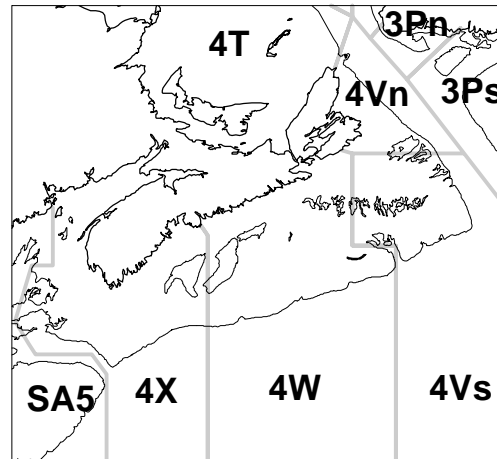


Maritimes Region



Pollock in 4VWX5Zc



Background

Pollock in the western Atlantic range from southern Labrador south to about Cape Hatteras. The main fishable concentrations, however, occur in the Georges Bank, Gulf of Maine, and Scotian Shelf areas.

Young pollock are closely associated with nearshore habitats, recruiting to the offshore populations at around age 2. Based on observations by fishermen and acoustic studies, pollock spend the least time on the bottom of all the cod-like fish. Pollock show strong schooling behaviour. Food of adult pollock include euphausiids and fish such as herring, sand lance and silver hake.

Pollock are mature at ages 3 to 5 depending on the area. Pollock also show marked differences in growth rate by area, with fish in the Bay of Fundy area growing faster than those on the eastern Scotian Shelf.

The management unit includes the Canadian portion of Georges Bank and the Gulf of Maine, and the Scotian Shelf. A variety of fishing gear are used to fish pollock, including primarily otter trawls, gillnets, handlines and longlines. Pollock are also landed as by-catch in the small-mesh silver hake and redfish fisheries. The Canadian fishery is managed on the basis of a target exploitation rate of about 24% of the population, and maintenance of adequate biomass levels to promote good recruitment.

Summary

- The 1998 fishery has been poor compared with 1997 in most areas, with exceptions including Georges Bank and some portions of western 4X.
- The geographic scope of the fishery has become increasingly constricted, with a growing proportion of landings coming from western 4X.
- The size and age of fish caught in the research vessel surveys and commercial fishery has diminished.
- The index of abundance, commercial fishery catch rates, has declined for the past two years.
- There is considerable uncertainty in the recent estimates of exploitation rate and population size due to a retrospective pattern in the population model.
- The 1999 yield that reflects the average retrospective pattern in $F_{0.1}$ catch calculated over the period 1995-1997 is about 5000 t.
- Given the negative indicators for this resource, a rebuilding strategy is required.

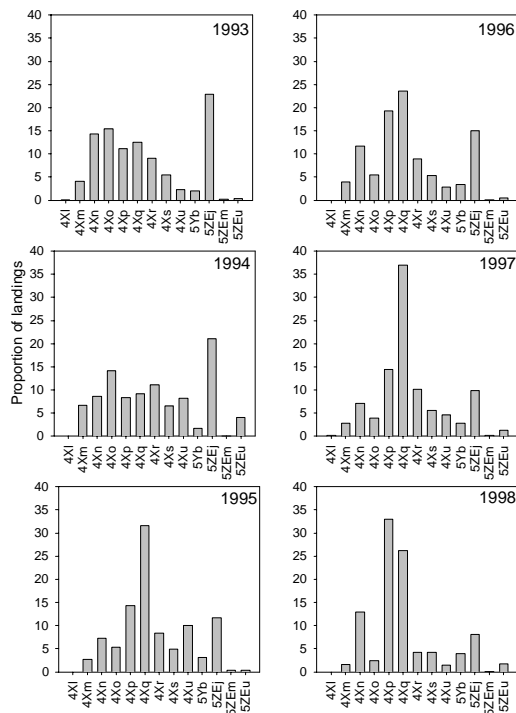
The Fishery

Landings (thousand tonnes)

Year	1992	1993	1994	1995	1996	1997	1998
TAC	43.0	21.0	24.0	14.5	10.0	15.0	20.0
Canada ¹	32.0	20.3	15.2	9.7	9.1	11.9	
TOTAL	34.1	21.1	15.2	9.8	9.3	12.0	

