FISHERIES RESOURCE CONSERVATION COUNCIL

BUILDING THE BRIDGE

1997 CONSERVATION REQUIREMENTS FOR ATLANTIC GROUNDFISH

REPORT TO THE MINISTER OF FISHERIES AND OCEANS

FRCC.96.R.2
October 1996

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We dedicate this report to our friend and colleague, Fred Allen, who passed away on September 28, 1996.

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The Honourable Fred Mifflin, 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 1996 activities and conservation recommendations for the 1997 Atlantic groundfish season. This is the Council's fifth comprehensive report on conservation measures for Atlantic groundfish. All of our reports have consistently advocated a conservation approach to managing and prosecuting Canada's fisheries. As part of our past four reports, we have expanded upon this theme and advocated the need for: an eco-system approach to fisheries management; better knowledge; and more effective partnerships amongst all stakeholders. With this report, the time as come when we must move from themes and theories, to practice. We can not possibly emphasize enough in our report, the need for all involved to adopt a strong conservation attitude and act upon this attitude with solid conservation measures.

We have chosen the title "Building the Bridge" for our report. It is meant to speak, metaphorically, to the challenge of moving from moratoria to sustainable harvest of fish stocks. After reviewing the scientific data, conducting extensive consultations, and long and thoughtful consideration, the Council is recommending to you that we move forward cautiously and prudently with low level re-openings of commercial cod fisheries in 3Ps, 3Pn-4RS, and 4TVn. Our quota recommendations are focused on re-building these stocks while working with the industry to develop conservation ethics.

I want to emphasize that your Council remains concerned about the health of fish stocks and in no way should this report be interpreted as a "green light" to return to pre-moratoria levels and practices. The challenges which lie ahead for fishermen and managers have never been greater. They must come to terms with the difficult decisions involved in carefully managing small quotas. The tough lessons we have learned, and the sacrifices we have made, over the past three and four years, should never be forgotten. We must couple these lessons with new and careful management practices to serve as a guide-post for the future direction of the fishery. We are disappointed that more has not been accomplished with respect to reducing capacity. This problem will further complicate the challenges involved in managing small quotas.

Our recommendations for re-opening should be couched in the words we have heard over and over again during the past four years: "the fishery can not re-open the same way it closed." As a Council, we believe that there have been some significant changes in some areas and we applaud those who have worked tirelessly over the past years to achieve these changes. Indeed many fishermen, managers and scientists are deserving of a "conservation award" for their leadership and perseverance in changing past practices. However, this attitude is still not shared by all and much work remains to be done to rebuild fish stocks and to ensure that future fisheries management is based on the precautionary approach.

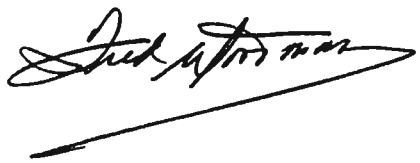
Similar to past years, Chapter Two of our report deals with conservation issues which fall outside of our stock-by-stock recommendations. We have emphasized in this chapter the need for improving the knowledge base. We were struck by the tremendous sense of frustration at the lack of specific answers in spite of significant efforts by all concerned to provide the most relevant and up-to-date science for the FRCC. In some cases, such as 3Ps, it is not clear if enough information will be available in the foreseeable future to answer all concerns about the state of the stock. We must continue to use all available means to improve our knowledge base of fish stocks. We are committed to seeing sentinel fisheries continue and we encourage the use of industry vessels, both inshore and offshore, to supplement Research Vessel Surveys. Science - industry initiatives should be encouraged and expanded.

Chapter Three of our report outlines our strategy and criteria for re-opening closed fisheries. These criteria have been developed by the Council over the past two years. We have conducted two extensive rounds of consultations with stakeholders and, during our second round, we worked closely with fisheries managers from your department. We are still firmly of the belief that criteria on the state and health of the stock by themselves are not enough to re-open closed fisheries. We must be able to control the tremendous appetite and capacity that exists for fish. We applaud the efforts that have been made over the past few years through the use of Conservation Harvesting Plans and Small Fish Protocols, and we encourage you and your department to go beyond these.

Last November, the Council promised to develop a conservation strategy for groundfish. We have worked hard to make progress on this and I am confident that we will deliver this to you early in 1997. The ideas we touch on throughout this report will be expanded and enhanced as part of our groundfish conservation strategy.

We are encouraged by the progress Canada has made with respect to conservation at the Northwest Atlantic Fisheries Organization (NAFO), but much remains to be done if the once prolific Grand Banks are ever to return to their full fishing potential. We believe Canada should continue to lead the way in promoting conservation measures and we urge you to be steadfast in your resolve on this point.

Minister, we are <u>your</u> conservation Council, we are here to assist you in furthering the conservation and sustainability of Atlantic groundfish stocks. We remain committed to ensuring that the fishery of the future will not mirror the fishery of the past. The approach offered in this report, and the conservation measures many have begun to put in place over the past few years, represent important steps toward achieving this goal. We are honoured to have this opportunity to present you with our advice and look forward to serving you in the coming year.



Fred Woodman
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 June 1994 review of Greenland halibut in NAFO Zones 0,1, 2 and 3, and the review of Lobster Conservation in 1995.

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 1997.

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 1996, the FRCC held a public meeting of Council on June 27 in Montreal to accept receipt of the Department of Fisheries and Oceans Stock Status Report. Following this, DFO Science distributed copies of the Stock Status Report and provided video tapes of its release to local television stations and interest groups in Atlantic Canada and Québec. Beginning on September 3, the FRCC held 11 consultations with stakeholders in five provinces. Over 700 stakeholders took part in the consultations and over thirty briefs were received.

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

September 3: Matane, Québec
September 4: Cap-aux-Meules, Québec
September 4: Clarenville, Newfoundland
September 5: Charlottetown, P.E.I.
September 5: Harbour Breton, Newfoundland
September 6: Tracadie, New Brunswick
September 6: Deer Lake, Newfoundland
September 6: Port Hawkesbury, Nova Scotia
September 19: Dartmouth, Nova Scotia
September 20: Yarmouth, Nova Scotia
October 11: Halifax, Nova Scotia (Redfish only)

A letter was sent to stakeholders on July 31, 1996 advising them of the consultations. This was followed by a second mailing and fax-out asking stakeholders to consider questions for discussion concerning stocks in their area. A summary of the consultations appears with each stock in Chapter 4 and copies of the discussion questions can be found as part of Appendix 2.

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 and the most recent research surveys), 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.

1.3 EXPECTATIONS

The Council noted that the mood at many of the consultations was more positive than in previous years and the tone of discussion focused on conservation. There are many things which may account for this change from other years: fishermen's own observations about the state of the stocks, the information available from the sentinel fisheries program, improve-

ments in the rapport between fishermen and DFO scientists in some areas, and, perhaps most importantly, the arrest of the declines and improvements in the state of certain key stocks.

Most fishermen were genuinely concerned about conservation requirements for fish stocks. We believe that many, but not all, have accepted the invitation to "Come Aboard" for conservation. Although we are encouraged by this, we can not retreat from strong conservation messages. We have noted that some industry and government leaders have been quick to jump on the recovery band wagon. We urge all involved in the fishery to adopt a conservation-first approach. It is critical for 1997 that we reinforce the conservation beliefs of those in the industry who have led the way and continue to preach to the unconverted.

During consultations, most stakeholders advocated a cautious approach for 1997 and called for fisheries to be closely monitored. A notable exception to this was strong pressures for a 20,000t TAC for 3Ps cod. Council was urged to "give fishermen what they need to make a living" and to "err on the side of fishermen" (as opposed to erring on the side of caution). In most areas, however, we were struck by the cautious approach to re-opening closed fisheries expressed by most fishermen despite the pressures which are coming to bear as The Atlantic Groundfish Strategy (TAGS) nears completion and changes are made to fishermen's Employment Insurance (EI).

Given the high degree of public expectation that 1997 will hold more promising news, this report has been a particular challenge to the FRCC. There were often discrepancies between available scientific reports and sentinel fisheries data, stakeholder views and anecdotal information. 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. In some cases, such as 3Ps, it is not clear if enough information will be available in the foreseeable future to answer all concerns about the state of the stock. This report attempts to reconcile those differences of view while at same time "erring on the side of caution".

1.4 Groundfish Conservation Strategy

In last year's report "Conservation Come Aboard", the Council indicated that it believed there was a need for a more comprehensive treatment of groundfish conservation than its annual report to the Minister allowed. We committed to designing a strategy that allows for the re-building of fish stocks and the subsequent maintenance of a sustainable fishery.

The Minister of Fisheries and Oceans, in his press release announcing the appointment of the current Chairman of the FRCC, asked Council to "...give priority to the development of a groundfish conservation strategy..." and the Council has worked to meet this objective.

The strategy will build on the work that the Council has already undertaken with respect to groundfish, including: criteria for re-opening closed fisheries, the gear technology report, the historical perspectives report "Learning from History", and the many consultations we have held with stakeholders over the past three years. The report itself will take an approach similar to the Council's report on Lobster Conservation. It will advocate certain principles and objectives and offer a practical approach for action.

In our previous reports, we defined fisheries conservation as:

> *"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."*

Council has furthered this by stating that its conservation objectives include, but are not restricted to:

> *"rebuilding stocks to their optimum level 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 sexes and ages present in fish stocks and catching fish of optimal size."*

In our groundfish conservation strategy, we build on these objectives and elaborate on what our principles for conservation should be:

Protection of the Resource - Insure the continuity and sustainability of the resource base; protect the renewable capacity of the resource; account for uncertainty in population analysis.

Adoption of the Pre-cautionary Principle - In face of uncertainty, bias the decisions in the direction of conservation by advocating to err on the side of caution.

Accountability - Every stakeholder, including scientists and fisheries managers, are responsible for the sustainability of the resource; conservation is compulsory, not optional; effective participation of all stakeholders in the decision making process.

Responsiveness - In face of changing environment and technology, adopt flexible measures, adaptable to new emerging conditions; assess the effect of those measures and correct accordingly.

Systems Approach - Understand the interaction between the various elements of the fishery system (resource, eco-system, fisheries activities, behavior and technology); include those elements in the assessment of the fishery and in the design of conservation measures.

Consistency - Every fishing activity should abide by the same principles; conservation measures should be consistent for a particular stock or within a specific geographical area.

The Groundfish Conservation Strategy will also deal with: the history of groundfish in Atlantic Canada and Québec (including our mistakes of the past); long-term goals for the future fishery; implementing our conservation principles; a practical approach to assist with implementation; and, a discussion of the role we all must play in groundfish conservation.

The Council expects to complete the Groundfish Conservation Strategy by early 1997. We will present it to the Minister at that time.

1.5 General Activity

The FRCC focused its attention in 1996 on groundfish conservation. In addition to the work undertaken on a groundfish conservation strategy, we continued with work on: criteria for re-opening closed fisheries and conservation aspects of gear technologies. The Historical Perspectives sub-committee's report entitled "Learning From History" (FRCC.96.R.1) is now finished. This report is available upon request. The Council also provided advice to the Minister on conservation requirements for George's Bank groundfish (Appendix 5) and for Northwest Atlantic Fisheries Organization (NAFO) managed stocks in the Canadian zone (Appendix 6).

NAFO

The Council is encouraged by the advances that have been made in management of NAFO stocks over the past two years. We must not allow ourselves to become complacent with our recent successes. We want to encourage the work of the NAFO working group on the Objection Procedure. In the past, the Objection Procedure was, in large part, responsible for many abuses of the past decade.

The Council remains steadfast in its belief that there must be consistent conservation strategies inside and outside the 200 mile limit. We must entrench our observer programs and be diligent with our enforcement.

As we indicated in our letter to the Minister, increased mesh size and the ongoing work of the Scientific Council on protected juvenile areas and discards remain important initiatives for conservation in these fisheries.

Gear Technology

During March and April, 1996, the Gear Technology Sub-committee of the FRCC held seven public consultations throughout Atlantic Canada and Quebec, and a teleconference with representatives of the Nunavut Wildlife Management Board, on the conservation aspects of groundfish fishing gear technologies. A copy of the discussion document (FRCC.96.TD.1) and list of briefs received can be found at Appendix 3.

As was expected, the opinions expressed and the positions put forth were as diverse as the fishery itself. While some of the discussions wandered off into areas that were clearly outside the mandate of the FRCC, there were many fruitful debates and positive suggestions. There is tremendous concern that the fishery of the future will mirror the fishery of the past. Concerns about the amount of capacity that is sitting at the wharf, ready for the fishery to re-open, were heard at every consultation. There are many who believe that we must prevent gear technology, and fishing technology in general from running away with us, as they believe it did in the past. Most feel that excessive harvesting power in any gear type is dangerous for the resource.

The Gear Technology Sub-committee is currently finalizing its report and the FRCC expects to release its report before the end of the year.

Re-Opening Criteria

The Stock Assessment Sub-committee of the FRCC held six public consultations through-out Atlantic Canada and Québec in July. The sub-committee asked stakeholders for their views on the FRCC discussion paper "From Moratorium to Sustainability: Criteria for Re-opening and Sustainable Harvesting, With Reference to Cod Stocks in Areas 3Ps, 4TVn and 3Pn4Rs" (FRCC.96.TD.2). This report is included as Appendix 4 and a full discussion of this topic takes place in Chapter three.

2. Conservation Issues

2.1 Building The Bridge

The closure of many groundfish fisheries which followed the decline in Atlantic Coast stocks both highlighted the need, and created the opportunity, to critically assess the structure and conduct of the fishery from a conservation perspective. Many changes have resulted. There remains, however, a number of conservation issues wherein the Council believes further change is required to help ensure that sustainability is achieved in future. As we move to re-establish limited commercial fisheries in some stocks, it is critical that the fishing industry, DFO and the FRCC press forward on a number of conservation issues and thereby BUILD THE BRIDGE between moratoria and sustainable commercial fisheries.

2.1.1 Managing Capacity

The need to balance the effort directed against a resource with the amount of resource available for harvest has become widely recognized as an important conservation requirement and was a major message in the Report on Income and Adjustments in the Atlantic Fishery. Available capacity in most Canadian Atlantic groundfish fisheries is far in excess of what was required to harvest the resource. Significant (up to 50%) capacity reduction in the groundfish fleets across Atlantic Canada was one of the primary objectives of The Atlantic Groundfish Strategy (TAGS). Many fishermen anticipated that the actual reduction achieved by TAGS and the Harvesting Adjustment Board (HAB) process would be far less than predicted and their suspicions seem to have been well founded. Although there have been pockets of success, the overall reduction in capacity is disappointingly small. Moreover, in many fisheries, the capability of the remaining fleet has been maintained as a result of expansion of and re-direction into other lucrative fisheries, notably snow crab, lobster and scallops. As a result, the potential fishing power in most groundfish fisheries in 1997 may be effectively unchanged, or even greater given advances in technologies, that took place before the current crisis.

The FRCC, in each of its previous annual reports concerning groundfish stocks has highlighted the need to address the capacity issue decisively and directly. The Council continues to feel strongly that every effort must be made to reduce the size, and fishing power, of groundfish fleets across the Atlantic Coast if long-term sustainability and orderly management of the fishery is to be achieved. However, the Council, in this current report, has recognized that recovery has begun in a number of groundfish stocks and is recommending that some previously closed fisheries be reopened on a very limited and controlled basis for 1997. As a result, in addition to continuing pressure to reduce the total capacity in groundfish over time, the Council believes that special measures are required to ensure that the available capacity is managed so that excess effort does not compromise conservation objectives at this critical juncture.

The Council recommends that special measures be taken to ensure that the available capacity is managed so that excess effort does not compromise conservation objectives at this critical juncture.

To manage any existing level of capacity is to control the collective effort exerted by the fleets against the resource. A number of the major

components of direct effort control have been in place for some time in most fisheries, including limits on the number of vessels, the size and capabilities of those vessels and the amount and type of gear vessels can use in their operations. To date, further controls on the amount of effort, such as limits on the number of days-at-sea, have not been widely employed in the groundfish fishery. As some fisheries reopen at well below historical levels, the imbalance between potential effort and available resource will be greater than has been the case at any previous time. The FRCC feels that the groundfish industry and DFO managers must now consider the utility of more rigorous direct effort control measures in managing these fisheries. The FRCC is encouraged by the seminar which is to take place this fall with Gulf of St. Lawrence fishermen to discuss many of these issues. We believe that this approach should be followed in other areas.

The FRCC recommends that the industry, FRCC, and DFO undertake a comprehensive and in-depth analysis of the use of direct effort control measures and test these measures further in pilot scale situations.

To facilitate these discussions, the FRCC will release in the near future a Discussion Paper on Conservation Aspects of Quota and Effort Controls which will serve as a basis for these discussions.

2.1.2 Conservation Harvesting Plans

Other types of management measures have been reviewed and recommended in previous FRCC reports; including seasons, closed areas, selectivity for species and size of fish, and monitoring and control of activities. Some of these may also have the effect of indirectly limiting effort. The Council notes that the widespread introduction of comprehensive Conservation Harvesting Plans (CHPs), which address these components, has improved the quality of management in the groundfish fishery. Council also recognizes that this process has involved fleets more directly in molding their own management regime to meet conservation objectives. We have incorporated CHPs as part of our re-opening criteria discussed in the next chapter of this report.

The FRCC recommends that as fisheries re-open on a limited basis, the CHP process must be retained as a mandatory. In particular, the Council feels that the following components of the management regime must be strengthened beginning in 1997: small fish protocols, dumping and discarding, and area/time closures.

Small fish protocols. The Council notes that these are in place in many fisheries but feels that, as they are a natural complement to gear selectivity controls, they should be in effect in all fisheries. They appear to have been effective, in many circumstances, where excess juvenile mortality was previously a problem. However, Council has heard in consultations that enforcement has been lax and that action has not always been taken on violations of the Small Fish Protocols. It is critical that we are able to implement these measures firmly, but fairly, on all fishermen and fleets to reinforce the compliance of other fishermen. Enforcement is a critical component of any CHP.

Dumping and discarding. All parties must be rigorous in implementing the necessary combination of measures to address this complicated issue. Experience has shown that no one measure is likely to be effective; rather the various pressures which create incentives to discard species and sizes of fish must be treated with a holistic approach involving the setting of appropriate TACs for mixed species, gear design and use, monitoring, education and awareness and where necessary, firm and fair sanction. It is imperative that the gear used be designed in such a way to allow for the escapement of small fish.

Area/Time Closures. The FRCC continues to feel that seasonal and/or permanent restrictions on some, or all fishing activities may be an effective component of management in many areas. Some examples, such as the seasonal closures in Unit 2 redfish to protect the migratory Unit 1 stock are now seen as effective measures by fishermen in that area. Area/Time Closures can take many forms and can be defined as precisely as necessary to address the needs of the particular fishery involved, including protection of juvenile and spawning concentrations, ecologically important grounds like George's and Emerald Banks, etc. As well, there are provisions in the Canada Oceans Act for protecting habitats and critical areas. These provisions will encourage the development of reserves which can serve as refuge for fish populations and which may be of substantial benefit to growth and future productivity of fish stocks. The impact of areas closed to fishing will need to be carefully monitored so that effectiveness of such arrangements can be evaluated.

2.1.3. Other Conservation Concerns:

Monitoring, Control And Surveillance

Improving the effectiveness of monitoring, control and surveillance has been a continuing theme of Council through out our reports. It is impossible to put a fisheries officer on every boat to ensure compliance with the rules, but effective monitoring, control and surveillance is key to a commercial fishery. The use of: at-sea observers, new technologies to monitor "at sea" practices, mandatory dockside monitoring , and substantially increased penalties will go a long way to changing certain non-conservationist fishing practices. As we begin to re-open closed fisheries, it is critical that we are able to carefully monitor what occurs in these fisheries. The limited amount of quota available and the lack of progress on reducing capacity may provide added incentive to some to high-grade and misreport landings.

The FRCC, in all of its previous reports, has recommended that penalties for those who cheat be significantly increased. This is particularly important for 1997. We heard time and again at our consultations calls to "get the pirates off the water". We again recommend that the penalties for those who cheat be significantly increased and rigidly enforced. It is not fair to the vast majority of fishermen and communities who have worked hard to adopt a conservation ethic that these practices be allowed to continue and the culprits get off with a "slap on the wrist."

The FRCC again recommends that the penalties for those who cheat be significantly increased and rigidly enforced

By-catch in shrimp fisheries

The Council remains concerned about the occasional reports of by-catch of juvenile groundfish in the northern shrimp fishery. The shrimp fishery on the Flemish Cap (NAFO division 3M) is a classic example of what can happen when controls are not in place. In the three years prior to the implementation of the Nordmore grate in this fishery, approximately 230 million juvenile redfish were taken as by-catch in this fishery. Science estimates that, if left to grow, this would have yielded approximately 25,000 t to the fishery.

While the Nordmore grate is mandatory in some areas of the northern shrimp fishery, in other areas it is mandatory only after certain by-catch limits have been reached. While the by-catch problem in the northern shrimp fishery in recent years has not been as acute as it has been in 3M, the Council remains concerned that any catch of groundfish in this area, given the extremely low level of these groundfish stocks, could hamper further recovery. During our consultations, there was almost unanimous support for the use of the Nordmore grate in all shrimp fisheries.

The FRCC recommends that the use of the Nordmore grate be mandatory in all shrimp fisheries in Eastern Canada. Additionally, the Council recommends that further work be carried out in 1997 to reduce the by-catch levels of groundfish, especially that of juvenile redfish.

Recreational and Food Fisheries

The Council, in its past two reports, has recommended that no food or recreational fisheries take place on stocks which are under moratorium. During our consultations in 1996, concerns were expressed about the recreational or food fishery in Newfoundland, the Maritimes and Québec. In the Maritimes and Quebec, people were especially concerned over the length of time the recreational fishery had remained open and the amount of fish "tourists" were allowed to catch. The Council's principal concern, however, remains focused on the uncontrolled nature of this fishery and the grave consequences this poses for conservation. In many cases, we believe this fishery has offered a cover for "black market" operations and can continue to do so. Furthermore, Council remains concerned about the consequences of this fishery on spawning stocks and the missed opportunity to provide more detailed information about the health of fish stocks. Unlike a limited commercial or sentinel fishery, the information provided by the food fishery is, at best, limited.

An indication of the potential tonnage that can be caught and landed comes from the statistics provided by the Department of Fisheries and Oceans on this fall's Newfoundland food fishery. The fishery was opened for a total of six days and during that time it is estimated that 1,230 t of cod were caught. It is further estimated that 21,944 vessels were on the water and that effort was of the order of 93,000 people-days.

The FRCC recommends that in areas where moratoria still exist, there be no recreational or food fisheries. In areas where limited commercial fisheries have re-opened, any recreational or food fishery should be strictly monitored and effort controls be implemented (e.g. number of days, licensing requirements, limited number of tags per season) etc.

2.2 Attitudinal Change

Over the past few years, as fisheries have been closed, or in some cases reduced by 40%, some members of the fishing industry have gone through a significant attitude change. The situation has forced fishermen to evaluate why the stocks they fish have gone through such a drastic change. Many have emerged with the realization that there is a need to look at their fishery, and the resources on which it depends, with new care and respect.

On the other hand, there are still fishermen who believe that when fisheries reopen, they will "go at it" the same way they did before. They are still unwilling to fill out logbooks and enter into catch monitoring agreements. Just as there are fishermen who are unwilling to go the extra step for conservation, there are also some processors who are still encouraging poor fishing practices and providing a ready market for misreported or "black market" fish. The attitudinal problem does not stop with the fishing industry. There are also members of the non-fishing public who continue to abuse the recreational fishery by selling the fish they catch and going over their daily trip limits. The Council disagrees with the notion that every person in a coastal community has the "God-given right" to catch fish.

The fact is that when fisheries reopen, fishing will not be the same as it was before. Neither members of the fishing industry nor governments nor citizens of Canada want to go through the anguish caused by groundfish closures again. When closed fisheries are re-opened for directed fishing, new

care will have to be taken to harvest larger fish that have achieved their growth potential, or an appropriate mix of year-classes. More selective gear has become the norm since some closures and such gear will be even more important in a reopened fishery. There will be a need for acceptance and endorsement of monitoring systems. We know now that there are ways to minimize the risk of reoccurrence of the closures of the mid-1990's and we have to be sure that we put our knowledge into practice.

Attitudinal changes to improve the future of our fisheries can be fostered. Fishery organizations represent an important vehicle for changes. They provide fishermen the opportunity to be involved in the policy and management decisions of the fishery. They provide fishermen the opportunity to become more knowledgeable about the biological aspects of the stocks they fish and participate in collecting scientific data that will further the knowledge of the stock.

Coincidental with the increased involvement in large numbers of fishermen and their organizations is the need for roles in fisheries management and science to be equalized. Fishermen, through their organizations, can and must take a more prominent role in fisheries management and fisheries science. It is also important that individual fishermen recognize their personal obligation to follow good fishing practices which minimize wastage of the resource and account for the total fishery take.

And finally, fisheries generate untold benefits to coastal communities. Some communities recognize their dependence on fisheries and some do not fully. Communities have a role in backing up good fishing practices, supporting their fleets in good fishing practices and encouraging fishery organizations by incorporating them into the community at large. If coastal communities acknowledge and support the fishery as a common property or public resource, they must be prepared to accept some responsibility for the health and well being of this resource.

Communities have a tremendous amount of moral suasion that they can exert to discourage cheating and other non-conservationist fishing practices.

The FRCC recommends that fishermen, through their organizations, get more involved in management, get involved in joint scientific initiatives, continue efforts toward development of a conservation approach to our marine environment and guide others to see the need to do the same. In the end, all involved should adopt a code of conduct for responsible fishing.

2.3 Predator-Prey Relationships

A precautionary approach to fisheries on "food" species and exercising prudent conservation measures in all fisheries that are at the base of the food chain e.g. herring, silver hake, sand lance, shrimp, etc. should be rigorously followed. The role these species play in the food chain should remain an important consideration in any management plan for commercial fisheries.

The FRCC recommends that any fishery on these species be undertaken with extreme caution.

Krill

There have been several recent proposals for establishment of krill fisheries. Krill are a keystone species - food for wide variety of marine animals, including commercially important groundfish species. A precautionary approach for such emerging fisheries is required and before such fisheries develop additional information is required.

Krill abundance is poorly documented and seems to show considerable inter-annual variability. Errors associated with estimation of krill abun-

dance have been identified and there are no quantitative estimates of the importance of krill for its predators, including groundfish species.

The FRCC recommends that no additional dependence by industry on this food chain species be introduced, before more adequate information is available. The Council believes that a rapid expansion of such a fishery would violate the precautionary approach to emerging fisheries.

Capelin

The Council is encouraged by the most recent scientific reports on the status of the capelin stock in 2J3KL. However, Council continues to remain concerned about the capelin fishery as capelin is a very important component of the food chain for all species.

The FRCC recommends that the conservative approach to the management of this resource continue. This fishery should be carefully monitored to ensure that dumping and discarding are kept to a minimum and, infractions occurring for a certain gear type or sector lead to closure for the gear type or sector involved. The by-catch of juvenile cod must also be closely monitored and if large by-catches of cod are detected, then fishing by the offending gear should be stopped.

Seals

The Council continues to receive complaints about seals from fishermen. Many noted the increasing abundance of grey seals in the Strait of Belle Isle, on the Southern Shore of Newfoundland, in the Gulf and on the eastern shore of Nova Scotia in 1996. There were also reports of abundant harp and hooded seals on the South Coast of Newfoundland and inshore in 3K. Seals were also associated with partially consumed fish on hooks or in gillnets.

DFO Science presented an analysis of causes for recent low productivity of 4VsW cod at the World Fisheries Congress in Brisbane, Australia. The increased mortality of young cod aged 1-3 since the mid-1980's was close to the level expected from a grey seal predation model. The continuing 12.5% per year increase in the Sable Island grey seal herd may be a major factor in the survival of recruiting year-classes of 4VsW cod in the 1990's.

The harp seal hunt increased substantially in 1996. While this is encouraging, maintaining the harp seal herd at 5 million animals also maintains their level of consumption of fish. The estimated consumption of some 140,000 t per year of cod by harp seals in the Gulf of St. Lawrence and in 2J3KL remains a cause of concern to the Council.

Seals represent a renewable resource which can be harvested sustainability in the context of overall management of the Atlantic marine ecosystem.

The FRCC recommends that ways to increase harvests of harp, hooded and grey seals be pursued. Initiatives to encourage product development and identification of new markets should be encouraged. The alternative of contraception to limit the size of the herd should be implemented.

2.4 Improving The Data Base

When a commercial fishery is active, the assessment of a stock status is derived not only from scientific research surveys but from commercial catch data as well. The Council relies on information from DFO Science and information from fishermen to judge the state of stocks and trends in abundance and productivity. The widespread moratoria of the 1990s have severely limited information from commercial fisheries.

This current system appears to be limited in several areas. In the recent past (after introduction of moratoria), the scientific surveys became, de facto, the primary source of information, and

were seen as the most objective manner to quantify the abundance of the resource. Because of the numerous closures of fisheries, scientific surveys became the sole source of information. Despite their rigorous design, fishermen believe they are insufficient to properly follow stock trends. This can be due to a number of factors including technical constraints, and, limited survey coverage of inshore areas. Inshore areas such as the interior of Fortune Bay and Placentia Bay, where aggregations of fish were reported, are not surveyed by scientific cruises. In 3Ps, many fishermen consider that most cod had moved inshore before April 1996, when the 1996 research survey took place. They believe this may have led to an underestimation of the stock size. The apparent discrepancies between scientific surveys and both the inshore sentinel surveys and the fishermen pursuing open fisheries have reduced the confidence of fishermen in research vessel surveys.

As fisheries re-open, a significant number of fishermen will be going to sea over the whole season, this could provide useful complementary information to a scientific survey. Carried on at a specific short period in the year, sentinel fisheries were implemented, and expanded, to bridge the gaps between scientific knowledge and traditional knowledge of the fishermen.

2.4.1 Sentinel Fisheries

Sentinel fisheries have brought scientists and fishermen closer together. This program has helped to build an effective "cooperation" between scientists and fishermen that must be pursued and expanded. Sentinel fisheries appear to have been a valuable source of information on changes in the inshore abundance of cod and other species. In the Gulf of St. Lawrence, sentinel fisheries were also a source of information on the abundance of offshore fish. Sentinel fisheries have also been able to track changes in condition, growth, recruitment, and feeding of cod over the past three seasons. Fishermen were trained to collect a large amount of scientific data and are now able to provide that data for incorporation in the regular assessment process.

Sentinel surveys have proven valuable sources of information about stocks under moratorium. They complement research vessel surveys by covering areas not otherwise surveyed. They were funded first through TAGS and more recently by DFO. Means must be found to continue the partnership between fishermen and scientists when fisheries reopen and to maximize the information provided by the fishery. For stocks being reopened to commercial fishing, the system of data collection implemented with the sentinel fisheries must be maintained and expanded.

The FRCC recommends that the continuation of sentinel surveys where fishermen follow a scientific sampling protocol should be complemented by a program where fishermen fish in their normal commercial fashion but report more accurate information to scientists than is usually the case.

The FRCC recommends that cooperative sentinel and index fishery programs should be encouraged between fishermen and DFO Science. Considering the shrinking of financial resources, a system of self-financing, science - industry initiatives, should be developed as part of the management plan.

The FRCC recommends that, for stocks still under moratorium, sentinel fisheries should be expanded to include the offshore sector, particularly in the area 2J3KL, where information remains scarce. The Council is encouraged by the offshore sector's proposal of "tows for science" and believes it should be implemented.

In addition, the FRCC recommends that DFO should encourage joint projects with fishermen whereby they take on more of the sampling and data collection role. Already, some fishermen are voluntarily tagging and releasing fish and some processors have offered to collect samples and otoliths from landings. Such initiatives should be encouraged and expanded. However, the role of fishermen in the scientific process should be enhanced well beyond that of data collector. Council is encouraged by the role many fishermen and their organizations have played in RAP sessions and we believe this should be further encouraged in all regions.

2.4.2 Emerging Fisheries And Minor Stocks

These stocks require more attention then they have received in the past. Since moratoria were imposed on major groundfish stocks, several stocks, some of them very valuable, have become a source of additional, if not the main, income for fishermen in several areas. Because of their historical status, and justifiable requirements to focus scientific effort on major species, information on these so called "minor stocks" is typically inadequate as a means for making informed decisions about exploitation levels and conservation requirements. Scientific surveys are not designed to evaluate the particular abundance of those stocks and, in most cases, the gears in use are inadequate to catch them efficiently, as is the case for skates or lumpfish, for instance. When information is inadequate, the Council must follow a precautionary principle in making its decisions on establishing TACs and implementing other conservation measures. Typically, this will mean greater limitations on fishing.

Given the increasing limits of DFO Science resources, it is unlikely that adequate scientific effort will be possible on those minor stocks unless new ways are developed to increase our knowledge. Both Industry and DFO have interest in expanding the data base on minor stocks.

The FRCC recommends that these science - industry initiatives on emerging species be expanded.

3. Re-Opening Closed Fisheries

3.1 Introduction

The FRCC was created in the wake of the collapse of the northern cod fishery and the 1992 moratorium. Its mandate was clearly focused on conservation and on sustainable use of groundfish resources. The first concerns of the FRCC were to examine the causes of the catastrophe and to find means to prevent its recurrence.

Faced with precipitous declines in many groundfish stocks, as indicated by decreasing catches, increasing effort and a growing proportion of small fish (a situation corroborated by scientific assessments), the FRCC recommended in the summer of 1993 emergency conservation measures. These measures ranged from reductions in the Total Allowable Catches of some stocks to complete closure of directed fishing on other, most rapidly declining groundfish stocks.

The idea behind closing of a fishery directed at a specific stock is, of course, to allow its population to increase without interference from fishing mortality. While it is not possible to prevent all capture of a species as part of the harvest of another, measures were put in place by DFO to minimize by-catch of the stocks protected by closure. In this protected state, the remainder of the stock were to be allowed to grow into spawners and their offspring also to be protected until the population grew again to an exploitable level. Environmental variability and the presence of uncontrolled predators might partly thwart such a plan, but as fishing is the only part of the system accessible to human control, that is where action must first focus.

Closure can only be a temporary measure: the aim of fisheries conservation is to make fish stocks available for human use, not to preserve them in an ocean museum. The FRCC thus soon began to be concerned with the questions of when and how to re-open closed fisheries and to ensure their sustainability. The general collapse of the Canadian Atlantic has variously been attributed to a combination of environmental influences, inaccurate reporting, overfishing - especially of small fish, hesitant scientific advice and political interference. The FRCC was determined to avoid repeating past mistakes in re-opening, and to base its advice on conservation of the stocks rather than on economic pressures, as mandated by its creator, Minister Crosbie.

In this chapter, we present the basic principles which have guided our deliberations, outline the extensive consultation process which has been carried out, and present the current thinking of the Council on criteria for re-opening and sustainability.

3.2 Towards The Development Of Re-Opening Criteria

3.2.1 Some Guiding Principles

From the very beginning, the FRCC was guided by broad principles inspired by the biological nature of the resource and the uncertainty of the information available on its status.

Fish live in the sea; their lives are conditioned by the marine environment and by their interactions with other sea creatures. To manage a living resource, it is essential to know what affects its fertility, growth rate and mortality. Understanding of fish stocks as part of oceanic

ecosystems is a prerequisite of successful fisheries management. This understanding includes the accumulated wisdom of fishermen, their recent observations at sea, as well as the observations and experiments of professional scientists who devote their lives to studying the ocean and its resources.

To conduct a fishery, there must then be enough fish in the sea and, to ensure sustainability, no more must be taken than will allow for continuation of the stock at a desired level. The information about stock levels is, however, always uncertain: one cannot count every fish. Different sources of information are also sometimes contradictory: how is one to weigh their relative worth and arrive at a reasonable decision? If the mistakes of the past are to be avoided, a "precautionary approach" is clearly indicated. If one is to sin in error, one should sin on the side of caution.

These general principles of management, based on reliable information and cautious decisions, open the door to many practical questions. For example, what information is most important? How is a precautionary approach to be implemented in practice? Over the past two- and-a-half years, the FRCC has been pursuing a process of deliberation and consultation on these issues, particularly with respect to the question of when to re-open fisheries which are now closed.

3.2.2 Discussions and Consultations

The issue of "How to re-open a closed fishery" has been a topic of reflection and discussion for the entire Council. Many of the discussion papers and consultations were conducted on its behalf by its Stock Assessment Sub-committee, which regularly reported to the full Council through discussion documents and consultation reports.

The first general question concerns methods of stock assessment: what information can be obtained about fish stocks, and of what is available, what is most useful and reliable? As a first step, the FRCC requested extensive briefings on the scientific methods used by DFO. Because so much information comes from DFO stock assessments, it is essential for the FRCC to understand the origin and reliability of that information. How are scientific surveys planned and conducted, how are their results interpreted, how are these results combined with commercial catches through Sequential Population Analysis to obtain estimates of the stock abundance and age structure. FRCC members were particularly concerned about the reliability of the measurements and of the methods of calculation and about the nature and cause of errors in the estimates. After all, these are the same basic methods in use before the stock collapse, developed with great care and effort by fisheries scientists in Canada and elsewhere. Were they reliable then, and why, or why not?

At many public meetings, the FRCC heard criticism from fishermen about the practice and methodology of scientific surveys - "they are not going where the fish are"; "a single survey can't do for all species", etc... - these criticism were duly recorded, discussed with DFO scientists, and kept in mind as contributions to the interpretation and reliability of scientific assessments based on survey data.

After closure of groundfish fisheries in many areas, commercial catches were no longer available to complement and calibrate scientific surveys. As a means to improve the information base on the status of stocks no longer actively fished, particularly cod stocks, the FRCC recommended that Sentinel Fisheries be initiated in these areas. Sentinel Fisheries now underway in the Gulf of St. Lawrence, in Newfoundland waters and on the Scotian Shelf provide an additional source of stock status information.

Scientific surveys, Sentinel Fisheries and commercial catches, provide information on fish caught: their numbers; their length, age, condition, sexual maturity; their place and time of capture. But what do they tell us about the fish not caught? About those fish left in the water which will ensure continuity of the fishery? Sustainability has more to do with fish left alive than with fish caught! That is indeed the greatest challenge of

stock assessment: to know how many fish will be left alive after a fishery.

At this point, one might suggest that history could guide us: so much fishing effort in the past has led to so many fish being caught, so that there should exist a solid historical relationship between effort and catch and in turn between catch and stock size. There are two serious problems with this approach. First, fishermen are smart and skillful, forever taking advantage of new information and technology in a competitive environment: their collective and individual skill at catching fish continuously improves, and so does catch per unit effort. Second, fishermen are hunters. Except in some cases (stationary fish traps), they do not sit still, waiting for fish to come to them. It is quite possible that they (again collectively), could find and catch the very last aggregation of fish before anyone notices that there are no fish left. Catch per unit effort may thus not be a reliable indicator of stock status and must be supplemented by additional information, as provided by scientific surveys, for example. Nevertheless, the information required to make management decisions must reflect current fishing conditions and must be available soon enough to react to current stock conditions.

Furthermore, of all the many items of information about fish caught, including where and when they are caught, and how difficult they were to find, as well as all their biological properties, which are the most useful for assessing the state of the stock, particularly of that part which is left in the ocean? Are there any "indicators" of stock status which are most useful and reliable as tools for monitoring the fishery?

These questions are not specific to Canadian Atlantic groundfish fisheries; they are central to fisheries management worldwide. In order to gain some perspective on these issues, the FRCC consulted broadly. In the summer of 1994, members of the Stock Assessment Sub-committee spent two days discussing biological indicators at the St. Andrews, N.B. biological station with DFO biologists, statisticians and assessment scientists. Following that workshop, an initial document (FRCC.94.TD.1) was prepared, debated internally and circulated widely.

That first discussion document presented a general approach towards a re-opening decision based on the identification of biological indicators. Indicators were presented and explained, and their use illustrated in preparing a "report card" of the status of the stock. Generic examples were given of possible rules leading to a decision to re-open (or not) on the basis of the available information. Public meetings were held in August 1995 in Caraquet, Halifax and St.John's, were many fishermen, other industry participants and the public had the opportunity to react to the document.

Most of the participants in the consultations strongly supported the idea that conservation rather than economic pressures should determine the re-opening decision and fishing levels. Biological properties, especially recruitment, but also total and spawning biomass, as well as others, were recognized as appropriate indicators of stock status. Much emphasis was placed on the need for reliable information on the stocks and on the importance of including scientific, sentinel and fishermen's information within the data base available to the FRCC. Participants expressed a wish for more specific applications. Strong arguments were also put forward for testing the strength of some cod stocks now showing signs of recovery (for example, high by-catch levels, small fish in lobster traps) through a more intensive level of fishing. It was also argued that it was important to demonstrate that a small commercial fishery could be conducted under strict conservation principles.

These views were reflected in the FRCC report to the Minister in the fall of 1995 (FRCC95.R.2), wherein expanded Sentinel Fisheries were recommended on cod stocks in areas 3Ps, 4TVn and 3Pn4RS. Preparation began for a more detailed and more specific report.

Later that year, in December 1995, the FRCC also held a Strategic Planning Workshop, attended by invited industry, government and academic leaders from Canada and abroad, where the themes of re-opening criteria and the conduct of a sustainable fishery were at the fore. The importance of developing criteria for re-opening was also emphasized by Minister Mifflin in his appointment letter to the FRCC's new chairman, Mr. Woodman, in April 1996.

A second discussion document (FRCC.96.TD.1), was prepared over the winter of 1996; it is attached here in Appendix 4. Two thousand copies of this report were circulated in June 1996 and focused public consultations were held in late July in Moncton, Sydney, Clarenville, Deer Lake, Blanc Sablon and Gaspé. At all these locations, FRCC discussions on criteria and conservation issues took place in a morning session. In the afternoon, participants heard from DFO area managers about what would have to happen in order for a fishery to actually take place. The afternoon discussions addressed many implementation issues ranging beyond the FRCC's immediate mandate, but nevertheless of relevance to conservation.

The second discussion document reviewed previous progress and made definite suggestions on what indicators should be used and how the decisions should be made regarding re-opening of cod fisheries in areas 3Ps (southern Newfoundland), 4TVn (southern Gulf and Sydney Bight) and 3Pn4RS (eastern and northern Gulf). The most relevant indicators suggested were the rate of recruitment of young fish - a direct index of stock renewal, and the total biomass and/or numbers of mature spawners in the stock and the total biomass and/or numbers of mature spawners. The geographical distribution of a stock, particularly when compared to its historical spread, was also one of the indicators considered. Values of the indicators were compared to levels observed at closure and to long-term average levels. At a threshold value equal to the half-way point between closure level and the long-term average, the stock was considered to have sufficiently recovered to consider a re-opening. An application of the precautionary principle was also presented in the form of risk curves, showing the likelihood of unfavourable outcomes following specific decisions.

Participants in the 1996 consultations reacted vigorously to the ideas expressed in the document and put forward a wide range of views. While some, clearly pressed by economics, claimed for an immediate re-opening, others continued to support a cautious approach. Many intervenors had thoughtful comments to make about the details of the re-opening process outlined in the document. Problems about the reliability of sources of information (scientific surveys, sentinel fisheries, by-catches, directed catches) continued to attract discussion. While most intervenors accepted the value of qualifying the state of the stock through a few indicators, the FRCC was reminded that, in the face of uncertainty, it should keep in mind all available clues about fish stocks. Furthermore, some were alarmed at the fact that the indicators proposed: biomass, recruitment, spawners, geographical distribution - were the same factors that DFO scientists had used to assess the stocks in former years.

Many intervenors challenged the use of a threshold value for assessing recovery and considering possible re-opening (in the examples presented, half-way between closure and long-term average levels), claiming it to be completely arbitrary and drawn on debatable information. Some even argued that given such thresholds and existing uncertainty, it would never be possible to justify re-opening. The use of a risk analysis to assess the consequences of management decisions was well received... although the discussion did not delve on the nature of the information required to calculate risk curves. The FRCC document was also criticized for not presenting explicit long-term targets for stock recovery.

Overall, the use of biological indicators, as presented in the attached discussion document, received broad support. There was some debate

about which indicators were most important, and there was reluctance to the use of specific reference levels to determine re-opening conditions.

3.3 How to re-open and maintain a sustainable fishery?

After nearly three years of deliberations and consultations, the FRCC has heard from many intervenors and has had time to deliberate at length on the process of re-opening a closed fishery. The discussions also turned out to be quite relevant to the future conduct of fisheries which have never been closed. What has been learned and how will the FRCC decisions be guided by the results of the deliberation and consultation process?

As a first basic principle, it is clear that to ensure sustainability and to avoid the catastrophes of yore, fisheries management must always be guided by conservation rather than economic objectives. Re-opening just because fishermen need income or increasing a TAC to achieve a more equitable allocation of resources are recipes for disaster which have already ruined many fisheries.

The first pillar of conservation is knowledge. In its discussion documents, the FRCC attempted to identify, as indicators, those items of information which were most relevant to assessing stock status. Although these indicators play a foremost role in characterizing the status of the stock, they are all tainted with significant uncertainty and must be supplemented with any additional information available. Reduction of stock information to a handful of numbers is useful for general guidance, but it transforms a real fishery into an abstract concept which alienates scientists from fishermen. Conversely, the information presented by fishermen is generally qualitative and site-specific, and unsuitable for systematic stock assessment. Neither re-opening nor the continued management of the fishery are reducible to simple formulas or to one-sided considerations. Conservation decisions require real input from all sources of information. While the FRCC will continue to rely in part on indicators of stock status, it will also include, within its information base, information from fishers at sea and any clues about the marine ecosystem. Matching the various sources of information remains a constant challenge.

Knowledge, even with a solid appreciation of the uncertainty which surrounds it, is not enough. The second pillar of conservation is the approach adopted to manage and carry out the fishery, which determine how knowledge and its uncertainty are used. The approach adopted by the FRCC is the "precautionary approach", recommended by the United Nations (Conference on Straddling Fish Stocks, 1995) in dealing with cases where information is uncertain, unreliable or inadequate. The precautionary approach favours management measures which minimize the risk of undesired outcomes. For example, a bold, economically-driven manager might be willing to risk serious stock depletion to take advantage of particularly high prices; by contrast, the conservation-minded precautionary manager would not allow the risk of stock depletion to reach above a certain (low) level, regardless of the price of fish. One approach considers money as the item of most value, the other, the sustainability of the fishery.

How is available information and its surrounding uncertainty to be used in a manner consistent with the precautionary approach? The United Nations documents speak of "precautionary reference points... derived through an agreed scientific procedure... which can be used as a guide for fisheries management." Such reference points might be, for example, a biomass level corresponding to a rise half-way from its closure level to a long-term average (as in the FRCC document in Appendix 3), or a recruitment rate of so many millions of individuals. The FRCC and other agencies (for example the NAFO Fisheries Commission) are striving to delineate practical rules to apply the precautionary principle. Given the historical variability of Canadian Atlantic groundfish stocks and the high degree of uncertainty which surround some population estimates,

setting precise values for re-opening thresholds or long-term stock targets may appear arbitrary and impractical at this time. Furthermore, reference points based on environmental and fishing conditions which prevailed a decade or more ago may be inappropriate to tomorrow's circumstances.

Species shifts occur in oceanic ecosystems even in the absence of human intervention; who can tell whether the ecosystem will return to the same species assortment which preceded the great fishing onslaught. Will tomorrow's dominant near-benthic species in Atlantic Canada be groundfish or crustaceans? Today's understanding of the ecosystem is insufficient to answer this question with confidence.

3.4 Practical Application

When considering re-opening a closed fishery, the FRCC has taken into account the criteria relevant to an evaluation of the stock status (as in Appendix 4), using all available information from the latest DFO surveys and analyses as well as sentinel surveys and advice received during public consultations.

The precautionary approach used has consisted of:

- **basing the recommendation to re-open on the strength of biological indicators;**
- **taking into account uncertainty about stock status;**
- **opening only at a level which ensures continued rebuilding;**
- **insisting on a solid assurance of management control.**

The history of indicator levels over time, as shown in the graphs of Appendix 4, has been used only for guidance; at this time no long-term target levels or thresholds have been set. Recommendations have been based more on the current state of the stocks than on historical levels. Long-term targets will be revisited at a later date after stocks have recovered more of their strength. Exploitation rates have been set at a fraction of $F_{0.1}$ (wherever an estimate is available) and on consideration of other indicators so as to ensure continuing growth of the stocks.

Setting a TAC is only the first step in re-opening. In all cases where a re-opening has been recommended, a number of management conditions have been specified. These conditions are imposed so as to ensure control of the fishery, protection of the stock against accidental over-exploitation, and gathering of additional information about stock status. Management control takes the form of a Conservation Harvesting Plan (CHP), to be developed by industry in consultation with DFO.

The FRCC recommends that Conservation Harvesting Plans should include the following components (among others):

- **matching the effort to the available resource;**
- **seasonal catch repartition where appropriate;**
- **extensive and timely monitoring through a combination of measures: log-books, observers at sea, dock-side monitoring;**
- **use of gear with appropriate selectivity to avoid catching juveniles and spread the catch over a range of year classes;**
- **by-catch provisions;**
- **small fish protocols;**
- **suitable seasonal and area closures to protect juveniles, pre-spawning and spawning aggregations;**
- **mechanisms for mid-season and end of season evaluation of the fishery;**
- **provision for gathering information about fish stocks.**

Conservation Harvesting Plans are now a requirement for all Atlantic groundfish fisheries; they are recognized as a highly beneficial conservation and management measure. For freshly re-opened fisheries, these plans will have to be particularly explicit and subject to close monitoring and strict enforcement.

Thr FRCC recommends that for freshly re-opened fisheries, these plans will have to be particularly explicit and subject to close monitoring and strict enforcement.

Sentinel Fisheries were introduced to provide additional information in closed fisheries. With re-opening of commercial fisheries these surveys will develop and change. It will continue to be important to obtain as much information as possible about fish stocks directly from the fishery. Harvesting plans should be developed in consultation with DFO-Science to maximize the amount and quality of the information about stock abundance, properties and distribution obtained from the fishery.

4. Conservation Recommendations for 1997: Stock-by-Stock

4.1 Introduction

In its previous reports on conservation requirements for Atlantic groundfish, the Council anticipated the pressures for effort re-direction from groundfish fisheries which were closed. Where re-direction of effort occurs, the result is, invariably, too much effort on the directed species and an unreasonably high by-catch of the species under moratorium. The Council urged that management actions be taken to avoid this re-direction of effort and its negative impact on conservation. Displacement of effort onto other non-traditional and non-quota managed groundfish stocks remains a concern and the added fishing pressure on certain stocks which were often already fully exploited has made them even more vulnerable. The growing concerns on the lumpfish stocks in Newfoundland can serve to illustrate this point.

The Council also recommended in its previous reports that management measures be taken to ensure that by-catches remain truly incidental and be kept to an absolute minimum. The Council believes that conservation must be a top priority in setting allowable by-catch levels. In 1994, the Council also expressed frustration that, in some areas, by-catch limits were seen as allocations or "targets to reach" rather than as tolerance limits put in place to allow a fishery be prosecuted on a species not under moratorium.

Measures implemented to address these concerns have not been completely effective. In 1995, for instance, we received many reports from some areas of an expansion in the effort directed (or supposedly directed) at "minor" or "underutilized" species, such as "black back" or winter flounder, Atlantic halibut in the Gulf, skate, monkfish, and lumpfish.

In 1995, the Council recommended that an option would be to close completely these other fisheries "to give the ecosystem a rest from fishing" and to allow enforcement to have a chance at the legal fisheries in other areas. Another option was to restrict current effort only to those fishermen who traditionally prosecuted that fishery prior to the cod moratorium. As well, the Council proposed that full dockside monitoring be implemented for all fisheries, that penalties for any illegal fishing be increased and that no recreational fisheries be permitted for fish stocks under moratorium.

In the current report, the Council is recommending, for three of the cod stocks which were under moratorium, a reopening of commercial fishing at a small scale. These recommendations must not be seen as an indication that these stocks have returned to their historical levels of productivity. On the contrary, the Council remains extremely concerned with the status of these stocks. In their 1996 Stock Status Report on Atlantic Groundfish, DFO scientists have clearly indicated that "Although the declines have been arrested, the rebuilding of groundfish stocks has only partially begun". The Council is concerned that the abundance of these stocks remains low, much below historical levels. Recruitment, while improving, remains poor. Growth, despite definite improvements in the condition of individual fish, remains poor. Environmental conditions, while somewhat improved, remain rather cold, particularly in the Gulf of St. Lawrence. The message must be clear: we must proceed with caution and take these limited re-openings as an opportunity to rectify the "errors of the past" by implementing sound fishing practices and by learning how to adjust fishing effort to match the reduced productivity levels that seem to be prevailing. We must

also take these limited re-openings as a means to learn as much as possible on these stocks so as to develop an understanding of the mechanisms driving their productivity.

For the three cod stocks for which a limited commercial fishery is recommended, the Council recommends that a mid-season evaluation of the fisheries be completed by management and the industry. This evaluation should serve to adjust, redesign or correct fishing plans at mid-point, so as to ensure sound fishing and management practices. If necessary because of conservation concerns, these small scale fisheries should be closed and remain so until it is clear that poor fishing or management (e.g. misreporting) practices are eliminated.

4.2 Stocks of Labrador, Northeast Newfoundland Shelf, Grand Banks and Southern Newfoundland

4.2.1 Ecosystem Overview

4.2.1.1 General Features

Water masses in this area move broadly 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 influences the general characteristics of the water in the Labrador current.

The Labrador Current consists of three layers. The 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 ranges 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.

