistance and stringent conservation measures to rebuild the fish stocks.

It was during this transition from stock decline to rebuilding that the Canadian industry experienced significant resource shortages. Against this background, the department in 1976 introduced the first major plan for allocation of fish stocks among sectors of the Canadian fleet by means of the 1977 Groundfish Fishing Plan. This process was extended to virtually all species in the late 1970's and the development of annual fishing (allocation) plans is now a well-established facet of the Atlantic fisheries management process.

When Canada extended its fisheries jurisdiction to 200 miles on January 1, 1977, it did so in the context of the developing consensus on the Law of the Sea and undertook to manage the fisheries of the extended zone in accordance with general principles developed in that forum. Article 61 of the L.O.S. Consolidated Negotiating Text provides that: "(1) The coastal state shall determine the allowable catch of the living resources in its

exclusive economic zone; (2) The coastal state, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over exploitation; (3) Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustained yield, as qualified by relevant environmental and economic factors, including the economic needs of coastal fishing communities". Article 62.2 stipulates that "the coastal state shall determine its capacity to harvest the living resources of the exclusive economic zone. Where the coastal state does not have the capacity to harvest the entire allowable catch, it shall...give other states access to the surplus of the allowable catch...".

Thus Canada sets the Total Allowable Catches or other conservation measures taking into account "relevant environmental and economic factors, including the economic needs of coastal fishing communities". Canada determines its harvesting capacity and where it does not have the capacity to harvest the entire allowable catch, it makes available to other states the surplus, i.e. the difference between the Total Allowable Catch and Canada's harvesting capacity.

This procedure gives rise to important policy issues relating to the definition of "surplus" in a given situation and foreign allocations. The first is the extent to which Canada can or should harvest resources within the 200 mile zone while the second includes the use of surpluses for Canada's best advantage. Decisions on the optimal use of any resource depend on many factors, including economic and social as well as biological elements. There are, however, in most cases a range of possible harvesting policies and a range of possible measures to implement any given policy. Choosing the particular line of action requires an ability to forecast the results of the various alternatives, not only those resulting directly but also the implications of associated elements.

Extensive consultations with interested parties including other governments and all sectors of the fishing industry are well established as a prerequisite for choosing between alternative levels of harvest and resource use.

(i) Foreign Allocations - It appears to be a generally accepted view that Canada should harvest 200 mile zone resources to the extent that such harvesting is profitable to the fishing industry or regional economy. This view carries two major implications. The first is that we would not necessarily harvest all of any stocks that provide profitable operations - the possibility of superior profitability from allocations to foreign interest could exist. Secondly, and conversely, we would not maintain fishing effort for stocks within our zone simply because there are allowable catches.

The determination of resources surplus to Canada's needs flows from this approach to our own harvesting operations. Any amounts surplus to our needs would be the quantity that exceeds our average profitable harvest levels. However, harvesting of such surplus by other countries should not lead to net economic losses for Canada. In allocating resource surpluses to other nations, the benefits received by Canada should exceed all the costs to us of the additional foreign harvesting effort. These costs and benefits should include effects on our conventional or even potential markets in addition to any effects on our harvesting costs. In certain cases, benefits arising from resulting technology transfer could be part of the question.

The above approach is fully under our control in the case of such stocks as are wholly within our zone. Transboundary stocks should be subject to the same general approach but some of the benefits may have to be taken in less tangible terms than with 200 mile zone stocks.

(ii) Domestic Allocations - The question of allocation of access to domestic fleets is one of the most contentious and difficult issues facing resource managers. Resource harvesting by Canadian fishermen involves several main policy issues:

- (a) allocation of access to the resource,
- (b) fleet size and composition, and
- (c) operational patterns.

These areas cover the whole range of harvesting issues: by whom and where resources are harvested, the numbers and type of vessels used and the extent to which harvesting operations are specialized or diversified. An equally critical factor is that these policy areas are not independent of each other but are all intertwined.

The ultimate aim of allocating access to the resource should be maximization of net benefits from harvesting operations. In practice, a variety of factors will have to be accommodated in allocating resource amongst competing fleets. These will include proximity, direct dependence, and efficiency of fleet sectors. In the short term particularly, existing situations will require greater emphasis on such factors as dependence and proximity. In the longer term, maximization of net benefits should be the overriding consideration. Moving towards this state will also produce greater stability of earnings from harvesting.

The issue of fleet size and composition cannot be effectively divorced from the allocation of access issue. It is equally difficult to determine which one should be dealt with first. Invariably, allocation decisions influence fleet and vice versa.

In the short term, with certain conditions already fixed (number of vessels and fishermen etc.) the tendency is to try to accommodate access desires, sometimes to the detriment of both proper allocation of access and fleet configuration. Over the longer term, this incompatibility can be reduced or eliminated by aiming for minimization of harvesting costs. The fleet size and composition produced by this strategy will be conducive to the maximization of net returns desired from allocation of access policy. Or to state it slightly differently, the method of access allocation that maximizes net benefits should be complemented by a fleet structure that minimizes the long run cost of harvesting. As a practical prescription, an

allocation policy that produces maximum net returns from harvesting and a fleet policy that minimizes costs of catching would be mutually supportive. In this context, however, it must be recognized that the principle of priority in allocations to contiguous and less mobile fleet sectors is well established and should be maintained. A recent study by the department has analysed projected costs and earnings of offshore vessels (over 100') under different replacement scenarios and in terms of implications for resource allocations required to ensure viability. New fleet replacement guidelines are being developed for large groundfish trawlers. Similar cost and earnings studies are being initiated for smaller vessel categories.

The issue of specialization versus diversification of fishing operations is a significant one on parts of the Atlantic Coast. Diversification is often sought and supported because it is claimed to be the only viable means of fishing profitably in many areas. The major practical problem is that resource levels of certain species are often not high enough to accommodate all those who wish to diversify.

In reality, fleet specialization is the preferred alternative where full-time harvesting of a single species or species group is permitted by resource availability. If a fleet can make required annual returns from a single type of operation (e.g. crab, herring, etc.) capital costs can be restricted to those for a single method of fishing.

However, if resource availability, because of stock size, quota restrictions or seasonal limitations, does not permit a fleet to make sufficient annual returns from a single operation diversification into other available species and species groups should be permitted. However, the range of choices or the extent to which diversification can extend must be limited by viability requirements of individual vessels. This means, on the one hand, that fleet units participating in a series of fisheries must be viable overall. It also implies that any single fishery in a diversification combination must not have more units than can be viably supported by it.

In addition to the major policy issues outlined above, a few more general harvesting issues should be highlighted.

The issue of domestic concentration and ownership of fishing vessels and licences is an ongoing resource harvesting issue overlaid on the basic issues of allocation, fleet configuration, etc. Apart from aspects of monopoly power which is a Combines Act question, the issue becomes mainly one of distribution of benefits.

Independent ownership of fishing vessel has been advocated for several years. Some of the main reasons for this approach have been the following:

1. The promotion of an efficient catching sector that would survive on returns made from harvesting activities;
2. Economic forces would dictate deployment or location of fishing vessels in relation to returns from fish catching;
3. A more effective port pricing system would develop to reflect fish catching operations;
4. Consolidation or concentration of catching capacity would be less likely to continue or develop.

This proposal has drawn mixed reaction from all segments of industry. A main stumbling block to effective progress has been lack of suitable financial mechanisms to enable independent ownership especially for more costly vessels. Development of such arrangements would make it possible for independent ownership to develop.

A different sort of resource harvesting issue has arisen lately, that of loss of landings because of "glut" situations. This occurs mainly in seasonal, fixed gear, small boat fisheries but is not solely confined to these. Suggested solutions include effort control of the catching fleet, quality grade standards for landed fish, improvement of handling and holding capability afloat and on shore, and where necessary over-the-side sales arrangements.

