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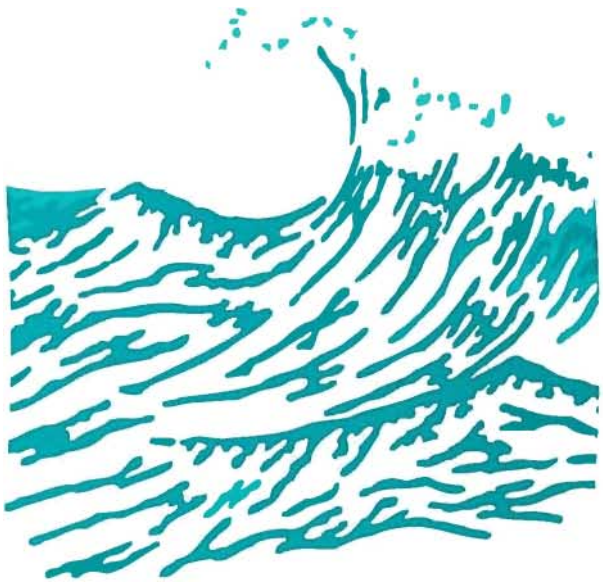
CONSERVATION
Come Aboard

1996 Conservation Requirements for Atlantic Groundfish

Report to the Minister of Fisheries and Oceans



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The Honourable Brian Tobin P.C., M.P.
Minister of Fisheries and Oceans

Dear Minister:

I am pleased to provide you with this report of the Fisheries Resource Conservation Council (FRCC) on its 1995 activities and conservation recommendations for the 1996 groundfish season. This is the Council's fourth comprehensive report on conservation measures for Atlantic groundfish. All reports advocate "erring on the side of caution" and, with Ministerial approvals and assistance, a new course for fisheries conservation is being put in place. In addition, you have eloquently and convincingly pursued the conservation agenda both domestically and around the world and much progress has been made.

Metaphorically speaking, a ship called "conservation" has been constructed in cooperation with, and inspired by, the tireless devotion of many stakeholders, Government leaders, DFO scientists and managers. With each successive FRCC report we test its rigging and seaworthiness. Initial tests point to difficulties, mostly because there remain many who do not share our vision. On the other hand, the FRCC is mindful of the tremendous impact that its recommendations have had on Atlantic Canada and recognizes that many have already signed-on to conservation and all that it entails. If we are to keep momentum for change we will need to have all who have a stake in the fishery adopt a sincere conservation attitude.

This year's title "Conservation - Come Aboard" speaks to those who have not yet signed-on. We feel it essential that all those concerned with the groundfish fishery need to join in, do their part and help ensure a sustainable fishery for the future.

The Council's design of a conservation strategy to rebuild stocks and maintain a sustainable fishery is based on the following: conservation first; an ecosystem approach to fisheries conservation and management; better knowledge; partnership; and, effective management. This is outlined in detail in Chapter 2 of the report, as is a discussion on conservation principles and measures that would be part of the strategy.

The FRCC expects that providing a conservation framework for groundfish will be a demanding and challenging task in the coming months. Discussion with stakeholders on an ecosystem approach, the conservation aspects of gear technology and the effectiveness of sentinel and similar fisheries will require tremendous effort.

Particular mention should be made on the process towards re-opening a closed fishery. This is the subject of Chapter 3. There are three stocks for which the Council received repeated requests for a cautious but substantive approach in 1996 towards eventual re-openings, namely cod on the south coast of Newfoundland (3Ps), cod in the northern Gulf (3Pn4RS) and cod in the southern Gulf of St Lawrence (4T4Vn). In each case, the requests were encouraged by observations of significant quantities of cod by fishermen prosecuting non-cod fisheries and/or information originating from sentinel fisheries or research surveys.

These encouraging signs have been the source of much speculation regarding approaches that the FRCC might recommend. Decisions by the Council in this regard have been extremely difficult. On the one hand, scientific assessments are not overly optimistic, while, on the other, stakeholders and some sentinel fishermen are seeing good signs of fish. The Council's clear position is that caution and a precautionary approach is needed in decisions that could affect re-opening of closed fisheries. Most stakeholders support this position as well.

Consequently, the Council is recommending a continuation of the moratorium for 3Ps cod, 3Pn4RS cod and 4T4VN cod for 1996. However, additional information from these stocks is required to determine, among other things, if the positive signs extend over the entire range of the stock and whether or not "commercial like" catch rates can be sustained. We are therefore, recommending significantly expanded sentinel fishery programs in these areas in 1996. The proposed characteristics, scope and planning process for these programs are outlined in detail in Chapter 3.

Chapter 4 provides the stock-by-stock recommendations for each of the general ecosystem areas: Labrador, Northeast Newfoundland Shelf, Grand Banks and Southern Newfoundland; Gulf of St Lawrence; and, Scotian Shelf, Bay of Fundy and Georges Bank.

We are honoured to have the opportunity to present you with this advice and trust you will find it helpful.

Sincerely

H.M. Clarke
Chairman

1. BACKGROUND

1.1 INTRODUCTION

The Fisheries Resource Conservation Council was established in 1993 to advise the Minister of Fisheries and Oceans on conservation issues, including the appropriate levels for Total Allowable Catches (TACs). The Council also provides advice on science and research priorities. As well, the FRCC has addressed special requests of the Minister, e.g., the recent review of Lobster Conservation and the June 1994 review of Greenland halibut in NAFO Zones 0,1, 2 and 3.

This report is one in a series of annual reports that the Council makes to the Minister of Fisheries and Oceans regarding conservation measures for groundfish, in this case recommendations for 1996.

1.2 APPROACH

Before making recommendations on groundfish conservation, the FRCC carries out a series of public consultations on stock status information and other conservation issues. In 1995 the FRCC modified the approach to the development of its groundfish report. In the previous two years, when the Department of Fisheries and Oceans Stock Status Report was released, the FRCC conducted dissemination meetings to discuss with stakeholders the scientific assessment of the status of stocks. In 1995 this series of meetings was conducted by DFO Science as it is their legitimate responsibility. We also started with an Atlantic wide meeting as recommended by stakeholders and did not allow cameras to record any proceedings, even though all meetings were public. As well, a teleconference with stakeholders interested in redfish was held on October 19, 1995. Approximately 250 stakeholders took part in the consultations and twenty-eight briefs were received.

The Council conducted its consultations in September in the following locations:

September 11, 1995	Dartmouth, Nova Scotia
September 12, 1995	Sydney, Nova Scotia
September 12, 1995	Moncton, New Brunswick
September 13, 1995	Deer Lake, Newfoundland
September 13, 1995	Gaspé, Québec
September 14, 1995	Clarenville, Newfoundland
September 19, 1995	Clark's Harbour, Nova Scotia

A letter was sent to stakeholders on August 24, 1995 advising them of the consultations and requesting that they consider the following three questions:

1. *What are your views on the sources and timing of information that the FRCC uses to develop stock advice for the Minister of Fisheries and Oceans, including DFO stock assessments, traditional knowledge, and sentinel fisheries. Can these sources, or their use, be improved?*

2. *Is there a fishery currently under moratorium which you feel should be re-opened? Can this be done without compromising the goals of rebuilding and of optimum sustainability? If so, how?*

3. *In considering conservation recommendations, the FRCC has promoted an "ecosystem approach" which includes multi-species considerations, habitat, and predator/prey interactions. What are your comments or suggestions in this regard?*

A summary of the consultations can be found as Appendix 5.

The Council has been encouraged in 1995 with evidence that:

a) For some groundfish stocks, the decline has been arrested and some rebuilding seems to be occurring, e.g., 3PS cod, 3Pn4RS cod and 4T4VN cod.

b) A conservation strategy is emerging through the Council's own deliberations, the work of scientists and the outlook of people in the industry.

c) Stakeholders have contributed significantly and positively to the Council's initiatives respecting how to re-open a closed fishery.

d) Sentinel fisheries are not only operational but are resulting in the production of significant information for scientists, stakeholders and the FRCC. Congratulations are in order for some excellent work in this area.

In developing its recommendations, the FRCC considered the views of stakeholders, studied the most recent scientific information available for each stock (including sentinel fisheries information), reviewed Council's past evaluations regarding the stocks, reviewed the work of the Council's subcommittees and endeavoured to maintain an historical perspective, including the use of traditional knowledge.

Nevertheless, this report has been a particular challenge to the FRCC as stakeholder views and anecdotal information were often inconsistent with available scientific reports. In some areas, there is a tremendous sense of frustration at the lack of specific answers in spite of significant efforts by all concerned to provide the most relevant and up-to-date science for the FRCC. This report attempts to to reconcile those differences of view while at same time "err on the side of caution".

2. CONSERVATION ISSUES

2.1 TOWARDS A CONSERVATION STRATEGY

The FRCC began its work in 1993 at a time when immediate action was needed to arrest dramatic declines in many Atlantic Canadian groundfish stocks. Eventhough some positive signs are beginning to appear, the crisis has persisted. This chapter documents a variety of actions needed to deal with current constraints on stock rebuilding - whether from seal predation, excessive bycatches of depleted stocks, anti-conservationist actions at sea, and so on.

We must develop a conservation strategy that will succeed in rebuilding stocks and maintaining a sustainable fishery into the future. Council's approach is based on:

- CONSERVATION FIRST: the fundamental premise of erring on the side of caution must reflect a precautionary approach that takes into account uncertainty in information.

- AN ECOSYSTEM APPROACH TO FISHERIES CONSERVATION AND MANAGEMENT: while it is not intended to try to manage the ecosystem, fish species must be seen as a part of a whole system, where inter-species relationships (e.g. predator-prey) and environmental factors play a major role in affecting fish stocks, and, where interactions between the fish and the harvesters have to be taken into account.

- BETTER KNOWLEDGE: enhanced additional sources of information are needed, particularly in trying to incorporate fishermen's information (such as sentinel fisheries) into stock assessment methods.

- PARTNERSHIP: stakeholders must be involved in a process with DFO science and management to set up enforceable conservation-oriented fishing plans and ocean conservation measures.

- EFFECTIVE MANAGEMENT: actions must be taken to eliminate obstacles to conservation such as, dumping and discarding, directed "bycatch" fisheries, lack of enforceability of some management initiatives, redirection of effort, developmental fisheries for species already under pressure, etc..

The Council has emphasized certain elements of a conservation strategy throughout its work and has moved in the direction of developing such a strategy. For example, a report on "Conservation Aspects of Groundfish Gear Technologies in Atlantic Canada" (FRCC.94.TD4) reflected the Council's interest in examining the conservation implications of the various methods for catching fish, and in maximizing the long-term benefits from harvesting. This theme was also pursued in a discussion paper on "Other Conservation Measures" (FRCC.94.TD2), which began an examination of the need to manage when and where fish are caught, and the need to match fishing effort at sea with the resource available to be caught.

As well, Council's focus on an ecosystem approach to fisheries conservation was reflected in its discussion paper "Some Issues Related To Seal-Fisheries Interactions In Eastern Canada" (FRCC.94.TD3). Our January 1994 letter to the Minister on Science Priorities reflected a desire for the development of effective partnerships.

The most recent Council paper, "Considerations on Re-opening a Closed Fishery" (FRCC.95.TD1) and subsequent public consultations, focused on several key issues. The paper highlighted the need to determine key "indicators" of stock health (such as the spawning stock biomass, recruitment level, and condition factor), acceptable levels of those indicators, and agreed-upon ways to measure the indicators. The re-opening discussion also highlighted the fact that how the fishery re-opens is inherently a conservation issue, not only a management concern.

> **The FRCC will continue its work on the development of a comprehensive groundfish conservation strategy with a view to making specific recommendations before the end of 1996.**

Some aspects of such a conservation strategy are described in the following sections.

2.1.1 Conservation Principles

The FRCC Definition of Conservation states:

> "Fisheries conservation is that aspect of the management of the fisheries resource which ensures that its use is sustainable and which safeguards its ecological processes and genetic diversity for the maintenance of the resource. Fisheries conservation ensures that the fullest sustainable advantage is derived from the resource and that the resource base is maintained."

Its conservation objectives include, but are not restricted to:

> rebuilding stocks to their optimum levels and thereafter maintaining them at or near these levels, subject to natural fluctuations, and with sufficient spawning biomass to allow a continuing strong production of young fish; and,
>
> managing the pattern of fishing over the sizes and ages present in fish stocks and catching fish of optimal size.

When the Council was first asked to address groundfish stocks in Atlantic Canadian waters, key biological indicators were declining rapidly and the biomass of many stocks was characterized as the lowest ever observed. The decisions to recommend major reductions in TACs for some stocks and closures for others were based not only on the interpretation of biological and fisheries data from scientists but also on observations from fishermen, processors, and managers that:

- Fish being caught were small;
- Fishermen had to deploy more effort to catch their quotas;
- Older mature fish were more difficult to find;
- Small fish were prominent in processing operations; and,
- There were changes in fish migrations and in the distribution of fish aggregations in relation to traditional fishing grounds.

With Council's definition of conservation and related objectives in mind, the basic approach to conservation recommendations focused on the need to halt the declines and then begin the rebuilding process through, in part, providing maximum protection to small fish, the source of future spawners. The protection of small fish was particularly important as juvenile fish, which could be the target of commercial fisheries, were the principal component of what was remaining in many of these stocks. In some cases, total biomass (juvenile and mature fish) was so low as to give no alternative but to recommend complete closure. In other cases, reduced TACs or special management measures (e.g. protocols) were recommended to give protection to small fish.

While it appears that declines have been halted in some stocks and in some areas rebuilding has begun, the principle of protecting small fish remains relevant. Other principles will emerge as stocks improve to levels where they can confidently be categorized as "normal" rather than "critical". This event will most likely not occur suddenly but rather will be the result of several stages of progression.

In addition, the need to focus on basic principles of conservation is heightened by the frightening reports of abusive fishing practices in fisheries still in operation, such as reports of misreporting or non-reporting of catches and discarding of small fish and fish for which there is not sufficient quota. This is of tremendous concern to the Council at this stage of the groundfish crisis. As well, it is of concern to see that many still expect that the solution lies mainly in actions by various levels of government or other sectors of the industry rather than with themselves.

> **For its part, the Council believes that an effective partnership between the fisheries managers, scientists and the fishing industry is necessary. No one is immune from their responsibility in this area. Fishing practices consistent with conservation and a conservation ethic must be the norm. Fishing sectors must adjust fishing effort to the resources available and the industry as a whole must control capacity and promote sound fishing practices. Fisheries managers must develop and test processes that will better permit this change without compromising conservation.**

2.1.2 Conservation Measures

From its beginning, Council has been expected to examine a wide range of possible conservation measures and to recommend those most appropriate. Specifically, the FRCC's mandate states:

> "the Council may recommend any measures considered necessary and appropriate for conservation purposes such as TACs, closure of areas to fishing during specific periods, approaches to avoid catching sub-optimal sized fish or unwanted species, and restrictions on the characteristics or use of fishing gears."

Increasingly since 1993, Council has sought to meet this mandate by expanding its attention to conservation measures that could supplement TACs. This was made clear in Council's report on 1994 conservation requirements:

> "At present, the TAC approach combined with the limitation of entry is well-established within the Atlantic groundfish fishery. However, the FRCC recognizes that stock conservation involves more than just catch quotas. Other measures may complement the setting of TACs, in providing protection for fish resources."

In our 1994 report, Stay The Course, we highlighted that some management policies and programs result in fishing activities that are contrary to the conservation process. As well, the FRCC has recommended, in specific cases, the protection and/or release of small fish in a number of stocks, improved selectivity of fishing gears (increased hook and mesh sizes), limitations on quantity and dimensions of fishing gear used, expanded area closures to protect spawning and/or juvenile aggregations, additional closed seasons, and effort reduction.

As well, in 1994, Council released a discussion paper on "Other Conservation Measures", which raised for consideration a set of conservation "tools" that could complement TACs, including:

1. better monitoring and control of catches,
2. determination of appropriate TACs in mixed stock fisheries,
3. effort control,
4. fish maturity targets,
5. closed areas, and
6. optimal timing of fish harvesting within the season.

In some areas initiatives such as dockside monitoring, small fish protocols and requiring the use of the nordmore grate in some shrimp and the silver hake fisheries are having positive results. Unfortunately, they are often overshadowed by other policies that have the effect of re-directing effort to already stressed fisheries or that permit bycatches of fish from stocks under moratorium. This situation is exacerbated by differences of opinion between fisheries managers and concerned stakeholders regarding the actual conservation impacts of these policies. One step towards correcting this problem is through an effective and well respected comprehensive monitoring program.

Council remains concerned over weaknesses in the current management regime for some fisheries and will direct increasing attention to the development and refinement of conservation tools to correct this situation. Effective monitoring will be a key aspect to a successful resolution.

Council has also noted the widespread expression of desire by fishermen and other stakeholders to protect certain parts of the ocean. Protecting spawning areas, important juvenile habitat and places of refuge for threatened stocks are among the reasons put foward. Clearly, Marine Protected Areas -that is, seasonal closures or permanent closed areas - fit well with a desire for an ecosystem approach to management. Some are already in place in Atlantic Canada and stakeholders continue to exhibit confidence that closure of spawning areas like Brown's Bank, George's Bank, and the "haddock box" in 4W have had positive effects.

Recognizing this, Council raised the subject in its 1994 report and stated that it "...believes that there is a need to protect special areas as part of future management and therefore, the use of Marine Conservation Areas is a tool to be considered."

The Government's proposed Oceans Act features Marine Protected Areas as a key part of an oceans conservation plan. The Council commends the Minister for the significant steps he has taken in this area.

Clearly Marine Protected Areas have much to offer as a conservation tool, but we must also recognize a need to proceed with sensitivity to local concerns, and with full input from fishermen, local communities, non-governmental organizations, scientists and other interested parties. Many questions need to be addressed including whether closures are to be seasonal or permanent, what uses are to be allowed within them, how they are to be evaluated, etc.. This topic will form a specific theme at the Council's Strategic Planning Workshop in December 1995.

2.1.3 Management Problems Affecting Conservation

Most people realize that the fishery of the future should be a smaller, more conservation oriented, fishery. Failure to achieve this will undoubtedly mean that mistakes of the past will be repeated. Clearly, the fishing industry is at a significant crossroads and the Council believes that this situation has caused a reluctance by Governments and industry stakeholders to address the obstacles that now exist to conservation. First and foremost, there is a need for development of a conservation attitude amongst all who are involved in the fishery and secondly no decisions should be made without first considering the conservation impacts. Continuing the theme raised in section 2.1.2 concerning the development and refinement of conservation tools, the following are key questions to be addressed and answered satisfactorily before initiating action:

Question 1 Is the management plan for this fishery consistent with the intent of the FRCC recommendations accepted by the Minister?

Question 2 Does the amount of effective effort that is being permitted to prosecute the fishery correspond to the health of the stock and if not, are there sufficient safeguards in place to ensure conservation will not be compromised?

Question 3 Will there be a bycatch of fish now under moratorium?

Question 4 Is pressure for access to a particular fishery only a means to get access to fish under moratorium?

Question 5 What steps will be taken to prevent discarding and misreporting? How will management ensure success of these steps?

Question 6 Is there reasonable assurance that the fishery is both manageable and enforceable?

The Council believes that not all of the management decisions taken in the past year would stand up to the above approach. As well, the Council was given this message in a clear way from stakeholders during the consultation process. Whether it is a misplaced perception or not, the Council believes that perception has become the reality and that there is an erosion of confidence in the management system that must be addressed immediately.

The FRCC recommends that the Minister of Fisheries and Oceans initiate a comprehensive review of management practices which have conservation implications and define a process whereby conservation requirements are effectively addressed in all management policies. This review should be conducted in partnership with industry stakeholders and be completed in 1996.

The Council also recommends that this review recognize that, for a long term sustainable fishery, fishing effort at sea must match the resource. This implies that effort - the combination of boats, technology and number of days fishing - must be limited to a level compatible with the available harvest.

2.1.4 Gear Technology

The conservation impacts of the use of various gears have been of interest and concern to the FRCC. In December, 1994 the Gear Technology Subcommittee issued a document titled "Conservation Aspects of Groundfish Gear Technologies in Eastern Canada". Council's intention was to establish a factual base from which a comprehensive discussion on the conservation principles surrounding gear could begin.

During 1995 a consultation document, which suggests conservation principles and their applicability to each gear type, was developed by the Gear Technology Subcommittee. A very helpful groundtruthing session was held with some stakeholders. The consultation paper can be found in Appendix 2 and the Council plans to engage in comprehensive consultations soon after the release of this report once stakeholders have had adequate opportunity to consider the consultation document. Stakeholders are also encouraged to submit written briefs to the Council prior to the commencement of consultations.

During the groundtruthing session, and also at the general groundfish consultation meetings, many expressed the view that they want assurances from Government that changes in the percentage allocations to individuals or the right of individual sectors to fish will not be affected by their open participation in discussions on the conservation aspects of gear use.

The FRCC recommends that the Minister of Fisheries and Oceans make known, as soon as possible, the resource access policies that will apply to future fisheries.

2.2 ECOSYSTEM APPROACH TO FISHERIES CONSERVATION AND MANAGEMENT

2.2.1 The Ecosystem Approach

In its original mandate, Council was tasked "to develop a more profound understanding of fish-producing ecosystems including the inter-relationships between species and the effects of changes in the marine environment on stocks." The Environment and Ecology Subcommittee was set-up to undertake this, and the process is ongoing. The following section summarizes the thinking so far.

It is obvious that environmental conditions affect the life and life cycle of marine animals, but it is more difficult to demonstrate cause and effect. As well, an exploited fish population must be studied and managed in the context of a complex community of predators and prey. For example, DFO biologists have calculated that the cod in 4T are able to consume, each year, 60,000 t of herring, 25,000 t of northern shrimp and varying amounts of capelin. At the same time the cod are themselves consumed by various predators such as seals and larger fish. A major decrease in groundfish, with a corresponding reduction in the consumption of their prey, may lead to a shift in the abundance of other predators and prey. Competitors, like dogfish, may come to occupy the same niche. Important prey species, like shrimp, snow crab or lobster, may rise in abundance as groundfish decline. In 2J3KL, for example, the collapse of groundfish has been coincidental with a major increase in shrimp and snow crab.

There is a concern that heavy predation (by seals, for example) may hinder the recovery of depleted groundfish stocks, while at the same time the recovery of these stocks may affect the abundance of prey species which support these fisheries. It is in the light of concerns like these that Council promotes a more systernic approach to conservation.

For the last decade, scientists have increasingly tried to consider the interactions between species and the links between the ocean environment and fish. This leads to the concept of "ecosystem management". It is important to stress that this term does not imply management of the ecosystem. Rather the term implies trying to manage our own participation in the system with a fuller understanding of its processes and our effects upon them. For example, this would mean ensuring that fishing does not seriously disrupt the balance between species. It also seeks to clarify the relations between species and their environment in order to better understand abundance trends and adjust harvest levels and practices accordingly. In the

ocean, most fish are predators whose prey changes with their age and size. Capelin, for example, is a favourite food of adult cod, but capelin may well feed on cod eggs and larvae when these are available.

In the broadest sense, ecosystem management in the ocean means managing the behaviour of people (chiefly their fishing) in order to maintain or restore desired levels of diversity, abundance and productivity in the ocean system. Because so much remains unknown, this is an ongoing process, moving at the pace of learning.

Despite being limited by a lack of information when considering specific ecosystem relationships, the FRCC recommended conservation measures for 1995 that were based on a concern for groundfish stocks within their ecosystem. For example, Council addressed the issue of the mixed species nature of the 4X fishery, the impact of the herring and capelin fisheries on cod abundance and the impact of seals on the recovery of groundfish. In recommending science priorities, in January, 1994, Council recommended a multidisciplinary approach to fishery research and urged DFO to study "fishing" itself as a system, to better understand the relationship between the resource and the technology, practices and capacity of the fishing industry.

Ecologically-oriented programs such as the Northern Cod Science Program, the multi-disciplinary research on Gulf cod studies of fish community structures and food webs are on their way within DFO Science and must be encouraged.

For its part, Council will examine the following questions in 1996:

- Do some populations increase as others decline? For example, is the increase in landings of shrimp, lobster and crab related to the decline of groundfish? If so, what could be the effect of rebuilding those stocks?

- How can we best cope with ecological uncertainty? How can we integrate human factors (e.g., fishing effort and traditional knowledge) into our understanding of the ecosystem?

- An ecosystem approach to management, like any form of management, has to be designed on a specific scale. How can we define the boundaries within which particular conservation measures should apply?

- How can we define conservation measures to take account of multi-species interactions? How can we best take a multi-species approach to stock assessment as well as to fisheries management?

2.2.2 Prey Species

Concerns have been repeatedly voiced in consultations regarding the status of bait species and potential impacts on groundfish recovery. Capelin, herring and shrimp were all identified

as bait species required by groundfish in ample supply but which are being exploited by directed fisheries in their own right.

Inshore fishermen in Newfoundland and in Cape Breton have asked that capelin be carefully protected. Capelin scientists report increased abundance of these stocks in 1995, especially inshore. However, the fish are extremely small, there is less beach spawning and separation of males and females at beaches. Spawning has occurred very late in the season and there have been poor indications of abundance offshore. There is insufficient information on the impact of these factors on spawning success. Because of the extremely small size of individual capelin, commercial fisheries have not occurred during the past two years.

The Council believes that the abundance of capelin is critical to the recovery of groundfish stocks and that adequate protection of this food species is central to an ecological approach to fisheries conservation and management.

Similarly, large amounts of herring and shrimp are removed by commercial fisheries and marine mammals, and are therefore unavailable as food for groundfish. Some herring stocks have been reduced by these fisheries; and shrimp fisheries have been rapidly increasing in recent years. The impact of such fisheries on the recovery of groundfish, by reducing available food resources, cannot be precisely determined at present. However, in general, prey availability influences predator populations and such removals could affect groundfish populations.

The Council reiterates its concern for prey species, such as capelin, herring and shrimp, that are at or near the base of the food chain and recommends that decisions regarding their use in commercial fisheries also take into account a full evaluation of their role as part of the food chain and potential impact on groundfish recovery.

2.2.3 Predators of Groundfish - Seals

In public consultation and in its own deliberations, Council has repeatedly come up against the issue of seals and the impact of their predation on depleted groundfish stocks. Studies of seal population and diet now leave little doubt that seal predation is slowing the recovery of some stocks.

In many stocks, particularly northern cod, the spawning biomass has been critically depleted. It appears that all that is left is young fish. Stock recovery depends on the survival of these younger age classes to maturity, but studies of the diet of seals make it clear that most of the groundfish they eat are young. Even when commercial species form a small percentage of the seal diet, it takes huge numbers of young fish to make up that share.

In the case of harp seals and northern cod, for example, 4.8 million seals are estimated to eat roughly a billion young cod each year and these numbers appear to be increasing. Science does not yet know enough about cod recruitment to tell us how many of these young fish would otherwise grow up. However, if only 1% of that one billion fish reached an average

weight of 1.5 kg at age 7, they would contribute 15,000 metric tonnes to the spawning biomass each year. From a conservation perspective such a gain would greatly enhance the recovery of a stock which everyone agrees must be restored.

The harp seal population is now estimated to be at 4.8 million animals which are distributed widely across the Arctic and the north Atlantic. Scientists estimate that 287,000 animals could be harvested from this stock without changing the total population (replacement yield). Harp seals are estimated to have consumed 6.9 million tonnes of prey species in 1994. Approximately 3.7 million tonnes of this was taken in Canadian waters. Estimates of consumption in 1994 off Newfoundland include Artic cod (1.2 million tonnes); Capelin (620,000 tonnes) and Atlantic cod (88,000 tonnes). In the Gulf, the estimates are capelin (445,000 tonnes); Atlantic cod (54,000 tonnes) and Artic cod (20,000 tonnes). The remaining 1.2 million tonnes is made-up of various species including other groundfish.

Grey seals are usually divided into two groups based upon two centers of pup production in eastern Canada: Sable Island and the Southern Gulf of St Lawrence. They disperse widely throughout eastern Canada during the non-breeding period but do not undergo large migrations. The 1993 grey seal population was estimated at 143,500 animals and while there is a seasonal variation in their diet, cod is consumed throughout the year. Capelin in the Gulf and sand lance on the Scotian Shelf are the most important prey. According to the 1994 Atlantic Groundfish Stock Status Report, in 1993 grey seals were estimated to have consumed a total of 40,000 tonnes of cod and similar amounts of flatfishes.

Hooded seals are migratory but recent information from hooded seals tagged with satellite transmitters has indicated that these animals spend a much greater period of time in Gulf and Newfoundland waters than previously thought. The first good estimate of pup production for the Northwest Atlantic was obtained only in 1984, which indicated the population was substantially larger than previously thought. It is estimated that 400,000 hooded seals were in Canadian waters off the coast of Newfoundland in 1990 and the numbers have increased since then. While the diet of hooded seals is not well known, an analysis by Ross and Stenson of 72 seals collected from nearshore waters off Newfoundland indicated that the primary prey of hooded seals were Greenland Halibut and redfish (in that case making up 63% of the net weight of stomach contents).

In 1994 the Council recommended that early action be taken to significantly reduce the populations of all three species of seals. This recommendation was seen as necessary to help recovery of groundfish stocks. The Council also recommended that a special forum on the issue be established to determine ways to achieve those significant reductions. Two fora have since been held to discuss the question of increasing the commercial harvest of harp seals.

> **The FRCC remains very concerned about the increasing populations of seals and believes that consumption by seals is a significant constraint to the recovery of groundfish stocks.**

2.3 BETTER INFORMATION THROUGH PARTNERSHIP

2.3.1 Sources of Information

Successful fisheries conservation depends critically on the availability of information about fish stocks. This information must be:

Reliable - Because of the uncertainties involved, the more independent sources of information there are, the greater the confidence in the results. Clearly, there is a need for additional indices for many stocks.

Timely - Given the natural variability of stocks, decisions must be made on the basis of information which is as current as possible. Action taken on the basis of out-dated information may lead to erroneous decisions. We must continue to be diligent in using the most current information available.

Trusted - Finally, it is essential for the management of a fishery that the information available be trusted by those whose livelihood depends on it. Compliance with fishing plans and conservation measures is difficult to enforce when fishermen do not have full confidence in the stock assessment information on which these plans are based.

Efforts to improve the quality of information about exploited stocks has been foremost in the FRCC's thinking and positive steps are being taken by Science and fishermen alike. The success of the sentinel fisheries program, the industry conducted mobile gear survey in 4X and the call by some stakeholders for "tows for science" are all encouraging.

INFORMATION FROM AN OPEN ACTIVE FISHERY. When a fishery is fully active, the assessment of the status of the stock has several sources of information. Catch and effort data are collected through dockside monitoring, log books and observers on-board. Landings can be monitored with a comprehensive (100%) coverage or on the basis of a statistical designed sampling. Monitoring of landings in itself, however, does not take into account dumping and discarding at sea resulting from incidental catches of non-targeted species or "highgrading" of targeted species. Misreporting and avoidance of the monitoring system also result in an underestimate of catch and affect the assessment of stocks.

Scientific stock surveys may also provide an abundance index of stocks. These surveys are based on a stratified random sampling design, which is intended to remain constant over years in order to have a time series with comparable information from one year to another. The surveys often provide information on biomass, age structure, recruitment trends and environmental characteristics. They are carried on, however, only once per year and generally, the vessels used do not allow sampling in shallow waters in coastal areas. There is some mistrust by stakeholders of the information from these surveys particularly when fish populations are low. Egg and larval distribution as well as acoustic surveys may provide additional useful information.