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. 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

Cold air temperatures and strong NW winds resulted in early ice formation, greater aerial extent of ice and a longer presence of ice on the Labrador/Newfoundland shelves. A larger number of icebergs than normal reached the Grand Banks. Water temperatures were not as severe, however, as in recent years and appear to be moderating. Ocean temperatures off Newfoundland at Station 27 were below normal during most of 1995 but had warmed relative to the extreme cold period of the early 1990s. The area of the CIL in summer across the northeast Newfoundland Shelf generally decreased in

HYDROGRAPHIC CONDITIONS FOR NEWFOUNDLAND REGION IN 1995

- **Ice coverage during winter still above normal**
- **Water temperatures near normal during winter months at station 27**
- **Overall volume of CIL the lowest measured over the last 15 years**
- **Off the south coast, cold conditions still observed, but have moderated**
- **For 1996, as of mid-year, evidence of warmest conditions in 10 years**

SOURCES: DFO Stock Status Report 96/15; NAFO Scr Doc. 96/41

1995 and at two-out of the three transects, the area was below normal. The volume of the CIL declined significantly and its core temperature generally rose. Large areas of the continental shelf, particularly the Grand Banks, contained warmer-than-normal bottom temperatures in the autumn, the first time in several years that this has occurred. Temperatures anomalies off southern Newfoundland remained cold, continuing a trend established in the mid-1980s.

The atmospheric pressure patterns over the North Atlantic are dominated by two systems: the Icelandic Low and the Bermuda-Azores High. The difference in winter atmospheric pressure between the two systems is known as the North Atlantic Oscillation (NAO) Index. Cold temperatures and heavy ice conditions in the Labrador Sea are generally associated with a strong positive NAO Index. Since the mid-1960's, the NAO Index has shown an increasing trend, with positive peaks in the early 1970's, mid-1980's, and the 1990's. The increasing trend and the positive peaks in the NAO Index in the last decades have resulted in generally colder water temperatures off Newfoundland, with coldest periods in the early 1970's, mid-1980's, and the 1990's. However, in 1996, the NAO index became strongly negative. Milder temperatures and lighter ice conditions are generally associated with a strong negative NAO index in the Labrador sea. In 1996, winter air temperatures, from Iqaluit to St. John's, were above normal; water temperature at Station 27 was above normal from the surface to the bottom as of July; minimum CIL temperature in July on Flemish Cap and Bonavista line were above normal, and the warmest in 8 years.

4.2.1.3 General Trends in Ecosystem

The traditional groundfish resources in the waters around Newfoundland continue to be at or very near historical low levels. For Canadian managed stocks still supporting a fishery, reductions in TACs were imposed in 1995. The quotas for Unit 2 redfish was reduce from 25,000 metric tons in 1994 to 14,000 metric tons in 1995. For the NAFO-managed resources excluding those of the Flemish Cap, directed fisheries remain open only for Greenland halibut and 3LN redfish in 1996. Ongoing assessments of these resources are more critically dependent on research activities such as research surveys and Sentinel Surveys. In addition to data on catch rates, information on fish sizes, fish condition, and age and growth are being gathered in Sentinel surveys.

Divergence of capelin biomass estimates between acoustic and other methods has not been resolved. Year-classes from 1992 and 1993 appear strong and will contribute to the 1996 capelin spawning stock. Delay in the time of capelin spawning appears related to colder water temperatures, as well as to smaller sizes at age.

Herring stocks off the east and south coasts of Newfoundland are at low levels, with biomasses of only about 10% of observed maxima. Cold water temperatures appear to have contributed to recent low recruitment and low growth rates.

From 1987 to 1992, survival rates of salmon declined in many areas of Newfoundland. Since 1992, survival rates of salmon have increased again.

Shrimp stocks appear very healthy, with high commercial catch rates and high spawning biomass. The distribution of shrimp is currently widespread and has possibly been expanding. Good recruitment over the short-term is apparent. Crab landings reached an all time high of 32,000 metric tons in 1995. Catch rates have declined in some inshore areas, but have remained high in most offshore areas of divisions 3K and 3L. Commercial concentra-

tions of scallop are few on the Grand Banks and beds of scallops in Division 3N are possibly being depleted.

A considerable amount of new information on marine mammals, particularly harp seals, became available in 1995. Progress is continuing in studies of their abundance, distribution and diet.

Preliminary descriptions of the temporal and spatial patterns in the variation of nutrients, phytoplankton and zooplankton in Newfoundland waters was developed. An analysis of long-term fluctuations in seabird populations, their reproductive success and their diets indicated associations with oceanographic and climactic changes.

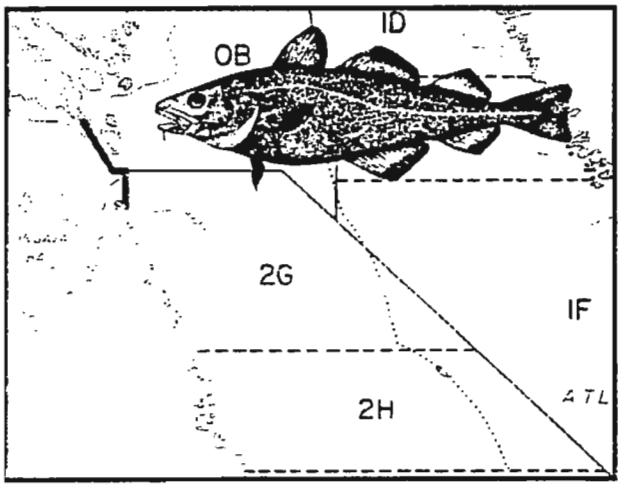
GENERAL TRENDS IN ECOSYSTEM OFF NEWFOUNDLAND IN 1995

- **Traditional groundfish resources continue to be at or very near historical low levels**
- **Herring stocks low and status of capelin stocks still uncertain**
- **Shrimp and crab stocks strong with high landings and good recruitment**

Source: DFO Stock Status Report 96/15

4.2.2 Stock-By-Stock Recommendations - Newfoundland

4.2.2.1 Cod: Northern Labrador - 2GH



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. This recommendation was repeated for 1996.

1996 Consultations:

There were no comments received from fishermen specifically about 2GH cod.

Analysis:

The 1996 DFO Stock Status Report indicates that:

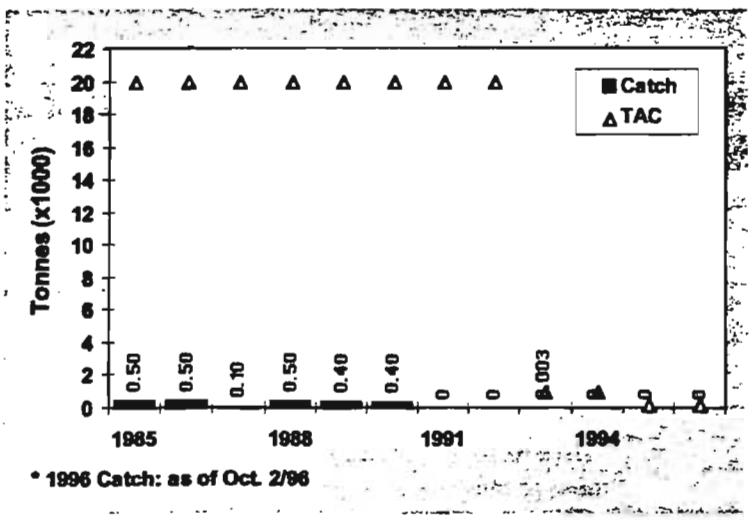
- the catch has been negligible since 1990.
- the survey conducted in 1991 detected very few fish.
- there are possible links with northern cod.
- the status remains unknown but abundance is assumed low.

There is limited information on this stock and no new information since the last DFO Stock Status Report. There have been no research surveys for the past five years. There are some by-catches reported by observers in the shrimp fishery, although the use of the Nordmore grid is intended to reduce this.

Recommendation # 1:

The FRCC recommends that:

1.1. there be no directed fishery on this stock.
1.2. cooperative science-industry surveys should be encouraged.



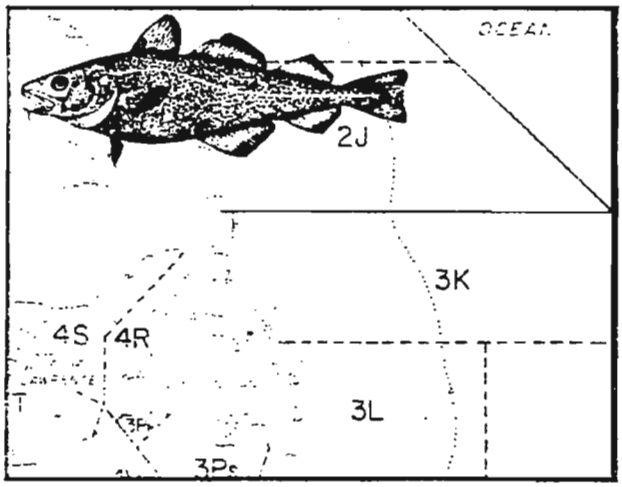
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: very low; status unknown

	Compared to average
Spawning Biomass:	unknown
Total Biomass:	unknown
Recruitment:	unknown
Growth and Condition:	unknown
Age Structure:	unknown
Distribution:	unknown

Recent Exploitation Level: none - no fishery

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



HISTORY OF FRCC RECOMMENDATIONS:

In 1993, the Council indicated that this stock was at a very low level with poor recruitment prospects, and that a recovery of the spawning biomass was unlikely before the year 2000 at the earliest. The Council recommended that the moratorium on fishing 2J3KL cod be continued for 1994 and that strict limits be placed on food fisheries. In 1995, the Council emphasized the importance of the Sentinel Fishery in monitoring this stock during the moratorium. The Council recommended the moratorium be continued for 1996.

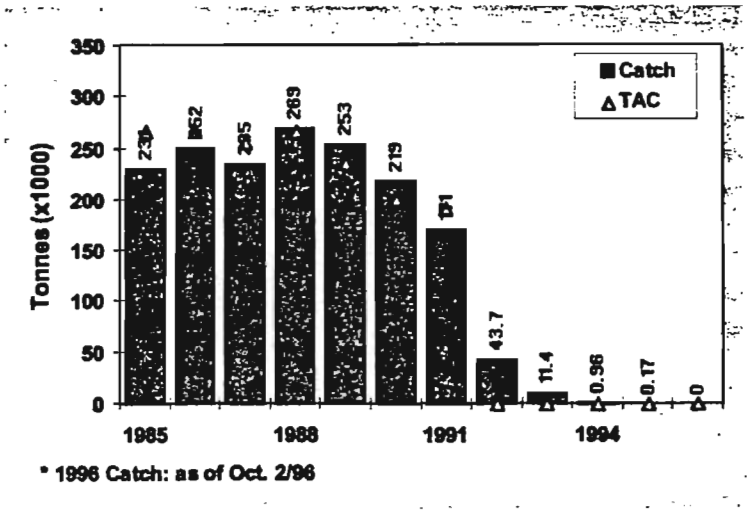
1996 CONSULTATIONS:

There were few cod reported near St. Anthony for most of the year although some fish appeared in August. In 3K, around the Notre Dame Bay area, there was a very good show of fish as by-catch. Distribution was abnormal; most fish were found in shallow water. In some cases, fish were not abundant in traditional fishing grounds. Fish were reported in good condition. Some fishermen argued for more liberal by-catch limits, as it was difficult to fish for other species because of the abundance of cod. Others cautioned that fish in 3K were spotty and the distribution was unusual. In that area, Sentinel Fishermen reported some improvement in 1996 over 1995 catch rates. In southern 3K, catches are 2-3 times higher in 1996. One Sentinel Fisher reported that although there were improved signs of fish in some areas, he would hate to have to make a living on it. Several reported a good sign of small cod in capelin traps. In 3L, Sentinel Fishery catches were high, and in

RECOMMENDATION # 2:

The FRCC recommends that:

- **2.1. the moratorium on fishing 2J3KL cod be continued during 1997.**
- **2.2 the inshore Sentinel Fishery be continued with appropriate expansion and an offshore Sentinel Fishery program be initiated.**
- **2.3. strict monitoring of by-catch limits is necessary.**
- **2.4. Strenuous efforts to control poaching on inshore concentrations that may be critical to stock recovery continue to be a high priority.**
- **2.5. Spawning aggregations be evaluated and appropriate time/area closure management plans be formulated for the future.**



were observed inshore but distribution was quite unusual. One aggregation was studied by DFO and Memorial University in Smith Sound, T.B.; also, there were indications of fish in Hawke Channel.

The condition of fish that was observed in samples from 1989 to 1992 continue to improve. However, the condition of survey fish sampled in 1995 were slightly poorer than in 1994. Age at maturity is still declining and the values for 1995 were the lowest observed. Growth (weight at age) has been increasing in recent years.

some cases exceptionally high. Seals were reported as being abundant in 3K; however, fewer seals were observed inshore in 3L in 1996.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- the biomass remains very low.
- year-classes have been weak since 1986-87.
- the 1995 Sentinel Survey indicated varying amounts inshore; catches improved in 1996, especially in 3L.
- the signs of recovery inshore remain limited.

Because of changes in survey gear and the research vessel, the 1995 estimates cannot be compared directly with estimates made in preceding years. Comparative fishing trials indicated that the new Campelen trawl more effectively samples smaller fish.

Generally, mean catches per tow remained exceptionally low throughout the survey area in 1995. There were few older cod (> age 7) in survey catches; no large aggregations of fish of any age were found. The pelagic juvenile cod survey index was lower in 1995 then in 1994. Generally, the abundance found inshore by fishermen and the Sentinel Fishery were high and indicated some recovery of this stock is underway. Fish of all ages

In 1995, Sentinel Fisheries catch rates were lower than the last year of the commercial fishery. The worst catches occurred in the northern portion of 2J3KL; somewhat better catches occurred in southern areas. In 1996, the Sentinel Fishery began about a month earlier than in 1995 which was a more appropriate time for commercial fishing. Catches remain very low in 2J and northern 3K. Catches in 3L and southern 3K were much higher then last year, with some areas reporting very good catches. The condition of fish caught by the Sentinel Fishery was good.

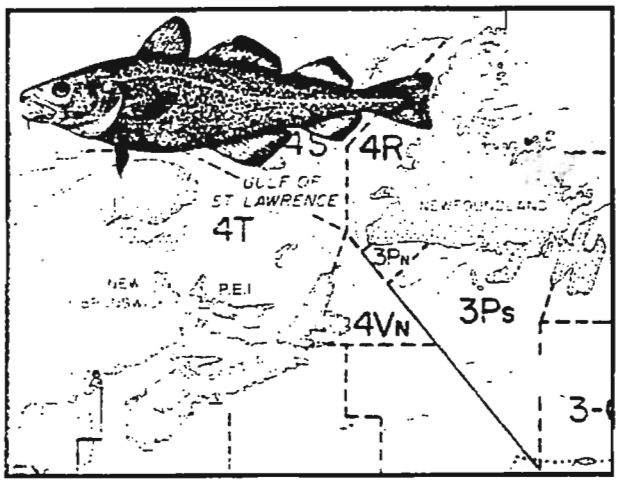
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**very low; signs of improvement in 3L**
	Compared to average
Spawning Biomass:	**very low**
Total Biomass:	**very low**
Recruitment:	**poor**
Growth and Condition:	**growth poor, condition good**
Age Structure:	**poor - no old fish**
Distribution:	**improving in south, still abnormal**

Recent Exploitation Level: low

Overall the stock remains at a very low level. The Council remains concerned with the numerous reports of cod availability on local markets. There is serious concern that by-catches are not always truly incidental and that fishing practices have not been optimized to avoid cod. Poaching is also seen as a problem that may impede recovery as it concentrates on known inshore aggregations; it reflects and entrenches a negative conservation attitude that can destroy a future sustainable fishery.

4.3.2.3
COD: ST. PIERRE BANK - 3PS



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.

RECOMMENDATION # 3:

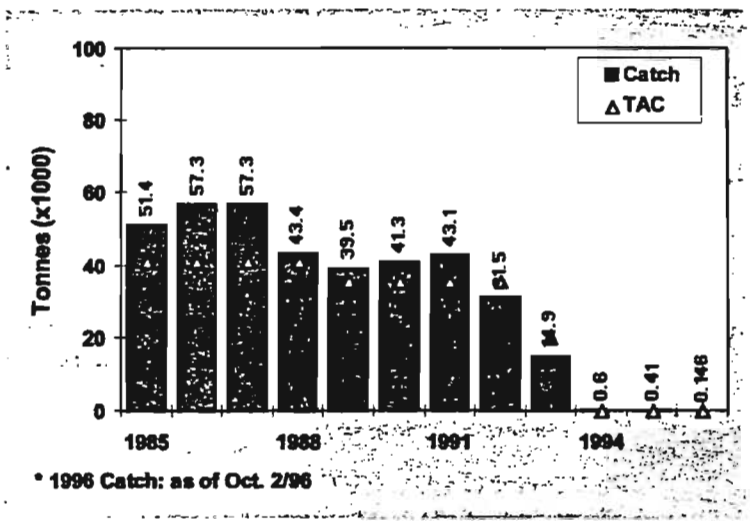
The FRCC recommends that:

3.1. the fishery be re-opened for a commercial fishery in 1997 with a TAC set at 10,000t.

3.2. the TAC be evenly divided by quarters to minimize impact on stock sub-components.

3.3. Conservation Harvesting plans be required. This should be developed with input from DFO Science to insure sampling of sub-stock components in 3Ps. These plans should ensure that:

- **fishing is not concentrated solely on the 1989 year class.**
- **there be a mandatory monitoring of catches of all species.**
- **simple and reliable danger signals are identified and monitored during the fishery. These indicators must be incorporated into monitoring programs and summarized in a timely manner. These indicators should be used to halt fishing if danger signals are detected.**
- **time/area closures for identified spawning/juvenile aggregations be established. Studies, as necessary, should be initiated to identify where such aggregations occur.**
- **effort is controlled and reduced to match available quotas.**



The Council's recommendations for 1996 were for a continued moratorium on commercial fishing and a significantly expanded Sentinel Fishery with an upset limit of 3,000 t to evaluate the high catch rates found by Sentinel Fishermen.

1996 Consultations:

Almost unanimously, fishermen reported unusually high abundance of all ages of inshore fish that were in good condition. This was supported by the information collected by Sentinel Fishermen. Most felt that a cautious fishery should begin so that recovery can be further evaluated. Fishermen discounted research vessel survey results from offshore because of the timing of the survey; many reported good abundance of fish offshore as well. Fish were in good condition and there was clear evidence of small fish in capelin traps and around wharfs. Seals were abundant in the Burgeo area. Concerns were expressed about cod fishing in St. Pierre and Miquelon.

The Council was urged to 'err on the side of fishermen'. There were strong and convincing arguments presented for a commercial re-opening of fishing on 3Ps cod. Most fishermen felt that the stock clearly warranted this and a cautious fishery would not seriously impact the stock. Council was urged to recommend very careful monitoring of catches through full dock side monitoring. If there were indications of a decline or serious impacts on the stock, emergency closures of the fishery should be implemented. A willingness was expressed to participate in scientific work, use log books, tag gear and participate in effort controls. The Council was reminded that once a quota was assigned, then the more difficult task of optimal harvesting strategies would rest with the industry and managers.

Analysis:

The 1996 DFO Stock Status Report indicates that:

- Cod from the 1989 year-class are now mature and must be protected
- the 1990 year class is average.
- there is no evidence of strong year-classes after 1990.
- the increase in the 1995 survey was due to one large tow in the RV survey; the 1996 RV survey estimate was only slightly higher than the 1994 estimate.
- this stock is considered to be at a low level of abundance offshore, according to RV surveys.

Council's views on Stock Status:

Overall Stock Indicator: improving; mixed signals

	Compared to average
Spawning Biomass:	**improving with 1989 year class**
Total Biomass:	**uncertain**
Recruitment:	**no signs offshore; inshore indications of small fish**
Growth and Condition:	**average growth, good condition**
Age Structure:	**1989 year class strong; 1990 average; most others weak**
Distribution:	**good inshore; poor offshore**

Recent Exploitation Level: low

- older fish have disappeared; growth rates have declined somewhat.

Tagging studies, catch records and traditional ecological knowledge all indicate that the 3Ps cod stock is most likely composed of at least five major sub-stocks. This, and the variable timing of the research vessel survey, make it difficult to reconcile low estimates offshore with indications of excellent inshore abundance. Historically, the 3Ps research estimates of biomass have not related closely to commercial experience of abundance.

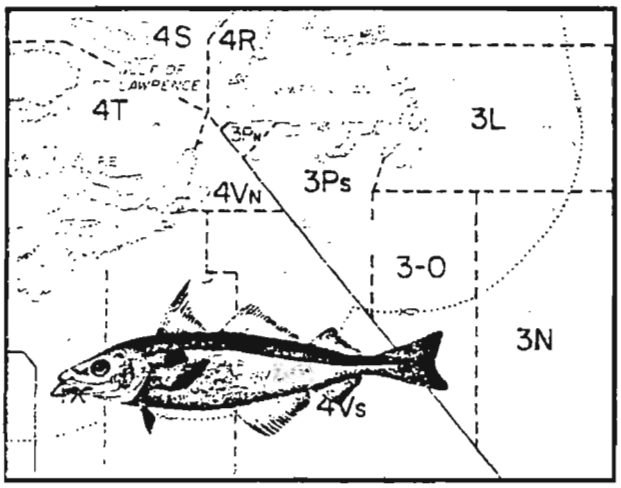
The research vessel survey and commercial data indicate that the 1989 year-class is the strongest of recent year-classes; the 1990 is average and subsequent year-classes are weak. Inshore catch rate data available from commercial fishing represent only 2% of effort and are available only for vessels 35-65 ft. Catch rates in these data are variable and contradictory between gears but generally do not indicate declining biomass in the 1990s.

At present, there are indications of excellent inshore abundance which includes all ages of fish. Fish are in good condition. However, inshore distribution is reported to be unusual in some areas and timing of abundance has changed. Sentinel Fishery catches are exceptional throughout the area, as are by-catches, and in all cases, these are higher than when the fishery was closed. The effect that competitive fishing with increased effort will have on these catch rates is not known.

An acoustic survey in Placentia Bay estimated 23,000t of primarily age 5-6 fish. If this estimate and attendant Sentinel Fishery catches are used to estimate biomass throughout 3Ps, an estimate exceeding 100,000t is obtained. The research vessel estimate for 1996 was slightly higher than the 1994 value.

There are major sources of uncertainty in evaluating the status of this stock. The stock was not severely depleted at the closure of the fishery and signs of abundance are impressive and consistent. Given uncertainties, and because biomass is primarily composed of a two major year classes, recommendations must continue to be cautious. Expanded exploitation of this stock, properly managed, can provide the information needed to more adequately resolve basic questions about the stock components and provide better estimates of stock status.

4.2.2.4
HADDOCK: GRAND BANKS - 3LNO



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 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. In November 1994, the Council reiterated its advice for no directed fishery and recommended reducing the by-catch limit to 100t for 1995. The Council noted in 1995 that there had been no signs of improved recruitment and there were no prospects for stock improvement in the near future. It again recommended no directed fishing in 1996 and a by-catch limit of 100t.

1996 CONSULTATIONS:

No specific comments were received on this particular stock during the 1996 consultations in Newfoundland.

ANALYSIS:

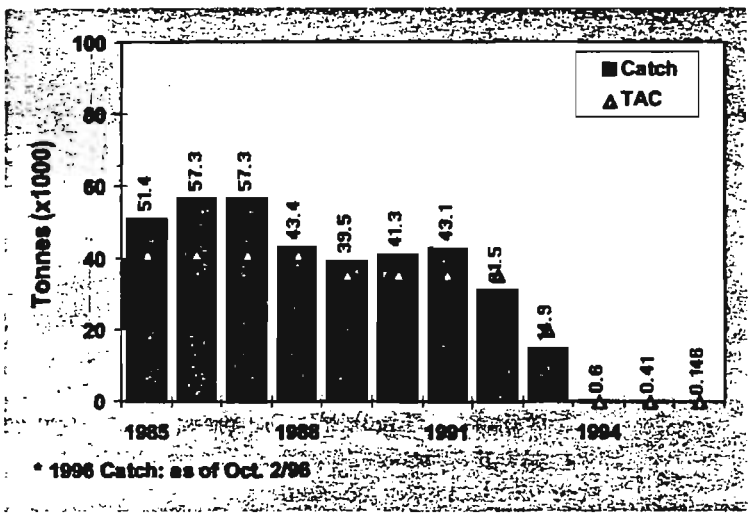
The 1996 DFO Stock Status Report indicates that:

- high catches in the 1980s were due to the strong 1980 and 1981 year classes.
- there is no evidence of more recent strong year-classes.
- there are no prospects of the stock improving in the near future.

Haddock abundance in 3LNO was low throughout the 1979's, higher in 1984-1988, and subsequently low. Very few haddock have been found in recent research vessel surveys. The research surveys show that recent year classes are weak and there are no prospects of the stock improving in the near future. Fish that reach spawning age must be protected if recruitment is to improve in the future for this stock.

RECOMMENDATION # 4:

4.1. **The FRCC recommends that there be no directed fishing for 3LNO haddock in 1997 and by-catches be limited to 100t.**



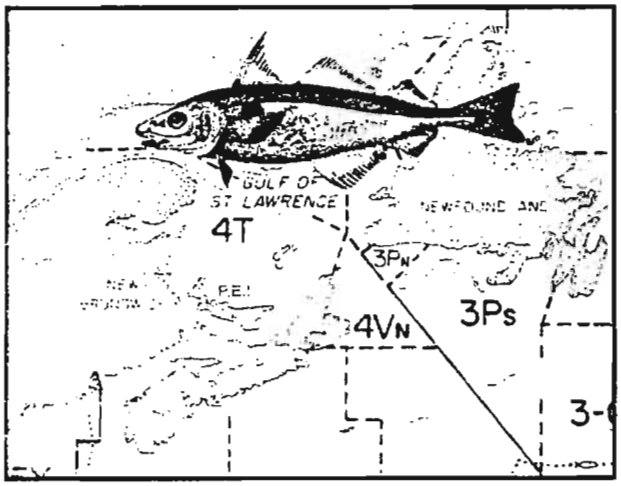
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	low
Total Biomass:	low
Recruitment:	no signs of good recruitment
Growth and Condition:	not available
Age Structure:	all recent year classes weak
Distribution:	few in 3L

Recent Exploitation Level: unknown; lower than in the past

4.2.2.5
HADDOCK: ST. PIERRE BANK - 3PS



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. The by-catch of haddock was significantly reduced because of closures in fisheries for other species. The Council recommended that there be no directed fishing for the 3Ps haddock stock in 1994 and that by-catches be limited to 500t. In November 1994, the Council reiterated its advice for no directed fishery and recommended reducing the by-catch limit to 100t during 1995. This advice was repeated for 1996.

1996 CONSULTATIONS:

Few comments were received on this particular stock during the 1996 consultations. One fisherman noted that there was an abundance of haddock in Hermitage Bay. Another suggested that offshore haddock were found in abundance in a variety of sizes. Some noted that by-catch of large haddock was common.

ANALYSIS:

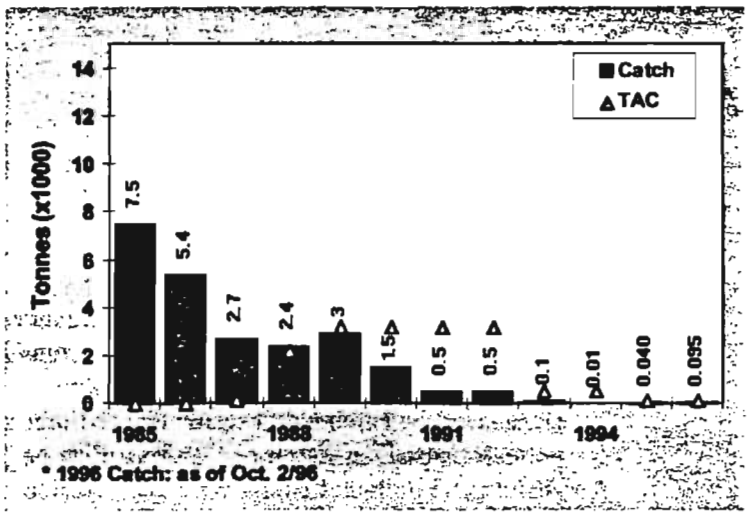
The 1996 DFO Stock Status Report indicates that:

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

Haddock in Newfoundland waters are at the northern limit of their range in the NW Atlantic. There are few indications of improved recruitment in this stock and there are no prospects of the stock increasing in the near future. The abundance of large fish appears to have increased inshore; an increase in effort for cod would likely exploit this abundance. As this species is taken as by-catch, it is anticipated that catches will increase when cod fishing is re-opened.

RECOMMENDATION # 5:

5.1. **The FRCC recommends that there be no directed fishing for 3Ps haddock in 1997 and that by-catches be limited to 300t and implemented so as not to impede a limited cod fishery.**



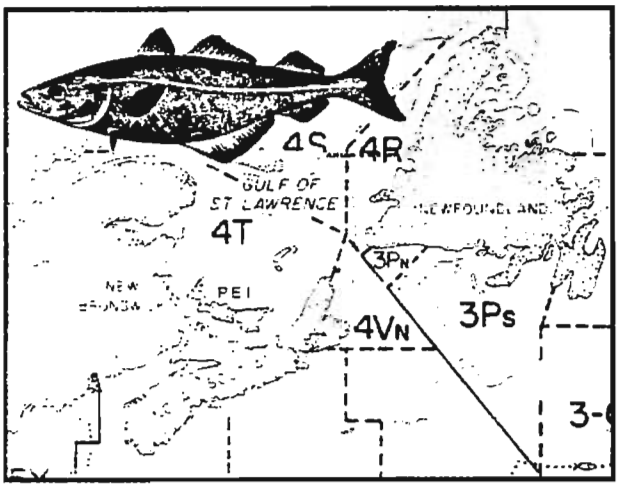
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	low, unknown
Total Biomass:	low, unknown
Recruitment:	poor, no signs of improvement
Growth and Condition:	not available
Age Structure:	not available
Distribution:	increased inshore

Recent Exploitation Level: low

4.2.2.6
POLLOCK: ST. PIERRE BANK - 3PS



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council noted that there were very few pollock in 3Ps and the TAC was reduced from 5,400t to a 600t by-catch limit. The Council recommended that there be no directed fishing for the 3Ps pollock stock in 1994 and that by-catches be limited to 500t. In November 1994, the Council re-iterated its advice for no directed fishing in 1995 and recommended reducing the by-catch limit to 100t. This recommendation was repeated for 1996.

1996 CONSULTATIONS:

Fishermen noted that pollock abundance in 3Ps was exceptional. Fish of all sizes were in evidence. Because fish appear in abundance only occasionally, they recommended that quotas should be generous. Cod by-catch was a serious impediment for pollock fishing. By-catch restrictions must be less strict for a pollock fishery to proceed. Pollock by-catch had limited redfish fisheries on the south coast.

ANALYSIS:

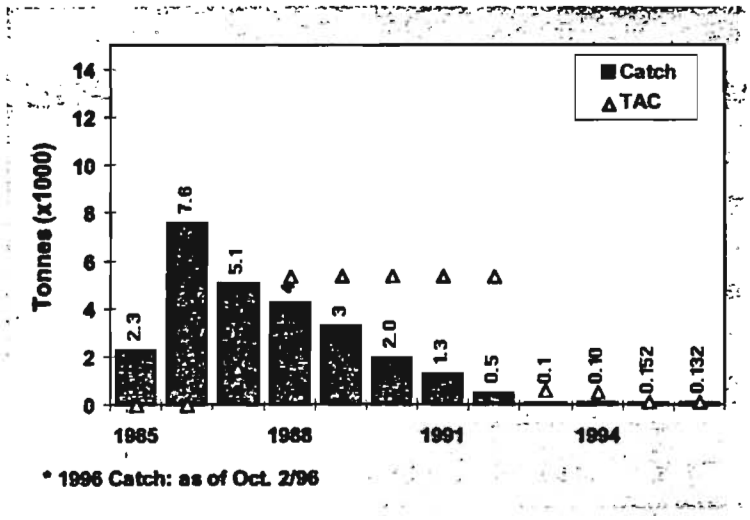
The 1996 DFO Stock Status Report indicates that:

- this stock is at the extreme north of geographic distribution for pollock.
- recent surveys showed low abundance and biomass.
- schools of small pollock were observed in 1995 in some inshore areas.
- an abundance of large pollock has been reported in some areas.

Pollock in Newfoundland waters are at the northern limit of their range in the NW Atlantic. Recruitment to commercial fisheries has been unpredictable. Commercial catches have varied greatly and have been based on occasional pulses of abundance. Because of the movements of

RECOMMENDATION # 6:

6.1. **The FRCC recommends that there be no directed fishing for 3Ps pollock in 1997 and that by-catchs be limited to 1,500t, and implemented so as not to impede a limited cod fishery.**



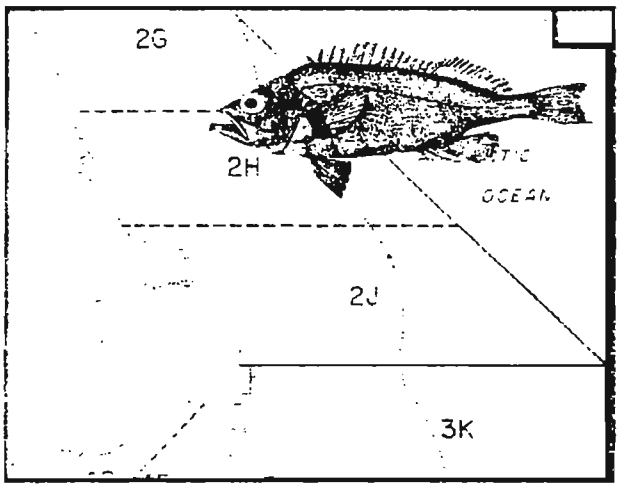
pollock, research vessel estimates of abundance are difficult to interpret and may not be reliable. Recent research surveys indicate poor abundance. However, in 1995, there were many small pollock reported around wharfs by fishermen. Exceptionally large fish in unusual quantities have appeared throughout 3Ps recently and there continues to be good evidence of young fish inshore.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**unknown; likely increasing**
	Compared to average
Spawning Biomass:	**unknown; large fish present**
Total Biomass:	**unknown**
Recruitment:	**positive signs inshore**
Growth and Condition:	**growth not available; condition good**
Age Structure:	**variety of sizes observed; unknown**
Distribution:	**sporadic at northern limit of range**

Recent Exploitation Level: low, by-catch

4.2.2.7
REDFISH: LABRADOR AND NORTHERN NEWFOUNDLAND - 2+3K



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 and 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 in 1995. This advice was repeated for 1996.

1996 CONSULTATIONS:

No specific comments were received on this stock during the 1996 consultations

ANALYSIS:

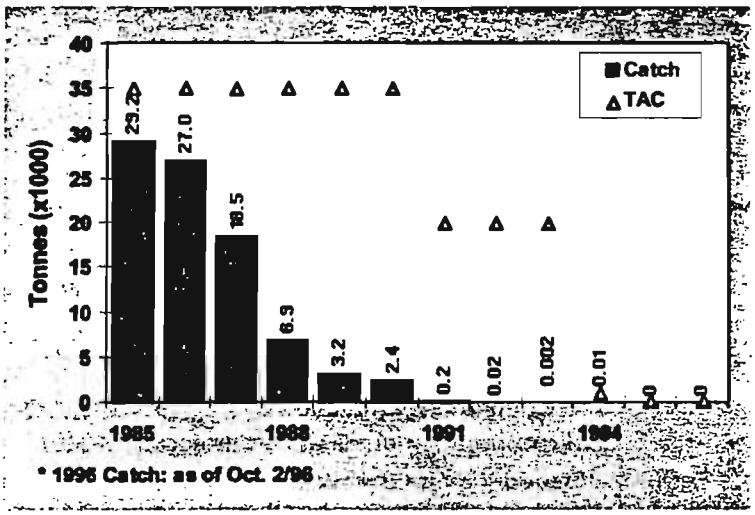
The 1996 DFO Stock Status Report indicates that:

- there has been virtually no recruitment since early 1970s.
- this stock is at a very low level.
- there is no recovery possible until the occurrence of good recruitment.

The survey biomass indices fell to extremely low levels in 1994; declines were of the magnitude of about 95-99%. The most recent survey produced somewhat higher catches of small fish but cannot be directly related to historical estimates because of a change in the survey vessel and gear. These index estimates are still low compared to estimates from the mid-1980s. There are no indications of good recruitment. Recruitment into this stock, when it occurs, would require a minimum of 10 years before if would contribute to any fishery. No fishing on this stock is justified.

RECOMMENDATION # 7:

7.1. **The FRCC recommends that there be no directed fishing in 1997 on 2+3K redfish.**



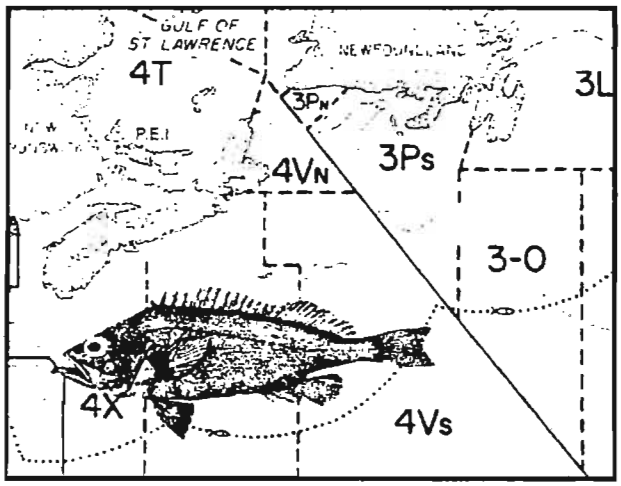
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: extremely low

	Compared to average
Spawning Biomass:	low
Total Biomass:	low; unknown
Recruitment:	very poor
Growth and Condition:	not available
Age Structure:	poor
Distribution:	

Recent Exploitation Level: low

4.2.2.8 REDFISH 3-O



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council recommended reduction of the TAC to 10,000t for 1994. 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. Information provided in the 1995 Stock Status Report suggested that observed 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.

The Council recommended a 1996 TAC at 10,000t and continuation of small fish protocols. It also noted that continued studies were necessary to determine the relationship between redfish found in 3O and those in neighbouring Divisions.

1996 CONSULTATIONS:

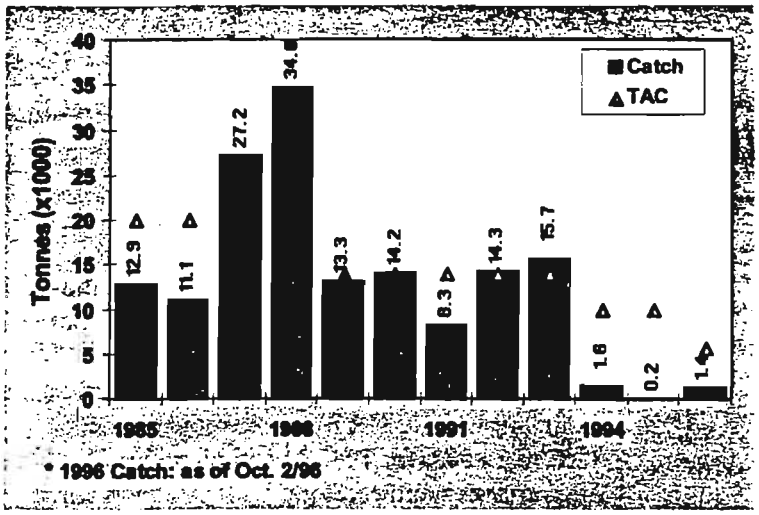
Redfish in Area 3-O is a demonstration of the effectiveness of the use of the small fish protocol in 1996. This area has not traditionally been harvested by domestic fleets because of the catch of juvenile redfish. Since the implementation of the small fish protocol, the average size of harvested fish has increased as a result of changed fishing patterns and the exploration of new fishing grounds.

Industry members advocated a change from a 130 mm minimum mesh size to 105 mm mesh size to avoid the problem of substantial post selection mortality. This mortality occurs in the escapement of fish from the trawl at the surface and before it is brought aboard the vessel.

RECOMMENDATION # 8:

The FRCC recommends that:

- **8.1. the TAC for 1997 be set at 10,000 t.**
- **8.2. small fish protocols must remain in place and apply to all fleets harvesting the resource throughout the range of the stock.**
- **8.3. modifications to gear should be examined to reduce the catch of small fish while minimizing post selection mortality.**



ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- larger fish found in deeper waters but generally untrawlable areas.
- research survey index increasing but may be attributable to two large sets in the survey.
- not possible to describe overall trends in total stock size or to estimate the current size of the fishable portion of the population.
- catches at the 10,000 t level unlikely to be harmful to the resource.

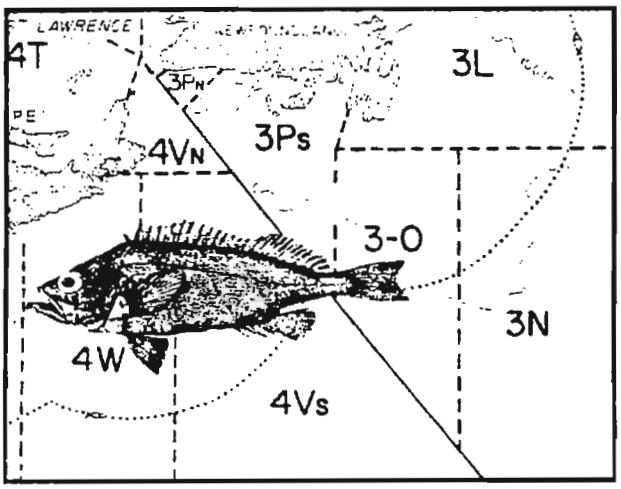
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: stable

	Compared to average
Spawning Biomass:	**unknown**
Total Biomass:	**slight increase**
Recruitment:	**improving**
Growth and Condition:	**unknown**
Age Structure:	**appears to be narrow range**
Distribution:	**unknown**

Recent Exploitation Level: estimated at 10%

4.2.2.9
REDFISH UNIT 2 - LAURENTIAN CHANNEL - 3PS4VS4WFG+3PN4VN (JUN.-DEC)



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. 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 scientific work clarify redfish management units and develop a better understanding of migration patterns and stock status. The Council recommended that the fishery be limited as much as practical during the January through 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.

The Council recommended a TAC reduction to 10,000t for 1996 with: rigid small fish protocols, no fishing in 3Pn and 4Vn during November and December, and a limiting, as much as possible, fishing from January to June.

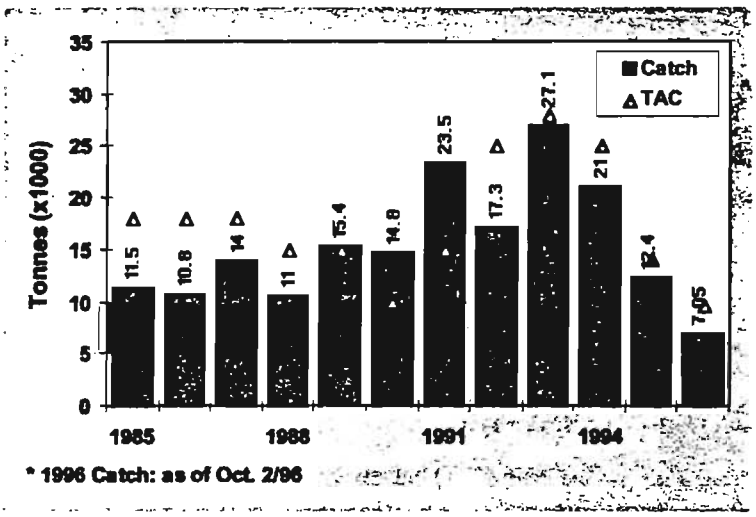
1996 CONSULTATIONS:

There was substantial consensus that current management measures in this stock including the small fish protocol served the purpose of protecting juvenile fish. The small fish protocol resulted in changing fishing patterns of operators with the result that larger fish were harvested. It was pointed out by several participants that water depth, time of year and the small fish protocol were more effective measures to protect juvenile fish than increased

RECOMMENDATION # 9:

The FRCC recommends that:

- 9.1. **the TAC remain at 10,000 t.**
- 9.2. **the small fish protocol be continued. DFO and Industry discuss the merits of protecting the 1988 year-class, accordingly, adjustments should be made to the minimum size in the small fish protocol.**
- 9.3. **seasonal and area closures be continued.**



mesh size. Concern was expressed about the by catch of groundfish species such as cod in this fishery as those stocks recover. Industry noted as well, that better DFO Science coordination between regions is required to answer questions about intermingling of these stocks.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- No signs of good recruitment subsequent to the 1988 year-class
- Catch of 10,000 t in 1997 would generate an exploitation rate of about 10% (less than the $F_{0.1}$ rate of 12%-13%)
- Stock size remained stable between 1995 and 1996, slighty below the 1994 level.

The Council is concerned about lack of recruitment in this stock. Recruitment has been poor since the 1988 year-class. Stakeholders generally agreed with this view of the stock and the need for a continued cautious approach is necessary. Council believes that the seasonal closures in the fishery have been effective at reducing the catch of Unit 1 redfish.

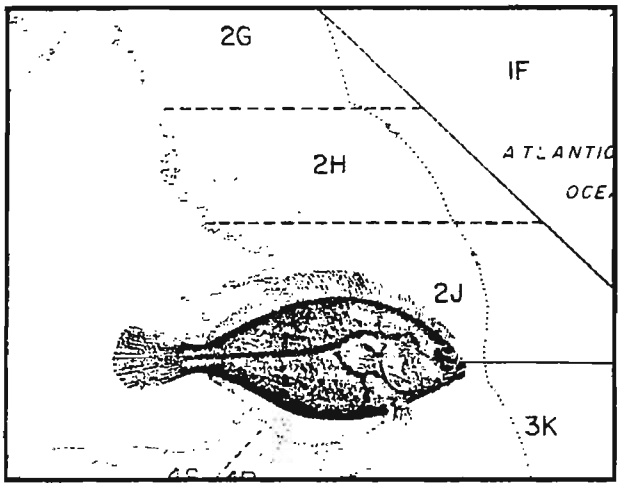
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: stable

	Compared to average
Spawning Biomass:	**average**
Total Biomass:	**average**
Recruitment:	**strong 1988 year-class, low thereafter**
Growth and Condition:	**unknown**
Age Structure:	**dominated by 1981 and 1988 year-class**
Distribution:	**unknown**

Recent Exploitation Level: moderate

4.2.2.10
American Plaice: Labrador & Northeast Newfoundland - 2+3K



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. This advice was repeated for 1996.

1996 Consultations:

There were no comments during the 1996 consultations specific to this stock.

Analysis:

The 1996 DFO Stock Status Report indicates that:

- abundance and biomass are very low.
- the spawning biomass is only about 2% of peak values.
- reported catches cannot explain the decline.
- in recent years recruitment has been low.
- prospects for rebuilding in foreseeable future are poor.

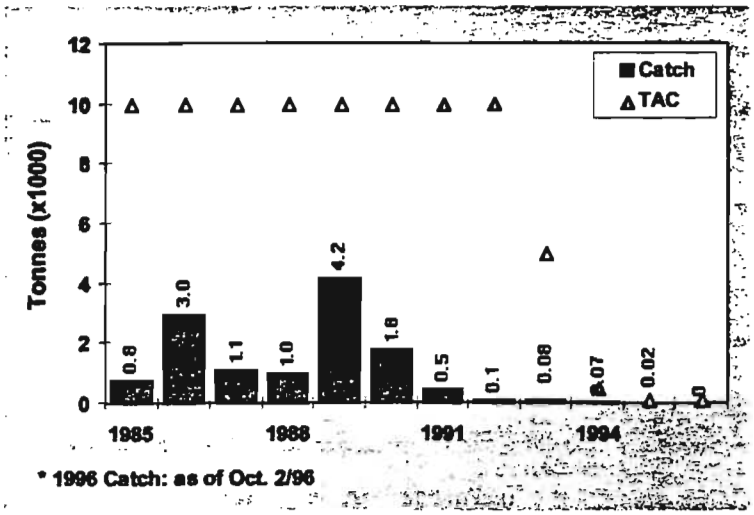
In recent research surveys, 2+3K plaice have been found in deeper waters. The 1996 research vessel survey indicates that estimates of abundance for this stock continue to be very low, a small percentage of peak values. Abundance has declined in all age groups. It is generally believed that fishing mortality alone cannot be responsible for the magnitude of the observed

Recommendation # 10:

The FRCC recommends that:

10.1. there be no directed fishing for 2+3K American plaice during 1997 and that by-catches be limited to 100t.

10.2. cooperative science-industry surveys should be encouraged.



declines in this stock. Generally, the low abundance and lack of recruitment in this stock indicate poor prospects for recovery.

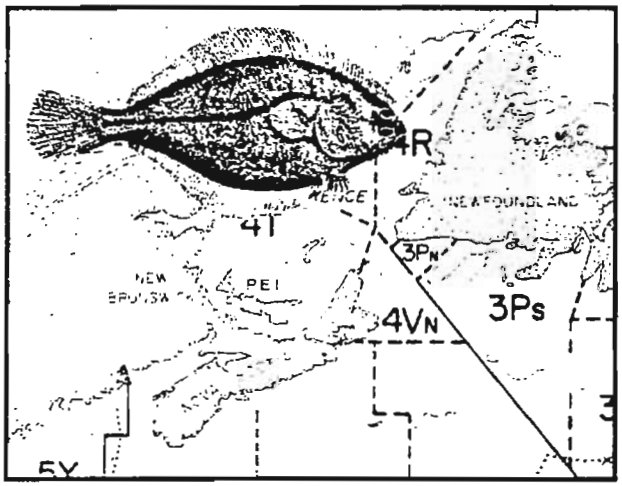
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: poor

	Compared to average
Spawning Biomass:	**very low**
Total Biomass:	**very low**
Recruitment:	**poor**
Growth and Condition:	**not available**
Age Structure:	**not available**
Distribution:	**moved to deeper water**

Recent Exploitation Level: low; by-catch only

4.2.2.11
American Plaice: St. Pierre Bank - 3Ps



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 and that by-catches be limited to 500t during 1994. The recommended by-catch limit was further reduced in 1995. Closure and minimal by-catch were again recommended for 1996.

1996 Consultations:

No comments were received on this stock during 1996 consultations.

Analysis:

The 1996 DFO Stock Status Report indicates that:

- recruitment is very low.
- this stock is currently at a very low level.
- the spawning stock biomass is the lowest since 1975.

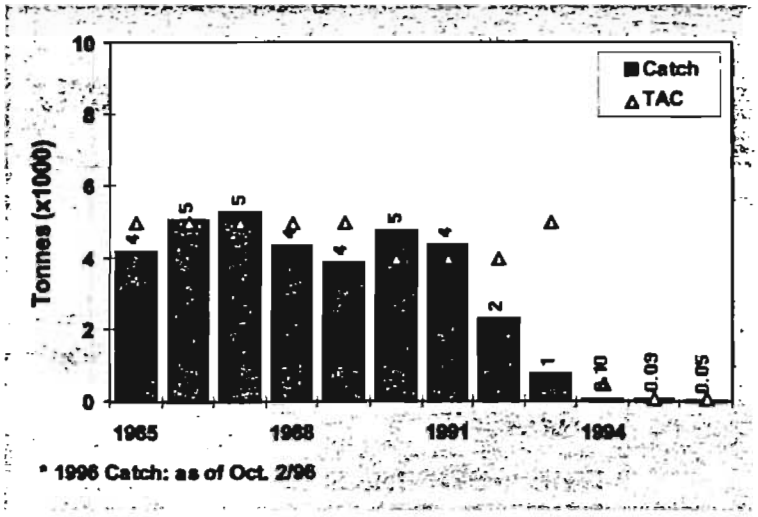
Catches of 3Ps plaice were highest from 1968-1973 and averaged over 10,000 t. Since 1980, catches have exceeded 5,000t only twice and there have been clear indications that the stock has declined dramatically. Research vessel surveys continue to indicate that the stock is at a very low level. All age groups have declined and recruitment in recent years has been very low. The outlook for this stock is very pessimistic. There are plaice found in low numbers inshore, however, and a slight expansion of by-catch limits may be necessary to permit a limited cod fishery.

Recommendation # 11:

The FRCC recommends that:

11.1. there be no directed fishing for 3Ps American plaice in 1997 and that by-catch limits of 100 t be implemented so as not to impede a limited cod fishery.

11.2. cooperative science-industry surveys should be encouraged.



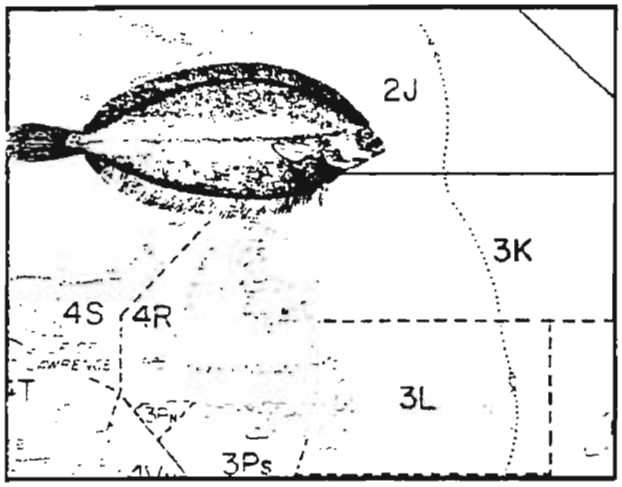
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: poor

	Compared to average
Spawning Biomass:	very low
Total Biomass:	very low
Recruitment:	poor
Growth and Condition:	not available
Age Structure:	all years low recently
Distribution:	in deeper water than usual

Recent Exploitation Level: unknown; by-catch only

4.2.2.12
WITCH FLOUNDER: LABRADOR & NORTHERN GRAND BANKS - 2J3KL



HISTORY OF FRCC RECOMMENDATIONS:

In 1993, the Council noted that the biomass of witch flounder in 2J3KL 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. 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 in 1996. The Council repeated this recommendation for 1997.

1996 CONSULTATIONS:

There were no specific comments received on this particular stock during 1996 consultations.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- this stock remains at a very low level.
- there are some indications of movement to deeper waters of 3L.