(iii) Canada/Foreign Arrangements - Since extension of fisheries jurisdiction, there have been a number of different types of cooperative arrangements involving foreign vessels which have come under the umbrella designation of "foreign arrangements". Four main categories may be distinguished: (1) Direct Sales (better known as "over-the side" sales) of fish by fishermen to foreign vessels; (2) Developmental Charters; (3) Charter of foreign vessels as Plant Extensions; and (4) Supply of fish caught by foreign vessels to Resource-Short Plants. These programs have had a number of objectives, the chief of which have been (1) Technology Transfer - providing an opportunity for Canadians to acquire knowledge and expertise leading to Canadian acquisition of harvesting and processing capability; (2) Market penetration - by linking market access to such arrangements it has been possible to achieve a foothold for Canadian products in new markets; (3) Alternate Markets. These programs have contributed beneficially to the development of the Canadian fishery over the past several years. Both fishermen and processors have benefitted - fishermen from over-the-side sales such as those in the Bay of Fundy which were a key to the transformation of the large herring fishery between 1975 and 1977 into a fishery providing improved incomes and more stability to fishermen, and processors from the resource-short plants supply programs, developmental charters and plant extensions.

More recently, in 1980, attention has focussed primarily on Direct (over-the-side) sales. Current policy permits "over-the-side" sales where potential catches are surplus to the processing and marketing capability of Canadian industry or where Canadian processors will not buy from Canadian fishermen at an acceptable economic return to fishermen. "Over-the-side" sales should not be permitted to prejudice the existing markets of Canadian industry. Preferential treatment is given to countries with which Canada has marketing or other special interests and foreign partners are normally restricted to countries which do not use the purchases in direct marketing competition with Canadian products. Sales "over-the-side" on the Atlantic coast in 1979 represented approximately one percent of the total landings and less than 0.7 percent of total value.

Whether such arrangements continue in future will be dependent upon the extent to which the Canadian industry is able to provide adequate markets for underutilized species such as mackerel at an acceptable economic return to fishermen.

(iv) Licensing - Regulating the fishery through the issuance of fishing licences is one of the most powerful and controversial tools of fisheries management, especially when the number of licences issued is limited. This form of effort control is directed primarily at the economic state of specific fisheries. Resource conservation is achieved through other direct means such as the establishment of quotas and fishing seasons. Limited entry licensing is basically concerned with allocation of access to given fisheries, both in terms of total numbers and the actual identity or category of entrants.

Licence limitation has existed on the Atlantic coast since the late 1960's. This approach and principle were further extended in 1973 with the introduction of universal personal licensing and vessel registration. The 1973 licensing policy and subsequent licensing adjustments subjected almost all fisheries to the many facets of limitation of entry. In addition to limiting the numbers of available licences for specified fisheries, the evolving licensing regime has been characterized by vessel replacement criteria and guidelines, participation/utilization clauses, transfer restrictions and prohibitions, reserved licence lists, replacement approval systems, etc. By the late 1970's, a fairly complex licensing system had developed, accompanied by considerable confusion and dissatisfaction amongst both resource users and managers.

In late 1978 a complete review of the Atlantic coast licensing system was undertaken, through the consultative process, resulting in the Levelton Report of June 1979. This report reviews the basic principles and elements of fishery licensing and makes a series of general and specific recommendations. Since the release of the report further study and discussions have occurred on specific approaches to the implementation of certain of its recommendations.

(v) Sector Management - In recent years, considerable difficulty has been encountered in dealing with aspirations of localized fishing fleets, catching capacity of mobile vessels and overall resource availability. As well, inconsistencies in approach have developed because general measures often do not apply equally across the Atlantic Coast. Serious catching effort and resource imbalances have arisen in several areas with spillovers, real or imagined, into adjacent areas where local fleets have not had opportunities to develop.

Against this background has developed the concept of sector management. Under this approach small vessel fisheries (vessels less than 65 feet) would be managed on a more localized area basis with a sector's fishing capacity confined to and equated with its fishery resources. It would also contribute to better utilization of a region's total fishery resources, permitting greater diversified participation by sector fleets and processing facilities. The approach could allow easier implementation of several recommendations made in the Levelton Report on Atlantic Coast Licensing, in particular the committee approach to licensing. In many ways, the basis for sector management already exists in the annual Groundfish Management Plans.

(vi) Regulations and Enforcement - Following selection of a harvesting policy and associated management measures, these are implemented. In Canadian fisheries, this is normally achieved by the establishment of appropriate regulations and the monitoring of their implementation by enforcement officers.

The increasing complexity of Canada's Atlantic fisheries has required the development of a complex regulatory framework. Existing regulations are designed for a whole range of purposes from stock conservation to control of access. The protection of fish stocks can be achieved by such measures as catch quotas, gear sizes, fishing season. The objective of "best use" led to controls on fishing effort and entry to the fishery. Allocations of access has led to regulations such as boat quotas and catch/trip limitations.

Clearly, in the overall context, it is in the interest of all participants to minimize regulations to the extent compatible with achievement of fisheries management objectives, both from the viewpoints of economic efficiency and enforceability. Thus constraints on individual decision-making must be balanced with stock conservation and "best-use" objectives.

Effective management requires an effective program of surveillance and enforcement of both the foreign and domestic fishing fleets. Non-compliance with regulations is a serious problem which threatens the success of fisheries management. Widespread non-compliance can lead to overrunning of catch quotas, over-fishing of particular species in various areas and depletion of fish stocks. The long-run consequences are reduced catches, spread equally but tending to have severe localized impacts on fishing communities.

Three inter-connected factors must be examined when considering compliance with regulations:

- (1) the potential size of the gain by violating regulations;
- (2) the potential size of the loss (penalty) if caught; and
- (3) the violator's perception of the chance of getting caught and prosecuted.

The potential size of the gain depends on the abundance of fish stocks and other factors such as the level of competitive fishing effort. There is a relationship between improved stock management and greater potential for gain by violating regulations. The potential size of the loss depends on the penalty limits written into the laws, and the extent to which maximum penalties are imposed. Draconian penalties, which may seem desirable from a stock management viewpoint, may be unacceptable in terms of simple justice. Legal penalties raise the question of effects on innocent third parties. Severe penalties, such as withdrawal of licence and confiscation of vessel, may in the case of the offshore fishery have third-party impacts on the output of local fish processing plants and on the local employment

of vessel crew and plant labour. The violator's perception of the chance of getting caught and prosecuted depends on several factors including the frequency of air and sea patrols and the frequency of arrest and prosecution.

To achieve deterrence, the chance of being detected and arrested and the chance of being severely penalized have to be credibly high.

Currently, conventional penalties for serious violations seem too small. Increased maximum penalties and the authority of the Minister to order forfeiture resulting from amendments to the Fisheries Act in 1977 have been a major deterrent factor with respect to inland and most inshore commercial fisheries (e.g. lobster) but a maximum fine of \$5,000 is not sufficient deterrent to illegal fishing in the offshore fisheries and some of the more lucrative inshore fisheries. Thus increased maximum penalties, and forfeiture of catch policies, plus the increased use of licence suspension (bearing in mind the constraints outlined above) are needed to create the necessary deterrence.

At the same time, it is evident that there must be a greater degree of self discipline. Co-management mechanisms such as that employed in the P.E.I. lobster fishery may prove to be effective in relation to inshore fisheries. Pilot projects are required in other areas and fisheries.

### C. PROCESSING, QUALITY AND MARKETING

The processing sector is an integral part of the fisheries management system. It provides the fisherman with a market for his catch and a source of employment and income for a large segment of the population living in the fishing communities. It is often the main source of shore employment for these communities.

The primary responsibility for this sector is with provincial governments, but mainly because of close links with the primary sector, fish inspection regulations, export marketing and regional economic development, the federal government has been, and will continue to be, involved.

The main policy issue in this sector is the extent to which governments should intervene to influence or control such factors as location, number and size of plants, degree of processing in Canadian plants, improvement of quality, vertical integration of the processing and the harvesting sectors, corporate concentration, foreign control and investment, and orderly marketing of fishery products.

The majority of opinions expressed during the consultations were that governments should intervene to limit the number and size of fish plants. The form of intervention could include selective use of financial assistance and licencing control to achieve a better balance between raw material supplies and processing capability.

Further processing of fish in Canadian plants is an often advocated objective for government to pursue. In the strictest economic and commercial sense, the degree of processing should be determined by market forces. Processors should produce those products that give the highest net return on investment or per unit of output. More properly, they should maximize their net returns from the type of products produced. It does not necessarily mean, however, that higher valued products will provide higher net returns because production costs are also bound to be higher. In many cases also, highly processed products are subject to import tariffs or restrictions that reduce the net returns received, or limit the amounts that can be sold.

The major argument for further processing is often the higher employment that is thought to go with it. But this is not always the case as many types of further processing are capital intensive and highly mechanized. Therefore, while the further-processing objective is not always what is claimed to be, there may be instances when government may wish to intervene to encourage more investment.