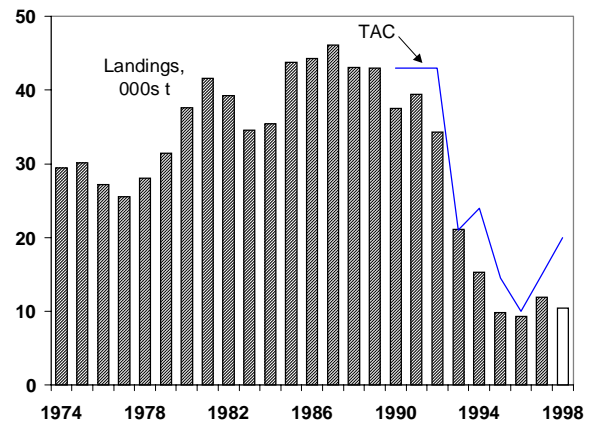
1. The management unit included NAFO Subarea 6 and divisions 5Y and 5Z prior to 1988. Starting with 1988, only the Canadian portions of divisions 5Y and 5Z were included in the landings.

The recent pollock fishery continues to be dynamic, with significant changes in area fished within the management unit and dominant gear type. During the 1980s, landings from Divs. 4VW accounted for about 30% of landings from the management unit. In 1997, Div. 4VW landings have accounted for about 10% of total landings. Within Div. 4X, the proportion of landings from the western half (includes unit areas 4Xq, r, and s) has increased from 31% in 1991 to 65% in 1997. Unit Areas 4Xq and 4Xp currently contribute the greatest proportion of pollock landings within the western half of the management unit.



The contribution of larger trawlers to total landings (TC 4+) has been steadily declining since 1981. In contrast, the contributions of TC 1-3 trawlers and fixed gear vessels (gillnet, longline) have been increasing over the same period.

In 1997, **landings** increased to 11936 t from 9280 t in 1996. With the exception of large mobile gear, most sectors were able to catch close to their quota. Landings in the small mesh silver hake fishery decreased to 10 t in 1997 from 64 t in 1996. Landings of pollock in the domestic redfish fishery, which also uses relatively small mesh gear, were 358 t. In 1998, landings were 10,353 t (including landings made up to the end of August) against the 20,000 t quota. Most gear sectors indicated that they would not be able to catch their quota.



The **size composition** of landings in 1997 was larger than that observed in 1996 for the aggregate fishery. The catch at age in 1997 did not compare well with expectations, with considerably fewer age 7 and older fish caught than anticipated and considerably more age 4 and 5 fish. Average weights at age from the fishery have been stable in recent years.

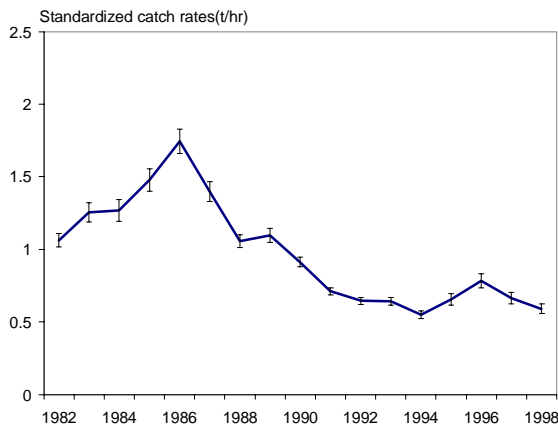
During **consultations** with industry in September and October of 1998, fishermen reported mixed experiences with the pollock fishery this year. In general, fishing was considered poor throughout much of the management unit. Notable exceptions to this

were Georges Bank and parts of western 4X where good fishing was reported. Other consistent observations were that fish were found in unexpected areas, but not in some traditional fishing areas. These observations appear consistent with **oceanographic information** that indicate anomolous conditions in 1998, particularly the influx of Labrador Shelf water onto the central and western Scotian Shelf. Comments on fish size were variable, but in general it was noted that there were few large pollock.