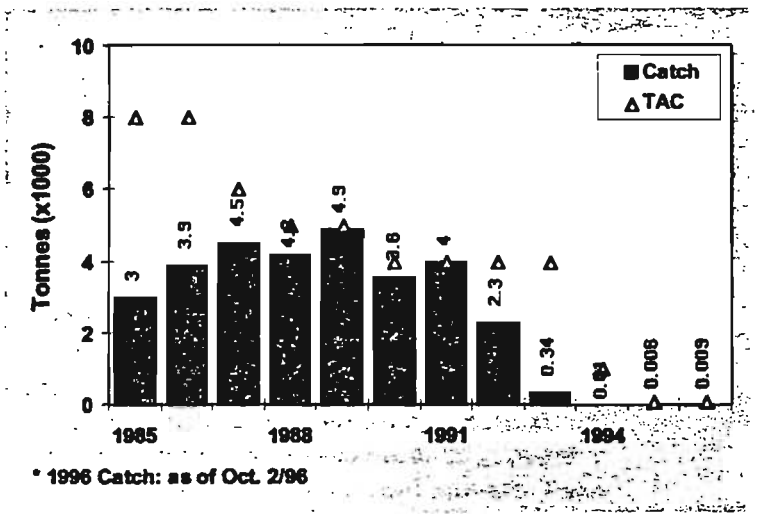
Witch is a slow-growing species that may live to 30 years. Age groups in the 2J3KL stock have been reduced substantially since the 1970s. There are fewer older fish now. Fishing has generally taken fish from pre-spawning and spawning concentrations. Recently, witch appears to have moved to deeper water (in excess of 900 m). Recent data on this stock indicate that it has dramatically declined since the 1980s; relative biomass in 1994 was estimated to be 4% of the 1986 level. Research surveys in 1996 found that witch was somewhat more abundant in the Flemish Pass area and may have migrated from Canadian waters. Generally, the stock is at the lowest level ever observed and there are no signs of improving

RECOMMENDATION # 12:

The FRCC recommends that:

12.1. there be no directed fishing for 2J3KL Witch flounder in 1997 and that by-catches be limited to 100t.

12.2. cooperative science-industry surveys should be encouraged.

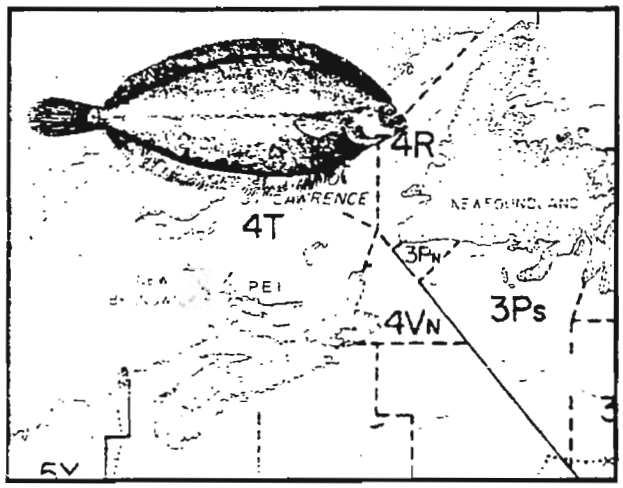


recruitment. The shrinking area of distribution of this stock, despite its low biomass, may increase its vulnerability to fishing.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	very poor
	Compared to average
Spawning Biomass:	very low
Total Biomass:	very low
Recruitment:	poor
Growth and Condition:	not available
Age Structure:	age groups reduced
Distribution:	in deeper water than usual; decrease in area
Recent Exploitation Level:	low; NAFO catches unregulated

4.2.2.13
WITCH FLOUNDER: ST. PIERRE BANK - 3PS



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. Because biomass estimates were historically low the Council recommended that the TAC be reduced to 500 t for 1996.

1996 CONSULTATIONS:

There are a small number of boats dependent on the TAC of 3Ps witch. During the 1995 consultations, concern was expressed that this fishery could not be prosecuted due to high by-catches of cod. During 1996 consultations, one fishermen noted that, although catches are confined to a very small area, the quota is too small as catch rates are good.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

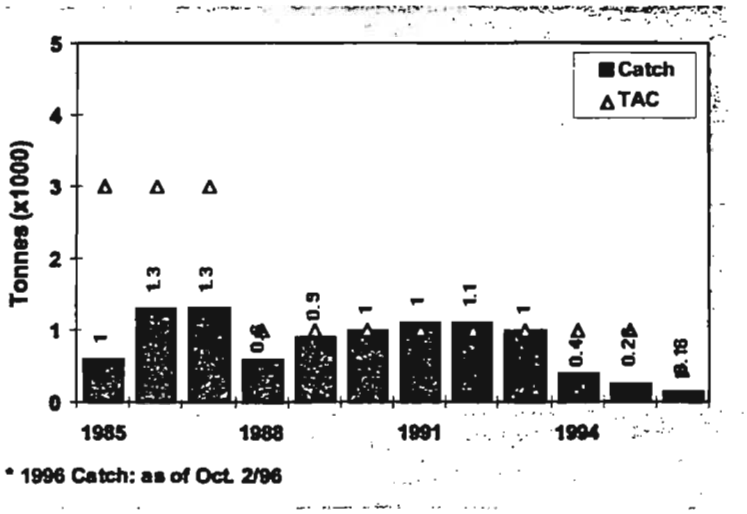
- recent biomass estimates are at the low end of observations.
- the survey does not cover the entire stock range.

Quota for witch were first set in the mid-1970s at 3,000t; these were reduced to 1,000t in the late 1980s. Catches come mainly from St. Pierre Bank in depths of 200-900 m. The research survey relative biomass index has shown substantial variation but no trend between 1976-1994. The research survey does not cover Fortune Bay where 35% of the catch occurs. The survey biomass index was high for 1996 but this may reflect a more efficient survey trawl used for the first time this year. Recruitment levels are at the long-term

RECOMMENDATION # 13:

The FRCC recommends that:

13.1. the 1997 TAC for 3Ps witch flounder be set at 500t.
13.2. cooperative science-industry surveys be encouraged.

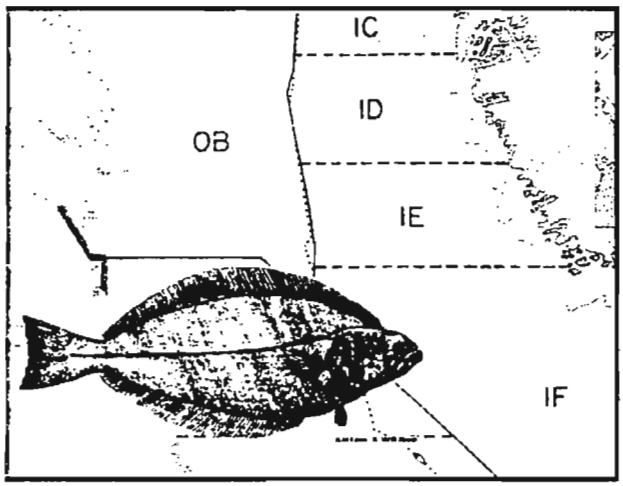


average. Because the fishery is concentrated on a pre-spawning aggregation in a very small area, catch rates may not be an indicator of a high level of biomass.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	about recent average
	Compared to average
Spawning Biomass:	unknown
Total Biomass:	no trend; unknown and variable, low
Recruitment:	about long term average
Growth and Condition:	not available
Age Structure:	not available
Distribution:	in deep water
Recent Exploitation Level:	low

4.2.2.14
GREENLAND HALIBUT: 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.

The Councils' recommendations for 1996 were for a TAC below 11,000t. It was further recommended in view of the international nature of this resource that the feasibility of closing a spawning area in the Davis Strait be given consideration in discussions with Greenland.

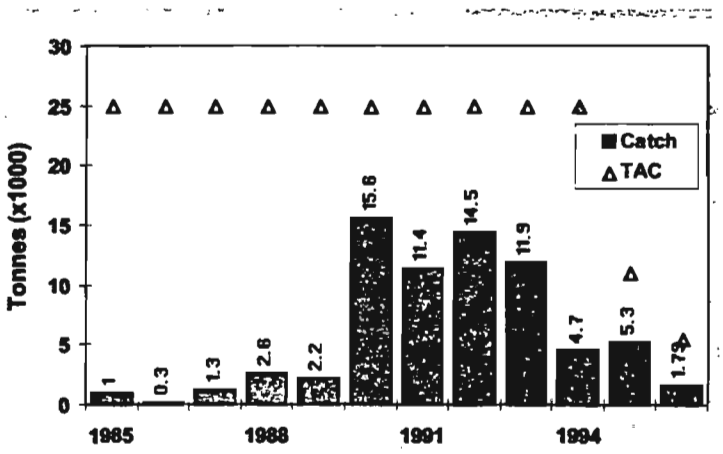
1996 CONSULTATIONS:

No specific comments were received on this stock during the 1996 consultations.

RECOMMENDATION # 14:

The FRCC recommends that:

- **14.1. the 1997 TAC for Greenland halibut in 0B+1B-F be set below 11,000t.**
- **14.2. Canada and Greenland should seek consistency in controls on harvesting Greenland halibut in Area 0B+1B-F.**
- **14.3. the emerging fishery by gillnets in deep water be carefully monitored as it appears to have serious problems. Regulations to address problems should be introduced as necessary.**
- **14.4. the feasibility of closing spawning and nursery areas in the Davis Strait be given consideration in discussions with Greenland.**
- **14.5. if small turbot in the West Greenland nursery area recruit to Canadian fisheries, by-catch in shrimp fishing may become a problem and should be explored with Greenland.**



Changes in the commercial fishery have changed the relative age distributions in catches. Age 7 is still the most dominant year-class in overall catches, but due to increases in longline and gillnet fishing there is a tendency to larger, older fish in the catches compared to previous years. Catch rate series are incomplete and it is difficult to determine overall trends.

During a phone consultation with the Nunavut Wildlife Management Board, concerns were expressed about the emerging fishery on turbot by Newfoundland vessels offshore of Frobisher Bay in Davis Strait. Fishing was on mature spawning fish with gillnets. Gillnet effort per boat was very high, soak durations were long. Concerns were raised about the extent of net loss in this fishery.

ANALYSIS:

Turbot have a relatively low reproductive rate compared to other deep water fish species. Redirection of effort to deepwater fishing of this species make the impact on stocks difficult to assess.

Since 1987 bottom-trawl surveys have been conducted in subarea 1 jointly by Japan and Greenland. In division 1A, trawlable biomass was slightly higher than that estimated in 1994; other areas were also slightly higher in depths between 400-1,500m. The increase was most pronounced in age group 4, the 1991 year-class. Shrimp trawl surveys off West Greenland in waters from the 3 mile limit to 600m depths increased from 1991-1994, but dropped in 1995. These catches were 1-2 year old fish. Biomass in the nursery area (1AS and 1B) at below the level found in 1992-1994 but above the 1990-1991 level. Recruitment has been declining since the large 1991 year-class. The 1994 year-class is at an average level.

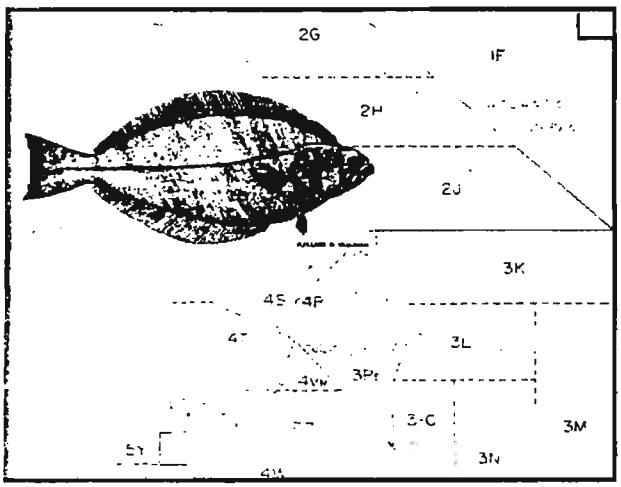
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: average

	Compared to average
Spawning Biomass:	**unknown**
Total Biomass:	**unknown; deep water abundance difficult to assess**
Recruitment:	**strong 1991 year-class; other year-classes average**
Growth and Condition:	**unknown**
Age Structure:	**age 7 dominant in catches; increases of older fish in recent catches**
Distribution:	**normal**

Recent Exploitation Level: unknown

4.2.2.15 GREENLAND HALIBUT: 2+3



HISTORY OF FRCC RECOMMENDATIONS:

In August 1993, the Council called for significant reductions in catches in the Regulatory Area and for a joint commitment to 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. In June 1994, the Council noted 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, 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 Council 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

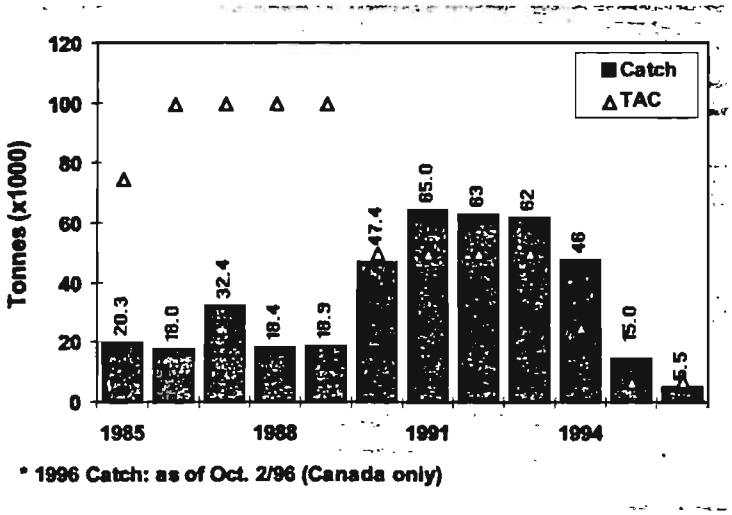
RECOMMENDATION # 15:

The FRCC recommends that:

15.1. the current Canadian quota of 7,000t in area 2+3K be considered as the upper limits of what this stock can sustain in that area.

15.2. conservation measures outside Canada's zone be consistent with those employed inside Canadian waters.

15.3. measures to protect juveniles be implemented, as it is important that recent year-classes be given a chance to grow and to rebuild the stock.



* 1996 Catch: as of Oct. 2/96 (Canada only)

highest catches on record, largely because of catches of young fish. There has been good recruitment in turbot in this area.

Catch rates were somewhat lower in gillnet and will not improve substantially until the strong recent year-classes recruit to the fishery. Long soak times reported in the gillnet fishery may have serious conservation impact. There appears to be recruitment in 2 + 3 turbot and measures are necessary to protect juveniles.

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).

In August 1996, the FRCC was encouraged by the new evidence of good recruitment for Greenland halibut. The Council indicated that the above-average year-classes from the 1990's must be protected to allow the stock to rebuild and that catching large numbers of these fish as juveniles will waste the potential for rebuilding the stock.

In September 1996, the NAFO Fisheries Commission concluded that the 1997 TAC would continue to be set at 20,000t for Greenland halibut in 3LMNO.

1996 Consultations:

No comments were received on this stock during the 1996 groundfish consultations.

Analysis:

This stock has been at a low level in the RV survey estimates. However, fall RV surveys beyond 1,000m were generally not satisfactory and deep water impressions are from the gillnet fishery. In 1995, data from Spain was not available. Although there are no adequate estimates of biomass, recruitment has been good recently. The Campellen trawl survey in 1995 produced the

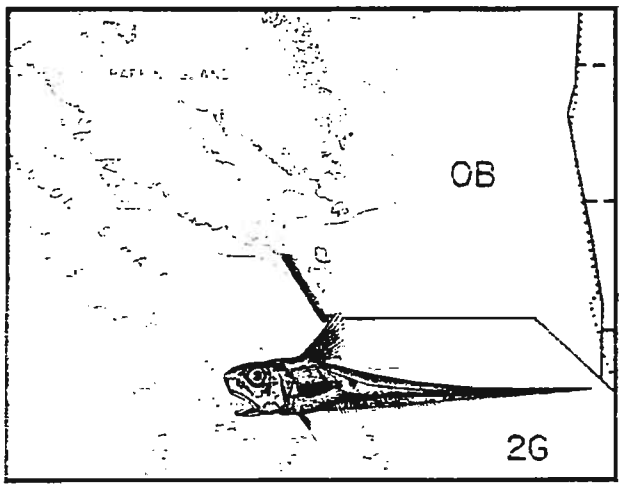
Council's views on Stock Status:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	low; unknown
Total Biomass:	low; unknown
Recruitment:	good
Growth and Condition:	unknown
Age Structure:	unknown
Distribution:	

Recent Exploitation Level: maximum that stock can sustain

4.2.2.16
ROUNDNOSE GRENADIER: SUBAREA 0



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

1996 CONSULTATIONS:

There were no specific comments received on this stock during the 1996 consultations.

ANALYSIS:

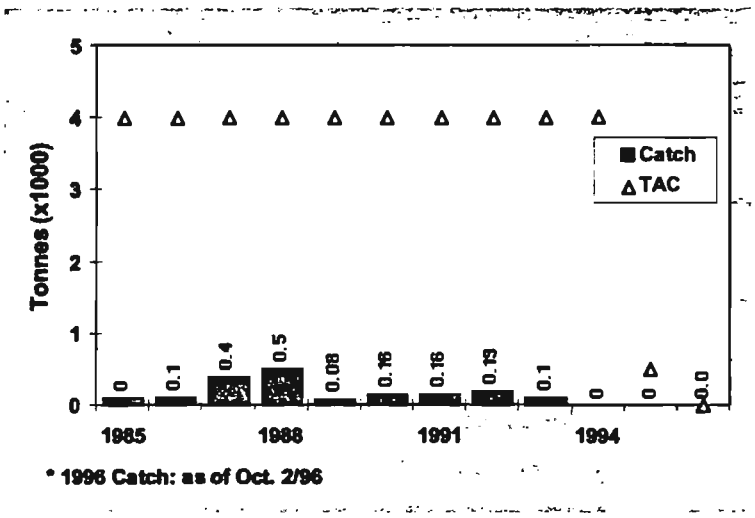
The 1996 Report of the NAFO Scientific Council indicates that this stock seems to be at a very low level. The NAFO Scientific Council recommended that there be no directed fishing for roundnose grenadier in 1997 and that catches be restricted to by-catches in fisheries targeting other species.

The only information available for grenadier comes from research surveys. The status is difficult to evaluate and there is no information available from fishermen. Survey research indicates declines in size of fish and in biomass.

RECOMMENDATION # 16:

The FRCC recommends that:

16.1. there be no directed fishing for roundnose grenadier in Subarea 0 in 1997.
16..2. cooperative science-industry surveys should be encouraged.



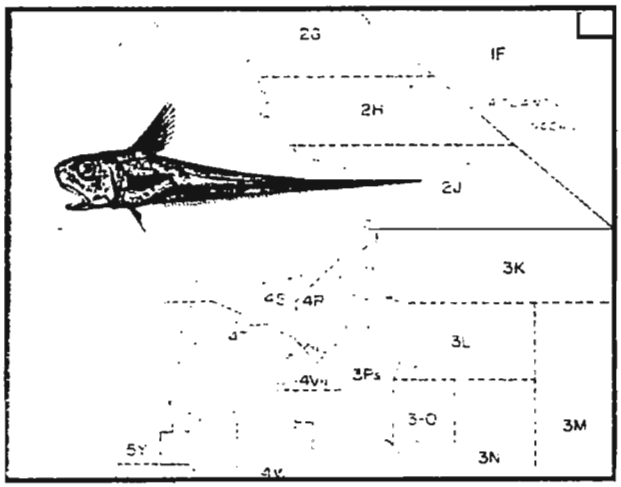
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: likely low

	Compared to average
Spawning Biomass:	likely low; unknown
Total Biomass:	likely low; unknown
Recruitment:	not available
Growth and Condition:	not available
Age Structure:	not available
Distribution:	unknown

Recent Exploitation Level: unknown, low

4.2.2.17
ROUNDNOSE GRENADIER: 2+3



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. Very few fish were caught in 1994-1995. The Council's recommendation for 1996 was that, should there be directed fishing on this stock, it should be conducted within the framework of a scientifically conducted test fishery and that a TAC of 1,000t be set for this purpose. This recommendation was repeated for 1996.

1996 CONSULTATIONS:

One fishermen noted that he found grenadier to be abundant and recommended a high TAC in the order of 10-15,000t.

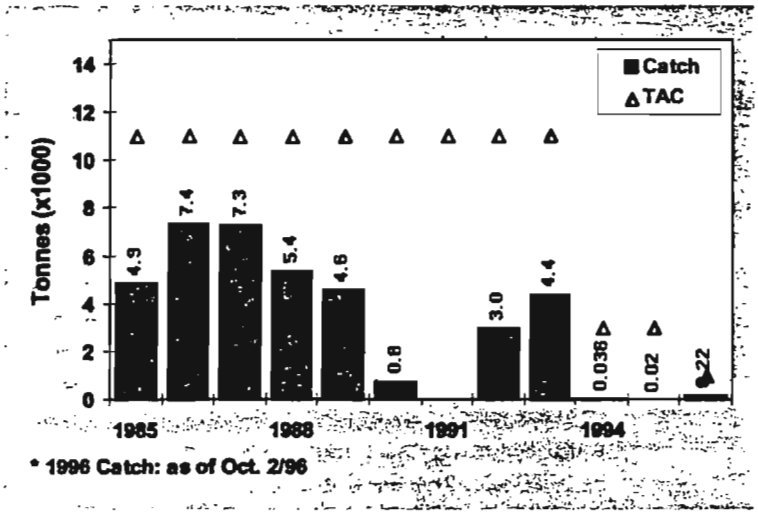
ANALYSIS:

The 1996 NAFO Report indicates that catches in recent years have primarily been from the NAFO Regulatory Area, as by-catch in the Greenland halibut fishery. There were no new data presented at the June 1996 meeting of the NAFO Scientific Council and, thus, scientists were unable to provide any advice for this stock.

RECOMMENDATION # 17:

The FRCC recommends that:

17.1. there be no directed fishery on this stock.
17.2. cooperative science-industry surveys should be encouraged.



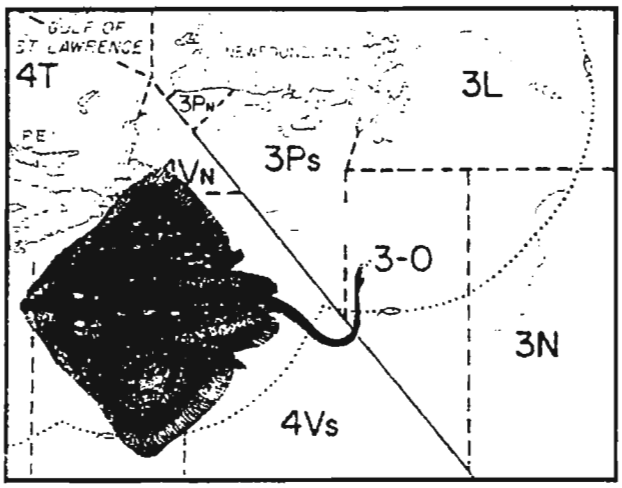
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: unknown

	Compared to average
Spawning Biomass:	unknown
Total Biomass:	unknown
Recruitment:	unknown
Growth and Condition:	unknown
Age Structure:	unknown
Distribution:	unknown

Recent Exploitation Level: unknown

4.2.2.18
SKATES: GRAND BANKS - 3LNOPS



HISTORY OF FRCC RECOMMENDATIONS:

The first year that the Council reported on this species was 1995. The Council recommended a precautionary TAC of 2,000t for 1996 and that steps be taken to spread effort amongst different stock concentrations to ensure that fishing effort is not concentrated in one area.

1996 CONSULTATIONS:

In 1995, the skate fishery was criticized because a new directed fishery had been initiated with a serious lack of assessment information. During 1996, there was criticism that effort remained concentrated during 1996 and that the TAC was too low. One fisher recommended quotas as high as 10,000-15,000t for this stock.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- there is a growing interest in skates with the decline in traditional species.
- biomass estimates have been declining since 1986.
- the average size has declined quite dramatically.
- managing 3LN, 3O and 3Ps separately should be considered.

There are 8-10 different species of skate in waters around Newfoundland. Thorny skate and smooth skate are the most abundant and most common in research and commercial catches. Skate exhibit limited movements and are regarded as sedentary. They have limited reproduction potential; females lay only 6-40 eggs per year in contrast to ground-

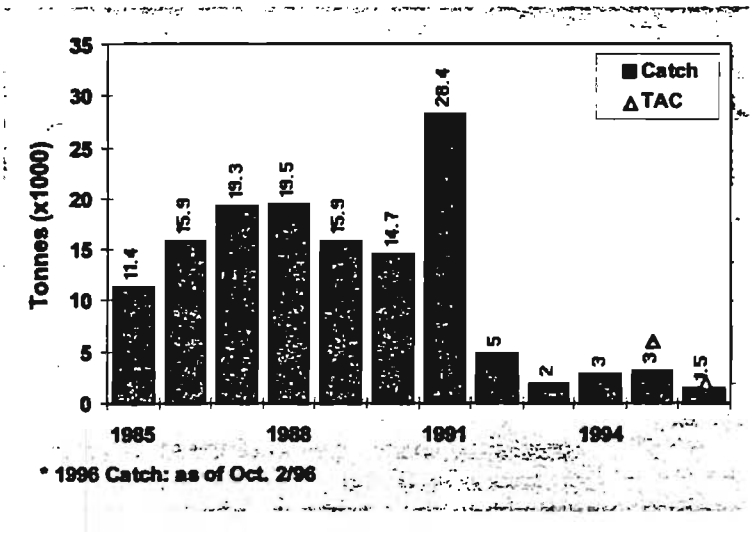
RECOMMENDATION # 18:

The FRCC recommends that:

18.1. 3LN, 3O and 3Ps be treated as separate management areas.

18.2. the overall TAC be set at 3,000t for 1997; this should be distributed between management areas, as recommended in the Stock Status Reports.

18.3. cooperative science industry initiatives be encouraged, especially in areas outside of the areas where fishing is presently concentrated.



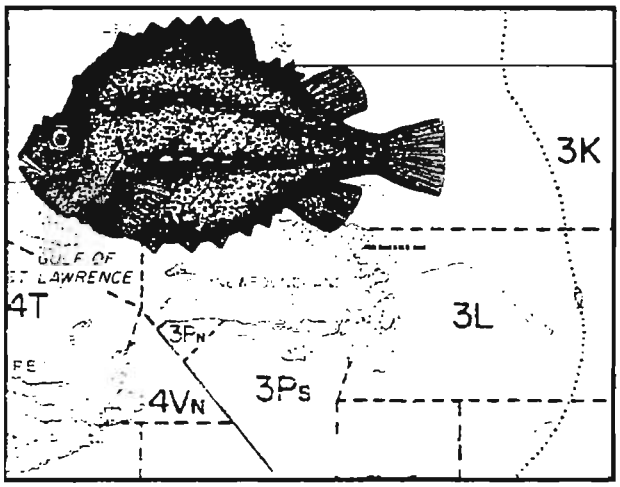
fish species, such as cod, that may lay millions of eggs per year. Estimates of the relative biomass of skate indicate a stable stock in 3O and 3Ps until the early 1990s and then a decline since. Declines are also evident in 3L and 3N and may be due to catches outside 200 miles. The average size of skate has been declining dramatically. Generally, there are serious deficits in information about skate species, including knowledge of growth rates, age at maturity, age and size structure of the population(s). The present TAC of 2,000t is estimated to represent about 10% of the 1994 survey biomass. High catches outside 200 miles continues to be a problem in divisions 3LN; skate in 3O and 3Ps have not been effected to the same extent. Skate catches are not regulated outside 200 miles. Fishing has been extremely concentrated in small areas and commercial catch rates may not reflect stock abundance overall.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**unknown, declining**
	Compared to average
Spawning Biomass:	**unknown**
Total Biomass:	**declining recently**
Recruitment:	**unknown**
Growth and Condition:	**size declining in RV survey**
Age Structure:	**not available**
Distribution:	**local concentrations**

Recent Exploitation Level: unknown

4.2.2.19
LUMPFISH: NEWFOUNDLAND



HISTORY OF FRCC RECOMMENDATIONS:

The FRCC first reported on this particular stock in 1995. The Council recommended that management measures, such as shortened season, be used to reduce the effort on this stock. It further recommended that roe content monitoring programs, similar to those employed in the capelin fishery, be established to ensure that fishing takes place at an appropriate time and that closed and protected areas be established for this stock.

1996 CONSULTATIONS:

Generally, fishermen have indicated that catch rates have been declining since the late 80's and that landings have declined with an increase in effort. While most areas of the province have seen landings decline significantly, including a further decline in 1996, the southwest coast, including parts of 3Ps and southern 4R, have experienced improved landings in 1996. While there is no readily available explanation for this, some fishermen suggest that these lumpfish are different from those normally seen in the catch and believe they are fish that were, in the past, caught as by-catch by otter trawlers in the winter fishery off southwestern Newfoundland. While there have been some measures implemented in recent years to reduce the effort on this resource, many feel that in some areas the measures have been too

RECOMMENDATION # 19:

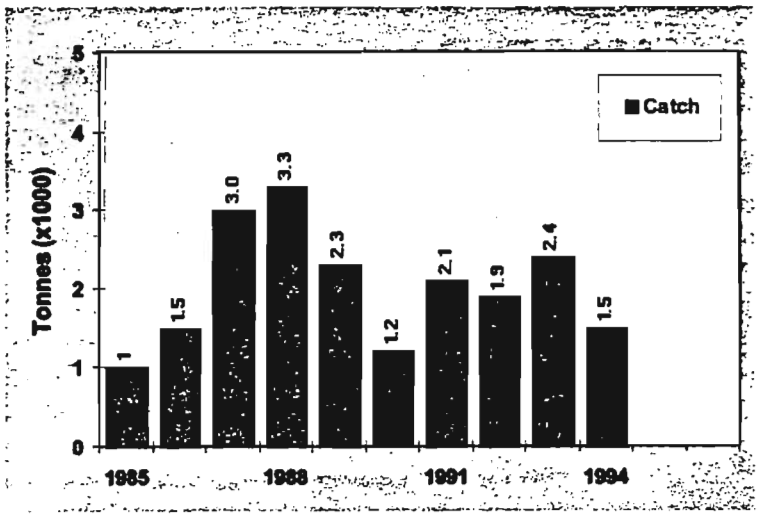
The FRCC recommends that:

19.1. dramatic new management measures be taken to insure conservation of lumpfish in 1997.

19.2. these measures include a combination of the following:

- **roe content monitoring programs should be established to determine timing of the fishery to maximize yield/fish;**
- **closed and protected spawning areas must be established throughout the range of the stock;**
- **more localized management must be established**
- **effort must be further reduced;**
- **gear limits must be decreased and the season shortened.**

Unless these measures are effectively implemented, the closure of this fishery is imminent.



little, too late. Many indicated that the fishery should be closed. Some made the suggestion that protecting areas for spawning and further limiting of capacity is required.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- there is little scientific information and inadequate biological sampling.
- there has been a 40% decline in roe landings from the recent average.
- inshore fishermen are nearly unanimous in view that this stock is declining, especially in northern areas.

Lumpfish males establish breeding territories inshore; these may be used year after year. Data from studies which have monitored these territories indicate exceptional impact from the fishery. Landings of roe averaged 2,000t from 1988-1995. In 1996 they declined to 1,200t. There is nothing known about stock structure and no research planned to study this. Biomass indices have declined by an order of magnitude from 1985 to 1995. The biomass estimate for 1996 is the lowest since the 1980s. Fishermen have expressed concern over effort in the fishery. Catch rates by monitors in 3Ps were the lowest reported since the fishery began in the 1970s.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**declining**
	Compared to average
Spawning Biomass:	**declining**
Total Biomass:	**declining**
Recruitment:	**unknown**
Growth and Condition:	**not available**
Age Structure:	**unknown**
Distribution:	**inshore**

Recent Exploitation Level: effort down; catch/effort declining

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 Subarea 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 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.

In its letter of August 16, 1996, to the Minister of Fisheries and Oceans, the FRCC stated that the current status of groundfish stocks on the once-prolific Grand Banks is a sad reflection of the failure of past management: maximizing exploitation was clearly more important than sustaining and conserving fish stocks. The Council fully supports the NAFO Scientific Council recommendations for moratoria on the following stocks: 2J,3KL Cod, 3NO Cod, 3M Cod, 3LNO American Plaice, 3M American Plaice, 3NO Witch Flounder, 3LNO Yellowtail Flounder and 3NO Capelin.

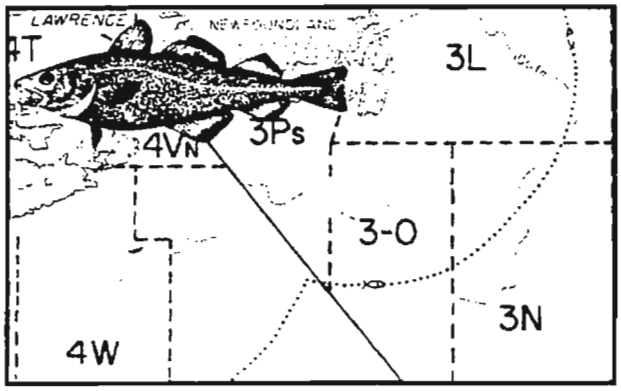
The Council also expressed strong concern about the state of Greenland Halibut stocks and Redfish in divisions 3LN and 3M and the increased effort in the 3M shrimp fishery, which is contrary to NAFO Council advice in 1995.

The FRCC concluded its letter by looking to the future and noting that we look forward to the day when straddling stocks recover since they are critically important for the Canadian fishing industry. The Council believes that for this to happen, *it is essential that the conservation*

measures adopted as a pilot project by NAFO in 1995 continue and that the excessive harvest of juveniles which occurred in past fisheries not be repeated. These are crucial prerequisites to long-term rebuilding and recovery.

The NAFO Fisheries Commission met in September 1996 and management decisions have been taken for 1997. For completeness, information on the stocks of particular interest to Canadian fishermen follows.

4.2.3.1 NAFO Regulatory Area
COD 3NO



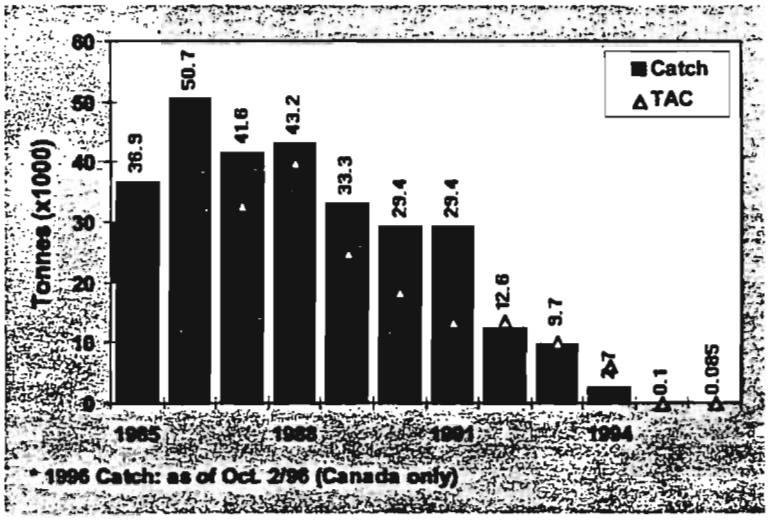
In the June 1995 report of the NAFO Scientific Council, scientists indicated that this stock was at an all time low in 1994 and was represented mainly by 2 year-classes (those of 1989 and 1990). In particular, the year-classes since 1990 appeared to be weak and the estimates of the 1989 and 1990 year-classes, which were believed to be average, were much lower than previously estimated. Sampling information indicated that commercial fisheries had 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 its August 1994 and 1995 letters to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium for cod in division 3NO. The Council is particularly concerned with the low levels of biomass and the lack of recruitment for this stock. The NAFO Commission has continued the moratorium on 3NO cod.

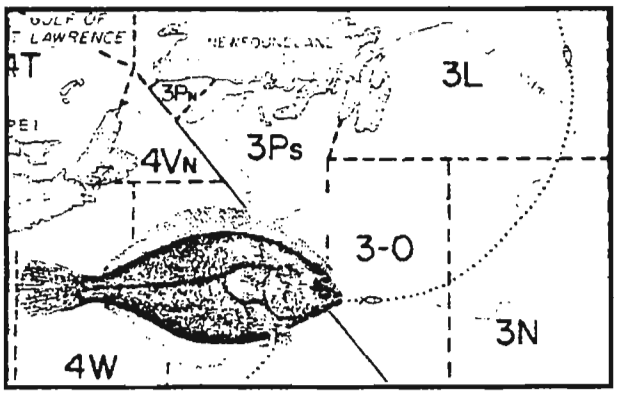
The 1996 report of the NAFO Scientific Council indicates that:

- 1989+1990 year-classes are not as strong as expected; year-classes since 1990 appear to be weak.
- the stock is at all time low.
- the total and spawning biomass are the lowest observed in data series.
- The 1989+1990 year-classes no longer offer much rebuilding opportunities.

In August 1996, in a letter to the Minister of Fisheries and Oceans, the FRCC again recommended to continue the moratorium on directed fishing for 3NO cod. In September 1996, the NAFO Fisheries Commission agreed to continue the moratorium on fishing 3NO cod in 1997.



4.2.3.2 NAFO Regulatory Area
AMERICAN PLAICE - 3LNO



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 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 .

In its letters of August 1994 and 1995 to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium 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. The Council was particularly concerned with the low levels of biomass and the apparent lack of recruitment for this stock.

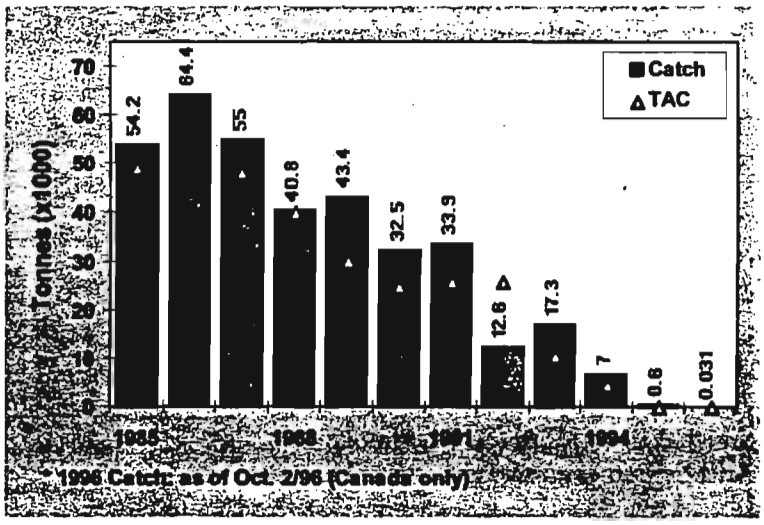
At the September 1995 meeting of the NAFO Fisheries Commission, it was agreed to continue the moratorium for fishing on 3LNO American plaice in 1996.

The 1996 DFO Stock Status Report indicates that:

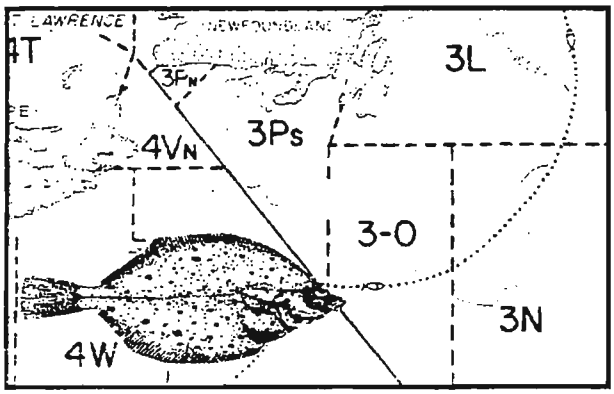
- this stock is at a low level.
- the 1988+1989 year-classes show some promise but there has been no evidence of large year-class since.

The Council believes that a recovery in the short term is unlikely. In the past, high abundance of juveniles has not translated into a stronger fishable stock.

In August 1996, in a letter to the Minister of Fisheries and Oceans, the FRCC again recommended to continue the moratorium on fishing for 3LNO American plaice. In September 1996, the NAFO Fisheries Commission agreed to continue the moratorium on fishing 3LNO American plaice in 1997.



4.2.3.3 NAFO Regulatory Area
YELLOWTAIL FLOUNDER 3LNO



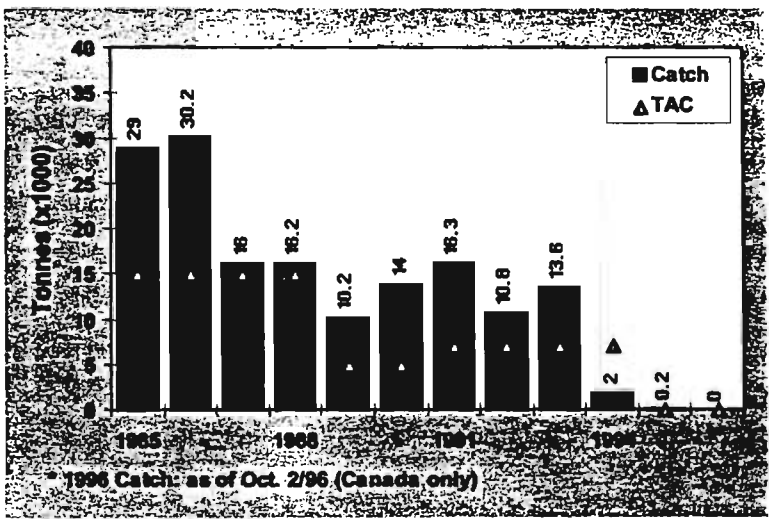
In the June 1995 Report of the NAFO Scientific Council, scientists indicated that the potential growth on the stock from the relatively large 1984-86 year-classes has not occurred, likely because of large catches of these cohorts as juveniles by fisheries in the Regulatory Area, and because the TAC has 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 letters of August 1994 and 1995 to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium 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. The Council is particularly concerned with the low levels of biomass and the lack of recruitment for this stock. The NAFO Commission has continued the moratorium on 3LNO yellowtail flounder.

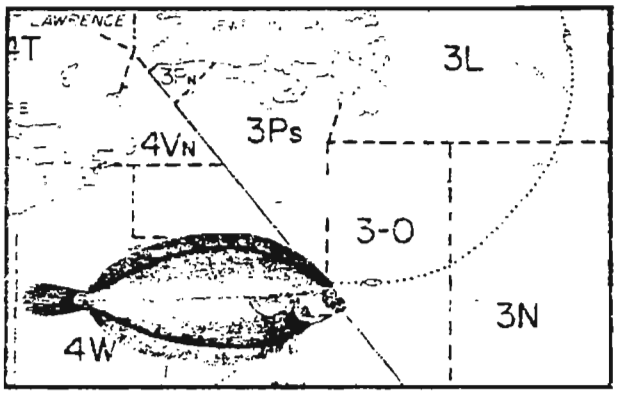
The 1996 report of the NAFO Scientific Council indicates that:

- this stock remains stable at a low level.
- annual catches exceeded TACs from 1984 to 1993.
- there has been a contraction of geographic distribution.

In its August 1996 letter to the Minister of Fisheries and Oceans, the Council reiterated its recommendation for the continuation of the moratorium on 3LNO yellowtail flounder. The FRCC notes that the potential growth from the 1984-86 year-classes has not occurred, probably because of large catches of juveniles in the NAFO Regulatory Area. In September 1996, the NAFO Fisheries Commission agreed to continue the moratorium on fishing 3LNO yellowtail flounder in 1997.



4.2.3.4 NAFO Regulatory Area
WITCH FLOUNDER - 3NO



In the June 1995 Report of the NAFO Scientific Council, scientists indicated that this stock appears to be at a very low level. 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.

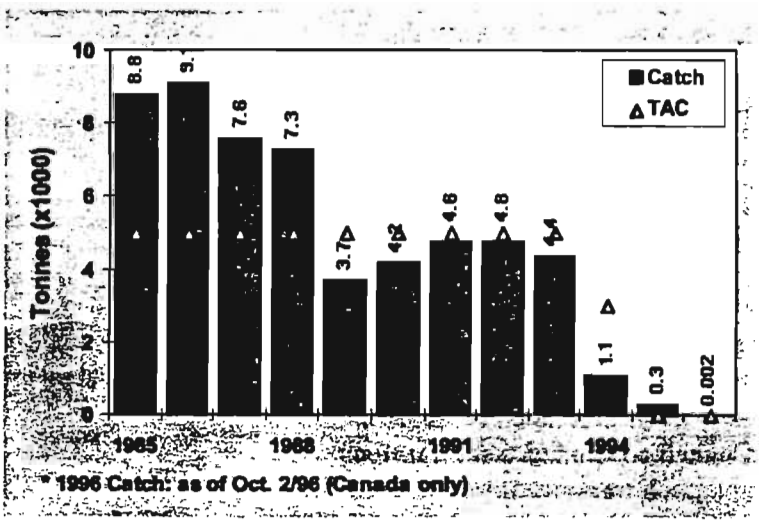
In its letters of August 1994 and 1995 to the Minister of Fisheries and Oceans, the Fisheries Resource Conservation Council recommended to continue the moratorium for witch flounder in Division 3NO. At the September 1995 meeting of the Fisheries Commission, it was agreed to continue the moratorium for fishing on 3NO witch flounder in 1996.

The 1996 report of the NAFO Scientific Council indicates that:

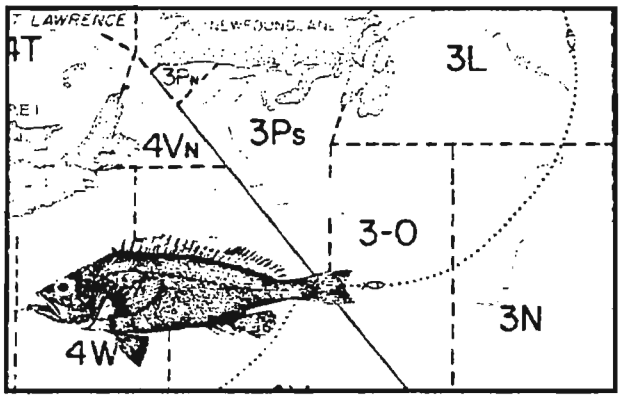
- this stock appears to be at very low level.

The NAFO Scientific Council recommended that no fishing be allowed on this stock in 1997 to allow for stock rebuilding. It also recommended that by-catches be kept at the lowest possible level.

In August 1996, in a letter to the Minister of Fisheries and Oceans, the FRCC again recommended to continue the moratorium on fishing for 3NO witch flounder. In September 1996, the NAFO Fisheries Commission agreed to continue the moratorium on fishing 3NO witch flounder in 1997.



4.2.3.5 NAFO Regulatory Area
REDFISH 3LN



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".

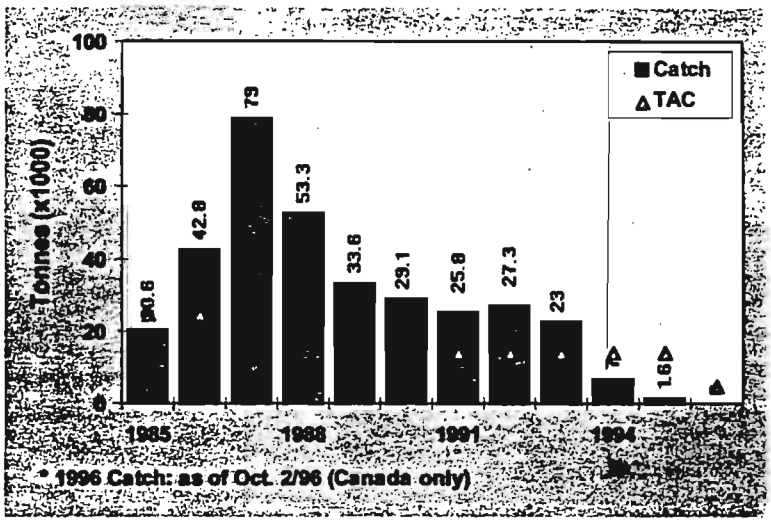
The Fisheries Resource Conservation Council made no specific recommendation on this stock for 1995. At the September meeting of the NAFO Commission, it was agreed to set the 1995 TAC for 3LN redfish at 14,000t.

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.

The 1996 report of the NAFO Scientific Council indicates that:

- this stock is very low in 3L; the status of this stock is uncertain in 3N.
- there is concern for the future of this stock in view of the general lack of good recruitment.

In its August 1996 letter to the to the Minister of Fisheries and Oceans, the FRCC noted that they can see little evidence to support a 14,000 t Total Allowable Catch (TAC) for 3LN Redfish. The Council noted that the Fisheries Commission set the quota at 11,000 t for 1995. Despite this, the NAFO Scientific Council considers that this stock has declined since the mid 1980's and continues to be at a low level, particularly in Division 3L. There is some indication of recruitment in 3N but



no sign of any good year-classes to follow. For these reasons, the FRCC recommended that Canada should propose a substantial reduction in this TAC. In September 1996, the NAFO Fisheries Commission agreed to the TAC for 1997 be set at 11,000t for 3LN redfish.

The FRCC also cautioned that any further expansion of the shrimp trawl fishery into 3LN should be discouraged. The FRCC has noted with concern the high discard rate of small flatfish and redfish in other shrimp fisheries and the effect this could have on recruitment and loss of yield for these stocks, which are on the Grand Banks at critically low levels. Given these reasons, the approach taken by Canada at NAFO in the previous year with respect to an expanded 3LN Shrimp trawl fishery should be continued.

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 heating and freshwater discharge; an intermediate cold layer 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

In 1995, the mean temperature in the surface layer (0-30 m) was near 11 °C, slightly above the 10.4 °C average. In the 30-100 m layer, the mean temperature was 0.6 °C, nearly a full degree below the average of 1.5 °C. This was the tenth consecutive year in a row that the temperature in the core of the CIL was below the long-term average. The average temperature in the 100-200 m layer was 1.7 °C, 0.8 °C below the average. The mean temperature in the 200-300 m layer was 4.9 °C, very near the normal of 4.8°C. In deeper layers, the temperature decreased slightly compared to 1994: the temperature decreased by 1 °C in the 100-200 m layer, and by 0.4 °C in the 200-300 m. In the southern Gulf, a record 25,000 km2 of bottom area was covered with water colder than 0°C.

HYDROGRAPHIC CONDITIONS IN THE GULF OF ST. LAWRENCE IN 1995

- **surface (0-30 m) temperature slightly above normal**
- **colder-than-normal temperature observed for the 10 th consecutive year in the cold intermediate layer**
- **water colder than 0°C covering record bottom area in the southern Gulf**
- **deep water (200-300 m) temperature near normal, but colder than in 1994.**

Source: DFO Fisheries Oceanography Committee Annual Report

4.3.1.3 General Trends in Ecosystem

Groundfish fisheries in the Gulf have traditionally been dominated by three groups of fish: gadoids (cod and hake), redfish, and flatfish. After a period of high abundance in the mid-60's, cod stocks in the northern and southern Gulf declined in the 70's and raised again in the 80's after several years of good recruitment. Since then, due to heavy fishing and poor growth and recruitment, the cod stocks have collapsed. Recent information does not indicate any substantial recruitment. The persistent lack of good recruitment is impeding the recovery of the stocks. In 1995, the condition ("fatness") of the fish has improved, indicating an improve-

ment in growth conditions. This is marked improvement over 1994, when fish were suspected to be near death because of excessive thinness. The last good year of recruitment for redfish was 1980. Redfish born in 1988 appeared to be abundant, but either have died in the Gulf or migrated out. With such lack in recruitment and an intense fishing mortality, redfish stocks have declined dramatically and their commercial fishery is now stopped in the Gulf. Generally, the flatfish (American plaice, turbot, witch flounder) have also declined to low levels in recent years and good recruitment are awaited.

GENERAL TRENDS IN ECOSYSTEM IN THE GULF OF ST. LAWRENCE IN 1995

- **stocks of groundfish at very low levels with no evidence of good recruitment**
- **marked improvement in the condition (fatness) of cod**
- **invertebrate stocks in good shape and supporting an intense fishing effort**
- **strong fishing pressure on declining flatfish stocks**
- **pelagic stocks in good condition, with appearance of strong recruitment of mackerel in recent years**
- **seal populations high and growing.**

Source: DFO Atlantic Fisheries Stock Status Report 1996

Pelagic stocks are generally near or above average levels of abundance. The biomass of herring in the Northern Gulf increased until 89-90, but has decreased since, particularly for the stock in St. Georges Bay. In the Southern Gulf, low populations of the early 80's increased dramatically in the late 80's until early 90's; recent recruitment has decreased and a drop in biomass is to be expected. The abundance of mackerel is high, with the stock supporting a modest fishing mortality. Recent years (93 and 94) appear to have produced strong year-classes. Capelin is an important species in the north of the Gulf; little is known of its biomass, which is suspected to be important, yet lightly exploited.

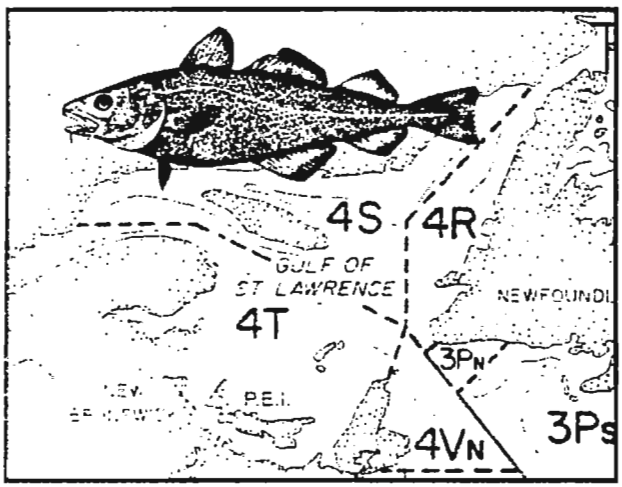
Stocks of invertebrates are generally in good shape, despite intense exploitation. Shrimp stocks have increased in the late 80's and declined slightly in the early 90's, but now appear to be raising again as a result of strong recent recruitment. Shrimp is an important food item for cod and redfish - the collapse of those fish stocks may have favoured the observed extension of shrimp stocks. Landings of snow crab peaked in early 90's, but poor recruitment in 85 and 87 is now causing a decline in biomass. Recent good recruitment indicate that biomass should rebound in late 90's. Lobster landings peaked in 1990. The lobster fishery is based on yearly recruitment, and recent high landings may have been caused by environmental conditions favouring good recruitment. Molluscs beds are exploited in the Gulf of St. Lawrence. Little information is available on the size of the stocks and the growth rates, but high fishing pressure is suspected. Scallops around Magdalen Islands are known to be heavily exploited and their fishery relies on yearly recruitment.

