

NEWFOUNDLAND REGION OVERVIEW

Background

In Newfoundland, Science Branch of the Department of Fisheries and Oceans is responsible, either directly or indirectly, for advising on the status of various groundfish stocks extending from Davis Strait between Baffin Island and Greenland in the north to off the south coast of Newfoundland in the south.

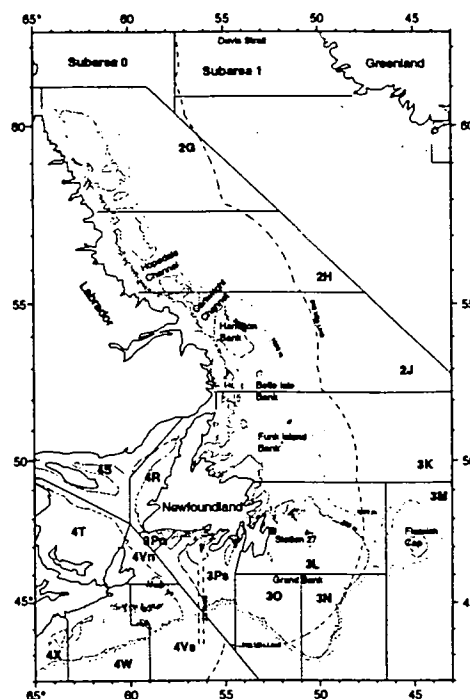
In this area, there are 5 cod stocks (2GH, 2J3KL, 3M, 3NO and 3Ps), 5 redfish stocks (SA2+3K, 3LN, 3M, 3O and Unit 2), 4 American plaice stocks (SA2+3K, 3LNO, 3M and 3Ps), 3 witch flounder stocks (2J3KL, 3NO and 3Ps), 2 Greenland halibut management areas (SA0+1 and SA2+3KLMN), 2 haddock stocks (3LNO and 3Ps), 1 yellowtail flounder stock (3LNO), 1 pollock stock (3Ps), 2 roundnose grenadier stocks (SA0+1 and SA2+3) as well as a portion of the 3NOPs4VWX Atlantic halibut stock. In addition, there is a fishery for lumpfish, as well as relatively new fisheries for monkfish and skates. These latter two came under quota management for the first time in 1995.

Scientific information on the above stocks is provided either through the DFO Science Branch regional review process and the FRCC, or the Scientific Council of NAFO. Quotas are set by the NAFO Fisheries Commission for 3NO and 3M cod, 3LN and 3M redfish, 3LNO and 3M American plaice, 3LNO yellowtail flounder, 3NO witch flounder, SA2+3 roundnose grenadier and SA2+3KLMN Greenland halibut. The NAFO Scientific Council also reviews the Canadian assessment of 2J3KL cod on an annual basis. Greenland halibut and roundnose grenadier in SA0+1 are managed bilaterally by Denmark, on behalf of Greenland, and Canada. Quotas for the other stocks are set by the Minister of the Department of Fisheries and Oceans based on recommendations of the FRCC.

The FRCC makes recommendations to the Minister on all groundfish stocks, advising either on catch levels, or recommending a Canadian position to be taken during NAFO Fisheries Commission meetings.

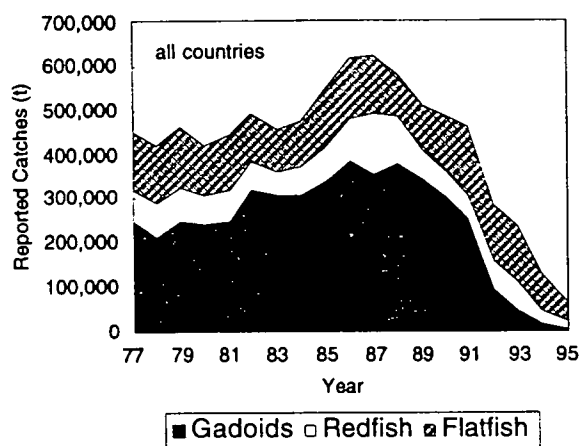
The Newfoundland Region Stock Status Reports contain information only for those stocks for which the FRCC provides direct catch recommendations to the Minister. Information on the stocks evaluated and managed by NAFO is contained in separate documentation; the reports of the NAFO Scientific Council.