INFORMATION FROM CLOSED FISHERIES. In areas where directed commercial fisheries on a stock are not permitted, commercial catch information is no longer available to compliment research surveys. The information base is thus significantly weakened and the interpretation of survey results becomes the subject of closer scrutiny. While pleased with the significant efforts by Science to address this situation and not wanting to erode confidence in the good work that has been done, the Council has noted several recurring concerns:

1. When only research survey results are available, care must be taken in interpreting assessment results that are driven by "anomalous" or extreme samples. It is important to develop methods that are less sensitive to the results of any single tow.

2. It may be appropriate in the assessment of stock levels to re-examine assumptions about the randomness of fish within the "strata", or sub-divisions, of the survey. Are surveys that were appropriate for large populations equally relevant to greatly reduced populations. This relates to the Council's 1994 recommendation regarding focused research on the causes of continuing low levels of fish stocks and lack of recruitment.

3. Finally, there is a clear need for additional sources of information. The Council recommended in 1994 that DFO Science implement effective mechanisms to systematically collect and use information from fishermen and the commercial fishery in stock assessment. For example, the fact that fishermen are reporting high bycatches of cod to the point that other directed fisheries have had to be frequently closed, leads one to ask whether by- catch rates could be used as an abundance index.

   The FRCC recommends that DFO Science consider ways to address these problems.

In response to previous FRCC recommendations, a number of sentinel fisheries programs were carried out in 1995 to provide additional information on stocks under moratoria and to involve harvesters in the data collection process. Successful programs have been launched in all regions and have been recognized as significant contributions to information gathering. The Council is encouraged by the development of these programs which address both the need for information and the need for participation and partnership.

Due to their novelty and their inherent socio-economic complexities these programs have faced significant administrative difficulties. As well, there has been a problem in that some of the variability in approach between regions has been unnecessary and undesirable. It should be noted that further information on the spatial distribution of populations and its seasonal changes is also necessary to interpret the effectiveness of management and conservation measures, such as marine protected areas.

The Council considers it important that existing projects continue in 1996 (and in some cases be expanded) and that the process be made as effective and efficient as possible. To this end we suggest a workshop of key Departmental and industry project leaders be held as soon as possible.

2.3.2 Timeliness

Current practice in groundfish management sees information gathered in a given year being interpreted and released in a report which appears in June of the following year. Consultations and discussions take place over the summer and additional information is collected which is used by the FRCC in the early fall to make its recommendations to the Minister before the end of the year (November). A fishing plan for the following year is then based on the Minister's decision.

This time lag, over a year in some cases, between the collection of information and its subsequent impact on a fishing plan is a source of serious concern for the FRCC, DFO and industry. In attempting to address this concern, DFO Science has made significant efforts to provide the most up to date information, including preliminary information on current scientific surveys and sentinel fisheries, for the Council's deliberations. We think further improvements can be made.

To this end, timeliness was raised as a specific question for stakeholders during the Council's September consultations. Many expressed the view that timeliness could be improved by modifying the time frame of the Groundfish Management Plan. Some suggested that all stocks be dealt with on a fiscal year basis rather than on a calendar year basis. Others suggested that the time frame of the plan could vary between stocks or groups of stocks.

> **It is obvious that the question of the most appropriate time frame for groundfish management plans is complex with significant implications in terms of workload and decision making for scientists, managers, the FRCC, the Minister and all industry stakeholders. As a first step in considering this question, the FRCC will ask DFO Science to advise on the most timely and reasonable schedule for each groundfish stock assessment.**

2.3.3 Uncertainty

In spite of best efforts, stock assessment will always be subject to considerable uncertainty. In its 1994 report "Partners in Rebuilding Fish Stocks For Our Future" the Council pointed out the uncertainty related to $F_{0.1}$ calculations and other biological indicators of stock health. Recognizing and accounting for this uncertainty is one of the most difficult tasks that has faced the FRCC, especially when observations from fishermen are in conflict with the best science available.

As a practical example in 1995, the Council has had an extremely difficult time in determining the most appropriate course of action for 3PS cod, 3Pn4RS cod and 4T4Vn cod. A high degree of uncertainty exists over the validity of the assessment results, due in part to the fact that there are so few stock indices. Fishermen firmly believe there are important signs of recovery. They are recommending that additional data be obtained in 1996 to verify what they see as positive signs and to serve as a basis for the development of an action plan that will lead to an eventual re-opening of these fisheries. Their recommendations include an allocation of fish for this purpose.

In some fisheries, which are open, there are widespread reports of discarding and highgrading the extent of which has not been quantified. This uncertainty is extremely perplexing and, if the reports are true, there are clearly significant conservation repercussions from such activity.

The Council's theme in these circumstances is to err on the side of caution and the Minister has fully supported this approach.

> **However, excessive prudence leads to inaction and the FRCC encourages efforts to quantify the risk associated with various conservation options. DFO Science have ongoing projects in this area. As well, the Council welcomes the research initiative taken by a group of Canadian economists and scientists (including DFO and the FRCC as associate partners) to focus on problems of uncertainty and sustainability in fisheries.**

2.3.4 Communications and the Exchange of Information

The FRCC believes that communications is a two way street and has been working in 1995 to enhance its communication process.

Communicating information about groundfish stocks to the industry begins with DFO's Stock Status Report. The FRCC was very pleased with the Report's new format which presents stock status information in a very accessible manner and addresses ecosystem issues more extensively than in the past. The next step in this process requires both DFO and the FRCC to hear and discuss with stakeholders their views on the stocks. The FRCC's public consultations are focused on obtaining fishermen's information, whether corroborating or disputing scientific surveys, and assessing their general confidence in published scientific results. The Council's approach to these consultations was adjusted in 1995 in response to stakeholder input.

The Council newsletter "Update" (Le Point) is another measure the Council has taken in 1995 in an effort towards keeping stakeholders better informed of Council activities. The Council is hopeful that it will also be available to stakeholders through the internet before the end of 1995.

Another important aspect of the communication function is between DFO and the FRCC to ensure that the spirit and intent of Council recommendations to the Minister are fully understood and conversely for the Council to understand the rationale behind specific management measures or scientific approaches. This partnership is evolving in a substantive and positive way and the Council will continue to foster its growth.

2.3.5 Science Priorities

Of fundamental and continuing importance to stock recovery and future sustainable fisheries is the recruitment of young fish to the fishable populations and their survival from year to year. Almost all Atlantic groundfish stocks have suffered poor recruitment during the 1990s. Continuing research is needed to ensure a better understanding of the reasons for recent low recruitment and to forecast when recruitment might return to historical levels.

Poor fish condition and increased predators may have increased the natural mortality of some stocks in recent years. Ecosystem influences and environmental factors affecting natural mortality of commercial groundfish, such as cod, remain poorly understood. There is a clear need for continuing scientific research to clarify and quantify the extent of, and reasons for, changes in the natural mortality of commercial groundfish.

The precision of scientific abundance surveys does not meet the expectations of fishermen. New and improved methods of fish counting, the use of traditional knowledge, the development of additional indices of stock abundance and new approaches to interpreting these data are needed.

These three issues are of fundamental importance to the conservation and management of fish stocks. They require a sustained research effort for several years if significant improvements in knowledge and practice are to be achieved.

3. TOWARDS RE-OPENING A CLOSED FISHERY

3.1 THE FRCC'S APPROACH TO RE-OPENING A CLOSED FISHERY

After several years of closed fisheries intended to have positive impacts on stock recovery, the question is asked: how would one then know when to re-open? This question was one of the tasks assigned to the Council's Stock Assessment Subcommittee.

Following some background work, this subcommittee prepared a preliminary discussion document outlining a general approach to re-opening a fishery. That document (FRCC95.TD.1) was debated in three public meetings devoted to this issue, and held in Caraquet, Halifax and St. John's near the end of August 1995. The document together with a summary of the consultations is included as Appendix 1 of this report.

There was a general agreement among stakeholders that conservation objectives should take precedence over socio-economic necessities in re-opening and conducting a fishery, and that decisions should be based on well-understood and reliably measured biological criteria. Recruitment and spawning biomass were recognized as major indicators. Industry, however, pointed out that more reliable information about stocks is needed. As well, over-capacity and uncertainty about sectorial allocations of the resource were identified as serious obstacles to the discussion on re-opening a closed fishery.

Strong arguments were presented on the need for limited fisheries as means to find out more about stock levels and to reconcile conflicting views between some scientific data and fishermen observations. There are three stocks for which the Council received repeated requests for a cautious but substantive approach in 1996 towards eventual re-openings, namely cod on the south coast of Newfoundland (3Ps), cod in the northern Gulf (3Pn4RS) and cod in the southern Gulf of St. Lawrence (4T4Vn). In each case, the requests were encouraged by observations of significant quantities of cod by fishermen prosecuting non-cod fisheries and/or by information originating from sentinel fisheries or research surveys.

A decision to re-open a fishery, even in a limited way, in a specific area and on a specific stock, must be based on solid conservation principles. This is not the time to waste the efforts and sacrifices made so far to allow stock rebuilding. Biological criteria and threshold levels must be defined and decisions made based on reliable information about fish stocks. Further, obstacles to conservation, such as over-capacity, must be dealt with so that fishing plans in a re-opened fishery ensure sustainability. Any other course of action may again lead to overfishing, collapse and further economic hardship.

The FRCC consultations on re-opening as well as the consultations on conservation measures for 1996 served to identify both a general feeling of concern with respect to the lack of progress in reducing harvesting overcapacity and the need for a fundamental change in fishing practices. The FRCC consultations on criteria for re-opening also brought out the difficulties inherent in using concrete measuring criteria even when the best of the information that could be reasonably expected is available. Participants were reluctant to accept a process where decisions are based on rigid, quantitative criteria because, as mentioned here-above, the

information base does not always allow, or lend itself to, a quantitative treatment. Quantitative thresholds for various measurements (stock abundance, spawning biomass, recruitment, etc.) have therefore yet to be defined and agreed upon and as well, their definition is unlikely to take place without additional guidelines.

The FRCC believes that a decision to re-open a fishery must be based on solid and reliable information; be in accordance with sound conservation principles; and be made only if there is a sound conservation based approach to fishing. In this regards, the FRCC recommends a cautious stepwise approach.

3.2 ACTION FOR 3Ps, 3Pn4RS AND 4T4Vn FOR 1996

The FRCC has reviewed all available stock status information from scientists, Sentinel Fisheries, and fishermen for 3Ps, 3Pn4RS and 4T4Vn and evaluated it in relation to its conservation objectives and the tremendous hardship and cost that has already been invested towards stock rebuilding. We have concluded that:

- this is not the time to re-open a commercial fishery;
- neither is the status quo appropriate;
- there are confidence problems with current scientific surveys and the stock assessment based upon them;
- the signals from the Sentinel Fisheries are positive but not clear;
- we need more information and we need to fully integrate all existing and potential sources of information into the stock assessment;
- stakeholders want the other fisheries operational problems such as excess capacity, resource access, gear restrictions, etc. to be addressed and dealt with by government and industry;
- 1996 should be the start of a transitional period during which time proper planning, an essential pre-requisite for re-opening a fishery, should be undertaken by all parties;
- a review of all available information should take place in October, 1996 to determine whether the transitional period should continue or whether conditions are appropriate for a limited re-opening.

The FRCC therefore recommends for each of 3PS, 3Pn4RS and 4T4Vn for 1996 that:

1. **The moratorium on commercial fishing be continued;**

2. **A significantly expanded sentinel fishery be conducted to help address the additional information requirements of the FRCC, including:**

   - **the presence and characteristics of fish over the whole geographical range of the stock;**

   - **whether or not catch rates seen in 1995 sentinel fisheries can be sustained with a modest increase in fishermen and fishing effort and whether or not 'commercial like' catch rates are available; and,**

   - **information on the age structure of the stock including whether or not there are significant signs of new recruitment.**

3. **The expanded sentinel fishery have the following characteristics:**

   - **be comprehensive as to geographic area and time frame and include continuation of the current sentinel fisheries projects as an integral component;**

   - **be flexible so as to include fishermen conducted/science directed surveys designed for specific purposes;**

   - **when, where, and how this fishery is conducted be determined in a partnership process by fishermen, scientists and managers within the context of the crucial need for systematic stock status information including the specific elements outlined above;**

   - **planning be done on the basis of specific "upset limits" in each stock area and on the basis of geographical distribution and time frame restrictions determined at the beginning of the year and maintained throughout the year so that specific pockets of fish are not too heavily fished;**[1]

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1 These "upset limits" are not to be considered targets, quotas, or allocations. They should be precautionary levels that can be taken without seriously damaging the stock but at the same time allowing the objectives set out above to be met. While the precise levels will be determined in the partnership process recommended, at this stage, the FRCC believes the program design levels should not exceed 2,000t for 3PN4RS; 3,000t for 3Ps; and, 4,000t for 4T4VN. Therefore, given the restrictions by geographical sub-areas and time period, it is very unlikely that harvests in aggregate, would meet these "upset limits" or levels.

- **only a small percentage of fishermen would be expected to participate;**
- **all proceeds from the sale of fish be used to help offset project costs;**
- **all catches be landed and subjected to 100% dockside monitoring.**

4. **The FRCC participate in the planning of the expanded sentinel fishery to ensure that the intent and objectives articulated in #2 and #3 above are met.**

3.3 PREPARING FOR RE-OPENING

The FRCC recommends that parallel to the above, planning begin in 1996 for an eventual re-opening. Such a planning process might include:

- **the FRCC conservation related obligations and responsibilities as outlined in the discussion paper "Considerations on Re-opening a Closed Fishery";**
- **the operational considerations related to DFO managers' obligations and responsibilities; and,**
- **full participation of stakeholders in both (a) where the FRCC would take the lead with DFO observation and participation; and (b) where DFO would take the lead with FRCC observation and participation.**

4.0 CONSERVATION RECOMMENDATIONS FOR 1996: STOCK-BY-STOCK

4.1 INTRODUCTION

In each of its three previous reports on Conservation Recommendations for Groundfish, the FRCC anticipated the pressures for effort re-direction from groundfish fisheries which were closed and urged that management actions be taken to avoid this and its negative conservation impacts.

In its August 1993 report the FRCC recommended that management measures must be taken to ensure that bycatches are truly incidental and kept to an absolute minimum. As well, the Council recommended that measures be taken to avoid displacement of effort onto other groundfish stocks that were seen to be extremely fragile and/or fully exploited. This was reiterated in the FRCC's November 1993 report. That report also suggested that conservation should be a top priority in setting allowable bycatch levels.

In its November 1994 report the FRCC outlined a number of specific concerns related to the redirection of effort and its effects on conservation. The Council recommended a review of existing management initiatives, and any new ones contemplated, to ensure that conservation effects are minimized. The Council also expressed frustration that in some areas bycatch limits were seen as bycatch allocations and the Council reiterated its recommendations that bycatches be kept to an absolute minimum.

Measures implemented by the Department to address these concerns have not been completely effective. In 1995 we have received many reports from some areas of an expansion in the effort directed (or supposedly directed) at these "minor" or "underutilized" species e.g.. "black back" or winter flounder, Atlantic halibut in the Gulf, skate, monkfish, lumpfish, fixed gear fishery for redfish, etc..

Where it occurs, the result is:

a. too much effort on the directed species, most of which may already be over-exploited;
b. an unreasonably high bycatch of cod (the species under moratorium).
c. a negative impact on conservation attitude (moving backwards); and,
d. impossible enforcement.

Conditional licenses have been issued when they probably should not have been and some fishermen have blatantly abused the privilege they were given. Landings of significant quantities of cod have been reported and when finally detected, the legitimate halibut (or black back flounder) fishermen have been treated the same as the abusers and the fishery is closed.

At the same time, there are numerous reports of large scale illegal fishing in some areas. However, we have been unable to obtain specific estimates of quantities. In recent months, efforts to address this situation have been intensified by the Department and we would advise the Minister that these efforts must continue so that a similar situation does not re-occur in 1996.

In addition for 1996, the FRCC recommends that:

Either

- **these other fisheries be closed completely to give the ecosystem a rest from fishing and to allow enforcement to have a chance at the legal fisheries in other areas;**

Or

- **current effort be restricted to only those fishermen who traditionally prosecuted that fishery prior to the cod moratorium.**

As well,

- **full dockside monitoring for all fisheries should be implemented;**
- **penalties for any illegal fishing should be increased; and,**
- **no recreational fisheries should be permitted for fish stocks under moratorium.**

4.2 STOCKS OF LABRADOR, NORTHEAST NEWFOUNDLAND SHELF, GRAND BANKS AND SOUTHERN NEWFOUNDLAND

4.2.1 ECOSYSTEM OVERVIEW

4.2.1.1 GENERAL FEATURES

Generally, water masses in this area move southward as the Labrador Current, one of the largest movements of cold water in the North Atlantic. One branch of this current hugs the coastline, while another moves along the edge of the continental shelf. Freshwater runoff originating from Hudson Bay and the rivers of Labrador greatly influence the general characteristics of the water in the Labrador Current.

The Labrador Current consists of three layers. A surface layer, to a depth of 40 m, varies greatly in temperature and salinity with the seasons. The extent and the duration of ice coverage in winter may change both the salinity and the temperature of this layer from year to year. The Cold Intermediate Layer (CIL) follows and extends to a depth of 150-200 m. Its temperature may vary several degrees, due to movements of the water masses and mixing with the surface layer in winter. This means that a cold winter may reduce the temperature in the CIL. The bottom layer is warmer and more saline than the upper layers and is preferred by cod.

The southern area of the Grand Banks is also influenced by the relatively warm offshore slope waters to the south and occasionally by the Gulf Stream, which brings warmer waters from the south. For this reason, cod in this area grow faster than cod from northern areas. The St. Pierre Bank area is influenced by incursions of cold water from the Labrador Current, water coming out of the Gulf of St. Lawrence, and by warmer water from the offshore slope waters.

4.2.1.2 RECENT TRENDS IN HYDROGRAPHIC CONDITIONS

The cold air temperatures and strong northwesterly winds that prevailed in the winter of 1994, caused ice to form early, cover an area larger than normal, last longer, and leave later than usual off Newfoundland and southern Labrador. Large numbers of icebergs reached the Grand Banks in 1994. Air temperatures over Eastern Canada, which were

HYDROGRAPHIC CONDITIONS FOR NEWFOUNDLAND REGION IN 1994

- extent of cold intermediate layer (CIL) still above average, but less so than in past 4 years
- moderation of cold conditions in surface water (0-30m) and above-normal temperature at station 27 in July
- temperatures below-normal in deeper water (100-176m) until fall, when they returned to normal values
- areas with below-normal temperatures still found on eastern side of St. Pierre Bank, Placentia Bay, and on the Continental Margin

SOURCE: DFO FISHERIES OCEANOGRAPHY COMMITTEE ANNUAL REPORT

typically 1-2°C below normal in the winter, had moderated to warmer-than-normal conditions by summer and autumn. Air temperatures returned to colder than normal in the winter of 1995. The strength of the warming over eastern Canada in the summer and autumn was greatest in the southern regions but decreased northwards.

The anomalously cold water temperatures experienced in recent years along the east coast of Newfoundland appear to be moderating. In the upper water column (0-30 m), summer temperatures reached upwards of 2°C above normal at Station 27 but returned to near normal in autumn. Temperatures in the deeper waters (below 100 m) were below normal through most of 1994 but approached near the long-term normal by late fall. Data for 1995 indicate that water temperatures were normal during the winter months but had cooled to below normal in the spring and early summer. Salinities at Station 27 were generally below normal with the greatest departures from the long-term mean appearing in the upper 50 m in late summer. The low salinities at this time are believed to reflect the large amount of sea ice melt from the Labrador Shelf.

The area of the CIL in summer of 1994 along the Bonavista Line, as defined by waters less than 0°C, decreased substantially from the previous few years but still remained slightly above normal (by 7%). In 1995, the extent of the CIL appears to have increased considerably in this area. Observations south of Newfoundland in area 3Ps and 3Pn indicate water temperatures there also appear to be moderating from the very cold period that began in the mid-1980s and extended into the 1990s. Cold water still exists, however, near bottom over St. Pierre Bank, in Placentia Bay and on the continental slope areas.

GENERAL TRENDS IN ECOSYSTEM OFF NEWFOUNDLAND IN 1994

- most of traditional groundfish resources at or near historical low levels
- pelagic stocks generally in low abundance and with slow growth
- invertebrate stocks in good conditions, but concerns for crab recruitment
- population of harp seals increasing
- respective roles of fishing and environment in stock declines still debated

SOURCE: DFO ATLANTIC FISHERIES STOCK STATUS REPORT 95/4

4.2.1.3 GENERAL TRENDS IN ECOSYSTEM

Most of the "traditional" groundfish resources in the waters around Newfoundland continue to be at or very near historical low levels. For the NAFO managed resources on the Grand Banks, directed fisheries remain open only for Greenland halibut and 3LN redfish. NAFO scientists have expressed concern that overfishing on these stocks is causing them to decline gradually.

The state of the capelin stock in Subarea 2 + divisions 3KL is difficult to estimate because of diverging indices. However, capelin in this area is smaller at age than in the 1980s, and it has been suggested that this might be the result of colder water temperatures. The capelin stock in divisions 3NO appears to be at a relatively low level. Herring stocks are estimated to be low off the east coast. The small size of recent year-classes, the delays in the timing of spring

spawning, and the slower growth, have been related to the cold environmental conditions. Stocks of herring off the southeast coast are considered to be at low levels.

The shrimp stocks off the east coast appear to be healthy. Crab landings have been increasing since 1989, reaching an all time high in 1994. Biomass could decline as the large stock of commercial sized crab is depleted and pre-recruits are declining.

The population of harp seals around Newfoundland is increasing. Estimates of their consumption indicate that Arctic cod, capelin and cod make up a significant portion of their diet. Of this, cod, mainly aged 1 and 2, accounts for about 3%. Scientists estimate that, in 1994, harp seals consumed 1.2 million tons of Arctic cod, 620,000t of capelin and 88,000t of Atlantic cod in NAFO area 2J3KL.

The role of fishing and environment in the decline of traditional groundfish resources is still debated. For some stocks, overfishing, particularly on the young and immature sizes, may have been a key factor in the recent decline. For other stocks, like for the northern cod, the picture does not appear to be as clear. The decline of northern cod progressed from 2J, south towards 3L. Yet, offshore fishing effort was greatest in division 3L and least in division 2J. For American plaice in Subarea 2 + division 3K, the overall decline has been about 10 times greater than the total reported catches for the period. It is difficult to contemplate that discarding for a species more valuable than cod would have been sufficiently high so as to account for this decline. For redfish, the decline is related to continued low recruitment for over 20 years.

Arctic cod appears to be increasing in abundance and expanding its range off Newfoundland. It is believed that this expansion is related to colder conditions throughout the area. The role of Arctic cod in the ecosystem, particularly as a predator, remains poorly understood.

4.2.2 STOCK-BY-STOCK RECOMMENDATIONS

4.2.2.1 COD: NORTHERN LABRADOR (2GH)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	1,000	1,000	200
CATCH	500	500	100	500	400	400	0	0	3	0	0*

*As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for 2GH cod be set at 1,000t as a precautionary measure. The consultations held in 1994 confirmed that there had been very few cod in 2GH in recent years and led the FRCC to recommend, in November 1994, that any fishery for cod in 2GH be carried out within the framework of a scientifically coordinated test fishery. The Council recommended that a nominal amount of 200t be provided for this purpose.

STOCK STATUS OUTLINE

- Catch negligible since 1990.
- Survey made in 1991 detected very few fish.
- Possible links with northern cod.

(from DFO SSR 95/3)

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

ANALYSIS: Catches on 2GH cod have been negligible since 1990 and, while the information on this stock is very limited, indications are that there have been few fish in 2GH in recent years. The Council notes that this stock is likely influenced by the dynamics of neighbouring cod stocks, i.e., northern cod and cod in West Greenland. As a consequence of this, scientists believe that recovery will likely be dependent upon events that take place within these neighbouring stocks. As both of these stocks are low at present, prospects for recovery are poor. The Council notes that the use of the Nordmore grid in the shrimp fishery is intended to eliminate the bycatch of cod.

RECOMMENDATION: The Council recommends that, should any directed fishery be contemplated for 2GH cod in 1996, it be carried out within the framework of a scientifically coordinated test fishery and that a nominal amount of 200t be provided for this purpose.

4.2.2.2 COD: SOUTHERN LABRADOR, NEWFOUNDLAND SHELF AND NORTHERN GRAND BANK (2J3KL)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	266,000	266,000	256,000	266,000	235,000	199,262	190,000	Mora-torium	Mora-torium	Mora-torium	Mora-torium
CATCH	231,300	251,500	235,000	268,700	253,400	218,700	170,900	43,700	11,400	955	148*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: As the June 1993 assessment of 2J3KL cod showed that this stock was at a very low level with poor recruitment prospects, the Council concluded in November 1993 that substantial recovery of the spawning biomass was unlikely before the year 2000 at the earliest. The Council recommended that the moratorium on fishing for 2J3KL cod be continued for 1994 and that strict limits be placed on "food fisheries" to ensure that they were truly for personal consumption. In the consultations that took place in 1994, the FRCC determined that there was an overall consensus for terminating the food fisheries for the moratorium period. Furthermore, because the biomass was at such a critically low level, the Council pointed at the negative impact of predation by seals on stock recovery. The Council recommended that the moratorium on fishing be continued in 1995 for 2J3KL cod and that no recreational/food fishery be permitted. In addition, the Council recommended that a broad-based sentinel fishery program be implemented to complement research surveys. The moratorium has been in place since June 1992 and no food fishery was allowed in 1995, as recommended.

1995 CONSULTATIONS: During the 1995 consultations, the general picture depicted was that seals were abundant, that capelin were almost gone and that cod abundance was very low. Someone noted that the pressure was high to "catch the last cod" and that it does not seem that we have learned from the collapse of the northern cod stock as there was still evidence of illegal fishing activities (e.g., local selling of cod fillets and tongues) in certain areas.

STOCK STATUS OUTLINE

- 1994 biomass estimate from survey is lowest observed.
- Year-classes weak since 1987, improving in '93+'94.
- Biomass at an all time low.
- Adult biomass very low.
- No signs of recovery.

(from DFO SSR 95/3)

Many expressed their frustrations over the apparent lack of control in pursuing violators or in limiting the amount of cod being landed as by-catch in non-cod fisheries. For instance, some indicated that the lumpfish fishery and the black back flounder fishery are, in fact, directed cod fisheries by some fishermen.

COD: 2J3KL (cont)

It was reported that catches were low, overall, on the Northeast Coast Sentinel Fishery and that the fish aggregation encountered during an acoustic research study in Smith Sound had not been seen by the Sentinel Fisheries in Bonavista Bay and Trinity Bay. Some suggested that there should be a spawning biomass of 200,000t and an overall biomass of 700,000t before consideration be given to re-opening this fishery.

ANALYSIS: The Council notes that, as recommended last year, sentinel fishery projects were implemented in 1995. Traps, gillnets and trawl lines were used in various projects. Catch rates for traps, nets and trawl lines were initially low, with the exception of St. Mary's Bay and the headland areas of Trinity Bay. The most-recent information from mid-September suggests that catch rates are improving on trawl lines. In many places, fish are described as healthier and larger than expected. In particular, Fogo Island fishermen were surprised at the size and condition of cod, and report that they have not seen fish like this in at least a decade.

The improvement of ocean conditions in 1994, the identification of some spawning aggregations in 1995, the increase in the abundance of small cod and the improvement in cod condition are encouraging signs. Despite these positive signs, the stock remains at an "extremely low level". Furthermore, the Council is concerned that predation by seals may significantly delay or slow down an eventual recovery.

The Council remains concerned with the numerous reports of cod availability on local markets but notes that at least some of this cod was taken within legal fishing operations as by-catch in non-cod fisheries. There is concern, however, that by-catches are not always truly incidental and that fishing practices have not been optimized to avoid cod.

Recent information on this stock was also analyzed by the NAFO Scientific Council at their June 1995 meeting. They concluded that "the stock remains at a very low level, probably in the order of 1% of that in the early-1980s". Scientists noted an improvement in ocean conditions, in cod growth rates and in the condition of cod. However, the NAFO Scientific Council indicated that stock rebuilding will "only be possible if the moratorium is maintained."

RECOMMENDATION: The Council recommends for 2J3KL cod that the moratorium on fishing be continued in 1996 and that the Sentinel Fisheries program be continued.

4.2.2.3 COD: ST. PIERRE BANK (3Ps)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	41,000	41,000	41,000	41,000	35,400	35,400	35,400	35,400	20,000	Mora-torium	Mora-torium
CATCH	51,400	57,300	57,300	43,400	39,500	41,300	43,100	31,500	14,900**	600	377*

* As of November 15, 1995
****Closed in September 1993.**

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the low estimates of biomass for this stock led the Council to recommend that fishing be discontinued, at least until April 30, 1994. The fishery was closed by DFO in September 1993. While the Council indicated in its November 1993 report that recommendations for this stock would be forthcoming following the analysis of the results of the spring survey, such a review was made unnecessary when the fishery was closed by the Minister of Fisheries and Oceans for the whole year.

In November 1994, the Council determined that the results of the 1994 survey confirmed earlier survey results and indicated that the stock abundance was at the lowest level observed since 1978. Consequently, the Council recommended that there be no directed fishing for 3Ps cod in 1995 and that by-catches be kept to the lowest possible level. The Council also recommended that efforts be made to expand surveys into inshore areas, that no recreational/food fishery be permitted and that a broad-based sentinel fishery program be implemented.

1995 CONSULTATIONS: There was considerable discussion at the Sept. 14, 1995 consultation meeting in Clarenville, Newfoundland, concerning the status of the 3Ps cod stock.

Several participants cannot understand why the fishery is closed. Others maintain that it can't remain closed based on what they perceive as a very successful sentinel fishery, heavy cod bycatches in several groundfish fisheries which led to several closures, a very positive biomass estimate from the 1995 research survey and numerous anecdotal comments about an overall abundance of cod in most areas. There were

STOCK STATUS OUTLINE

- Cod from the 1989 year-class are now mature and must be protected
- No evidence of strong year-class after 1990; increase in 1995 survey due to one large tow.
- Considered to be at a low level of abundance
- Older fish have disappeared; growth rates have declined.

(from DFO SSR 95/3)

COD: 3Ps (cont)

concerns that the monkfish, skate and hake fisheries are catching a lot of cod some of which is being landed in Nova Scotia.

There were several suggestions, one being that a TAC from 20,000 to 25,000t would not hurt the stock, to one that there should be only a limited hook and line fishery in the order of 2,700t. Most felt it should be very limited, e.g.., 3-5,000t. The consensus was, however, that 3Ps cod is one stock that should be considered for re-opening now. The participants indicated that there are more questions than answers regarding the re-opening of any closed fishery. There is a general feeling that managers are moving too slowly in their effort to reduce fishing effort and over capacity. It was suggested that it would not be appropriate to implement a re-opening without a thorough discussion on access and gear composition/selection.

ANALYSIS: A broad based sentinel fishery was conducted in 3Ps in 1995, at twelve (12) selected sites from St-Brides to Ramea, which substantiated many of the findings of the scientific survey. Both gillnets and long line gear was used. Preliminary catch rate data from the late fishery start to June 8th showed that catch rates over all (10 out of 12 ports) were as good or better than they were prior to the moratorium. The Council notes that catch rates were still relatively good in some areas when the moratorium was introduced, but that this could be expected in fisheries prosecuted when cod are aggregated and may not be reflective of a significant biomass. Also, sentinel fishermen are concerned that catch rates might not be sustained for long if everybody were allowed to fish and they wondered what the situation was like in locations other than those where the sentinel fisheries took place.