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 abundant in the Gulf, and part of the most abundant pinniped in the Northwest Atlantic. Harp seals pup production in the Gulf was estimated at 580,000 (±78,000) in 1990 and 703,000 (±127,000) in 1994. The population was estimated at between 4.1 and

5.5 million individuals, which would have consumed an estimated 54,000 t (13 500 t - 150,000 t) of cod in the Gulf. No information is available on the size of the hooded seal population or on its diet in the Gulf of St. Lawrence. The pup production has been estimated at 3000 in 1993.

4.3.2 Stock-By-Stock Recommendations

4.3.2.1
Cod - 3Pn4RS



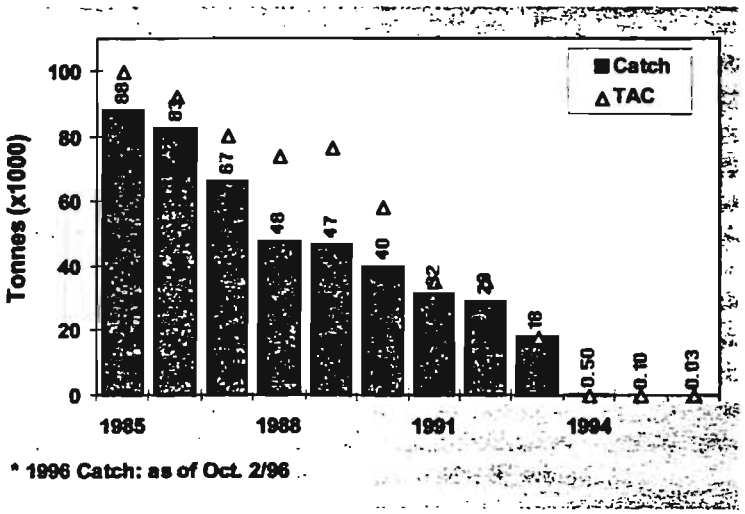
History of FRCC Recommendations:

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. In the fall of 1993 and 1994, 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. In addition, the Council recommended for 1995 that there be no recreational/food fishery on this cod stock and that a broad based Sentinel Fisheries program be implemented. In November 1995, the Council re-iterated that there was a need to continue the moratorium on commercial fishing, as well as a need to expand the Sentinel Fishery program for this stock.

Recommendation # 20:

The FRCC recommends that:

- **20.1.** **the fishery be reopened for a commercial fishery in 1997 with a TAC set at 6,000 tonnes.**
- **20.2.** **fishing effort of each gear sector be controlled to match the quota available.**
- **20.3.** **the fishery be closely controlled and monitored, in order to obtain reliable data for future decisions (such as: log-books, observers at sea, dock-side monitoring).**
- **20.4.** **measures be taken and enforced to protect young fish, and especially the 1993 year-class, including a small fish protocol and suitable gear restrictions, and to ensure that the catch is comprised of a suitable range of year-classes in the adult stock.**
- **20.5.** **measures be considered to avoid targeting strong pre-spawning and spawning aggregations, including possible time/area closures.**
- **20.6.** **the gathering of scientific data on the basis of the Sentinel Fishery be pursued.**



1996 Consultations:

During the 1996 consultations, in Matane (Québec), fishermen reported that it was impossible to find cod north of Anticosti Island, a traditional fishing ground, and where by-catches in the shrimp fishery were usually high, on the northwest side of that island, is now empty of cod.

Fishermen urged a limited commercial fishery in 4RS because there are good signs of abundance, especially in the southern portion of 4RS. They indicated that there were signs of good recovery in the Sentinel Fisheries throughout the stock area, except in the Strait of Belle Isle. Caution was urged in opening, and managing this fishery. High by-catches of cod in halibut, flounder and hake fisheries are a problem and a limited fishery would give flexibility to manoeuvre. The present closure for cod is placing a great deal of pressure on other species; a limited opening for cod would ease this. A TAC of 6,000t was suggested. Fishermen felt it was critical to systematically gather their information and if the fishery was opened the Sentinel Programs should continue.

Analysis:

The 1996 DFO Stock Status Report indicates that:

- this stock remains very low but has been relatively stable over the past 4 years.
- recent year-classes (1991 and 1992) are poor; however, there are some signs that the 1993 year-class may be better.
- there was some improvement in the condition of fish in the fall of 1994, with even better improvement in fish condition during 1995.
- Sentinel fisheries indicate differences in condition of fish between the cod caught in the inshore sector and the offshore ones, fished with mobile gears.

Sentinel Fisheries Overview

The Sentinel Fishery Program has had two components since 1994: the fixed gear component (longlines and gillnets), sampled as regular dockside monitoring as fishermen work according to their traditional habits; the mobile gear component, designed as a scientific survey (random stratified trawls, with liner in codend to assess the prerecruited ages, 100% observer coverage). The mobile gear surveys covered the entire area 3 times during 1995. April, August and October; the area is covered almost simultaneously by all vessels, which is different, and may be preferable, from the "classical" scientific cruise (i.e. one month to do the same thing once). The same protocol was used in 1996, with the addition of four new sites for fixed gear in 3Pn and 4R and with only two mobile gear prospections.

The minimum trawlable biomass, estimated from the mobile gear sector, is increasing (around 41,000 tonnes) but is still at a low level. Catch rates from fixed gears have gone up significantly in all areas, compared to 1995. Good catch rates were reported by gillnets in 4S (Lower North Shore), where very few fish were found in previous

years. A fair abundance of small fish (around 33cm, age 3) were found in 1996, in accordance with the observations made in 1995. Capelin fishermen have found an unusual quantity of small cod in their traps. Scientists consider, however, that it is too early to conclude if there is good recruitment coming into the stock. Sentinel Fishermen also conclude that, even if the catch rates are improving, they remain below historical levels. The data from the Sentinel Survey indicate that the condition of fish is better than in the previous years, especially in the mobile gear catches, where condition remained low in 1995.

The 1996 summer scientific survey indicates that the overall biomass remains low. It has increased by a factor of around 8% since 1995. The mobile gear Sentinel survey seems to indicate a larger increase of the minimum trawlable biomass from 32,000 tonnes in August 1995 to 41,000 tonnes in July 1996 (preliminary estimate). The geographical distribution is improving since 1993, as significant catches have been reported in the 4S area, both by the summer survey and by the fixed gear Sentinel program. Along with the moratorium, the age structure is improving with the persistence of the 1987 and 1988 year-classes, which are now mature. After the poor recruitment observed for the 1991 and 1992 year-classes, the 1993 year-class appears to be strong, even if it is too early to compare with the average. The condition of fish is improving; if this situation continues with better environmental conditions, those large healthy fishes are likely to contribute to the future recruitment, on the long term.

The Council considers that the stock is rebuilding according to several positive signs. It opens the possibility of a small-scale reopening of the commercial fishery. That reopening should:

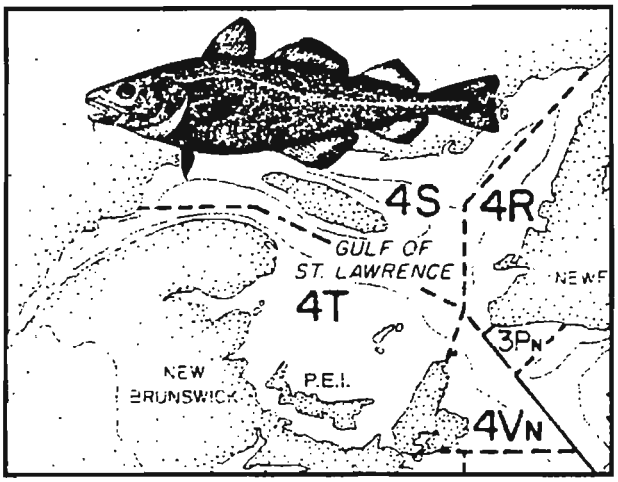
- provide better data on the actual stock status;
- allow a better adjustment of the by-catch rules for other non-cod fisheries;
- limit the impacts of recreational fisheries.

As the stock has not yet totally recovered (the spawning biomass remains low), the reopening should be strictly limited, in order to help the continuing rebuilding of the population and to give the incoming recruitment a chance to reproduce at least once. No firm reference level can be calculated at this stage. The minimum trawlable biomass, obtained from the Sentinel mobile gear survey in July 1996, was around 40,000 t. The long-term average productivity of the stock was around 60,000 tonnes/year for an absolute calculated biomass close to 300,000 tonnes. The Council estimates that catches should be much below 10,000 tonnes to warrant rebuilding.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**stock rebuilding, however at low level with limited improvement; better geographical distribution**
	Compared to average
Overall biomass :	**much lower than average**
Spawning biomass :	**lower than average with slight increase**
Recruitment :	**weak 1991-1992 year-classes, 1993 year-class likely to be better**
Growth and condition :	**condition factor improving about average, growth rate back to normal rate**
Age structure :	**some improvement**
Recent exploitation level:	**fishery closed since 1994**

4.3.2.2
COD - 4T+4VN (N-A)



HISTORY OF FRCC RECOMMENDATIONS:

In 1993, due to the dramatic decline in all of the indicators for this stock and the poor recruitment prospects, the Council recommended that this fishery be discontinued at least until June 1994. The fishery was then closed by Fisheries and Oceans. Taking a cautious approach, the Council recommended in November 1994 that no directed fishing take place on this stock in 1995. In 1995, as prospects for recovery continued to be bleak, the Council recommended for 1996 that the moratorium on commercial fishing be continued with a significant expansion of the Sentinel fishery.

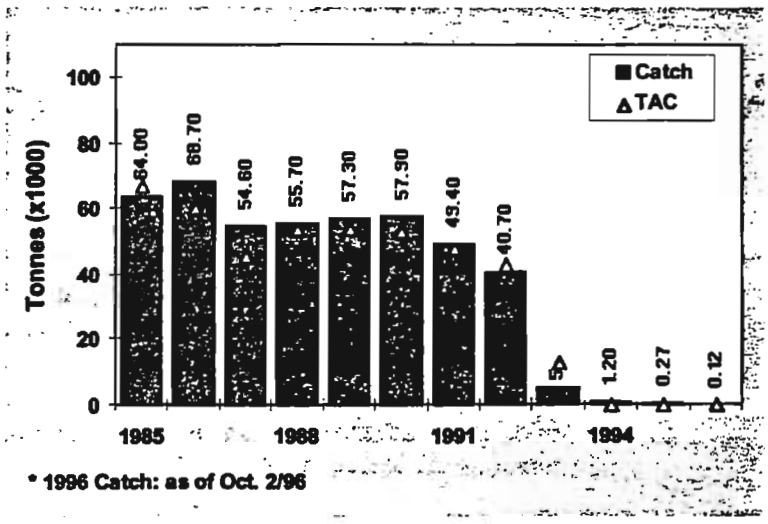
1996 CONSULTATIONS:

During the 1996 consultations, fishermen reported that cod was abundant around Prince Edward Island, on Miscou Banks and on the southern grounds of Magdalen Islands, where by-catches prevent a full flatfish (American Plaice, Atlantic Halibut) fishery in some areas. Echo-sounder marks which were believed to be related to cod were also reported. Unusual cod catches, compared to historical memory, in lobster traps were noted around PEI and Magdalen Islands. In several coastal areas (Chaleur Bay, Eastern New-Brunswick coast, Saint Lawrence Estuary), however, inshore fishermen mentioned that cod

RECOMMENDATION # 21:

The FRCC recommends that:

- **21.1. the fishery be reopened for a commercial fishery in 1997 with a TAC set at 6,000 tonnes.**
- **21.2. fishing effort of each gear sector be controlled to match the quota available.**
- **21.3. the fishery be closely controlled and monitored, in order to provide reliable data for future decisions (such as: log-books, observers at sea, dock-side monitoring).**
- **21.4. measures be taken and enforced to protect young fish, and especially the 1993 year-class, including small fish protocol and suitable gear restrictions, and to ensure that the catch is comprised of a suitable range of year-classes in the adult stock.**
- **21.5. measures be considered to avoid targeting strong pre-spawning and spawning aggregations, including possible closures of areas and periods.**
- **21.6. the gathering of scientific data on the basis of the Sentinel fishery be pursued.**



appears to be in much lower abundance than in the past history (information from Sentinel fishermen, recreational fishery, by-catches of other fisheries such as Greenland Halibut). A fisherman suggested that the presence of cod in marginal areas such as the Saint-Lawrence estuary, where a fishery used to take place, is the outflow of a large biomass, and as cod has not re-appeared in those areas is a sign that the population has not yet recovered. It was mentioned that, as long as a longliner is not able to make a living with cod in the northern part of 4T area, as is the present situation, the stock must be considered as being still in bad shape. In the contrary, some fishermen, from PEI, indicated that the present geographical distribution is not uncommon as, in the past, fleet from Québec and New-Brunswick were coming to Northern PEI to fish. It is also felt that large cod that were usually fished in winter, are now seen in the Gulf, which was translated as a positive effect of the winter fishery closure. Fishermen feel that small fish (probably age 3) are abundant, according to the by-catches in lobster traps and landings in the recreational fishery. Fish appear generally in good health, with stomachs full of food. Seals were presented as a major problem : fish partially eaten on longlines, traces of biting on fishes, cod disappearing on traditional grounds when seals are abundant. In some areas (Chaleur Bay, entrance of the Saint Lawrence Estuary), dogfish raised the same concern.

The catch limitations imposed to experimental studies, such as selectivity, make it difficult to prosecute those studies effectively. Frustrations also arose from the recreational fishery. Perceived as a non-controlled fishery, it is seen as a non-official commercial fishery feeding the black-market. The general feeling was that not enough data are available to assess accurately the actual potential of the stock. In that view, a limited reopening would allow to improve the data base in order to get a real perception of the stock status. A reopening may also help to solve the several problems raised by the by-catch and the recreational fishery. It is clear that a commercial fishery resulting from the partial reopening should be well monitored to provide the requested information. It was mentioned that reopening will always present a risk, and the fishery has to be reopened with calculated risk, minimizing any possible damage.

Rights of access remain a major issue. While some felt that only traditional environmental "friendly" gears (hook and line, gillnets), should be allowed as a first step, others recommend quotas based on historical share. A participant suggested that the large vessels should be banned. Few suggestions were made on a possible TAC, considering the lack of reliable information. During discussions, amounts between 10,000 and 15,000 tonnes have been mentioned. In PEI, a quota of 4,000 tonnes was requested for the Island alone. A fishermen representative noted that the TAC should be in accordance with conservation principles. It was also noted that the quality of fish landed should be better promoted and controlled as it would be possible to get the same earnings with less fish but of better quality.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- recruitment has been poor in late 1980s and early 1990s.
- there are some signs of improvement in recruitment but it is too early to be certain.
- the biomass is close to the lowest level observed.
- the spawning biomass would increase slightly (5%) if there is no fishery in 96.

Overview of The Sentinel Fishery

In the Southern Gulf of St. Lawrence (4T area), Sentinel Fishery started in fall 1994 with two mobile gear vessels. In 1995, more mobile gears were in use and fixed gears were added. In 1996, following FRCC's recommendation, the Sentinel Fishery was significantly expanded to cover most of the area from July to October, with a wider representation of gear sectors. The protocols were designed by combining fishermen's knowledge, regarding traditional fishing areas, with a scientific protocol in order to limit the biases and to produce the maximum of information from the project. For the fixed gear sector, once the locations were determined, they remained constant for the whole season. The mobile gears were represented by trawls and danish (scottish) seine and twelve trips were carried on during the season. Every three trips, a liner was added in order to provide information on the abundance of juvenile fish.

In the mobile Sentinel Fishery, catch rates were around 20% higher than observed in 1995, at a similar date. A good portion of that increase is related to the growth of fish remaining in the population at the time the fishery closed. Longline catches are similar to those observed in 1995 at a similar date. Catch rates were high around P.E.I. along the Gaspé coast, catches have been very poor, with no fish being caught on several instances. The data provided by the mobile fleet indicate that the 1993 year-class may be higher than the 1992 year-class, but it is too early to estimate the actual strength of that 1993 class.

Several consistent signals indicate that the stock biomass has improved since the fishing closure. The improvement is confirmed by the Sentinel fisheries in some areas. The importance of by-catches in several fisheries (lobster, plaice, Atlantic Halibut, spiny dogfish) indicates also that the population is in better shape than in the recent past. The stock does not seem, however, to have recovered its full geographical distribution as shown by the poor catch rates in littoral zones such as the eastern coast of New-Brunswick, the Saint-Lawrence Estuary, and Chaleur Bay. The 1996 fall scientific survey confirms the geographical distribution of cod observed in other fisheries. It indicates a marginal increase in the number of fish caught per tow, and a more substential increase of the weight per tow. The preliminary conclusion is that the biomass is recovering, however at a slow rate and remain very low. The presence of a significant amount of 3 year old fish (1993 class) is confirmed, but that year-class is not as strong as expected. The 1995 year-class may be of good size. The ongoing poor oceanographic conditions observed in the southern Gulf is likely to limit the biological productivity for a certain period of time.

The Council is aware that both by-catch rules and recreational fishery induce frustrations among fishermen. The Council is also concerned by the fact that the recreational fishery is neither properly controlled nor monitored, opening the door to possible poaching and black-markets for fish.

In its 1995 report, the Council estimated that the stock could sustain a 4,000 tonnes catch and that this value could be used as an "upset limit" for an enlarged Sentinel Fishery. The 1996 catches will be well below that level, despite increasing recreational fishery. The calculated spawning biomass (age 5+) for 1996 is around 110,000 tonnes, improving but still below the values observed in the mid-eighties (around 230,000 tonnes). The stock appears to be rebuilding at a rate of around 10% per year since the moratorium, although this is mainly due, at this stage, to the growth of fish already present at closure. The 1993 year-class appears to be better than the previous ones and

could help to contribute to the biomass in the future. Considering the risk analysis provided by scientists, the biomass should increase between 1996 and 1997, due to expected low catches. The same analysis, based on 1995 data, indicates that catches above 6,000 tonnes in 1996 would have induced 50% chance of a decline of the spawning biomass. Catches above 10,000 tonnes would have moved that probability to 80%.

The Council considers that the observed improvement authorizes a limited reopening for commercial fishery in 1997. That reopening should:

- provide better data on the actual stock status;
- allow a better adjustment of the by-catch rules for other non-cod fisheries;
- limit the impacts of recreational fisheries.

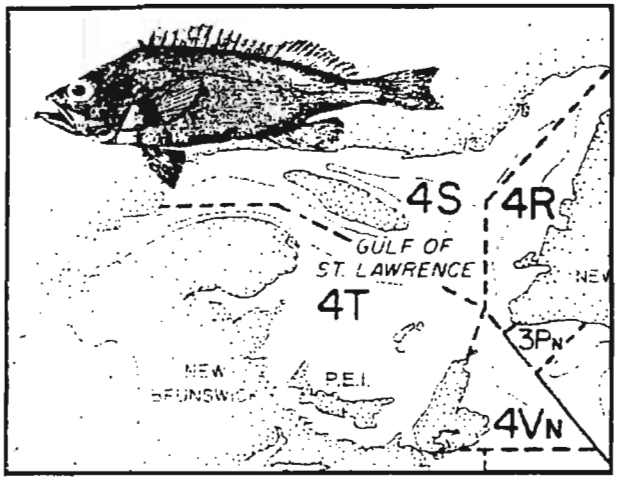
As the stock has not yet totally recovered (still low spawning biomass, limited geographical distribution, limited recruitment), the reopening should be, however, strictly limited, in order to help the continuing rebuilding of the population and to allow incoming recruitment to reproduce at least once. The analysis indicates that catches have to be below 10,000 tonnes, considering the overall objective of rebuilding. The catches at the $F_{0.1}$ level would be in the vicinity of 16,000 tonnes.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator :	**stock rebuilding, but still at low level**
	Compared to average
Overall biomass :	**lower than average, concentrated in the south-eastern part of the area**
Spawning biomass :	**lower than average, increasing at a rate of 10% per year since moratorium, due to growth of old fishes**
Recruitment :	**below average since cohort of 1987; 1993 year-class likely to be better**
Growth and condition :	**condition improving, about average in 1994 and 1995**
Age structure :	**affected by poor recruitment; age 7 dominant in 1995 landings; likely to improve due to 1993 cohort**

Recent exploitation level: fishery closed since 1993

4.3.2.3
REDFISH UNIT 1 - 4RST+3PN (JAN-MAY)+4VN (JAN-MAY)



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council expressed its 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. For 1996, the FRCC recommended continuing the moratorium and minimizing the by-catch of redfish in other fisheries.

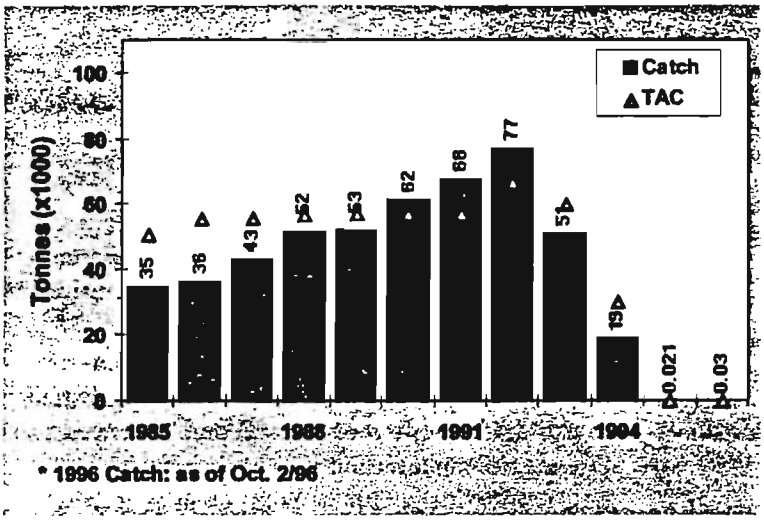
1996 CONSULTATIONS:

The Council held a special consultation on redfish stocks on October 11, 1996. Some positive results were reported from the Sentinel Fisheries,

RECOMMENDATION # 22:

The FRCC recommends that:

- 22.1 **no directed fishery take place in 1997.**
- 22.2 **cooperative science industry surveys must be undertaken.**
- 22.3 **recruitment continue to be monitored using all sources of information including by-catches from the shrimp fishery.**



but the consensus of stakeholder was that, with the continuing decline of the biomass, the fishery should remain closed. Stakeholders remain concerned about the overall state of this resource. Industry noted as well, that better DFO Science coordination between regions is required to answer questions about intermingling of these stocks.

ANALYSIS:

The 1996 DFO Stock Status Report indicates:

- no sign of incoming recruitment
- biomass at very low levels
- recovery may occur 7-9 years but only after significant recruitment has occurred.

This assessment was supported by stakeholders at consultations. The Council remains very concerned about the status of this stock and notes that there is still no apparent improvement in the state of the stock despite the moratorium. Council also feels it is important to gather more information on this stock through joint industry science initiatives.

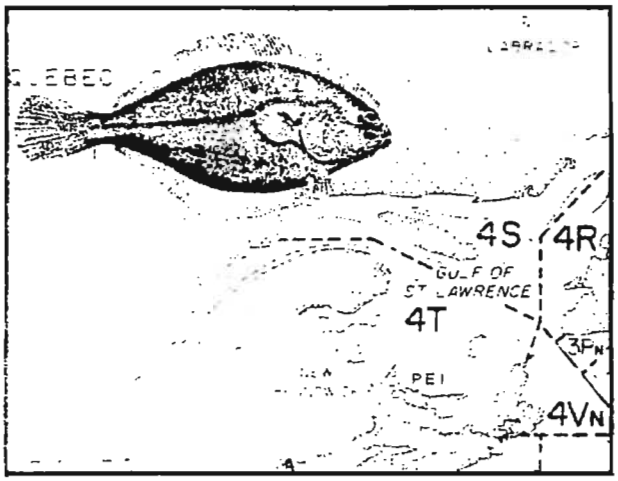
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator : very low

	Compared to average
Overall biomass :	**very low**
Spawning biomass :	**very low**
Recruitment :	**very low**
Growth and condition :	**unknown**
Age structure :	**dominated by 1981 year-class**

Recent exploitation level: moratorium

4.3.2.4 AMERICAN PLAICE - 4T



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council recommended that the 1994 TAC be set at 5,000 t, with continued conservation measures to protect small fish. This 5,000t TAC limit was also recommended in November 1994 for 1995. In November 1995, due to indications that the biomass was at the lowest level observed, the Council recommended a reduction of the TAC to 2,000t. It also recommended that efforts continue to be made to minimize the capture and discard of small plaice and that cod by-catches be kept to the lowest possible level.

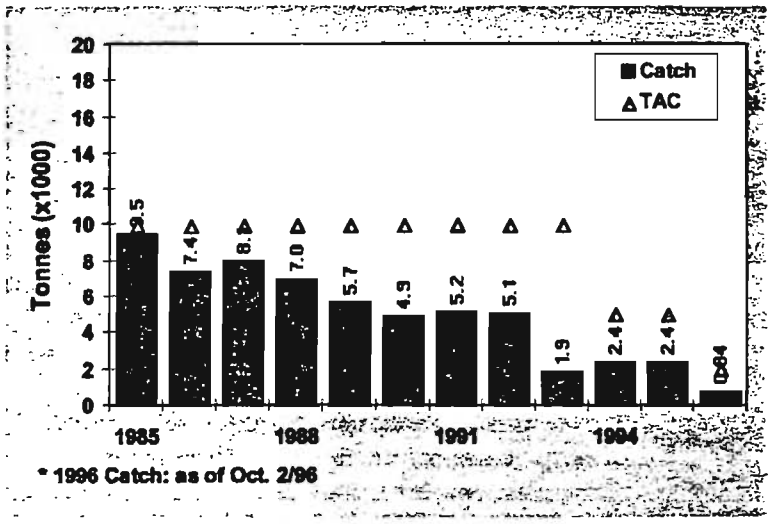
1996 CONSULTATIONS:

During the 1996 consultations, the general feeling was that the numerous closures due to cod by-catch do not allow fishermen to clearly assess the status of this stock. The 10% by-catch rule is perceived as a major constraint for an effective fishery. It also results in unequalities among fishermen, as some areas may be closed to a particular gear while remaining open to another one. Fishermen claim that modifications of the by-catches rules are necessary. A fisherman suggested that this by-catch situation was expected, due to a redirection of effort toward plaice that was usually a by-catch in the cod fishery. Other fishermen mentioned that a directed plaice fishery took place, in the past, in the southern part of the Gulf. It was felt that the increase of the mesh size is effective in preventing catch of small plaice, and that the fishery was much "cleaner" than in previous years. The catches of those small fish, though uncommon, are still occurring. Concerns were, however, raised about the on-going purchase of small plaice for bait by some processors. Selectivity studies are underway to limit the cod by-catch and the small fish by-catch. In PEI, the mean size of fish caught is now larger and the catch rates have increased, despite greater fishing effort. This was seen as an improvement of the stock status. Fishermen, in that area, feel that the

RECOMMENDATION # 23:

The FRCC recommends that:

23.1. the TAC for 1997 be set at 2,500 tonnes.
23.2. measures be taken to limit the redirection of effort from other fisheries.
23.3. size limits be strictly enforced



stock is presently in better shape and could sustain a larger TAC; 5,000 tonnes was suggested. In the Magdalen Islands, fishermen consider that the plaice stock is weaker than in the 1960s; they have not found large fish (15-16 inches) since the years 1987-88. In the northern part of the 4T area, fishermen consider that plaice has almost disappeared from the region.

ANALYSIS:

The 1996 Stock Status Report states that:

- the biomass estimate in 1995 is the lowest since 1971.
- recruitment has generally been poor since mid-1970s.
- discarding of under-sized plaice remains a problem.

The Council recognizes that the status of the stock remains unclear and faces conflicting views. The DFO stock assessment indicates a very poor status for this stock. Fishermen on the south eastern side indicate improving catch rates, despite the increased mesh size and the increasing fishing effort due to the increasing number of participants in this fishery. The plaice caught are larger and said to be in better condition than in the past. The Council notes that the biomass was relatively stable during the past 10 years, although at a much lower level than during the late 1970s. That situation is confirmed by the 1996 fall scientific survey, where the number of fish per tow remianed unchanged since 1995. The plaice was mainly concentrated in the eastern southern Gulf.

The Council acknowledges that actions have been taken to prevent catches of small fish, in accordance to its previous recommendations, and that the fishing mortality on immature plaice has been significantly reduced.

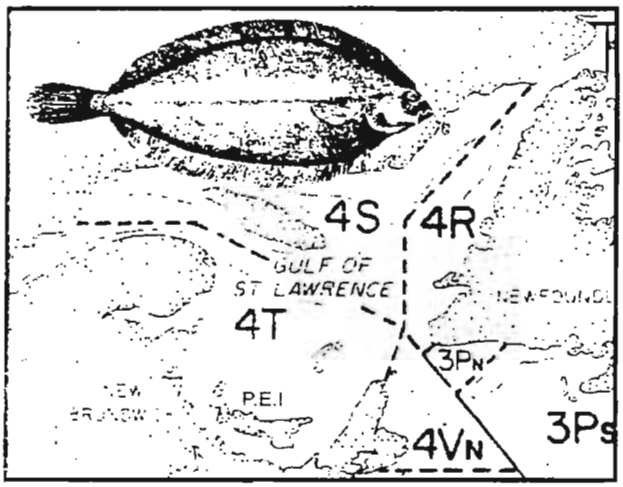
While trying to reconcile conflicting views, the Council considers that some signs of improvement are shown in the fishery and that conservation measures have had a positive effect on the stock.

The Council feels that a slight increase of the catches is possible. It remains concerned, however, by the low level of biomass, and considers that the increase should be in accordance with a rebuilding strategy. As landings of small plaice are still reported, the Council urges that a strict compliance to the regulations be enforced.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator :	may be rebuilding; signs of improvement in the fishery; higher catch rates despite larger mesh size.
	Compared to average
Overall biomass :	still at low level; close to stable over the past 10 years
Spawning biomass :	stable at low level
Recruitment :	poor
Growth and condition :	discarding of small fish much reduced and larger fish being caught
Age structure :	unknown
Recent exploitation level:	redirection of effort may be a concern

4.3.2.5 WITCH FLOUNDER - 4RST



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council recommended that the 1994 TAC be set at 1,000t as a precautionary measure 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. Following the recommendation of the Council, the management unit was extended to include 4T in 1995. In 1995, the Council recommended that the 1996 TAC remain at 1,000t.

1996 CONSULTATIONS:

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

During the 1996 consultations, some concerns were expressed about the FRCC's 1995 recommendation; there were indications that the witch flounder TAC should be higher than 1,000t. Some suggested that the quota for 4T should be increased, with a two-month fishery in the spring and a two-month fishery in the fall.

ANALYSIS:

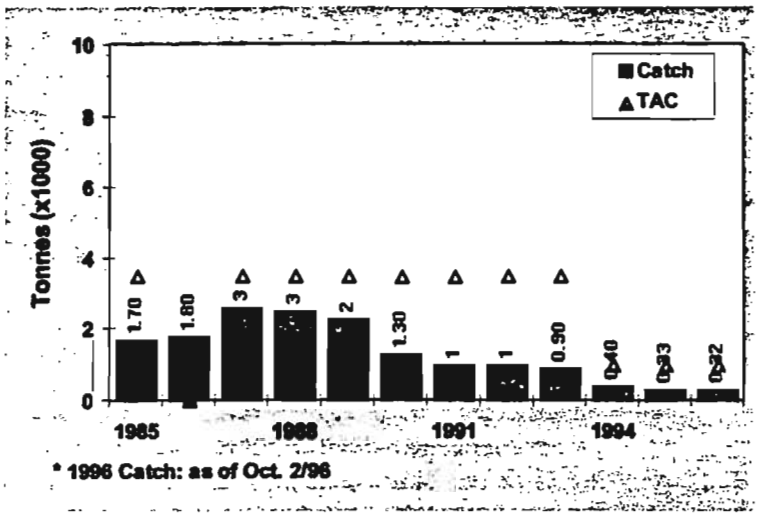
The 1996 DFO Stock Status Report indicates that:

- after the large decline observed in the late 1980s, the biomass remains stable in 4RS area and shows a marginal increase in 4T.
- recent catches have been much below TAC

RECOMMENDATION # 24:

The FRCC recommends that:

24.1. the TAC for 1997 be set at 1,000 tonnes.
24.2. measures be taken to harmonize mesh size to the entire area.

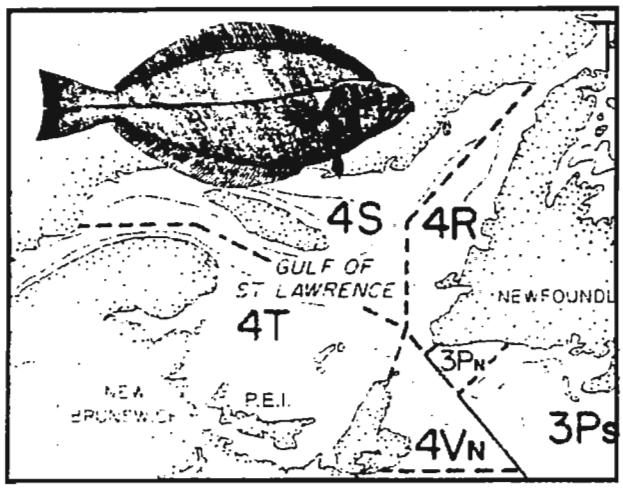


The Council notes that measures have been taken to reduce the catch of small witch flounder (i.e. fish smaller than 30cm). The Council notes that the resource appears to be at low level, particularly in the northern Gulf, where the flounder used to be the most abundant. Also, scientists indicate that "the observed trend in the abundance of the resource may require additional reductions in fishing effort". The September 1996 survey in 4T indicates that the abundance index has increased since 1995. In that survey, witch flounder was primarily distributed along the Laurentian Channel and the Cape Breton Trough. Few witch flounder were found between the Gaspé shore and Orphan Bank, as opposed to previous years. The Council is puzzled by the numerous mesh size limits in place in the southern Gulf and considers that this situation may be detrimental to conservation.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator :	**stock stable at low level; some improvement in 4T**
	Compared to average
Overall biomass :	**Low**
Spawning biomass :	**Low**
Recruitment :	**No information**
Growth and condition :	**No information**
Age structure :	**No information on age structure**
Recent exploitation level:	**larger mesh size being used for past 2 years; effort still high**

4.3.2.6 GREENLAND HALIBUT - 4RST



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993 and 1994, the Council recommended that the TAC be set at 4,000 t. Because of concerns with indications of declining abundance and the large quantity of undersize fish being caught, the Council added in 1994 that there was a need for additional management measures to promote targeting of fish larger than 50cm. In 1995, the Council recommended that the 1996 TAC be set at 2000t, with measures to allow young turbot to mature (including implementation of a small fish protocol and of an increase in mesh size for gillnets) and with the fishery being subjected to 100% monitoring at dockside.

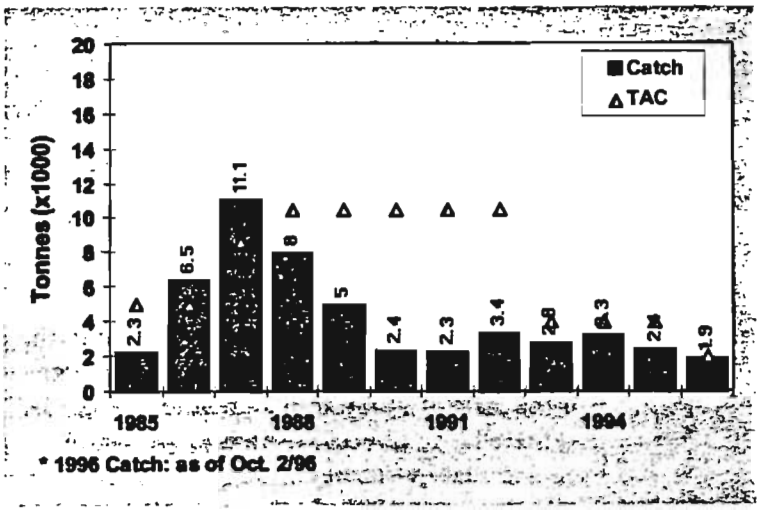
1996 CONSULTATIONS:

This species is of great importance for fixed gear fishermen of the Saint-Lawrence Estuary and in the Anticosti Island area. During the 1996 consultations, these fishermen expressed a lot of concerns about the present quota and were questioning the rationale of the 50% decrease from 1995. They indicated that they have taken several actions to improve exploitation of the stock: increasing mesh sizes, reducing the number of participants in the fishery and the number of nets per vessel (down to 80). They reported that catch rates were very high in 1996, resulting in a very short season, despite the reduction in effort. Fish were larger than last year and in good condition. Fishermen were concerned by the large amount of mature female in catches (more than 80% of the catches) as a result of the mesh size increase. They reported that the number of prerecruited fish is increasing and a significant amount of very small turbot are being taken in the shrimp trawl fishery despite the Nordmore grate (not confirmed everywhere), which could mean that strong year-classes are coming. The participants

RECOMMENDATION # 25:

The FRCC recommends that:

25.1. TAC for 1997 be set at 3,000 tonnes.
25.2. present conservation actions (limited effort, larger mesh size) be maintained.
25.3. scientific research be pursued in order to develop a more precise view of stock delineation and migration patterns.



generally agreed that the stock is now in good condition and that a return to a 4,000 tonnes TAC is warranted. Fishermen questioned the delineation of stocks units and migration patterns. They raised concerns about the winter fishery in the vicinity of the Cabot Strait, as it could negatively affect the Québec fishery.

In Newfoundland, fishermen reported the same improvement of the stock. Catch rates were increasing and signs of recruitment were seen.

ANALYSIS:

The Council notes that the situation has much improved since the assessment derived from 1995 data. The declared catch rates are increasing and the high landings in 1996 induced a premature closing of the fishery. This is consistent with the observations made by the scientists during the 1996 summer survey, which indicates continuous improvement of the biomass since 1993. Abundance of commercial-sized fish increased by 30% between 1995 and 1996 and abundance of fish greater than 50cm more than doubled. Good signs of recruitment are also shown in 1996, with an abundance not seen since the early 1990's. The Council recognized the positive actions taken by the fishermen in order to reduce the effective effort and to increase the mesh size. Those actions have led to positive effects on the catches of immature fish.

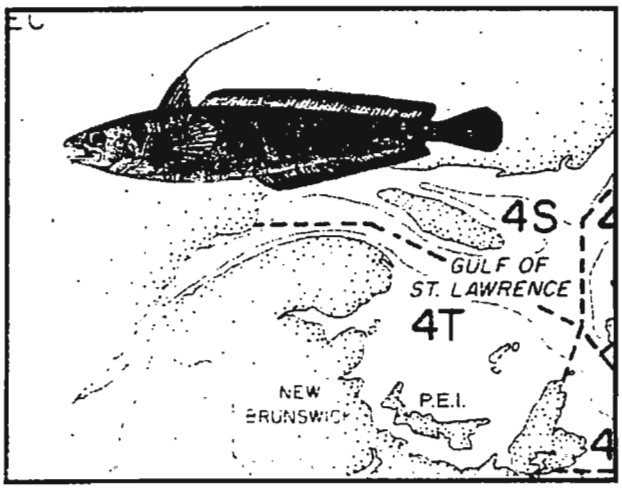
The fishermen report that the 2,000 tonnes TAC was far to low considering the current status of the resource and that there is room for a larger catch. They are concerned by the poor knowledge of the ecology of the species, particularly in relation to the migration patterns. The Council recognizes that the possible migration of turbot through different areas could have to conservation implications.

The Council considers that the stock is improving since its last evaluation in 1995 and that positive measures have been taken to address the concerns raised in its previous report. It considers that conservation measures should be pursued in order to help the stock to fully recover and to maintain the biomass above its current level. It considers also that, even if there is room for an increased TAC, a cautious approach should be taken to ensure the rebuilding of the stock.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator :	**stock rebuilding at a fast rate**
	Compared to average
Overall biomass :	**good improvement in 1996**
Spawning biomass :	**likely to increase in 1996**
Recruitment :	**abundance of young fish appearing in 1996**
Growth and condition :	**slight improvement in condition**
Age structure :	**improvement due to increased mesh size and to an improvement in recruitment**
Recent exploitation level:	**likely reduced as a reduction in TAC, reduction in effort and increase of gillnet mesh size**

4.3.2.7 WHITE HAKE - 4T



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council recommended that the TAC be reduced to 2,000 t for 1994 as a precautionary measure. Due to the historically high incidence of small fish in the catch, the Council also recommended that the measures introduced in 1993 to protect small fish be continued. It was 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 November 1994, as there was no change in the abundance estimates (which remained at about half the level of 1992), the Council recommended that there be no directed fishing for 4T white hake and that by-catches be kept to the lowest possible level. In 1995, due to continued concerns over low abundance and with the indications of weak incoming recruitment, the Council recommended a continuation of the moratorium on directed fishing in 1996.

1996 CONSULTATIONS:

During the 1995 consultations, lobster fishermen indicated that they had observed large numbers of white hake in their traps. Overall, fishermen did not believe that white hake was "in trouble".

During the 1996 consultations, the perception of the stock status varied between areas. In the Magdalen Islands, fishermen consider that the hake has disappeared. In PEI, however, fishermen feel that the stock is no longer in trouble. Important by-catches are reported in lobster traps, in eel and smelt traps, and in scallop dredges.

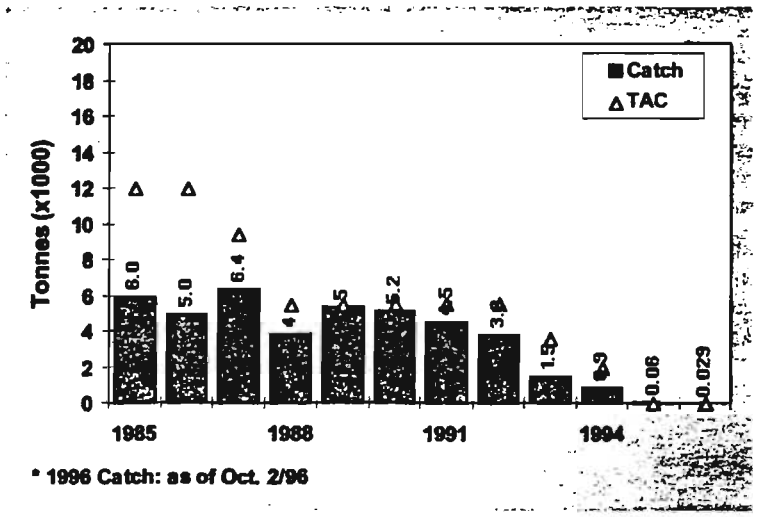
RECOMMENDATION # 26:

The FRCC recommends that:

26.1. there be no directed fishery for 4T white hake in 1997. A quota of 500 tonnes may be allowed for by-catches, with a sufficient flexibility to avoid closing traditional directed groundfish fisheries.

26.2. the fishery be closely controlled and monitored in order to provide reliable data for future decisions.

26.3. studies on the definition of the stock unit be pursued.



This perception comes mainly from the east side of PEI; in the western side, reports were sketchy and Sentinel catches are very low in comparison to cod. It was suggested that a small scale fishery should be prosecuted in order to get a better view of the resource status. Several questions were raised about the migration of the fish and the residence of local populations during winter.

In Port Hawkesbury, one fisherman indicated that he had the best inshore fishery for a long time. Another fisherman indicated that there must be "lots of hake" as they are seen in gill nets and on "hook and line" gear.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- fishing mortality has been high prior to the closure.
- incoming recruitment is weak but some very young fish were seen in 1995 survey.
- biomass is at the lowest level observed.
- there has been a contraction of the geographical range in recent years.

Most of the hake catches in the Sentinel Fishery occurred in St. Georges Bay and in eastern P.E.I. with some very good daily catches. Catches increased around P.E.I. at the end of the season.

Virtually no white hake were caught off N.B., Quebec and the Magdalen Islands.

Scientists have indicated that the rebuilding of this stock will be slow in view of the low abundance and limited indications of recruitment.

The Council notes that the 1996 assessment indicates that the biomass remains close to the lowest level observed. However, the presence of small fish, including young-of-the-year hake, in the 1995 survey is encouraging. Small fish also occurred as by-catch in other fisheries and by the 1996 fall research survey. That survey found a mean number per tow similar to that of 1995, indicating that abundance remains near the lowest historical level. The mean weight per tow is still decreasing.

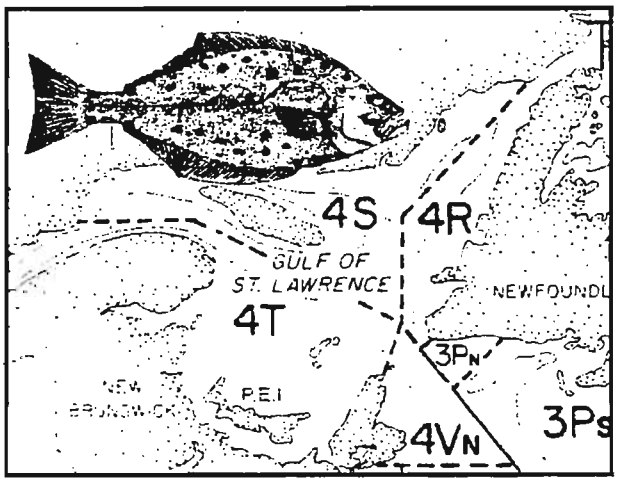
The Council notes that high concentrations of white hake are found only in some localized areas (e.g. St. Georges Bay and central part of the Northumberland Strait); but hake remains scarce elsewhere. The possible expansion of the geographical distribution around PEI has to be monitored. Many questions have been raised on the migration of white hake out of the Gulf in winter. In particular, white hake found in 4Vn in winter is likely from the Gulf stocks.

The Council considers that localized signs of improvement are shown. This suggests that there could be a small TAC, for by-catches only, in order to allow a better species ratio in other fisheries. It would also provide additional data to assess the status of this stock.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator :	still critical; stock globally at its lowest level; local improvements
	Compared to average
Overall biomass :	at lowest level despite local improvement; contraction of geographical distribution, may be improving.
Spawning biomass :	very low.
Recruitment :	some encouraging signs but limited
Growth and condition :	no information
Age structure :	abundance of larger hake (larger than 45cm) close to lowest level observed
Recent exploitation level:	High prior to moratorium

4.3.2.8
ATLANTIC HALIBUT - 4RST



HISTORY OF FRCC RECOMMENDATIONS:

In the reports produced since November 1993, the Council recommended that the TAC for 4RST Atlantic halibut be set at 300 t. In addition, the Council recommended in 1995 that the release of Atlantic halibut smaller than 81cm be mandatory and that cod by-catches in this fishery be effectively eliminated.

1996 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 by-catch than for halibut.

During the 1996 consultations, fishermen reported that the cod by-catch rules prevent an effective long-line fishery, and insisted that modifications to those rules were necessary. Because of the numerous closures due to cod catches, they could not provide a clear view of the halibut status. They also reported that seals are becoming a problem as the finding of only heads of fishes on hooks is now common. Fishermen also reported the increasing abundance of fish weighting between 30-60 pounds and the disappearance of very large halibut.

ANALYSIS:

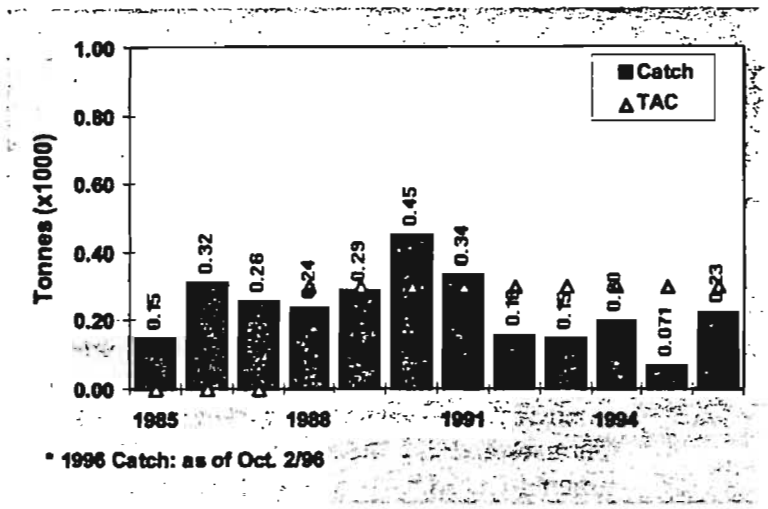
The 1996 DFO Stock Status Report indicates that:

- recent catches correspond only to about 10% of long term historical values (1900-1950)

RECOMMENDATION # 27:

The FRCC recommends that:

27.1. the TAC for 1997 be maintained at 300 tonnes;
27.2. the release at sea of halibut below 81 cm be mandatory.



Scientists indicate that, compared to the long term, the halibut stock is at a historically low level. It appears that the stock is stable.

The Council recognizes that the status of the stock is not precisely known. The fish is scarce on the grounds and cannot be properly assessed through the scientific surveys. Commercial catch rates are not reliable in some areas due to the numerous closures related to cod by-catch. In the northern part of the area, fishermen report fairly good catches in 1996. Fishermen noted a scarcity of large halibuts in their catches. The biomass seems to remain stable, but at low level.

The Council is concerned by the catches of immature fishes still occurring in the gillnet fishery. In 1995, it recommended that small fish should be released, as is the case outside the Gulf. That recommendation came in effect in 1996. The Council notes the positive effect of the introduction of the Nordmore grate in the shrimp fishery to prevent by-catch of immature halibut.

In 1995, the Council noted the concerns raised by the non-declared cod catches occurring in the halibut fishery. These illegal practices were not reported in the 1996 consultations.

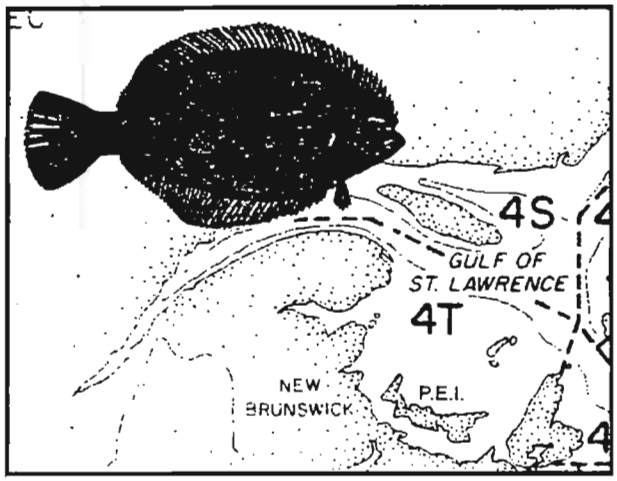
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator : stock at a very low level

	Compared to average
Overall biomass :	**very low level**
Spawning biomass :	**biomass at very low level.**
Recruitment :	**some, as per catch of immature**
Growth and condition :	**not available**
Age structure :	**few old mature fishes in landings**

Recent exploitation level: landings limited by moratoria for fishing cod and redfish.

4.3.2.9
WINTER FLOUNDER - 4T



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993, the Council recommended that landings of 4T winter flounder be monitored more closely as this stock is not under quota management and that the measures introduced to protect against high mortality of juveniles be continued. In 1994, the Council again recommended that this fishery continued to be monitored and that the Department of Fisheries and 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. In 1995, the Council recommended a continuation of monitoring in 1996 and that the directed fisheries on this stock not be allowed unless and until there are measures in place to keep the by-catch of cod to the lowest possible level.

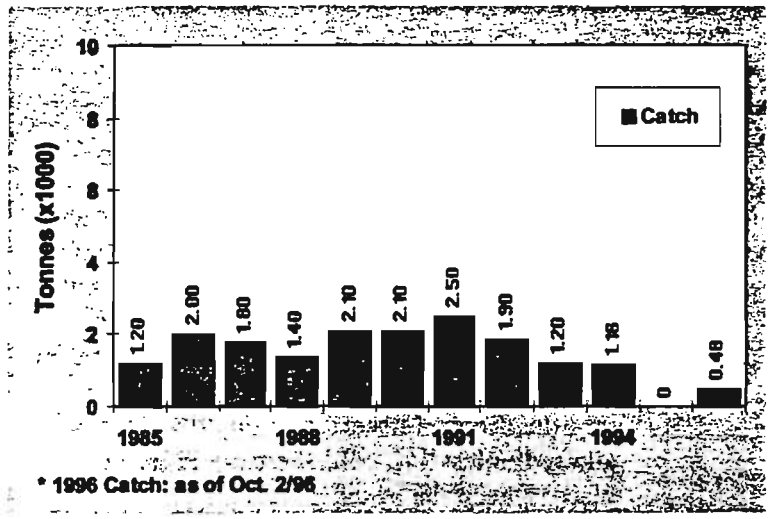
1996 CONSULTATIONS:

During the 1996 consultation in Québec, fishermen reported increasing catch rates and feel that the stock is improving. In New Brunswick, the high level of cod by-catches prevented an effective fishery and several fishermen decided to withdraw from that fishery. For these reasons, the fishermen's knowledge of the stock remains unknown. Off eastern PEI, fixed gear catches were very good and clean, until the sector was closed due to by-catch problems which occurred in Nova-Scotia. The landings of small winter flounder for the bait market remains a problem.