Detailed technical information on each of the stock assessments can be found in the research documents listed with each stock report. Technical information for the NAFO stocks is available through the NAFO SCR Document series.



The Groundfish Fisheries

Cod has traditionally dominated catches in Newfoundland waters, but with the decline in these traditional resources, catches of other species exceeded those of cod in recent years. Significant reductions in catches of a number of different species and stocks occurred in 1995. For example, Greenland halibut catches in subareas 2+3 dropped from about 48,000 metric tons in 1994 to only about 13,000 metric tons in 1995.



Reductions of similar magnitude were recorded

for most other species. These declines were the result of reduced fishing effort in the NAFO Regulatory Area. A significant reduction was even noted for Division 3M cod, with catches declining from about 32,000 metric tons in 1994 to about 10,000 metric tons in 1995.

Inside 200 miles, groundfish catches were once again dominated by Unit 2 redfish, although its was reduced by about 50% from the 1994 level.

In 1996 as in 1995, for the 'traditional' resources, only directed fisheries for Greenland halibut in SA0+1 and SA2+3KLMN; cod in 3M; redfish in 3LN, 3M, 3O and Unit 2; American plaice in 3M; and witch flounder in 3Ps are occurring. Fisheries for other species such as lumpfish, monkfish, wolffish, white hake, "black back" (winter) flounder and skates are also taking place.

Information on offshore fishing effort in the Newfoundland area was presented in some detail in the 1995 Regional Overview. Because of the current very limited fisheries, there is almost no new information. Historically, most of the reported directed effort by all countries combined was toward cod with flatfish ranked second and redfish third. In recent years however, most of the reported effort has been for flatfish, specifically non-Canadian effort for Greenland halibut. Inside the Canadian zone, most offshore effort is being directed towards redfish, followed by Greenland halibut.

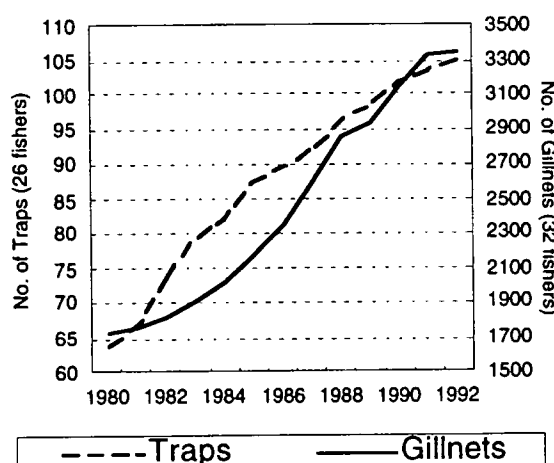
Since extension of jurisdiction, most **Canadian offshore effort** took place in Division 3L, while the least was in Division 2J. Currently it is most in the Unit 2 area (divisions 3P and 4V).

Non-Canadian effort declined after extension of jurisdiction in 1977, but increased significantly again, especially in divisions 3LN around 1985.

During the second half of the 1980s, reported non-Canadian offshore effort was restricted to only the 'nose' and 'tail' areas of the Grand

Banks outside 200 miles. Nonetheless, this effort was about the same as, or even greater than that of the Canadian fleet fishing in the Canadian portion of the Grand Banks even though the area outside 200 miles is very much less than that inside. Effort outside 200 miles declined significantly during 1995 as a result of the 'turbot war.'

Effort information related to northern cod, obtained from **interviews of inshore fishers**, was made available this year. The data suggest substantial increases in inshore effort in the area of the Bonavista Peninsula during the 1980s. It might be hypothesized that similar increases occurred over time throughout much of the stock area.