As well, the 1995 Stock Status Report states that fisheries managers indicated that cod by-catches were a major problem in some alternate groundfish fisheries during 1995, leading to several closures. The factors as noted are not indicative of further stock decline.

The 1994 Stock Status Report indicated that stock abundance continued to be at its lowest since 1978. The biomass and abundance indices from the 1995 survey were substantially higher than those of recent years, but this was related to very large cod catch in a small portion of the survey area. Scientists have warned that these results have to be interpreted cautiously as the age composition determined from the 1995 survey does not indicate "that the apparent increase in 1995 is due to recruitment". They believe that the stock is likely closer in abundance to that estimated for 1992-94.

The reader is referred to Chapter 3 where further details on the Council's thinking regarding this stock are provided.

RECOMMENDATION: The FRCC recommends for 1996 that:

1. **the moratorium on commercial fishing of 3PS cod be continued; and,**
2. **a significantly expanded Sentinel Fishery in line with the planning process and criteria described in Chapter 3 be conducted.**

4.2.2.4 HADDOCK: GRAND BANKS (3LNO)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	——	——	4,100	8,100	8,100	10,000	4,100	4,100	500	500**	100**
CATCH	4,000	7,400	5,700	8,200	6,700	3,200	1,300	1,000	900	1	20*

*As of November 15, 1995
**By-catch limit.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that the TAC had been reduced to 500t for 1993, from 4,100t in 1992, following recommendations from scientists that removals should be limited to a by-catch fishery with a precautionary ceiling of no more than 500t. In order to prevent a repeat of the heavy exploitation that was exerted in the mid-1980s on the 1980 and 1981 year-classes, the Council recommended that there be no directed fishing for the 3LNO haddock stock in 1994 and that by-catches be limited to 500t. Reported catches in 1994 were minimal. In November 1994, the Council reiterated its advice for no directed fishery and recommended reducing the by-catch limit to 100t.

1995 CONSULTATIONS: No specific comments were received on this particular stock during the 1995 consultations in Newfoundland.

ANALYSIS: All indications are that there continues to be no improvement in recruitment and, therefore, no prospects of stock rebuilding in the near future.

RECOMMENDATION: The Council recommends that there be no directed fishing for 3LNO haddock in 1996 and that by-catches be limited to 100t.

STOCK STATUS OUTLINE

- High catches of the 1980s due to strong 1980 and 1981 year classes, which have been fished out.
- No signs of improved recruitment in recent years.
- No prospects of the stock improving in the near future.

(from DFO SSR 95/3)

4.2.2.5 HADDOCK: ST. PIERRE BANK (3Ps)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	—	—	150	2,200	3,200	3,200	3,200	3,200	500	500**	100**
CATCH	7,500	5,400	2,700	2,400	2,900	1,500	500	500	100	10	34*

*As of November 15, 1995
**By-catch limit.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that the TAC had been reduced to 500t for 1993, from 3,200t in 1992, following recommendations from scientists that removals should be limited to a by-catch fishery with a precautionary ceiling of no more than 500t. The Council noted that with the closure of the American plaice and the cod fisheries in 3Ps, the by-catch of haddock would be significantly reduced. The Council recommended that there be no directed fishing for the 3Ps haddock stock in 1994 and that by-catches be limited to 500t. Reported catches in 1994 were minimal, reflecting the closure of the 3Ps cod and American plaice fisheries. In November 1994, the Council reiterated its advice for no directed fishery and recommended reducing the by-catch limit to 100t.

1995 CONSULTATIONS: No specific comments were received on this particular stock during the 1995 consultations.

ANALYSIS: All indications are that recruitment has not improved in recent years and, therefore, the prospects of stock rebuilding in the near future are poor.

RECOMMENDATION: The Council recommends that there be no direct fishing for 3Ps Haddock in 1996 and that by-catches be limited to 100t.

STOCK STATUS OUTLINE

- Stock increased in mid-1980s due to the 1981 year class, which has been fished out.
- No signs of improved recruitment in recent years.
- No prospects of the stock improving in the near future.

(from DFO SSR 95/3)

4.2.2.6 POLLOCK: ST. PIERRE BANK (3Ps)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	—	—	1,500	5,400	5,400	5,400	5,400	5,400	600	500**	100**
CATCH	2,300	7,600	5,100	4,300	3,300	2,000	1,300	500	100	100	148*

*As of November 15, 1995
** By-catch limit.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that there were very few pollock left in 3Ps and that the TAC was reduced, from 5,400t in 1992, to 600t (bycatch only) in 1993. The Council recommended that there be no directed fishing for the 3Ps pollock stock in 1994 and that bycatches be limited to 500t. Reported catches in 1994 were minimal. In November 1994, the Council re-iterated its advice for no directed fishing in 1995 and recommended reducing the by-catch limit to 100t.

1995 CONSULTATIONS: While there was considerable discussion concerning the 3Ps cod stocks during the 1995 consultations, there were no specific comments on 3Ps pollock.

STOCK STATUS OUTLINE

- At the extreme north of geographic distribution for pollock.
- Recent surveys showed low abundance and biomass.
- Schools of small pollock observed in 1995 in some inshore areas.

(from DFO SSR 95/3)

ANALYSIS: The Council notes that this is the northern limit of the range of distribution for pollock and that the catches experienced in the mid- to late-1980s were the result of an unusual recruitment pulse. While the Council notes the presence of schools of small pollock in many south coast harbours in the spring of 1995, it is premature to say if these schools are the signs of a significant recruitment pulse for pollock in 3Ps. In any case, until there is evidence of significant recruitment of pollock in 3Ps, current conservation measures must continue. Should strong recruitment be demonstrated in the future, displacement of fishing effort that could lead to overfishing this pulse must be avoided.

RECOMMENDATION: The Council recommends that there be no directed fishing for 3Ps pollock in 1996 and that by-catches continue to be limited to 100t.

4.2.2.7 REDFISH: LABRADOR AND NORTHERN NEWFOUNDLAND (2+3K)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	35,000	35,000	35,000	35,000	35,000	35,000	20,000	20,000	20,000	1,000	200
CATCH	29,200	27,000	18,500	6,900	3,200	2,400	239	15	2	9	0*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In 1993, the Council observed that, given the very low level of this stock, the TAC of 20,000t was too high. The Council recommended, as a precautionary measure, that the 1994 TAC for the 2+3K redfish stock be set at 1,000t. There was practically no fishing during 1994. In November 1994, the Council recommended that any directed fishery, should it be allowed, be carried out within the framework of a scientifically coordinated test fishery and that a nominal amount of 200t be provided for that purpose. The 1995 TAC was set at 200t.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

ANALYSIS: The Council notes that this stock is at an extremely low level and that recovery in the short- to mid-term is unlikely in view of poor recruitment prospects.

STOCK STATUS OUTLINE

- Virtually no recruitment since year-classes of the early 1970s.
- Stock at a very low level.

(from DFO SSR 95/3)

RECOMMENDATION: The Council recommends that, should any directed fishery be contemplated for 2+3K redfish in 1996, it be carried out within the framework of a scientifically coordinated test fishery and that a nominal amount of 200t be provided for this purpose.

4.2.2.8 REDFISH: 3O

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	20,000	20,000	20,000	14,000	14,000	14,000	14,000	14,000	14,000	10,000	10,000
CATCH	12,900	11,100	27,200	34,800	13,300	14,200	8,300	14,300	15,700	1,610	180*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended, as a precautionary measure, to reduce the TAC to 10,000t for 1994, from 14,000t in 1993. In November 1994, the Council expressed it's concern over the uncertainties related to the origin and abundance of small redfish in this Division. The Council recommended that the 1995 TAC be set at 10,000t but that a small fish protocol be established to protect juvenile redfish and that research be accelerated to determine the origin of the small fish found in this Division

The information provided in the 1995 Stock Status Report suggests that recent increases in 3O may be partially associated with declines in 3N. Also, redfish in 3O are more closely related to 3N, in so far as growth rates and maturity are concerned, than with redfish found further west.

1995 CONSULTATIONS: Generally, stakeholders look forward to the results of the research work underway and in the meantime support the continuation of the current TAC.

STOCK STATUS OUTLINE

- Larger fish found in deeper hard-to-fish areas.
- fishermen at shalower depths target small, immature fish.
- Conflicting stock indicies; not possible to estimate stock abundance.

ANALYSIS: The Council notes the progress made in the establishment of a joint DFO/industry Multidisciplenary Research Program on redfish. In particular, the Council believes that the stock structure must continue to be studied so as to clarify the links with redfish in neighbouring Divisions and to clarify whether redfish in Division 3O are resident or migrate from another area. The Council believes that the difficulties in interpreting the abundance indicies are compounded by the limited understanding of the stock structure and stock dynamics. The Council is particularly concerned with the predominance of small immature redfish in the shallower waters which are easier to fish and could attract a sigificant proportion of the fishing effort.

RECOMMENDATION: The Council recommends that the TAC for 3O redfish be set at 10,000t and that a small fish protocol continue to be used for this stock.

4.2.2.9 REDFISH: LAURENTIAN CHANNEL (3Ps4Vs4Wfg+3Pn4Vn (Jun.-Dec) - Unit 2)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC**	18,000	18,000	18,000	15,000	15,000	10,000	15,000	25,000	28,000	25,000	14,000
CATCH	11,500	10,800	14,000	10,700	15,400	14,800	23,500	17,300	27,100	21,250	11,822*

*As of November 15, 1995
**TACs for 1984-1992 are for former management unit (3P)

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the TAC for Unit 2 redfish be reduced from 28,000t to 25,000t in 1994. Following the next years regular fall consultations and based on requests from stakeholders, the Council held special consultations on redfish. There was no agreement amongst stakeholders on the overall status of this stock. In November 1994, the Council recommended that the TAC be set at 20,000t for 1995 and that a small fish protocol be established to protect juvenile redfish. The Council also recommended that no fishing be permitted in 3Pn and 4Vn during November and December and that the scientific work be strengthened and elaborated so as to clarify redfish management units and develop a better understanding of migration patterns and stock status. The Council recommended that, in consultation with industry stakeholders, the fishery be limited as much as practical during the January to June period to avoid taking fish that may, in fact, be fish from Unit 1. The Minister reduced the TAC to 14,000t for 1995 and implemented measures to avoid catching Unit 1 redfish when they could be mixed with redfish from Unit 2.

Further to the recommendation of the Council for a joint industry/science initiative for redfish, a multidisciplinary research program was developed jointly with industry stakeholders in an attempt to address key questions related to redfish biology, stock definition and migrations, and stock status.

1995 CONSULTATIONS: During a special consultation held through a conference call on October 19, 1995, following release of stock status information on redfish, catch rates were categorized as good, stable or constant for the July-October period. The winter closure was found to be acceptable and did not appear to have created undue problems. There was a general agreement that large fish were declining

STOCK STATUS OUTLINE

- Late 1980s year-classes good but not as strong as those of early 1980s.
- Abundance of fish larger than 25 cm. is expected to decline.
- Summer surveys suggest stable abundance in 1994 and 1995.
- Proportion of older, commercial sized, fish declined from 1994 to 1995.

(from DFO SSR 95/3 and 95/8)

REDFISH: Unit 2 (cont)

and that we must be cautious in establishing TAC levels for future years until there is certainty about the actual abundance of the next pulse of recruitment from the 1988 year-class. It was agreed that a reduction in the TAC for 1996 would be in order.

ANALYSIS: The Council notes that while the abundance of Unit 2 redfish remained relatively stable between 1994 and 1995, the abundance of redfish of harvestable size (mainly 25 cm) is expected to continue to decline in upcoming years. Scientists forecast that the redfish from the 1988 year-class will not reach the size range of (traditional) commercial interest before 1997 or 1998 and warned that this year-class may not be as large as that of the early 1980s.

The Council remains concerned about the overall state of this stock, particularly the decline in abundance of larger fish. As well, Council supports the industry's desire to take a cautious approach to the setting of TACs for future years.

The Council welcomes the development of a joint industry-Science approach to address basic biological questions related to redfish in the Northwest Atlantic. The recommendations of the Council on redfish research has led to an immediate and thorough response through the creation of a joint stakeholder-scientist undertaking aimed at developing an integrated and multi-disciplinary research on redfish. The efforts made by all contributors to advance knowledge on redfish in this area and the high priority given by scientists for the development of a multi-disciplinary program have been noted and should serve as a model for future undertakings.

RECOMMENDATION: The FRCC recommends that:

1. **the 1996 TAC for Unit 2 Redfish be set at 10,000t;**
2. **a small fish protocol be established and rigidly enforced;**
3. **no fishing be permitted in 3Pn and 4Vn during November and December; and,**
4. **the fishing be limited, as much as is practical, during the January to June period.**

4.2.2.10 AMERICAN PLAICE: LABRADOR & NORTHEAST NEWFOUNDLAND (2+3K)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	5,000	500	100**
CATCH	800	3,000	1,100	1,000	4,200	1,800	500	100	80	74	22*

*As of November 15, 1995
** By-catch limit

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that the spawning biomass was far below any previous level and that there were no signs of good recruitment for this stock. The Council recommended that there be no directed fishing for 2+3K American plaice in 1994 and that by-catches be limited to 500t. The Council re-iterated its recommendation in November 1994 for no directed fishing, together with a reduction in the by-catch limit to 100t. These recommendations were accepted.

STOCK STATUS OUTLINE

- Decline in recruitment in recent years.
- Abundance very low.
- Spawning stock abundance about 2% of peak values.

(from DFO SSR 95/3)

1995 CONSULTATIONS: There were no comments during the 1995 consultations specific to this stock.

ANALYSIS: It is clear from research vessel data that this stock has declined to an extremely low level. The 1995 Stock Status Report indicates that any directed fishery in 1996 could be detrimental to stock rebuilding.

RECOMMENDATION: The Council recommends that there be no directed fishing for 2+3K American plaice in 1996 and that by-catches be limited to 100t.

4.2.2.11 AMERICAN PLAICE: ST. PIERRE BANK (3Ps)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	5,000	5,000	5,000	5,000	5,000	4,000	4,000	4,000	5,000	500	100**
CATCH	4,200	5,100	5,300	4,400	3,900	4,800	4,400	2,300	800	100	78*

*As of November 15, 1995.
**By-catch limit.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that this stock had declined below any previously-observed level and that there were no signs of good recruitment. The Council recommended that there be no directed fishing for 3Ps American plaice in 1994 and that by-catches be limited to 500t. In November 1994, the Council re-iterated its recommendation for no directed fishing, together with a reduction of the by-catch limit to 100t.

1995 CONSULTATIONS: No comments were received on this particular stock during the 1995 consultations.

ANALYSIS: The 1995 Stock Status Report indicates that the abundance of all age groups has declined and there has been a decrease in recruitment. The overall outlook remains bleak given the current low stock size and lack of recruitment.

STOCK STATUS OUTLINE

- Recruitment very low.
- Stock currently at a very low level.
- Spawning stock biomass the lowest since 1975.

(from DFO SSR 95/3)

RECOMMENDATION: The Council recommends that there be no directed fishing for 3Ps American plaice in 1996 and that by-catches be limited to 100t.

4.2.2.12 WITCH FLOUNDER: LABRADOR & NORTHERN GRAND BANKS (2J-3KL)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	8,000	8,000	6,000	5,000	5,000	4,000	4,000	4,000	4,000	1,000	100**
CATCH	3,000	3,900	4,500	4,200	4,900	3,600	4,000	2,300	340	10	5*

*As of November 15, 1995.
** Bycatch limit

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that the biomass was far below any previous estimate in the 15-year time series, and consequently recommended that, as a precautionary measure, the 1994 TAC for 2J3KL witch flounder be reduced to 1,000t. There was very little fishing effort expended in this area in 1994. In November 1994, the Council recommended that there be no directed fishing for 2J3KL witch flounder in 1995 and that by-catches be limited to 100t.

1995 CONSULTATIONS: While there was considerable discussion on many of the stocks affected by the current moratorium during the 1995 consultations in Newfoundland, there were no specific comments received on this particular stock.

STOCK STATUS OUTLINE

- Area of distribution shrinking.
- Stock presently at an extremely low level.

(from DFO SSR 95/3)

ANALYSIS: The 1995 Stock Status Report indicates that this stock remains at an extremely low level and that any exploitation of it in its present state continues to be unjustifiable from a conservation perspective.

RECOMMENDATION: The Council recommends that there be no directed fishing for 2J3KL witch flounder in 1996 and that by-catches be limited to 100t.

4.2.2.13 WITCH FLOUNDER: ST. PIERRE BANK (3Ps)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	3,000	3,000	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
CATCH	600	1,300	1,300	600	900	1,000	1,100	1,100	1,000	400	111*

*As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council noted that this stock had been relatively stable and recommended that the TAC level of 1,000t be maintained for 1994. In November 1994, the Council re-iterated its recommendation for the continuation of a TAC level of 1,000t for 1995.

1995 CONSULTATIONS: During the 1995 consultations, concern was expressed that this fishery could not be prosecuted due to high by-catches of cod.

1995 DFO STOCK STATUS REPORT

- Recent biomass estimates at the low end of observations.

(from DFO SSR 95/3)

ANALYSIS: The 1995 Stock Status Report indicated that research survey data for this stock does not indicate any increase in recruitment in recent years. However, it is anticipated that this stock should not decline under present conditions. Scientists warn that the TAC level of 1,000t was based on surveys which averaged 4,000t but that survey estimates have declined to about 2,000t in recent years.

RECOMMENDATION: The Council recommends that the 1996 TAC for 3Ps witch flounder be set at 500t.

GREENLAND HALIBUT 0-3

OVERVIEW

Greenland halibut in the northwest Atlantic (with the exception of those in the Gulf of St. Lawrence) are considered to be one stock extending from Davis Strait, south to the Grand Banks. In a special FRCC report to the Minister in June 1994, the Council stated that Greenland halibut in Subareas 0,1,2 and 3 inside and outside Canada's 200-mile fisheries zone must be managed by a comprehensive conservation management plan. In particular, the Council observed that from a conservation point of view, the stock situation was alarming and was characterized by a significant declining traditional fishery, the absence of mature individuals, and very few year-classes contributing to the total biomass.

In June 1994, the NAFO Scientific Council concluded that a reduction in fishing effort would require that the TAC for 1995 be set well below the present catch levels. The Scientific Council recommended that a separate TAC be established for Division OB and Division 1BCDEF, and that it be set below 11,000t for 1995. A separate TAC of 12,000t was also recommended for Div. 1A. For Subareas 2+3, they considered that any catch level above 40,000t for 1995 would not be adequate to restrict the fishery and expressed the concern that, based on some of the available stock indicators, the catch in 1995 should be substantially lower to halt the decreasing biomass trend.

The reports led the Minister of Fisheries and Oceans to announce, on June 29, 1994, a reduction of the Subarea 0 quota from 12,500t to 5,500t and the cancellation of the developmental fisheries in Division 2GH, off Labrador. In addition, the Minister reduced in July the Canadian quotas from 12,500t to 3,000t in Subarea 2, and from 12,500t to 3,500t in Subarea 3.

In August 1995, in a letter to the Minister of Fisheries and Oceans the FRCC re-iterated the need for maintaining reduced TACs. The conclusion of the Scientific Council that the large catches of immature Greenland halibut are a major impediment to stock rebuilding was noted. The FRCC suggested that Canada's objective for the near future should be to rebuild the stock to biomass levels of the early 1980s in order to support a sustainable fishery in the long term.

4.2.2.14 GREENLAND HALIBUT - 0B+1B-F

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	11,000
CATCH	1,000	300	1,300	2,600	2,200	15,600	11,400	14,500	11,900	4,700	4,074*

*As of November 15, 1995 (Canada only)
**TAC for SA0+1, catches are for 0B+1B-F.

HISTORY OF FRCC RECOMMENDATIONS: In its first reports (November 1993 and June 1994) on Greenland halibut, the Council recommended that the TAC for Subarea 0+1 Greenland halibut be set at 25,000t (12,500t for Subarea 0). Further work of the NAFO Scientific Council in June 1994 led to the recommendation that the 1995 TAC be set below 11,000t for Divisions 0B and 1B-F, i.e., below the offshore catch levels (11,000-15,000t) seen in recent years.

In November 1994, the Council recommended that the 1995 TAC be set below 11,000t and recommended that the conservation merits and feasibility of closing a spawning area in Davis Strait be evaluated in bilateral discussions with Greenland on appropriate sharing arrangements. The 1995 Canadian quota for Subarea 0 was set at 5,500t.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations. However, concern has been expressed over the uncontrolled expansion of gillnet gear use in the area around Baffin Island. Many believe that there is an impact on the ecosystem in this area from "ghost nets".

ANALYSIS: In June 1995, the NAFO Scientific Council concluded that Greenland halibut in this area appear to be declining and recommended that the 1996 TAC be set below 11,000t for 1996 in an attempt to halt the decline.

RECOMMENDATION: The Council recommends that the 1996 TAC for Greenland halibut in 0B+1B-F be set below 11,000t and that in view of the international nature of this resource, the feasibility of closing a spawning area in the Davis Strait be given consideration in bilateral discussions with Greenland with respect to appropriate sharing arrangements.

4.2.2.15 GREENLAND HALIBUT: 2+3

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	75,000	100,000	100,000	100,000	100,000	50,000	50,000	50,000	50,000	25,000	6,790
CATCH	20,300	18,000	32,400	18,400	18,900	47,400	55,000 to 75,000	63,000	62,000	48,000	2,548*

* As of November 15, 1995 (Canada only)

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Fisheries Resource Conservation Council called for significant reductions in catches in the Regulatory Area and for a joint commitment to appropriately address the scientific questions related to stock structure. In November 1993, the Council concluded that the 1994 TAC for 2+3KLMN Greenland halibut should be reduced substantially and that catches in the order of the historical catch level of 25,000t should be a maximum level.

The Council further noted, in June 1994, the absence of controls on the foreign fishery outside 200 miles and recommended that "all means be taken by Canada to limit the effort on this stock". In November 1994, the Council reiterated that catches in the order of the historical catch level of 25,000t should be a maximum level.

The NAFO Scientific Council concluded in June 1995 that the TAC for Greenland halibut in 2+3KLMNO should continue to be set at levels well below the catches achieved in recent years until it is clear that the stock is increasing. In addition, the Scientific Council recommended that measures be considered to reduce, as much as possible, the exploitation of juvenile Greenland halibut.

In August 1995, in a letter to the Minister of Fisheries and Oceans the FRCC re-iterated the need for maintaining reduced TACs. The conclusion of the Scientific Council that the large catches of immature Greenland halibut are a major impediment to stock rebuilding was noted. The FRCC suggested that Canada's objective for the near future should be to rebuild the stock to biomass levels of the early 1980s in order to support a sustainable fishery in the long term.

The NAFO Fisheries Commission concluded at the September 1995 meeting that the 1996 TAC would be set at 20,000t for Greenland halibut in 3LMNO, with an additional TAC of 7,000t to be allowed in SA2+3K (Canada only).

1995 CONSULTATIONS: During the 1995 consultations concerning turbot, it was reported that catches had been decreasing in 2J+3KL over the past few years. It was also noted that the fixed gear fishery moved north in its search for fish and expands now to the entrance of Cumberland Sound.

GREENLAND HALIBUT: 2+3 (cont)

ANALYSIS: The Council observed that from a conservation point of view, the stock situation is alarming and is characterized by a significantly declining traditional fishery, a drastic reduction in mature individuals and very few year classes contributing to the total biomass. In light of these facts and given the tremendous amount of uncertainty surrounding the health of this stock we must again emphasize the importance of limiting the effort that is directed at this stock. Over the past ten years the fishery for Greenland halibut has shifted from a predominantly 2J+3KL fishery, inside 300 fathoms, to a fishery that is now prosecuted in the extreme north and south of the range outside 500 fathoms. The fishery is now predominantly a harvest of immature individuals in the south and directed at a greatly reduced biomass in the north.

Based on the shifting of the fishing effort, the harvest of immature fish, the dramatic decrease in the distribution of older fish and the unknown effect of ghost fishing by lost gill nets, the FRCC continues to be concerned about the health of this stock and must reiterate that the catch of Greenland halibut should be kept below 25,000t. We emphasize that, given the shifting fishing pattern and the uncertainty surrounding the scientific information , the TAC and the allocations within it be viewed as upper limits that should not be exceeded rather than targets that fishermen strive to attain. Further, effort redirection in this fishery should be looked upon as extremely dangerous for the health of the stock and should not occur.

RECOMMENDATION: The Council continues to believe that current TACs must be viewed as at the upper limits of what this stock can sustain. Further, the Council believes effort re-direction in this fishery is extremely dangerous for the health of this stock and should be stopped.

4.2.2.16 ROUNDNOSE GRENADIER: SUBAREA 0

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	500
CATCH	100	100	400	500	80	160	160	190	100	0	0*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In its previous reports (November 1993 and 1994), the Council recommended that the TAC for roundnose grenadier in Subarea 0 be set at 4,000t. The TAC for Subarea 0 was set at 500t for 1995.

1995 CONSULTATIONS: There were no specific comments received on this stock during the 1995 consultations.

ANALYSIS: Catches have remained very low over the past ten years. In June 1995, the Scientific Council of NAFO recommended that there be no directed fishing for roundnose grenadier in 1996 and that catches be restricted to by-catches in fisheries targeting other species. Scientists believe this stock is at a very low level of abundance.

RECOMMENDATION: The Council recommends that there be no directed fishing for roundnose grenadier in Subarea 0 in 1996.

4.2.2.17 ROUNDNOSE GRENADIER: 2+3

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	3,000	3,000
CATCH	4,900	7,400	7,300	5,400	4,600	800	5,000-10,000	3,000	4,400	36	18*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In its previous reports (November 1993 and 1994), the Council recommended that the TAC for SA2+3 roundnose grenadier be set at 3,000t. The TAC was reduced from 11,000t in 1993 to 3,000t in 1994 and 1995, consistent with the recommendations of the Council.

1995 CONSULTATIONS: No comments were received on this particular stock during the 1995 consultations.

ANALYSIS: There has been very little fishing actively for this species. In June 1995, the Scientific Council of NAFO advised that the current TAC may be excessive. Scientists advised that there was an important decline in biomass estimates in 3K between 1994 and 1995 but that this decline could not be attributed to the fishery as catches have been low. While fisheries by Germany and the Russian Federation traditionally took place in the Canadian zone, catches since 1992 have been totally from the NAFO Regulatory Area. In recent years, there were no allocations to non-Canadian vessels inside the Canadian zone. The Council is concerned about the state of this stock, particularly the decline in the 3K biomass.

RECOMMENDATION: The Council recommends that, should any directed fishery be contemplated for 2+3 roundnose grenadier in 1996, it be carried out within the framework of a scientifically coordinated test fishery and that a TAC of 1,000t be set for this purpose.

4.2.2.18 SKATES: GRAND BANKS (3LNOPs)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC											6,000
CATCH	11,400	15,900	19,300	19,500	15,900	14,700	28,400	5,000	2,000	3,000	3,268*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: This is the first year that the FRCC has reported on this particular stock. Consequently there are no previous recommendations.

1995 CONSULTATIONS: In the Deer Lake and Clarenville meetings fishermen expressed concern that this fishery was begun without adequate caution and information; a suggestion was made that we should start fishing "right" rather than later having to fix up fisheries once stocks are depleted.

ANALYSIS: Declines in other groundfish species have quickly directed fishery effort toward skate. Landing data cannot be totally trusted as some non-Canadian reported landings may have actually been other species such as flatfish or cod. Canadian surveillance has estimated that catches outside 200 nm are higher than those reported.

STOCK STATUS OUTLINE

- Interest in skates growing with decline in traditional species.
- Biomass estimates declining since 1986.
- Average size declining quite dramatically.
- Consider managing 3LN, 3O and 3Ps separately.

(from DFO SSR 95/3)

The Council is concerned with the dramatic declines in survey biomass indexes in all fishery zones and with dramatic declines in the size of fish taken. Quotas were set in l995 because of concern that the rapidly developing uncontrolled fishery would quickly deplete the skate stocks. Quotas were based on a 20% exploitation rate of the l991-l993 average survey biomass indices and were divided by area because of fishing interest; the quotas were split between the Grand Banks (5000t) and St. Pierre Bank (l000t). Concentrated fishing can deplete populations as skate remain as residents to a local area. Because of this, fishing effort should be spread amongst different areas and concentrations of fish.

The Council is concerned about declines in this species and unregulated fishing outside Canada's 200nm jurisdiction where the highest landings are reported. Canada's position at NAFO should be to request that skate become a regulated species.

SKATES: 3LNOPs (cont)

RECOMMENDATION: The Council recommends that the 1996 TAC for 3LNOPs skate be set at 2,000t and, that steps be taken to spread effort amongst different stock concentrations to ensure that fishing effort is not concentrated in one area.

4.2.2.19 LUMPFISH: NEWFOUNDLAND

FISHERIES STATISTICS (from DFO)

Roe Landings (mt)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC											
CATCH	1,000	1,500	3,000	3,300	2,300	1,200	2,100	1,900	2,400	1,500	*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: This is the first year that the FRCC has reported on this particular stock. Consequently there are no previous recommendations.

1995 CONSULTATIONS: One fishermen for the Great Northern Peninsula reported catches of only three lumpfish in l995; for a number of years, this same fishery had provided him with a good income. Unanimously, fishermen reported re-directed effort to lumpfish during moratoriums on major species. Individual fishermen expanded effort when a l00 net limit was introduced in l993; this limit was reduced to 50 nets in l995 but this measure did not effectively reduce total effort. All fishermen reported declining catches and indicated that stocks were greatly reduced.

STOCK STATUS OUTLINE

- 25% decline in roe landings.
- Proportion of females in survey catch declining.
- Catch rates declining in 3K; low in 3Ps for 1994.

(from DFO SSR 95/3)

ANALYSIS: There is little research work done on the lumpfish and the stock structure is not known. Research surveys have generally estimated less than 2,000 metric tons in Divisions 3K and 3L. In Division 3Ps, the surveys indicate a decline in biomass by an order of magnitude from l984 to l995. The catch of females has declined steadily during this same period. Examination of logbook records from fishermen indicate declines of 80-90% in CPUE over the past decade, with declines of as much as 70% in the past several years by some. The decline in catches is not as evident in Subdivision 3Ps but l994 estimates are the lowest on records even though total landings have remained fairly high.

The Council is concerned with the lack of research and knowledge, the level of effort which cannot be matched to the resource, declining percentages of females in the catches and dramatically declining catches in most cases even with increased effort.

LUMPFISH: NEWFOUNDLAND (cont)

In its 1994 Groundfish Report, the FRCC recommended that marine protected areas be considered. The 1995 Stock Status Report specifically recommended closed spawning areas for lumpfish in major bays. The lumpfish fishery is for pre-spawning mature females that lay eggs in male territories which are then maintained on the ocean bottom for several years. This makes the stock extremely vulnerable to over-exploitation but also predicts high potential value of closed areas management or natural refuges for the conservation of this species

RECOMMENDATION: The Council recommends that:

1. **management measures such as shortened seasons be put in place to reduce the effort on this stock;**
2. **roe content monitoring programs, similar to those employed in the capelin fishery be put in place, to monitor roe content to ensure that fishing takes place at an appropriate time; and,**
3. **closed and protected spawning areas be established for this stock.**

4.2.3 STOCKS IN THE NAFO REGULATORY AREA

The Terms of Reference of the Fisheries Resource Conservation Council state that the Council may also advise the Minister on the position to be taken by Canada with respect to transboundary stocks under the jurisdiction of international bodies such as the Northwest Atlantic Fisheries Organization (NAFO).