RECOMMENDATION # 28:

The FRCC recommends that:

- **28.1. the overall catches in 1997 not exceed the long term average of reported landings.**
- **28.2 as in 1995, scientific effort be pursued in order to clarify the various stock units.**
- **28.3. management measures be implemented and enforced to prevent the by-catch of flounders and to prevent catches of immature fish.**
- **28.4. the monitoring of the fishery be improved to limit the by-catch of flounder and obtain precise information on winter flounder landings.**
- **28.5. measures be taken in order to ensure that mesh sizes are standardized and are appropriate to respect the small fish protocol for this species and that by-catches of other species remains within accepted limits.**



ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- landings are uncertain due to inaccurate reporting.
- overall abundance is about average.
- this is a shallow water species, likely composed of several separate stocks.

While the information available on this resource is limited, this stock is probably at an intermediate level of abundance. The abundance increase mentionned by fishermen is confirmed by the September 1996 survey which indicates a biomass index superios to the level observed in the late 1970s and early 1980s. As indicated in the stock status report, this resource is found mostly in shallow waters and appears to be composed of a number of localized populations across the southern Gulf. As such, its abundance can vary greatly between different regions.

Traditionally, the 4T winter flounder resource supported fisheries for lobster bait and limited food markets. Winter flounder was also taken as a by-catch in the cod, plaice and white hake fisheries. Since the closure of many groundfish fisheries in the southern Gulf, the exploitation of winter flounder has become a directed fishery. In its previous reports, the Council expressed its concerns over the re-direction of effort to this resource. The Council notes that a number of measures were introduced in 1995 to reduce the catch of small winter flounder. Also, a TAC of 1,000t was introduced in 1996. The Council recognizes that this measure was an attempt to prevent the escalation of effort on this resource and effort to limit that escalation should be pursued, along with stringent monitoring of the catches. While the poor accuracy of catch statistics has been an issue, the measures introduced in recent years to improve monitoring and to control the removals should also result in improved reporting of catches. While these efforts are recognized, it is important to continue to make efforts to eliminate misreporting and to provide better estimates of catches.

The Council faces a great lack of information regarding this stock. The scarce information provided by fishermen indicate a fair improvement of the biomass, especially in the northwestern part of the Gulf. In other areas, the cod by-catch prevented significant commercial activities. The Council is concerned by the lack of

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator :	**Probably average in abundance**
	Compared to average
Overall biomass :	**Probably average; varies by region**
Spawning biomass :	**No information**
Recruitment :	**No information**
Growth and condition :	**Varies by region**
Age structure :	**No information**
Recent exploitation level:	**Effort reduced since 1993. Continued effort needed to improve catch reporting.**

surveillance that allows significant landings of small fish for the bait market and significant landings of other flounder species.

The Council is puzzled by the numerous mesh size limits in place in the southern Gulf and considers that this situation may be detrimental to conservation. This also lead to illegal landings of small fish of other flounder species. This practice should be stopped.

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 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

Time-series of coastal sea surface temperatures show that since the late 1980s, the trends at the Gulf of Maine and Bay of Fundy sites have generally been on the increase whereas those along the Atlantic coast of Nova Scotia have been decreasing. Annual mean surface temperature for 1995 was above-normal at Boothbay Harbor and St. Andrews and had raised from 1994. Annual mean surface temperature for 1995 were below normal at Halifax, similar to last year and still nearly as cold as the mid-1960s.

Cold conditions were observed in the CIL layer and near-bottom on the northeastern Scotian Shelf, inshore along the Atlantic coast of Nova Scotia and off southwestern Nova Scotia. This continued a pattern established in the middle of the 1980s. These cold waters are believed to be transported onto the Scotian Shelf from the Gulf of St. Lawrence and perhaps off the Newfoundland Shelf and to a lesser extent from on site cooling during the winter. In contrast to these cool conditions, the waters in the central Scotian Shelf over Emerald Basin and along the continental slope, were warmer-than-normal. These conditions have persisted since 1992 and reflect the presence of warm slope water offshore. At station Prince 5 near the entrance to the Bay of Fundy, monthly temperature anomalies were generally positive, though less

HYDROGRAPHIC CONDITIONS FOR THE SCOTIAN SHELF AND GULF OF MAIN IN 1995

- **Cold conditions in the CIL and bottom-waters on the NE scotian shelf**
- **Warmer-than normal waters in the central scotian shelf**
- **Temperature predominantly warmer-than-normal in the gulf of maine**
- **Waters in the bay of fundy cooler than last year but still much warmer than in 1992 and 1993**

Sources: NAFO SCR Doc. 96/41; DFO SSR 96/41

than last year but still well above the 1992 and 1993 values. In the Gulf of Maine, temperatures were predominantly warmer-than-normal which is believed to be due to the influx of slope water into the region through the Northeast Channel.

4.4.1.3 General Trends in Ecosystem

The zooplankton population, including krill, appears to be declining from the high levels seen during the last few years. Copepod levels were slightly below the long-term average on the Shelf and below the 1991 to 1993 levels on Georges Bank. It is not known if the steep decline in krill observed in 1995 indicates the start of a long-term trend in the abundance of the population.

On the Eastern Scotian Shelf (Eastern Shelf) the total trawlable finfish (bottom plus pelagic) biomass increased throughout the 1970s until 1981, and has declined to its lowest value at present. Finfish biomass on the southern Scotian Shelf (Southern Shelf) increased abruptly in 1982 and continued to increase until 1987. From 1987 until the present, the Southern Shelf finfish biomass has shown a more gradual decline than on the Eastern Shelf. Since 1992, the finfish biomass on the Southern Shelf has been higher than on the Eastern Shelf, contrary to pre-1992 conditions.

Demersal (bottom) biomass on the Eastern Shelf increased from 1970 to 1984 and declined to a low in 1994. Present estimates remain below those of the early 1970s. As with the trend in total finfish biomass, demersal biomass on the Southern Shelf shows a gradual decline until now.

Cod-like fishes (gadids) make up for 50% of the demersal biomass on the Eastern Scotian Shelf, whereas on the Southern Shelf, gadids make up for as low a percentage as observed during the 1970s. Non-gadid demersal fish biomass on the Eastern Shelf has declined since 1970, while it increased on the Southern Shelf. Non-gadid demersal biomass on the Eastern Shelf comprises flatfish, mainly American plaice. On the Southern Shelf, the biomass of flatfish is negligible, while spiny dogfish make up significant portion of the biomass , i.e. 30-50%, with a slowly declining percentage of skates.

On the Eastern Shelf, small pelagics make up for 15-30% of the total trawlable biomass, while on the Southern Shelf, they make up for 10% of the total. On Georges Bank and the Scotian Shelf, capelin is increasing; recent cold temperatures may have positively influenced capelin abundance there.

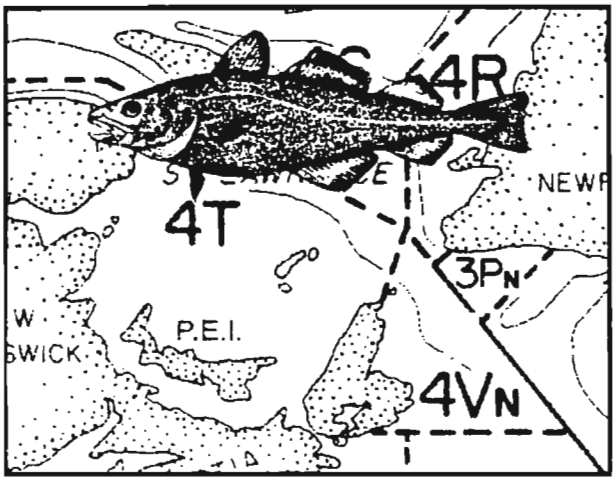
GENERAL TRENDS IN ECOSYSTEM FOR THE SCOTIAN SHELF AND GULF OF MAIN IN 1995

- **Possible decline in zooplankton, especially krill**
- **Finfish trawlable biomass at its lowest; biomass higher on the southern shelf than on the eastern shelf**
- **Gadoids make up for 50% of demersal trawlable biomass on eastern shelf**
- **Spiny dogfish make up for 30-50% of trawlable biomass on southern shelf**

Sources: DFO SSR 96/62, 96/64, 96/42

4.4.2 Stock-By-Stock Recommendations - Scotia-Fundy

4.4.2.1 Cod 4Vn (M-O)



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 and again in November 1995 for the 1996 fishing season. These recommendations were accepted annually and the fishery has remained closed.

1996 Consultations:

Fishermen continue to express concern about the lack of detailed scientific analyses due to the lack of commercial catch data. However, most inshore representatives feel that the picture is not as bleak as presented. They are seeing lots of signs of small cod in lobster traps and in herring gill nets and feel there are positive signs of abundance. Consequently, most inshore sectors are advocating a limited re-opening of 4Vn Cod to the fixed gear sector only. This would allow for a restricted hook and line commercial index fishery. The majority of those in attendance at the Port Hawkesbury consultation were fixed gear fishermen and supported a limited re-opening.

Analysis:

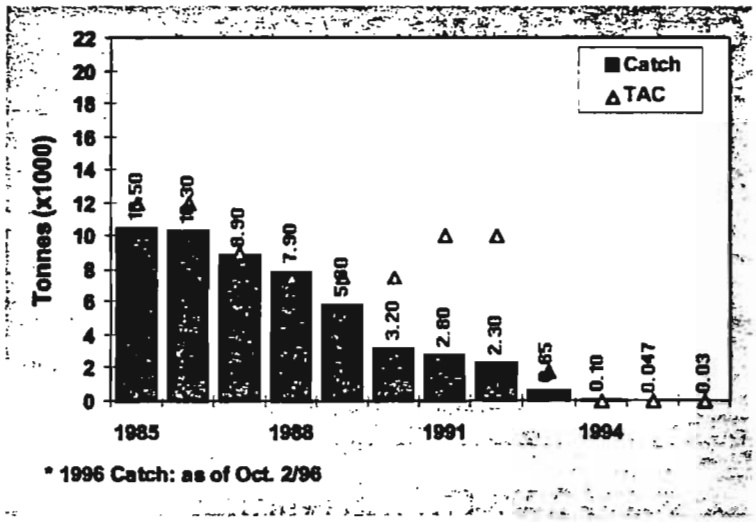
The 1996 DFO Stock Status Report indicates that:

- recruitment continues to be low
- the adult population remains low
- short term prospects remain bleak
- no changes are expected in 1997

Recommendation # 29:

The Council recommends that:

29.1. there be no directed fishery for 4Vn Cod in 1997.
29.2. an expanded Sentinel Fishery with strong commercial index component be implemented.
29.3. by-catches be kept to the lowest possible level, consistent with historical by-catch level.



The Council remains concerned about the depressed state of this stock. This was reinforced by the results of the fall Sentinel Fishery survey of 1996. On a positive note, however, the 1996 summer survey found an abundance of 0 to 1 year-class juveniles which might have a positive impact on future recruitment.

Sentinel Fishery Overview:

Initiated originally in 1994, a 4Vn Sentinel Fishery is conducted annually in 4Vn. The Sentinel Fishery Survey is conducted by commercial longliners and follows a stratified random design similar to that used by the Department of Fisheries and Oceans annual July groundfish surveys.

Four surveys have now been completed; September 1994, July and September 1995 and July 1996. Results are pending from a September 1996 Survey.

The geographical distribution of cod caught in all four surveys was similar. However, while catch rates in September 1994 and September 1995 were virtually identical, the catch rate during July 1995 and July 1996 were much lower. This appears to be a seasonal effect and supports longline fishermen observations that July catch rates historically have been lower.

Aside from the seasonal variance the July 1996 landings were still lower than anticipated and the Sentinel Fishery landings overall were considered low.

A comparison of the July 95 Sentinel Fishery and DFO's July trawl survey in 1995 demonstrated that cod were caught in the same area.

The Council recognizes the merits of Sentinel Fisheries particularly as a source of necessary assessment data. An expanded Sentinel Fishery with a broader self-funding commercial index component would provide essential commercial fishery data to the stock assessment process.

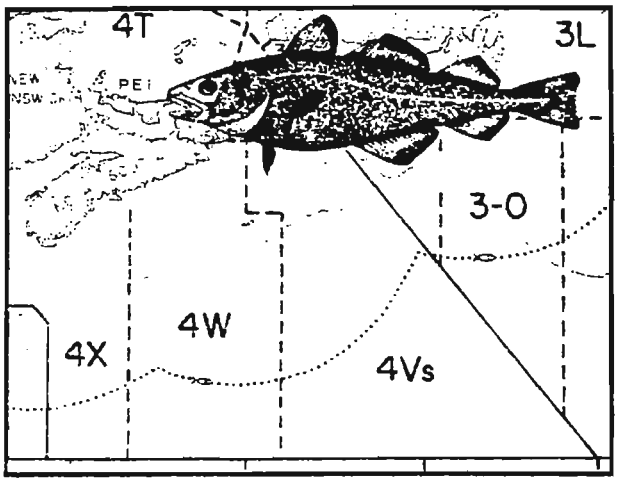
Council's views on Stock Status:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	**below average**
Total Biomass:	**below average**
Recruitment:	**below average level of recruitment**
Growth and Condition:	**size at age declined, below average**
Age Structure:	**below average**
Distribution:	**poor, below average**

Recent Exploitation Level: Fishery closed since Sept. 1993, Sentinel Fishery since Oct. 1994

4.4.2.2 COD 4VSW



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. This recommendation was repeated in November 1995 for the 1996 fishing season, consequently; the fishery has remained closed.

1996 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 the 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 the major impediment to stock rebuilding. They feel that there is an increase in abundance of 4VsW Cod. While they are not yet advocating re-opening the cod fishery, they feel the 10% cod by-catch limit is restrictive, prohibiting effective prosecution of the hake and pollock fisheries.

They recommend an increase in the by-catch of 4VsW cod for legitimate hake, pollock and halibut fisheries.

ANALYSIS:

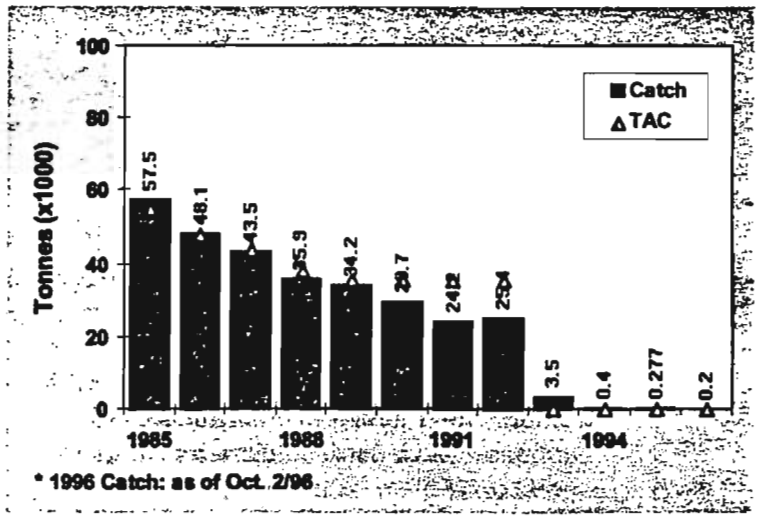
The 1996 DFO Stock Status Report indicates that:

- recruitment remains poor
- the adult population is near historical low
- fish condition and growth are poor
- there is significant predation by seals
- water remains cold

RECOMMENDATION # 30:

The Council recommends that

30.1. there be no directed fishery for 4VsW cod in 1997
30.2. an expanded Sentinel Fishery be considered for this stock
30.3. by-catches be kept to the lowest possible level.



The Council remains concerned about the depressed state of this stock and its dismal prospects. The apparent disappearance of the spring spawning components along with a number of other factors indicate that the resource is under significant ecological stress. There is no indication of any significant recruitment.

The Council continues to share the concerns expressed by area fishermen that grey seals are having a tremendous impact, by contributing to the increased mortality. This concern was echoed in the 1995 Stock Status Report which stated that there is a continuing predation by seals contributing to natural mortality. The 1996 Stock Status Report indicated that given the low and declining biomass of 4VsW cod and continuing growth of the grey seal population, the estimated consumption of 4VsW Cod by grey seals was 17,700t in 1995; an increase of 12% over 1994. At the same time, it has been reported that the Sable Island seal herd population underwent a 12% increase.

Sentinel Fishery Overview

The 4VsW Sentinel Fishery Survey, conducted for the first time in October 1995, landed a total of 6.7t of cod from a total of over 200 standardized longline sets with 1500 hooks/set. Sets were distributed throughout divisions 4Vs and 4VW from inshore to midshore waters. The survey was conducted primarily in waters not included in DFO research vessel surveys and, consequently, provided for a more comprehensive view of the distribution and abundance of adult cod. A review and consultation with the survey participants took place early in 1996 and indicated that, while the design of the 4VsW Sentinel Survey satisfied DFO Science requirements, it was not seen as being adequate from an industry perspective as it required fishermen to "fish where there is no fish" occasionally. Based on this review and the Councils own recommendation that "commercial-like" catch rate indices be obtained where possible, a commercial index component was included in the 1996 program.

The 1996 Sentinel Survey commenced on September 4, 1996. Unfortunately the picture remains bleak. The 1996 July Research Vessel Survey results indicated that the size composition of the stock is continuing to decrease; no fish in the 60-80 cm range were found.

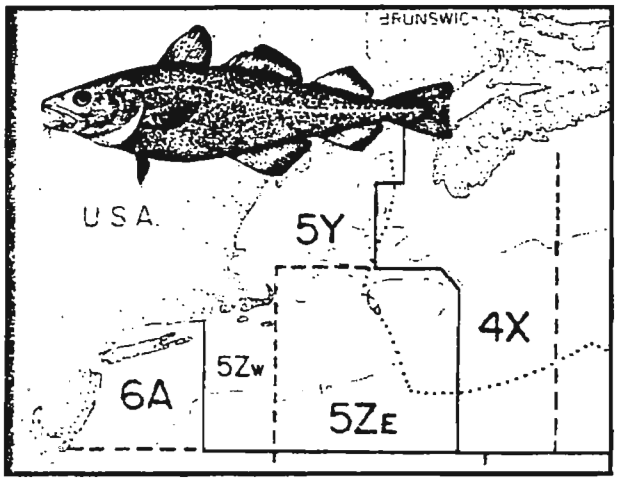
Council's views on Stock Status:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	**below average**
Total Biomass:	**well below average**
Recruitment:	**below average level of recruitment**
Growth and Condition:	**below average**
Age Structure:	**below average (smaller fish at age)**
Distribution:	**below average**

Recent Exploitation Level: fishery closed since September 1993

4.4.2.3 COD 4X



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. 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.

In November 1994, the Council recommended that the 1995 TAC for 4X cod be set at 9,000t. As well, Council recommended that 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. In the fall of 1995, the Council recommended a TAC of 11,000t for 1996 with mandatory dockside grading for all gear types.

1996 CONSULTATIONS:

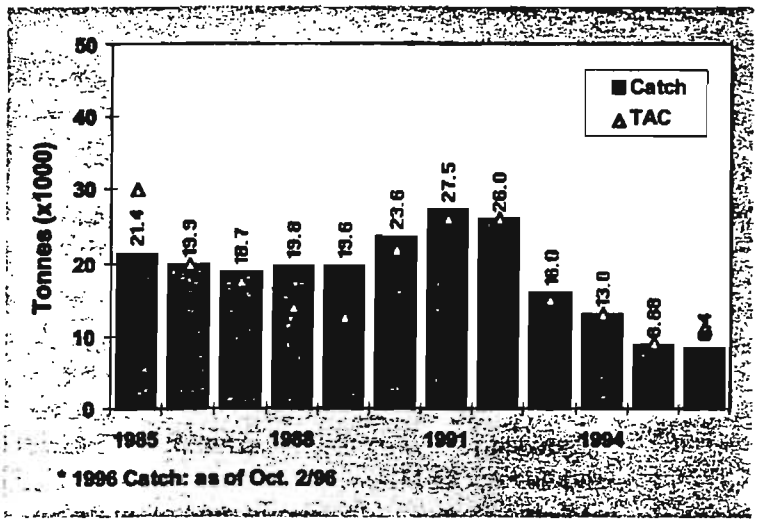
There was a considerable amount of discussion on this particular stock during the 1996 consultations. Most feel that the 4X Cod stock is in better shape than indicated in the past and is, in fact, improving. All fishing sectors are recommending an increase in the 4X cod TAC.

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.

RECOMMENDATION # 31:

The FRCC recommends that:

31.1. the 1997 TAC for 4X cod be set at 13,000t;
31.2. mandatory dockside monitoring be maintained for all gear types; and,
31.3. dialogue between DFO and industry concerning dumping, discarding and misreporting continue, to ensure that management measures to avoid these problems remain in place.



They felt that a slight increase in TACs, shared equitably among the various gear sectors, would enable respective conservation harvesting plans to work better and remove the need to dump, discard and misreport catches in order to make a paying trip. There was agreement from most of the inshore fishing sectors in South West Nova that the 4X cod stock could certainly stand an increase in TAC. The suggestions for a TAC ranged from 12,500t to 14,000t with the majority being in the order of 13,000t.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- the 1992 year-class is strong
- biomass is increasing since the 1994 historic low because of improved recruitment

The Council remains concerned about the acknowledged dumping of 4X haddock in this 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. The Council believes 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 1997 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.

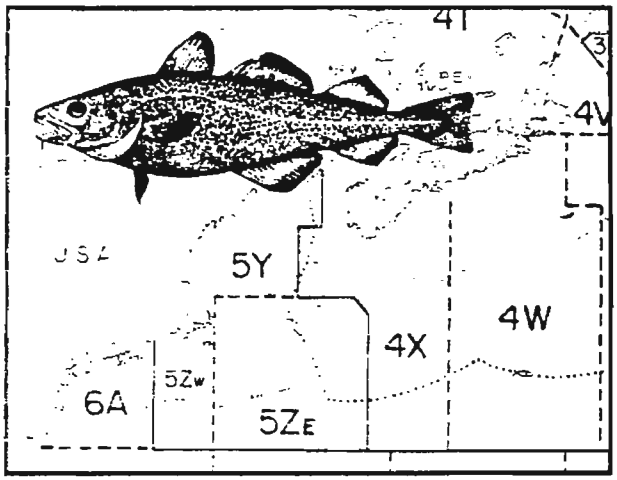
On a positive note, the 1996 Stock Status is clear that this stock is increasing, recruitment is good, and that geographical distribution is expanding. This growth is attributed to lower fishing mortality and a strong 1992 year-class. The biomass is at levels comparable to 1982/83. Consistent with the Stock Status Report and recommendations from the industry, the Council is recommending an increase in the TAC for 4X cod in 1997. The Council also notes the efforts made by the inshore ITQ survey participants in conjunction with DFO.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**increasing biomass**
	Compared to average
Spawning Biomass:	**increasing**
Total Biomass:	**average**
Recruitment:	**strong 92 year-class**
Growth and Condition:	**average**
Age Structure:	**average**
Distribution:	**average**

Recent Exploitation Level: .17 if 1996 TAC is taken

4.4.2.4
COD 5ZJ,M



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 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. In November 1995, the Council again recommended that bilateral consultations continue and that the fishery remain closed until June 1996. In May 1996, the Council recommended that the 1996 TAC for 5Zj,m cod be set at 2,000t.

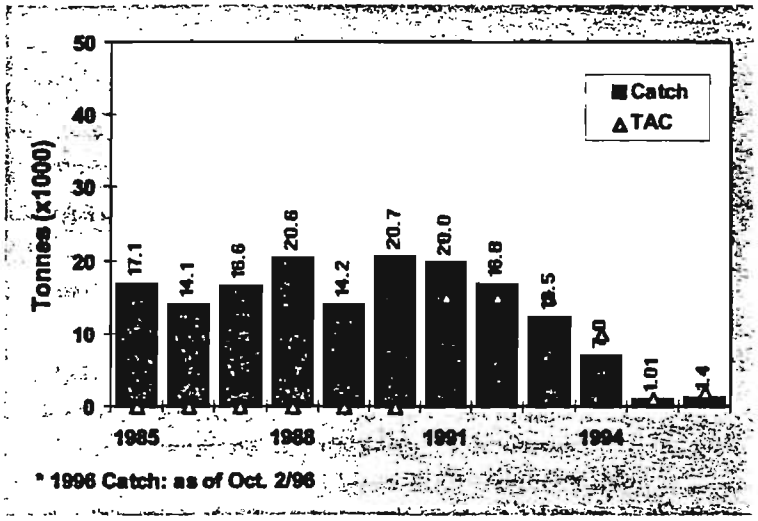
1996 CONSULTATIONS:

Consultations on 5Z stocks were held in Yarmouth in May, 1996. Stakeholders were unanimous in asking the Council to consider strong conservation measures on all 5Z stocks. Those who fish on Georges Bank have seen signs of recovery and are committed to seeing these stocks rebuild. There was a consensus that a cautious increase in the TAC for 5Zj,m cod would still

RECOMMENDATION # 32:

The FRCC recommends that:

32.1. bilateral consultations with the U.S. continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1997, prior to which time the Council will provide a definitive recommendation with respect to the 1997 TAC.



allow for rebuilding of the stock. All industry presentations recommended a number lower than $F_{0.1}$ for cod.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- the adult biomass is increasing slightly
- the exploitation rate is below $F_{0.1}$

While this stock was at its lowest observed level in 1994, it did increase in biomass, slightly, in 1995. Exploitation has decreased from a high of 41% in 91-93 to 10% in 1995 (i.e. by-catch fishery only). The 1995 year-class appears to be of moderate strength. The $F_{0.1}$ projection for this stock indicates that a combined Canada/U.S.catch effort of 3,500t will allow the biomass to increase slightly, consequently the increase in TAC to 2,000t for Canadian vessels in 1996.

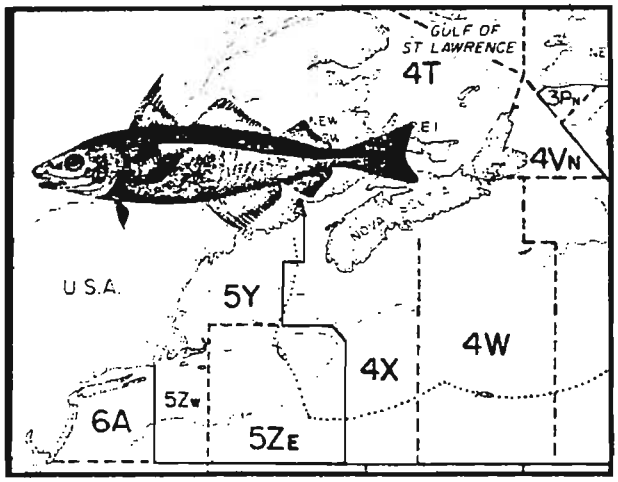
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: slight increase

	Compared to average
Spawning Biomass:	**below average**
Total Biomass:	**below average**
Recruitment:	**below average**
Growth and Condition:	**average**
Age Structure:	**average**
Distribution:	**below average**

Recent Exploitation Level: below average

4.4.2.5
HADDOCK 4TVW



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 and again for 1996.

1996 CONSULTATIONS:

Eastern shore fishermen believe that there are more haddock in 4VsW. They are seeing more haddock and larger haddock as legitimate by-catches to the hake and pollock fisheries throughout 4VsW. Consequently they are finding it hard to fish hake or pollock cleanly along the shore of Eastern Nova Scotia. The 10% by-catch provision for 4VsW haddock is now considered to be too prohibitive due to an obvious increase in abundance.

While not advocating a re-opening of the 4VsW haddock fishery at this time, fishermen recommended an increase in the by-catch limit for 4VsW haddock for legitimate hake, pollock and halibut fisheries.

ANALYSIS:

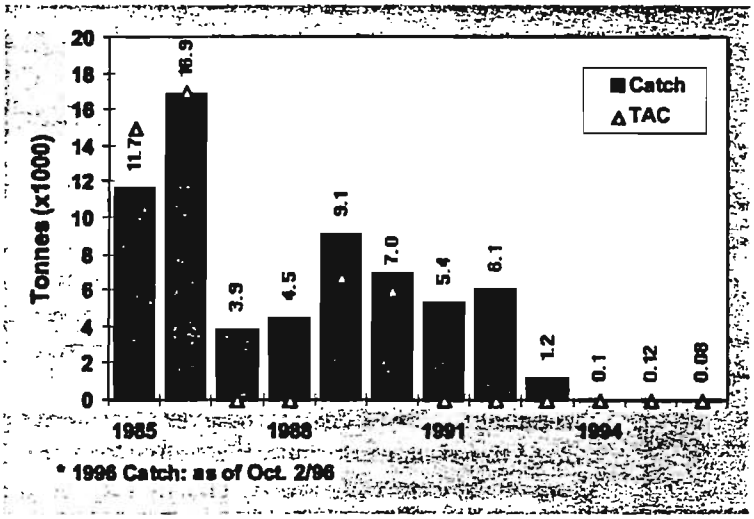
The 1996 DFO Stock Status Report for this species indicates that:

- the spawning biomass continues to be low
- 1992 and 1994 year-classes are above average
- while yield prospects are better than 4VsW cod, there is a need for a continued closure

RECOMMENDATION # 33:

The Council recommends that:

33.1. there continue to be no directed fishing for 4TVW haddock in 1997.
33.2. the closure of the Haddock box to all gears be continued.



In 1995, the Council noted that, with the removal of all fishing activity from the closed area in 1993 and a virtual closure of the fishery in 1994, exploitation had fallen to the lowest observed since 1970. Scientists indicate that the 1992 and 1994 year-classes must be protected to promote stock re-building. The fishing industry continues to believe that this stock should remain closed and the status quo maintained. However, they also believe that there should be more flexibility with respect to by-catch.

Sentinel Fishery Overview

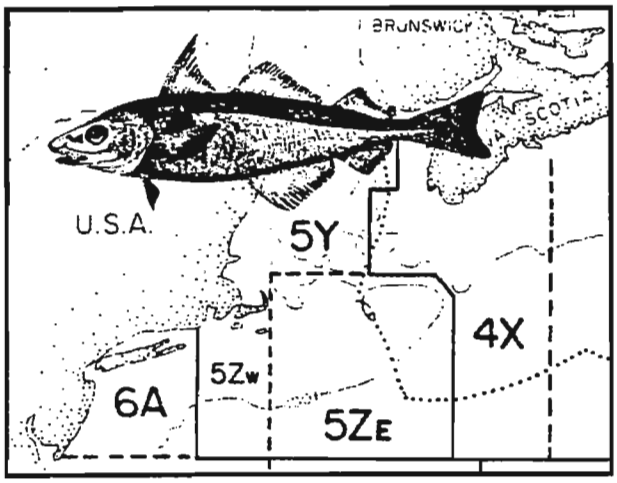
The 4VsW Sentinel Survey conducted in October 1995 landed a total of just over 6t of haddock from a total of about 220 standardized longline sets (1500 hooks per set). Unlike the results observed for cod, which came out of the same Sentinel Survey, there was no indication of numerous haddock in inshore waters at that time of the year. The 1996 Sentinel Survey commenced on September 4, 1996. However, results so far have not indicated a change in the overall picture, which remains bleak for 4TVW haddock.

Council's views on Stock Status:

Overall Stock Indicator	**extremely low spawning biomass**
	Compared to average
Spawning Biomass:	**below average**
Total Biomass:	**below average**
Recruitment:	**above Average**
Growth and Condition:	**average**
Age Structure:	**average**
Distribution:	**average**

Recent Exploitation Level: below average

4.4.2.6
HADDOCK 4X



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.

In November 1995, the Council recommended that the 1996 TAC for 4X Haddock be set at 6,500t, that mandatory dockside grading be implemented for all gear types and that the same closure procedure as recommended in 1995 be implemented for 1996.

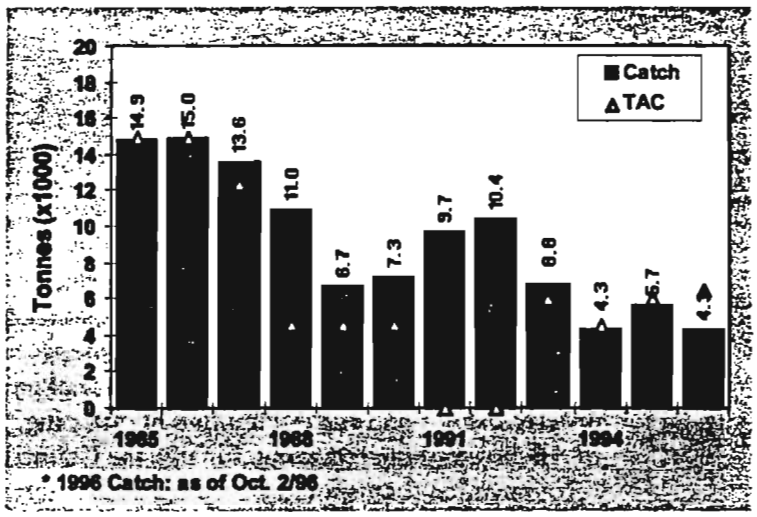
1996 CONSULTATIONS:

There was a general consensus from South West Nova fishermen in 1995 recommending slight increase to the TAC for 4X haddock in 1996. Industry is beginning to agree with the scientific assessment of this stock. In general, fishermen report that haddock abundance is stable, certainly higher than the levels showed in past surveys.

RECOMMENDATION # 34:

The FRCC recommends that:

34.1. the 1997 TAC for 4X Haddock be set at 6,700t;
34.2. mandatory dockside monitoring be maintained for all gear types;
34.3. should there be sufficient evidence of dumping, discarding and misreporting, the fishery be closed for the gear type involved until such time as fisheries managers can be assured that this activity will not continue; and
34.4. fisheries managers take appropriate measures to ensure the protection of incoming year-classes, including rigorously enforcing existing small fish protocols.



Given the general improvement in the status of this stock 1996, the industry is promoting a modest increase in the 1997 TAC for 4X haddock.

ANALYSIS:

The 1996 DFO Stock Status Report for 4X Haddock indicates that:

- the spawning biomass is starting to increase
- the 1996 exploitation rate is at 30%
- the 1996 Summer Survey showed improved abundance
- the 1993 and 1994 year-classes are strong
- measures are required to protect incoming recruitment

Mobile gear sector representatives indicate that haddock abundance has increased in 4X. Fixed gear fishermen fishing the banks also report increased abundance. The Council notes 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 was mostly due to record catches of one-year old haddock. The 1993 year-class was also stronger than average. The Council also notes, however, the concerns raised in the 1996 Stock Status Report with respect to a need to protect the 1993 and 1994 year-classes and is of the opinion that these year-classes must be protected to become mature and reproduce. The 1996 Stock Status Report suggests that a 1997 TAC of 6700t would not adversely affect the spawning stock biomass.

The Council believes 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 Council notes the efforts made by the fleet in developing, jointly with DFO scientists, a survey of resources in inshore areas. In 1996, the ITQ fleet conducted a groundfish survey in 4X for a second year. In comparison to 1995, there was a slight decrease in catch rates, from 55 kg per tow to 50. On the other hand, the haddock biomass increased in the 1996 summer research survey, from 34 kg per tow in 1995 to 53 in 1996.

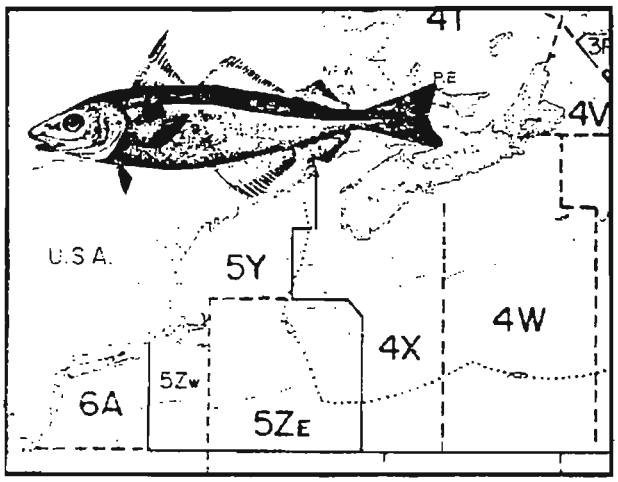
The challenge for 1997 will be to continue the process of ensuring long term sustainability of 4X cod, haddock and 4VWX5Zc pollock stocks and to find the most effective strategy for this mixed stock fishery to reach its full potential.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**below average, but improving**
	Compared to average
Spawning Biomass:	**below average**
Total Biomass:	**increasing**
Recruitment:	**good, above average**
Growth and condition:	**low**
Distribution:	**above average**

Recent Exploitation Level: above target

4.4.2.7
HADDOCK 5ZJ,M



HISTORY OF FRCC RECOMMENDATIONS:

In August 1993 and in November 1993, the Council recommended that, from a conservation perspective,the haddock fishery on Georges Bank 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. In May 1996, the Council recommended that the 1996 TAC for 5Z,m haddock be set at 4,500t.

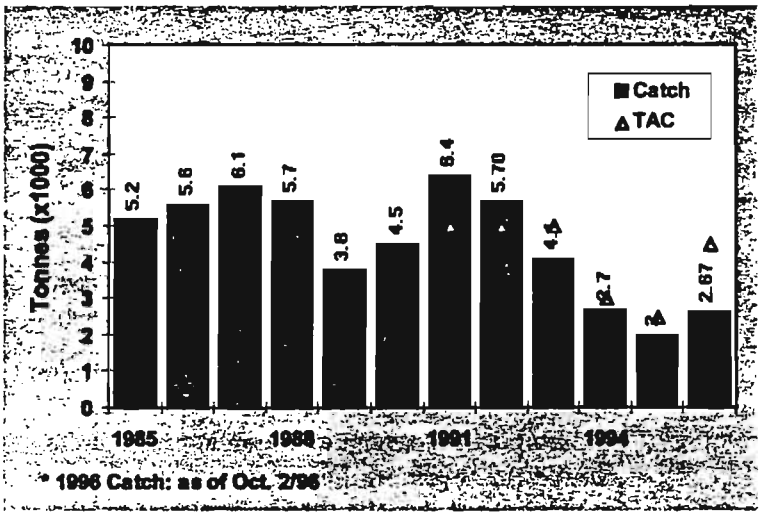
1996 CONSULTATIONS:

As with Georges Bank cod, there was considerable discussion on this stock during the 1996 groundfish consultations on 5Z stocks which took place in Yarmouth N.S. in May 1996. As with cod, stakeholders asked the FRCC to consider strong conservation measures. They believed that a cautious increase in the TAC for 5Zj,m haddock would still allow for rebuilding of the stock. It was noted that delaying the opening of the fishery until June 1996 has had a positive effect, as has the closed area on the U.S. side of the line.

RECOMMENDATION # 35:

The FRCC recommends that:

35.1. bilateral consultations with the U.S. continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1997, prior to which time the Council will provide a definitive recommendation with respect to the 1997 TAC.



ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- the biomass is rebuilding
- the age structure is expanding
- 1990's recruitment has been better than 1980's
- exploitation rates are now below $F_{0.1}$
- the spring 96 survey indicates strong 95 year-class

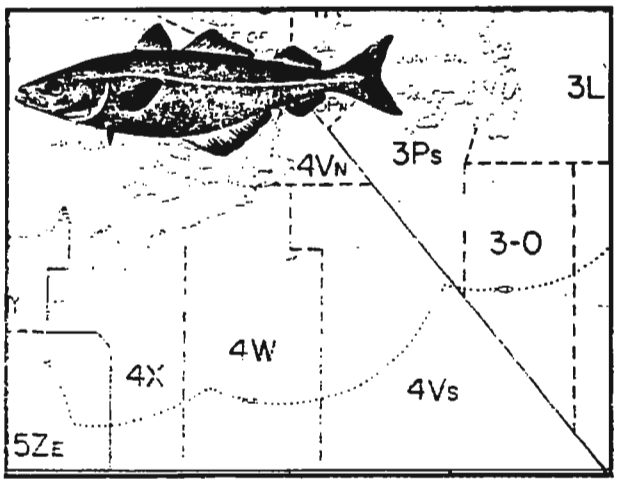
This is a transboundary stock, the majority of which appears to be in Canadian waters. The 1991 Stock Status Report suggests that the projected increase in 5Z haddock abundance is due primarily to recruitment of the 1992 year-class with support from the 1991 and 1993 year-classes. As well, the conservation efforts of the past two years with respect to joint industry/DFO management practices, and reduced fishing effort, have contributed to the growth of the biomass. The Stock Status Report indicates that the $F_{0.1}$ calculation is estimated at around 6,800t, but that the biomass would increase only marginally under that scenario.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator	**improved recruitment**
	Compared to average
Spawning Biomass:	**fair**
Total Biomass:	**average**
Recruitment:	**average to good**
Growth and Condition:	**fair**
Age Structure:	**average**
Distribution:	**average**

Recent Exploitation Level: average

4.4.2.8
POLLOCK 4VWX5ZC



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 the 2nd Groundfish Workshop held in early October 1995 provided a forum to disucss possible measures to further improve conservation of groundfish stocks in this area. In November 1995, the Council recommended that the 1996 TAC for 4VWX5Zc pollock be set at 10,000t.

1996 CONSULTATIONS:

Given the improvements in the outlook for this stock in the 1996 Stock Status Report, the industry was particularly interested in giving this stock appropriate attention during consultations.

While pleased to see the overall positive signs of growth and abundance, the industry expressed a degree of hesitancy about moving too fast. All concerned felt that although the TAC for 4VWX5Zc pollock could certainly stand an increase in TAC for 1997, there remains the need

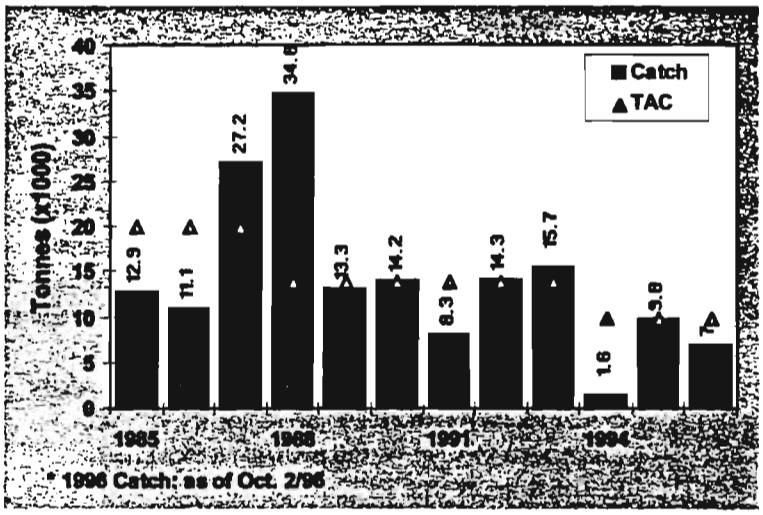
RECOMMENDATION # 36:

The FRCC recommends that:

36.1 the 1997 TAC for 4VWX5Zc pollock be set at 15,000t.

36.2 DFO 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.

36.3 DFO scientists be encouraged to look at other abundance indicators.



to proceed with caution. The consensus of the discussions on 4VWX5Zc pollock was that an increase in the 1997 TAC in the order of perhaps 40% is in order. Some fishermen noted the absence of very large pollock.

Analysis

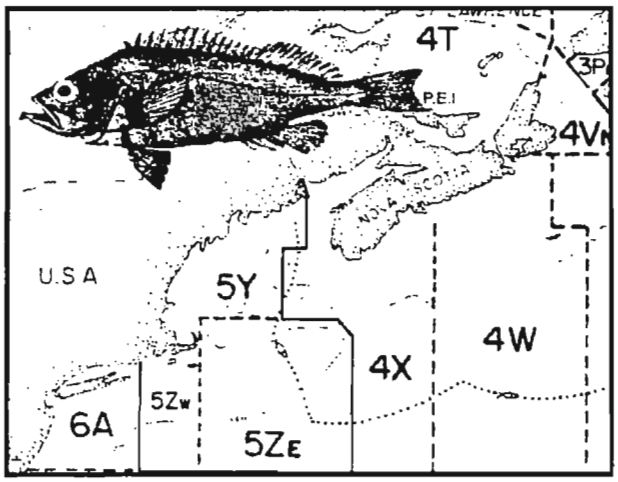
The 1996 Stock Status Report indicates that the biomass is starting to show signs of recovery due mainly to the strong 1989 year-class. Although year-classes subsequent to 1989 are weak, the 1997 advice at $F_{0.1}$, assuming the 1996 TAC is taken, is 22,159t. While there are reports of high abundance throughout the Bay of Fundy, there is a general absence of larger fish. As well, there is a lower abundance of pollock reported on the Eastern Scotian Shelf. There is a degree of uncertainty in the assessment because of problem in aging fish between 4VW and 4X and a change in age groups used and because of the large geographic range of the stock. Consequently, while the Council feels that there is room for optimism, it is felt that we should proceed with a degree of caution. The Council feels that an increase in the 1997 TAC for 4VWX5Zc pollock in the order of 40% to 50% would be in order.

Council's views on Stock Status:

Overall Stock Indicator:	**increasing biomass**
	Compared to average
Spawning Biomass:	**near average**
Total Biomass:	**below average**
Recruitment:	**strong 89 year-class**
Growth and Condition:	**average**
Age Structure:	**average**
Distribution:	**changing, below average**

Recent Exploitation Level: below average

4.4.2.9
REDFISH UNIT 3 - 4WDEHKLX



HISTORY OF FRCC RECOMMENDATIONS:

In November 1993 and November 1994, the Council recommended that the 1994 TAC for Unit 3 redfish be set at 10,000t. The Council also recommended in 1994 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. In November 1995, the Council reiterated that there was a need for maintaining for 1996 the same small fish closure provisions as recommended in 1994, with a 1996 TAC of 10,000t.

1996 CONSULTATIONS:

Industry stakeholders emphasized the need to protect small fish in this area. Some stakeholders viewed mesh size increases as a method to avoid the capture of small fish while others supported closed areas and harvesting in deeper waters as effective means to avoid the capture of juveniles. There was general support for the small fish protocols. Particular note was made of by catch problems of traditional groundfish species in the directed redfish fishery in this area.

ANALYSIS:

The 1996 DFO Stock Status Report indicates that:

- the abundance of Unit 3 redfish had been relatively stable since the late 1980's.
- indications of an improvement in recruitment in recent years.
- catches of 10,000 t in 1997 would approximate the $F_{0.1}$ level.

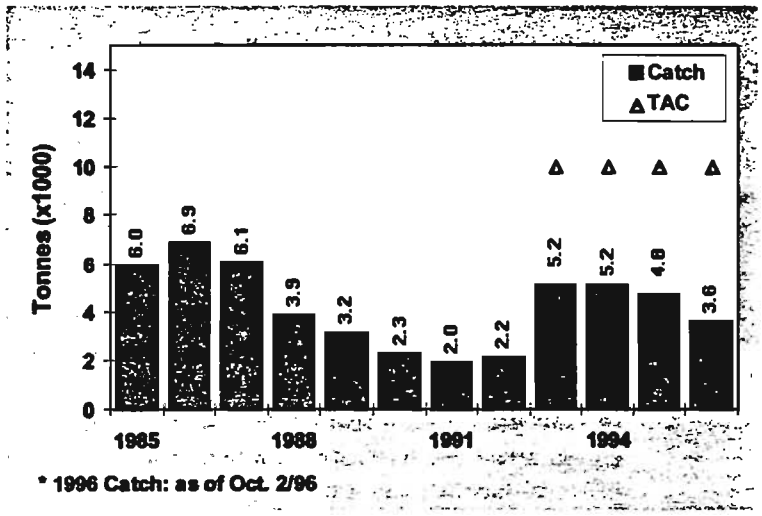
RECOMMENDATION # 37:

The FRCC recommends that:

37.1. the 1997 TAC for Unit 3 redfish be set at 10,000 t.

37.2. the small fish protocol be consistently applied and enforced.

37.3. other measures to avoid small fish should be evaluated, including increased mesh size. Any increase in mesh size should be implemented only after industry and science are convinced that there will not be an increase in post selection mortality.



The Council is alarmed to see in the Stock Status Report incidences of small fish being landed fr use as lobster bait. The Council is troubled by these reports and the apparent lack of enforcement of the small fish protocol.

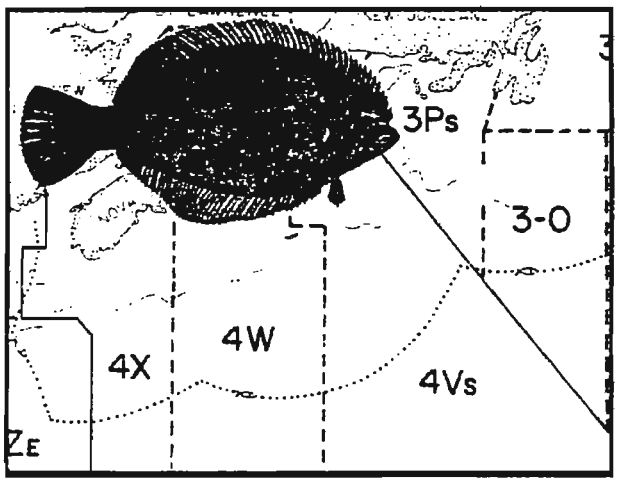
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: stable

	Compared to average
Spawning Biomass:	**stable**
Total Biomass:	**stable**
Recruitment:	**improving**
Growth and Condition:	**unknown**
Age Structure:	**improving**
Distribution:	**poor**

Recent Exploitation Level: moderate

4.4.2.10 FLATFISHES 4VW, 4X



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. In November 1995, the Council recommended that the 1996 TAC for 4VW flatfishes be set at 3,500t and that the 1996 TAC for 4X+5 flatfishes be set at 3,375t.

1996 CONSULTATIONS:

At the consultations held in Port Hawkesbury, 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 1997 for flatfish in 4VW and 4X. At the Dartmouth N.S. consultation, this stock was discussed as well; the consensus was that there be no change in the 1997 TAC's for both stock components.

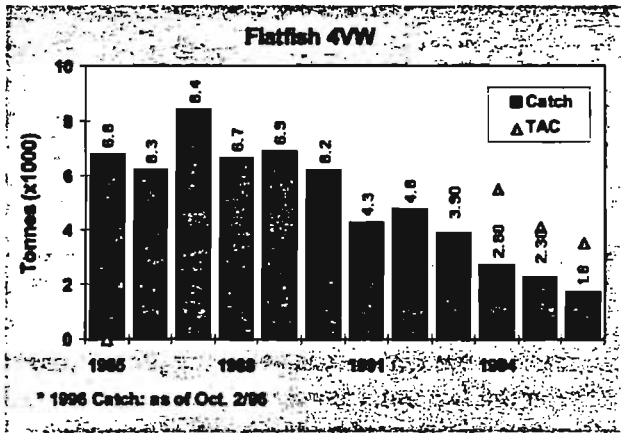
RECOMMENDATION # 38:

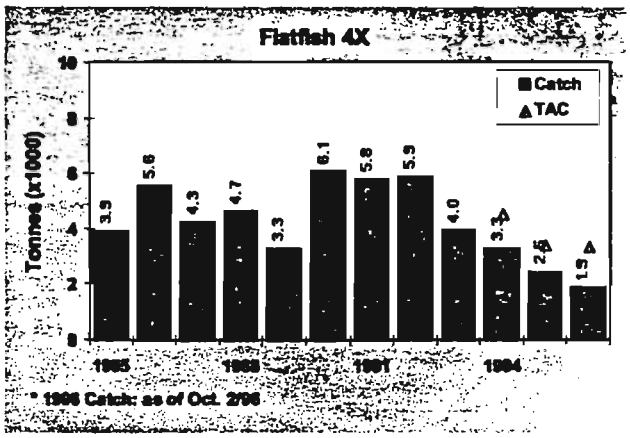
The FRCC recommends that:

38.1. the 1997 TAC for 4VW flatfishes be set at 3,000t and that efforts to avoid the capture of small fish be continued.

38.2. the 1997 TAC for 4X+5 flatfishes be set at 3,000t and that efforts to avoid the capture of small fish be continued.

38.3. continued work be carried out by DFO and the industry, possibly in conjunction with the dockside monitoring program, to address the problem of species identification.





ANALYSIS:

The 1996 DFO Stock Status Report for 4VW Flatfish indicates that:

- effort has been declining
- biomass overall is in decline
- there are signs of incoming recruitment except for yellowtail

The 1996 Stock Status Report takes a precautionary position noting that 4W flatfish population is showing a decline in abundance similar to 4V components, even in the absence of any significant level of fishing. The Report suggests that the declines observed in 4V may not be entirely related to fishing. Consultations with industry were somewhat mixed, but generally indicated a scarcer flatfish resource. The 1996 Stock Status Report warns that a catch at or above the 1996 level would not likely promote recovery of this stock.

The 1996 DFO Stock Status Report for the 4X stock component also indicated that:

- abundance is stable for winter flounder, plaice and yellowtail
- witch flounder abundance is declining
- there is incoming recruitment for all species
- 1997 Prospects - No change except for witch (declining abundance)
- No directed fishery for witch flounder

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 and recommends a decrease in the TAC's for both stock components for 1997.

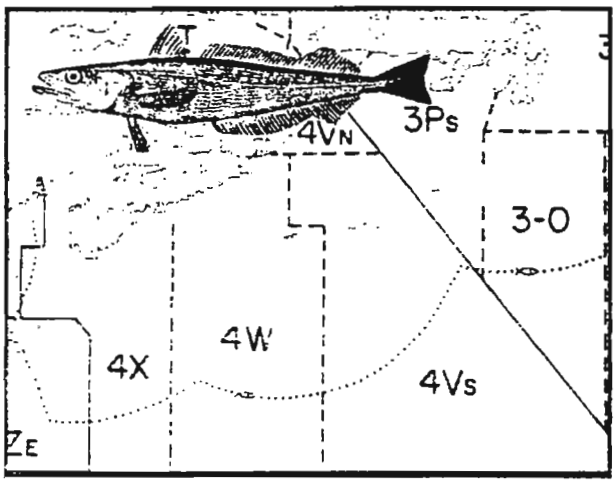
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: remains poor

	Compared to average
Spawning Biomass:	**low**
Total Biomass:	**low**
Recruitment:	**near average**
Growth and Condition:	**poor**
Age Structure:	**average**
Distribution:	**poor**

Recent Exploitation Level: mixed above average in 4VW; average in 4X

4.4.2.11
SILVER HAKE: SCOTIAN SHELF - 4VWX



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. In November 1995, the Council recommended that the 1996 TAC for 4VWX silver hake remain at 60,000t.