Background to Groundfish Reviews

Unlike in previous years, the regional review of the status of the groundfish resources around Newfoundland has been divided into different time periods. The **'traditional' stocks off the northeast coast and on the Grand Banks** (2GH and 2J3KL cod, 3LNO haddock, SA2+3K American plaice, 2J3KL witch flounder and SA2+3K redfish) were reviewed or updated during the usual time period in May.

The **'traditional' stocks found off the south coast** (3Ps cod, 3Ps haddock, 3Ps pollock, 3Ps American plaice and 3Ps witch flounder) will be reviewed in August.

The reason for this change is to better accommodate analysis of data collected during the 1996 3Ps survey which ended in early May. In addition, as outlined below, the region changed survey fishing gears during 1995 in order to catch more small fish as well as other species such as crab and shrimp. Additional time is therefore required to complete the analyses.

Division 3O redfish and **Unit 2 redfish** will be reviewed in detail during September, with a Zonal report available by the end of that month. This timing change first occurred during 1995, and was made so the redfish in units 1, 2 and 3 as well as Div. 3O could be reviewed together, and results of the summer surveys could be incorporated. As an interim measure, report updates containing information on the 1995 fisheries have been prepared.

Work is ongoing to evaluate, to the extent possible, the status of a number of other species/stocks such as lumpfish, skates, monkfish, white hake and wolffish. It is anticipated that this work will be reviewed and reports made available by the end of August.

This overview currently incorporates only information from the reviews of the northeast coast and Grand Bank stocks. It will be updated to include additional information after all of the regional reviews as well as the NAFO assessments are completed. The final version should become available by the end of September.

Groundfish Resource Status

Northeast Newfoundland and Grand Banks

The 'traditional' groundfish resources in the waters around Newfoundland continue to be at or very near historical low levels. For Canadian managed stocks with TACs still in place, reduced TACs were imposed for 1995, and further reductions occurred for 1996. For example, the quotas for Unit 2 redfish have

declined from 25,000 metric tons in 1994 through 14,000 metric tons in 1995 to only 10,000 metric tons in 1996.

For the **NAFO-managed resources** excluding those of Flemish Cap, directed fisheries remain open only for Greenland halibut and 3LN redfish in 1996. The NAFO Scientific Council continues to express concern that overfishing on these is gradually reducing stock sizes. Updated information on the status of these resources will be available in June, 1996 after the annual meeting of the Scientific Council.

Because of the many closures now in place, data from fisheries-related activities which previously made up an important part of the assessment database, are no longer available. Ongoing assessments of these resources are more critically dependent on research activities such as research surveys and sentinel surveys.

In 1995 **Sentinel Surveys** began on both the northeast (2J3KL cod) and south (3Ps cod) coasts. For the first time, Departmental scientists are working closely with inshore fishers to derive information on the status of cod resources in the inshore areas. In addition to collecting data on catch rates, information on fish sizes, fish condition, and age and growth are being gathered.

Although the Sentinel Survey on the northeast coast began somewhat later than optimum in 1995, and although there is only one year's data available so far which limits their usefulness, it is anticipated that as the information base increases, these will serve as invaluable additions to our knowledge of the two cod stocks. It is planned to have fishing gear in the water by early June in both areas for 1996.

Other Species Groups

Pelagic Fish Species

The offshore acoustic estimates of the capelin stock in Subarea 2 + divisions 3KL have been

very low since about 1990. However, other indices, including inshore data, have suggested higher abundance during the same period. The reasons for the divergent results remain unclear. It does appear that the 1992 and 1993 year-classes are relatively abundant, and will contribute significantly to the 1996 spawning stock.

Capelin of these year-classes are smaller at age than those of the 1980s, similar to other recent year-classes.

Recent studies have shown that the recent delay in the time of capelin spawning is related to colder water temperatures as well as the overall smaller sizes-at-age.