The FRCC submitted its first report to the Minister of Fisheries and Oceans on NAFO managed stocks and other stocks in the Regulatory Area of interest to Canada in August 1993. That report recommended extending the moratorium on 2J3KL cod; implementing moratoria for 1994 on 3LNO American plaice, 3LNO yellowtail flounder, 3NO witch flounder and 3NO cod; finding a mechanism to limit catches of Greenland halibut in Subareas 2 and 3 to a maximum of 25,000t per year; and implementing a proper conservation and management regime for 3M shrimp.

In August 1994, the FRCC presented the Minister with its advice for 1995 on these stocks. The Council recommended for 1995: to continue the moratorium for 2J3KL cod, 3LNO American plaice, 3LNO yellowtail flounder, 3NO witch flounder, 3NO cod and 3NO capelin; to address the concerns raised by the exploitation of immature fish in the directed fisheries in the Regulatory Area; to take the lead in proposing that NAFO immediately implement a cautious approach to managing 3M shrimp; to take a responsible and conservation-oriented position in dealing with other fisheries which might be considered of lesser importance to Canada, such as those occurring on the Flemish Cap.

In a letter to the Minister of Fisheries and Oceans dated August 15, 1995, the Council reaffirmed its support for an effective management regime in the NAFO Regulatory Area. The FRCC believes that "the major challenge for NAFO is to change its focus from exploitation to conservation". The Council noted that with Canadian leadership, progress has been made, particularly for straddling stocks where moratoria have been adopted because stocks were at record low levels. The Council expressed its support for the management and enforcement measures negotiated with the European Union last spring and encouraged Canada to place high priority on convincing the NAFO Fisheries Commission to adopt these measures for all fisheries in the NAFO Regulatory Area.

The FRCC notes that recent reports of the NAFO Scientific Council continues to stress that many of the stocks in the NAFO Regulatory Area are at, or near, all time low levels and that, in order for rebuilding to occur, year-classes must be protected until they are mature. The NAFO Fisheries Commission met in September 1995 and management decisions have been taken for 1996. For completeness, information on the stocks of particular interest to Canadian fishermen follows.

4.2.3.1 STOCKS IN THE NAFO REGULATORY AREA: COD - 3NO

FISHERIES STATISTICS

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	33,000	33,000	33,000	40,000	25,000	18,600	13,600	13,600	10,200	6,000*	0
CATCH	36,900	50,700	41,600	43,200	33,300	29,400	29,400	12,600	9,700	2,700	100**

*No direct fishery in 1994
**As of November 1, 1995 for Canadian catches; as of October 10 for catches reported to NAFO.

STOCK STATUS OUTLINE

- 1989+1990 year-classes not as strong as expected; year-classes since 1990 appear to be weak.
- Stock at all time low.
- Total and spawning biomass lowest in series.
- The 1989+1990 year classes no longer offer much rebuilding opportunities.

In the June 1995 report of the NAFO Scientific Council, scientists indicated that this stock was at "an all time low in 1994 and was represented mainly by 2 year-classes" (those of 1989 and 1990). Recent survey data suggest that the year-classes since 1990 may be weak and that current estimates of the 1989 and 1990 year-classes, which were believed to be average, are much lower than previously estimated. Sampling information indicates that commercial fisheries have targeted these year classes since 1991. In 1994, scientists warned that the spawning stock biomass cannot begin to recover unless the 1989 and 1990 year-classes survive to maturity. In particular, they indicated that rebuilding will not happen if fisheries on immature fish continue at current high levels. The NAFO Scientific Council recommended that there "be no direct fishing for cod in Div. 3N and 3O in 1996" and that "by-catches in fisheries targeting other species should be kept at the lowest possible level".

In August 1994, in a letter to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium in 1995 for cod in Div. 3NO and pointed at the need to address the concerns raised by the exploitation of immature fish in the directed fisheries in the Regulatory Area by non-contracting parties. At the September 1994 meeting of the NAFO Commission, is was agreed to continue the moratorium on 3NO cod in 1995.

In its August 1995 letter to the Minister of Fisheries and Oceans, the Council reiterated its recommendation for the continuation of the moratorium on 3NO cod in 1996. The Council is particularly concerned with the low levels of biomass and the lack of recruitment for this stock. At the September 1995 meeting of the Fisheries Commission, it was agreed to continue the moratorium for direct fishing on 3NO cod in 1996.

4.2.3.2 STOCKS IN THE NAFO REGULATORY AREA: AMERICAN PLAICE - 3LNO

FISHERIES STATISTICS

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	49,000	55,000	48,000	40,000	30,300	24,900	25,800	25,800	10,500	4,800*	0
CATCH	54,200	64,600	55,000	40,800	43,369	32,500	33,900	12,600	17,300	7,000	500**

*** No direct fishery in 1994**
****As of November 1, 1995 for Canadian catches; as of October 10 for catches reported to NAFO.**

In the June 1995 Report of the NAFO Scientific Council, scientists indicated that the abundance of American plaice in 3LNO is "at a record low level". Given the extremely low population size, the concerns with respect to the spawning biomass, and the apparently large (but unexplained) mortality on juvenile plaice, the NAFO Scientific Council recommended that there "be no fishing for American plaice in Div. 3LNO in 1996" and that by-catches "be reduced to the lowest possible level".

STOCK STATUS OUTLINE

- Stock at a record low level.
- 1988+1989 year-classes show some promise but no evidence of large year-class since.
- Recovery in short term unlikely.
- In past, high abundance of juveniles has not translated into stronger fishable stock.

In its letter of August 8, 1994 to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium in 1995 for American plaice in Division 3LNO. The Council also pointed at the need to address the concerns raised by the exploitation of immature fish in the directed fisheries by non-contracting parties, as well as the suspected high and increasing by-catches of American plaice in the Greenland halibut fishery by both contracting and non-contracting parties. At the September meeting of the NAFO Commission, it was agreed to continue the moratorium on 3LNO American plaice in 1995.

In its August 1995 letter to the Minister of Fisheries and Oceans, the Council reiterated its recommendation for the continuation of the moratorium on 3LNO American plaice in 1996. The Council is particularly concerned with the low levels of biomass and the apparent lack of recruitment for this stock. At the September 1995 meeting of the NAFO Fisheries Commission, it was agreed to continue the moratorium for fishing on 3LNO American plaice in 1996.

4.2.3.3 STOCKS IN THE NAFO REGULATORY AREA: YELLOWTAIL FLOUNDER - 3LNO

FISHERIES STATISTICS

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	15,000	15,000	15,000	15,000	5,000	5,000	7,000	7,000	7,000	7,000*	0
CATCH	29,000	30,200	16,300	16,200	10,200	14,000	16,300	10,800	13,600	2,000	100**

*No direct fishery in 1994
**As of November 1, 1995 for Canadian n catches; as of October 10 for catches reported to NAFO.

STOCK STATUS OUTLINE

- Stock remains stable at a low level.
- Potential growth from the 1984-86 year-classes has not occurred, probably because of large catches of juveniles in the NAFO Regulatory Area.
- Annual catches exceeded TACs from 1984 to 1993.
- Contraction of geographic distribution.

In the June 1995 Report of the NAFO Scientific Council, scientists indicated that the "potential growth on the stock from the relatively large 1984-86 year-classes has not occurred, likely because of large catches of these cohorts as juveniles by fisheries in the Regulatory Area, and because the TAC has been exceeded each year from 1984 to 1993." The NAFO Scientific Council concluded that this "stock is at a low level". The scientists also noted that the geographic distribution of this stock has contracted in recent years, making it very vulnerable to over-exploitation. In view of the above, the NAFO Scientific Council recommended that "there should be no directed fishing on yellowtail flounder in 1996" and that by-catches "be reduced to the lowest possible level".

In its letter of August 8, 1994 to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium in 1995 for yellowtail flounder in Division 3LNO. The Council also pointed at the need to address the concerns raised by the exploitation of immature fish in the directed fisheries in the Regulatory Area by non-contracting parties. At the September meeting of the NAFO Commission, it was agreed to continue the moratorium on 3LNO yellowtail flounder in 1995.

In its August 1995 letter to the Minister of Fisheries and Oceans, the Council reiterated its recommendation for the continuation of the moratorium on 3LNO yellowtail flounder in 1996. The Council is particularly concerned with the low levels of biomass and the lack of recruitment for this stock. At the September 1995 meeting of the Fisheries Commission, it was agreed to continue the moratorium for fishing on 3LNO yellowtail flounder in 1996.

4.2.3.4 STOCKS IN THE NAFO REGULATORY AREA: WITCH FLOUNDER -3NO

FISHERIES STATISTICS

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	3,000*	0
CATCH	8,800	9,100	7,600	7,300	3,700	4,200	4,800	4,800	4,400	1,100	300**

* No direct fishery in 1994
** As of November 1, 1995 for Canadian catches; as of October 10 for catches reported to NAFO.

STOCK STATUS OUTLINE

- Stock appears to be at very low level.

In the June 1995 Report of the NAFO Scientific Council, scientists indicated that this "stock appears to be at a very low level". The scientists observed that the 1994 catches were of the order of 1,100t, despite the moratorium on directed fishing. The NAFO Scientific Council recommended that no fishing be permitted on witch flounder in Division 3NO in 1996 in an effort to rebuild this stock to former levels. Scientists also recommended to reduce by-catches to the lowest possible level.

In its letter of August 8, 1994 to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium in 1995 for witch flounder in Division 3NO. At the September meeting of the NAFO Commission, it was agreed to continue the moratorium on 3NO witch in 1995.

In its August 1995 letter to the Minister of Fisheries and Oceans, the Council reiterated its recommendation for the continuation of the moratorium on 3NO witch flounder in 1996. At the September 1995 meeting of the Fisheries Commission, it was agreed to continue the moratorium for fishing on 3NO witch flounder in 1996.

4.2.3.5 STOCKS IN THE NAFO REGULATORY AREA: REDFISH - 3LN

FISHERIES STATISTICS

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	25,000	25,000	25,000	25,000	25,000	25,000	14,000	14,000	14,000	14,000	14,000
CATCH	20,600	42,800	79,000	53,300	33,600	29,100	25,800	27,300	23,000	7,000	1,300*

*As of November 1, 1995 for Canadian catches; as of October 10 for catches reported to NAFO.

In the June 1995 report of the NAFO Scientific Council, the scientists concluded that redfish abundance was very low in Division 3L, with no sign of good recruitment. In Division 3N, they observed that the stock has declined from 1984 to 1991 but that "the status since then is uncertain". The Scientific Council of NAFO recommended for 1996 that "total catches of redfish in Division 3LN should not exceed 14,000t in 1996".

STOCK STATUS OUTLINE

- Catch within TAC for first time since 1985.
- Poor recruitment in 3L since the early-1980's; in 3N, no sign of recruitment after 1986-87 year-class.
- Stock very low in 3L; uncertain in 3N.

The Fisheries Resource Conservation Council made no specific recommendation on this stock for 1995. At the September meeting of the NAFO Commission, it was agreed to set the 1995 TAC for 3LN redfish at 14,000t.

In its August 1995 letter to the Minister of Fisheries and Oceans, the Council concluded that abundance in 3L appears very low, with no sign of good recruitment, and abundance in 3N has declined to an unknown extent, with no sign of any good year-class since those of 1986/87. The Council noted that for the first time in many years, the TAC was not taken in 1994, due largely to unsuccessful fisheries by several member states. The Council concluded that a cautious approach was crucial for 3LN redfish and that the TAC for 1996 should be substantially reduced from the current level of 14,000t, probably to a level below the 1994 catch of 7,000t. At the September meeting of the NAFO Commission, it was agreed to reduce the TAC for 1996 to 11,000t.

4.3 STOCKS OF THE GULF OF ST. LAWRENCE

4.3.1 ECOSYSTEM OVERVIEW

4.3.1.1 General Features

The Gulf of St. Lawrence is a semi-enclosed sea connected to the North Atlantic Ocean through the Cabot Strait to the southeast, and the Strait of Belle-Isle to the northeast. Forces acting upon the Gulf include seasonally variable freshwater runoffs, mainly from the St. Lawrence River and rivers from the Northern Shore. The water column is in three layers: a surface layer which displays large variations in temperature and salinity in response to variations in solar radiation and freshwater discharge; a cold intermediate layer (CIL) resulting from winter cooling and influx of cold Labrador water through the Strait of Belle-Isle; and a deep layer of warmer and more saline water of oceanic origin penetrating through Cabot Strait and moving upstream through the wide and deep trench of the Laurentian Channel.

4.3.1.2 Recent Trends in Hydrographic Conditions

Colder-than-normal temperatures were observed for the 9th consecutive year in the depth range of 30-100 m which corresponds to the CIL in the Gulf of St. Lawrence. The minimum temperature in the CIL in mid-summer was approximately minus 0.7°C, similar to that recorded during the previous 4 years. As a result, cold bottom waters covered the Magdalen Shallows in September during the annual groundfish survey in the southern Gulf. The thickness of the CIL throughout the Gulf, as defined by waters less than 0°C, decreased slightly compared to 1993. The largest decrease occurred in the Cabot Strait region. Deep waters (200-300 m) in the Gulf ranged between 4 and 5°C, which is slightly above normal. In Cabot Strait, deep temperatures fell slightly compared to the very warm waters of 1993 but farther shoreward in the Laurentian Channel the temperature warmed slightly. Surface layer temperatures were highly variable through the year. One important surface feature was the presence of very cold water along the Quebec north shore during August due to intense wind-induced upwelling.

4.3.1.3 General Trends in Ecosystem

Groundfish stocks in the Gulf of St. Lawrence are generally in poor condition, close to or at historic low levels. Intense harvesting combined with a decrease in biological production has brought about a catastrophic decline in cod stocks. The two components of production - individual growth and recruitment- have both decreased greatly since the mid-1980s. A detailed

HYDROGRAPHIC CONDITIONS IN THE GULF OF ST. LAWRENCE IN 1994

- colder-than-normal temperatures observed for the 9th consecutive year in the cold layer
- thickness of cold layer throughout the gulf decreased slightly compared to 1993
- deep water temperature slightly above normal
- cold water along north shore in August due to wind-induced upwelling

SOURCE: DFO FISHERIES OCEANOGRAPHY COMMITTEE ANNUAL REPORT

examination was made of the mechanisms affecting growth and condition in northern Gulf cod. Cod sampled at sea were found to show indices of condition similar to captive cod known to be starving and near death. With fish in such poor condition, natural mortality rates may change. With the exception of turbot, flatfish stocks do not appear to experience such pronounced fluctuations. After a period of relative abundance during the 1960s and early 1970s, flatfish stocks declined slightly, but have remained relatively stable since. Redfish live in the deep waters of the Gulf which, contrary to the surface waters, have been warmer than average over the past decade. While the growth rates of individual redfish does not appear to have changed, its abundance has declined to a low level as there has been no significant recruitment to commercial sizes since the year-classes of the early 1980's.

Stocks of herring in the Gulf are relatively abundant. However, the spring spawner component of the northern Gulf herring in Bay St. George is now very low. Despite poor recruitment in recent years, the mackerel stock remains abundant and has declined only slowly since it is exploited only lightly. Capelin is not extensively harvested in the Gulf and its biomass is believed to be large.

GENERAL TRENDS IN ECOSYSTEM IN THE GULF OF ST. LAWRENCE IN 1994

- invertebrate stocks in good shape
- stocks of groundfish at historic low levels
- strong fishing pressure on flatfish stocks
- pelagic stocks mainly in good condition
- grey seal population high and increasing

SOURCE: DFO ATLANTIC FISHERIES STOCK STATUS REPORT 95/5

Stocks of invertebrates in the Gulf are generally abundant with biomass near or above long-term average. Shrimp biomass in the Gulf increased from the early 1980s until 1990, then decreased slightly. Observed recruitment suggests that shrimp biomass will remain stable and perhaps even increase in the short term. The snow crab biomass is currently very high, but a decrease is expected to begin in 1995 because of weak recruitment. However, the biomass should begin to increase again towards the end of this decade. Lobster landings have increased steadily form the late 1970s to the early 1990s but have declined since then. The high landings in recent years are generally attributed to a combination of good oceanographic conditions and increased harvesting capacity.

Four species of seal (harbour, hooded, grey and harp) are present in the Gulf of St. Lawrence. The grey seal population has grown at the rate of 8% a year. Total consumption of cod (mainly pre-recruits) by grey seals in 1993 has been estimated at 18,000 t in the Gulf of St. Lawrence. Harp seals are also abundant in the Gulf, consumption of cod in 1994 was estimated at near 54,000 t, made up mainly of pre-recruits. There is little information on the size of the hooded seal population or on its diet in the Gulf of St. Lawrence.

4.3.2 STOCK-BY-STOCK RECOMMENDATIONS

4.3.2.1 COD: 3Pn4RS

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	100,000	92,100	80,300	73,900	76,540	58,000	35,000	35,000	18,000	Mora-torium	Mora-torium
CATCH	88,300	82,800	66,500	48,000	46,900	39,900	31,800	28,900	18,200	500	90*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council recommended, as a precautionary conservation measure, that the 1993 TAC for this stock be reduced from 31,000 t to 18,000 t, the revised $F_{0.1}$ level for 1993. The TAC was reduced by the Minister of Fisheries and Oceans in September 1993. In November 1993, the Council recommended that there be no directed fishing for the 3Pn4Rs cod stock in 1994 and that by-catches be kept to the lowest possible level. This recommendation was accepted by the Minister of Fisheries and Oceans.

Indications from the 1994 summer survey were that the cod biomass had increased slightly in comparison to 1993 but was still at a very low level, close to the lowest level ever observed. In November 1994, the Council recommended that there be no directed fishing for 3Pn4RS cod in 1995 and that by-catches be kept to the lowest possible level; that no recreational/food fisheries program be permitted; and that a broad-based sentinel fisheries program be implemented. These recommendations were accepted.

STOCK STATUS OUTLINE

- Cod condition, growth and recruitment have been poor; some improvement in condition in fall '94.
- Biomass estimates are very low; no signs of good recruitment.
- All indications are that the spawning biomass is very low.

(from DFO SSR 95/3)

1995 CONSULTATIONS: During the 1995 consultations in Gaspé, many indicated that a small-scale commercial fishery would help fishermen to develop a better feel for the resource. Stakeholders were generally in agreement that conservation must continue to prevail and take precedence over economic considerations. In the Deer Lake consultations, fishermen mentioned good signs of recruitment and good bycatches of cod in the Rocky Harbour area. The Council was advised that there is a lot of discussion on re-opening, although one stakeholder from the Labrador Coast was shocked that others would consider re-opening at this time given the fact that there was very little sign of cod in the 4S part of the stock area.

COD: 3Pn4RS (cont)

ANALYSIS: The June 1995 Stock Status Report states that if there is no commercial harvesting, the stock biomass should begin to increase; however, as long as there is no abundant recruitment (at this point, there is no sign of new abundant year-classes), stock rebuilding will most likely be slow. The Council notes that the index of biomass from the August 1995 survey has not changed significantly from that of 1994 and remains at a very low level. The Council further notes the scientists searched for and were able to locate an aggregation of cod in pre-spawning and spawning condition during an exploratory survey conducted in the spring of 1995. The average length of these fish were of the order of 45 cm (most likely from the 1989 year-class. While it is understood that this survey is not designed to produce a quantitative estimate of biomass but to study distribution and biological characteristics during spawning, which confirms that spawning does take place despite the low abundance of spawning stocks. The Council was encouraged by this observation.

While the sentinel fisheries served to identify some improvement in the condition of cod, all indications are that stock recovery will be slow in view of the lack of recruitment. Some improvements were also observed in the mobile gear sentinel fishery in the 3Pn-4R area. The biomass index from the August 1995 sentinel fishery (minimum trawlable biomass of 44,000t) was much higher than the estimate obtained in December 1994 for the same area (14,000t). However, results from the fixed gear sentinel projects have been variable but generally poor particularly in the Strait of Belle Isle. Fishermen from Red Bay, Newfoundland, were extremely disappointed with the results of their portion of the sentinel fishery this year.

RECOMMENDATION: The FRCC recommends for 1996 that:

1. **the moratorium on commercial fishing of 3Pn4RS cod be continued; and,**
2. **a significantly expanded Sentinel Fishery in line with the planning process and criteria described in Chapter 3 be conducted.**

4.3.2.2 COD: 4T+4Vn (N-A)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	67,000	60,000	45,200	54,000	54,000	53,000	48,000	43,000	13,000 Closed*	Mora-torium	Mora-torium
CATCH	64,000	68,700	54,600	55,700	57,300	57,900	49,400	40,700	5,200	1,200	267**

* Closed in September 1993.
** As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council noted the dramatic decline in all of the indicators for this stock and the poor recruitment prospects. In November 1993, the Council recommended that the 4T+4Vn (J-A) fishery be discontinued at least until June 1994. The fishery was subsequently closed by Fisheries & Oceans.

The Council believed that it was best to take a cautious approach for 1995 as well and, in November 1994, recommended that there be no directed fishing for 4T+4Vn(N-A) cod in 1995 and that by-catches be kept to the lowest possible level.

1995 CONSULTATIONS: During the 1995 consultations, many participants indicated that they are convinced that this cod stock is at a point that some type of limited commercial fishery can take place in 1996. They noted that by-catch limitations are such that they prevent any other fishery from taking place and suggest the number of closures during 1995 is, by itself, sufficient proof that there is an abundance of cod in the southern Gulf. Similarly, the new fishery on dogfish was prevented because of the high incidence of cod. However, while there are many indications that cod remain present in the southern Gulf in noticeable quantities, there is general agreement that there is "no indication that the stock is tremendously healthy". Unlike in 1993 when cod was present in the southern part but not in Gaspé and in the Magdalen Islands, cod were present in these northern areas as well in 1994.

STOCK STATUS OUTLINE

- Recruitment has been poor in late 1980s and early 1990s; there is no indication of improvement in recruitment.
- Biomass close to the lowest observed.
- Spawning biomass would increase slightly (6-10%) if there is no fishery in 1996.

(from DFO SSR 95/3)

Some believe that the closure of the winter fishery in 4Vn has had a dramatic effect on the biomass recovery and many believe that a small-scale commercial fishery would help fishermen develop a better feel for the resource. Some participants indicated that re-opening at a low level will not be sufficient and that a re-opening has to allow a meaningful, broad-based participation of the industry. One participant suggested that in his opinion, the

COD: 4T+4Vn (N-A) (cont)

quota should be of the order of 8,000-10,000t if we "want to let fishermen really test what is there". While some promoted a "partial" re-opening for "green" fishing gear such as longlines, others recommended re-opening with a limited quota based on traditional shares and implemented so as to minimize by-catch problems in other (non-cod) fisheries.

ANALYSIS: The 1995 Stock Status Report states that "prospects for a firm and steady stock recovery continue to be bleak. Biomass and stock abundance are currently very low, close to the lowest previously observed for this stock. A juvenile cod survey conducted in July indicated that the 1992 and 1993 year class are poor.

The Council notes that the Sentinel Fishery in the Shediac Valley found some concentrations of small fish and that the 1995 September Survey may indicate an improvement in the abundance of recent year classes. However, the large number of small fish seen in the research survey and the sentinel fishery were limited only to one area. Scientists reviewing the latest data indicated that it is premature to conclude from these observations that recent year classes (1994 and 1995) have improved significantly.

The FRCC notes that the estimate of biomass is in excess of 100,000t (the biomass being about one quarter of what is used to be) and is not surprised to see that cod remains widely distributed, albeit at a reduced level, in much of the southern Gulf area. However, the consequence of the lack of recruitment is that the prospects for sustained recovery are bleak. While a catch at F0.1 in 1996 would be in the order of 11,000 - 16,000t, the spawning biomass would be expected to decline by 5% to 9% under such a strategy. Scientists estimate that the spawning biomass would remain stable with catches of 6,000t - 8,000t in 1996. With no catch in 1986, the increase in the spawning biomass is expected to be of the order of 6% to 10%.

RECOMMENDATION: The FRCC recommends for 1996 that:

1. **the moratorium on commercial fishing of 4T4Vn(N-A) cod be continued; and,**
2. **a significantly expanded Sentinel Fishery in line with the planning process and criteria described in Chapter 3 be conducted.**

4.3.2.3 REDFISH: 4RST+3Pn (JAN.-MAY)+4Vn (JAN.-MAY) - UNIT 1

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC**	50,600	55,600	55,600	56,600	57,000	57,000	57,000	67,000	60,000	30,000	Mora-torium
CATCH	35,100	36,400	43,400	51,900	52,500	61,900	68,000	77,400	51,100	19,100	13*

*As of November 15, 1995
** TACs for 1984-1992 are for former management unit (4RST)

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council expressed its serious concern about this stock and recommended that the 1994 TAC be set at 30,000 t (a 50% reduction) with the view to keeping it at this level for the following two years, if at all possible, to achieve stability.

In its 1994 report, the Council recommended, for Unit 1 redfish, that current scientific work be strengthened and elaborated in co-operation with the industry so as to clarify redfish management units, as well as to better understand migration patterns and stock status and that the 1995 TAC be set at 7,500t. As well, the Council recommended that a small fish protocol be established to protect juvenile redfish; and that Fisheries and Oceans, in consultation with industry stakeholders, limit the fishery as much as practical during the January to June period. The Minister considered the FRCC TAC recommendation but concluded that no fishery for Unit 1 redfish should occur in 1995. Further to the Council's recommendation for a joint industry/science initiative for redfish, a multi-disciplinary research program was developed jointly with industry stakeholders and DFO in an attempt to address key questions related to redfish biology, stock definition and migrations, and stock status.

1995 CONSULTATIONS: The Council held a special consultation on this stock in the form of a teleconference after the release of new scientific information in October. The consensus of stakeholders was that, with the continuing decline of the biomass, the fishery should remain closed. Stakeholders remain concerned over the overall state of this resource.

STOCK STATUS OUTLINE

- 1988 year-class, which was strong, has disappeared from survey estimates.
- Biomass continues to decline.

(from DFO SSR 95/3 and 95/9)

ANALYSIS: The Council remains very concerned with the massive reduction in this stock and notes that there has been no apparent improvement in the status of this stock despite the moratorium. Preliminary results from the 1995 summer survey indicate a decrease of 36% of the biomass estimate in comparison to

REDFISH: UNIT 1 (cont)

1994. All indications are that recruitment prospects are poor. Stakeholders generally agree that this stock is in poor condition and that the moratorium should continue.

As mentioned for Unit 2 redfish, the Council is pleased with the progress made in the establishment of a joint industry/science initiative to enhance research on redfish in this area.

RECOMMENDATION: The Council recommends that the moratorium for Unit 1 redfish be continued in 1996 and that by-catches of redfish be kept to the lowest possible level.

4.3.2.4 AMERICAN PLAICE: 4T

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000
CATCH	9,500	7,400	8,100	7,000	5,700	4,900	5,200	5,100	1,900	2,400	2,390*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for the 4T American plaice stock be set at 5,000 t. The Council also noted the apparent high incidence of small plaice and recommended that conservation measures such as those instituted in 1993 to protect small fish be continued. In 1994, fishermen were indicating that plaice are virtually absent in the northwesterly portion of 4T. As well, some fishermen who participated actively in the fishery in the southern areas were recommending that the TAC be reduced by 50%. In November 1994, the Council recommended that the 1995 TAC for 4T American plaice be set at 5,000 t.

1995 CONSULTATIONS: During the 1995 consultations, stakeholders recommended that developmental work be undertaken to study the feasibility of eliminating the by-catch of cod in the plaice fishery by using separator grids.

ANALYSIS: All indications are that the biomass is at the lowest level observed. The 1995 September survey confirms that abundance remains at the low level observed in recent years. The Council notes that the industry has adopted larger mesh sizes in an attempt to target larger plaice and minimize by-catches of cod.The Council believes that the American plaice is in trouble and that the responsible approach would be to reduce catches.

STOCK STATUS OUTLINE

- Biomass estimate in 1994 is the lowest since 1971.
- Recruitment has generally been poor since mid 1970s.
- Discarding of undersized plaice remains a problem.

(from DFO SSR 95/3)

RECOMMENDATION: The Council recommends that

1. **the 1996 TAC for 4T American plaice be set at 2,000t;**
2. **efforts to minimize the capture and discard of small plaice continue; and,**
3. **bycatches of cod in the American plaice fishery be kept to the lowest possible level.**

4.3.2.5 WITCH FLOUNDER: 4RST

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	3,500	—	3,500	3,500	3,500	3,500	3,500	3,500	3,500	1,000	1,000
CATCH	1,700	1,800	2,600	2,500	2,300	1,300	1,000	1,000	900	400	315*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that, as a precautionary measure, the 1994 TAC for 4RS witch flounder be set at 1,000 t and that, pending clarification of stock boundaries, catches of witch flounder in 4T be monitored. The TAC was reduced to 1,000 t in 1994.

In November 1994, the Council recommended that the management unit be redefined to include 4T and that the 1995 TAC for 4RST witch flounder be set at 1,000 t.

1995 CONSULTATIONS: During the 1995 consultations, participants indicated that there was little fishing in 1995 because of the by-catch closures.

STOCK STATUS OUTLINE

- Large decline in abundance in 4RS; marginal increase in 4T.
- The new management unit is more appropriate.
- TAC was reduced in 1994; recent catches much below TACs.

(from DFO SSR 95/3)

ANALYSIS: The management unit for this stock was redefined in 1995 to include 4T, as per the recommendation of the Council. In addition, the Council notes that the TAC of 1,000t for 1995 was applied to the expanded management unit, as recommended.

The stock appears to be declining in the northern area and, while surveys indicate an increase for the southern area, scientists caution that this may be due to changes in the distribution of witch in the Gulf of St. Lawrence. However, the 1995 summer survey indicated a slight decline in 4T witch abundance with no change noted in the Northern Gulf. The Council believes that the TAC must continue to be set at a reduced level until there are clear signs of recovery for the entire stock area.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4RST witch flounder be set at 1,000t.

4.3.2.6 GREENLAND HALIBUT: 4RST

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	5,000	5,000	8,700	10,500	10,500	10,500	10,500	10,500	4,000	4,000	4,000
CATCH	2,300	6,500	11,100	8,000	5,000	2,400	2,300	3,400	2,800	3,300	2,427*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for 4RST Greenland halibut be reduced to 4,000 t. In November 1994, with a declining abundance and large numbers of immature fish being caught, the Council recommended that the 1995 TAC for 4RST Greenland Halibut be set at 4,000 t; and that the Department of Fisheries and Oceans take steps to reduce the catch of undersize fish by introducing management measures to promote targeting of fish larger than 50 cm.

1995 CONSULTATIONS: During the 1995 consultations in Gaspé, fishermen indicated that they themselves proposed using 20% 6" gillnets in 1995, to be increased to 100% within 3 years, so that fishing could avoid catching spawners but concentrate on the juveniles which are of commercial size. Gaspé-Fishermen report that catches have been good in 1995 despite a reduction in the number of nets and the number of vessels. They report that fish seem to be larger than those caught last year. It was suggested that statistics on landings are "suspect". At the Deer Lake consultation meeting, fishermen stated that 4RST turbot landings were down, with a considerable amount of small fish being taken.

STOCK STATUS OUTLINE

- Low recruitment after 1988.
- Abundance low.
- Exploitation likely high and targetting immature fish.

(from DFO SSR 95/3)

ANALYSIS: The Council notes that commercial catch rates are reported to be increasing and that preliminary estimates from the summer survey are comparable to those obtained last year. However, the abundance of this stock remains low and scientists are concerned with the lack of recruitment since 1988. The Council is also concerned with the large quantities of immature turbot being caught in this fishery. Recommendations for this stock have been difficult for managers as the TAC appears to be unachievable due to the need for a large mesh size to avoid fish less than 50 cm. The Council is concerned that TACs are viewed as targets that must be met rather than upper limits for harvests when conservation minded management measures are put in place. While the management measures implemented in 1995 are a beginning, they are not sufficient to allow sustained recovery of the population.