1996 CONSULTATIONS:

Information obtained at various fisheries management meetings show that fishermen remain concerned about the silver hake resource in 1996. Fishermen continue to believe that this stock is not as healthy as indicated by scientific assessments, and are concerned about the by-catch of other groundfish in the silver hake fishery. Some feel the fishery should be reduced regardless, as silver hake is an important food for cod.

ANALYSIS:

The 1996 DFO Stock Status Report for this species indicates that:

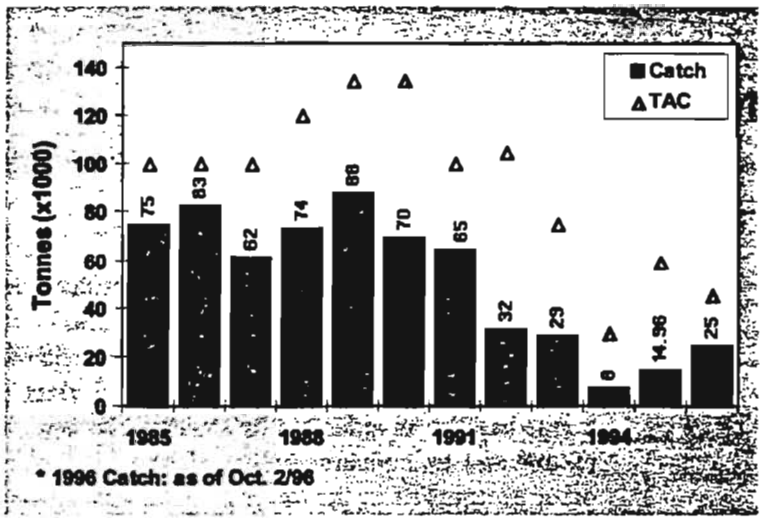
- the estimates of the 90-93 year-classes are variable
- commercial catch rates have been dropping since 1989
- weight of age is declining
- the biomass is now stable but low
- the 94 and 95 year-classes are strong

The Council notes that, effort in 1995 remained greatly reduced over historical levels. The June 1996 Report of the NAFO Scientific Council indicates that in-coming year-classes (1994 and 1995) are better than those of late 1980s and early 1990s and that the biomass is increasing. Scientists

RECOMMENDATION # 39:

The FRCC recommends that:

39.1. the 1997 TAC for 4VWX silver hake be set at 50,000t.



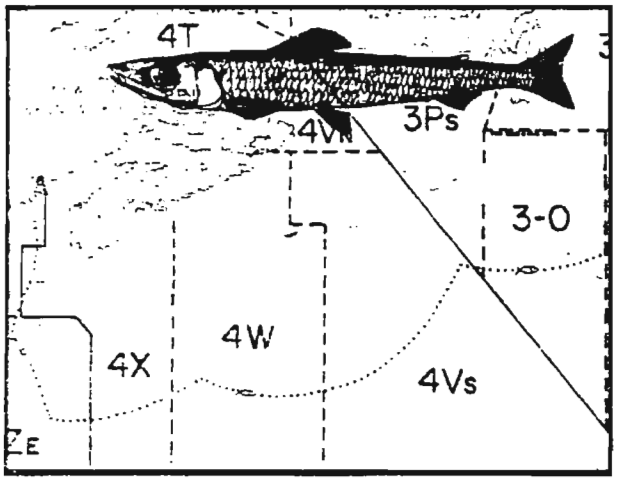
calculated that the $F_{0.1}$ catch for 1997 was of the order of 50,000t. The 1996 Stock Status Report confirms that the 4VWX Silver Hake stock is showing signs of re-building.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**increasing biomass**
	Compared to average
Spawning Biomass:	**increasing**
Total Biomass:	**increasing**
Recruitment:	**above average (94 and 95 year-classes)**
Growth and Condition:	**above average**
Age Structure:	**average**
Distribution:	**average**

Recent Exploitation Level: below $F_{0.1}$ level

4.4.2.12 ARGENTINE 4VWX



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 and this recommendation was repeated for 1996.

1996 CONSULTATIONS:

There were no specific comments concerning this stock during the 1996 consultative process.

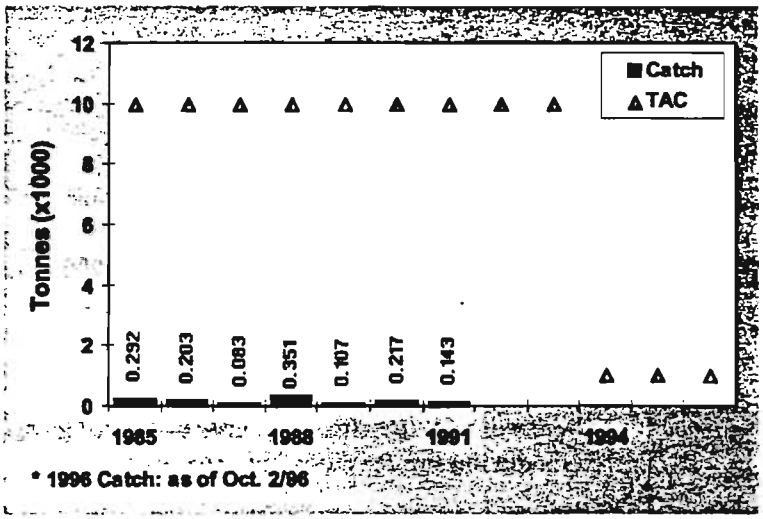
ANALYSIS:

The 1996 DFO Stock Status Report indicates tha there is too little known about this stock component to generate sufficient data for analytical purposes. Given the by-catch nature of this fishery and the low catches in recent years, the Council believes that the 1997 TAC can continue to be set at 1,000t, as a precautionary measure.

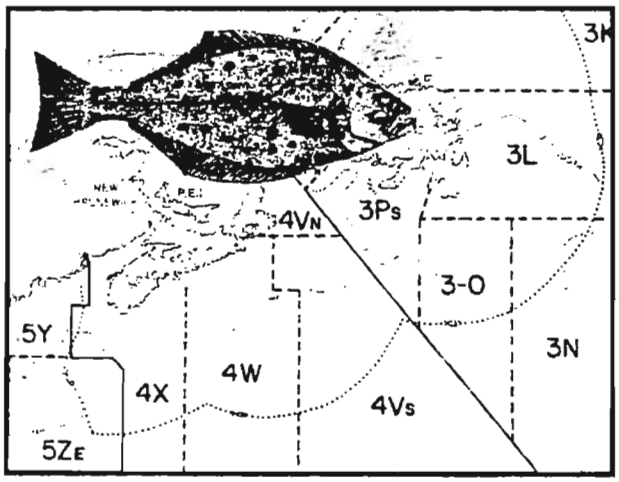
RECOMMENDATION # 40:

The FRCC recommends that:

40.1. the 1997 TAC for 4VWX argentine be set at 1,000t, consistent with the truly by-catch nature of this fishery.


Tonnes (x1000)
12
10
8
6
4
2
0
Catch
TAC
0.232
0.203
0.083
0.351
0.107
0.217
0.143
1985
1988
1991
1994
* 1996 Catch: as of Oct. 2/96

4.4.2.13
Atlantic Halibut: Grand Banks & Scotian Shelf - 3NOPs4VWX5Zc



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 81 cm (32 inches) to be released. This was implemented in 1994 and remains a critical component of the FRCC recommendation for this stock.

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. In November 1995, the Council recommended that the 1996 TAC for Atlantic halibut remain at 850t with the same small halibut release provision.

1996 Consultations:

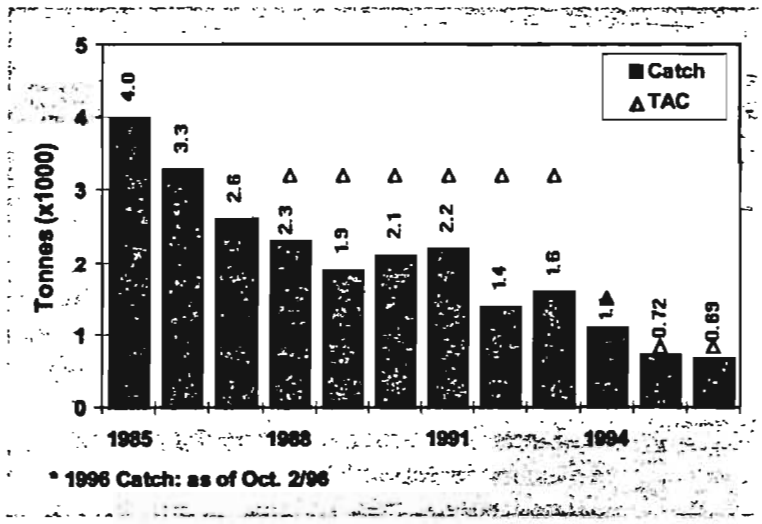
Inshore fishermen in 4Vn (Northern Cape Breton) and along the eastern shore of Nova Scotia (4W) reported a dependence on the halibut fishery during the 1996 consultation. As well, they suggested that halibut appeared to be slightly more abundant than observed in the past. This species was raised again in Dartmouth and in Yarmouth. Inshore fishermen maintain the fishery appears to be stable. It is particularly important to inshore fishermen in Eastern Nova Scotia and Cape Breton and all concerned are advocating a slight increase to the 1997 TAC given the extremely large area covered by this stock and the

Recommendation # 41:

The FRCC recommends that:

41.1. the 1997 TAC for 3NOPs4VWX5Zc Atlantic halibut be set at 850t, and that the provision for the release of halibut smaller than 81cm be maintained.

41.2. in addition, a joint DFO/industry study be conducted to assist in the overall assessment process, such as appropriate biological sampling, a tagging/movement component, identification of stock sub-components and identification of alternative survey indices.



widespread belief that the stock has not been properly assessed given the difficulty of finding reliable abundance indicators.

ANALYSIS:

The 1996 DFO Stock Status Report for this species indicates that:

- effort increased slightly in 1995
- there is a decline in recruitment
- the resource in severely depleted state
- catches are not sustainable at current level

The 1995 Stock Status Report indicated that stock conditions in 1996 were not expected to be any different than in 1995 and that it would be necessary to maintain present restrictions for several years. The 1996 Stock Status Report states that all biological indicators suggest a stock in a severely depressed state and that maintenance of the existing level of effort in this stock is likely to further the decline in this resource.

The Council notes that again, 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. At the same time, the Council is sensitive to industry comments that the Atlantic halibut stock, given its large range, has not yet been properly assessed due to the lack of satisfactory abundance indices. Consequently, the Council supports additional work in this area.

Further to these concerns, many scientists agree with fishermen who feel the trawl groundfish surveys, which aim at all groundfish species, are unsuitable for accurate halibut assessment purposes. Fishermen have expressed a wish to participate in programs to provide science with more appropriate raw data on which to base assessments. The Council supports such initiatives.

Given the vast area covered by this single assessment, fishermen contend there could be several stock components. They express a requirement for a modest increase in TAC to facilitate additional research.

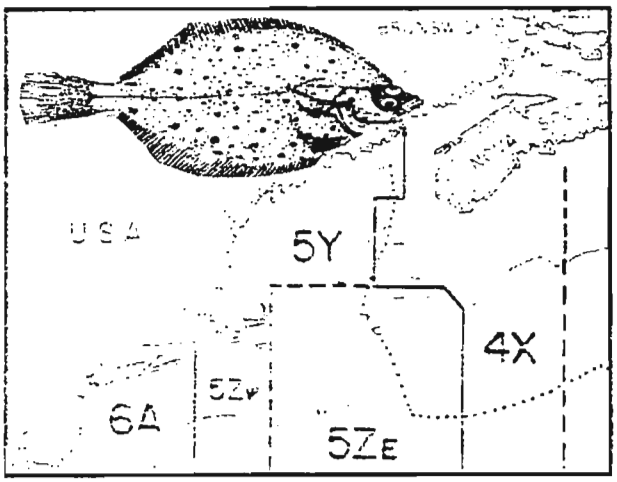
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: depressed biomass

	Compared to average
Spawning Biomass:	**low**
Total Biomass:	**low**
Recruitment:	**low, below average**
Growth and Conditions:	**Unknown**
Age Structure:	**below average**
Distribution:	**below average**

Recent Exploitation Level: high, above average

4.4.2.14
YELLOWTAIL FLOUNDER: GEORGES BANK - 5ZJ,M



HISTORY OF FRCC RECOMMENDATIONS:

The directed fishery for yellowtail flounder began only recently, with 8 to 10 boats participating in a fishery. It was expanded rapidly in 1994, with about 40 vessels pursuing the fishery. In November 1995, the Council recommended that bilateral consultations continue with the U.S. with the objective of undertaking management action appropriate to rebuild this stock. In the meantime, it was recommended that the fishery remain closed until June 1996, prior to which time the Council would provide a definitive recommendation with respect to the 1996 TAC. In May 1996, the Council recommended that the 1996 TAC for 5Z, in yellowtail flounder be set at 415t.

1996 CONSULTATIONS:

There was some debate with respect to 5Zj,m yellowtail flounder at the May 1996 consultation in Yarmouth, N.S.. Again, as with cod and haddock, stakeholders asked the Council to consider strong conservation measures. An increase in the TAC for 5Z yellowtail did not, in the end, hold much support and fishermen tended to agree with DFO Science.

ANALYSIS:

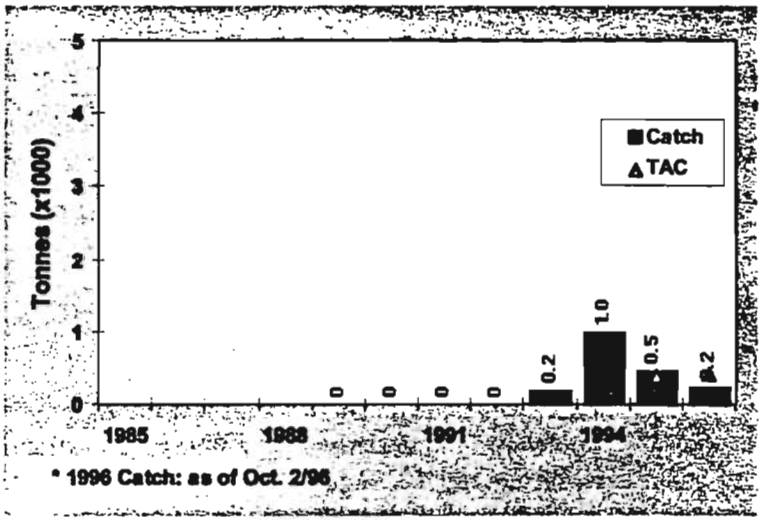
The 1996 DFO Stock Status Report for this species indicates that:

- this is a newly-established Canadian Fishery
- resource (abundance) is depressed compared to historical levels
- 87, 90 and 92 year-classes are near average
- Exploitation rate is at 40% (above $F_{0.1}$) for 1995

RECOMMENDATION # 42:

The FRCC recommends that:

42.1. bilateral consultations with the U.S. continue with the objective of undertaking management action appropriate to re-build this stock. In the meantime, the fishery should be closed until June 1997, prior to which time the Council will provide a definitive recommendation with respect to the 1997 TAC.



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

The 1995 Stock Status Report indicated 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. It also indicated that present harvest levels were likely exceeding any reasonable reference, and that consequently annual catches should not exceed 435t. The 1996 Stock Status Report indicated that commercial catch rates and the most recent survey observations suggest that abundance increased between 1995 and 1996. Nevertheless, the biomass remains very low compared to historic levels. Consequently, it is felt that the 1997 TAC should not be increased.

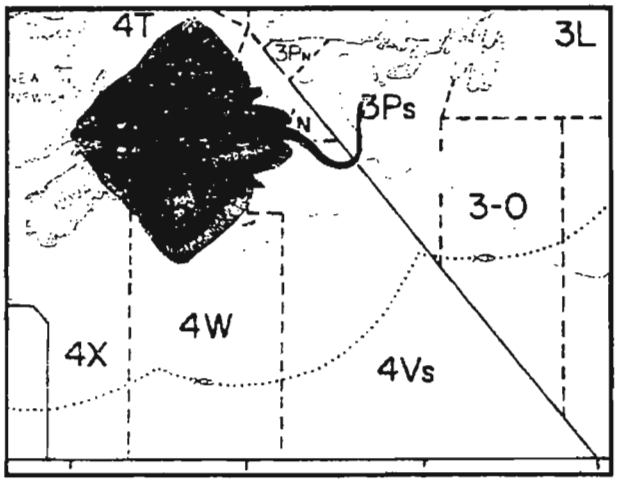
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: increase in abundance

	Compared to average
Spawning Biomass:	**average**
Total Biomass:	**low**
Recruitment:	**low**
Growth and Condition:	**fair**
Age Structure:	**poor**
Distribution:	**average**

Recent Exploitation Level: average

4.4.2.15
SKATES: SCOTIAN SHELF - 4VSW



HISTORY OF FRCC RECOMMENDATIONS:

This is the second time that the Council has had an opportunity to view information on this fishery and to formulate recommendations for its conservation.

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 by-catch 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. In 1996, the TAC was lowered to 1200t, with an additional 20% by-catch allowed in the directed flatfish fishery.

1996 CONSULTATIONS:

Several participants in the 4VsW experimental skate fishery were present at the Dartmouth N.S. consultation. The four-vessel, five-year experimental fishery appears to be proceeding very well. There were no proponents for an expanded fishery at this time.

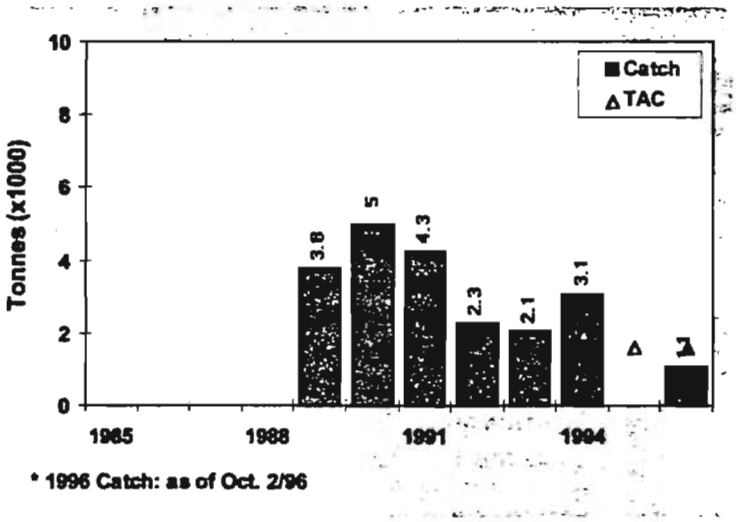
ANALYSIS:

The biomass index of skates from annual summer surveys has shown a general decline since 1982. In 1995, DFO scientists indicated 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 indicated the need for a continuation of a conservative approach to harvesting. Given the low reproductive rate

RECOMMENDATION # 43:

The FRCC recommends that:

43.1. the 1997 TAC for 4VsW skates be set at 1,200t, including by-catch.
43.2. measures be implemented to diversify size and species of skate in the catch.



common to skate and the current practice of selective removal of large individuals, a reduction in the reproductive potential of the stock is possible.

The 1996 DFO Stock Status Report for this species indicates:

- this is an experimental fishery
- the biomass of thorny skates is declining
- discard rates are high
- a harvest of 1200t is consistent with conservation

Consequently, Council feels that the experimental fishery should continue at a similar level of fishing effort in 1997 to increase our understanding of the resource and to provide the basis for improved assessment and management in the future.

Measures should be implemented to diversify the size and species of skate to maintain a viable fishery.

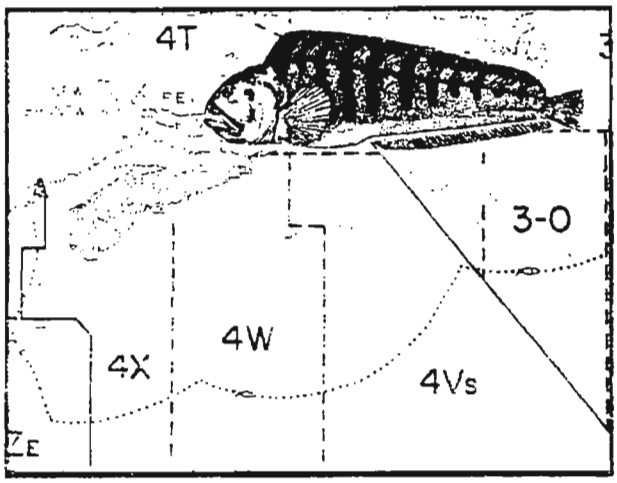
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:

	Compared to average
Spawning Biomass:	**unknown**
Total Biomass:	**below average (Thorny Skates)**
Recruitment:	**below average**
Growth and Condition:	**average**
Age Structure:	**below average**
Distribution:	**below average**

Recent Exploitation Level: average

4.4.2.16
WOLFFISH: SCOTIAN SHELF - 4VWX



HISTORY OF FRCC RECOMMENDATIONS:

This is the second year that the Council has had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource. With the limited information available in 1995 on which to base a firm recommendation, the Council recommended a precautionary TAC for 1996 at 600t.

1996 CONSULTATIONS:

During the 1996 consultation process, the 4VWX wolffish issue was raised on several occasions. Comments ranged from having a wide open fishery on wolffish, as this species has an adverse effect on lobster stocks to not setting a rigid limit on TAC, as a fixed limit could lead to closing other fisheries. Wolffish is seen as a significant by-catch in other fisheries. Too low a TAC, likely to be caught, will see other fisheries shut down because there will be no quota left to cover the by-catch.

ANALYSIS:

The 1996 DFO Stock Status Report for this species indicates that:

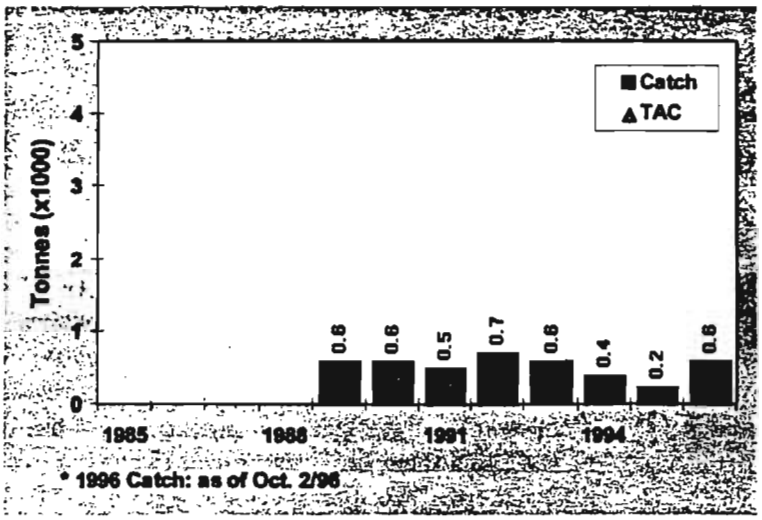
- the biomass is declining
- there are signs of incoming recruitment
- fishing pressure is high

It appears that the concentrated fishing effort in 4X on this species, which has likely contributed to overall decline. As well, scientists believe that catches in excess of 600t in 1997 would not likely be sustainable.

RECOMMENDATION # 44:

The FRCC recommends that:

44.1. catches should be limited of the historical levels consistent with the truly by-catch nature of this fishery, with sufficient flexibility to avoid closing traditional directed groundfish fisheries.



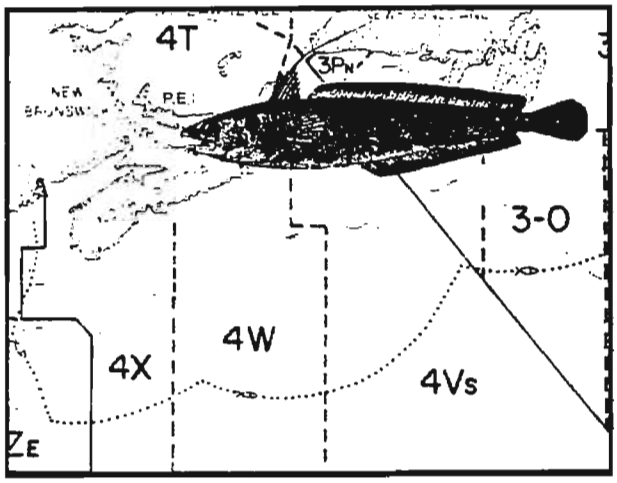
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	low, declining in 4VWX
Total Biomass:	low, declining in 4VWX
Recruitment:	near average, small fish in 4X
Growth and Condition:	below average
Age Structure:	poor
Distribution:	average

Recent Exploitation Level: unknown

4.4.2.17
WHITE HAKE: SCOTIAN SHELF - 4VWX+5ZC



HISTORY OF FRCC RECOMMENDATIONS:

This is the second time that the Council has had an opportunity to review information on this fishery and to formulate recommendations for its conservation. In November 1995, the Council recommended that the 1996 TAC for 4VWX white hake be set at 2,500t.

1996 CONSULTATIONS:

Similar comments were raised during the 1996 consultations concerning 4VWX white hake as were raised with respect to wolffish. Fishermen are concerned that these minor fisheries with low TAC's have the potential of being fished-up quickly and then being responsible for the closure of more important commercial fisheries because no quota remains to offset legitimate by-catches.

ANALYSIS:

The 1996 DFO Stock Status Report for this stock component indicates that:

- recruitment in 4VWX+5 is at an average level;
- the reduction in abundance is a concern;
- the trawlable biomass in 4VW is 4,700t and in 4X is 31,000t;
- abundance levels are at moderate levels in 4V and below average in 4W and 4X;
- the stock structure is complex.

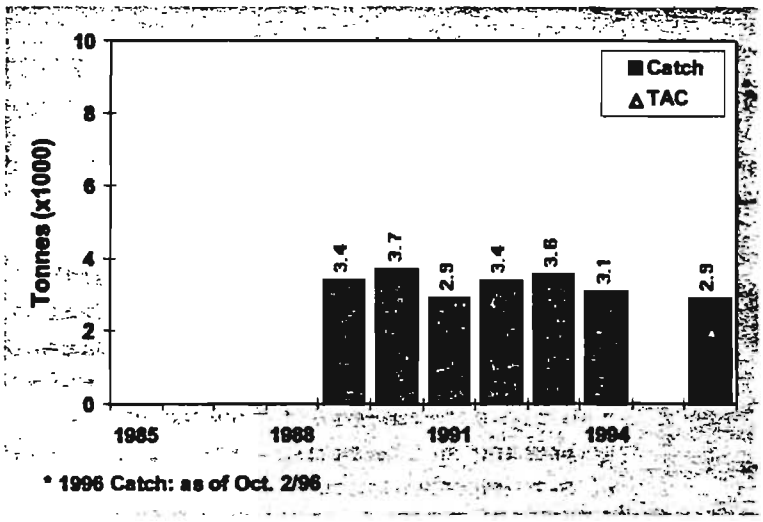
RECOMMENDATION # 45:

The Council recommends that:

45.1. the 1997 TAC for 4VWX+5Zc white hake be set at 3,500t with flexibility to avoid closing traditional directed groundfish fisheries.

45.2. for assessment purposes, separation of management units 4VW and 4X+5Zc should be implemented.

45.3. given the belief that the western stock (4X+5Zc) is transboundary, the Council recommends that this stock be included in the bilateral consultations on groundfish with the U.S. with the objective of developing a joint management strategy.



The 1996 Stock Status Report indicates that the existing management units used to describe this stock are not consistent with the distribution of this species. Separation of management units to 4VW, and 4X and 5 should be considered.

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. The Council feels that annual catches of the order of 3,500t would be more consistent with the status of the stock based on long term averages.

The assessment indicates that the 4VW stock component is declining and this should be taken into consideration in developing and in assessing CHP's.

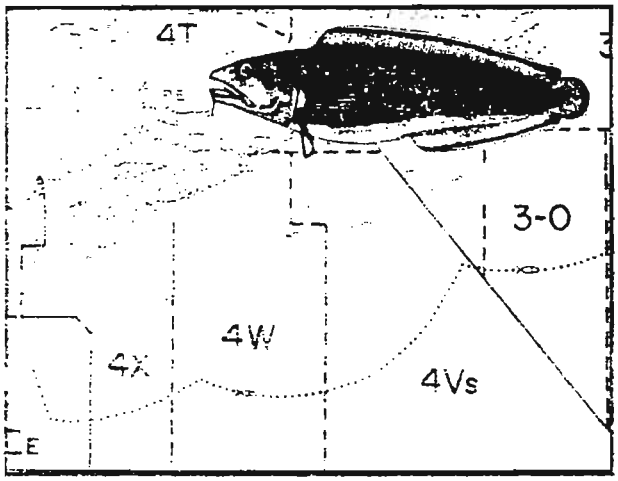
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:

	Compared to average
Spawning Biomass:	**declining in 4VW, near average in 4X**
Total Biomass:	**average**
Recruitment:	**average**
Growth and Condition:	**average**
Age Structure:	**average**
Distribution:	**average**

Recent Exploitation Level: average

4.4.2.18
CUSK: SCOTIAN SHELF - 4VWX



HISTORY OF FRCC RECOMMENDATIONS:

This is the second year that the Council had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource. In November 1995, the Council recommended that the 1996 TAC for 4VWX cusk be set at 1500t.

1996 CONSULTATIONS:

There were no specific comments nor recommendations on 4VWX cusk during the 1996 consultative process.

ANALYSIS:

The 1996 DFO Stock Status Report for this stock component indicates that:

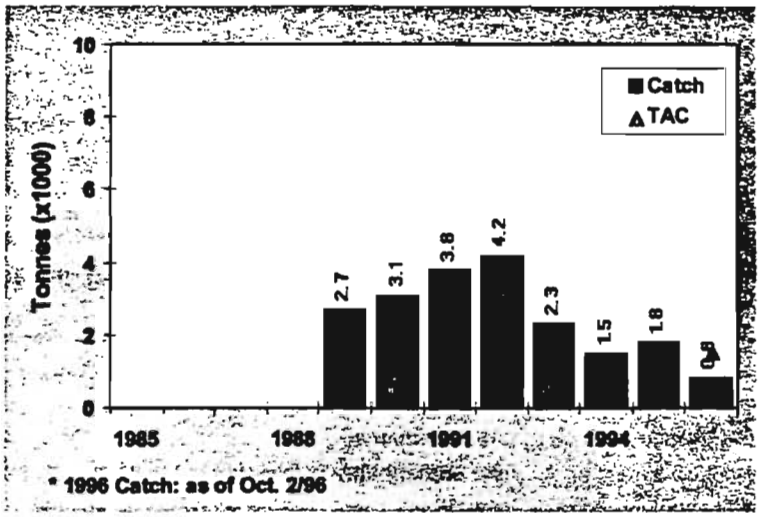
- cusk are primarily caught in 4X
- there has been slow decline in abundance
- the survey shows biomass at historical low

In the 1995 Stock Status Report, scientists indicated that the cusk biomass in both 4W and 4X has shown a gradual decline since groundfish surveys commenced in 1970. The 1996 Stock Status Report confirms this decline, adding that the 1995 estimate is amongst the lowest observed. The Report states that, given the estimate of low and declining biomass, catches should be restricted to below 2,000t.

RECOMMENDATION # 46:

The FRCC recommends that:

46.1. the 1997 TAC for 4VWX cusk should not exceed historical catch levels, with sufficient flexibility to avoid closing traditional directed groundfish fisheries.



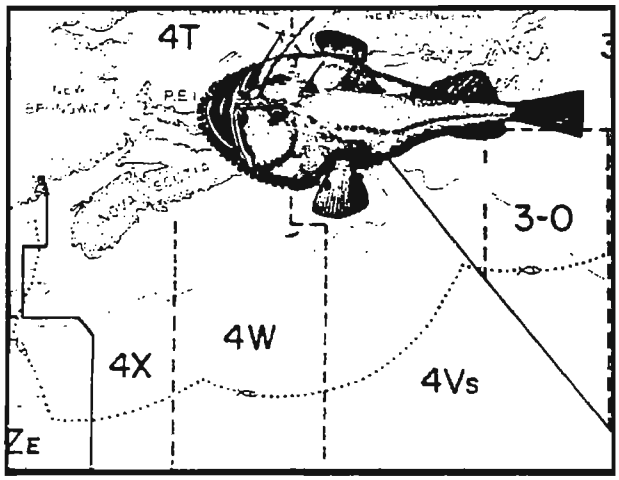
COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator: low

	Compared to average
Spawning Biomass:	low
Total Biomass:	historical low
Recruitment:	no sign
Growth and Condition:	poor
Age Structure:	below average
Distribution:	similar to recent years (average)

Recent Exploitation Level: unknown

4.4.2.19
MONKFISH: SCOTIAN SHELF - 4VWX



HISTORY OF FRCC RECOMMENDATIONS:

This is the second time that the Council has had an opportunity to review information on this fishery and to formulate recommendations for the conservation of this resource. In November 1995, the Council recommended that the 1996 TAC for 4VWX monkfish be set at 700t.

1996 CONSULTATIONS:

There were no specific comments nor recommendations on 4VWX monkfish during the 1996 consultative process.

ANALYSIS:

The 1996 DFO Stock Status Report for this stock component indicates that:

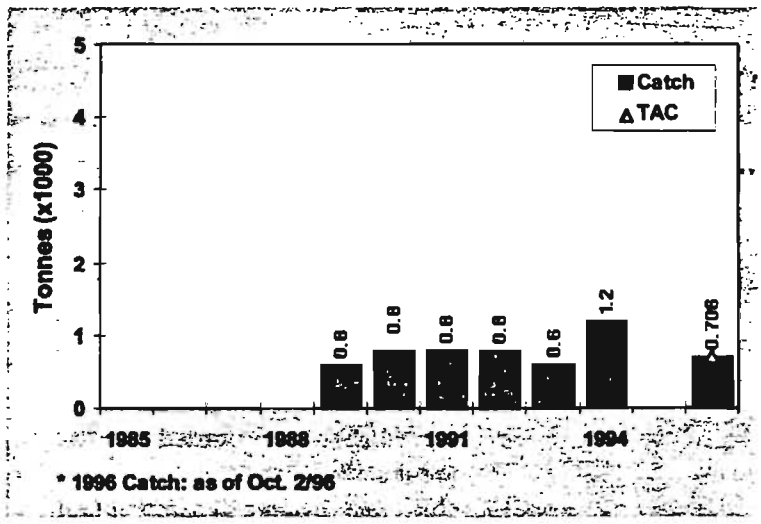
- the biomass is declining
- exploitation rates are high
- catch in 96 should be limited to 800t
- fish are mostly immature
- this stock may be an extension of Gulf resource

Historically, monkfish have been almost exclusively a by-catch fishing of groundfish and scallops ventures. Between 1992 and 1994, the less than 65 ft. mobile fleet has been directing for monkfish in 4X. Consequently landings in this area increased from just over 300t in 1991 to 1,100t in 1994. Abundance is highest in central Scotian Shelf and in the inshore areas of west of 4W. This is a shared resource with the U.S. where the fishery is essentially unregulated. The U.S. survey shows the resource is over exploited. There is no evidence of large scale migration of this stock and there appears to be discrete spawning components in canadian waters. Consequently, the stock may be managed successfully by Canada with 5Zc included in the management area.

RECOMMENDATION # 47:

The FRCC recommends that:

47.1. the 1997 TAC for 4VWX monkfish should not exceed historical levels, with sufficient flexibility to avoid closing traditional directed groundfish fisheries.
47.2. monkfish should be treated as a by-catch in all other fisheries.
47.3. the joint industry/DFO science five year program should be continued.



There is a joint industry/science five year program to improve knowledge of the resource being conducted by five-mobile gear vessels less than 65 feet. They are conducting a directed fishery in Georges Basin for 200t in co-operation with DFO. There is no biological basis to date for establishing a TAC. DFO Science recommends that catches be maintained at a low level and that the five-year research program be continued.

Scientists suggested that catches be limited to less than 800t, the average landing since 1988. The 1996 Stock Status Report confirms that the biomass remains low and catch level in the order of 800t continue to be suggested.

COUNCIL'S VIEWS ON STOCK STATUS:

Overall Stock Indicator:	**below average**
	Compared to average
Spawning Biomass:	**below average**
Total Biomass:	**below average (declining)**
Recruitment:	**mixed average in 4X, below average in 4VW**
Growth and Condition:	
Age Structure:	**unknown**
Distribution:	**average**

Recent Exploitation Level: above average

APPENDIX 1

FRCC MANDATE AND MEMBERSHIP

APPENDIX 1: FRCC MANDATE AND MEMBERSHIP

1.1 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 interrelationships 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 is also responsible for advising the Minister on Canada's position 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.

1.2 FRCC Membership

Members:

Fred Woodman, Chairman
Dr. Jean-Claude Brêthes, Vice-Chairman
Michael Belliveau
Dr. Tony Charles
Frank d'Entremont
Sam Elsworth
Tom Hallett
Frank Hennessey
Dr. Paul LeBlond
Dr. Jon Lien
Dr. Victorin Mallet
Jones Sheehan
Trevor Taylor
Maureen Yeadon

Provincial/Territorial Delegates:

Bruce Ashley, Northwest Territories
Glen Blackwood, Newfoundland and Labrador
David Gillis, Prince Edward Island
Marianne Janowicz, New Brunswick
Jean-Paul Lussiaà-Berdou, Quebec
Clarrie MacKinnon, Nova Scotia

Ex Officio from DFO

Dr. Bill Doubleday
Dawn Nicholson-O'Brien
Barry Rashotte

FRCC Secretariat

Catrina Tapley, Executive Director
Denis Rivard
Fred Allen
Linda Brisebois
Renée Brisson
Lisa Tenace
Michael Mancini

APPENDIX 2

GROUNDFISH CONSULTATIONS

2.1 Invitation to Groundfish Consultations

July 31, 1996

Dear Stakeholder:

The Fisheries Resource Conservation Council (FRCC) will hold a series of public consultations in September to gather input from industry stakeholders on ***all Atlantic groundfish stocks*** to assist the FRCC in making its recommendations in October to the Minister of Fisheries and Oceans for 1997 conservation requirements for Atlantic groundfish.

The FRCC makes public recommendations to the Minister of Fisheries and Oceans on such issues as total allowable catches (TACs) and other conservation measures for the Atlantic fishery. Because the fishery is at such a critical point and plays such an important economic role in Atlantic Canada, the challenges ahead for groundfish conservation are great. The Council will apply what it has learned from stakeholders and the work done in areas such as re-opening criteria, to form its advice to the Minister for groundfish conservation requirements for 1997.

Reopening closed fisheries is a critical issue in Atlantic Canada, as fishermen and communities begin to see signs of improvement. A decision to re-open a fishery, even in a limited way, must be based on solid conservation principles. The FRCC has held numerous public consultations with scientists and industry on reopening which revealed universal support for a conservation-guided approach to managing the fishery.

This fall, the FRCC will release comprehensive criteria on which we will base our recommendations for re-opening closed fisheries. Further, as it has noted for some time the need for a broader plan to rebuild groundfish stocks, the Council is developing a *Groundfish Conservation Strategy*, to contain action plans and a toolkit.

The Council has carefully considered the views of industry at past consultations, and will be using the September groundfish public consultations as a sounding board for parts of its strategy.The Council hopes to present the strategy to the Minister in 1996.

The FRCC will hold public consultations from September 3 to September 20 at locations listed in the enclosed schedule. We will discuss and provide advice to the Minister on the following stocks:

NEWFOUNDLAND and NAFO REGULATORY AREA

COD	(2GH, 2J3KL, 3Ps, 3NO)
HADDOCK	(3LNO, 3Ps)
POLLOCK	(3Ps)
REDFISH	(2+3K, Unit 2, 3O, 3LN)
AMERICAN PLAICE	(2+3K, 3Ps, 3LNO)
WITCH FLOUNDER	(2J-3KL, 3Ps, 3NO)

GREENLAND HALIBUT (TURBOT)	(0B+1B-F, 2+3)
ROUNDNOSE GRENADIER	(Subarea 0, 2+3)
ATLANTIC HALIBUT	(3NOPs4VWX5Zc)
SKATE	(3LNOPs)
YELLOWTAIL FLOUNDER	(3LNO)
LUMPFISH	

GULF OF ST. LAWRENCE

COD	(4TVn, 3Pn4RS)
REDFISH	(Unit 1)
AMERICAN PLAICE	(4T)
WITCH FLOUNDER	(4RST)
GREENLAND HALIBUT (TURBOT)	(4RST)
WHITE HAKE	(4T)
ATLANTIC HALIBUT	(4RS
T)	
WINTER FLOUNDER	(4T)

SCOTIAN SHELF, BAY OF FUNDY AND GEORGES BANK

COD	(4Vn, 4VsW, 4X, 5Zj,m)
HADDOCK	(4TVW, 4X, 5Zj,m)
POLLOCK	(4VWX5Zc)
REDFISH	(Unit 3)
FLATFISHES	(4VW, 4X)
SILVER HAKE	(4VWX)
ARGENTINE	(4VWX)
ATLANTIC HALIBUT	(3NOPs4VWX5Zc)
YELLOWTAIL FLOUNDER	(5Zj,m)
SKATE	(4VsW)
WOLFFISH	(4VWX)
WHITE HAKE	(4VWX)
CUSK	(4VWX)
MONKFISH	(4VWX)

This is a very important year for the Atlantic fishery. The success of these consultations will depend on the broad-based participation of all stakeholders, and the meetings provide an excellent opportunity for you to present your views on all stocks.

The FRCC is counting on your participation in September. The advice you provide is essential in arriving at recommendations for the 1997 fishing season. For further information, please contact the Fisheries Resource Conservation Council, P.O. Box 2001, Station D, Ottawa, Ontario K1P 5W3, phone (613) 998-0433, fax (613) 998-1146, Internet address www.ncr.dfo.ca/frcc.

Sincerely,

Fred Woodman
Chairman

2.2 Questions to Stakeholders

2.2.1 Questions For Discussion At FRCC Groundfish Consultations For Newfoundland And Labrador

2J,3KL Cod

1. To what extend is 2J,3KL cod recovering? How do signs of abundance compare with those you observed at the close of the fishery and during past periods of good fishing?
2. Sentinel Fishermen have noted an abundance of cod in inshore areas while the Research Vessel Surveys are still showing no significant signs of abundance in offshore areas. How do you explain this?

3Ps Cod

3. In your opinion, have stocks recovered to a degree which would sustain a directed commercial fishery? If so, at what level?
4. Recruitment is a crucial factor in the recovery and long term sustainability of fish stocks. What signs have you observed with respect to recruitment in 3Ps cod?

2J,3KL Cod and 3Ps Cod

5. To what extend to you think poaching, by-catch and re-directed fishing effort are effecting the recovery of cod stocks? What impact are closures having on other fishery resources?
6. What environmental changes have you noted over the past few years e.g. water temperature, slub on nets (etc.)? What environmental factors are having an impact on fish stocks?
7. Fishermen and scientists have noted that fish are in better condition (fatter) than in recent years. The FRCC has also observed that prey species such as capelin, herring, shrimp, and the appearance this year of squid, are in greater abundance than in previous years. Are these two observations related? Is this confirmed by your findings? What other changes e.g. the environment, have you noticed which might also explain this?

3Ps Pollock

8. Fishers have noticed more pollock in 3Ps for the first time in many years. Does this indicate to you that the stock has begun to recover? Should we increase the by-catch limit from 100 t?

3LNOPs Skate

9. Last year the FRCC recommended that the effort on skate be spread amongst different stock concentrations. Should we manage skate and set TACs for smaller geographic areas e.g. 3LN, 3O, 3Ps rather than a single TAC for 3LNOPs?

2.2.2 Questions for Discussion at FRCC Groundfish Consultations for the Gulf of St. Lawrence

4T,4Vn Cod

1. The FRCC is aware that there is an abundance of Cod in close inshore grounds since the closure of the fishery, and again this season. Could this be because there is essentially no effort, fixed or mobile, directed against them in that time? Would these concentrations become more dispersed if the fishery was open? How should we interpret CPUE form the sentinel fishery in these areas? How does the distribution of fish compare with traditional patterns?

2. Fishermen and scientists agree that there is more than 100,000 t of adult fish in the 4T,4Vn stock at present. These are largely the same fish that were in the stock when the fishery closed in 1993. The FRCC is concerned that the production of young fish has been extremely low for a number of years and , in relation to reopening this fishery, the presence of young fish to replace current spawners will be a critical factor. What evidence have fishers seen regarding young fish in the southern Gulf area? What indicators would fishers normally use to determine if there is an abundance of small fish compared to other years?

4RS,3Pn Cod

3. Fishermen and Scientists have observed that northern Gulf cod has been concentrated off western Newfoundland with very few signs of cod in 4S (Québec north shore). Is this a normal pattern of geographical distribution or do you think this indicates that this stock has still not yet sufficiently recovered?

4RS,3Pn and 4T Cod

4. Scientists observe that fish in this stock are in better condition (fatter) than in recent years. Is this confirmed by fishers observations and what, if any, changes in the environment and food supply have you noticed which might explain this?

4T Hake

5. In recent years, the distribution of the hake resource has shrunk into the area between Eastern PEI and George's Bay. Are the hake still present in this area? In other areas?

6. What evidence have fishers seen of young hake, possibly in the bays and estuaries around the southern Gulf?

4T Plaice

7. Captures of large numbers of immature plaice have been prevalent in the southern Gulf plaice fishery. The FRCC has supported measures to reduce this and changes, particularly in mobile gear mesh sizes, have resulted. Have these measures been effective?

8. Traditionally, the cod and plaice fisheries have been a mixed fishery, especially in the summer months across much of the southern Gulf. With regard to conservation measures, can these two species be fished together without putting one at risk, or can they be managed as separate fisheries, i.e.: not mixed? If you have fished these species, what effective measures did you use to fish cleanly?

9. Research surveys have indicated a low level of biomass, however, some fishers indicate that the stock is improving and catch rates are low due to changes in fishing practices such as mesh size and fishing closures. What evidence have you observed that the stock is recovering? What measures could be put in place to aid this recovery?

Winter Flounder (Blackback)

10. Efforts directed at winter flounder have increased in some areas since the closure of the cod and hake fisheries and the lowering of the plaice quota. Blackback stocks are very localized and do not migrate far. What is your impression of the state of the blackback resource in your fishing grounds?

4RST Greenland Halibut (turbot)

11. According to scientists, the 1991 and 1992 years classes (which will be ages 6 and 5 in 1997) are scarce. This should lead to a decline in recruitment in the next few years. Do you agree with this observation? As recruitment is likely to decline, do you believe that maintaining the TAC at 2000 t will be acceptable to ensure a sufficient spawning biomass?

12. In previous years, the FRCC has recommended that measures be put in place to allow juvenile turbot to mature. What have been your observations this year regarding the percentage of juvenile turbot caught? Is the mesh size currently in use for gillnets sufficient to protect spawners?

13. Considering that the mesh size used in the turbot fishery is likely to catch juvenile Atlantic Halibut, have you observed an increase in the by-catch of Atlantic Halibut?

2.2.3 Questions for Discussion at FRCC Groundfish Consultations for Scotian Shelf and the Bay of Fundy

4X

1. In previous consultations, fishers have told the Fisheries Resource Conservation Council (FRCC) that a proper mix of species in this area helps to prevent dumping and discarding. What is the proper mix of cod, haddock, pollock, flatfish and hake so fisheries are conducted cleanly and dumping of one species to catch another is eliminated?
2. There have been reports of improvement with respect to the abundance of haddock. Have you also observed improvements in abundance with respect to cod and pollock?

4VsW

3. Have fishers seen any positive signs or evidence of concentrations of 4VsW cod or 4W haddock in any localized areas?
4. Efforts directed at flounder stocks have increased in 4VsW since the closure of cod, haddock and pollock fisheries. Flounder stocks appear to be somewhat localized and subject to added pressure. What is your impression of the state of the overall flounder stocks in 4VsW?

Atlantic Halibut

5. In previous years the FRCC has recommended that measures be put in place to allow juvenile halibut to mature. In 4VsW halibut less than 81 cm (32 inches) must be released. What are your observations this year with respect to the percentage of juvenile halibut caught? Have you observed an increase in the by-catch of Atlantic halibut in other fisheries?

Unit 3 Redfish

6. There have been reports of significant catches of small redfish in Unit 3. Does the current gear/mesh size (90 mm diamond) adequately allow for the escapement of small fish?

General Discussion

7. During previous consultations, many of you have made the FRCC aware of problems with the observer program and non-conservationist practices such as dumping/discarding, shacking-off, misreporting, etc. What improvements have been put in place to correct these problems? Is this sufficient to address the problem?
8. What other issues related to conservation should the FRCC be examining to assist fishers in developing a sustainable fishery? Effort controls? Other measures such as quota "carry-over" from one year to the next?

2.2.4 Questions for Discussion at FRCC Redfish Consultation Units 1, 2, 3 and Division 3 O

1. Do you have any suggestions on how the information on redfish stocks can be improved or expanded, particularly in Unit 1 where there has been moratorium in place since 1995? Sentinel Fishery? "Tows for science"?
2. Does the scientific information provided for Units 2 and 3 and NAFO Division 3 0 compare with your experience in fishing these stocks over the past few years? If not, how does it differ?
3. In previous years, the indications were that the larger, commercial size redfish in Unit 2 were declining. Is this consistent with your observations this year? Is a 10,000 t TAC offering stability in this fishery, or are stocks still continuing to decline? Are other measures needed to protect the 1988 year class?
4. There have been reports of significant catches of small redfish in Unit 3. Are there changes that can be made to fishing gear to allow small fish to escape and to reduce post-escapement mortality? Are mesh size increases necessary or is this related to depth?
5. Do you believe that evidence exists to support the theory that 3 0 is a juvenile redfish area for neighbouring redfish stocks? If so, what measures should be put in place to protect this area? Is strict use of small fish protocol enough?
6. In keeping with the Fisheries Resource Conservation Council (FRCC) mandate to re-build stocks the FRCC has recommended reduced quotas, closures and small fish protocols over the past three years. Keeping in mind the Council's mandate, have these measures been adequate/effective in re-building stocks?

2.3 Briefs Received for the Groundfish Consultations

1. *Matane, Quebec - Sept. 3, 1996*
   - FRCC.96-GR-M-1 Regroupement des pêcheurs professionnels du Nord de la Gaspésie, (Gaspésie, Que.)
2. *Cap-aux-Meules, Iles-de-la-Madeleine, QC - Sept. 4, 1996:*
   - FRCC.96-GR-IDM-1 Fédération des pêcheurs semi-hauturiers du Québec
   - FRCC.96-GR-IDM-2 Regroupement des pêcheurs professionnels des Iles
3. *Clarenville, Nfld - Sept. 4, 1996*
   - FRCC.96.GR-CL-1 Southern Shore Inshore Fishermen's Action Committee
4. *Charlottetown, PEI - Sept 5, 1996:*
   - FRCC.96-GR-CH-1 Prince Edward Island Fishermen's Association
   - FRCC.96-GR-CH-2 John H. Banks, Sentinel Fisherman
5. *Harbour Breton, NF - Sept 5, 1996:*
6. *Tracadie, NB - Sept. 6, 1996*
   - FRCC.96.GR.TR.1 l'Association des Pêcheurs de poisson de fond acadiens
7. *Deer Lake, Nfld. - Sept 6, 1996*
   - FRCC.96.GR.DL.1 Highlights of the 1996 4R3Pn Sentinel Fishery Scientific Review (Aug. 13-16/96)
   - FRCC.96.GR.DL.2 Clifford Gould, Inshore Fisherman, 4R - cod
8. *Port Hawkesbury, NS - Sept. 6, 1996*
   - FRCC.96-GR-PH-1 Clifford Aucoin, NCBFVA
   - FRCC.96-GR-PH-2 Greg Organ, North of Smokey Fishermen's Association
9. *Atlantic Wide Consultation - Dartmouth, NS - Sept. 19, 1996*
   - FRCC.96-GR-ATL-1 Mark Butler, Marine Issues Committee, Ecology Action Centre
   - FRCC.96-GR-ATL-2 Brian Giroux, SF Mobile Gear Fishermen's Association
10. *Yarmouth, NS, - Sept. 20, 1996*
    - FRCC.96-GR-Y-1 Derek Jones, Canadian Ocean Habitat Protection Society
    - FRCC.96-GR-Y-2 Capt. Blantford Nickerson, NS Crewmen and Fish Plant Workers Assn.
    - FRCC.96-GR-Y-3 E.L. Walters, SF Inshore Fishermen's Assoc.
    - FRCC.96-GR-Y-4 Maritimes Fishermen's Union, Local 9
    - FRCC.96-GR-Y-5 Pubnico Ledge Fisheries
    - FRCC.96-GR-Y-6 John R. Decker, SW Nova Fixed Gear Assn.

11. Halifax - Oct. 11, 1996 (Redfish)

12. Briefs Received by Mail

FRCC.96-GR-1	Gilbert W. Linstead, General Manager, Labrador Fishermen's Union Shrimp Company Limited
FRCC.96-GR-2	Regroupement des pêcheurs professionnels du Nord de la Gaspésie, (Gaspésie, Que.)
FRCC.96-GR-3	Joe Fitzpatrick, sentinel fishery (inshore fisherman)
FRCC.96-GR-4	Jim Woodworth, Fishermen's Resource Centres
FRCC.96-GR-5	Thomas J. Fennelly
FRCC.96-GR-6	Inshore Fisheries Ltd. (d'Entremont Family)
FRCC.96-GR-7	Sylvain D'Eon, D'Eon Fisheries Ltd.
FRCC.96-GR-8	Bruce Chapman, FANL

APPENDIX 3

GEAR TECHNOLOGY

3.1 Invitation to Gear Technology Consultations

February 12, 1996

Dear Groundfish Stakeholder:

In December, 1994 the Fisheries Resource Conservation Council issued a discussion paper on "Conservation Aspects of Groundfish Gear Technologies in Eastern Canada" which was intended to provide a factual base for discussion on gear technology. During 1995 the FRCC has considered approaches to this issue and, as an appendix to its 1995 report "Conservation - Come Aboard", released a consultation paper on gear technology which is attached.