Although the question of vertical integration of the processing sector into the harvesting was not considered a pressing issue by Atlantic Coast fishermen, the government may, however, as part of overall fisheries management policy, wish to put restrictions on this process and eventually dissociate the two sectors. More studies are required in order to properly assess the effects of a wholesale separation of catching and processing. The role of government in the area of corporate concentration could be to provide a balance between the opportunities offered by large corporate structures (ability to withstand economic fluctuations, capability of self financing expansion, better managerial group, improved marketing capability, possible economies of scale, risk-taking capability, etc.) and the dangers of increasing corporate concentrations (possible lower prices to fishermen, influence on government to adopt policies favourable to large corporations, possible reduction in the level of employment in the industry, and the possibility that small firms may be forced out of business by relentless competition, etc.).

The question of foreign control and investment in the fish processing sector does not attract much attention in the Atlantic fishing industry itself. But government wishes to limit foreign ownership of processing plants as part of its overall economic policy.

There is general acceptance that the quality of Canadian products must be further enhanced in order to properly utilize market opportunities created by Canada's extension of fisheries jurisdiction to 200 miles. Government's role should include the definition of regulatory standards at various levels of handling and processing (from the time of capture to that of marketing), monitoring and enforcement of these standards. Government could also provide information to the industry on market quality requirements and standard levels of our principal competitors. The role of fishermen, buyers and processors is to participate in the development of standards and establish price structures related to quality standards. It is the responsibility of all sectors of industry to conduct their operations in compliance with regulations using good commercial practices to preserve quality and ensure that products meet market requirements. The federal government has recently launched a major quality improvement initiative tied to export licensing which is detailed in Chapter IV.

As Canadian fisheries are primarily dependent on exports, it is essential that Canada obtain long-term secure markets. This can be achieved through further penetration of existing export markets and development of new markets for traditional and non-traditional fishery products. To pursue these objectives, the role of the government includes improving marketing operations, providing marketing support services and correcting market defects. Government can also contribute by improving access to export markets through negotiations on institutional barriers, by providing aggregate market statistics and, on occasion, by legislating to remove market defects (e.g. Fresh Fish Marketing Corporation and Canadian Saltfish Corporation).

#### D. FISHERIES DEVELOPMENT

Since Canada's extension of fisheries jurisdiction to 200 miles, there has been growing optimism about the future of the Atlantic fisheries. There has been a considerable change from the depression of 1974 and the attendant requirement for the government of Canada to expend considerable sums of money to sustain the fishing industry through the difficult combination of resource decline, cost increases and market slump. Fish catches and prices have been improving and there have also been pressures and demands for developmental opportunities ranging from the need for upgrading of fish handling systems inshore to demands for licensing of freezer and factory freezer trawls. Bearing in mind the general boom and bust syndrome which has characterized fisheries historically, it is necessary to examine carefully the real prospects for development of the Atlantic fisheries in the 1980's.

The success of development activities has usually been measured in gross dollars or physical terms. Increases in volumes output (landings or products), additions to fleets or processing facilities, infrastructural increases or improvements, or additions to the fishing or processing labour force are taken as signs of program success. However, none of these results indicate success, especially if they occur where over-capacity in

primary or secondary sector activities already exists. Moreover, these approaches to fishery development are often misguided attempts at regional economic development. Such actions usually achieve neither fisheries nor regional development objectives.

The purest measurement of fisheries development success is the creation of net benefits. In other words, the development effort results in more additions to total revenue or earnings than to total costs (including capital investments, operating costs of development programs, and the creation of obsolescence in existing assets). In economic terms, the objective of development would be the maximization of net benefits (economic and social).

Taking net benefits or returns as the ultimate objective or criterion means that simple increases in capital investment, total incomes, employment or output cannot be used as measures of development success. At the very least, the latter two types of increases can be tolerated only if their achievement does not add more to total costs than to total returns. Even then, the amount of net benefits lost from pursuing sub-optimal courses should be known if a completely rational development decision is to be made. Moreover, development efforts should create commercial market-oriented activities that are self supporting once established. For example, production should not be developed just for production's sake but because it can be sold on a commercial market.

Because of the common property characteristics of fisheries, development efforts that aim simply at increasing gross incomes, employment, investment and output are generally self-defeating. This result should be immediately clear in the case of mature fisheries where inputs are already excessive and output (in gross terms) at a maximum. In developing or under-developed fisheries (of which there are few remaining cases) there is an inescapable limit to the extent that these sub-optimal results can all be achieved together.

This points up an interesting, but often overlooked, dichotomy which has existed between the aims of fisheries development and fisheries management activities. The later are aimed at stock preservation and economic well-being of fishing enterprises. A variety of management measures are utilized, such as quotas, seasons, gear restrictions, licence limitations, etc., all of which are anti-development in the usual expansionary sense. This conflict was often displayed by fishery management being condemned for threatening to decrease development activities or by development programs proceeding apace with inevitable detrimental effects on management regimes. These situations can be readily visualized in the case of fully managed fisheries but it is also easy to conceive of the problems over-zealous or misdirected development effort could create for managing developing fisheries. This is especially true when full management programs, i.e. including effort limitation, are usually not instituted until fisheries are already depressed.

Some of these same observations can apply to development efforts in the secondary sector as well. The problems or the results there would not be essentially different for expansionary development thrusts. Indeed, for processing activities drawing supplies from fully developed fisheries the results, in terms of conflicting objectives, will be identical to those in the primary sector.

Fisheries development in the 1980's should be more qualitative than quantitative in approach. It should lead to improvement of average returns to all sectors of the industry, rather than to simple gross increases in output, income, or employment. It might be said that if total output, income and employment is increased but current average returns are not, then fishery development is a failure. A word of caution though is necessary in this latter regard. In certain high unemployment areas, creation of job opportunities may be a social benefit (return) in itself. In such instances, labour intensive development would make much more sense than introduction of capital intensive technology.

Development activities that meet the criterion of maximizing or generating net returns usually will not be expansionary but will be more directed to improvement of net returns from fisheries operations, or really, from use of fishery resources. Indeed, there may be still some room for the "traditional" expansionary type of development programs. However, these should be expected only in developing, under-developed, or significantly enhanced fisheries where the scale of expansion would be limited by the requirement of producing net returns.

This qualitative approach to fisheries development may be attempted in three main areas: (1) The first covers measures or programs designed to increase the net productivity of input units. Such attempts could consist of technological improvements of inputs, resource enhancement, or cost reducing techniques, etc. (2) The second area includes all actions that increase the net unit value of outputs. A variety of initiatives could fall under this heading, including quality upgrading, prevention of spoilage, higher valued processing, etc. (3) The third area provides for actions that increase the earning base of existing production units and thereby increasing net returns. In this category would fall new species fisheries, or processing that is added to existing operations.

Another dimension of the fisheries development issue is the involvement of, or expenditures by, other Departments or Agencies. These development-oriented activities cause considerable difficulties for an effective and unified approach to fisheries management and development. The wide range of financial assistance or expenditures often works at crosspurposes with each other and with various fisheries policies and objectives. The end result can be a general aggravation of the inherent tendencies of the industry to over-investment and over capacity.

Efforts are clearly needed to coordinate such development-oriented activities to make them more selective, and more realistic in relation to the true potential of the fisheries.

## E. FISHERIES MANAGEMENT PROCESS

No single level of government or agency has jurisdiction over the entire fisheries management system. Under the British North America Act, the federal government has jurisdiction over the management of the fishery resource, harvesting and inter-provincial and international trade. Provinces have jurisdiction over the type, number, and location of processing plants. Fisheries must be managed as an integrated system from the resource through to harvesting, processing to marketing. To ensure that harvesting and processing capacity are matched to resource availability and market requirements both levels of government, fishermen, and processors must consult and cooperate frequently. This cooperation will ensure effective contribution of the fisheries to the economic and social well-being of the Atlantic Provinces.

There are many existing consultative mechanisms in the Atlantic fisheries system: the Atlantic Council of Ministers (at the ministerial level), the Federal-Provincial Atlantic Fisheries Committee (at the Deputy Minister's level), the Atlantic Groundfish Advisory Committee, the Atlantic Herring Management Committee, the Snow Crab Advisory Committee for the Gulf of St. Lawrence, various local species committees and more. In addition, task forces or working groups established to undertake a specified task engage in extensive consultations, e.g. the group set up to review fisheries policy, the group to study licencing. Seminars have been held (northern cod, squid, salmon, crab, Gulf groundfish), others are planned, to obtain the views of various interest groups on specific policy issues.