GREENLAND HALIBUT: 4RST (cont)

The 1995 Stock Status Report indicated that the exploitation rate of Greenland halibut in the Gulf is probably high and the small number of large fish means that harvesting concentrates on annual recruitment. As well, it was stated that the TAC of 4,000t is probably too high and maintaining it will not allow the population to rebuild. The 1995 Stock Status Report further indicates that it is important to protect immature fish to allow the adult biomass to increase. The 1995 summer survey results are similar to those obtained in 1994 and confirm that the abundance of this stock is low.

Reports of inaccurate reporting of catch statistics in some areas and the apparent reluctance to adopt management measures that would protect juvenile turbot are particularly disconcerting for the Council as it was a principle recommendation in the 1994 report. The Council remains greatly concerned with the low number of adult fish in this stock and with the poor recruitment prospects.

RECOMMENDATION: The Council recommends that:

1. **the 1996 TAC for 4RST Greenland halibut be set at 2,000t;**
2. **measures be implemented to permit young turbot to mature, including implementation of a small fish protocol and increasing the mesh size of gill nets; and,**
3. **the 4RST Greenland halibut fishery be subjected to a 100% dock-side monitoring program.**

4.3.2.7 WHITE HAKE: 4T

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	12,000	12,000	9,400	5,500	5,500	5,500	5,500	5,500	3,600	2,000	Mora-torium
CATCH	6,000	5,000	6,400	3,900	5,400	5,200	4,500	3,800	1,500	900	53*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for 4T white hake be set at 2,000 t as a precautionary measure. The Council also noted the historically high incidence of small fish in the catch and recommended that measures such as those instituted in 1993 to protect small fish be continued. The Council also recommended that key areas and times of spawning activity for this stock be delineated and that, if feasible, measures be taken to establish closures during spawning areas/periods.

In the 1994 September survey, the abundance remained comparable to that of 1993, which itself was about half that of 1992. As in 1993, white hake were virtually absent from the western part of 4T in 1994. Some fishermen advised the Council that a healthy fishery had been conducted in 1994 in St George's Bay and that the FRCC recommendation for this stock did not recognize this fact. In November 1994, the Council recommended that there be no directed fishing for 4T white hake in 1995 and that by-catches be kept to the lowest possible level.

1995 CONSULTATIONS: During the 1995 consultations, lobster fishermen indicated that they had observed large numbers of white hake in their traps. Overall, fishermen do not believe that "white hake is in trouble" and the comment was made at the Moncton meeting that "if 4T White Hake is in trouble, fishermen are saying opposite". One fisherman reported that white hake is particularly abundant in area 4T8. It was suggested that a small scale fishery is needed to get the data necessary to establish "what is out there".

STOCK STATUS OUTLINE

- Fishing mortality has been high.
- Incoming recruitment weak.
- Biomass is at a very low level.
- Contraction of geographical range in recent years.

(from DFO SSR 95/3)

ANALYSIS: The 1995 Stock Status Report indicated that white hake in 4T may be at its lowest level since the first quota was introduced in 1982. Early recovery of this resource

WHITE HAKE: 4T (cont)

remains unlikely, given the current low abundance and indications of weak incoming recruitment. Index fishermen had reported that hake were "smaller" and "scarcer" in recent years and other comments from the industry indicate that the abundance of white hake has declined. As well, the September, 1995 groundfish survey in the Southern Gulf of St. Lawrence indicates that this stock remains near its historic low level.

The Council is concerned with the low abundance of this stock and with the indications of weak incoming recruitment. The Council notes that the 1995 Stock Status Report indicates that in the survey found white hake in areas where fishermen had reported high concentrations in 1994; however, despite this, the survey results showed a decline in the abundance of large fish, no improvement in recruitment and a contraction of the geographic range.

The September 1995 survey indicates that this stock remains at the low level observed in recent years. Stock discrimination studies have indicated that there are two components to this stock; those fish distributed in summer along the Laurentian Channel in deeper water and, those fish distributed in shallower waters across the Southern Gulf. The apparent contraction of the geographic area of distribution, particularly of the inshore component of the stock, a phenomenon generally associated with a declining stock, is cause for concern.

RECOMMENDATIONS: The Council recommends that there be no directed fishing for 4T white hake in 1996 and that bycatches be kept to the lowest possible level.

4.3.2.8 ATLANTIC HALIBUT: 4RST

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	—	—	—	300	300	300	300	300	300	300	300
CATCH	150	315	260	240	290	450	340	160	150	200	69

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for the 4RST Atlantic halibut stock be set at 300 t. In November 1994, the Council recommended that the 1995 TAC for 4RST Atlantic halibut be set at 300 t.

1995 CONSULTATIONS: During the 1995 consultations, fishermen commented that it was difficult to remain within prescribed cod by-catch limits in the longline fishery for Atlantic halibut. Many spoke of high numbers of additional permits being issued for this stock and that the fishery was conducted more for its cod bycatch than for halibut.

STOCK STATUS OUTLINE

- Signs of good recruitment.
- 60% of captures below 81 cm (estimated size at maturity)

(from DFO SSR 95/3)

ANALYSIS: The 1995 Stock Status Report indicated that there is no reason to change the TAC of 300 t, but that catches are dominated by fish smaller than 81 cm, the size at maturity. The Council notes that 60% of the captures are below 81 cm. That is cause for concern in view of the indications of good recruitment. While this stock remains relatively stable, the capture of immature fish and indications of poor reporting of cod bycatch are issues that must be addressed.

As well, the Council is particularly concerned about the large number of 4RST Halibut permits issued in 1995. The resultant heavy cod by-catch gave the appearance of a directed fishing on a stock presently under moratorium.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4RST Atlantic halibut be set at 300t, the release of Atlantic halibut smaller than 81cm be mandatory and cod bycatches in this fishery be effectively eliminated.

4.3.2.9 WINTER FLOUNDER: 4T

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC											
CATCH	1,200	2,000	1,800	1,400	2,100	2,100	2,500	1,900	1,200	1,161	*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: This stock is not under Quota Management. There is uncertainty as to the total catches due to discarding, non-reporting and incorrect identification of the species in landings statistics. In November 1993, the Council recommended that landings of 4T winter flounder be monitored more closely and that the measures introduced to protect against high mortality of juveniles be continued. In 1994, the Council recommended that this fishery continue to be monitored and that the Department of Fisheries & Oceans, in consultation with the industry, introduce measures to allow directed fisheries only in specific and well defined areas and allow the release of small fish.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

ANALYSIS: As noted previously, this stock is not under Quota Management. The limited information available on this stock suggests that it is at "an intermediate" level of abundance and that abundance varies greatly between regions. The accuracy of catch statistics remains an issue, in particular with respect to catches in the bait fisheries and fisheries for personal consumption. The resource appears to be composed of some number of localized populations across the southern Gulf -some of which are depleted and in need of protection. It is becoming apparent that this stock represents a potential opportunity to harvest cod as a bycatch. Continued work must be done to identify and quantify stock components such that specific management measures can be implemented. The Council remains concerned about the re-direction of effort to this resource.

STOCK STATUS OUTLINE

- Landings uncertain due to inaccurate reporting.
- Overall abundance is about average.
- Shallow water species; likely several separate stocks.

(from DFO SSR 95/3)

RECOMMENDATIONS: **The Council recommends that this fishery continue to be monitored in 1996 and the directed fisheries on winter flounder in 4T not be allowed unless and until there are measures in place to keep the bycatch of cod to the lowest possible level.**

4.4 STOCKS OF THE SCOTIAN SHELF, BAY OF FUNDY AND GEORGES BANK

4.4.1 Ecosystem Overview

4.4.1.1 General Features

The Continental Shelf off Nova Scotia is separated from the Newfoundland area by the Cabot Strait and the Laurentian Channel. The shelf is marked by depressions, depths greater than 200 m, and several shallow banks. Georges Bank is located in the most southern part of the region.

The inner part of the shelf, between the banks and the shore line, is influenced by waters originating from the Gulf of St. Lawrence and flowing south. These waters are characterized by low salinity and seasonal temperature variations. The seasonal variations create a warm surface layer in summer that overlays a water body, the Cold Intermediate Layer (CIL), that remains cold (less than 4 -6°C) all year round. Slope water invades the deep basins on the Scotian Shelf, below the CIL. The slope water is formed, in variable proportions, from a mixing of Shelf, Gulf Stream, and Labrador Current waters.

4.4.1.2 Recent Trends in Hydrographic Conditions

Waters below the upper mixed layer (less than 30 m) on the northeastern Scotian Shelf were generally colder-than-normal throughout the year, continuing a trend that has existed throughout the 1990s. Similar cold conditions were observed in the depth range 50-100 m over the remainder of Scotian Shelf except above Emerald Basin. The deep waters (more than 150 m) in the Basin were warmer-than-normal and are consistent with conditions found in the Laurentian Channel and the Gulf of Maine. These deep waters originate offshore and are transported onto the shelf through cross-shelf exchange processes. Measurements in 1994 indicate that these offshore slope waters were also warmer-than-normal. Bottom temperatures observed during the July groundfish survey indicated warming since 1992 over most of the Shelf although temperatures were still below normal or near normal except in the vicinity of Emerald Basin. Warm bottom temperatures were seen in the central Gulf of Maine and the Bay of Fundy during the survey and were typical of conditions through most of the year. The influence of these warm waters penetrated to the coast by July, causing high sea

HYDROGRAPHIC CONDITIONS FOR SCOTIAN SHELF AND GULF OF MAINE IN 1994

- Mid-depth waters still colder-than-normal over most of Scotian Shelf
- Bottom temperatures still below normal, but evidence of warming since 1992
- Shelf/slope front shoreward of its long-term mean position
- More gulf stream warm-core eddies formed than in any single year since 1981

SOURCE: DFO FISHERIES OCEANOGRAPHY COMMITTEE ANNUAL REPORT

temperatures during the second half of the year. Also, more Gulf Stream warm-core eddies formed in 1994 than in any single year in the last 13.

4.4.1.3 General Trends in Ecosystem

Since 1991, levels of phytoplankton were high compared to levels of the early 1970s. Between 1991-1993, the total zooplankton levels on the Scotian Shelf were above the long-term mean. Concentrations of fish larvae have been above the long-term mean on the Scotian Shelf and the Gulf of Maine, and appear to fluctuate in synchrony with changes in zooplankton abundance.

The biomass of all bottom-dwelling fishes on the Scotian Shelf has been decreasing since the mid-1980s. The total trawlable biomass is presently at its lowest level since the initiation of standard surveys in 1970. The biomass of all cod-like fishes drives this pattern. The decline has been most dramatic for cod, but is also evident for haddock, pollock and silver hake. These declines have been compensated for by increased exploitation of species such as skates, monkfish and several species of flatfish (American plaice, yellowtail, witch). On the eastern Shelf, those flatfish show signs of declining biomass and contraction of the population age structure into younger age groups - a sign of overexploitation. On the southern Shelf, flatfish stocks also show signs of decline, but less so than on the eastern Shelf. Redfish appear to be stable, with some evidence of recruitment, but this perception is based on limited information. There are signs that cold water temperature on the Eastern Shelf have caused the condition of cod to decline over a long period, and recent low recruitment coincided with high abundance of predator (e.g. seal).

GENERAL TRENDS IN ECOSYSTEM ON SCOTIAN SHELF AND GULF OF MAINE IN 1994

- Plankton relatively abundant
- Biomass of groundfish stocks at or near historic lows
- Main stocks of pelagics in decline
- Crustacean stocks in good shape
- Scallop stocks low

SOURCE: DFO ATLANTIC FISHERIES STOCK STATUS REPORT 95/6

The decrease in larval abundance in the 1994 survey and observations on the lack of large fish, low fat content, and distribution anomalies, led to concerns for the state of herring in 4WX. The Georges Bank herring population which collapsed in 1977 following years of overexploitation shows signs of steady recovery. Capelin has been observed in quantity on the eastern Shelf since the late 1980s, coincident with the increased intrusion of cold water into that region. Tunas (bluefin, yellowfin, bigeye, albacore) and swordfish stocks are either exploited at maximum or declining (bluefin and swordfish).

Indicators of abundance of most of the scallop stocks were low in 1994, and the prognosis for many of the stocks is not good. The shrimp fishery is likely yet not fully developed. In the crab fishery, landings in 1994 were down by 24% and catch rates declined in all stocks, which suggest crab abundance has decreased.

In Eastern Nova Scotia, recent lobster catches have been relatively stable but exploitation rates are believed to be very high. For Southwestern Nova Scotia, inshore lobster fishery landings in 1994 were 3 times higher than the average for the period 1950-1979. High exploitation rates and low egg production have characterized the mid-shore grounds. Stock status indicators have remained stable throughout the offshore area.

4.4.2 STOCK-BY-STOCK RECOMMENDATIONS

4.4.2.1 COD: 4Vn (M - O)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC*	12,000	12,000	9,000	7,500	7,500	7,500	10,000	10,000	1,800 Closed**	Closed	Closed
CATCH	10,500	10,300	8,900	7,900	5,800	3,200	2,800	2,300	650	100	46***

* TACs are for former management unit (i.e. May to December)
** Closed in September 1993
*** As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council recommended that fishing on this stock be halted immediately. The recommendation was accepted and the fishery was closed in September. In November 1993, the Council recommended that there be no directed fishing for this stock in 1994 and that by-catches be kept to the lowest possible level. This recommendation was repeated in November 1994 for the 1995 fishing year. These recommendations were accepted and the fishery has remained closed since September 1993.

STOCK STATUS OUTLINE

- Fishery closed since 1993.
- Little or no recruitment since 1989.
- Stock in a very depressed state; no signs of improvement.
- Unit redefined as Nov.-Dec. catches are primarily from 4T stock.

(from DFO SSR 95/3)

1995 CONSULTATIONS: Overall, groundfish fishermen are concerned about the depressed state of this stock. At the same time they have expressed concern about the lack of current scientific advice and lack of commercial catch data. Consequently all inshore sectors are advocating an expanded sentinel fishery which they feel will expand the limited scientific data base on 4Vn Cod. Suggestions have also been raised that the sentinel fishery be modified to a test fishery using hook and line only (with severe limitations).

ANALYSIS: The Council remains concerned about the depressed state of this stock. The 1995 Stock Status Report indicates that the future of this stock continues to look bleak.

RECOMMENDATION: The Council recommends that there be no directed fishery for 4Vn(M-O) cod in 1996, the sentinel fishery be continued and bycatches be kept to the lowest possible level.

4.4.2.2 COD: 4VsW

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	55,000	48,000	44,000	38,000	35,200	35,200	35,200	35,200	11,000 Closed*	Closed	Closed
CATCH	57,500	48,100	43,500	35,900	34,200	29,700	24,200	25,400	3,500	400	237**

* Closed in September 1993
** As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, based on the drastic stock decline, the Council recommended that the 4VsW cod fishery be halted immediately. The fishery was closed in September. In November 1993, the Council recommended that there be no directed fishing for the 4VsW cod stock in 1994 and that by-catches be kept to the lowest possible level. Again in 1994, the Council recommended that there be no directed fishing for 4VsW cod in 1995 and that by-catches be kept to the lowest possible level. The fishery has remained closed since September 1993.

1995 CONSULTATIONS: Generally, fishermen remain concerned about the poor state of the 4VsW Cod stock. However, as in 4Vn, there is a feeling among the stakeholders that a Sentinel Fishery is essential to provide additional information to offset the lack of commercial catch data. Industry continues to express concern about the size of the grey seal herd and continues to recommend a major reduction in the size of the herd. They believe that seals are a major impediment to stock rebuilding.

STOCK STATUS OUTLINE

- Fishery closed since September 1993.
- Recruitment has been poor since 1984.
- Adult population at historic low levels.
- Predation by grey seals is significant.
- Growth and condition of the fish are poor.

(from DFO SSR 95/3)

ANALYSIS: The Council remains concerned about the depressed state of this stock and its dismal prospects. There is no indication of any significant recruitment or of any improvement in general condition of the fish. The 1995 summer survey on this stock indicated that abundance had increased slightly in comparison to 1994, but not enough to indicate a change in the depressed condition of the stock.

The Council shares the concerns expressed by area fishermen that grey seals are having a tremendous impact, by contributing to the increased mortality of this particular cod stock. This

COD: 4VsW (cont)

concern is echoed in the 1995 Stock Status Report which states that there is a significant and increasing predation by seals contributing to natural mortality.

RECOMMENDATION:The Council recommends that there be no directed fishery for 4VsW cod in 1996, a sentinel fishery be considered for this stock and bycatches be kept to the lowest possible level.

4.4.2.3 COD: 4X

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	30,000	20,000	17,500	14,000	12,500	22,000	26,000	26,000	15,000	13,000	9,000
CATCH	21,400	19,900	18,700	19,800	19,600	23,600	27,500	26,000	16,000	13,000	8,090*

* As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council recommended, as a precautionary conservation measure, that the 1993 TAC be reduced from 26,000t to 15,000t, a level still about twice the $F_{0.1}$ level. In November 1993, the Council recommended that the 1994 TAC for 4X cod be set at 13,000t. In addition, the Council recommended that other conservation measures, such as (a) improved selectivity of fishing gears (increased hook and mesh sizes), (b) limitations on the quantity and dimensions of fishing gear used, and (c) expanded use of area closures to protect spawning and/or juvenile aggregations, be considered for this fishery.

The Council was struck by the acknowledged dumping of 4X haddock in the 4X cod fishery in 1994, a problem which appears to be extremely difficult to control. Consequently the Council felt that new approaches must be developed focusing on multispecies management. In November 1994, the Council recommended that the 1995 TAC for 4X cod be set at 9,000t. As well, Council recommended that prior to the 1995 fishing season a workshop be organized jointly by the Department of Fisheries and Oceans and industry with the objective of an orderly fishery and the elimination of dumping, discarding and misreporting; and finally the Council recommended that should dumping, discarding and misreporting persist, the fishery be closed for the gear type involved.

1995 CONSULTATIONS: There was a considerable amount of discussion on this particular stock during the 1995 consultations. Most feel that the 4X Cod stock is in better shape than indicated in the past and is in fact, improving. This is also noted in the 1995 Stock Status Report which indicates that the stock is showing an increase. All fishing sectors are recommending an increase in the 4X cod TAC and suggestions have ranged from 10% to 30%.

Many expressed the frustration of trying to fish within the limits imposed by too small a TAC when they could all see signs of plenty of fish. They felt

STOCK STATUS OUTLINE

- Exploitation rate more than twice the target.
- The 1990 and 1992 year-classes are about average;
- Stock showing slight increase in 1995, from the low levels observed in 1993 and 1994 (lowest in time series).
- $F_{0.1}$ for 1996 around 7,400 t.

(from DFO SSR 95/3 and Scotia-Fundy Region update)

COD - 4X (cont)

that a slight increase in TACs, shared equitably would enable respective conservation harvesting plans to work and remove the need to dump, discard and misreport catches.

ANALYSIS: The Council remains concerned about the acknowledged dumping of 4X haddock in the 4X cod fishery as well as continued discarding of small cod. Solving these problems through various enforcement initiatives appears to be extremely difficult. However, continuing conservation efforts are needed to rebuild the population biomass and expand the age structure and the fishing industry must recognize this. Further, The Council is concerned over the time taken to resolve very serious difficulties that are involved in managing the 4X mixed-species fisheries. There are serious conservation impacts to current approaches which need to be rectified.

The Council is convinced that the problems associated with managing this stock in a mixed stock fishery , and the subsequent conservation impacts are restricting 4X cod stock from reaching its maximum sustainable level. Despite all efforts to date, pessimism continues to exist. The Council believes, as well, that there should be an appropriate mix of the various age classes of fish in the population and is concerned that this state is far from being reached.

The challenge for 1996 will be to begin the process of ensuring long term sustainability of 4X cod, haddock and 4VWX5Zc pollock stocks and to find the most effective strategy for this mixed stock fishery to reach its full potential.

On a positive note, the September update of the status report, based on the 1995 summer survey indicates that the biomass continues to increase for this cod stock primarily due to the 1992 year-class, which now appears even stronger than estimated in the spring.

RECOMMENDATIONS: The Council recommends that:

1. **the 1996 TAC for 4X Cod be set at 11,000t;**
2. **mandatory dockside grading be implemented for all gear types; and,**
3. **Should there be sufficient evidence of dumping, discarding and misreporting, the Council recommends the fishery be closed for the gear type involved until such time as fisheries managers can be assured that this activity will not continue.**

4.4.2.4 COD: 5Zj,m

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC							15,000	15,000	15,000	10,000	1,000
CATCH	17,100	14,100	16,600	20,600	14,200	20,700	20,000	16,800	12,500	7,000	932*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council concluded that, from a conservation perspective, the fishery for this stock should be closed. The Council noted, however, that a closure by Canada alone would not be sufficient to protect the stock without corresponding action by the United States. The Council urged that consultations continue with the United States with the objective of undertaking urgent and immediate management action to rebuild this stock.

In 1994, the fishery was closed to all sectors from January 1 to May 31 and for an additional month to June 30 to the offshore sector. The U.S. fishery was closed from January 1 to June 30.

In November 1994, the Council recommended that bilateral consultations continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1995, prior to which time the Council would provide a definitive recommendation with respect to the 1995 TAC. In May 1995, the FRCC recommended to the Minister of Fisheries and Oceans that there be no directed fishing for 5Zj,m cod in 1995 and that by-catches be limited to less than 1000t.

1995 CONSULTATIONS: There was not a lot of discussion on this stock during the 1995 consultations. However, some fishermen's representatives did request an increase in the TAC for 1996, ranging from 10 to 25%. Some suggested a TAC of 5000t would be appropriate given the low level of fishing in 1995 and the belief that there are more cod in 5Z than has been found during the surveys.

Concern was expressed about what the U.S. fishermen are doing on Georges Bank.

STOCK STATUS OUTLINE

- Fishing mortality very high.
- '91+'92 year-classes below average; '93+'94 lowest observed.
- Stock biomass lowest observed.
- Need to develop stock rebuilding strategy.
- $F_{0.1}$ for 1995 around 2,500 t.

(from DFO SSR 95/3)

COD: 5Zj,m (cont)

ANALYSIS: The 1995 Stock Status Report indicated that recruitment has been well below average since the 1990 year-class and was the lowest observed for the 1994 year-class. Fishermen have expressed various views on the recommended level of TAC for 1996 from the status quo to an increase. They continue to report good catches and greater abundance of large fish than implied in the stock status report. The Council remains concerned over the high exploitation on this stock and is particularly cognizant of the considerably different views of stock status from the two sources.

It is worth noting that although the F0.1 level for this stock is 2,500t, scientists advised the Council prior to making its 1995 recommendation in May 1995, that a TAC set at F0.1 would not allow rebuilding. Consequently the FRCC recommended a level below 1,000t for this stock as a by-catch fishery. Council believes that it is best to wait for the spring of 1996 before recommending the level of the TAC. This will permit a review of any new scientific information and assess progress on international discussions regarding this stock.

RECOMMENDATION: **The Council recommends that bilateral consultations continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1996, prior to which time the Council will provide a definitive recommendation with respect to the 1996 TAC.**

4.4.2.5 HADDOCK: 4TVW

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	15,000	17,000	By-catch	By-catch	6,700	6,000	By-catch	By- catch	By-catch	By-catch	By-catch
CATCH	11,700	16,900	3,900	4,500	9,100	7,000	5,400	6,100	1,200	100	83*

* As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council expressed concern about the low level of this stock. In November 1993, the Council recommended that there be no directed fishing for the 4TVW haddock stock in 1994 and that the closure of the haddock box to all gears be continued. In 1994, the Council repeated this recommendation for 1995 which was accepted.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

ANALYSIS: In addition to the information in the Stock Status Outline, the 1995 Stock Status Report also indicates that with the removal of all fishing activity from the closed area in 1993 and a virtual closure of the fishery in 1994, exploitation has fallen to the lowest observed since 1970. The fishing industry also accepts that this stock should remain closed and the status quo maintained.

STOCK STATUS OUTLINE

- Adult biomass near lowest observed since 1970.
- Likely improvement in recruitment with 92-93 year classes; needs to be protected to promote rebuilding.
- Stock has essentially disappeared from 4Vn and 4Vs.

(from DFO SSR 95/3)

RECOMMENDATION: The Council recommends that there be no directed fishing for 4TVW haddock in 1996 and that the closure of the Haddock box to all gears be continued.

4.4.2.6 HADDOCK: 4X

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	15,000	15,000	12,400	4,600	4,600	4,600	By-catch	By-catch	By-catch 6,000*	4,500	6,000
CATCH	14,900	15,000	13,600	11,000	6,700	7,300	9,700	10,400	6,800	4,300	4,875**

* Closed in September 1993
**As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In its August 1993 report, the Council recommended that every action be taken to ensure that there are no overruns of the 1993 quota. The stock was closed to fishing in September because the quotas had been taken. In November 1993, the Council recommended that the 1994 TAC for 4X haddock be set at 4,500t (by-catch only) and that every action be taken to ensure that there are no overruns of this quota.

In November 1994, the Council recommended that the 1995 TAC for 4X haddock be set at 6,000t. The Council recommended that, prior to the 1995 fishing season, a workshop be organized jointly by the Department of Fisheries and Oceans and the industry, with the objective of an orderly fishery, and the elimination of dumping, discarding and misreporting. Finally, the Council recommended that, should dumping, discarding and misreporting persist, the fishery be closed for the gear type involved.

1995 CONSULTATIONS: There was a general consensus from South West Nova fishermen recommending a 10 to 25% increase to the TAC for 4X haddock in 1996. Industry continues to disagree with the scientific assessment of this stock. In general, fishermen report that haddock abundance is higher, certainly higher than DFO abundance surveys show. As a result, there was considerable dumping and discarding of 4X haddock while fishermen tried to prosecute the 4X cod fishery and stay within trip limits.

ANALYSIS: The July 1993 survey biomass index was the lowest since at least 1970 and the 1994 results increased only slightly from the low 1993 value.

STOCK STATUS OUTLINE

- Exploitation rate decreasing but still well above reference.
- Recruitment below average since 1988 year-class; possible improvement with 1992, 1993 and 1994 year-classes which need protection to promote re-building.
- Adult biomass at historically low level.

(from DFO SSR 95/3 and Scotia-Fundy Region update)

HADDOCK: 4X (cont)

Mobile gear sector representatives maintain that haddock abundance has increased in 4X. Fixed gear fishermen fishing the banks report increased abundance while those fishing inshore in Eastern 4X report a decrease. A recent update of the Stock Status Report indicates that the abundance of 4X haddock in the 1995 summer survey was the second highest since the surveys began in 1970. The large increase over the 1994 survey estimate is mostly due to record catches of one-year old haddock. The 1993 year-class is also stronger than average. The Council notes the concerns raised in the Stock Status Report with respect to a need to protect the 1992 and 1993 year classes and is of the opinion that these year classes must be protected to become mature and reproduce. Indications are that a catch of 6,000t - 6,500t in 1996 would not result in a decrease of the total or spawning biomass.

The Council is convinced that the problems associated with managing this stock in a mixed stock fishery, and the subsequent conservation impacts are restricting 4X haddock stock from reaching its maximum sustainable level. Despite all efforts to date, pessimism continues to exist. The Council believes, as well, that there should be an appropriate mix of the various age classes of fish in the population and is concerned that this state is far from being reached.

The challenge for 1996 will be to begin the process of ensuring long term sustainability of 4X cod, haddock and 4VWX5Zc pollock stocks and to find the most effective strategy for this mixed stock fishery to reach its full potential.

RECOMMENDATIONS: The Council recommends that:

1. **the 1996 TAC for 4X Haddock be set at 6,500t;**
2. **mandatory dockside grading be implemented for all gear types; and,**
3. **Should there be sufficient evidence of dumping, discarding and misreporting, the Council recommends the fishery be closed for the gear type involved until such time as fisheries managers can be assured that this activity will not continue.**

4.4.2.7 HADDOCK: 5Zj,m

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC							5,000	5,000	5,000	3,000	2,500
CATCH	5,200	5,600	6,100	5,700	3,800	4,500	6,400	5,700	4,100	2,700	1,768*

* As of November 15, 1995 (Canada only)

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council recommended that the 5Zjm haddock fishery be closed. In November 1993, the Council reiterated that from a conservation perspective,the 5Zj,m haddock fishery should be closed. The Council urged the continuation of the consultations with the United States with the objective of undertaking urgent and immediate management action to rebuild this stock. The fishery was closed to all sectors from January 1 to May 31 in 1994 and for an additional month, to June 30, for the offshore. The management measures concentrated on avoiding the capture of the 1992 year class estimated to be 45 cm throughout most of the year.

In 1994, the Council recommended that bilateral consultations continue with the objective of undertaking management action appropriate to rebuild this stock. In the meantime, the Council recommended that the fishery be closed until June 1995, prior to which time the Council would provide a definite recommendation with respect to the 1995 TAC. In May 1995, the Council recommended that the 1995 TAC for 5Zj,m haddock be set at 2,500t.

1995 CONSULTATIONS: As with Georges Bank Cod, there was not a lot of discussion on this stock during 1995 groundfish consultations. However, representatives of the South West Nova Scotia mobile sector requested a modest increase in the 1996 TAC for Georges Bank haddock.

ANALYSIS: This is a transboundary stock, the majority of which appears to be in Canadian waters. The 1994 Stock Status Report indicated that this stock had increased slightly from levels which were near the lowest recorded. The 1995 Stock Status Report indicates a projected increase in haddock abundance. However, the Report states as well that continuing conservation efforts such as low exploitation and fishing practices which permit

STOCK STATUS OUTLINE

- Fishing mortality generally high, peaking in 1993.
- Indications of improved recruitment (1992 year class); 1993 year class weak.
- Stock increasing from near historical lowest level due to 1992 year class.
- F_{01} for 1995 is 3,000t.

(from DFO SSR 95/3)

HADDOCK: 5Zj,m (cont)

recruits to realize growth and reproductive potential are needed to rebuild the population biomass.

RECOMMENDATION: **The Council recommends that bilateral consultations continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1996, prior to which time the Council will provide a definitive recommendation with respect to the 1996 TAC.**

4.4.2.8 POLLOCK: 4VWX5Zc

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	42,400	40,000	43,000	43,000	43,000	38,000	43,000	43,000	21,000	24,000	14,400
CATCH	43,800	44,300	46,100	43,100	43,000	37,500	39,500	34,300	21,100	15,000	9,033*

* As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In August 1993, the Council recommended, as a precautionary conservation measure, that the 1993 TAC be reduced from 35,000t to 21,000t. The Council also noted that the closure of the 4VsW cod fishery could cause some redirection of effort to the pollock fishery. In November 1993, the Council recommended that the 1994 TAC for 4VWX5Zc pollock be set at 24,000t, the $F_{0.1}$ catch level then calculated for 1994.

In 1994, the Council recommended that the 1995 TAC for 4VWX5Zc pollock be set at the revised $F_{0.1}$ calculation of 14,500t. The Council also recommended that Fisheries and Oceans scientists work with the industry to determine if, and during what times of the year, it would be appropriate to establish closed areas for 4VWX5Zc pollock to protect the spawning stock. The Council notes that scientists from the Maritimes Region have worked with local fishermen to define in detail where the spawning grounds are. In addition, discussions took place at the 2nd Groundfish Workshop held in early October 1995 in the context of possible measures to further improve conservation of groundfish stocks in this area.