The capelin stock in divisions 3NO remains at a relatively low level, and the fishery is closed again for 1996.

Herring stocks off the east and south coasts of Newfoundland are at low levels; with biomasses of only about 10% of the observed maximums. The low stock sizes are the result of recent year-classes being small in relation to the very strong 1968 year-class. The size of recent year-classes, as well as delays in the timing of spring spawning, have been related to the cold environmental conditions. The colder conditions have also resulted in lower growth rates through the 1990s.

Invertebrate Species

The shrimp stocks off the east coast of Newfoundland appear to remain very healthy based on high commercial catch rates, and the continuing high proportion of large females in the catches (reflecting a high spawning biomass). Based on the distribution of fishing effort during the 1990s, the distribution of shrimp is currently widespread and has possibly been expanding. Continuing high catch rates of the smaller males suggests continued good recruitment over the short term.

Crab landings have been increasing since about 1989, reaching an all time high of 32,000 metric tons in 1995. Effort has approximately doubled since the late 1980s. There are indications of catch rate declines in some inshore areas, but they have remained high in most offshore areas of divisions 3K and 3L.

On the Grand Banks, there are only a few locations where Iceland scallops are found in commercial quantities. Research data indicate that the beds of scallops in Division 3N are possibly being depleted.

Salmonids

From 1987 to 1992, survival rates of salmon (as estimated from the ratio of smolts leaving a river to the numbers of adults returning one year later) declined in many areas of Newfoundland. Studies of salmon in the ocean have revealed that survival is correlated to temperature of the surface waters of the ocean (called thermal habitat). The timing of return to rivers in Newfoundland has also been shown to be related to sea surface temperatures. Since 1992, survival rates have again increased perhaps indicative of a better 'thermal habitat.'

Marine Mammals

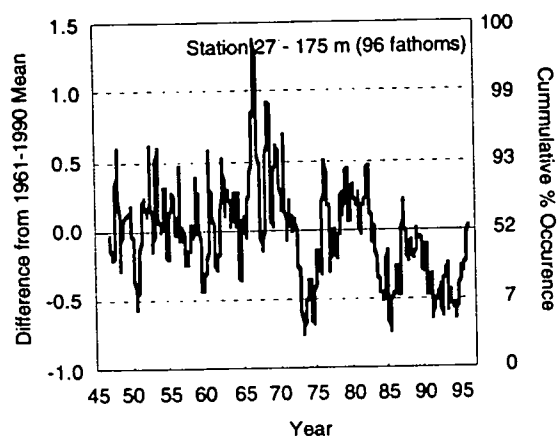
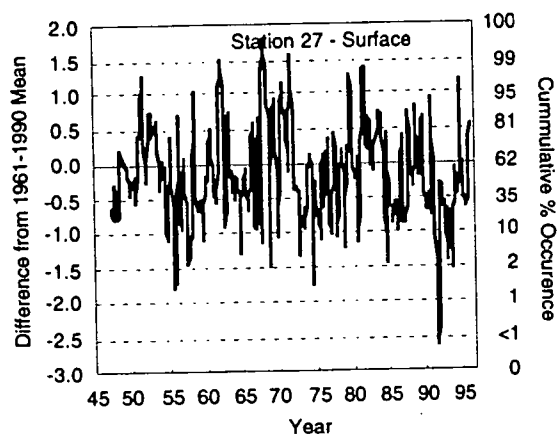
A considerable amount of new information on marine mammals, particularly harp seals, became available in 1995. Progress is continuing on studies of their abundance, distribution and diet.

The Environment

Colder than normal air temperatures were experienced in Atlantic Canada during the winter of 1994, but these had moderated to near normal by the spring of 1995. The above normal ice coverage during winter and early spring along the east coast of Newfoundland and Labrador had returned to near normal conditions by mid-May, 1996 except in a few isolated areas.