There is little disagreement among clients and resource users that the extent of consultative mechanisms now used by the Department is satisfactory. Ways should be found, however, to streamline consultations without sacrificing their effectiveness. It should be stressed that consultations should be meaningful, by which is meant that the view of all participants must be taken into consideration and not just the views of the more vocal, and that consultations should not be for cosmetic purposes only.

#### IV POLICY DIRECTIONS FOR THE 1980'S

This chapter contains conclusions regarding Atlantic Fisheries Policy, includes re-affirmations of policy in several areas, outlines some new or renewed actions the Department intends to take immediately or in the near future, and indicates various policy directions or procedures that should be pursued. These are all grouped under the various policy areas covered in the previous chapter. There will be some overlap and this is noted.

##### A. RESOURCE MANAGEMENT

###### (i) Stock Management

(a) Resource Research. The time frame for research is continuous from projects whose results are applied in the current year to projects with practical applications more than five years in the future. Data collection and analysis in support of the annual advisory process on the level of harvest and management measures will be strengthened to increase the accuracy of estimates and projections. Greater emphasis will be placed upon longer term research, especially on the effects of biological interactions and variations in the aquatic environment and ocean climate on fish stocks and fisheries, to provide a scientific basis for evaluations of stock management advice to account for multispecies factors.

(b) Economic Research and Analysis. The Department's capability to analyse the economics of industry viability must be bolstered. Establishment of the knowledge base for determining allowable harvest levels on the basis of Maximum Economic Yield (MEY), so long as the biological productivity of stocks is maintained, will require more in-depth economic research and the collection of comprehensive industry cost/earnings data.

(c) Scientific Advice on Harvesting Policy and Regulatory Measures

$F_{0.1}$  will remain the principal reference point for scientific advice on the level of harvest. A combination of controls on catch levels and fishing effort with use of other measures such as closed areas and size limits where appropriate will be pursued as the most effective means of achieving resource management objectives.

(d) Consultation. The Department will continue to consult extensively as an integrate part of the Department's overall resource management activities. This must provide the link between scientific stock assessment functions and the regulatory enforcement operations. Such a coordinated procedure is described later in this paper under the heading "Fisheries Management Process".

(e) Regulation and Enforcement. Regulations will be streamlined and minimized to the extent compatible with achievement of fisheries management objectives. The emphasis in enforcement of regulations will be placed on deterrence of violations through a combination of: (i) increased maximum penalties under the Fisheries Act and the Coastal Fisheries Protection Act, (ii) forfeiture of catch and (iii) licence suspension. At the same time, co-management mechanisms such as that employed in the P.E.I. lobster fishery will be encouraged.

(f) Fishery Monitoring. The timeliness, completeness, and accuracy of fishing statistics must be substantially improved.

(ii) Habitat Management

(a) Habitat Research. DFO analytical and prediction capabilities relating to the impact of man on fish habitat will be strengthened.

(b) Opportunities and New Initiatives. Opportunities for redirection in the 80's will include Departmental investigations and activities in the following areas of Mandate and Legislation, Communications and Public Awareness, Coastal Zone, Habitat Management, Planning, Cooperation with the private sector, Habitat restoration and mitigation.

This approach would take the form of a three stage program - increasing public and government awareness of the socio-economic value of fish habitat, promoting restoration of degraded habitats of importance to fisheries, and establishing joint plans and decision making processes aimed at prevention of further erosion of the habitat resource base.

#### B. RESOURCE HARVESTING

In the 1980's resource harvesting policies will aim at increasing the viability and stability of the Atlantic commercial fisheries.

(i) Foreign Allocation - The current policy of allowing foreign fleets access to certain allocations will continue based on the following considerations:

(a) Under current rules of international law and pursuant to Canada's bilateral agreements, the difference between reasonable total allowable catch limits and Canadian requirements, i.e. the surplus, will be distributed to foreign fleets;

(b) Benefits will be obtained for Canadian fishermen through special treatment in allocations from stocks overlapping the 200 mile limit and from Flemish Cap stocks in return for allocations to foreign fleets inside the Canadian 200 mile zone;

(c) Commercial benefits for the Canadian fishing industry involving the sale of Canadian fish products may also be obtainable in return for allocations primarily of surplus fish inside the 200 mile zone.

(ii) (a) Domestic Allocations and Limited Entry - Long term allocation plans that will be used as the basis for allocations among different groups of fishermen, e.g. inshore/offshore or between fixed mobile gear, or between commercial and sports interests, are being developed. During the past two years the Department has sponsored a number of government-industry seminars - Northern cod, Squid, Gulf Groundfish and Herring - the primary purpose of which has been to provide a basis for the development of long-range management (including allocations) plans for these fisheries. Following these Seminars papers have been issued setting forth the policy direction and, in certain cases, proposing long-range allocation priorities and formulae.

Following discussion of the 1981 Groundfish Fishing Plan and the Policy Paper resulting from the Gulf Seminar, a long range plan for allocation of the Atlantic coast Groundfish will be put in place.

Long range plans for management and allocation of the herring and mackerel fisheries are also being developed.

Within the context of such long term allocations plans, the Department will continue, and where necessary, extend licencing regimes designed to limit entry into the commercial fisheries. In this connection, licencing regimes will be designed to fit the economic circumstances of fishing enterprises harvesting a particular resource base. These circumstances relate not only to fisheries concerns, but also income relativities and to economic development prospects and plans in the area in which the fishery is based. By designing licencing regimes within the framework of long term allocation plans, rules regarding replacements and transferability can be adopted for one sector of the industry without posing a threat to other sectors harvesting part of the same resource base. It must be borne in mind, however, that traditional licence limitation regimes do not necessarily come to grips with the tendency towards unwarranted investment - such regimes simply internalize the problem within a given group of fishing enterprises. A major thrust of the Department will be to come to grips with this difficulty.

(ii) (b) Independent Vessel Ownership - The policy of encouraging independent ownership of fishing vessels will be maintained and strengthened. An immediate or complete separation of catching and processing is not envisaged but measures will be developed to allow and provide for increased vessel ownership by fishermen where they indicate a desire and ability to do so, with particular emphasis on the small-vessel fleet.

(iii) Canada/Foreign Arrangements - Since extension of fisheries jurisdiction, there have been a number of different types of foreign arrangements. Such programs as Direct Sales, Plant Extensions, Developmental Charters and supply of fish to Resource Short Plants have contributed significantly to the development of the Canadian fishery over the past several years. Current policy permits Direct Sales where potential catches are surplus to the processing and marketing capability of Canadian industry or where no domestic market exists at acceptable economic return to fishermen. Whether such arrangements continue in future will be dependent upon the extent to which the Canadian industry is able to provide adequate markets for underutilized species such as mackerel at an acceptable economic return to fishermen.

(iv) Licensing - The following licensing proposals based on the Levelton Report on Atlantic licensing are being implemented for the 1981 fishing season:

- 1) Vessel registrations will take place annually but details of vessel characteristics will be obtained only every three years.
- 2) Commercial fishing licences will be issued in distinct categories to distinguish between those who are dependent upon the fishery for their livelihood, either as operators of fishing units or helpers, and those who fish while having concurrent employment outside the fishery.

- 3) Local licensing allocation and appeal committees, consisting primarily of fishermen will be established to deal with appeals registered by those who are dissatisfied with their categorization. In addition, these committees will deal with such questions as who should receive new licences, participation requirements for licence holders and other matters.

The key element of this new licensing regime is that fishermen themselves will participate in the development of licensing proposals based on local needs and conditions.

Consideration will be given to the following proposals which have been developed from recommendations made in the Levelton Report. Prior to implementation of these or related proposals there will be further consultations with fishermen, utilizing the network of fishermen committees recently established.