1995 CONSULTATIONS: At the Halifax consultation meeting the South West Nova Scotia mobile gear sector indicated that pollock abundance in 4X appeared to improve in 1995 and they feel that the stock overall is in pretty good shape. The South West Nova fixed gear association is requesting an increase in the TAC while others are advocating status quo. However, at the Clarks Harbour meeting, the consensus was that pollock stocks overall are not in good shape and that perhaps a reduction in TAC of 5% would be in order.

STOCK STATUS OUTLINE

- 1990 year-class weak.
- Stock is at a very low level; exploitation twice $F_{0.1}$.
- Decline in weight at age.
- Fishing at $F_{0.1}$ in 1996 would yield 11,000 t.

(from DFO SSR 95/3)

ANALYSIS: Landings in 1994 declined to 15,250t, the lowest observed during the period 1960 to 1994. Landings declined everywhere but the declines were not as pronounced on Georges Bank.

POLLOCK: 4VWX5Zc (cont)

Pollock abundance is estimated to be very low, with high exploitation and a very weak year-class in the making. The 1995 Stock Status Report indicates that the stock is in a depleted state. The decline since the mid-eighties has been due to high exploitation, not poor recruitment. The $F_{0.1}$ catch in 1996 is 12,500t (if the catch is 8,400t in 1995) but uncertainties around that estimate are high and the spawning biomass would continue to decline under the $F_{0.1}$ scenario as the weak 1990 year class reaches maturity. The Council notes that in order to arrest the decline in the spawning stock biomass, a catch below 10,000t would be necessary in 1996.

The Council took into consideration the uncertainties inherent in past estimates of the stock and the fact that while TACs and catches have been decreasing each year, mortalities have been high. While scientists believe that the 1995 assessment is more consistent than previous assessments in calculating fishing mortalities, the Council remains very concerned with the low precision of the projection.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VWX5Zc pollock be set at 10,000t. Further, the Council recommends that Fisheries and Oceans scientists continue to work with the industry to determine if, and during what times of the year, it would be appropriate to establish closed areas for 4VWX5Zc pollock to protect the spawning stock.

4.4.2.9 REDFISH: 4WdehklX (UNIT 3)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC									10,000	10,000	10,000
CATCH	6,000	6,900	6,100	3,900	3,200	2,300	2,000	2,200	5,200	5,200	4,750*

* As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for Unit 3 redfish be set at 10,000t. In November 1994, the Council also recommended that the 1995 TAC for Unit 3 redfish be set at 10,000t; that the incidence of small fish be monitored in 1995 and that the area be closed to fishing when the incidence of small fish has reached an appropriate predefined level.

1995 CONSULTATIONS: In 1994, fishermen advised the Council that the TAC should not be increased in 1995 and many expressed the need for taking a prudent approach with respect to avoiding the catch of small fish. Fishermen remain concerned over redirection of effort towards redfish in this area. There was not a lot of discussion on this stock during the 1995 groundfish consultations. The South West Nova fixed Gear Association advocated an increase in TAC.

STOCK STATUS OUTLINE

- 7% small fish in 1994.
- Some improvement in recruitment in recent years.
- Exploitation believed to be low; effort increased in '93 + '94.
- Abundance stable since the late 1980s.
- 10,000t in 1996 is consistent with target harvest rate.

(from DFO SSR 95/3)

ANALYSIS: The Council notes that the increase in catches in 1993 and again in 1994 resulted from an increase in fishing effort as fishermen were forced to divert from more valuable species.

The 1995 Stock Status Report indicates that the low harvest rates which currently prevail should result in fishing and stock conditions in 1996 being much the same as in recent years. Catches of 10,000t in 1996 would be consistent with the currently established target harvest rate. The Council is concerned, however, about the high incidence of small redfish observed in some port samples in the first half of 1994 and considers that areas where a high incidence of small fish is oberved in the catch must be closed to fishing.

REDFISH: UNIT 3 (cont)

RECOMMENDATION: The Council recommends that the 1996 TAC for Unit 3 redfish be set at 10,000t. The Council also recommends that the incidence of small fish be monitored in 1996 and that an area be closed to fishing when the incidence of small fish has reached an appropriate predefined level.

4.4.2.10 FLATFISHES: 4VWX

FISHERIES STATISTICS (from DFO)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	10,000	7,500
Catch (total)	10,760	11,840	12,700	11,350	10,240	12,340	10,360	10,775	7,942	5,400	4,497*
Total 4VW	6,840	6,250	8,420	6,700	6,910	6,240	4,580	4,885	3,942	-	2,179*
Total 4X	3,920	5,590	4,280	4,650	3,330	6,100	5,780	5,890	4,000	-	2,328*

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that efforts underway to obtain better information on the landings by species and area be encouraged in order to provide a more rational basis for conservation measures for this resource complex in future years. The Council also recommended that, pending the provision of more reliable catch data on flatfish on the Scotian Shelf, the 1994 TAC for 4VWX flatfish be set at 14,000t.

In November 1994, based upon available information, the Council concluded that both the effort and the TACs for these stocks needed to be reduced further and, as well, that the proportions between the two units should be changed to better reflect relative stock abundance. The Council recommended that the global 1995 TAC for all 4VWX flatfishes be set at 7,500t.

STOCK STATUS OUTLINE- Flatfish 4X

- New management unit implemented in 1994.
- Overall landings declining.
- Plaice stable with signs of recruitment.
- Yellowtail flounder stable or increasing.
- Witch at a very low abundance with signs of recruitment.
- Winter flounder abundance declined in 1993 and 1994 but still above average.

(from DFO SSR 95/3)

STOCK STATUS OUTLINE- Flatfish 4VW

- New management unit implemented in 1994.
- Overall landings declining.
- Plaice depleted with signs of recruitment.
- Yellowtail flounder at very low level.
- Witch flounder low with signs of recruitment.
- Restrict 1996 catches to 1994 level.

(from DFO SSR 95/3)

FLATFISHES - 4VWX (cont)

ased upon available information, the Council concluded that both the effort and the TACs for these stocks needed to be reduced further and, as well, that the proportions between the two units should be changed to better reflect relative stock abundance. The Council recommended that the global 1995 TAC for all 4VWX flatfishes be set at 7,500t.

1995 CONSULTATIONS: At the consultations held in Sydney, the participants were of the opinion that the decline in landings were more the result of reduced TACs and management by allocation than the result of a decline in abundance. For instance, the offshore did not target for this species and consequently did not catch their share.

Overall, it was suggested that there be no change to the TAC in 1996 for flatfish in 4VW and 4X.

ANALYSIS: In the 1994 Stock Status Report, it was noted that fishing mortality for the 4VW stock component had increased because of a redirection of effort from the cod, haddock and pollock fisheries. Total landings of 4VW flatfish in 1994 amounted to 2,824t, a decrease due in part to the TAC reduction and particularly the new sharing arrangements. The 1995 Stock Status Report indicates that it would be prudent to continue to restrict catches at the 1994 level.

For the 4X component, plaice and yellowtail appear to be relatively stable.

The Council remains concerned about the status of these various flatfish stocks. Exploitation is high, effort appears to be increasing or being re-directed at flatfish fisheries, catches by certain fleet sectors are down and the stocks appear to be declining in some areas, most notably in 4VW. Based on available information, the Council continues to be concerned about the overall state of the 4VWX flatfish resources.

RECOMMENDATION: The Council recommends that:

1. **the 1996 TAC for 4VW flatfishes be set at 3,500t.**
2. **the 1996 TAC for 4X+5 flatfishes be set at 3,375t.**

4.4.2.11 SILVER HAKE: SCOTIAN SHELF (4VWX)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	100,000	100,000	100,000	120,000	135,000	135,000	100,000	105,000	75,000	30,000	60,000
CATCH	75,000	83,000	62,000	74,000	88,000	70,000	65,000	32,000	29,000	8,000	14,943*

*As of November 15, 1995

HISTORY OF FRCC RECOMMENDATIONS: In June 1994, the NAFO Scientific Council calculated that the catch at $F_{0.1}$ for 1995 would be 79,000t. However, they noted that this calculation could be overestimated by as much as 20,000t. The Council recommended that the 1995 TAC for 4VWX silver hake be set at 60,000t. In order to reduce by-catches, the Silver Hake Box was redrawn in 1994 to move its northern boundary into deeper waters. Mandatory use of the Nordmore grate was also imposed in 1994.

1995 CONSULTATIONS: The information obtained at various fisheries management meetings show that fishermen still have concerns about the silver hake resource. Some still believe that this stock is not as healthy as indicated by scientific assessments, others are concerned about the by-catch of other groundfish in the silver hake fishery, and some feel the fishery should be reduced regardless, as silver hake is an important food for cod.

STOCK STATUS OUTLINE

- 1990-93 year classes variable; weak 1994 year class.
- Commercial catch rates have dropped since 1989; remained stable in 1992-1994 at 40% of the 1989 level.
- Weight at age declining.
- Biomass appear stable but lower than in mid-1980s.

(from DFO SSR 95/3)

ANALYSIS: The Council notes that, effort in 1994 was greatly reduced over historical levels. The fishery started much later than anticipated in 1994 and optimal conditions for fishing were missed. The combination of serious delays in granting allocations, sudden shifting of the fishing zone, and the early closing of the season to avoid gear conflicts let to reduced catches in 1994.

The June 1995 Report of the NAFO Scientific Council indicates that in-coming year-classes are slightly below average and that the spawning biomass showed a modest increase in 1994. Scientists calculated that the $F_{0.1}$ catch for 1996 is of the order of 64,000t.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VWX silver hake remain at 60,000t.

4.4.2.12 ARGENTINE: 4VWX

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	1,000	1,000
CATCH	292	203	83	351	107	217	143	—	—	—	—*

As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: Catches from this stock, which are taken as by-catch in the silver hake fishery, have not exceeded 360t since 1983.

In November 1993, the Council recommended that, as a precautionary measure, the 1994 TAC for argentine in 4VWX be set at 1,000t. The TAC was set at that level for 1994. In 1994, the Council recommended that the 1995 TAC for 4VWX argentine be set at 1,000t.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

ANALYSIS: No direct interest has been expressed by Canadian fishermen in this fishery to date .

RECOMMENDATION: **The Council recommends that the 1996 TAC for 4VWX argentine be set at 1,000t.**

4.4.2.13 ATLANTIC HALIBUT: GRAND BANKS & SCOTIAN SHELF (3NOPs4VWX5Zc)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	—	—	—	3,200	3,200	3,200	3,200	3,200	3,200	1,500	850
CATCH	4,000	3,300	2,600	2,300	1,900	2,100	2,200	1,400	1,600	1,100*	695

*As of November 15, 1995.

HISTORY OF FRCC RECOMMENDATIONS: In November 1993, the Council recommended that the 1994 TAC for 3NOPs4VWX5Zc Atlantic halibut be set at 1,500t as a precautionary measure. The Council also recommended that the mandatory landing provisions be reviewed with the aim of allowing halibut smaller than 32 inches to be released, if feasible. This was implemented in 1994.

Concerned that the stock was continuing its rapid decline, in 1994, the Council recommended that the 1995 TAC for 3NOPs4VWX5Zc Atlantic halibut be set at 850t as a precautionary measure. The Council recommended also that mandatory landing provisions be reviewed regarding the discarding of incidental catches of halibut smaller than 32 inches.

1995 CONSULTATIONS: The South West Nova Scotia fixed Gear sector mentioned during the 1995 consultations that there are more halibut out there than as indicated by the DFO Stock Status Report. Scotia-Fundy fishermen expressed concern that they were releasing small halibut for conservation reasons, right up to the 4T/4Vn line, while fishermen in 4T were retaining some small fish in their catch. They were of the opinion that the same rules should apply everywhere for the release of small Atlantic halibut.

STOCK STATUS OUTLINE

- TAC was reduced in 1994 and 1995.
- Total effort stable since 1992.
- Necessary to maintain present restrictions in the fishery over several years.

(from DFO SSR 95/3)

ANALYSIS: The 1995 Stock Status Report indicates that stock conditions in 1996 are not expected to be any different than in 1995 and that it will be necessary to maintain present restrictions for several years.

The Council notes that there does not seem to be evidence of large scale redirection of fishing effort for the stock as a whole but remains concerned that re-direction of effort is a potential treat to conservation and could result, if it occurs, in mortalities higher than anticipated.

ATLANTIC HALIBUT: 3NOPs4VWX5Zc (cont)

RECOMMENDATION: The Council recommends that the 1996 TAC for 3NOPs4VWX5Zc Atlantic halibut be set at 850t and that the release of halibut smaller than 81 cm be mandatory.

4.4.2.14 YELLOWTAIL FLOUNDER: GEORGES BANK (5Zj,m)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	N/A	N/A	N/A	N/A	—	—	—	—	—	—	400
CATCH	N/A	N/A	N/A	N/A	0	0	0	0	200	1,000	474*

*As of November 15, 1995 (Canadian catch only).

HISTORY OF FRCC RECOMMENDATIONS: The directed fishery for yellowtail flounder commenced only recently, with 8 to 10 boats participating in a fishery and was expanded rapidly in 1994 with about 40 vessels pursuing the fishery.

1995 CONSULTATIONS: There were no specific comments on this particular stock during the 1995 consultations.

STOCK STATUS OUTLINE

- 5Zjm could be management unit.
- Present harvest likely above Fmax.
- Stock stable at a low level; much lower than in late 1960s.
- Signs of good recruitment (1992 year class).
- 1995 yield should not exceed 435t.

(from DFO SSR 95/3)

ANALYSIS: Both the American and Canadian scientists consider that this stock is at a low biomass level and overexploited.

The 1995 Stock Status Report indicates that the yellowtail flounder on the Canadian portion of Georges Bank could be the basis of a small sustainable fishery and NAFO subdivision 5Zj,m could be viewed as a management unit. The 1995 Stock Status Report indicates that present harvest levels are likely exceeding any reasonable reference, and that consequently annual catches should not exceed 435t.

RECOMMENDATION: The Council recommends that bilateral consultations continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1996, prior to which time the Council will provide a definitive recommendation with respect to the 1996 TAC.

4.4.2.15 SKATES: SCOTIAN SHELF (4VsW)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	N/A	N/A	N/A	N/A	—	—	—	—	—	2,000	1,600
CATCH	N/A	N/A	N/A	N/A	3,800	5,000	4,300	2,300	2,100	3,100	

*As of November 15, 1995 (Canadian catch only).

HISTORY OF FRCC RECOMMENDATIONS: This is the first time that the Council has had an opportunity to view information on this fishery and to formulate recommendations for the conservation of this resource.

In 1994, a combination of closures of traditional groundfish fisheries on the Scotian Shelf and openings in the markets for skate wings resulted in the development of a directed Canadian skate fishery.

In 1994 a preliminary TAC of 1,200t was established with an additional 800t allocated to joint industry/science surveys. The 1994 catch accounted for 3,100mt, including bycatch in non-directed fisheries. The 1995 directed fishery was regulated by 1,600t TAC with an additional 20% by-catch allowed in the directed flatfish fishery.

1995 CONSULTATIONS: There were no specific comments on this stock during the 1995 consultations.

ANALYSIS: The biomass index of skates from annual summer surveys has shown a general decline since 1982. The 1995 Stock Status Report states that the low reproductive rate of skates, combined with declining biomass, and the need to limit by-catch of traditional species in some areas, all indicate the need for a continuation of a conservative approach to harvesting.

STOCK STATUS OUTLINE

- New directed fishery.
- Declining biomass of thorny skates.
- Discard rates are likely very high in the fishery.
- Harvest of 1,200t consistent with conservation.

(from DFO SSR 95/3)

The harvest advice provided in 1994 was for a TAC of 1,200t for 1995. The 1995 Stock Status Report re-iterated this advice for 1996.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VsW Skates be set at 1,200t.

4.4.2.16 WOLFFISH: SCOTIAN SHELF (4VWX)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	N/A	N/A	N/A	N/A	—	—	—	—	—	—	—
CATCH	N/A	N/A	N/A	N/A	600	600	500	700	600	400	

*As of November 15, 1995 (Canadian catch only).

HISTORY OF FRCC RECOMMENDATIONS: This is the first time that the Council has had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

STOCK STATUS OUTLINE

- Biomass declining.
- Increase in small fish.
- Yield of 600t should be maintained.

(from DFO SSR 95/3)

ANALYSIS: The 1995 Stock Status Report states that the biomass has declined since the mid 80's in 4X and 4W while it has remained relatively stable in 4V.

There are signs of good recruitment but there is a need to reduce fishing presure if stock rebuilding is to take place. Scientists believe that annual catches of the order of 600t would be consistent with conservation.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VWX Wolffish be set at 600t.

4.4.2.17 WHITE HAKE: SCOTIAN SHELF (4VWX)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	N/A	N/A	N/A	N/A	—	—	—	—	—	—	—
CATCH	N/A	N/A	N/A	N/A	3,400	3,700	2,900	3,400	3,600	3,100	

*As of November 15, 1995 (Canadian catch only).

HISTORY OF FRCC RECOMMENDATIONS: This is the first time that the Council has had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

STOCK STATUS OUTLINE

- Current abundance compares to that in 1970s.
- Increasing pressure on stock.
- Yield should be restricted to 2,500t for 1996.

(from DFO SSR 95/3)

ANALYSIS: The Council notes that commercial landings of white hake from the Scotian Shelf are largely from 4X (70%) and 4W (10-20%).

The biomass of white hake on the Scotian Shelf is estimated to be much lower than the levels reached in the early 1980s and is now approaching the low levels reached in the 1970s. Scientists advise that annual catches of the order of 2,500t would be more consistent with current biomass levels.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VWX White hake be set at 2,500t.

4.4.2.18 CUSK: SCOTIAN SHELF (4VWX)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	N/A	N/A	N/A	N/A	—	—	—	—	—	—	—
CATCH	N/A	N/A	N/A	N/A	2,700	3,100	3,800	4,200	2,400	1,900	

*As of November 15, 1995 (Canadian catch only).

HISTORY OF FRCC RECOMMENDATIONS: This is the first time that the Council had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

STOCK STATUS OUTLINE

- Biomass declining.
- Yield for 1996 should be restricted to below 2,000t.

(from DFO SSR 95/3)

ANALYSIS: In the 1995 Stock Status Report, scientists warn indicates that the cusk biomass in both 4W and 4X has shown a gradual decline since groundfish surveys commenced in 1970.

Biomass estimates are now at their lowest observed values. Scientists believe that catches should be restricted to below the 1994 total, i.e. below 2,000t.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VWX cusk be set at 1,500t.

4.4.2.19 MONKFISH: SCOTIAN SHELF (4VWX)

FISHERIES STATISTICS (from DFO)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
TAC	N/A	N/A	N/A	N/A	—	—	—	—	—	—	—
CATCH	N/A	N/A	N/A	N/A	600	800	800	800	600	1,200	

*As of November 15, 1995 (Canadian catch only).

HISTORY OF FRCC RECOMMENDATIONS: This is the first time that the Council has had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource.

1995 CONSULTATIONS: No specific comments were received on this stock during the 1995 consultations.

STOCK STATUS OUTLINE

- Biomass declining.
- High exploitation rates.
- Should limit catch to less than 800t.

(from DFO SSR 95/3)

ANALYSIS: Historically, monkfish have been almost exclusively a by-catch fishing of groundfish and scallops ventures. Since 1992, the less than 65 mobile fleet has been directed for monkfish in 4X. Consequently landings in this area increased from just over 300t in 1991 to 1,100t in 1994. The 1995 Stock Status Report indicates that the biomass of this resource has declined from the high levels seen during the 1970s. The report indicates that the increased interest in this species will likely increase pressure on this resource and could lead to very high exploitation levels.

Scientists suggest that catches be limited to less than 800t, the average landing since 1988.

RECOMMENDATION: The Council recommends that the 1996 TAC for 4VWX monkfish be set at 700t.

APPENDICES

APPENDIX 1

Considerations on Re-Opening a Closed Fishery

research surveys. We have heard that they have worked with various degrees of success, and have sometimes faced serious administrative difficulties.

We have heard a serious lack of confidence expressed by fishermen in the results of scientific surveys. Similarly, DFO scientists have difficulty incorporating fishermen's information into their stock assessment methodology. This mutual lack of confidence is an obstacle to the development of reliable, widely acceptable criteria for re-opening and conducting the fishery.

4. **More sentinel fisheries, or a limited commercial opening?** While we have been admonished by some to be very cautious before re-opening closed fisheries, there is also broad pressure to re-open a fishery in the southern Gulf (4TVn) and in southern Newfoundland waters (3Ps). Arguments for re-opening were based on high groundfish by-catch rates in other fisheries and on evidence of groundfish seen by fishermen in those areas.

   It was argued that such a fishery could provide scientific information without the administrative difficulties encountered by sentinel fisheries. Some groups also agreed that effort control could be achieved by industry groups taking the initiative on limiting the number of fishing boats involved to catch their group's allocation. It was suggested that the conduct of such a limited commercial fishery would be subject to the preparation, in collaboration with DFO science and management, of a fishing plan satisfying scientific and conservation objectives. It remains to be seen whether it is possible and preferable to extend sentinel fisheries rather than to open a limited commercial fishery to ensure adequate information on stocks.

5. **What next?** The FRCC thanks all who participated in the consultations. As was indicated in the document circulated, these meetings were only a first step in a process which will help the FRCC sharpen its views on conservation issues about how and when to re-open a closed fishery. The FRCC wishes to hear from all interested contributors to this issue and will welcome briefs at any time on this subject. Further consultations are planned in the months ahead.

   At the same time as the FRCC concerns itself with conservation issues, it is to be expected that parallel discussions will take place between DFO and the industry for operational planning of the conduct of limited new fisheries. Issues of access to the fishery by the various gear sectors, and effort control to ensure catch limitations in a limited fishery, are two issues which were brought to our attention as requiring attention before a fishery can be re-opened.

1.2 LETTER TO STAKEHOLDER

28 July, 1995

Dear Groundfish Stakeholder:

The mandate of the Fisheries Resource Conservation Council is the conservation of fishery resources. This requires the rebuilding of stocks to optimum levels and maintaining them at or near such levels. When the Council began its work, many groundfish stocks were seriously depleted and the fisheries that exploited them had to be closed. As some stocks show signs of recovery, as is believed by fishermen to be the case in area 4T, pressure mounts for fisheries to begin again. How to deal with this situation is a major challenge. The Council's response is to propose criteria and a process that can be used to help determine when a fishery should re-open.

The past two and one half years have been extremely difficult for the Atlantic groundfish industry and decisions taken on fishery closures were based on a prudent approach, intending to "err on the side of caution." The resulting hardship cannot be overstated and the Council, often identified as the bearer of bad news, knows full well how difficult the decisions were. We all want to see a rapid return to healthy fisheries but we are not willing to consider shortcuts or to recommend openings prematurely.

Over the past eight months the FRCC has given very careful consideration to the preparation of the document before you. It now requires a thorough analysis and comprehensive comment from stakeholders. This is a beginning - but a beginning that will hopefully set the course for sustainable fishing at optimum levels for generations to come.

In judging the ability of a fish stock to sustain a re-opened fishery it is necessary to look at various stock status indicators: primary biological -such as total and spawning biomass, recruitment and age structure; secondary biological - such as geographical distribution, fish condition and weight at age; environmental and ecological conditions - such as physical and biological environment and habitat; and finally, trends. These are addressed in detail in the paper. Also, examples are provided on how the indicators can be applied to a fishery and I urge you to read them carefully.

As you study this document you should consider what indicators are most appropriate for the stocks in your area; Are there other indicators that should be considered? What are your views on the thresholds for those indicators?

Ultimately we will revise the document based on the input received and produce a set of criteria and a process which the FRCC will use over the next number of years in preparing our advice to the Minister of Fisheries and Oceans on the various closed stocks.

The Council is grateful for the work provided by its Stock Assessment Subcommittee, the advice of DFO scientists and the views expressed by stakeholders during our many consultations on groundfish stocks. It is now time to go to the next step and prepare for when closed fisheries can be re-opened. How we do this will be extremely important as the basis for optimal and sustained fisheries in the future.

We invite you to study this discussion paper and give us your views.

Yours sincerely,

H.M. Clarke
Chairman

1.3 CONSIDERATIONS ON RE-OPENING A CLOSED FISHERY REPORT

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CONSIDERATIONS ON RE-OPENING A CLOSED FISHERY

1. INTRODUCTION

In 1993, following a sharp decline in groundfish catches, scientific assessments showed that many stocks had fallen to unprecedented low levels. This was indicated by low spawning-stock biomass, declining weight-at-age, reduced geographical distribution, and no evidence of strong new year classes. As a first step towards conserving what remained of the stocks, the Fisheries Resource Conservation Council (FRCC) recommended closure of directed fisheries in a number of areas. The hope was that, over a period of time, these closures would allow rebuilding of the depleted fish populations.

When fisheries are closed, it is important to continue to assess their status regularly in order to determine when stocks have recovered. A decision to re-open a fishery must be based on reliable information about the status of fish stocks and their ability to support sustainable fisheries. The decision to re-open a fishery must also include discussions with stakeholders and the interested public. Their participation in the process is critical.

The purpose of this paper is to stimulate discussion on some of the issues involved in re-opening a fishery.

2. BACKGROUND

The Fisheries Resource Conservation Council (FRCC), which advises the Minister of Fisheries and Oceans on the conservation of Atlantic fisheries resources, has been considering the question of how to re-open a closed fishery for some time. Its Stock Assessment Subcommittee was asked to lead this discussion, which began within the Council itself. Members of the Stock Assessment Sub-Committee then met with scientists from the Department of Fisheries and Oceans to hear their views on biological criteria for stock status, as well as other issues involved in re-opening a fishery.

A short paper (FRCC.94.TDl), outlining some preliminary thoughts on the issue of re-opening fisheries, was circulated during the Council's September 1994 public consultation meetings. This paper expands on the issues raised in the earlier one.

It is our goal to stimulate stakeholder and public involvement in discussions on re-opening fisheries. We invite feed-back on all the issues in this paper, as well as suggestions on how to progress most effectively. Specific points for discussion, on which the FRCC would like stakeholders input, are suggested at the end of the paper.

A point to make at the outset is that this discussion is framed within the general conservation objectives that relate to the FRCC's mandate. These are:

> "(1) to rebuild stocks to their 'optimum' levels and maintain them at or near these levels (subject to natural fluctuations), with 'sufficient' spawning biomass to allow continuing strong production of young fish;
>
> (2) to manage the pattern of fishing over the size and ages present in fish stocks, catching fish of optimal size."

In particular, we are concerned here with developing methods for re-opening a fishery, perhaps at an initially low level of exploitation, so that stock recovery may continue during fishing.

The FRCC's mandate is conservation of fishery resources which support sustainable fisheries. Setting social and economic objectives for the fishery, or deciding on catch allocations and sharing rules is the responsibility of the Department of Fisheries and Oceans, in concert with industry.

As we proceed through the paper, we will indicate clearly where the FRCC has a role to play in re-opening fisheries and where decisions are to be taken by others, such as industry, other stakeholders, the Minister of Fisheries and Oceans and DFO staff. The reader is also referred to the accompanying flow chart (Figure l) which illustrates the steps to be taken in re-opening fisheries, and who takes them.

Re-opening fisheries involves a number of steps requiring consideration of: the nature of biological indicators of stock status; the criteria for re-opening; target values for stock indicators; the actual method of starting to fish again; and the objectives of the fishery. Each one of these steps is discussed below, beginning with a review of possible stock status indicators in the following section.

3. STOCK STATUS INDICATORS

What biological factors are most important in assessing the status of a fish population? Which of these factors must be considered to determine if a stock is so depleted that a fishery must remain closed, or "healthy" enough to withstand harvesting? These questions are clearly within the FRCC's mandate and will be explored in this paper.

To answer them, the appropriate indicators of the status of the fish stocks must be identified and the most important ones defined for each particular stock of concern.

Biological indicators include properties of individual fish, as well as characteristics of the whole population.

For example, "condition" is a numerical index which describes the health of individual fish (Figure 2). The status of the population as a whole is described by properties such as its total biomass, its spawning biomass, its age structure, recruitment and aspects of its geographical distribution.

Factors external to the fish population, such as fleet size and technical capacity, environmental conditions, or the abundance of food or predators, may also have to be taken into account when making re-opening decisions.

Some biological indicators, such as total biomass, are important in determining the status of almost any fish stock. The relative importance of other biological indicators or environmental factors may be different for different stocks. **Some basic understanding of which indicators contribute to the status of the stocks, as well as their inter-relation, based on science and traditional knowledge, is thus an essential first step towards appropriate conservation measures and a sustainable fishery.**

Before determining precisely what criteria are required for re-opening, a set of biological, and other, "indicators" must be agreed upon by those involved in the fishery. As noted above, these must be based on the key indicators of fish populations, as well as on the ecosystem and environmental features which affect it. The types of indicators most useful in establishing biological criteria and stock status will vary from stock to stock.

A. Primary Biological Indicators

The first kind of biological indicators are those which refer to the abundance and the age structure of the population. They are determined from data obtained by scientific surveys, catch estimates, sentinel fisheries or traditional knowledge. Primary

biological indicators are of utmost importance in establishing biological criteria and determining the status of the stock and its surplus production.

Total Biomass: The total biomass is a measure of the total size of the population. It is the total weight of the population; it is composed of juveniles, the smallest of which (pre-recruits) are too small to catch and have not yet been recruited to the fishery; slightly older fish (recruits) which are large enough to be caught; and adult spawners. The total biomass of the population depends on the total number of fish, as well as on the age (and weight) structure of the population. In most cases, a greater harvest can be taken from a population with a large total biomass than one with a smaller total biomass, all other factors being the same.

Spawning Biomass: Spawning biomass is the biological "capital" of the total population which will produce "interest" in future individuals. It is that segment of a fish population that reproduces. There is no simple relationship between spawning biomass and recruitment, but the probability of large recruitment is higher when the spawning biomass is larger. On the contrary, a very small spawning biomass is unlikely to ensure future large recruitment. For a sustainable fishery, the spawning biomass should not fall below a certain threshold.

Recruitment: Recruitment refers to the entry of new individuals into the fishery. It is the number of fish reaching commercial size, which can legally be caught when the fishery is open. Recruitment depends to some degree on the size of the spawning biomass; a very small spawning biomass is less likely to produce large recruitment than a larger spawning biomass. However, other factors affect the successful survival of eggs, larvae and juvenile fish, such as environmental conditions and the presence of food and predators.

Age Structure: This is an important factor in assessing the reproductive potential of the stock because: i- older individuals produce more eggs; ii-the presence of a range of age classes may prevent wide fluctuations in recruitment; iii- in some species, a broad age-structure, with several year classes, may be necessary to provide a stable level of both catches and egg production.

B. Secondary Biological Characteristics

A second class of biological characteristics of a fish stock consists of properties which may be quantitatively measured, either through scientific surveys, catches, or fishers' observations, but which are more difficult to interpret as indicators of the status of the stock, or as biological criteria for decision making.

Geographical Distribution: Changes in the geographical distribution of the population can be important. It would be risky to exploit a stock reduced to occupying only a small fraction of its original range. That would be especially true if it turned out that the remaining population consisted of isolated, vulnerable sub-stocks. The number of sub-stocks in a population is referred to as the "richness" of a population. Local abundance from sub-stocks may function as seed-stock to repopulate depleted areas. Re-opening should await confirmation of a sufficiently broad geographic distribution of a stock, so as to avoid depleting concentrated sub-stocks. The definition of a sufficient geographical distribution will likely be the subject of extensive discussion.

Fish Condition: The condition of individual fish may indicate the physiological strength or weakness of the population, which may be important to reproductive capacity, vulnerability to fishing, or yield of a fishery. This is illustrated in Figure 2. There is natural variability in physiological indices resulting from environmental factors and with the life

and reproductive cycle of the animals. Consequently, the overall influence of fish condition on stock status is difficult to interpret.