At Station 27 off St. John's, water temperatures were near normal during winter months, but

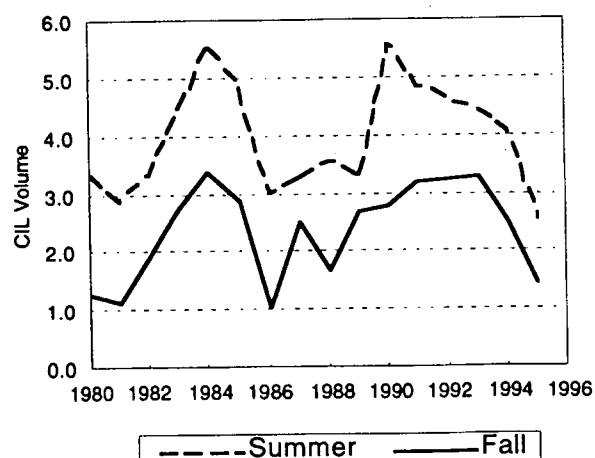
cooled to 0.5 - 1.0 °C below normal by spring. By fall, temperatures had returned to near normal throughout most of the water column. Surface water temperatures were above normal by the end of the year, while the deepest water had returned to normal.



The cold intermediate layer (CIL) on the Newfoundland shelf was about 20% above normal along the Flemish Cap line, but 28% below normal along the Bonavista line and 32% below normal along the Seal Island transect.

With the exception of the northern Grand Bank, the cross-sectional area of the sub-zero °C water was the lowest in 10 years.

Overall, during both summer and fall, the estimated volume of the CIL was at or close to the lowest measured over the last 15 years.



Off the south coast, the relatively cold conditions which began around the mid-1980s have moderated somewhat, but below normal temperatures continued through 1995.

Ecological Perspectives

A number of ecological studies have been undertaken during the past year. It is hoped that these will assist our understanding of the marine ecosystem as it relates to commercial and non-commercial species.

A preliminary description of the temporal and spatial patterns in the variation of nutrients, phytoplankton and zooplankton in Newfoundland waters was developed. All of these exhibit seasonal cycles. For example, phytoplankton concentrations peak during April-May. In addition, there appears to be considerable variation in the cycles from one location to another. This may be due to such factors as mixing, mixed layer depths, nutrient sources and advection. Further studies are necessary, but this type of information is important in that the cycles and their timing may play a significant role in determining year-class success.

It has been shown that long-term fluctuations in seabird populations, their reproductive success and their diets all exhibit associations with oceanographic and climatic changes. Analyses of the foods brought to gannet chicks on Funk

Island during the period 1977 through 1995 indicated that prey diversity increased, and also that there was a shift from migratory warm-water species to resident cold-water pelagic prey. These changes are indicative of large scale shifts in pelagic food webs associated with recent cooling trends in the northwest Atlantic. It is thought that data derived from studies of seabirds can compliment more traditional fisheries data collections and analyses.

Offshore Research Surveys

The Newfoundland Region has routinely had available two trawling research vessels for offshore studies: the *Gadus Atlantica* and *Wilfred Templeman*. An Engel 145 High Lift otter trawl was routinely used on both of these ships. In 1995, the *Gadus* was replaced by the new vessel *Teleost*.

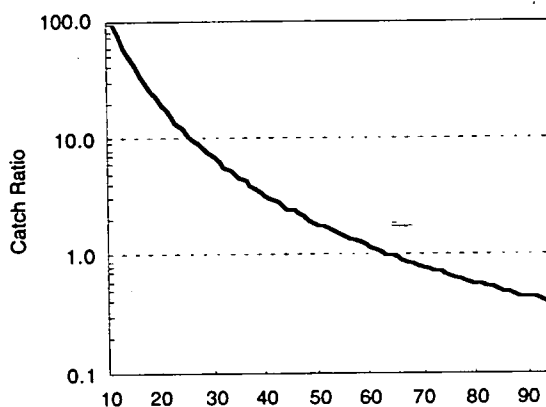
Because of a desire to collect more reliable information on juvenile fish, as well as information on other species such as crab and shrimp, it was decided to change the research trawl used for the offshore surveys at the same time as the vessel change. Therefore, the gear used by both the *Teleost* and *Templeman* was changed to a Campelen 1800 shrimp trawl with 'rock-hopper' foot gear.