- 1) Limited entry will be maintained in those fisheries where it is now in place and steps will be taken to designate remaining commercial fisheries as limited entry.
- 2) Licences will be issued to the owner to use a specified registered fishing unit or vessel in a specified fishery.
- 3) A system will be phased-in of permitting transfers of licences only to allow the continuance of an existing enterprise and in other cases to re-issue licences only at the discretion of the licensing authority.
- 4) The decision when to replace a vessel should be made by the vessel owner. However, replacement criteria will be developed to recognize changed resource and technological considerations.
- 5) Participation requirements must be developed in consultation with local committees to provide mechanism for redistributing the privilege to fish in line with local conditions.
- 6) The splitting of licences will, as a general rule, not be permitted.

- 7) Mechanisms will be examined whereby available licences for 65' - 100' vessels will be first offered to individual fishermen or groups of fishermen within a region or area.
- 8) Licence fees are being amended to increase the contribution by resource users to defraying the costs incurred by government.
- 9) Lists of limited entry licence holders will be maintained in departmental offices for public scrutiny.

Two other specific policies relating to the size of the offshore groundfish fleet and the application of freezer and factory/freezer technology will be maintained for the foreseeable future.

The offshore groundfish fleet can grow no larger than its current size. Essentially, vessels can fish or be replaced if they have been active in the groundfishery in 1976 or later, subject to specific conditions related to their participation in other fisheries. New replacement guidelines are being developed.

Under the policy on freezer and factory/freezer vessels, freezer trawlers may be acquired as replacement for existing groundfish trawlers but may not exceed 200 ft. LOA or fillet traditional species. In addition, the four non-traditional species licences issued in 1980 are subject to the same size and operating restrictions but may not fish traditional groundfish except as a replacement for an existing vessel under replacement guidelines.

Foreign Control of Domestic Licences - The current policy of restricting foreign control of domestic fishing licences to the level of 1973 will be maintained.

(v) Sector Management

In 1981 the sector management approach for vessels less than 65 feet will be further developed, with implementation envisaged for 1982. At least three major sectors are envisaged e.g. the Gulf (Areas 4RST + 3Pn), Newfoundland (Subareas 2 and 3) and Scotia-Fundy (Areas 4VWX + 5).

Such a sector management approach for the small vessel fleet would have several advantages:

- (1) It would permit better control of access among fleet sectors and allow for fishing capacity to be better matched to available resources within the boundaries of these areas. Specifically, it would ensure that in areas where adequate capacity (or over-capacity) may already exist, additional fishing effort by vessels from outside that sector would be restricted. This would ensure that quotas assigned for a particular size of vessel in a particular zone would in fact be harvested by vessels from that zone.
- (2) Sector management of the small vessel fleet within specified areas would provide for greater decentralization of management authority, and, in particular, provide a degree of flexibility to adapt management measures to the social and economic conditions within a particular area. Rules made to suit conditions in one area would not necessarily have to apply to other areas where circumstances are different.
- (3) As an essential condition to such an approach, it will be necessary to develop long term plans for allocation of the available resource among fleet sectors. The large vessel fleet would continue to be managed on an Atlantic-wide basis but within a specific share in each sector.

It is estimated that at the present time less than 5% of vessels less than 65 feet fish across the proposed sector boundaries. Cross-over provisions would be made for those vessels which have an established pattern of fishing in more than one sector.

### C. PROCESSING, QUALITY AND MARKETING

The thrusts in the processing and marketing areas will be renewed emphasis on creating conditions that foster industry viability and stability.

(i) Processing - The Department intends to work closely with other federal departments and with provincial governments to harmonize policies and to assure better results from assistance programs, through a greater selectivity in their application. This should result in more coordinated efforts to attack specific localized problems and better matching between resources available and fishing and processing capacity.

(ii) Quality Enhancement - Canada's Department of Fisheries and Oceans has set the stage for a major program to upgrade quality standards. A comprehensive national fish inspection program aimed at ensuring the health and safety of the consumer, adherence to minimum quality standards, and the prevention of fraudulent practices, has been in effect for many years. The department has provided financial assistance for improved handling and storage facilities. Assistance programs have been provided to increase ice-making and cold-storage capacity. For the inshore fisheries, improved equipment for on-board handling, offloading, dockside handling and transporting fish to processing plants has been provided.

Fisheries and Oceans has consulted extensively with fishermen's organizations, provincial governments and processors to establish guidelines for quality upgrading initiatives. As a result of these

efforts, the department has now embarked on a major quality initiative comprising the following principal elements:

- vessel certification
- quality protection on board
- dockside grading
- unloading, dockside handling and transportation to plants
- improved quality control in processing plants
- final product grade standards

Each program element is described below:

(a) Vessel Certification

Fishing vessels require adequate facilities for handling their catches and protecting their quality while on board. Fish is among the most highly perishable of all foods, and spoilage begins the moment it is taken by fishing gear. The effects of the spoilage process can be minimized if vessels are so equipped that fish can be carefully and quickly handled, protected from weather and contamination, and properly stowed and chilled in clean pens, boxes or other suitable containers. Existing regulations will be amended to require all vessels to use such facilities.

(b) Quality Protection On Board

Good handling practices on board fishing vessels are required to protect fish quality. The manner in which the fisherman handles his catch has a direct impact on the quality of the final product. Competitors require fish to be bled, gutted and iced onboard, and stowed at depths that preclude physical damage and loss of yield. They also prohibit the use of forks or other equipment that damage

fish. These precautions are essential to the landing of good quality, firm, and undamaged fish. In many sectors of the Canadian fishery, fish are not bled, gutted or chilled, are stored at depths well over 90 centimetres (three feet), and are handled with forks or pumps that damage the edible portion of the fish.

It is proposed that:

- fish be iced or chilled onboard;
- bulk stowed fish be shelved at 90 centimetre vertical intervals or less to prevent physical damage.

The bleeding of fish greatly decreases the incidence of bruises and blood spots, and improves the overall colour of the flesh. Gutting of fish retards both chemical changes and bacterial growth. The department will encourage the bleeding and/or gutting of fish by basing landed quality grades on onboard handling practices.

#### (c) Dockside Grading

Quality grades are being developed in consultation with fishermen and buyers as a basis upon which prices can be related to quality. Grades will be regulated (initially on a voluntary basis) and industry graders who apply them will be licensed by Government. On the basis of discussions with fishermen's organizations, it is apparent that implementation of dockside grading will require close monitoring by Government inspectors, who would also arbitrate quality disputes.

There are more than 2,000 communities in Canada where fish is landed for initial sale to buyers or processors. At many of these ports, a number of buyers compete for the landed catch. It is estimated that some 3,000 - 3,500 licensed industry graders will be involved in quality grading at dockside.

The most important requirements of dockside grading will be consistency and uniformity in the application of standards. To achieve this, a concentrated program to train and/or licence graders

will be required. When agreement has been reached on standards for dockside grading, it is proposed to enlist the assistance of provinces to undertake the training at fisheries training schools and colleges. The cooperation of fishermen and buyers will be sought to test the grading system in several locations.

Considerable progress has been made in the development of landed quality grade standards based on firmness, odour, exterior appearance and degree of bruising and blood spotting. In addition, it is proposed that first quality fish be bled and/or gutted and iced onboard. The detailed requirements of these grade standards will be discussed with fishermen and buyers' representatives.

(d) Unloading, Handling at Dockside and Transport to Plants

Existing regulations will be amended to prohibit the use of forks for unloading, and to control the use of pumps and other unloading equipment which may damage the edible portion of fish. The regulations will require the upgrading of equipment used at landing sites, and the icing or chilling of fish while held at dockside. The existing transportation requirements with regard to sanitation and chilling are adequate, but additional provisions regarding depth of bulk stowage and dividers in trucks are needed for quality protection.

An approved water supply at all unloading ports is a particularly difficult problem, requiring either installation of water systems or modification of existing unloading practices where acceptable water cannot be made available. This problem will be dealt with on a port-by-port basis, with the objective of having fully approved water or modified unloading systems in each port by 1985. In the meantime, an interim standard will be applied to ensure the safety of the fish products.

(e) Improved Quality Control in Processing Plants

The Fisheries Council of Canada, in consultation with the Department of Fisheries and Oceans, is developing guidelines for good manufacturing practices, and will promote their use in the industry. Voluntary compliance with the guidelines will be evaluated during 1981, and consideration given to their incorporation into regulations as a condition for plant registration.

There are approximately 1,100 fish processing operations in Canada, many of which do not have an organized quality control program or qualified staff to operate such a program. The training which these individuals require can best be undertaken at technological institutes having laboratory and pilot plant facilities. The good manufacturing guidelines, now being developed will provide a basis for short courses to upgrade the qualifications of plant personnel.