This work is in keeping with the mandate of the Gear Technology Subcommittee which is to:

> "...determine, for each harvesting technology, the conservation implications, optimum manner of usage and relative desirability from a resource conservation perspective. This will be based on an objective analysis of historical experience and current evidence concerning habitat impact, gear selectivity, inherent manageability, the potential for improvement or abuse of the technology, and any other relevant considerations."

The FRCC has asked its Gear Technology Subcommittee to begin public consultations respecting this mandate and believes that the two papers that have been issued by the Council will help to provide a focus for the discussion. Consequently, the Gear Technology Subcommittee of the FRCC will be holding public consultations with all interested stakeholders at the following locations on the dates specified, commencing at 10am:

February 27	Gaspé, Quebec; Auberge des Commandants
February 28	Moncton, N.B.; Wedgewood Hall, Mountain Rd
February 29	Port Hawkesbury, N.S.; Auditorium of the Nautical Institute
March 1	Bridgewater, N.S.; Wandlyn Inn
March 12	Deer Lake, Newfoundland; Deer Lake Motel
March 13	Twillingate, Newfoundland; Lion's Club
March 14	Clarenville, Newfoundland; Lion's Club

It is not the FRCC's intention to recommend, to the Minister of Fisheries and Oceans, the banning of any particular gear type. Rather, the Council has asked the Gear Technology Subcommittee to develop conservation principles related to the various gears and seek stakeholders views on those principles. This information will be used by the Council in the development of overall recommendations respecting groundfish conservation. Recommendations on who fishes and what gear types are used in a fishery will remain the responsibility of fisheries managers of the Department of Fisheries and Oceans.

The Subcommittee is asking stakeholders to consider the following questions prior to submitting written briefs and/or attending the consultation:

Questions:

Are the conservation principles identified in the consultation paper realistic and specific enough to deal with the conservation problems associated with gear use? If not, how should they be changed?

The Consultation Paper on Gear Technology has identified risks associated with each major gear type used in Eastern Canada. Are there other risks that should be considered?

How do you feel that a gear type could be modified so that identified risks are minimized and conservation principles met?

Recognizing that it is not possible to provide 100% assurance that gear will meet conservation principles, how should the FRCC proceed with the establishment of conservation principles to ensure they are meaningful and effective. The successful resolution of issues surounding the conservation aspects of gear use will depend, in large measure, on the nature of the briefs received and discussion held during the consultations. The Subcommitte has asked Department of Fisheries and Oceans Managers to attend the consultations and provide input as necessary and is appreciative of their commitment to assist in this process.

I look forward to meeting with you and urge you to attend a consultation or failing that to provide a written brief which can be sent to the FRCC Secretariat. As well, stakeholders are encouraged to read the 1995 FRCC report to the Minister of Fisheries and Oceans entitled "Conservation - Come Aboard" which provides 1996 conservation requirements for Atlantic groundfish. The report can be obtained by writing the FRCC at:

P.O. Box 2001
Station D
Ottawa, Ontario K1P 5W3
Fax (613) 998-1146

Trevor Taylor
Chairman
Gear Technology Subcommittee

3.2 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 reallocation 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.

3.3 Briefs Received for the Gear Technology Consultations

A. Deer Lake, Nfld. - March 11, 1996

FRCC.96.GR.DL-1	Bay of Island Fisherman's Committee

B. Twillingate, Nfld. - March 12, 1996

FRCC.96.GR.TW-1	John Elliot, Inshore Fisherman

C. Clarenville, Nfld. - March 13, 1996

FRCC.96.GR.CL-1	Joe Edwards

D. Gaspé, Qc. - April 16, 1996

FRCC.96.GR.G-1	Leroy Loggo, Brilliant Cove Fishermen's Assn.
FRCC.96.GR.G-2	Gerald Fortin, Pêcheurs de poisson du groupe Forillon
FRCC.96.GR.G-3	Paul-René Caron, Association des pêcheurs cotiers de forillon

E. Moncton, N.B. - April 17, 1996

FRCC.96.GR.M-1	Zoel Breau, MFU
FRCC.96.GR.M-2	David Coon, Conservation Council of New Brunswick
FRCC.96.GR.M-3	Cptn. David Tait, Nordsea Limited

F. Port Hawkesbury, N.S. - April 18, 1996

FRCC.96.GR-PH-1	Percy Haynes, Federation of Gulf of Nova Scotia Groundfishermen
FRCC.96.GR.PH-2	Ralph Halliday, Chris Cooper, Evan Walters, Alan Clarke
FRCC.96.GR.PH-3	Doug Mackinlay, for Prof. Judith Swan, Dalhousie Univer.

G. Liverpool, N.S. - April 19, 1996

FRCC.96.GR-L-1	Claude Albert d'Entremont, Inshore Fisheries Ltd.
FRCC.96.GR.L-2	John Angel, (Shrimp Fishing Graphics)
FRCC.96.GR.L-3	Terry L. Farnsworth, handline fisherman & member of the Alliance of Inshore Fishermen's Groups

H. Briefs Received by Mail

FRCC.96.GR-1	Maurice Ouellette, Assn. des Crabiers Gaspésiens Inc., Grande-Rivière, Que. (translated)
FRCC.96.GR-2	Daniel Boisvert, Resource Management, DFO, Laurentian Region (translated)
FRCC.96.GR-3	W.J. Christie, Christie and Associates, Picton, Ont.
FRCC.96.GR-4	George Chafe, Petty Harbour, NF
FRCC.96.GR-5	Patrick Ryan, Pres. Can. Society of Env. Biologists, Mobile, NF
FRCC.96.GR-6	Wayne Squires, inshore fisherman, Trinity Bay, NF
FRCC.96.GR-7	Roland Hedderson, inshore fixed-gear fisherman, Straitsview, Nfld.
FRCC.96.GR-8	Nelson Roberts, Loomis Way & Norman Cull, Nfld.
FRCC.96.GR-9	William Bowles, Burgeo, Nfld.
FRCC.96.GR-10	Floyd Hawkins, Beaver Harbour, New Brunswick

FRCC.96.GR-11	Robert McCarthy, Bellevue, Trinity Bay, Nfld.
FRCC.96.GR-12	Jerome Kerrivan, Placentia, Nfld., (2 ltrs.)
FRCC.96.GR-13	Marvin Hughes, Brook, Nfld.
FRCC.96.GR-14	Laurence Outhouse, Islands Inshore Fishermen's Assn., Tiverton, N.S.
FRCC.96.GR-15	Sylvain Samuel, La Federation des Pecheurs Semi-hauturier du Quebec
FRCC.96.GR-16	Submission presented on behalf of various organizations in Nova Scotia (Larry Parsons - 4VN Hook & Line, et al)
FRCC.96.GR-17	Michael O'Connor, National Sea Products Limited
FRCC.96.GR-18	Graeme Gawn, MFU Local 9
FRCC.96.GR-19	Ben Kovic, Nunavut Wildlife Management Board
FRCC.96.GR-20	Raziuddin M. Siddiqui, retired DFO employee
FRCC.96.GR-21	Derek P. Jones, Newellton, Nova Scotia
FRCC.96.GR-22	Association des pêcheurs de poisson de fond acadiens
FRCC.96.GR-22B	" " " " (cont'd)

APPENDIX 4

RE-OPENING CRITERIA

4.1 Invitation to Re-Opening Consultations

June 25, 1996

Dear Stakeholder:

The Fisheries Resource Conservation Council (FRCC) has held numerous public consultations with scientists and industry on potental reopening of closed fisheries. The consultations revealed universal support for a conservation-guided approach to managing the fishery, and support for reopening criteria. We have also issued two discussion papers.

The FRCC is pleased to release a third and final document for discussion with specific proposals for reopening criteria, entitled, **"From Moratorium to Sustainability: Criteria for Re-Opening and Sustainable Harvesting."** A copy is attached for your information.

In our analysis, we reviewed and evaluated, in relation to its conservation objectives, all available stock status information from scientists, sentinel fisheries and fishermen with respect to cod in 3Ps, 3Pn4Rs and 4T4Vn.

The time has come to put forth criteria that can be realistically applied — to decide on simple, relevant and reliable indicators which accurately characterize the status of the stocks. To this end, we have focused on spawning biomass, recruitment, age structure, and geographical distribution, using a half-way point for each indicator.

The FRCC will discuss with interested stakeholders the criteria put forth in the attached report during public consultations to be held in July 1996 at the following locations:

July 22 Moncton, NB	Hotel Beauséjour
July 23 Sydney, NS	Cambridege Suites
July 24 Clarenville, NF	Holiday Inn
July 25 Deer Lake, NF	Deer Lake Motel
July 26 Blanc Sablon, QC	Hôtel de Ville
July 27 Gaspé, QC	Auberge des Commandants

The sessions will begin at 9:00 AM. They will be chaired by Dr. Paul LeBlond and will be attended by members of the FRCC Stock Assessment Sub-Committee. Members of the media are welcome. For information, please contact the FRCC Secretariat at (613) 998-0433 or by fax at (613) 998-1146.

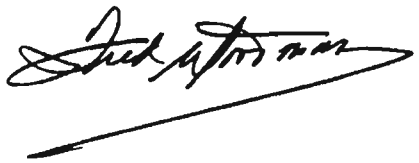
We recognize that the solution to orderly and sustainable fisheries lies not just with these conservation principles but with changes to the way in which we manage our fisheries. In our report to the Minister of Fisheries and Oceans in November 1995, **"Conservation, Come Aboard"**, we recommended that any further discussion on reopening be done in conjunction with those departmental officials responsable for the management of the resource.

At the public consultations, following the FRCC's presentation of the attached document, DFO officials will make their own presentation on management issues which impact on the re-opening of closed fisheries. It should be noted that these DFO management issues fall outside the mandate of the FRCC.

This year should be the start of a transitional period during which time proper planning — an essential prerequisite for re-opening fisheries — should be undertaken by all those involved. To this end, the FRCC has recommended a planning process involving stakeholders.

It will be so very important for all of us to work together to make re-opening a successful exercise, and I look forward to seeing all of you in July 1996.

Sincerely,



Fred Woodman
Chairman

4.2 From Moratorium To Sustainability: Criteria For Re-Opening And Sustainable Harvesting, With Reference To Cod Stocks In Areas 3PS, 4TVn And 3Pn4RS

1. INTRODUCTION

Last year, the FRCC attempted to stimulate discussion about re–opening fisheries through a discussion paper entitled "Considerations on How to Reopen Closed Fisheries" (FRCC 95.TD.1). In August 1995, public meetings were held to discuss that paper and the process by which fisheries which are now closed might be re-opened.

In this paper, ideas which were presented at these meetings are reviewed, together with the general principles relevant in determining the status of closed fish stocks. The paper then focuses on cod stocks in areas 3Ps, 4TVn and 3Pn4RS. Information currently available on these stocks is presented and evaluated for its reliability and relevance to re-opening decisions.

Specific proposals for re-opening criteria are presented for all three stocks. These proposals include the selection of appropriate levels of certain stock status indicators, at which the stock may be considered exploitable; they also include the determination of exploitation levels which ensure continued rebuilding and sustainability.

2. BACKGROUND

In its previous document on re-opening, the FRCC outlined a process of consultation with scientists and industry based on the identification and selection of appropriate biological indicators of stock status, followed by the selection of rules for opening and conducting a sustainable fishery.

Consultations confirmed "that conservation should take precedence and that the precautionary principle should guide decisions".

The fundamental importance of conservation in achieving a sustainable fishery has been widely recognized. For example, the Senate Committee on Fisheries, in its December 1995 report on "The Atlantic Groundfish Fishery: its Future" recommends that "conservation of the marine environment and its resources have priority over all other considerations". The Newfoundland and Labrador Round Table on the Environment and the Economy, in its October1995 report on "Sustainable Coastal Communities and Marine Ecosystems in Newfoundland and Labrador", found after extensive consultations that "communities would want the precautionary principle applied at the highest order, and it should not be compromised by any short term interest."

Fishers and environmentalists have expressed similar beliefs. "Cod stocks must be given every opportunity to rebuild and grow" insisted the Southern Shore Inshore Fishermen's Action Committee in a Sep 28, 1995 letter to the FRCC. Similarly, the Environmental Coalition of PEI, wrote in a 7 Nov 1995 letter that "...long-term goals of conserva-

tion and rebuilding must be paramount.... The FRCC must continue to be governed by the precautionary principle, regardless of public pressure."

Public consultations have thus revealed universal support for a conservation-guided approach to managing the fishery, as well as support for the general approach suggested by the FRCC in setting re-opening criteria. Participants everywhere also pointed out the difficulty of focusing on conservation as long as allocation issues remain unsettled — an issue beyond the FRCC's mandate, but worth noting here. It was also recognized that the manner of re-opening is extremely important: effort has to be matched to the resource, so that rebuilding can continue.

The time has come to focus on specific cases and to present definite options for stock status criteria and re-opening rules. The three stocks considered here were singled out for special action in the FRCC's latest Groundfish Report (FRCC.95.R.2). FRCC recommendations on 3Ps, 3Pn4RS and 4TVn cod stocks stated that the moratorium on commercial fishing be continued but that a significantly expanded sentinel fishery be conducted to address the need for additional stock status information and/or the need for a consensus on the state of the stocks. The FRCC also concluded that:

- 1996 should be the start of a transitional period during which time proper planning, an essential pre-requisite for re–opening the 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 biological conditions are appropriate to consider a limited opening.

We are at a point when it is necessary to decide on stock status indicators which characterize the status of the above three stocks (not necessarily the same for all three) and which are sufficiently reliable to guide decisions for re-opening and management of a sustainable fishery. In addition, appropriate exploitation levels, matched to the resource and to the social aspects of the fishery must be determined.

3. STOCK STATUS INDICATORS

3.1 The Indicators:

As described in the previous FRCC report on this subject, stock status indicators are properties of a fish population or of individual fish which characterize the current status, growth potential and exploitability of a stock. Consultations confirmed a general agreement on a list of indicators relevant to the definition of stock status, briefly reviewed here.

Recognized as particularly important were:

The total biomass: the total weight of all the fish in the stock;

The spawning biomass: the weight of those fish which are old enough to spawn;

Recruitment: the number of fish reaching legally catchable size in any given year.

A stock consists of fish of many ages, starting with juveniles, too small to catch, then recruits, of minimum catchable size, but sometimes too young to

spawn, and older spawners. It has been shown that bigger, older fish are more efficient spawners. A financial analogy would view the total biomass as the sum of all assets; the spawning biomass as those assets which are interest-yielding, and recruitment as the interest for a given year, coming mostly from those older, more mature assets.

Additional stock status indicators worth considering are:

Age structure: the proportion of the population in each year class, an indication of year-to-year consistency in recruitment and of the ability of the stock to renew itself. This is also relevant in assessing the use of gear most appropriate to the fishery.

Geographical distribution: the area occupied by the stock, especially in relation to its historic range. A reduced range may indicate a vulnerable population.

Properties of individual fish which may also be taken as indicators:

Weight at age: the weight of fish at a certain age can be taken as a measure of their rate of growth. an important factor in the rate of increase of the biomass; from knowledge of weight at age and the age structure of the stock one can calculate the biomass at each age and the total biomass.

Condition factor: the physiological state of individual fish, which may be important for their reproductive capacity.

In addition to the above indicators, which relate directly to the fish, environmental (or ecosystem) indicators may be useful in assessing the prospects of stocks:

Physical Environment, or Habitat: the state of the habitat, where the fish live,may be of concern for the long term health of a stock.

Biological Environment commercially exploited species interact with each other and with other species. When ecosystem links are known between various species (e.g. seal,cod, capelin), they become relevant to the assessment of a stock's ability to recover and grow.

3.2 What makes a good Indicator?

Many intervenors expressed the views that indicators used for decision-making should be simple, reliable and widely understood. General rules for the suitability of an indicator of stock status for management decisions are suggested as follows:

- **there must be a clear link between the indicator and the status of the stock**. Indicators which relate directly to the abundance of the stock (biomass, recruitment, age structure) are more direct than others, such as condition factor or habitat.
- **the indicator must be easy to calculate and understand.** It would also be desirable to be able to evaluate an indicator rapidly, so that there is as little time lag as possible between information and decision, and often, so that decisions may be taken soon enough to have the most impact.
- **the value of the indicator must be widely agreed upon and reliably known.** All participants in the fishery should be able to understand how the indicator value is arrived at and agree as to its value. Estimates of natural fish

populations are always subject to error and the greater the uncertainty, the less useful the indicator.

Uncertainty has two consequences. It is often a cause of dissension among the various parties, each supporting the estimate most favourable to its interest. It also imposes severe constraints on decisions based on risk avoidance. The more sources of information are available for an indicator, the more confidence can be put on its value.

Such rules can of course only be used as guidelines, as they may sometimes be in conflict with each other: a reliable indicator is not to be rejected because it is complicated to estimate; nor is a well estimated 'poor' indicator always better than a poorly estimated 'good' indicator. Habitat or ecosystem factors, which may be difficult to use quantitatively, and as such may not qualify as 'good' indicators, may nevertheless provide important clues in a careful, precautionary approach.

3.3 The Precautionary Approach

Having selected stock status indicators which satisfy the requirements of clarity, simplicity and reliability, how is one to use them to arrive at a decision to re–open, or to fish at a certain level of exploitation?

The FRCC has referred often to the idea of "erring on the side of caution", both in its own efforts to provide conservation advice, and its recommendations about the regular operation of the fishery as a whole. The FRCC supports fishery conservation approaches that are "prudent" and holds that it shouldn't be necessary to "prove" the need for conservation measures. It should be enough that, on the balance of the evidence, it makes sense to take conservation action, always in the best way possible: that is the Precautionary Approach.

The implications of the Precautionary Approach in thinking about re–opening fisheries are that re–opening should only take place when we are fairly sure that (1) the fish stocks are in good enough shape, and (2) the re–opened fishery can operate in a conservationist manner, keeping fishing mortality to a low enough level. It is crucial that BOTH of these conditions be satisfied. For example:

* In cases where the results of stock assessments are promising but unclear (perhaps because there is conflicting information from the various sources of information, or data from a new sentinel fishery that is very preliminary), it would be dangerous to re–open the fishery without waiting for confirmation. The future benefits we expect from a fishery closure may be lost if harvesting resumes too soon.
* If the fish stocks have at least somewhat recovered, but there have been few changes in HOW fishing is to take place (such as the amount of fishing effort allowed at sea), compared with before the collapse, it would again be dangerous to re–open the fishery. In this case, the achievement of rebuilding would be wasted; the fishery would likely head back toward another collapse.

The Precautionary Approach does not say: never harvest! Instead it says: weigh the evidence, and if on balance, it seems reasonable to re–open a fishery, from both a stock status and a manageability perspective, then do so, but cautiously ("err on the side of caution"), making sure

that management measures are sufficient to avoid another collapse. On the other hand, if re–opening seems unwise, or if the evidence is unclear, then wait. The Precautionary Approach is meant to help us avoid letting the immediate desire for harvesting from outweighing the long-term picture.

4. STOCK INFORMATION

The latest available information on cod stocks in areas 3Ps, 4TVn and 3Pn4RS is summarized here. Some of this information has already been presented in DFO's 1995 Stock Status Reports and in the FRCC's Nov. 1995 Groundfish Report. Additional information from sentinel fisheries and from special briefings with stock assessment scientists is also included.

4.1 3Ps Cod

The 1995 FRCC groundfish report indicates some divergence of views concerning the status of the St. Pierre Bank cod stock. The history of the population, based on catch data, is shown in Figure 1 up to the year of closure, 1993. Scientific surveys provide information beyond the year of closure (Fig. 2). The 1995 scientific survey shows an increase in numbers of spawners (age 6 and above), but this increase is based on a single large set and is subject to serious doubt.

The same survey does not show any increase in number of recruits and the scientific assessment continues to indicate that the stock is at a very low level. While the condition factor has shown some recent improvement (Fig. 3), cod in 3Ps continue to mature younger, and a smaller size, a trend begun in 1988 (Fig. 4). This trend towards smaller spawners means that a greater number of fish are needed to make up the same amount of biomass. Smaller spawners also produce fewer eggs, which lower survival rates, a trend might also be partly responsible for the low recruitment observed. Scientific assessments show the stock at a low level and recruitment to be very weak.

The current age structure of the stock is mainly a result of the success of past recruitment (as seen in the lower graphs of Fig. 1 and 2). Very little is left of the older year classes (83-88) today; 1989 was the strongest year-class in recent years (it shows up as a peak in the age three graph in 1992). Survey results indicate continuing weak recruitment and hence no large year class forthcoming.

In February 1995 a sentinel fishery was conducted at 12 sites in a narrow coastal corridor around Placentia Bay and west of the Burin Peninsula. Most sites used five-and-a-half inch monofilament gill nets, but at Arnold's Cove and the sites west of Burin, baited hooks were used. Catch rates were as good or better than before the moratorium and confirmed a broad and generally even distribution of fish within the area sampled. There appears to be only one strong year class (1989) within that area. Small cod were also seen around wharves and in shallow water in 1995, a phenomenon which had not been observed in the past 12–15 years. While catch rates were encouraging, each crew strongly advised that caution should be used in interpreting the results in relation to stock abundance: it is impossible to determine how catch rates would be affected if there were more boats on the fishing grounds. The sentinel fishery covered only near-inshore areas and thus sampled a different area than the scientific survey, a fact which makes comparison

between these two sampling programs difficult.

Interpretation of scientific surveys as well as of sentinel fisheries may be confused by the movement of different sub-stocks within the 3Ps area. The fishery exploits a complex of sub-stocks which spawn within as well as outside the management unit and move through it in various ways. The origin of cod occupying Placentia Bay, for example, at various times of the year remains one of the most contentious and poorly understood stock structure issues for 3Ps cod. Considerations on opening the fishery should take this situation into account as well as what effect exploitation within 3Ps may have on adjacent areas.

4.2 4TVn Cod

In its 1995 consultations, the FRCC heard from many participants that there were signs that cod were present in many areas of the southern Gulf in numbers sufficient to hinder the conduct of other fisheries because of by–catch limitations. The FRCC identified 4TVn as an area where an expanded sentinel fishery should be conducted to improve our understanding of the status of cod stocks.

The history of the stock, as obtained from the analysis of catch data (Fig. 6) shows the decline in spawning biomass and recruitment which led to closure in 1993. Continuation of the calculations to 1995 (a less reliable exercise in the absence of commercial catch data) suggests some recovery. However, calculations of recruitment remain very low. Research vessel surveys (Fig. 7) show similar information. All recent identifiable year classes (1987–91) are below average, with the 1987 year class being the strongest in the 1983–93 range. About 60% of the population is in the older age range, which indicates that there is little recruitment. Total biomass in 1995 is estimated at 116,000 mt, up from 98,000 in 1993, but still far from the 1971–95 average of 232,000 mt.).

Geographical distribution is representative of the historical pattern at low population numbers. Sentinel and research vessel surveys are consistent with each other in areas which they both sampled; both sources of information indicate that the abundance of cod in the southern Gulf has not changed markedly since the closure of September 1993. (Fig. 8).

4.3 3Pn4RS cod

This cod stock is third of the group singled out in the FRCC 1995 groundfish report as showing some suggestions of partial recovery and where an expanded sentinel fishery was recommended.

The history of the stock, as computed from catch data, is shown in Fig. 9 until 1993, the last year in which calculations were made. The commercial fishery was closed in 1994 due to rapidly declining stock levels and absence of recruitment. Research surveys also show a decline (Fig. 10) and, as we shall see below, a shift in stock distribution (Fig.11).

There is no sign of abundant year classes. Only the 1987 year class is above average in recent years. Most of the biomass currently consists of the 1990 and 1991 year classes which are not particularly large.

Results of sentinel fisheries confirm the relatively greater abundances observed in areas 3Pn and 4R compared to 4S (Fig. 11) and show mixed results, with indica-

tions of increased overall biomass accompanied by disappointing results in many areas (for example, the Strait of Belle Isle).

5. RE-OPENING CRITERIA

5.1 Guidelines

This section presents a set of criteria for re–opening and sustainable harvesting of the three cod stocks of immediate concern. The re–opening decision is based on the following three steps:

1. Choose stock status indicators.
   - These should be simple, relevant and reliable, using, where possible, several indicators to get a broad picture of stock status.
   - In our discussion, we will focus on **spawning stock biomass, recruitment, age structure** and sometimes **geographical distribution** of the fish.
2. For each indicator, a level must be chosen which is considered sufficient to support fishing activity.
   - In this discussion, we will use a **"half-way point"**, mid-way between the low level that existed when the fishery was closed and the average level over a recent period.
3. Looking at the package of indicators, one must decide, guided by the precautionary principle, what will be an acceptable "report card".
   - Must all the indicators reach suitable levels for re–opening, or only some of them?
   - For the sake of argument, we assume here that **all the most crucial indicators must reach acceptable levels**, while others are seen as being "desirable" but not necessary.

Should a decision to re–open be reached, there still remains to determine the level at which a sustainable fishery may be pursued.

- Clearly, a fishery on a stock which is still relatively depleted cannot re–open at catch levels that existed before closure. What levels of fishing mortality, of fishing effort and of catch are safe? Re-opening must be at a level which ensures continued recovery, with effort at sea well matched to the available resource.
- A precautionary approach must be taken in deciding on exploitation levels, to minimize the risk of harm to the resource.
- In this discussion, we have used as the initial level of fishing mortality a level of **one quarter of $F_{0.1}$**, and we have reduced this further where there is particularly great uncertainty about stock status.

For each stock, the information and decision process is summarized in the form of a Table. Readers are reminded that there may be considerable uncertainty associated with any of the numbers presented. Readers are also invited to comment on the choices of indicators, re–opening rules and levels of precautionary approach in conducting a sustainable fishery.

5.2 3Ps Cod

Main indicators:

1. Biomass:
   - No biomass calculated for 1995.
   - Minimum biomass from research surveys: above long-term average - but doubtful
   - Sentinel fisheries catch rates high in 1995, however very localized in space and time.

   Overall: positive signs, but low reliability.

2. Recruitment: still below the level at closure time; no new year class coming in
3. Age structure: no strong year classes since 1989.

Additional indicators:

4. Geographical distribution: few fish on the banks. Reduced distribution
5. Condition factor: below target level.

Analysis:

At the indicator levels selected, the $F_{0.1}$ catch level is 7,500 mt; a precautionary

Table 1: 3Ps Cod

Indicator		Long term average (1979-1993)	Status at closure (1993)	Present Status (1995)	Halfway recovery		Comments on stock status
					Biomass	Catch at F0.1	
Calculated indicators (ADAPT)	Total Biomass (mt)	131,000	77,000	Not available	104,000	--	No calculation after 1993.
	Spawning Biomass (mt) (age 6+)	60,000	33,000	Not available	46,000	7,500	
	Recruitment Biomass (mt) (age 3)	21,000	8,000	Not available	15,000	--	
Data from scientific surveys (mean #/tow)	Index of abundance Age 6+	7.17	4.18	29.38	--	--	Signs of biomass recovery (one single high tow)
	Index of abundance Age 3	1.12	0.41	0.19	0.76	--	Very low.
	Geographical Distribution	Distribution still shrinking. Survey indicate concentrations on some located spots along the deeper parts of the shelf.					Poor
	Level of recruitment	Recruitment well below average for the last 3 years. No good classes appearing after the relatively strong year class of 1989.					Poor
	Sentinel Fisheries	Catch rates high in 1995 (higher than before closure) however very localized in space and time. It is uncertain if those catch rates would have been sustained over the whole season and area with a higher effort. Small cod seen near shore.					

level of one quarter of this value would correspond to 1875 mt.

Considering the poor level of recruitment, the high level of uncertainty on the biomass estimates and the negative signs given by the additional indicators, the fishery should be kept closed.

5.3 4TVn Cod

Main indicators

1. Calculated biomass still below the target level (has changed little from the closing level).
   - Minimum biomass from research surveys still below target level (low level of uncertainty).
   - Sentinel catches consistent with calculations and surveys. Overall, negative signs.
2. Recruitment: seems to be improving, however, no strong year classes coming in.
3. Age structure: no strong year classes in the stock.

Additional indicators:

Table 2: 4TVn Cod

Indicator		Long term average (1971-1993)	Status at closure (1993)	Present Status (1995)	Halfway recovery		Comments on stock status
					Biomass	Catch at $F_{0.1}$	
Calculated indicators (ADAPT)	Total Biomass (mt)	232,000	116,000		165,000	--	
	Spawning Biomass (mt) (age 5+)	154,000	71,000	99,000	112,000	18,500	Decline in biomass seems arrested
	Recruitment Biomass (mt) (age 3)	43,000	9,000	12,000	27,000	--	Low
Data from scientific surveys (mean #/tow)	Index of abundance (age 5+)	68.47	35.4	36.22	51.94	--	Decline seems arrested
	Index of abundance (age 3)	27.21	9.34	5.86	18.27	--	
	Recruitment index (age 2-3)	18.88	6.68	3.24	12.78	--	Low
Geographical Distribution		Fish mainly concentrated along the south shore and around the Madgalens islands; historical range not recovered.					Poor
Level of recruitment		Recruitment well below average for the three last years and declining declining since 1985. No strong classes appearing. Some signs of slight improvement for 1996.					Poor
Sentinel Fisheries		In 1995, despite some good tows, data do not show a good improvement; recruitment appear also low.					

4. Geographical distribution: sentinel fishery and surveys confirm that population has not recovered over entire range; catches concentrated along south shore of Gulf.

5. Condition factor

Analysis:

At the indicator levels selected, the $F_{0.1}$ catch level is 18,500mt; a precautionary level of one quarter of this value would correspond to 4625 mt.

Considering the low level of biomass and the poor level of recruitment, the fishery should be kept closed.

5.4 3Pn4RS Cod

Main indicators:

1. No calculated biomass for 1994, 1995.

- Minimum biomass from research surveys at the lowest level since 1978 some localized improvements indicated by sentinel fishery Overall: negative signs.

Table 3: 3Pn4RS Cod

Indicator		Long term average (1974-1993)	Status at closure (1993)	Present Status (1995)	Halfway recovery		Comments on stock status
					Biomass	Catch at $F_{0.1}$	
Calculated indicators (ADAPT)	Total Biomass (mt)	300,000	220,000	Not available	260,000	--	No calculation after 1993
	Spawning Biomass (mt) (age 7+)	95,000	16,000	Not available	56,000	9,200	
	Recruitment Biomass (mt) (age 3)	42,000		Not available	--	--	
Data from scientific surveys (mean #/tow)	Index of abundance Age 7+ (1000 ind.)	4,542 (1990-1992)	552	2,202	No calculation	--	Low decline seems arrested
	Index of abundance Age 3 (1000 ind.)	11,196 (1990-1992)	1,349	1,046	No calculation	--	Low
Geographical Distribution		Some recovery since 1993. However fish mainly located in areas 3Pn and 4R (coast of Newfoundland; no recovery in 4S).					Improving however some problems
Level of recruitment		From research survey, year-classes 1990 and 1991 seems above average; year-class 1992 well below.					Postive signs
Sentinel Fisheries		In 1995, higher catches in the mobile gear survey than in the summer scientific survey; geographical distribution in agreement as well as level of recruitment.Catch rates of the fixed gear generally low; fish mainly located in the southern part of 4R ant in 3Pn.					

2. Recruitment: two moderate new year classes (1990-1991),declining afterward.

3. Age structure: generally weak year classes.

Additional indicators:

4. Geographic distribution: improving; however, fish now concentrated on the west coast of Newfoundland.

5. Condition factor: good improvement in 1995, after 4 bad years.

Analysis:

At the indicator levels selected, the F0.1 catch level is 9,200mt; a precautionary level of one quarter of this value would correspond to 2,300mt.

Considering the low level of biomass and the poor level of recruitment, the fishery should be kept closed.

6. AFTER RE–OPENING

Once a fishery has been re–opened, sustainable management begins. A vigilant guard must be continued on the stock status indicators identified as being important. The same precautionary approach which guided the decision to re–open a closed fishery must be applied to its sustainable exploitation. A re–opening decision will then carry with it a program of continued monitoring and assessment which will ensure that decisions are up dated to ensure continued health and recovery of the stock. Uncertainty in stock status indicators may have an important effect on catch levels.

A greater level of uncertainty requires greater caution in setting catch levels. To err on the side of caution means that if one is not sure, one must be more prudent. Fig. 12 shows a hypothetical example of two situations with the same stock status estimate but different degrees of uncertainty. The steeper (solid) curve corresponds to the case with greater certainty. The percentages shown are of exceeding a selected fishing mortality level (F). Say that we wish to be as careful as before and wish to have only a 20% chance of exceeding a fishing mortality target. To achieve this in the presence of greater uncertainty (dashed curve), the catch must remain below about 700 tonnes; for the less uncertain case, the catch can go up to about 900 tonnes. Uncertainty is expensive!

As a more specific example, calculations have been made to take into account the uncertainty in biomass estimates for the 4TVn cod stock. Fig. 13 shows the probability that biomass estimates exceed certain limits as a function of 1996 catch levels (if the fishery was open). This kind of graph shows very clearly how a certain level of precaution affects catches. Say that the objective is to continue rebuilding so that, even if there was a 1996 fishery, the 1997 biomass should exceed its 1995 level. Let us assume that a 80% probability of this happening is desired. One would then start at the 80% level on the vertical axis and proceed towards the right until the black line labeled B97>B95 is reached; the catch level would be then be read on the horizontal axis. If one were satisfied with a riskier situation, say only 60% probability, then a larger catch would result.

The FRCC is considering asking Fisheries and Oceans scientists to prepare probability estimates of this nature to guide its precautionary approach in decision making. Rather than simply choosing a

precautionary fishing level (a quarter of $F_{0.1}$, for example), a precautionary probability of not exceeding a certain fishing mortality or falling below a certain biomass level would be selected. This approach takes directly into consideration uncertainty in stock status indicators and once again demonstrates the advantages of having reliable data.

7. CONCLUSION

What is a sustainable fishery? Sustainability does not imply a lack of change or an insistence on non-economic harvest levels. What it does simply is a "conservation first" approach that husbands the resource so it continuously renews, while providing long-term social and economic benefits.

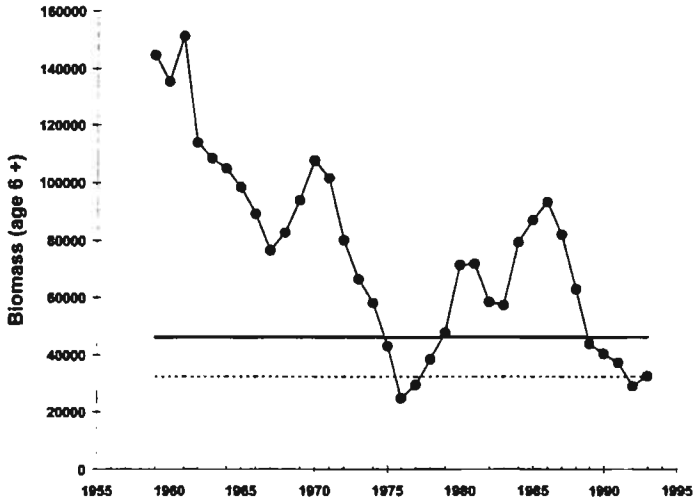
While that may appear simple in principle, there are considerable difficulties in the application. Not everyone may agree on how to achieve sustainability, and while discussions rages, the resource may be lost. Furthermore, the considerable natural variability in fish populations remains poorly understood and beyond management intervention. Sustainability is thus vulnerable to environmental as well as to socio-economic threats and accidents.

The challenge in re–opening closed fisheries is clearly to avoid repeating past mistakes. We must "err on the side of caution" in determining when to re–open, and also ensure that harvesting thereafter is truly sustainable. The Council welcomes comments on how best to meet the challenge, as well as on the approaches proposed in this paper.

FIGURES

FIGURE 1:

The history of the abundance of spawners (age 6+) and recruits (age 3) to the 3Ps cod stock, as calculated from catch data using the ADAPT method. The dotted line indicates levels calculated when the fishery was closed (as given on the right); the solid line is a reference level half-way between the 1979-93 average and the closing level. Based on preliminary analyses provided for illustrative purposes only.



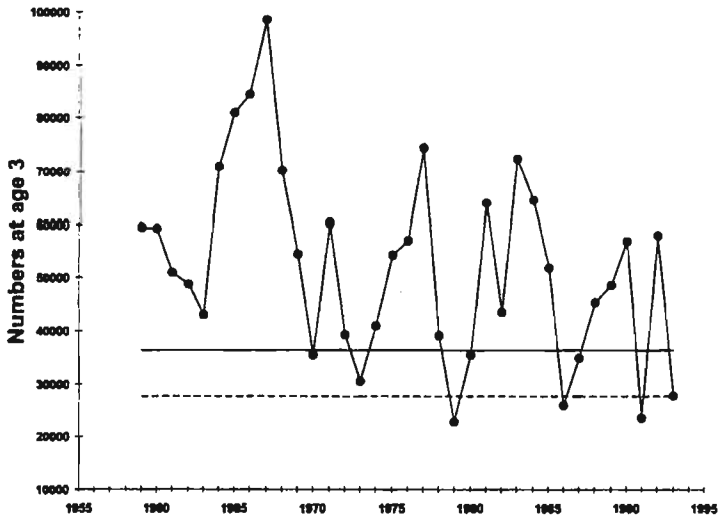
ADAPT - Calculated values of

TOTAL BIOMASS

1993	77,000 mt
Average 1979-93	131,000 mt
Half-way level	104,000 mt

SPAWNING STOCK (6+)

1993	33,000 mt
Average 1979-93	60,000 mt
Half-way level	46,000 mt



RECRUITMENT (AGE 3)

1993	8,000 mt
	28,000,000 fish
Average 1979-93	25,000 mt
	45,000,000 fish
Half-way level	15,000 mt
	36,000,000 fish

FIGURE 2:

The history of the abundance of the trawlable biomass of spawners (age 6+) and recruits (age 3) to the 3Ps cod stock, as estimated from research surveys. The dashed line indicates levels estimated when the fishery was closed; the solid line is a reference level half-way between the 1979-93 average and the closing level. Note that the very high increase in abundance in spawner biomass in 1995 is of debatable interpretation, being based on a single set through a spawning aggregation. These data do not show any increase in recruitment since closure.

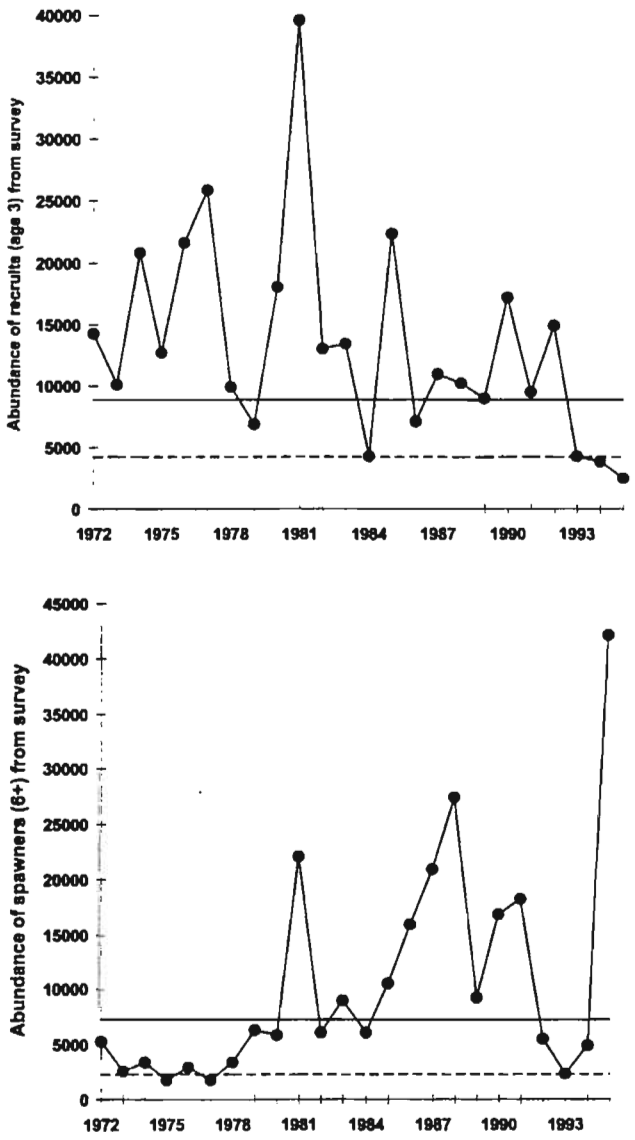


FIGURE 3:

Condition factor of southern Newfoundland cod over the years. The top graph shows a measure of "thickness" for gutted fish of a standard length (58 cm); the bottom graph shows the liver weight. The dashed line indicates levels estimated when the fishery was closed; the solid line is a reference level half-way between the 1978-93 average and the closing level. Following a decline since 1991, the condition factor improved in 1995. The liver weight continues to be low.

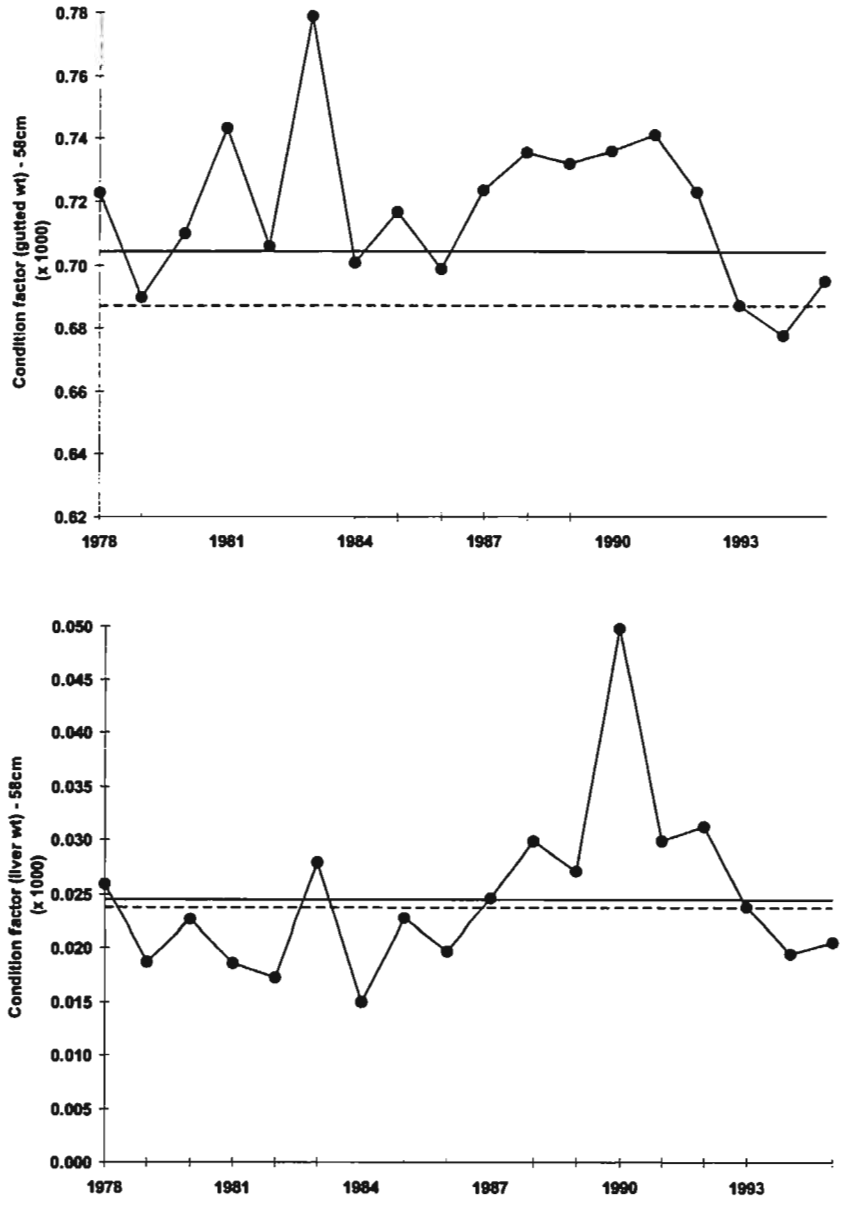
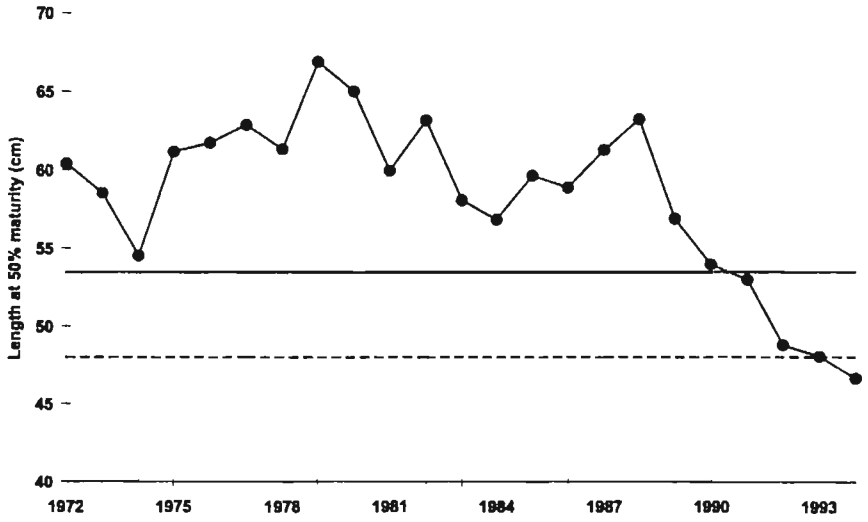


FIGURE 4:

Average length (above) and age (below) at maturity for 3Ps cod. As earlier, the dashed line is the 1993 level, the solid line is a level halfway between the dashed line and the long term average (1972-1993). Fish are maturing at a younger age and smaller size. This trend has continued since 1988.



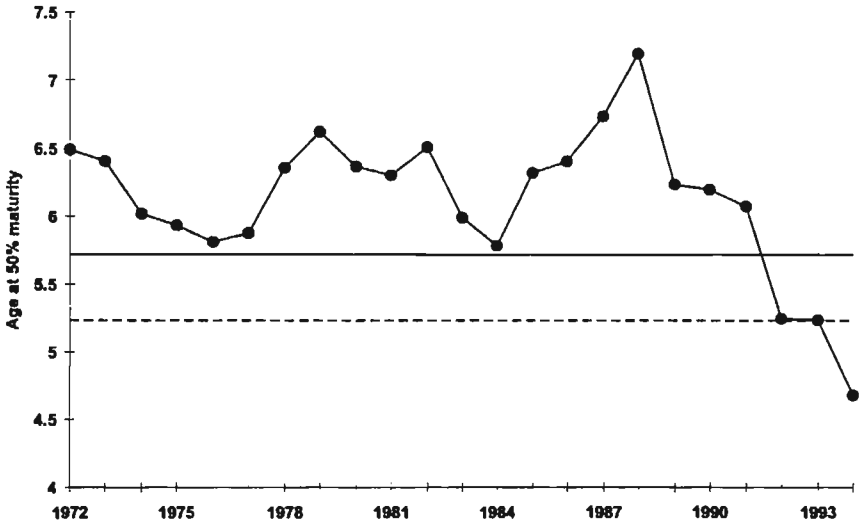


FIGURE 5:

Distribution of cod catches (kg/30 minute tow), as per scale in upper right, for 1985, 1993 and 1995. The -..-..- line shows the 100m depth contour. Note the absence of cod from shallow areas since 1993.

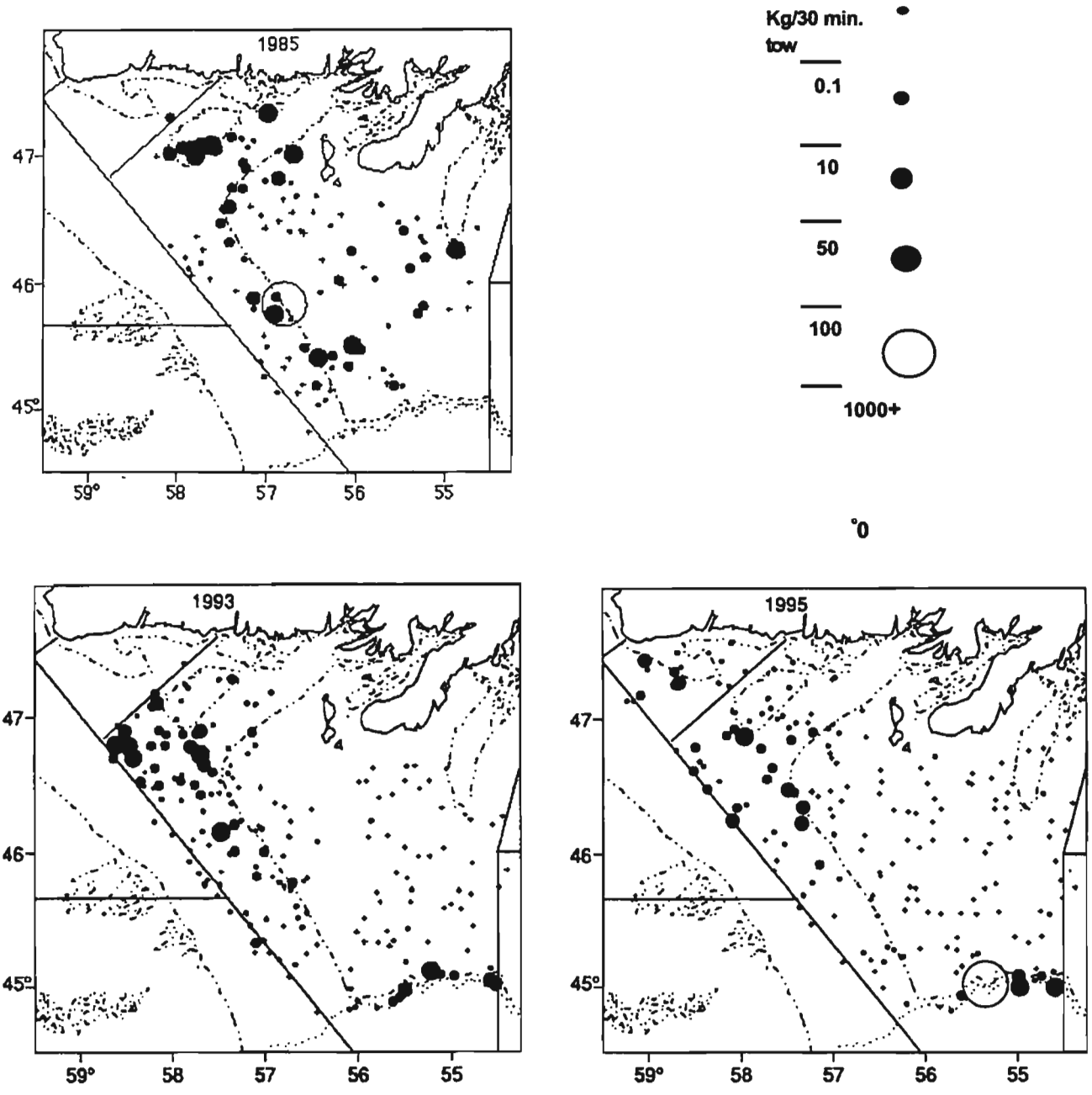
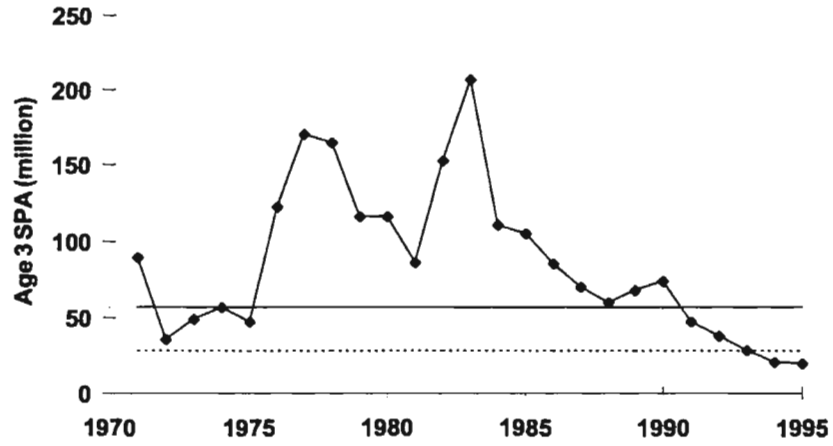


FIGURE 6:

Time history of the abundance of spawners (graph of age 5+) and recruits (age 3) to the 4TVn cod stock, as calculated by a model which includes commercial catches up to the year of closing of the fishery (September 1993). The dotted line indicates levels calculated at the time of closure; the solid line is a reference level halfway between the 1971–93 average and the 1993 level.