Resource Status

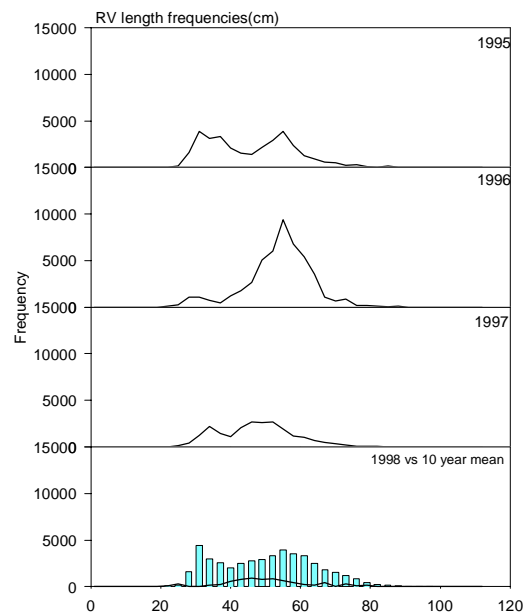
The stock status evaluation was based on an analytical assessment using landings statistics, sampling for size and age composition of the commercial catch, and trends in commercial fishery catch rate. Changes in the current assessment included an approach that employs the current year’s information. Thus, this assessment includes almost two years of new information and provides better insight into recruiting year-classes.

The index of abundance used in this assessment is the **standardized catch rate series** for otter trawlers of Tonnage Class 2-5 and 7. The standardized catch rate series accounts for differences in catch rate by vessel tonnage class, mesh type, unit area, month and year.



The catch rate series peaked in 1986 as the strong 1979 year-class became fully recruited, and declined thereafter. After a slight increase from 1994 to 1996, the catch rate series has decreased for two consecutive years. The catch rate series is considered indicative of population trends in general. However, the fishing industry feels that the catch rate series may be overestimating the decline of the resource in recent years. It was also noted that the interpretation of catch rate series can be influenced by many factors, including changes in the spatial distribution of the resource and the availability of fish to the gear. These concerns are unresolved at present.

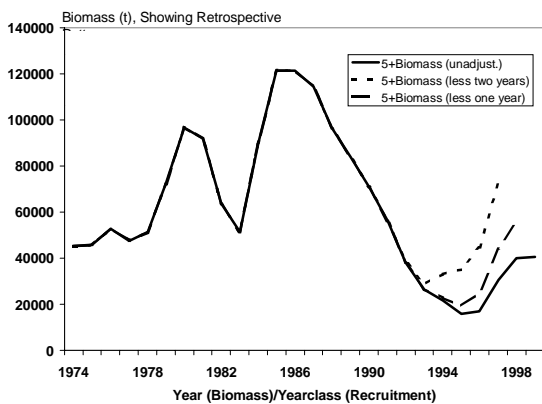
Research vessel survey data are not currently used as an index of abundance in this assessment, because there is considerable unexplained interannual variation of many year-classes, which is inconsistent with our knowledge of fisheries dynamics. However, the research survey information provides long-term information on the size and age structure of the population, and indicates fewer larger fish in the surveys in recent years compared with the ten year average.



Similarly, survey information indicates a comparative absence of fish older than 8 years in the most recent five year period compared with earlier five year periods.

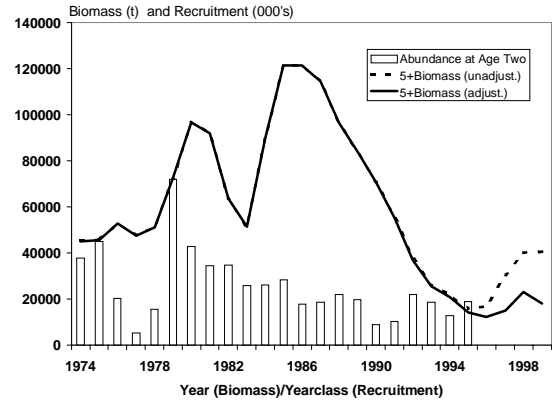
The **ITQ survey** conducted in NAFO Div. 4X also showed an absence of larger fish in 1998 compared with the three earlier years of the survey. Overall, catch rates in that survey have followed a declining trend, but one of the survey vessels was unable to occupy stations in known areas of pollock abundance because of gear conflicts in 1998. This affected six stations in the Bay of Fundy area.