(f) Final Product Grade Standards

The Department of Fisheries and Oceans is drafting final product grade standards for:

- crab;
- frozen pickerel fillets;
- frozen sockeye and pink salmon;
- groundfish fillets including fillet blocks;
- frozen herring fillets;
- cured herring products.

These standards will be circulated for comment as proposed amendments to the regulations. Following an initial evaluation period, such graded products would be subject to inspection to ensure compliance with the standards on a mandatory basis tied to export licensing.

(iii) Marketing - The commercial fishing industry is vulnerable to resource fluctuations and market instability that can have serious implications for the thousands of Canadians dependent on the fishery for their livelihoods. It should be noted that while resource declines can lead to economic distress, upward fluctuations, either in

Canada or in competing fisheries of other countries, can also cause market gluts, and consequent economic difficulty for the Canadian Industry.

To some extent, the severity of these fluctuations can be mitigated by fostering a viable industry able to survive lean or glut periods, particularly if problems of over-capacity and unwarranted investment can be effectively addressed. Another means of increasing market stability is to promote diversification, both in terms of markets and product type. In dealing with this potential, the department will also be expanding its efforts, in collaboration with the industry, to identify new market opportunities for Canadian production, and to negotiate the reduction or removal of trade barriers.

Market stabilization also requires an improved capability to predict ups and downs in the abundance of the resource along with the capability to react to these pressures. Nevertheless, in the short term at least, downswings can be expected, and temporary support may be required, together with measures to improve the performance of the Canadian industry in export markets. In this connection, the Department is planning to initiate an export licencing system, linked to final product grades to improve the performance of the Canadian industry in export markets, with a view to averting or cushioning future crises of the sort that occurred in the Atlantic groundfish industry in 1974-1977. This system will require all exporters, or groups of exporters, to obtain licences prior to engaging in international trade.

#### D. FISHERIES DEVELOPMENT

There will be a major shift in the fisheries development efforts of DFO during the 1980's. Development will not be based on the "expansionist" development philosophy of the 1970's. While there remain some underutilized species, and some stocks not yet fully rehabilitated, and also some real potential for resource enhancement/culture, it is nevertheless clear that recent expansions in harvesting and processing capacity are such that the limits to growth have been reached, and future

development will have to concentrate on competitiveness, efficiency and extracting more value domestically from a limited resource.

Development will be pursued through a more directed approach to existing, ongoing programs such as Small Craft Harbours and the Fishing Vessel Assistance Program which can be used to encourage innovative vessel designs, materials, and equipment in support of quality enhancement and energy efficiency. As well, it will be necessary to undertake selective new programs that will enhance the economic development potential of the fisheries resource. These programs will provide, among other things, incomes and employment for fishermen, plant workers and those in industries servicing commercial fishery, as well as in the tourism sector, particularly in regions and communities where there is little in the way of alternative employment prospects.

The department recently carried out a preliminary analysis of prospects for Atlantic fisheries development in the early 1980's. This review was carried out by designated "fisheries" with each analyzed in terms of resource projections, resource harvesting, infrastructure, processing capability and marketing. The central focus was to define development constraints to be overcome and/or opportunities available in the early 1980's.

At the same time certain themes were isolated that are characteristically common to all or many of fisheries examined. Hence, a number of major "cross-cutting" areas for development programming have been identified using this approach and these should be addressed in the early 1980's. Development initiatives will focus on the following themes: quality enhancement, energy efficiency, technology transfer, resource enhancement and specialized training.

Quality Enhancement will include such components as the regulatory Quality Improvement Program (described earlier), provision of major infrastructure (such as unloading systems) and development and demonstration of new on-board handling techniques and equipment and plant modernization. Energy efficiency will involve an energy audit for fishing vessels, the testing and demonstration of alternative or modified harvest techniques, vessel designs propulsion systems, etc. In terms of Resource Enhancement, the

department is examining the economic viability of an enhancement program for Atlantic salmon, on a cost recoverable basis. Technology Development and Transfer in the primary sector, will focus on vessel and gear developments which are based on indigenous Canadian Technology and essentially oriented towards Quality Improvement and increased Energy Efficiency. Processing development will include initiatives to diversify the product base, to increase value added, and to increase quality in the production process through plant modernization and related measures. There may be a need for small processors to work in consortia to carry out the product development and market penetration which each could not individually afford.

To implement this shift in direction for fisheries development, the proposed approach is to develop comprehensive, integrated plans for the exploitation of the various fisheries development opportunities in the Atlantic region. In terms of program development, this approach will be based on designating certain Major Opportunities for Development as outlined above and developing medium to long-term program plans to fully utilize these opportunities.

#### E. (i) Resource Management Process

The Department intends to strengthen the consultation mechanism in the resource management process for Atlantic fisheries to provide for a streamlined decision making system with particular reference to annual discussions on TACs, allocations and regulations for all fisheries.

The Modus Operandi of this process will be as follows:

1. All requests for scientific advice will be directed through CAFSAC or the NAFO Scientific Council as appropriate. The role of scientists at

fisheries management advisory committees will be to interpret the scientific advice given by these bodies on the resources rather than to generate such advice.

2. Key management decisions on strategies and TACs will be taken by the Atlantic DGs Committee which will refer decisions as necessary to the Minister.
3. Inter-regional management advisory committees will deal with stocks which are exploited by fishermen of more than one region. These committees will make recommendations on inter-regional issues only (e.g. split between mobile fleet and fixed gears) with regional working groups providing advice directly to individual DGs on detailed management plans for their regions. Each inter-regional management advisory committee will produce an annual fishing plan such as that which has been in place for several years for Atlantic groundfish.

The responsibilities for the various scientific committees will be as follows:

1. NAFO Scientific Council will be responsible for the provision of scientific advice on:
  - a) stocks residing entirely within the NAFO regulatory area (i.e. entirely outside the Canadian zone);
  - b) stocks overlapping the Canadian zone and the NAFO regulatory area;
  - c) the stocks in divisions 0 + 1 managed jointly by Canada and the EEC (provided that there is agreement between the two parties to refer such matters to NAFO);
  - d) certain stocks residing entirely in the Canadian zone for which there are significant foreign fisheries and for which Canada decides to seek NAFO advice.

2. ICES is a body which will be consulted for generation of specific scientific advice on Atlantic salmon relating to the impact of the Greenland fishery.
3. Scientific Committees of IWC and ICCAT will provide advice on cetaceans (whales, porpoises and dolphins) and tuna/swordfish respectively.
4. CAFSAC will be responsible for generation of advice on all other stocks. CAFSAC subcommittees will also consider Canadian assessments on salmon and seals prior to their consideration within ICES and NAFO. Scientific advice on cetaceans, tuna, and swordfish which is provided to commissions by the scientific committees of the IWC and ICCAT will be considered by CAFSAC as deemed appropriate.

The following inter-regional management advisory committees will provide advice to the Atlantic DGs Committee:

1. Atlantic Groundfish Advisory Committee (AGAC)<sup>1</sup>
2. Small Pelagics Advisory Committee (SPAC)<sup>2</sup>
3. Gulf Crab Advisory Committee (GCAC)
4. Gulf Shrimp Advisory Committee (GSAC)
5. Northern Shrimp Advisory Committee (NSAC)
6. Atlantic Bluefin Advisory Committee (ABAC)
7. Atlantic Salmon Board (ASB)
8. Atlantic Seals Advisory Committee (ASAC)

Membership on these committees will include representatives designated by provincial deputy ministers, fishermen's organizations, fishing companies including the secondary sector and departmental officials. Each inter-regional management advisory committee will be supported by a Working Group of DFO officers who will consolidate scientific, economic (including marketing) and other input into draft fishing plans for committee consideration.

(1) Includes squid.

(2) This is being replaced by 3 regional committees and a seiner committee.

Terms of Reference for each committee will be finalized following committee consideration; these will focus primarily upon questions of TACs, allocations and regulations.