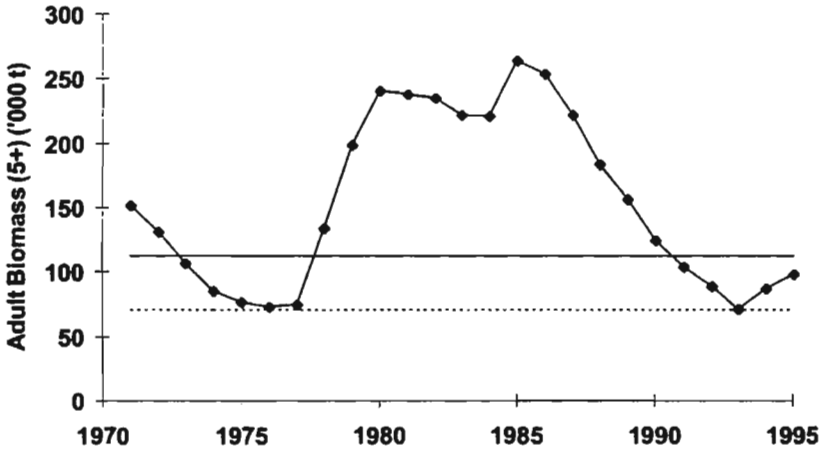
Calculated values (SPA) of:

TOTAL BIOMASS

1993	98,000 mt
1995	116,000 mt
Average 1971-95	242,000 mt
Half-way level	170,000 mt

RECRUITMENT (AGE 3)

1993	13,000 mt
	29,000,000 fish
1995	9,000 mt
	20,000,000 fish
Average 1971-93	41,000 mt
	92,000,000 fish
Half-way level	27,000 mt
	60,000,000 fish

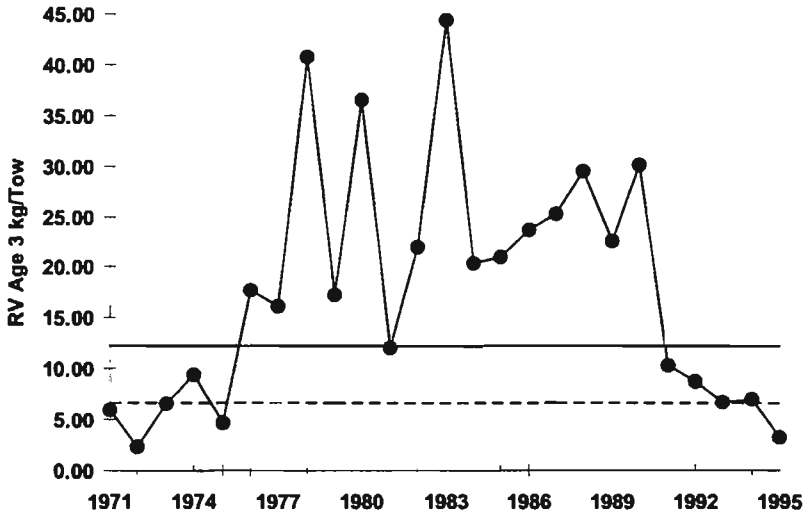


SPAWNING STOCK (5+)

1993	71,000 mt
1995	99,000 mt
Average 1971-93	159,000 mt
Half-way level	115,000 mt

FIGURE 7:

The history of the abundance of trawlable biomass of spawners (age 5+) and recruits (age 3) to the 4TVn cod stock, as estimated from research vessel surveys. The dotted line indicates levels calculated at the time of closure; the solid line is a reference level halfway between the 1971-93 average and the 1993 level.



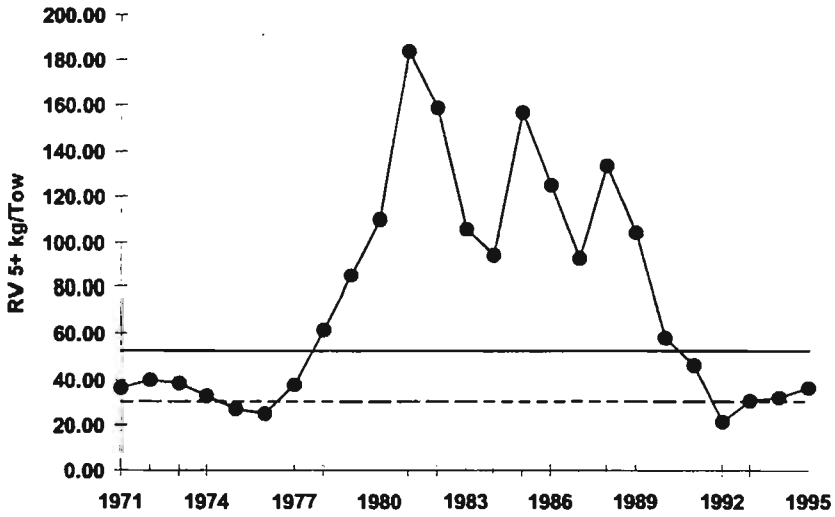


FIGURE 8a:

Cod catches (in kg) in area 4TVn in the September groundfish survey for 1990 and 1994.

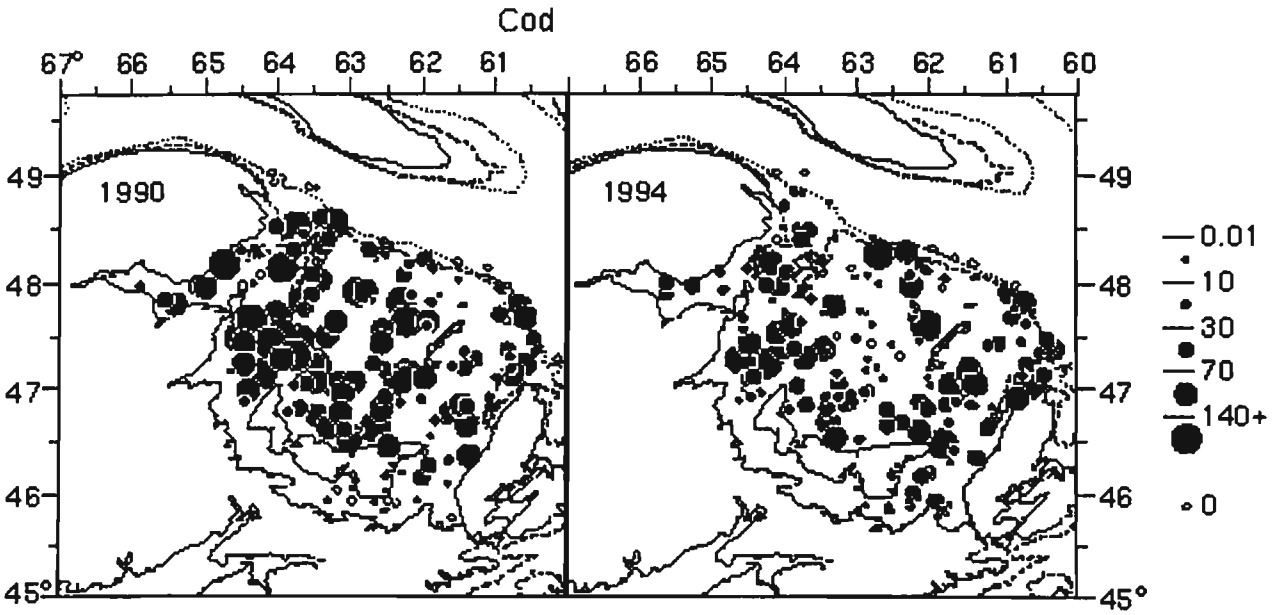


FIGURE 8b:

Cod catches (in kg) in the area 4TVn in the September 1995 groundfish survey.

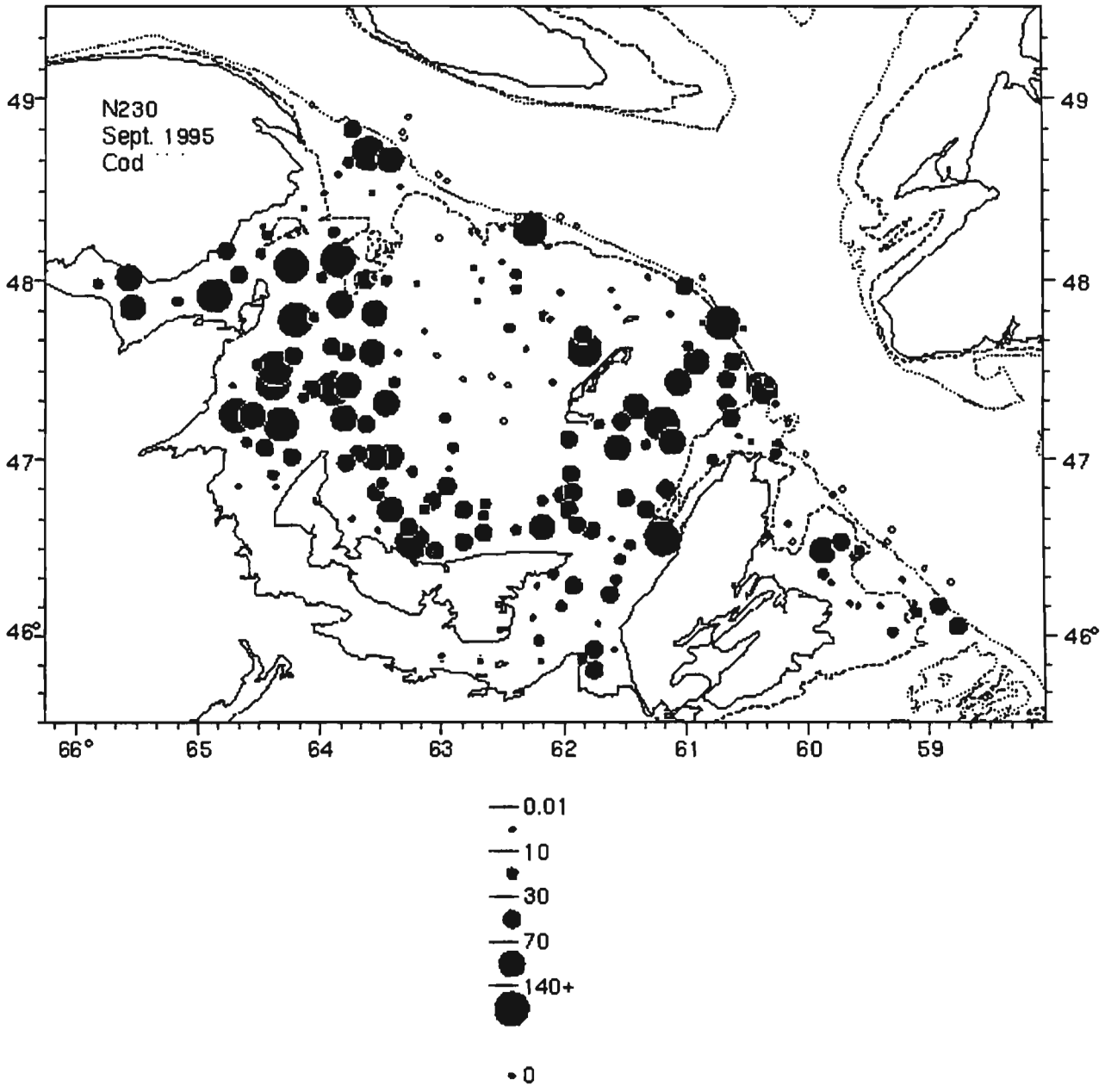


FIGURE 8c:

Cod catches (in kg) from a sentinel survey in September 1995.

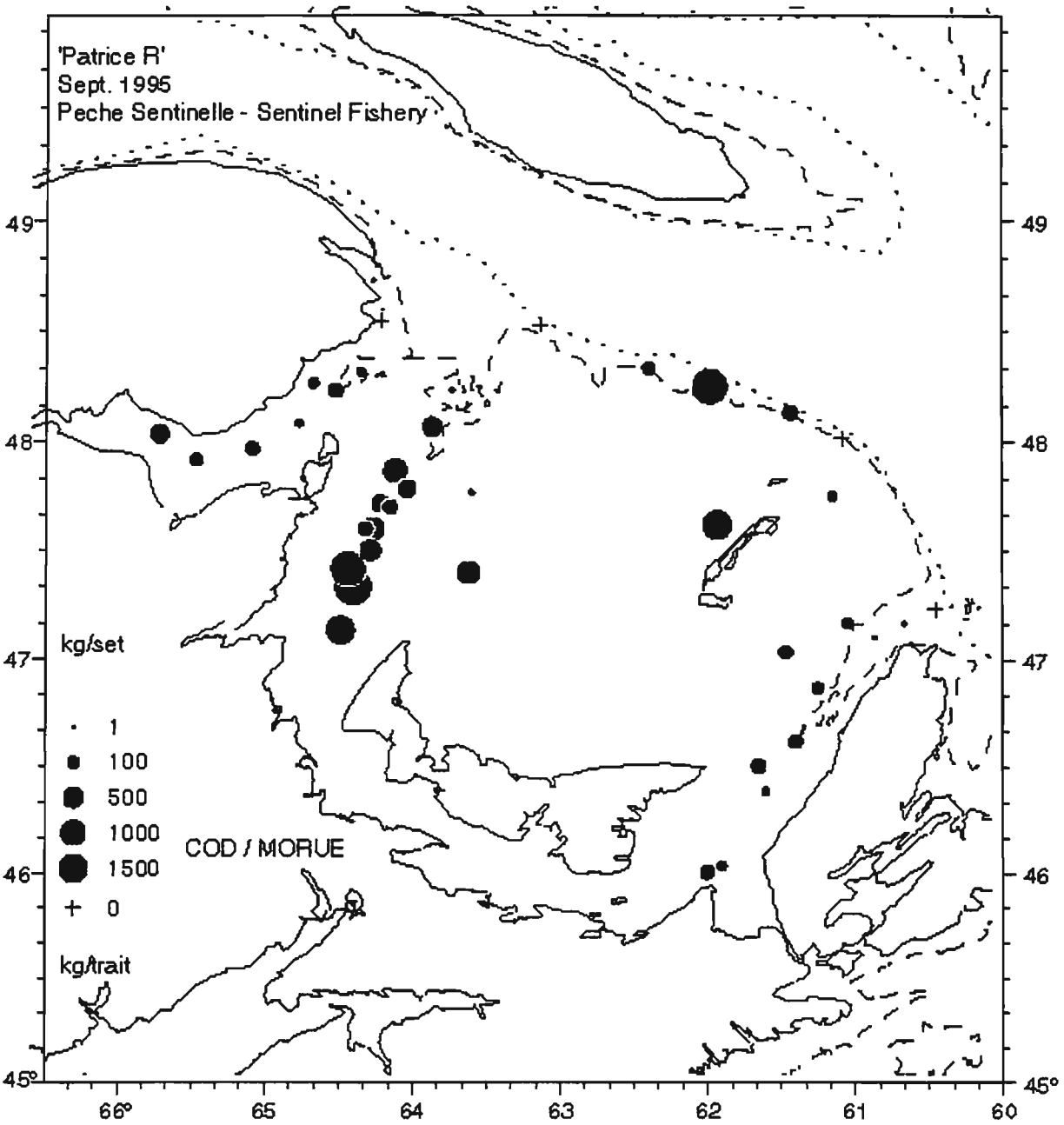
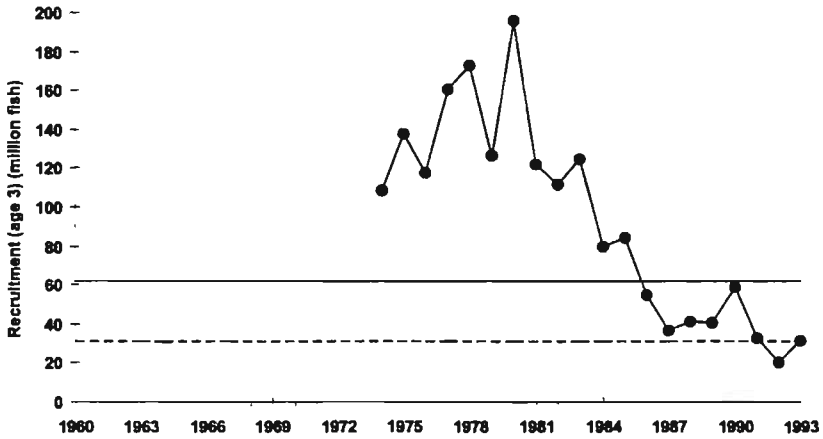


FIGURE 9:

Criteria for Reopening - Cod in Northern Gulf of St. Lawrence

RECRUITMENT:
(age 3) (million fish)

Average of recruitment observed at age 3. 2 to 4 years prior to current year has to improve half way (solid line) towards the average.



SPAWNING BIOMASS (SSB):
(7+ fish) ('000 t)

Consider reopening when SSB half way (solid line) towards the average. 20% of average spawning potential is 43.

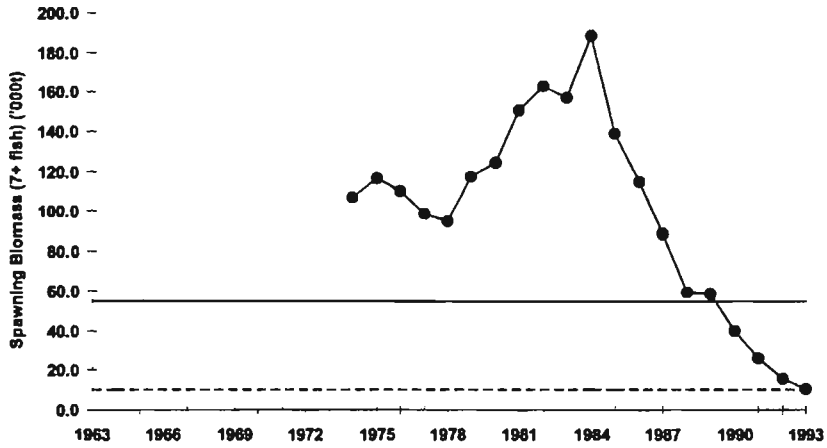


FIGURE 10:

Survey vessel estimates of maximum trawlable biomass in areas 3Pn (a), 4R (b), 4S (c) and all three areas together (d).

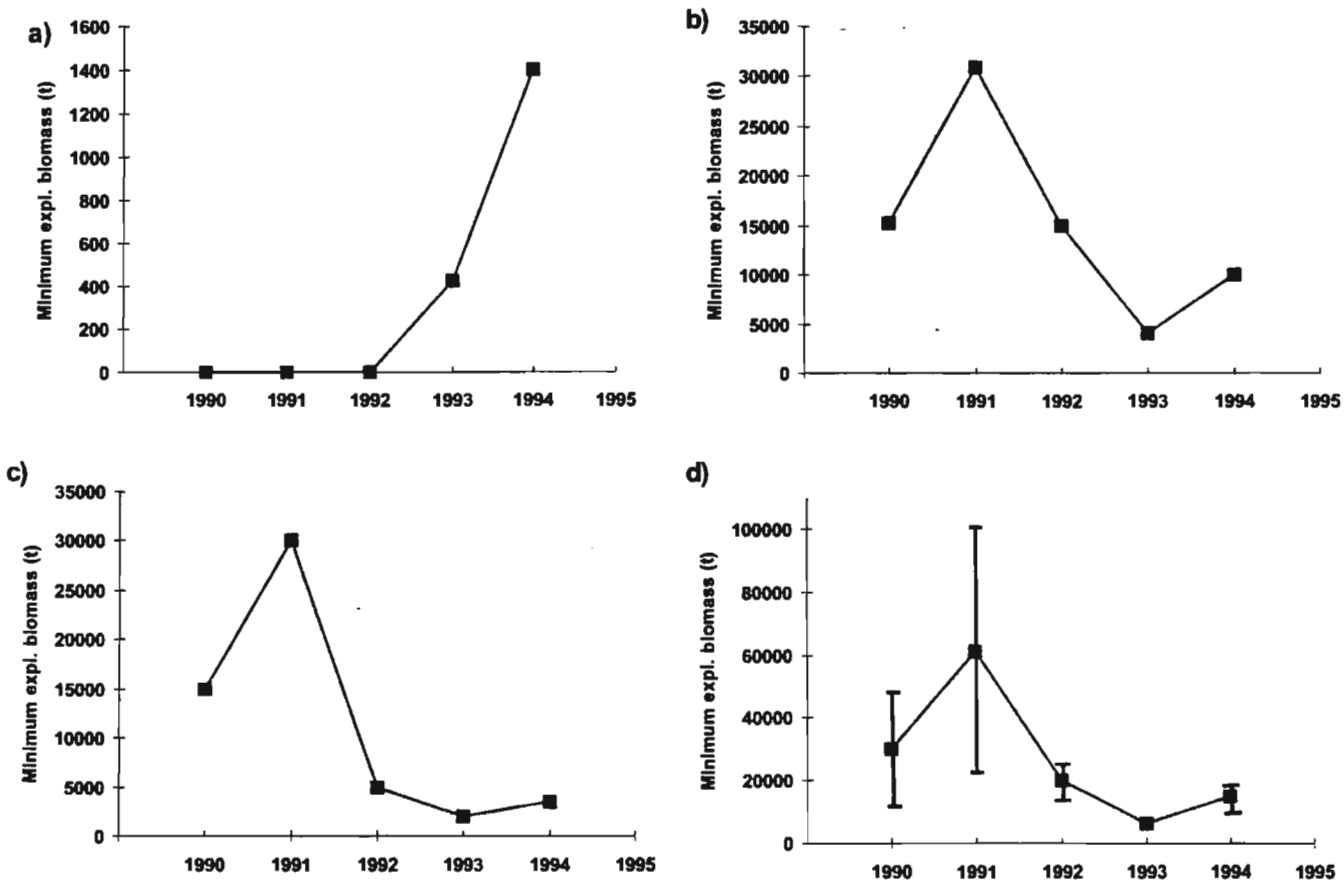


FIGURE 11a:

3Pn, 4RS cod. Distribution of catch rate (total number/24 min total number for 24 minute tow) from August-September research surveys (research vessel: "Alfred Needler").

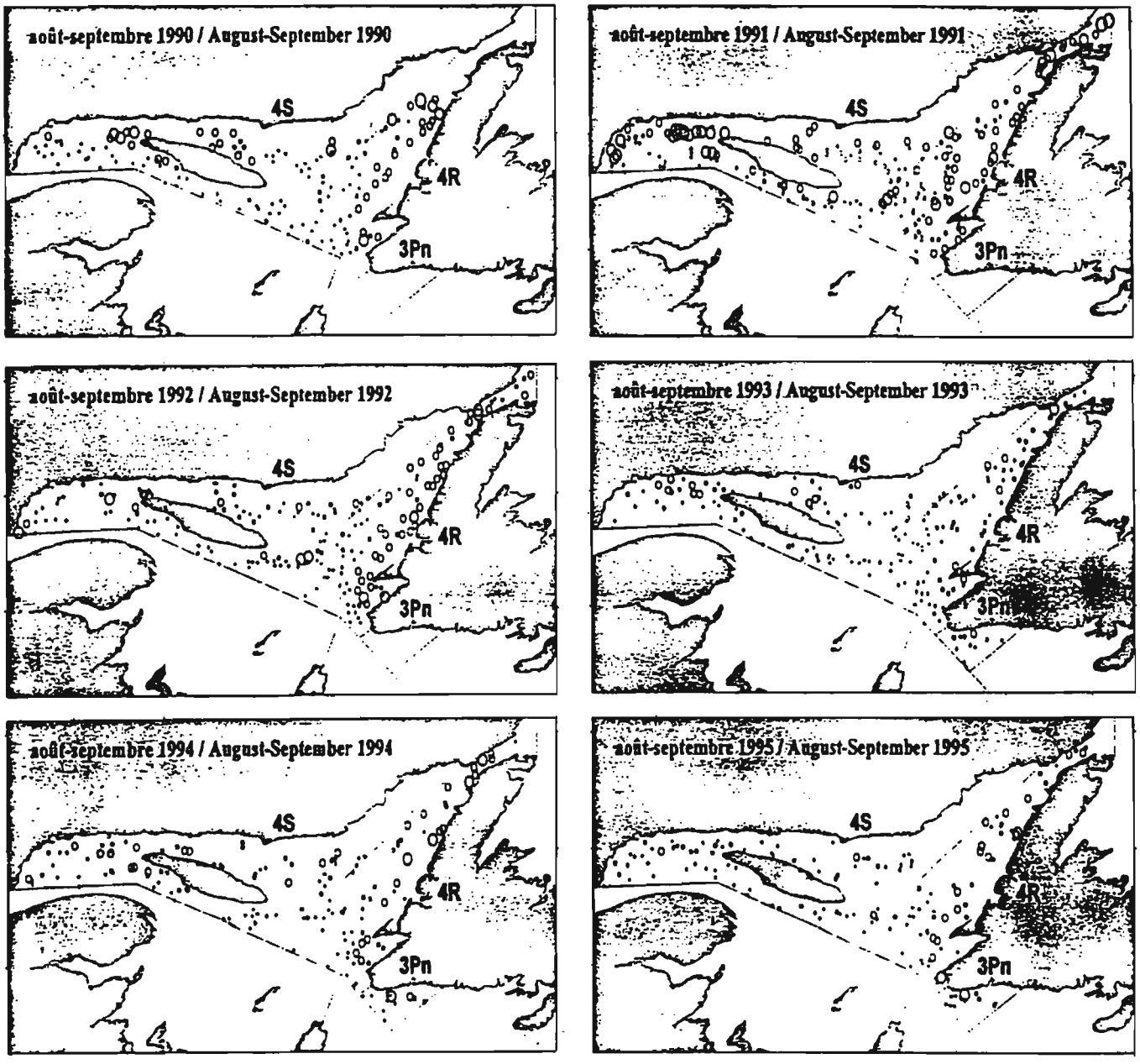


FIGURE 11b: Distribution of catches in 1995 sentinel survey.

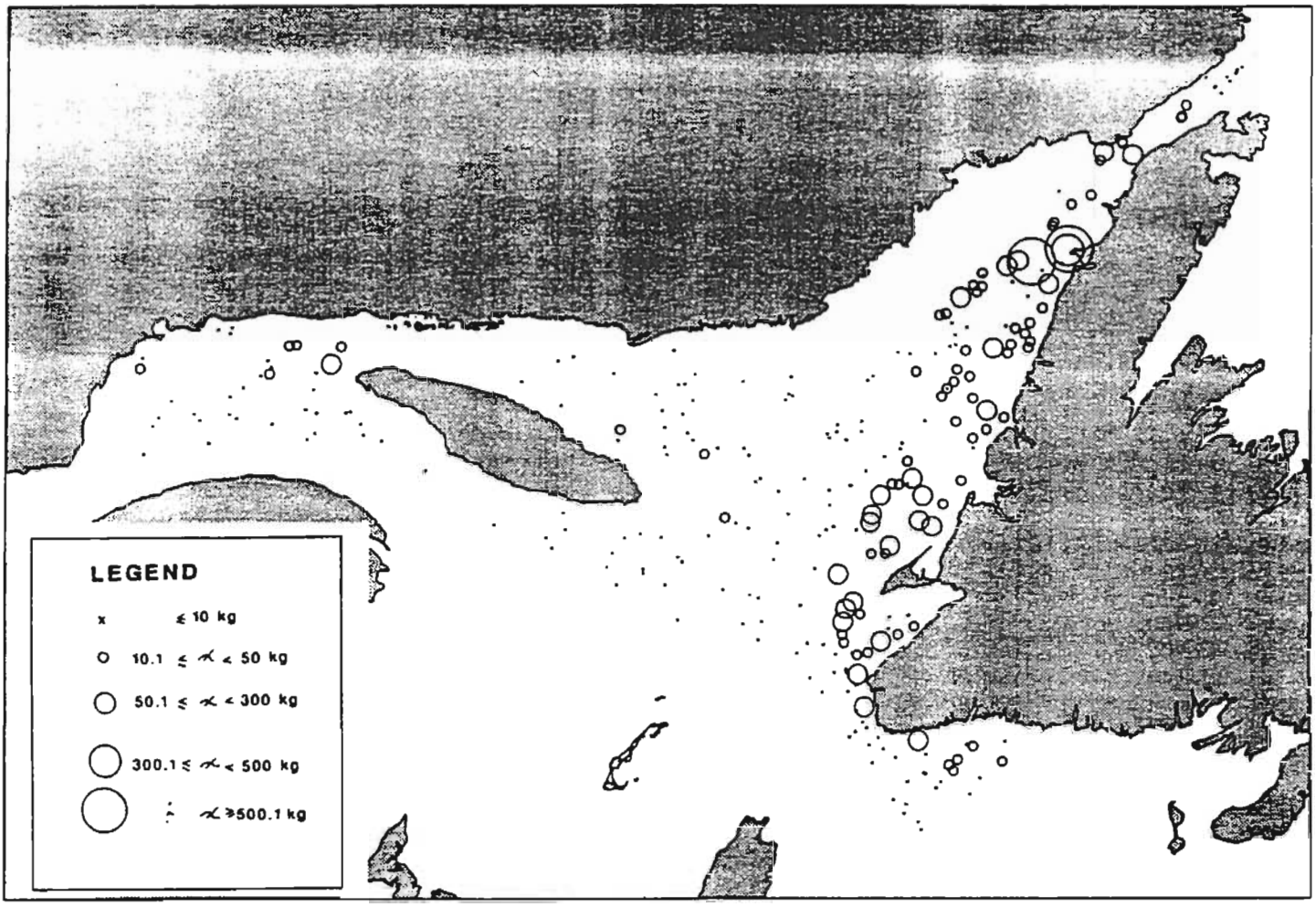


FIGURE 12:

A hypothetical example showing the catch that can be allowed if we are willing to accept any given probability (risk) of exceeding a target fishing mortality level. The solid line shows a case of less uncertainty in the estimates of fishing mortality than the dashed line. For example, if we are willing to accept a 20% chance of exceeding our target (see 20% on the vertical axis) then if estimates are very uncertain (dashed line) a catch of 650 tonnes might be allowed, while if estimates are more certain (solid line), a catch of 825t could be allowed.

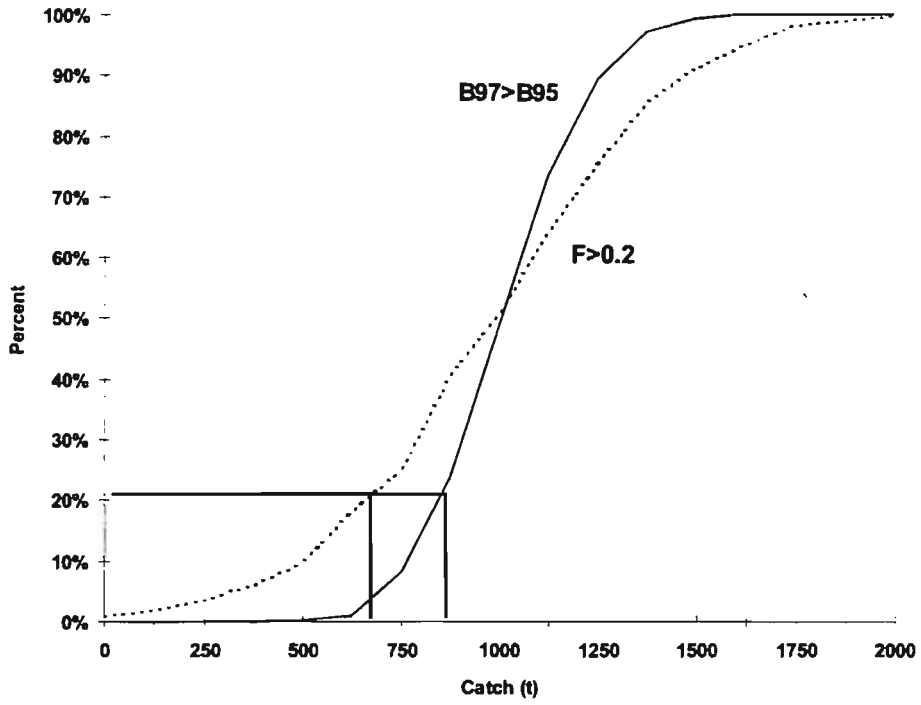
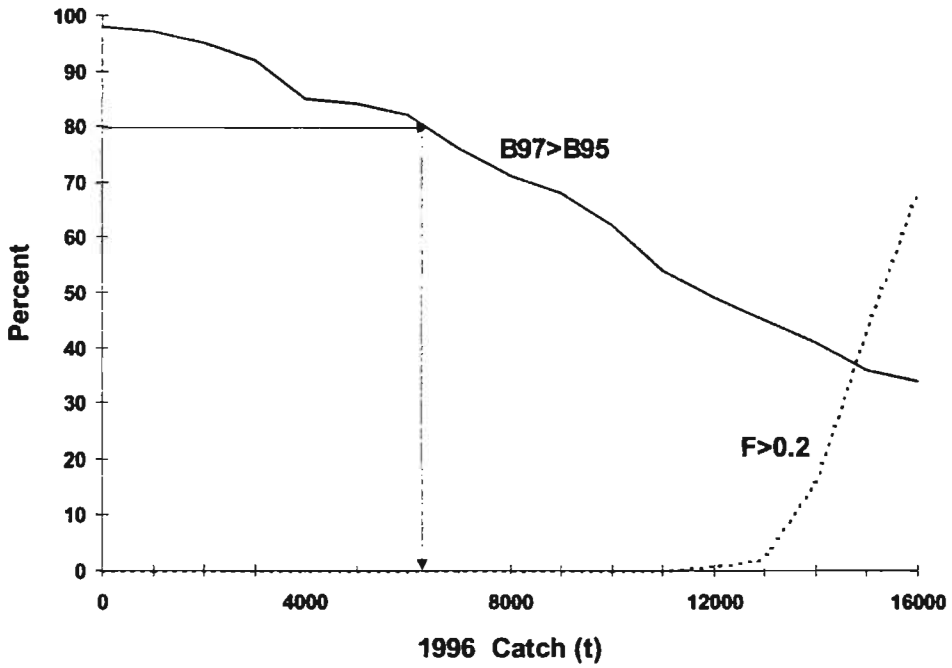


FIGURE 13:

Probability distributions for three 4TVn cod catch projections. The probability shown as a percentage in the vertical axis is that: 1- the 1997 biomass exceeds the 1995 biomass (B97>B95 curve); 2- the 1997 biomass exceeds 115,000 mt (B97>115 kt); and, 3- that the probability of the fishing mortality F exceeds 0.2. (Calculations by S. Gavaris and A. Sinclair).



4.3 Briefs Received for the Re-Opening Consultations

A. July 22, 1996 - Hotel Beauséjour, Moncton, N.B.

B. July 23, 1996 - Cambridge Suites, Sydney, N.S.

FRCC. Reopen.Sydney.1 Joe Burke, P.O. Box 274, Louisburg, N.S.
FRCC.Reopen. Sydney.2 Clifford Aucoin, Cheticamp, N.S.

C. July 24, 1996 - Holiday Inn, Cormack Room, Clarenville, N.F.

FRCC.Reopen.Clarenville.1 D.H. Steele, Memorial Univ., St. John's, NF

D. July 25, 1996 - Deer Lake Motel, Deer Lake, NF

E. July 26, 1996 - Hôtel de ville Blanc Sablon (salle municipale)

F. July 27, 1996 - L'Auberge des Commandants, Gaspé

H. Briefs Received by Mail

FRCC.REOPEN.1	G.A. Chouinard & A.F. Sinclair, DFO, Science Branch, Gulf Region (Maritimes) March 1995
FRCC.REOPEN. 2	Fred Winsor, St. John's, NF (July 1996)
FRCC.REOPEN.3	Alexandre Bernatchez & O'neil Cloutier, Regroupement pêcheurs professionnels du Sud de la Gaspésie (delivered by hand at groundfish consultations in Matane on Sept. 3/96)

APPENDIX 5

GEORGES BANK ADVICE

5.1 Invitation to Georges Bank Consultations

April 22, 1996

Dear Interested Stakeholder:

The Fisheries Resource Conservation Council (FRCC) will hold a public consultation on May 8, 1996 in the Yarmouth Room of the RODD GRAND HOTEL in Yarmouth, Nova Scotia to gather input from industry stakeholders **regarding Georges Bank Haddock, Cod and Yellowtail Flounder, Subarea 5Zjm.**

The FRCC is interested in the views of all stakeholders regarding the rebuilding and long-term sustainability of Atlantic groundfish stocks. This information will assist the FRCC in providing advice to the Minister of Fisheries and Oceans now regarding conservation requirements for Georges Bank stocks as well as in making its recommendations for conservation requirements for Atlantic groundfish in the fall.

Groundfish conservation is at a point where stakeholders will need to concentrate on approaches for long-term conservation, the conservation impacts of various gear types, the appropriate tools for ensuring conservation, and how to foster a conservation ethic. In this context, it is important for you to come out and make your views known.

As part of the FRCC report on conservation requirements for Atlantic groundfish in 1996, Conservation Come Aboard, and as part of the 1995 FRCC advice to the Minister on Georges Bank, the council made the following observations and recommendations on Georges Bank stocks:

COD

In May 1995, the FRCC recommended that there be no directed fishery for this stock and that by-catches be limited to less than 1000t. An increase in the TAC was requested by some industry representatives during FRCC consultations; concern was also expressed about the role of the United States on Georges Bank.

HADDOCK

The Council recommended that the fishery be closed until June 1996. To rebuild this stock, the Council believes that bilateral consultations should continue.

YELLOWTAIL FLOUNDER

Canadian and American scientists alike agree this stock is overexploited. Although a directed fishery has occurred only recently, it has expanded rapidly. The Council recommended closing this fishery until June 1996.

To help focus the discussion, we would like you to consider the following questions:

1. In your opinion, is there sufficient evidence of stock recovery to justify an increase in the TACs for groundfish stocks for 1996?
2. Recognizing that stocks have been at extremely low levels, what conservation measures are important to ensure the rebuilding of groundfish stocks?
3. What is an appropriate mix of Cod and Haddock to minimize by-catch and discarding?

The meeting will begin at 9:00 A.M.. Interested stakeholders are invited to make public presentations by way of oral presentation or by providing us with a written submission. If you are unable to attend the meeting but would like to submit a brief, please send it by facsimile or by mail to the following address: Fisheries Resource Conservation Council, P.O. Box 2001, Station D, Ottawa, Ontario, K1P 5W3 (613) 998-0433 phone (613) 998-1146 fax.

The Department of Fisheries and Oceans will release new data in early May in its 1996 Stock Status report. The FRCC has asked DFO Science to present this data to both Council members and stakeholders at the meeting. This information, combined with your input, should provide us with the tools with which to make recommendations to the Minister.

Your participation is important. We look forward to hearing your views.

Sincerely,

Fred Woodman
Chairman, FRCC

5.2 GEORGES BANK ADVICE

May 14, 1996

The Honourable Fred Mifflin, P.C., M.P.
Minister of Fisheries and Oceans
200 Kent St.
Ottawa, Ontario
K1A 0E6

Dear Minister:

CONSERVATION...WELCOME ABOARD

The mandate of the Fisheries Resource Conservation Council (FRCC) requires that it advise you on conservation requirements for Atlantic fish stocks. In keeping with this mandate we have conducted consultations with science and industry representatives on the conservation requirements for Georges Bank groundfish stocks for the forthcoming fishery.

The FRCC has now concluded consultations on eastern Georges Bank haddock, Georges Bank cod and Yellowtail Flounder. Our consultations were characterized by a strong conservation ethic on the part of all stakeholders. Over twenty-five industry representatives attended our meetings in Yarmouth as well as considerable interest on the part of the media and officials from your department.

The Council wants to take this opportunity to thank you and the department for the fine presentation given by the departmental officials from the St. Andrews Biological Station. The high level of debate and discussion at the Yarmouth consultation indicated how healthy the rapport between science and industry is in this area. We believe this is also indicative of the quality of the advice and the presentation, and ultimately, how far we have all come in working together to achieve our conservation goals. We want to further note how helpful we found the uncertainty calculations as a tool for demonstrating the potential long term effects of good conservation practices.

The Stock Status Reports, provided by Science, are attached to this letter. Some key highlights are presented below.

Haddock

The projected increase in haddock abundance is due primarily to recruitment of the 1992 year class, with support from the 1993 and 1991 year classes. The conservation efforts of the past two years with respect to management practices and reduced fishing effort have contributed to the growth in the biomass. Continued conservation efforts will sustain the rebuilding of the population in this stock. The F0.1 calculation is estimated to be around 6,800 t but the biomass is projected to increase only marginally under that scenario. A lower yield would increase the chance that the biomass would increase in 1997.

Cod

While this stock was at the lowest observed level in 1994, the biomass increased only slightly in 1995. The exploitation rate for this stock has declined from a high of forty percent in 1991 - 93 to ten percent in 1995 (by-catch only). Although recruitment has been well below average for this stock, the 1995 year

class appears to be of moderate strength. The F0.1 projection for this stock indicates that a fishing level of 3,500 t (combined USA/Canada) will allow the biomass to increase slightly but would still be well below the levels seen in the 1978 - 90 period.

Yellowtail Flounder

The USA survey conducted in the spring of 1995 and the 1995 Canadian mobile gear show substantial increases over 1994. Although the abundance has increased over last year, the biomass is still very low compared to historic levels. It is noted that maintaining the catch at 1995 levels will allow for some rebuilding of this stock.

FRCC Consultations

The FRCC sent a letter to stakeholders asking them to consider the following questions about this stock:

1. In your opinion, is there sufficient evidence of stock recovery to justify an increase in the TACs for groundfish stocks for 1996?
2. Recognizing that the stocks have been at extremely low levels, what conservation measures are important to ensure the rebuilding of groundfish stocks?
3. What is an appropriate mix of cod and haddock to minimize by-catch and discarding?

Stakeholders were unanimous in asking the FRCC to consider strong conservation measures on all of these stocks. Those who fish on Georges Bank have seen the signs of recovery and they are committed to seeing these stocks rebuild. They all believed that a cautious increase in the TAC for cod and haddock would still allow for rebuilding of the stock . In the case of cod and haddock, all industry presentations recommended a number LOWER than F0.1. Some debate occurred with respect to yellowtail flounder.

It was noted in consultations that delaying the opening of this fishery until June has had a positive effect as has the closed area on the US side of the line. It was stated by many of those present that the "hard line" on dumping and discarding though observer coverage and dockside monitoring has reduced this practice significantly from the previous decade and helped to minimize the number of small fish caught. Many spoke about more responsible fishing practices on the part of the industry.

FRCC Advice

The FRCC is committed to rebuilding these Georges Bank groundfish stocks. We have shown cautious optimism in our advice with respect to the rebuilding of these stocks given the favorable environmental conditions which exist on Georges Bank when compared with other areas, such as 2J,3KL. For example, cod on Georges Bank grow faster and reach maturity at age two and three as opposed to reaching maturity at age five or six for Northern Cod.

Council also feels confident about the rebuilding of these stocks given the strong conservation measures which exist in the management of this fishery such as mandatory hailing, use of square mesh gear for otter trawls, small fish protocol, observers, and the continued use of mandatory Dockside Monitoring. These measures are consistent with the Council's approach to conservation and to rebuilding. We believe this is also consistent with the strong conservation ethic expressed by industry representatives at consultations on these stocks.

We believe that the three strongest criteria for consideration when setting the TAC for these stocks should be:

- setting quotas below $F_{0.1}$,
- target an increase in biomass by 10 percent or more, and
- risk of decline in biomass (from the risk analysis) of the order of 20 percent or less.

Please note that all of the Council's quota recommendations, when combined with projected catch levels for the U.S. are: below the F0.1 level established in the Stock Status Reports, allow for rebuilding of the stocks, and the risk of decline in the biomass from quotas at these levels is less than 20 percent.

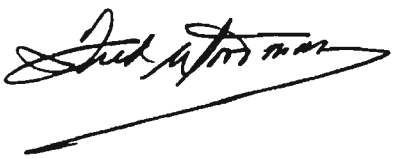
RECOMMENDATIONS

The Council recommends:

1. **The Canadian quota for haddock on Georges Bank (5Zjm) be set at 4500t. This should result in an increase of 10 percent in the biomass for ages three and older .**
2. **The Canadian quota for yellowtail flounder on Georges Bank (5Zhjmn) be set at 415t. This should result in an increase of approximately 32 percent in the biomass for ages four and older.**
3. **The Canadian quota for Cod on Georges Bank (5Zjm) be set at 2000t. This should result in an increase of 7 percent in the biomass for age three and older. Although the projected level of increase in the biomass is slightly less than the 10 percent target, it is important to achieve a ratio of cod to haddock that is realistic so as to minimize the incentive to dump and discard.**
4. **The Council also recommends that we continue to work cooperatively with the U.S. and we applaud the progress that has been made. It is essential for our conservation strategy that both countries continue to restrain and monitor their fisheries. Meaningful dialogue with the U.S. must continue, especially as this relates to non-conservationist fishing practices such as dumping and discarding, and the catch of small fish.**
5. **Finally, the Council recommends that this fishery open on June 1, 1996.**

Your Council is honoured to have this opportunity to present you with this advice and we trust you will find this helpful in your deliberations.

Sincerely,



Fred Woodman
Chairman

5.3 Briefs Received for the Georges Bank Consultations

FRCC.96.5Z-1	John Sollows, Yarmouth, N.S.
FRCC.96.5Z-2	Scotia Fundy Mobile Gear Fishermen's Association, Yarmouth, N.S.
FRCC.96.5Z-3	Blandford Nickerson, Derek Jones, Sanford Atwood on behalf of the Nova Scotia Crewmen and Fish Plant Workers Association, Port Joly, Queens Co., N.S.
FRCC.96.5Z-4	Alec d'Entremont, Pubnico Ledge Fishers Ltd., Yarmouth, N.S.
FRCC.96.5Z-5	Claude Albert d'Entremont, Inshore Fisheries Ltd., Yarmouth Co. N.S.
FRCC.96.5Z-6	Graeme Gawn, MFU, Local 9, Meteghan, N.S.
FRCC.96.5Z-7	Yvon Thibault, Atlantic Groundfish Association, Digby Co., N.S.
FRCC.96.5Z-8	Neil Bellefontaine, RDG Maritimes Region, submitting GOMAC Advice for Georges Bank.

APPENDIX 6

NAFO ADVICE

6. NAFO ADVICE

16 August 1996

The Honourable Fred Mifflin, P.C., M.P.
Minister of Fisheries and Oceans
200 Kent Street
Ottawa, Ontario
K1A 0E6

Dear Minister:

Section 4.5 of the Terms of Reference of the Fisheries Resource Conservation Council (FRCC) states the following:

> *"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)".*

The FRCC, having reviewed the report of the NAFO Scientific Council, June 5 - 19, 1996 meeting, is writing to recommend elements of a Canadian position for the forthcoming NAFO meeting.

The FRCC recognizes the difficulty in reaching consensus in international fora such as NAFO and the progress which Canada has made in recent years to end the overexploitation of stocks which straddle Canada's 200 mile limit. It is very important that the conservation steps taken to date continue and Canada should continue to aim for adoption of conservation measures outside 200 miles that are consistent with those inside.

The current status of groundfish stocks on the once-prolific Grand Banks is a sad reflection of the failure of past management, maximizing exploitation was clearly more important than sustaining and conserving fish stocks. The Council fully supports the NAFO Scientific Council recommendations for moratoria on the following stocks:

2J,3KL Cod
3NO Cod
3M Cod
3LNO American Plaice
3M American Plaice
3NO Witch Flounder
3LNO Yellowtail Flounder
3NO Capelin

Having reviewed the scientific advice on redfish stocks, the FRCC can see little evidence to support a 20,000 t and 14,000 t Total Allowable Catch (TAC) for 3M and 3LN Redfish respectively. Despite a TAC of 26,000 t, recent catches for 3M Redfish have been in the range of only 11,000 -13,000 t annually. The stock is characterized by low biomass levels, poor recruitment and high by-catches of juvenile redfish in the 3M Shrimp fishery. In 3LN Redfish, despite the Scientific Council recommendation of 14,000 t, the Fisheries Council set the quota at 11,000 t. For 1995, only 2,000 t were taken. The NAFO Scientific Council considers that this stock has declined since the mid 1980's and continues to be at a low level, particularly in Division 3L. There is some indication of recruitment in 3N but no sign of any good year classes to follow. For these reasons, the FRCC recommends that Canada should propose a substantial reduction in these TAC's.

The high by-catches of juvenile fish in the 3M Shrimp fishery are a major concern to the FRCC. The NAFO Scientific Council estimated that the catch of approximately 230,000,000 redfish from 1993 to 1995 led to a loss of 25,000 t of yield in the 3M Redfish fishery. Obviously this scale of destruction of the redfish stock is unacceptable. While the use of Nordmore grates has reduced the by-catch, it has not been eliminated. Efforts to minimize the redfish by-catch must remain in place. Despite contracting parties agreement to limit effort, the number of vessels has increased over 1995 and the effort is excessive.

The FRCC recommends that Canada propose a reduction in this fishing effort consistent with NAFO's 1995 agreement to limit effort. We understand that further advice will be forthcoming from the NAFO Scientific Council in September. Close scrutiny of September's advice on 3M shrimp is warranted given; the high exploitation rate, the catch of small shrimp, and the increased effort on this stock (the level of activity has been as high as 89 vessels in the 3M shrimp fishery in 1996).

The FRCC cautions that any further expansion of the shrimp trawl fishery into 3LN should be discouraged. The FRCC has noted with concern the high discard rate of small flatfish and redfish in other shrimp fisheries and the effect this could have on recruitment and loss of yield for these stocks, which are on the Grand Banks at critically low levels. Given these reasons, the approach taken by Canada at NAFO in the previous year with respect to an expanded 3LN Shrimp trawl fishery should be continued.

Evidence of good recruitment for Greenland Halibut is encouraging. It is essential that the above-average year classes from the 1990's be protected to allow the stock to rebuild. Catching large numbers of these fish as juveniles will waste the potential for rebuilding the stock. Therefore, the FRCC recommends that Canada propose a minimum increase in mesh size in this fishery to 145 mm mesh configuration which should have the effect of reducing the catch of young Greenland Halibut. This is consistent with regulations inside the Canadian zone.

The Greenland Halibut and Shrimp fisheries developed rapidly, exploiting previously unregulated species. This diversion of effort resulted in overexploitation in these new fisheries and substantial by-catches of other species. Canada is now pursuing a cautious approach to new fisheries on previously unregulated species, and the FRCC recommends that Canada encourage NAFO to adopt a similar approach.

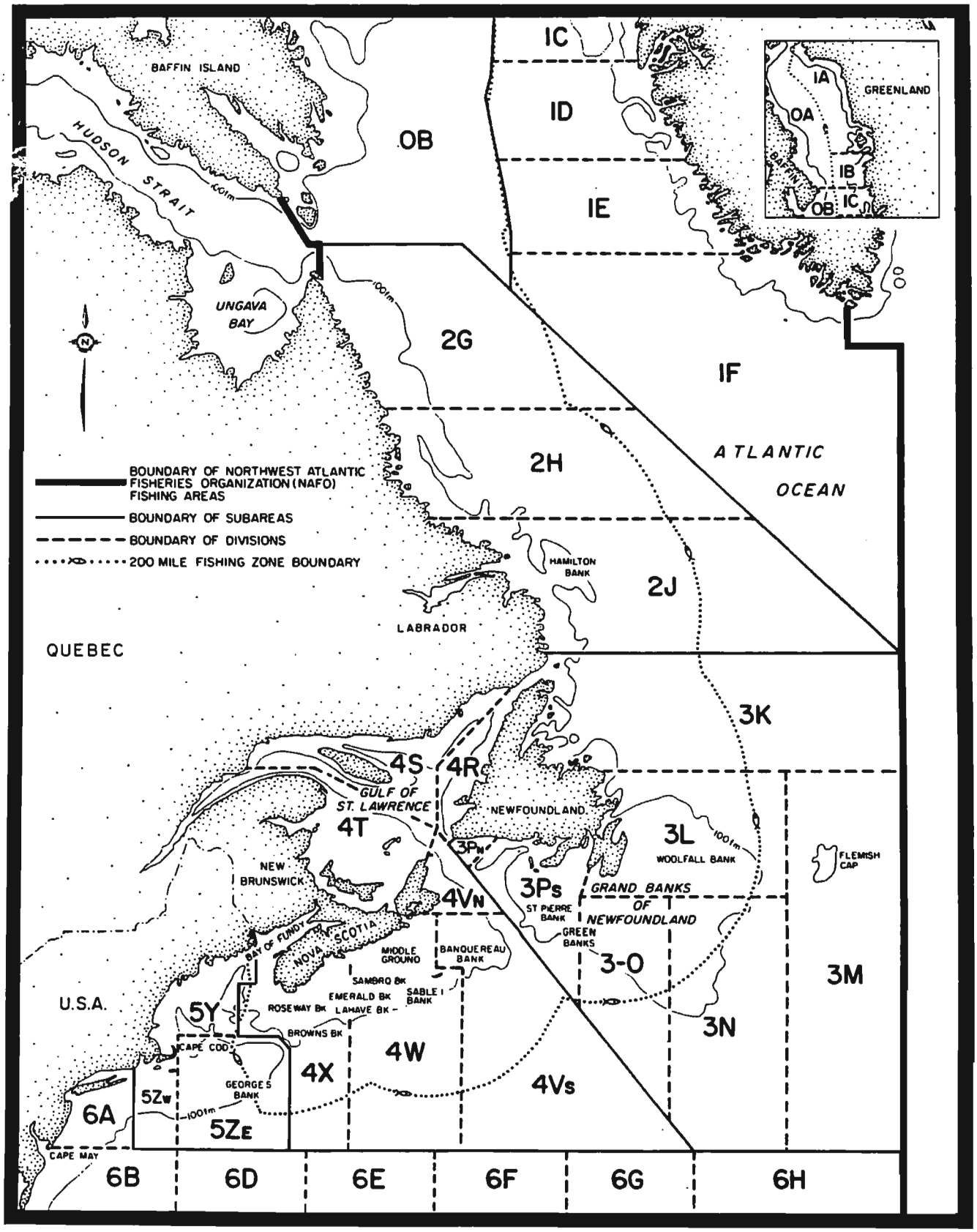
The FRCC looks forward to the day when straddling stocks recover since they are critically important for the Canadian fishing industry. For this to happen, *it is essential that the conservation measures adopted as a pilot project by NAFO in 1995 continue and that the excessive harvest of juveniles which occurred in past fisheries not be repeated*. These are crucial prerequisites to long-term rebuilding and recovery.

Best wishes for a successful NAFO meeting in September.

Sincerely,

Fred Woodman
Chairman

200 Mile Fishing Zone and NAFO Fishing Boundaries



Canada