There is considerable uncertainty in the recent estimates of exploitation rate and biomass. A major contributor to this uncertainty is a severe **retrospective pattern** in the population model, with successive estimates of year-class size often becoming considerably smaller as more data become available. This effect was most pronounced over the years 1994 to 1996. To illustrate the impact of the retrospective pattern, the figure of population abundance shown below includes trends that illustrate how the perception of population and exploitation level have changed with one and two years' less data.

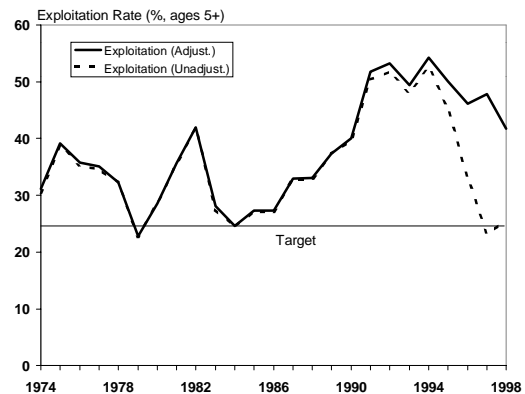


Should the retrospective pattern persist and influence the beginning of year 1999 population biomass estimate in a similar fashion, population biomass could be reduced from the current estimate of 40,527 t to as little

as 17,970 t, and the recent increase in biomass becomes much less obvious.

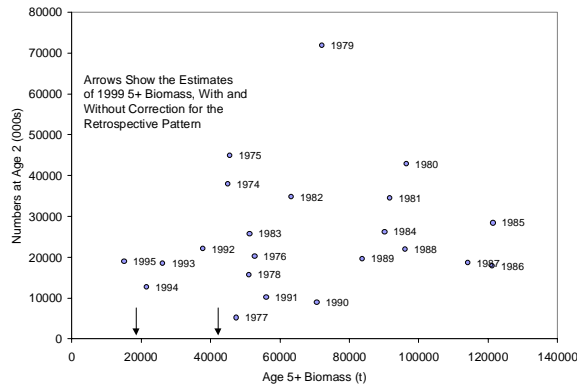


The **exploitation rate** at age 5+ that reflects the population abundance trends shown above shows considerable divergence with the adjusted and unadjusted scenarios. The unadjusted exploitation rates peak in 1991-1994, then decline to the target level in 1997 and 1998 (the actual value is contingent on the final removals in 1998). With analyses adjusted for the retrospective, the decline in exploitation rate is much less obvious during the same period. However, the observation that exploitation rates remained high throughout the recent past is inconsistent with the substantial decline in mobile gear effort from 1991 until 1996.



Recruitment after the strong 1979 year-class remained close to the long-term average of 28 million fish for nine years. Recent (1992-1995) year-classes has averaged about 18

million fish (unadjusted for the retrospective pattern). Even though there is little relationship between stock and recruitment for this groundfish resource, the 1999 adult biomass is at levels normally associated with poor recruitment, particularly after the retrospective adjustment.



Exploratory analyses were conducted that allowed the relationship between the index and the population to vary. The relationship is referred to as the catchability of the index gear, in this case the trawler. While further work is required, the preliminary analyses indicated that the assumption of constant catchability in the standard assessment approach has not been met, and this may be contributing to the retrospective pattern described earlier.

Because of the problems described above, the population model is of very limited value for describing the recent population status.

Outlook

Given the difficulties in determining recent population status, a very cautious approach to harvesting is required. Danger signals and sources of uncertainty include the continued geographic constriction of the fishery in Div. 4X and the absence of larger and older fish in the fishery and the survey. These factors and two consecutive years of catch rate declines have led to a markedly different interpretation of stock status than that presented in the last assessment.

Without adjustment for the retrospective pattern, the $F_{0.1}$ yield in 1999 is about 12,500 t (assumes total 1998 removals of 15,000 t). The 1999 yield that reflects the average retrospective pattern in $F_{0.1}$ catch calculated from 1995 to 1997 is about 5000 t. Given the negative indicators for this resource, fishing at a level less than $F_{0.1}$ should be considered to allow the stock to rebuild.

For More Information

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References

Neilson, J., and P. Perley. 1998. The 1998 assessment of pollock (*Pollachius virens*) in NAFO Divisions 4VWX and Subdivision 5Zc. DFO Can. Stock Assess. Sec. Res. Doc. 98/144.

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