The general process from the generation of scientific advice to the drafting of regulations can be described as follows:

1. For stocks managed by Canada, advice will proceed from the CAFSAC subcommittee to the CAFSAC Steering Committee (or from NAFO Scientific Council) to the DGs Committee from which it will proceed to:
  - a) an inter-regional management advisory committee for inter-regional consultations of a management plan and return to Atlantic DGs Committee for approval of the management plan; or
  - b) in the case of stocks of concern to one region only the advice will proceed from the Atlantic DGs Committee to the appropriate single region advisory committee. In both instances details of local management arrangements are subject to regional consultations reporting on regional DGs. Following this process, regulations are drafted within the Atlantic Operations Directorate.
2. For stocks managed by NAFO, advice will proceed from the NAFO Scientific Council to the NAFO Fisheries Commission. The advice will also be received by Atlantic DGs Committee which will employ this advice for consultation with inter-regional advisory committees regarding the Canadian negotiating position (including Canadian requirements). Following NAFO decisions on TACs and allocations, inter-regional advisory committees will be consulted regarding development of a Canadian management plan, following the process specified in 1(a) above.

Should the Canada/USA Fisheries Agreement be ratified, this would have a considerable impact on the process and timetable for many stocks.

E. (ii) Fostering Fishermen Involvement in Fisheries Management

During a period when major changes have been occurring in the Atlantic fisheries, the problem of fragmentation among Canadian fishermen remains a stumbling block. While much progress has been made in some areas, much remains to be accomplished in others. Fishermen must continue the movement away from their historic pattern of individual voices to make their views known more effectively as a group. Greater unity has to come before fishermen can talk with any confidence about the future. Fragmentation sows seeds of distrust between fleets, between regions and between individual fishermen. Fishermen need better organization in order to participate more effectively in the management of Canada's fisheries.

The Department of Fisheries and Oceans is presently having to spend too much of its efforts and resources doing the jobs that fishermen should be doing themselves. In particular, the Department is having to spend too much time and effort on arbitrating and policing. This is an area where fishermen's organizations could be decisively important. Strong organizations can make it possible for fishermen and government to co-manage the fisheries. The example of self-policing in the lobster fishery of P.E.I. and New Brunswick is one illustration of an initiative by fishermen themselves, acting in their own interests and in the best interests of the resource.

Additional steps will be taken by the Department to involve fishermen more directly in the management of the fishery. Several years ago, in an attempt to bring the management of the fishery closer to fishermen in their local area, the Department established a system of area managers. While the putting into place of area managers has been a very important and beneficial first step in bringing the management of the fishery closer to fishermen, it has become apparent that additional action is required if this system is to work effectively.

As noted elsewhere in this paper, consideration is being given to the concept of Sector Management. The chief purpose moving to a Sector Management approach would be to provide for a greater degree of decentralization to area (sector) managers of authority for management of those small vessel fisheries which are essentially self-contained within a given area. This would provide for greater flexibility in management to meet local social and economic objectives and for fishermen to have a greater say in the management of the fisheries of their area.

As another step in the process of bringing the management of the Atlantic fisheries closer to fishermen, the Department is setting up a new Region, the Gulf Region, which will be responsible for managing the fisheries of the Gulf of St. Lawrence. This will provide a better focus within the Department for the management of those fisheries and should also enable fishermen to have a more effective say in the management of their affairs.

Perhaps the most important action which will be taken in the coming months to achieve this objective will be a major change in the approach to licensing on the Atlantic coast. Steps are being taken to set up Licensing Committees which will be primarily composed of fishermen.

## APPENDICES

### A. Statistical Tables

I. Value of Landings, Atlantic, Major Species 1955-79

II. Value of Fishery Production, Atlantic by Major Product Groups 1955-79

III. Employment and Value of Fishing Craft in the Commercial Fisheries, Atlantic, 1955-79

IV. Imports of Fishery Products into Canada by Area of Origins, 1955-79

V. Exports of Fishery Products from Canada by Destination, 1955-79

VI. Atlantic Groundfish Landings by Province and Vessel Length Groups, 1978-79

\*B. Resource Prospects for Canada's Atlantic Fisheries 1980-85

\*C. The Atlantic Fisheries Resource Management Process

\*D. New Directions for Atlantic Licensing

\*E. Sector Management

\*F. Quality Excellence in the 1980's

\* Please note appendices B through F are available upon request from the  
Department of Fisheries and Oceans  
Communications Branch  
240 Sparks Street, 7th floor West  
K1A 0E6

T A B L E I

Value of Landings, Atlantic, Major Species, 1955-79  
(\$ Million, Current)

<u>Year</u>	<u>Cod</u>	<u>Small Flatfish</u>	<u>Herring</u>	<u>Scallop</u>	<u>Lobster</u>	<u>TOTAL</u>
1955	14.4	2.6	2.0	0.7	16.5	50.6
1956	16.4	2.3	2.4	1.1	18.0	56.0
1957	15.1	2.6	2.5	1.3	14.5	50.8
1958	13.2	2.6	2.8	1.3	15.4	51.2
1959	17.0	2.8	3.3	1.9	17.4	58.4
1960	16.5	3.8	3.7	2.0	18.0	59.8
1961	15.6	3.3	2.8	3.1	18.0	59.0
1962	18.9	3.2	3.4	4.5	19.8	68.4
1963	21.0	4.0	3.1	6.3	21.3	76.2
1964	22.1	5.2	3.2	7.3	24.2	87.5
1965	23.6	6.5	4.3	10.8	26.6	97.6
1966	25.1	7.8	6.2	7.4	22.0	100.5
1967	23.7	8.4	8.2	7.8	23.3	103.6
1968	24.4	8.1	12.0	13.4	24.4	115.7
1969	21.6	11.0	11.2	12.2	29.5	120.7
1970	21.9	14.2	13.2	14.1	29.7	131.4
1971	25.1	13.9	13.2	13.0	33.2	133.3
1972	26.2	14.0	12.7	19.5	37.0	145.1
1973	29.7	18.2	12.2	16.2	40.6	171.1
1974	32.1	16.8	13.4	18.6	38.0	171.6
1975	30.6	15.6	13.8	25.7	48.4	190.8
1976	43.0	20.4	15.8	38.9	46.0	224.1
1977	61.7	23.4	24.0	44.1	56.6	288.3
1978	86.3	24.3	43.3	63.5	75.6	416.0
1979	121.3	27.8	39.6	74.5	83.8	497.5

1. Major Species account for over 70% of landed value in the Atlantic during the years 1955, 1960, 1965, 1970 and 1978.

Source: Annual Statistical Review of Canadian Fisheries, various years.

T A B L E II

Value of ishery Production, Atlantic, by Major Product Groups, 1955-78  
 (\$ Million, Current)

<u>Year</u>	<u>Fresh &amp; Frozen</u>		<u>Cured</u>	<u>Canned<sup>2</sup></u>	<u>TOTAL</u>
	<u>Finfish<sup>1</sup></u>	<u>Shellfish</u>			
1955	39.0	23.4	26.7	6.9	104.7
1956	39.9	23.3	23.4	11.6	108.0
1957	42.6	20.2	23.7	11.3	105.1
1958	50.2	20.6	23.3	11.4	113.9
1959	51.9	23.4	21.0	12.9	117.8
1960	50.3	27.9	24.1	15.9	124.8
1961	51.5	27.8	23.9	11.9	124.8
1962	59.5	27.5	24.7	16.4	140.1
1963	68.4	34.6	27.1	15.4	158.9
1964	76.0	42.2	28.8	14.7	178.3
1965	87.4	51.9	24.9	16.9	201.6
1966	94.0	42.2	27.0	19.3	212.2
1967	84.9	43.2	30.3	18.4	209.2
1968	94.2	58.7	27.1	22.1	240.4
1969	107.4	70.2	26.5	21.6	271.0
1970	113.6	67.2	25.7	26.8	277.8
1971	141.3	76.6	32.7	26.0	316.4
1972	157.7	91.8	33.0	32.6	354.7
1973	217.7	110.2	42.0	40.4	462.7
1974	168.6	105.4	49.8	49.6	422.7
1975	216.3	137.2	48.4	38.1	483.5
1976	259.1	175.1	68.2	45.9	600.9
1977	361.8	170.4	78.5	79.6	750.2
1978	448.5	295.3	100.2	66.1	973.1
1979	n.a.	n.a.	n.a.	n.a.	n.a.

1. Chiefly filleted groundfish products, including blocks.

2. Mainly herring and certain shellfish species.

Source: Annual Statistical Review of Canadian Fisheries, various years.