Weight at Age: The weight which is reached by a certain age can be used as an indicator of fish growth. This indicator has the advantage of being easy to measure.

C. Environmental and Ecological Conditions

A third set of characteristics of stocks refers to their environmental and ecological situation. This might include water temperatures, oxygen levels, the presence of food resources, the effect of predators. It is difficult to interpret their impacts on stocks quantitatively. However, because such conditions are generally perceived as important to stocks, they should be kept in mind when considering re-opening options. As knowledge of the ecology of the stocks improves, it may become possible to better quantify the influence of these indicators.

The Physical Environment: The physical environment of a fish stock may be of crucial importance. Much has been said about possible impacts of low temperatures and salinity variations on recruitment in the cod fishery. Links between biological characteristics, such as egg and juvenile survival, recruitment, natural mortality, condition factor and environmental variables are as yet unclear.

The Biological Environment: Similarly, predator-prey relationships, including the fishery itself, may be viewed as obvious by some (e.g. seals eat cod; cod and seals eat capelin), but may hide unexpected complexities and remain to be quantified with reliability (for example, seals eat cod and hake, but hake also eats cod and thus more seals may mean less hake and thus more cod) . This is an important area for continuing research. It is not clear how relative abundances of prey and predators should enter into the definition of biological decision-making criteria.

Habitat: Habitat factors are also important. Disturbances or degradation of habitat which supports fish populations can greatly affect those populations and, hence, the sustainability of fisheries. Habitat deterioration may also have more impact on a weak, recovering stock than on a healthy population. Assessing habitat factors would involve determining the extent of knowledge of spawning and nursery areas and whether such areas should be protected.

D. Trends

In predicting the future state of a fishery, trends in the stock status indicators may be as important as knowledge of current values (for example, whether biomass has been increasing or decreasing in recent years). There is a need to improve the interpretation of the significance of trends, especially in the presence of large inter-annual variability.

4. RE-OPENING CRITERIA

Several steps are involved in the re-opening of a fishery:

a. First, the most important indicators of stock status must be chosen from the above list.

b. Second, for each of the indicators chosen, a specific level (threshold) must be decided upon at which point some amount of fishing can be permitted; for example, when the stock recovers to a certain total biomass, or age structure, and so forth. 'Optimum' or long-term target values for indicators levels should also be agreed upon.

c. Third, if some level of fishing can be permitted, what should that level of exploitation be? For example, how many fish

can be caught while ensuring continuing recovery toward some sustainable level of exploitation?

Both scientific expertise and public consultation will contribute to answering these questions for each stock. To facilitate this discussion, examples for specific stocks have been developed and are presented later in this document. These examples will also be discussed in public consultations.

Many indicators may contribute to the definition of the overall stock status thresholds. As in school, where a student must pass all courses to graduate, it may be decided that the threshold is reached only if all indicators have reached a sufficient level. On the other hand, some indicators may be much more important than others, so that in other cases the status threshold may be reached if only a few indicators are sufficiently high. **For each stock, a set of re-opening rules will have to be arrived at to establish a safe threshold to re-open the fishery.**

Once the threshold has been reached, fishing can begin — but only at a low level at first, to avoid over-harvesting the stock. Re-opening the fishery will be a gradual process, not just a matter of starting-up the fishery "like it was". On the other hand, it makes no sense to re-open a fishery to catch only a few kilograms of fish; the threshold will have to be defined so that a minimum, but viable level of harvesting can take place.

Re-opened fisheries will go through an initial developmental phase. If all goes well, as the stock continues to recover toward target indicator values, a higher level of exploitation may be appropriate. Throughout the process of development phase and increasing exploitation rates, managers must carefully develop a fishing plan for this, based on conservation advice.

If it should happen at some future time that the indicators show that the stock is again seriously declining, a decision may have to be made to close the fishery, following perhaps a different set of criteria. The decision to re-open a fishery would be made only if stock status was clearly better than when the fishery was closed.

Furthermore, given the natural variability of the environment and of fish populations, it will also be wise to study how stock characteristics might behave in future years under a variety of conservation options and environmental variability. One way to compare conservation options is to calculate, for a variety of situations, the likelihood of unfavourable events. For example, how likely is it that, because of adverse environmental conditions or because of uncertainties in assessment, the stock should fall below acceptable threshold levels and the fishery should have to be closed again.

Threshold levels for re-opening fisheries must be designed so as to avoid another crash of the stock! The FRCC may thus request that detailed calculations of the consequences of suggested conservation options be performed by DFO scientists.

The essential objectives of any fishery are conservation and sustainability. These are central to the FRCC's mandate. Additional objectives are socio-economic, aiming at such goals as maximum employment, maximum return on investment, or highest long-term yields, for example. These objectives are determined by the industry and are not part of the FRCC's mandate. However, such objectives, once selected, will have consequences on the exploited stocks and on the manner of fishing. The objectives of the fishery will thus partially determine the range of available conservation options.

Once relevant indicators have been identified and levels set to arrive at a decision to re-open, acceptable and enforceable rules to conduct the fishery must be developed so that it can proceed within its conservation objectives. The selection of such management rules is not part of the FRCC's mandate,

although its advice may be sought regarding conservation implications of fishing and management methods.

5. A SIMPLE EXAMPLE OF RE-OPENING CRITERIA

It was noted above that discussion about re-opening must be based on: (1) a set of criteria which determine when a stock status is adequate to re-open a fishery, and (2) decisions on harvesting levels, accompanied by a fishing plan. Here we focus on how these might be used in practice.

Clearly, the recovery of a fish stock requires net growth of the population, which in turn requires a sufficient number of spawners (measured by the Spawning Stock Biomass), and survival of enough young fish to a size at which they can be fished (the Recruitment). We thus take as primary, or essential, biological indicators the spawning biomass and an index of recent recruitment. We also consider, as a secondary indicator, an index of fish health: the weight at a given age.

The two stocks to which we will apply these criteria are the southern Gulf of St. Lawrence cod stock (4TVn) and the eastern Scotia Shelf cod stock (4VsW). For these two stocks, the above indicators are defined more precisely as follows:

a. **Spawning stock biomass:** the total weight of all fish of age 5 years and older for 4TVn cod, and 6 years and older for 4VsW cod.

b. **An indicator of recent recruitment** is calculated as the average number of fish in the year classes that would normally contribute to the fishery. In the specific examples discussed here, an index of the year-class abundance is obtained at age 3 for 4TVn cod and at age 1 for 4VsW cod. In each case, the indicator of recent recruitment was obtained by averaging the index for three consecutive years, so as to obtain a measure of the year-classes that would normally contribute to the fishery in a given year.

c. A rough fish health index may be taken as the **average weight of fish at age 7**, as measured in research surveys.

Let us consider 4TVn cod first. For reference, the values taken by the three indicators over a historical period of 35 years are plotted in Figure 3. The first two indicators are derived from the results of a population analysis using information from the commercial fishery and indicators of abundance. In the absence of catch data, when the fishery is closed, information would have to come solely from scientific surveys, or sentinel fisheries. Indicator values based on scientific surveys since 1978 are shown in Figure 4. In both figures, the level of the indicators at the time (1993) that the fishery was closed is shown by a dotted line; the level selected as a re-opening criterion is shown as a solid line.

As criteria for re-opening, we have selected as an example (this is one of the crucial points where scientific advice and public consultation are necessary) the following conditions:

a. the spawning biomass must have increased significantly from the level it had at the time the fishery was closed (the dotted line in the upper panel of Figures 3 and 4). The target level selected here is half-way between the level at closing and the average level over the historical period. This target level is shown as a solid line in Figures 3 and 4. While some might argue that this level is too low for re-opening and others might feel it is too high, remember that this is just an example, designed to focus discussion on these very questions!

b. average recent recruitment, as defined above, must **also** have recovered from its value when the fishery was closed, again to a level half- way to the historical average (see middle panel in Figures 3 and 4).

In this example, the above two criteria must **both** be satisfied before a re-opening decision is considered. The third criterion is used for additional guidance.

c. fish growth, as characterized by weight at age 7, should be above some historical level. The appropriate graph is the lower panel in Figures 3 and 4.

Projections of future levels of spawning biomass and recruitment are shown as open squares in the upper panels of Figure 3. These projections are based on today's assessment of the population and are subject to considerable uncertainty. Nevertheless, they provide a basis for discussion on what to expect.

In this example, there is an indication of future increase of spawning biomass towards the threshold level. However, projected recruitment keeps falling away from the selected threshold. Because we have decided that both indicators must reach assigned threshold levels, the decision must be not to re-open at this time. Remember however that this is only an example for the sake of discussion!

The second example is for the 4VsW cod stock. The same indicators are used and the information is presented in the same graphical form in Figures 5 and 6. Again, the choice of indicators and re-opening criteria would lead to a decision not to re-open at this time.

Another stock for which discussion of re-opening criteria is highly topical is southern Newfoundland, 3Ps cod. One would like to be able to define solid criteria, similar to those given in the above examples. However, there are serious difficulties in selecting appropriate biological indicators and defining threshold levels in this fishery. In the past, surveys have been conducted by Canada and France in this area. Each one of these surveys showed great variability (see for example Fig. 7); between the two of them and commercial catch data, it was possible to arrive at an assessment of the stock status. Currently, however, there remains only the Canadian research surveys. Fisheries scientists cannot identify reliable indicators. This is a clear instance of the need for a broad dialogue leading to a new approach in the assessment of this stock, to be initiated through the forthcoming consultations.

When all conditions or criteria are met, the level of the fishery will depend upon prospects for continuing stock rebuilding. To determine the level of fishing, expected recruitment and projected natural mortality (including by predation) will be assessed in relation to its ability to allow continuing stock growth. Any fishing will certainly be at a level below $F_{0.1}$ during the initial stages. Deliberations on re-opening will also have to keep in mind the need for some practical fishing level.

6. CONCLUSIONS

This paper has proposed a process for developing re-opening criteria and for using these criteria in decision-making; its main purpose is to stimulate discussion on all the issues associated with the re-opening process. Many questions arise within the re-opening discussion; for example:

a. Which indicators are the most important? The most reliable? Which indicators are easiest to apply?

b. How will it be possible to have enough information about indicators in a closed fishery? For which indicators do we have the best current information?

c. How will scientific and traditional (fishers') knowledge be blended in assessing indicator levels? How will we incorporate findings of sentinel fisheries in the process?

d. Must all indicator levels be above a certain value to reach a stock status threshold or could there be some trade-off between them?

e. How will thresholds be determined? Should they be historical levels, or a fraction thereof, or a recent average which reflects current environmental conditions?

f. Should one strive for the most conservative decision rules or for those that are the simplest to apply and enforce?

g. When will stock status be good enough to completely open the fishery?

h. Are there conditions under which the proposed framework might not lead to practical rules?

i. How can harvester and other industry groups be most effective in participating in this process?

These are only a few of the possible questions which must be considered for each stock.

To conclude, we remind all readers that this discussion paper is presented as an invitation to join the debate about re-opening fisheries. The FRCC is committed to its general conservation objectives of rebuilding the stocks and maintaining them at high sustainable levels. The FRCC is also committed to the idea that the process of re-opening a sustainable fishery must involve extensive consultation and a partnership between all interested parties.

CONSIDERATIONS ON RE-OPENING A CLOSED FISHERY

FIGURES

FIGURE 1: A flow chart of the decision process in re-opening a closed fishery

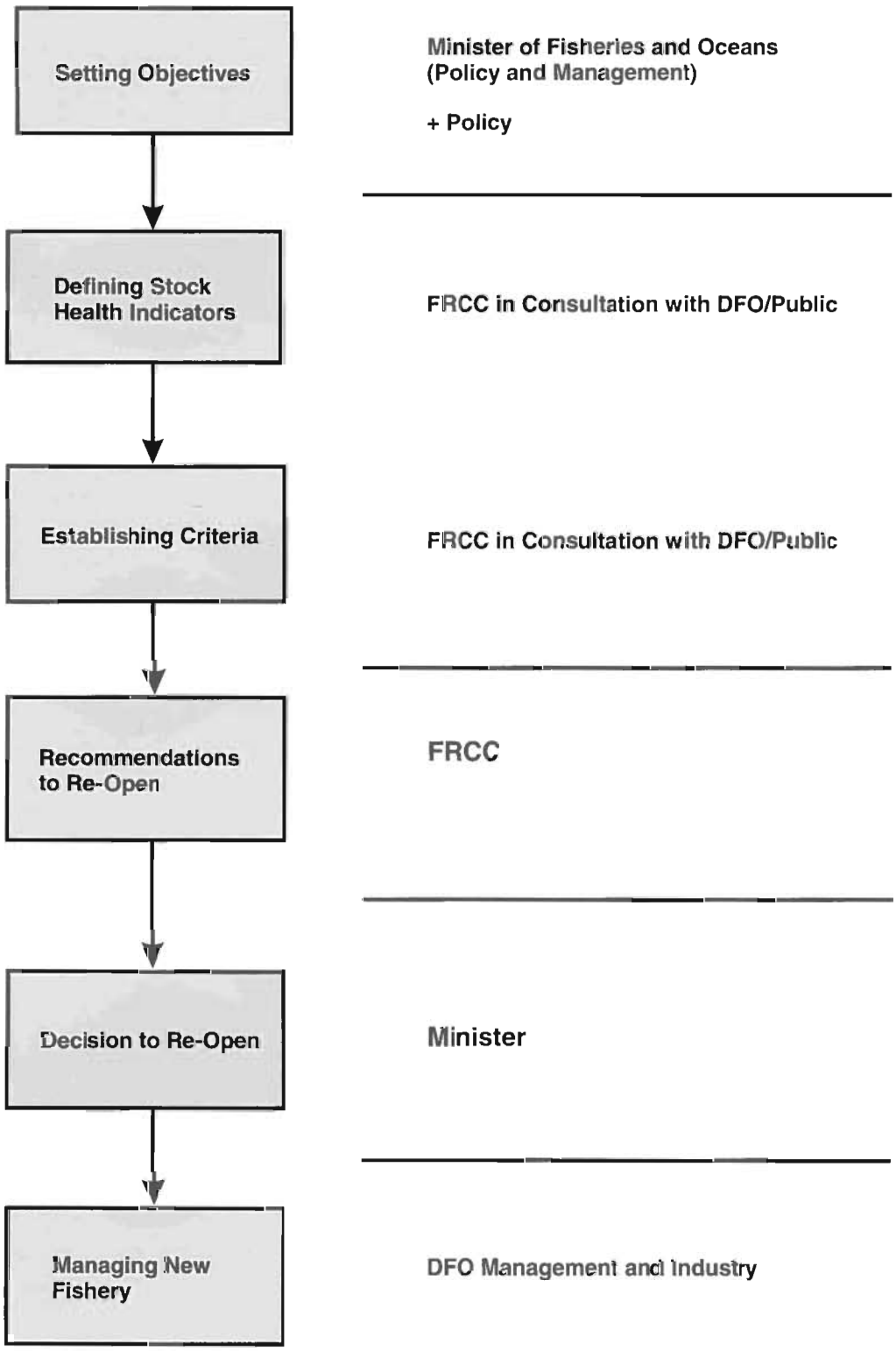
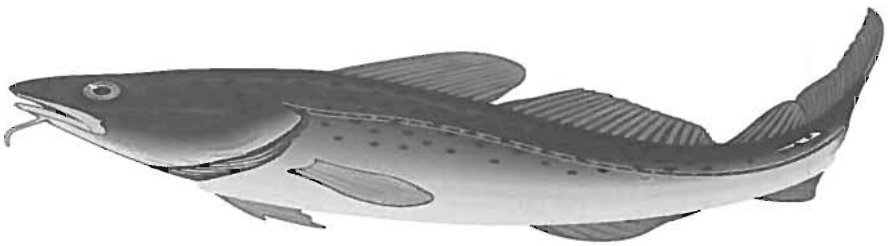
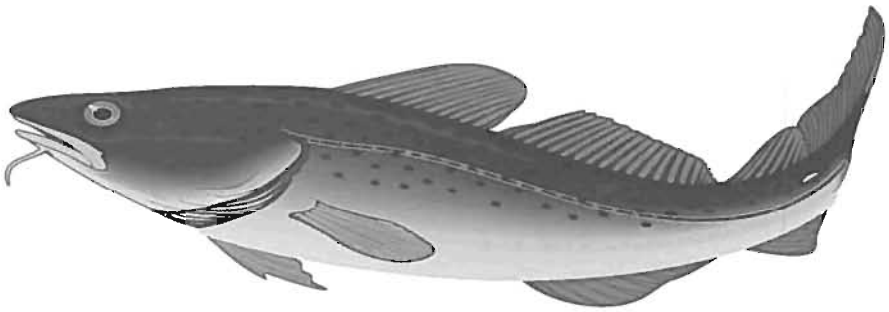


FIGURE 2: Individual fish condition: a measure of fish weight compared to their length.

Poor Condition



Good Condition



Excellent Condition

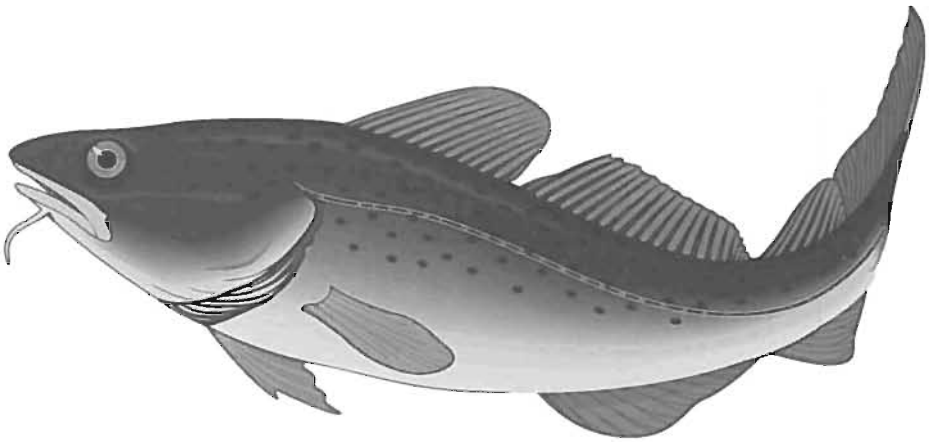
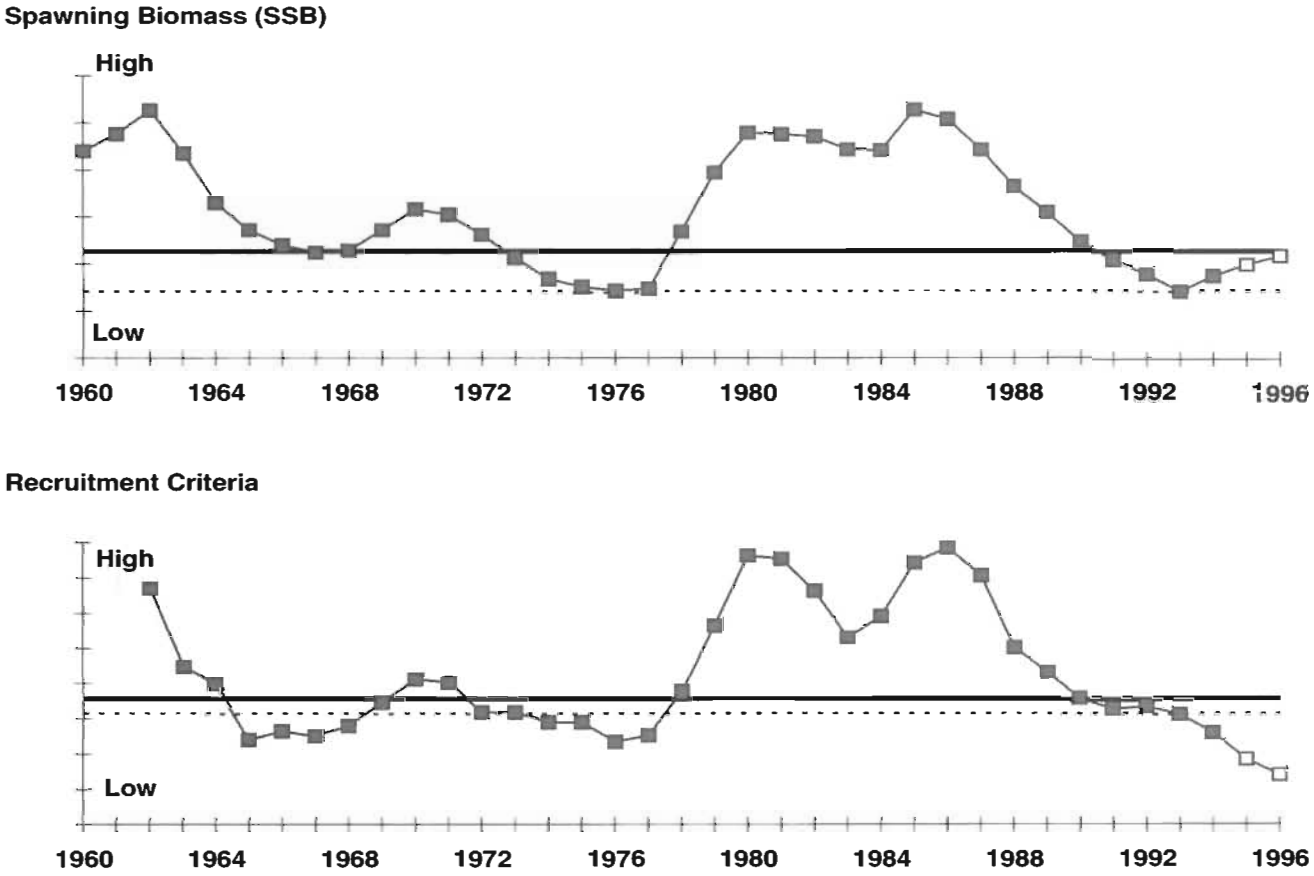
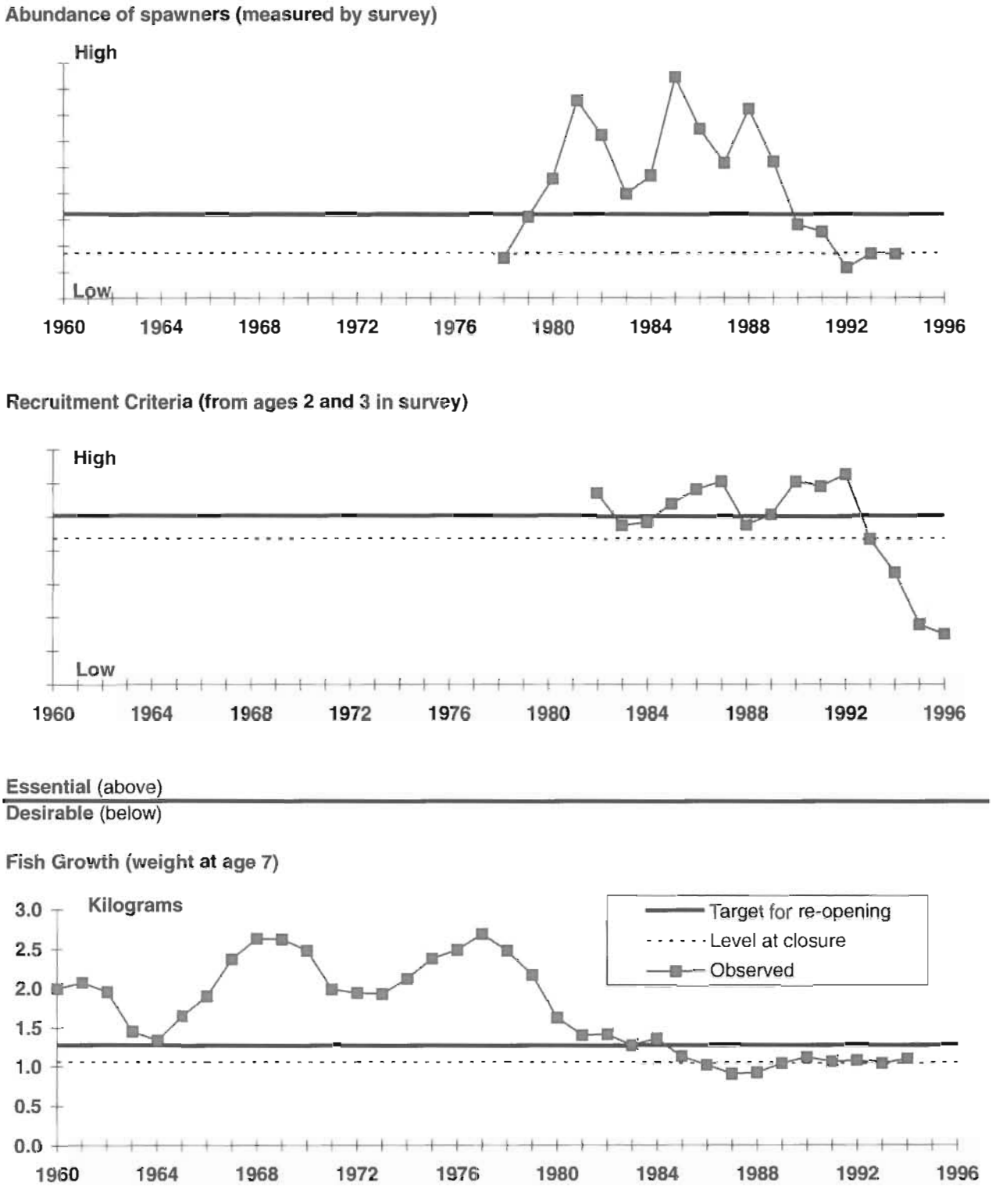


FIGURE 3: Sample criteria for re-opening of a 4TVn cod fishery based on information from age-structured analysis from catch data; at the top, spawning biomass, middle, recruitment; bottom, fish growth. In all plots, the dotted line is the level at closing the fishery, the solid line is the target for re-opening.



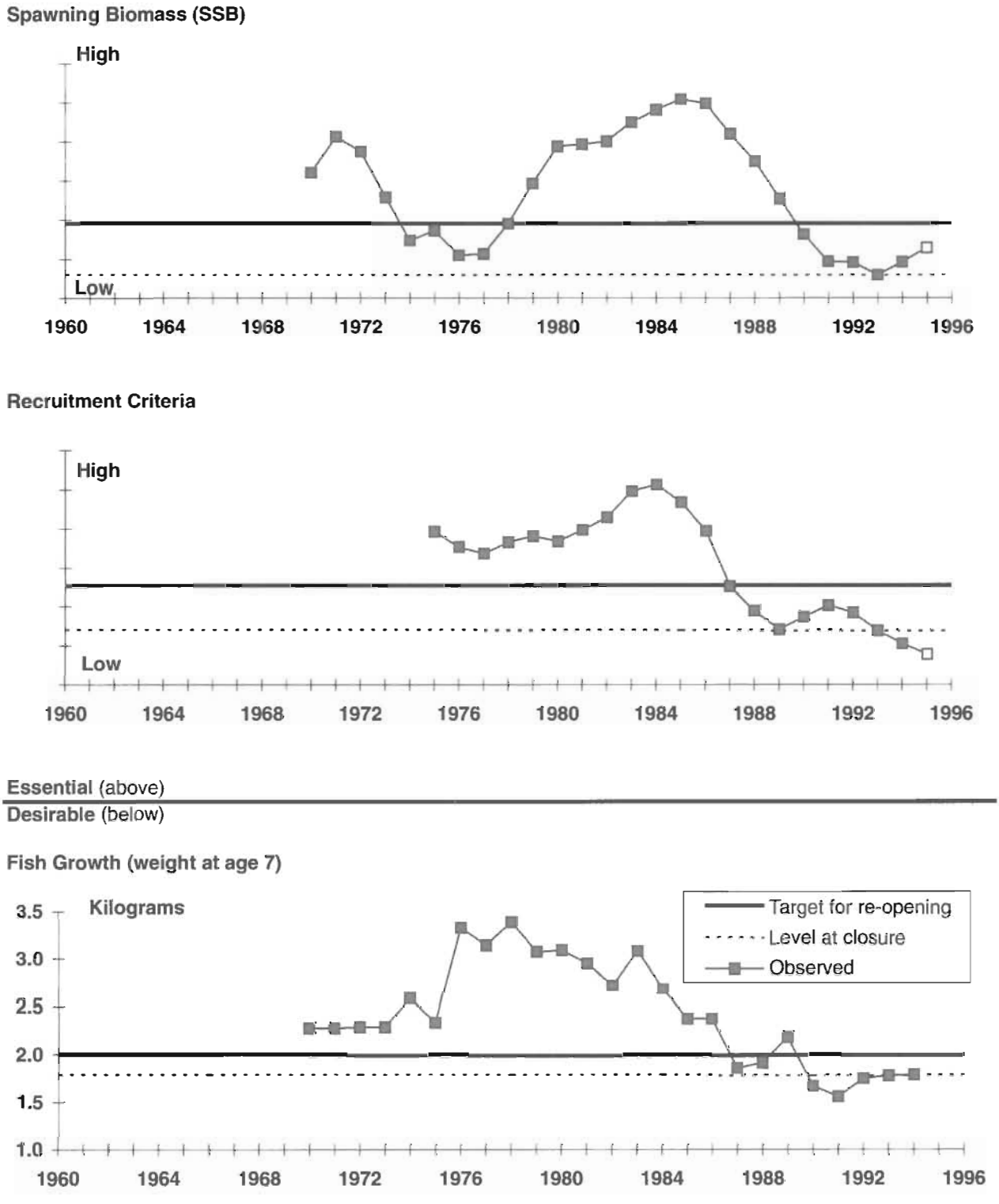
(from age-structured analysis; data provided by DFO-Science)

FIGURE 4: As in Figure 3, but using, in the top two panels, information from scientific surveys.