Different fishing gear will catch different sizes and quantities of fish species. Concurrent with the gear change, there was also a reduction in the duration of the standard tow from 30 minutes to 15 minutes. Therefore, before being able to relate catches from surveys using the new survey trawl and tow duration to those made in the past using the old survey trawl and 30 minute tow duration, it was necessary to conduct 'comparative fishing' experiments. That is, fishing both nets in the same area at the same time and then comparing catches. In addition, because different vessels have different fishing powers, it is necessary to conduct these net

comparison studies for both the *Gadus /Teleost*, and *Templeman* (Engel)/*Templeman* (Campelen).

During the past year, two separate studies were carried out. The first was a comparison of catches by the *Gadus* using the Engel trawl and the *Teleost* using the Campelen. This work has been completed, and conversion factors based on fish lengths for five species (cod, American plaice, redfish, Greenland halibut and witch flounder) have been derived.

Overall, the results indicate that the Campelen trawl has much higher catchabilities for smaller fish of all five target species; in the order of 50-100 times greater than catches by the Engel trawl. As fish size increases, differences in catchabilities declined to below a 1:1 ratio indicating that the Engel trawl is more efficient at catching larger fish. An example of the ratio between gears by length for cod illustrates the general relationship for the different species examined. The catch ratios shown are for the Campelen catches/Engel catches.



Time only permitted their preliminary application to the survey estimates for divisions 2J3KL cod this year as outlined in the Stock Status Report. Further scientific peer review of the conversion derivations will take place prior to wider application.

The second experiment, completed in March, 1996, compared catches by the *Templeman*

using the Campelen with those of the *Alfred Needler* (sister ship of the *Templeman*) using the Engel. Analysis of the collected data is still ongoing, but because no large concentrations of some of the target species (cod, American plaice, yellowtail, witch and Greenland halibut) were located, the conversions will not be as well estimated as in the earlier experiment. Additional field work in this area will be necessary.

One further experiment is planned: a comparison of the Campelen on the *Templeman* with the Yankee 41 shrimp trawl on the *Needler*. This latter net was used previously for juvenile studies on the Grand Banks. Results of this last experiment will not have any impacts on the stocks evaluated as part of the regional process. Instead, the information from this study will have implications for Grand Banks stocks assessed by NAFO, specifically divisions 3NO cod and divisions 3LNO American plaice and yellowtail flounder.

Outlook

Overall, for stocks off the northeast coast, there are no signs of recovery primarily as a result of continued low recruitment. If these low recruitment levels have been at least partially the result of the cooler water temperatures experienced during the early 1990s, then it is possible that moderating conditions now being observed may result in improved chances of survival of these young fish.

There are however, some positive signs. Both condition factor and length-at-age of northern cod appear to be improving from the low levels of the early 1990s.

Anon. 1996. Stock status update assessment of northern shrimp off Newfoundland and Labrador. DFO Atl. Fish. SSR 96/17.

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Brodie, W. 1996. A description of the 1995 fall groundfish survey in Division 2J3KLNO. NAFO SCR Doc. 96/27.

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Neis, B., L. Felt, D.C. Schneider, R. Haedrich, J. Hutchings and J. Fischer. Northern cod stock assessment: What can be learned from interviewing resource users? DFO Atl. Fish. Res. Doc. 96/45.

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Wheeler, J.P. and G.H. Winters. 1996. Newfoundland east and southeast coast herring - an assessment to the spring of 1995. DFO Atl. Fish. Res. Doc. 96/63.

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For More Information

Research Documents: Anon. 1996. Newfoundland and Labrador Snow Crab. DFO Atl. Fish. SSR 96/15.