T A B L E III

Employment and Value of Fishing Craft in the  
Commercial Fisheries, Atlantic 1955-79

<u>Year</u>	<u>Primary Sector</u>	<u>Employment</u> <u>1 /Secondary Sector 2</u>	<u>Value of Fishing Craft</u> <u>(\$ Million, Current)</u>
1955	47,900	11,200	32.8
1956	47,000	11,800	33.9
1957	48,100	10,900	37.6
1958	47,600	11,200	33.3
1959	46,300	11,100	36.9
1960	45,300	10,800	40.6
1961	44,600	10,500	42.0
1962	45,700	10,700	48.3
1963	47,800	11,300	65.7
1964	48,600	11,600	76.3
1965	49,300	13,000	91.1
1966	45,900	14,000	111.5
1967	45,200	13,900	152.6
1968	45,700	15,100	168.1
1969	42,900	15,500	161.6
1970	41,800	15,500	161.6
1971	39,700	15,000	160.0
1972	39,700	15,500	165.0
1973	39,000	16,600	189.2
1974	36,500	14,200	228.1
1975	40,600	12,900	241.8
1976	40,800	14,700	241.0
1977	43,100 (est.)	16,900	n.a.
1978	48,500	19,700	495.5
1979 (Pre1.)	55,700	n.a.	n.a.

1/The Fishing Fleets

2/ Processing Plants

Source: Annual Statistical Review of Canadian Fisheries, various years.

T A B L E IV

Imports of Fishery Products into Canada, by Area of Origin, 1955-79  
 (\$ Million, Current)

<u>Year</u>	<u>United States</u>	<u>Europe</u>	<u>Other</u>	<u>Total</u>
1955	*	*	*	12.5
1956	*	*	*	17.4
1957	*	*	*	16.5
1958	*	*	*	17.4
1959	*	*	*	16.3
1960	*	*	*	17.2
1961	*	*	*	20.6
1962	*	*	*	21.9
1963	*	*	*	22.8
1964	*	*	*	23.2
1965	14.5	4.9	8.5	27.9
1966	17.5	4.9	8.9	31.3
1967	18.1	6.1	12.6	36.8
1968	16.9	5.8	12.3	35.0
1969	24.1	6.1	12.1	42.3
1970	31.0	7.5	16.0	54.5
1971	33.7	8.3	18.9	60.9
1972	40.4	10.8	30.4	81.6
1973	54.2	15.1	42.0	111.3
1974	58.1	17.9	44.2	120.2
1975	74.5	17.2	43.1	134.8
1976	101.2	18.4	63.7	183.3
1977	120.5	22.2	78.1	220.8
1978	141.1	18.9	89.5	249.5
1979 (Pre1.)	182.4	18.8	113.4	314.6

\*Not readily available at time of compilation.

Source: Marketing Branch, Fisheries & Oceans

Source: Annual Statistical Review of Canadian Fisheries, various years.

T A B L E V

Exports of Fishery Products from Canada, by Destination 1955-79  
(\$ Million, Current)

<u>Year</u>	<u>United States</u>	<u>European Countries</u>	<u>Other Countries</u>	<u>All Countries</u>
1955	92.0	14.8	22.0	128.8
1956	96.8	15.3	21.6	133.7
1957	97.0	13.3	22.2	132.5
1958	103.3	31.6	20.1	155.0
1959	98.6	28.8	20.4	147.8
1960	98.8	18.0	21.3	138.1
1961	103.8	20.1	19.4	143.3
1962	114.3	22.7	19.6	156.6
1963	115.9	32.8	23.4	172.1
1964	130.9	46.5	25.2	202.6
1965	150.0	39.4	23.9	213.3
1966	151.0	41.6	27.2	219.8
1967	145.0	60.9	29.5	235.4
1968	174.0	55.0	29.0	258.0
1969	188.3	61.8	29.0	279.1
1970	202.3	49.0	28.7	280.0
1971	201.4	63.6	30.0	295.0
1972	229.7	73.7	47.0	350.4
1973	294.1	117.1	87.5	498.7
1974	264.0	98.5	74.2	436.7
1975	288.9	98.6	76.5	461.0
1976	357.9	120.3	122.3	600.5
1977	423.7	195.2	196.8	815.7
1978	557.5	268.7	308.0	1,134.2
1979 (Pre1.)	654.0	336.0	333.3	1,323.3

Source: Marketing Branch, Fisheries & Oceans.

Source: Annual Statistical Review of Canadian Fisheries, various years.

T A B L E VI

GROUND FISH LANDINGS BY VESSEL LENGTH GROUPS  
(In tonnes. live weight)

	<u>1970</u> <sup>(1)</sup>	<u>1971</u> <sup>(1)</sup>	<u>1972</u> <sup>(1)</sup>	<u>1973</u> <sup>(1)</sup>	<u>1974</u> <sup>(2)</sup>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>NOVA SCOTIA</u>										
Gulf: 100 ft. & over	17 402	16 702	15 282	19 872	17 280	16 164	21 309	16 471	20 501	22 350
Under 100 ft.	13 299	14 077	10 572	10 605	10 126	8 325	8 573	12 271	14 111	19 454
Province: 100 ft. & over	90 506	97 621	95 738	100 750	86 343	85 856	94 360	88 837	113 155	121 151
Under 100 ft.	52 359	63 869	61 862	66 913	75 409	73 170	66 421	76 985	91 981	109 620
<u>NEW BRUNSWICK</u>										
Gulf: 100 ft. & over	2 912	2 564	7 335	10 455	3 699	4 674	2 297	1 801	2 999	3 531
Under 100 ft.	26 754	26 045	19 810	16 181	12 680	14 862	13 056	15 823	13 651	17 896
Province: 100 ft. & over	3 596	3 007	7 335	10 471	3 699	4 674	2 297	1 802	2 999	3 531
Under 100 ft.	29 073	27 805	20 904	17 642	14 007	16 136	13 949	17 085	14 481	19 965
<u>PRINCE EDWARD ISLAND</u>										
Gulf: 100 ft. & over	895	4 176	7 996	8 108	1 963	1 122	416	1 521	1 980	1 434
Under 100 ft.	14 364	13 701	9 131	9 358	6 471	6 468	7 080	9 793	12 514	15 858
Province: 100 ft. & over	895	4 176	7 996	8 108	1 963	1 122	416	1 521	1 980	1 434
Under 100 ft.	14 364	13 701	9 131	9 358	6 471	6 468	7 080	9 793	12 514	15 858
<u>QUEBEC</u>										
Gulf: 100 ft. & over	8 162	16 573	16 716	21 974	13 807	13 290	4 806	6 580	6 923	8 344
Under 100 ft.	49 190	44 741	36 531	32 127	27 136	26 198	24 113	34 489	43 035	49 231
Province: 100 ft. & over	8 162	16 573	16 716	21 974	13 807	13 290	4 806	6 580	6 923	8 344
Under 100 ft.	49 190	44 741	36 531	32 127	27 136	26 198	24 113	34 489	43 035	49 231

T A B L E      VI    (cont'd)

	<u>1970(1)</u>	<u>1971(1)</u>	<u>1972(1)</u>	<u>1973(1)</u>	<u>1974(2)</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>NEWFOUNDLAND</u>										
Gulf: 100 ft. & over	26 631	18 655	20 657	22 362	19 029	18 975	19 904	18 336	23 947	27 930
Under 100 ft.	32 693	22 869	16 579	21 533	15 815	20 788	25 246	32 070	38 774	44 650
Province: 100 ft. & over	145 331	120 958	115 860	144 184	104 655	103 548	132 243	127 563	154 353	181 490
Under 100 ft.	132 074	123 747	102 267	89 364	69 623	90 430	123 981	150 699	170 631	192 735
<hr/>										
<u>ATLANTIC COAST</u>										
Gulf: 100 ft. & over	56 002	58 670	67 986	82 771	55 778	54 225	48 732	44 709	58 457	63 589
Under 100 ft.	136 300	121 433	92 623	89 804	72 228	76 641	78 068	104 446	124 978	147 089
All provinces: 100 ft. & over	248 490	242 335	243 645	285 487	210 467	208 490	234 122	226 303	276 517	315 950
Under 100 ft.	277 060	273 863	230 695	215 404	192 646	212 402	235 544	289 051	335 535	387 409

(1) - Landings reported in common landed form, from 1970 to 1973 for all provinces.

(2) - Landings reported in common landed form in 1974 for Newfoundland.



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