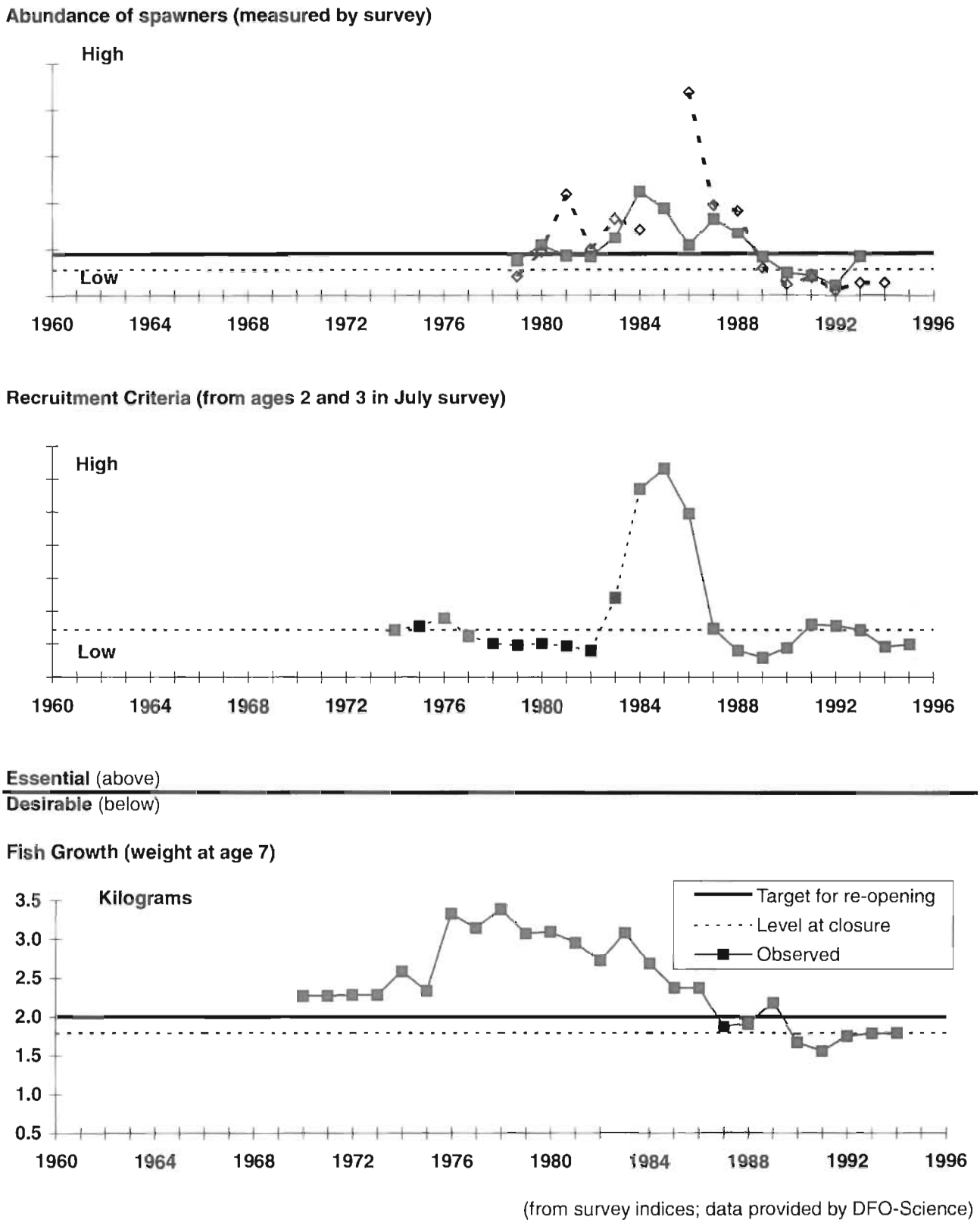
(from survey indices; data provided by DFO-Science)

FIGURE 5: As in Figure. 3, but for 4VsW cod.



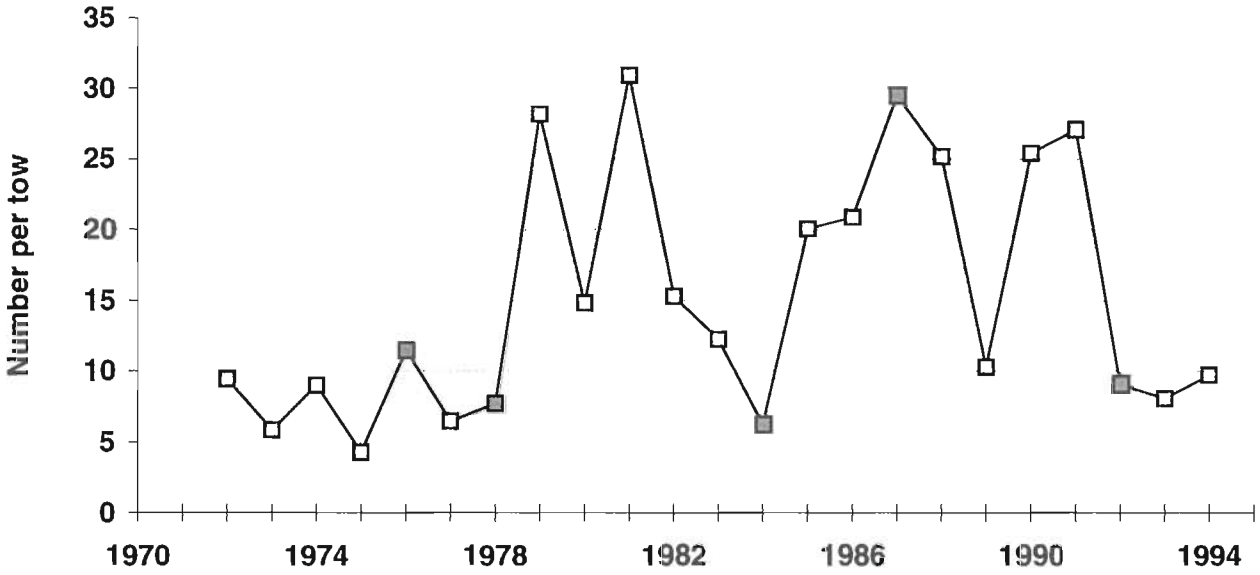
(from age-structured analysis; data provided by DFO-Science)

FIGURE 6: As in Figure 4, but for 4VsW cod.



(from survey indices; data provided by DFO-Science)

FIGURE 7: An example of the variability in research survey data for 3Ps cod.



APPENDIX 2

Consultation Paper on Gear Technology

APPENDIX 2: CONSULTATION PAPER ON GEAR TECHNOLOGY

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CONSULTATION PAPER ON GEAR TECHNOLOGY

1. INTRODUCTION

The Gear Technology Subcommittee (GTS) has reviewed the conservation aspects of groundfish fishing gear used in Eastern Canada and has developed the following consultation paper for use in its future deliberations on gear. The Subcommittee completed this portion of its work in keeping with the Fisheries Resource Conservation Council's (FRCC) instructions to develop a series of conservation principles on the use of groundfish fishing gear. In doing that, the GTS was to consider the extent to which those principles are undermined, the level of risk to conservation, the means by which conservation risk can be minimized or eliminated and to take into account regional and species considerations.

This consultation paper is based in part on a discussion paper released last December and entitled, **"Conservation Aspects of Groundfish Gear Technologies in Eastern Canada"**. In fact, the main conservation principles adopted for this consultation paper are to be found in the above-mentioned document, a revised version of which is now in print.

It is important to note that it is not within the mandate of the Gear Technology Subcommittee to discuss the allocation of resources between gear types. Consequently, it is not our intention to make recommendations concerning the transfer or re-allocation of resources from one gear type to another.

In fact, the object of the present document is to inform the fishing industry and the public of the progress of the Council on the issues surrounding groundfish gear technologies. Thus, the Council has preferred to develop a series of Conservation Principles specific to groundfish gear technologies upon which the fishing industry will be able to base its own Conservation Strategy for the future.

It is hoped that upcoming public consultation on the subject will help determine the reliability of the conservation principles as well as possibly adding new ones. The Council expects that following public consultation on the guiding principles related to groundfish gear technologies, recommendations covering the proper use of gear will be made. Hopefully these guiding conservation principles and recommendations will help the fishing industry in its decisions on the proper use of gear.

2. DEFINITION OF CONSERVATION AND OBJECTIVES FOR THE FISHERY

> *"Fisheries conservation is that aspect of the management of the fisheries resource which ensures that its use is sustainable and which safeguards its ecological processes and genetic diversity for the maintenance of the resource. Fisheries conservation ensures that the fullest sustainable advantage is derived from the resource and that the resource base is maintained."*

- "Conservation" objectives include:

  rebuilding stocks to their "optimum" levels and thereafter maintaining them at or near these levels, subject to natural fluctuations, with "sufficient" spawning biomass to allow a continuing strong production of young fish; and,

  managing the pattern of fishing over the sizes and ages present in fish stocks and catching fish of optimal size.

The conservation principles for groundfish gear have been developed from the FRCC discussion paper "Conservation Aspects of Groundfish Gear Technologies in Eastern Canada." In keeping with instructions from the Council, the Gear Technology Subcommittee has endeavoured to provide the Council with a proposed determination of what aspects of gear use are within the mandate of the FRCC and what the risks to conservation would be if the principles related to gear use are ignored.

3. CONSERVATION PRINCIPLES APPLICABLE TO GEAR

The FRCC discussion paper on gear technology highlighted several conservation issues related to each gear type(see 1, 2 and 3 below). In addition, new technological development was considered important by the Council and was therefore added as a fourth issue.

A. Selectivity and post-selection mortality
B. Environmental impacts
C. Manageability and potential for abuse
D. Technological Development

Considering the thrust of the discussion paper and the overall conservation objectives of the FRCC the Gear Technology Subcommittee proposes that the following principles be used as the basis for arriving at conclusions on the use of fishing gear:

A. Selectivity and Post-selection Mortality

i) Selectivity

a) All fishing gear for use in Eastern Canada should be capable of targeting a range of fish sizes of the directed species.

b) All fishing gear used in Eastern Canada should be capable of targeting a range of year classes of the directed species and allow small fish to escape so that they can spawn at least once.

c) Incidental harvesting of non-targeted species must be avoided and when it does occur the gear used and the operation of that gear should limit mortality to the lowest possible amount.

ii) Post-selection Mortality

Improved gear selectivity must not increase post selection mortality. Efforts must be made to ensure survivability of escaped or released fish.

B. Environmental Impact

It is recognized that some types of groundfish fishing gear may disturb the seabed. However, the impact of those gear types on the seabed must not be detrimental to the ecosystem.

C. Manageability and Potential for Abuse

i) Manageability

a) The implications of fisheries management decisions on conservation must be fully understood.

b) Fishing gear must not be adjusted or used in a way that will compromise conservation objectives.

c) All regulations specifically developed to protect fish stocks should be more rigorously enforced.

ii) Potential for Abuse

With regard to meeting conservation objectives, the potential for abuse of each fishing gear must be fully understood.

D. Technological Development

Technological developments related to fishing gear must first be evaluated for conservation implications and consistency with the above-noted objectives and principles before being considered for use.

4. FOCUS

This paper focuses on the following five major gear types employed in the Eastern Canadian groundfish fishery, namely otter trawl, Scottish/Danish seine, cod trap, gillnet and longline/handline.

However, before we focus on some of the issues related to existing gear types, we should touch briefly on some of the more positive aspects of each gear type.

The otter trawl's ability to select for size is significant. Its inability to select for specific species has been lessened in recent years by the use of various devices, such as lastridge ropes, horizontal panels, Nordmore grates and square-mesh codends. Slower tow speeds and shorter tows have been shown to increase selectivity as well.

The selectivity of the Scottish/Danish seine has also been improved by the use of Nordmore grates, lastridge ropes and square-mesh codends in various fisheries.

The gillnet is a very energy efficient way to fish and it has been found to be highly size selective. The concern over ghost fishing has been eased in some areas by limits put on the numbers of nets used per vessel and mandatory tending of nets.

The cod trap is very effective in harvesting inshore cod. Since the gear is stationary, its effects on the environment are negligible and losses of gear are rare.

Handlines and longlines are considered to be size and species-selective gears in most situations. The environmental effects of hook and line gears tend to be minimal. Even the loss of gear is of little concern as they stop fishing as soon as the bait deteriorates.

5. MAJOR RISKS IDENTIFIED BY GEAR TYPE

How fish are caught and how many are caught determines a fisher's livelihood. It also determines the health and long-term sustainability of the resource. That, of course, brings forth the issue at hand - the types of gear used in the Eastern Canadian Fishery and the overall risks to conservation.

Applying the conservation principles outlined in section 3 to the five major groundfish fishing gears used in Eastern Canada, the Gear Technology Subcommittee reviewed the major conservation risks associated with the use of each gear type.

A. Otter Trawl

There is an element of risk that moderate adjustment or operational changes can lead to an increased potential for abuse. As well, technological change directed at gear efficiency and effectiveness could seriously affect conservation principles if not properly evaluated.

In both cases the ability to avoid harvesting non-targeted species or non-targeted fish sizes could be compromised.

i) Specific Issues:

a) Selectivity towards size & species of fish.

b) Potential damage to bottom habitat in certain areas.

c) Potential for abuse.

d) Fish Survival after escape.

ii) Potential Recommendations:

a) Improve selectivity with proper escape equipment or changes to mesh size or shape, or operational practices which aid in escape and survival of unwanted fish.

b) Continue development work on trawl gear to make it less damaging to the bottom, such as using hydrodynamics rather than the use of doors or rock hopper gear on nets to keep gear barely touching the seabed.

c) Enforce regulations specific to abusive fishing practices and apply stiff regional sanctions as required by Law.

d) Continue development work to improve the survivability of escaped fish.

B. Gillnets

There is an element of risk that misuse of this gear type, leading to lost gear, would have a negative impact on the environment.

This remains an issue in the offshore fishery where a large number of nets are used.

As with otter trawl gear, there is an element of risk that even moderate adjustment or operational changes can lead to potential for abuse, specifically affecting the ability to avoid harvesting non-targeted species.

i) Specific Issues

a) Lost gear (ghost fishing) in certain areas.

b) Abusive fishing practices in certain areas. (Too many nets - longer soak times)

c) Fish survival.

ii) Potential Recommendations

a) Introduce mandatory locating devices and accountability for lost gear, where applicable.

b) Limit the number of nets and reduce soak times in areas where applicable.

c) Continue development work to improve the survivability of escaped fish.

C. Longline (Hook and Line)

There remains an element of risk in some areas of harvesting undersized fish and in other areas of harvesting non-targeted species such as in areas of heavy concentrations of mixed species, example 4X where mixed cod, haddock and pollock has led to combined cod, haddock and pollock (CHP) fisheries.

i) Specific Issues

a) Selectivity towards size and species of fish; e.g.. size and type of hook.

b) Fish survival.

ii) Potential Recommendations:

a) Regulate species specific bait/hook size and enforce strict by-catch & small fish protocols.

b) Re-evaluate the impact of size and type of hook on fish survival.

D. Scottish (Danish) Seines:

There is an element of risk that technological changes specific to gear effectiveness could lead to potential for abuse with respect to capture of non-targeted species or small fish.

That risk is mitigated to some degree in 4TVN, predominantly a one species area for seiners, i.e., targeting plaice in the southern Gulf or in 4Vn.

i) Specific Issues

a) Selectivity towards size & species of fish.

b) Fish Survival.

ii) Potential Recommendations:

a) Improve selectivity with proper escapement equipment or changes to mesh size or operational practices which will aid in survival of escaped fish.

b) Continue development work to improve the survivability of escaped fish. must be continued.

E. Cod Traps

This gear type is mostly species specific, i.e., to cod but the capture of small fish remains a concern in some areas. As well, by-catch of both sea trout and salmon is a problem with this gear in some areas.

i) Specific Issues

Selectivity towards size of fish in certain areas.

ii) Potential Recommendation

Introduce appropriate mesh size and small fish protocol where necessary.

6. GENERAL DISCUSSION POINTS

The following general discussion points are set out as tenets that the Gear Technology Subcommittee felt must be included in our discussion document.

A. By-catches are meant to be truly incidental catches, taken while directing for another species. Therefore, gears must be managed in a way to keep by-catches to an absolute minimum.

B. In cases where there is a by-catch or small fish are harvested, every effort should be made to release fish in a way that would ensure survival.

C. Nordmore grates should be mandatory for any trawl gear directing for shrimp in Eastern Canada.

D. In areas where the potential for lost gear is high, a minimum gillnet mesh size appropriate to the targeted species should be set and the maximum number of nets per vessel should be set at a number which can be safely handled and tended in a specific period of time.

E. In areas where lost gear (ghost fishing) is a problem, all hanging twine used in gillnets should be biodegradable.

F. A code of practice for each gear type should be developed including area or sector specific considerations which would outline, for example with longlines, hook size and type, number of tubs, bait size and type, or the use of rock hopper gear, with otter trawls.

G. In mobile gear fisheries for cod, haddock and pollock, square mesh gear only should be used. However, consideration might be given to alternatives such as the use of square mesh panels and lastridge ropes with diamond mesh gear. As a rule, diamond mesh should be used only in flatfish and redfish fisheries.

H. Fishing gear that causes irreversible damage to groundfish habitat should be prohibited.

APPENDIX 3

FRCC Terms of Reference

APPENDIX 3: FRCC TERMS OF REFERENCE

1. Introduction

The Government of Canada is committed to a more comprehensive approach to the conservation and management of our fisheries resource. This approach demands a better understanding of complex fisheries ecosystems - the interaction of fish with other species, predator-prey relationships, and also changes in the marine environment like ocean currents, water temperatures and salinity. The Government of Canada is also committed to a more effective role in decision-making for those with practical experience and knowledge in the fishery.

The Minister of Fisheries and Oceans has established the Fisheries Resource Conservation Council (FRCC) as a partnership between government, the scientific community and the direct stakeholders in the fishery. Its mission is to contribute to the management of the Atlantic fisheries on a 'sustainable' basis by ensuring that stock assessments are conducted in a multi-disciplined and integrated fashion and that appropriate methodologies and approaches are employed; by reviewing these assessments together with other relevant information and recommending to the Minister total allowable catches (TACs) and other conservation measures, including some idea of the level of risk and uncertainty associated with these recommendations; and by advising on the appropriate priorities for science.

2. Definition of Conservation

Fisheries conservation is that aspect of the management of the fisheries resource which ensures that its use is sustainable and which safeguards its ecological processes and genetic diversity for the maintenance of the resource. Fisheries conservation ensures that the fullest sustainable advantage is derived from the resource and that the resource base is maintained.

3. Council Objectives

3.1 To help the government achieve its conservation, economic and social objectives for the fishery. The conservation objectives include, but are not restricted to:

3.1.1 *rebuilding stocks to their 'optimum' levels and thereafter maintaining them at or near these levels, subject to natural fluctuations, and with 'sufficient' spawning biomass to allow a continuing strong production of young fish; and,*

3.1.2 *managing the pattern of fishing over the sizes and ages present in fish stocks and catching fish of optimal size.*

3.2 To develop a more profound understanding of fish-producing ecosystems including the inter-relationships between species and the effects of changes in the marine environment on stocks.

3.3 To review scientific research, resource assessments and conservation proposals, including, where appropriate, through a process of public hearings.

3.4 To ensure that the operational and economic realities of the fishery, in addition to scientific stock assessments, are taken into account in recommending measures to achieve the conservation objectives.

3.5 To better integrate scientific expertise with the knowledge and experience of all sectors of the industry and thus develop a strong working partnership.

3.6 To provide a mechanism for public and industry advice and review of stock assessment information.

3.7 To make public recommendations to the Minister.

4. Mandate and Scope

4.1 The Fisheries Resource Conservation Council will address these objectives by bringing together industry, DFO science and fisheries management, and external scientific and economic expertise in one body.

4.2 The Council will:

4.2.1 advise the Minister on research and assessment priorities;

4.2.2 review DFO data and advise on methodologies;

4.2.3 consider conservation measures that may be required to protect fish stocks;

4.2.4 review stock assessment information and conservation proposals, including through public hearings, where appropriate; and,

4.2.5 make written public recommendations to the Minister on TACs and other conservation measures.

4.3 The Council may recommend any measures considered necessary and appropriate for conservation purposes such as TACs, closure of areas to fishing during specific periods, approaches to avoid catching sub-optimal sized fish or unwanted species, and restrictions on the characteristics or use of fishing gears.

4.4 The Council's scope includes Canadian fish stocks of the Atlantic and Eastern Arctic Oceans. In the first instance, the Council will address groundfish, and then subsequently take on responsibility for pelagic and shellfish species.

4.5 The Council may also advise the Minister on the position to be taken by Canada with respect to straddling and transboundary stocks under the jurisdiction of international bodies such as the Northwest Atlantic Fisheries Organization (NAFO).

5. Size, Structure and Make-Up:

5.1 The Council will consist of not more than 14 members with an appropriate balance between 'science' and 'industry'.

5.2 Members are chosen on merit and standing in the community, and not as representatives of organizations, areas or interests.

5.3 'Science' members, are drawn from government departments, universities or international posts, and are of an appropriate mix of disciplines, including fisheries management and economics.

5.4 'Industry' members are knowledgeable of fishing and the fishing industry and understand the operational and economic impacts of conservation decisions.

5.5 All members of the Council are appointed by the Minister.

5.6 All members, including the Chairperson, are appointed for a three year term; terms can be renewed.

5.7 Members appointed from DFO serve 'ex officio'.

5.8 Members have to disclose any interest in the Atlantic or Eastern Arctic fishery and take appropriate measures so as to avoid potential or real conflict of interest situations during the term of appointment.

5.9 The four Atlantic Provinces, Quebec and the Northwest Territories may each nominate one delegate to the Council. These delegates have access to the Council's information, and may participate fully in meetings, but will not be asked to officially endorse the formal recommendations to the Minister.

5.10 The Council is supported by a small Secretariat, to be located in Ottawa. The Secretariat will:

5.10.1 provide administrative support for the functioning of the Council;

5.10.2 provide a technical science and fisheries management support;

5.10.3 organize Council meetings;

5.10.4 record decisions of the Council;

5.10.5 undertake a professional communications function for the Council, providing a central point for communications to and from the Council; and

5.10.6 undertake such other matters as from time to time might be appropriate.

5.11 The Chairman may appoint an Executive Committee, consisting of the Chairman, Vice-Chairman, and three other Members.

5.12 In addition, the Chairman may, from time to time, strike an 'ad hoc' committee to deal with a specific issue.

6. Activities

6.1 Reviews appropriate DFO science research programs and recommends priorities, objectives and resource requirements.

6.2 Considers scientific information -including biology, and physical and chemical oceanography, taking into account fisheries management, fishing practices, economics and enforcement information.

6.3 Conducts public hearings wherein scientific information is presented and/or proposed conservation measures/options are reviewed and discussed.

6.4 Recommends TACs and other conservation measures.

6.5 Prepares a comprehensive, long-term plan and a work plan for the Council which are reviewed annually at a workshop with international scientists and appropriate industry representatives.

6.6 Ensures an open and effective exchange of information with the fishing industry and contributes to a better public understanding of the conservation and management of Canada's fisheries resource.

APPENDIX 4

FRCC Members

APPENDIX 4: FRCC MEMBERS:

Members:

Herbert M. Clarke, Chairman
Michael Belliveau
Dr. Jean-Claude Brêthes
Dr. Tony Charles
Frank d'Entremont
Samuel Elsworth
Frank Hennessey
Dr. Paul LeBlond
Dr. Jon Lien
Dr. Victorin Mallet
Jones R. Sheehan
Trevor Taylor
Fred Woodman
Maureen Yeadon

Delegates:

Provincials/Territorial:

Clarrie MacKinnon
Jean-Paul Lussiaà-Berdou
Mary Ann Janowicz
David Gillis
Don Vincent
Glen Blackwood

Ex Officio:

Dr. Bill Doubleday
J.E. Haché
Catrina Tapley

APPENDIX 5

SUMMARY OF CONSULTATIONS

APPENDIX 5: SUMMARY OF SEPTEMBER 1995 GROUNDFISH CONSULTATIONS

The Fisheries Resource Conservation Council (FRCC) is now in the process of preparing its recommendations to the Minister of Fisheries and Oceans on conservation measures for groundfish stocks for the 1996 fishing season. To aid this process, the FRCC received stock status information from DFO Science, from the Sentinel fisheries projects where appropriate, and through a series of consultations with industry stakeholders. The purpose of this newsletter is to inform and advise you of the results of the FRCC consultations. These consultations, which included an Atlantic-wide consultation in Dartmouth, were held from September 11 to 19, 1995 as follows:

September 11 - Dartmouth, NS
September 12 - Sydney, NS
September 12 - Moncton, NB
September 13 - Deer Lake, NF
September 13 - Gaspe, QC
September 14 - Clarenville, NF
September 19 - Clark's Harbour, NS

We heard from over 250 people and received twenty-six written briefs. The discussions were candid, open, and very productive, focusing on stock-by-stock details and on the following three questions:

What are your views on the sources and timing of information that the FRCC uses to develop stock advice for the Minister of Fisheries and Oceans, including DFO stock assessments, traditional knowledge, and sentinel fisheries. Can these sources, or their use, be improved?

Is there a fishery currently under moratorium which you feel should be re-opened? Can this be done without compromising the goals of rebuilding and of optimum sustainability? If so, how?

In considering conservation re-commendations, the FRCC has promoted an "ecosystem approach" which includes multi-species considerations, habitat, and predator/prey interactions. What are your comments or suggestions in this regard?

SOURCES AND TIMING OF INFORMATION

Stakeholders expressed concern with the current timing for release of the groundfish management plan, i.e., the release of the DFO Stock Status Report in June, FRCC consultations in September, FRCC recommendations for 1996 in November, DFO consultations on the Groundfish management plan, ministerial decisions, and release of the plan before the new year.

In many cases, the scientific information on which recommendations for the 1996 fishery are based is derived from surveys conducted in 1994. The general feeling is that we cannot continue to manage fisheries with such a time-lag on information from the stock assessment process. As well, in many cases, survey results are at odds with what the industry sees on the fishing grounds.

It was clear from the discussions that DFO, the FRCC and stakeholders themselves must try to resolve this in a more timely manner. Suggestions included changing the Groundfish Management Plan to a fiscal year basis rather than a calendar year, or having different time frames for receipt of scientific information and release of the groundfish management plan for different stocks or groups of stocks. Further consideration of the implications of these suggestions is required.

RE-OPENING CLOSED FISHERIES

On the question of re-opening fisheries, there is near unanimity that a cautious and prudent approach be adopted. Many stakeholders believe that 4T+4Vn(N-A) cod, 3Pn4RS cod and 3PS cod stocks could be subject to some limited fishing in 1996. However, there was consensus that issues such as gear, capacity to match the resource, and resource access need to be addressed by industry and the Department of Fisheries and Oceans as soon as possible and before any commercial fishery begins. Many fishermen expressed the point that a limited fishery would allow fishermen to work with DFO Science and management on a new basis, providing fishermen with insight into the condition of the stock, and allowing scientists to collect data. In their view, without a limited fishery, a knowledge gap will always exist between industry and science.

The FRCC was struck by the sincerity and openness of stakeholders and the strong, almost pervasive, desire that the past not be repeated. For other stocks, such as 2J3KL cod, affected fishermen were adamant that this fishery remain closed until there is a significant and substantial biomass. The key word was caution.

Many stakeholders were pleased that the FRCC provided a summary report on the results of consultations on suggested criteria for re-opening a closed fishery. The positive comments were in fact a strong stimulus for the production of this special edition of the FRCC newsletter.

SENTINEL FISHERIES

Many fishermen were supportive of the sentinel fisheries program. While improvements can be made in organizational areas, most sentinel fisheries were seen to provide important data and to show the key role that fishermen can play in the overall development of accurate information about stock status. An emerging view is that enhanced, appropriately timed sentinel fisheries need to be developed for 1996 and they need to be comprehensive geographically and with respect to species. In addition there was a call for a more open dialogue on the development, structure and timing of new projects. Some stakeholders suggested an open forum with DFO Science.

ECOSYSTEM APPROACH

Generally, the FRCC was asked to ensure that its overall strategy for fisheries conservation be based on an ecosystem approach. Many fishermen believe that the FRCC+s concern for the habitat and the broad ecological overview are appropriate and that while predator/prey relationships might not be precisely known they are still having an impact on groundfish recovery and have to be taken into account. Others were silent on just what an ecosystem approach involves. It was recognized that much work remains to be done and some expressed concern that recommendations in this area should wait until further precise scientific information is available.

STOCKS

Although fishermen had much to say about specific traditional stocks, primarily in areas where they believe re-opening can be contemplated, there was concern expressed about re-direction of effort to fisheries such as lumpfish, skate, and Greenland halibut. Many believe these stocks to be over exploited and in some areas the concern was so strong that reopening of the cod fishery was suggested as a means of reducing pressure. Equally, many felt that the increased effort in these fisheries, particularly black back flounder and Atlantic halibut in the Gulf, was an excuse to catch cod and showed a blatant disrespect for the moratorium and the stock rebuilding program in place.

Similarly, in areas where fisheries are open, such as 4X in south western Nova Scotia, the Council heard of widespread dumping and discarding of fish. There was also a pervasive sense of frustration at the level of micro-management which is trying to control this mixed-species fishery at lower quota levels. The dockside monitoring programs that have been put in place in many areas have been advocated for all fisheries by some stakeholders. In the 4X situation it was suggested that this would at least provide more accurate information. On a more positive note, there are promising signs of good year classes recruiting to this fishery.

The stock status report for redfish was not available at the time of the September consultations. The FRCC therefore agreed to ensure that concerned stakeholders would have an opportunity to provide their input once the information is available and distributed.

DIALOGUE

On a number of occasions stakeholders expressed a high level of frustration resulting from a combination of factors, including the time it is taking for some stocks to recover, given widespread poor recruitment. Some matters of concern are a result of issues which fall within the Council+s mandate and there was significant discussion on them. Others are outside our mandate and the FRCC was pleased to provide a means for the airing of these views. We believe it is important to stakeholders that DFO managers and scientists attend these consultations to hear what is being said and to express their views on the issues which do not fall within the FRCC mandate.

A FINAL WORD

On behalf of all Council Members, I would like to take this opportunity to express our appreciation to those who came to share their views at the consultations.

5.1 BRIEFS RECEIVED AT THE GROUNDFISH CONSULTATIONS

1. Dartmouth, N.S. - September 11, 1995

FRCC.95-GD-1 John Decker, of the South West Nova Scotia Fixed Gear Association

2. Sydney, N.S. - September 12, 1995

FRCC.95.GS-1 Kevin Nash on behalf of Jeff Brownstein, President, Cape Breton MFU, Local 6

3. Moncton, N.B. - September 12, 1995

FRCC.95.GM-1 John Banks, PEI Fishermen's Association Ltd.

FRCC.95.GM-2 Cliff AuCoin, President, Northern Cape Breton Fishing Vessels Association

4. Gaspé, Qc. - September 13, 1995

FRCC.95.GG-1 A. Bernatchez, Regroupement des pêcheurs professionnels du sud de la Gaspésie

5. Deer Lake, Nfld. - September 13, 1995

FRCC.95.GD-1 Dennis Coates on behalf of Chesley Genge

6. Clarenville, Nfld. - September 14, 1995

FRCC.95.GC-1 Fishery Products International

7. Clark's Harbour, N.S. - September 18, 1995

FRCC.95.GCL-1 Sterling Belliveau, President, South West Nova Lobster Association

FRCC.95.GCL-2 Derek Jones, South West Fisherman's Rights Association

FRCC.95.GCL-3 Alex d'Entremont, Pubnico Ledge Fisheries Ltd.

FRCC.95.GCL-4 Donald Hart, Halifax West Commercial Fishermen's Association

FRCC.95.GCL-5 Ronnie Newell, South West Fishermen's Rights Association

FRCC.95.GCL-6 Ricky Nickerson, MFU Local 9

FRCC.95.GCL-7 Adlai Cunningham, Sea Star Seafoods (2 papers)

FRCC.95.GCL-8 Claude d'Entremont, Inshore Fisheries Limited

8. Briefs Received by Mail

FRCC.95.G-1	Dr. Carol Corbin, University College of Cape Breton & Wallace Barter, Louisbourg, N.S.
FRCC.95.G-2	Cliff Fanning, Eastern Fishermen's Federation
FRCC.95.G-3	Gabrielle Landry, Fédération des Pêcheurs semi-hauturiers du Québec
FRCC.95.G-4	Alain Dugas, Regroupement des pêcheurs professionnels du Nord de la Gaspésie
FRCC.95.G-5	Bruce Chapman, Fisheries Association of Newfoundland and Labrador Limited
FRCC.95.G-6	Brian Giroux, Scotia Fundy Mobile Gear Fishermen's Association
FRCC.95.G-7	Lloyd Sullivan, Southern Shore Inshore Fishermen's Action Committee
FRCC.95.G-8	Frank McLaughlin, MFU
FRCC.95.G-9	D.H. Steele, Memorial University, Newfoundland
FRCC.95.G-10	Gary McKay, Cape Breton Gulf Region Fisherman's Assoc.
FRCC.95.G-11	William Williams, SW Nova Fixed Gear Association
FRCC.95.G-12	Ralph Ryan, Southern Harbour Fishermen's Committee
FRCC.95.G-13	Tim Nickerson, SW Nova Fixed Gear