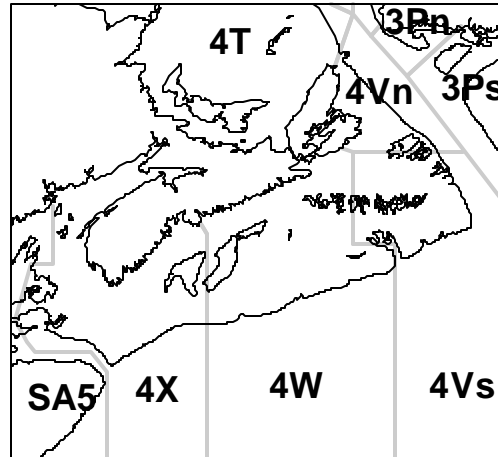




Maritimes Region



**Pollock in Div. 4VWX  
and SA 5**



**Background**

*Pollock in the western Atlantic range from southern Labrador to about Cape Hatteras. The main fishable concentrations 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 is used to fish pollock, primarily otter trawls, but also gillnets, handlines and longlines. Pollock are also landed as by-catch in the small-mesh silver hake and redfish fisheries.*

**Summary**

- The 1999 fishery has been poor compared with 1998 in most areas.
- The geographic scope of the fishery is still constricted, with the largest proportion of landings coming from western 4X.
- The ranges of size and age of fish caught in the research vessel surveys and commercial fishery have diminished.
- The index of abundance (commercial fishery catch rates) has declined for the past two years and is now at the lowest level observed for the series.
- The  $F_{0.1}$  catch for the fishing year commencing April 1, 2000 is 7000 t.
- Continued caution in establishing harvest levels is required.

*Summary of Attributes of Stock Status*

This year, the stock assessment includes a compilation of attributes of stock status. While the attributes are generally those traditionally included in an assessment, other more novel indicators are also included. Summarizing these attributes in a tabular format facilitates comparison and should be an aid for decision makers.

Attribute	Recent Trends	Current Status
Biomass SPA Ages 5+, 1982-1999	Unchanged	Below average.
Exploitation Rate SPA, Ages 4-7, 1982-1999	Has fluctuated around target since 1995 ( $F_{0.1}$ )	Close to lowest observed.
Recruitment SPA Age 2 1982-1999	Decreasing	Close to lowest observed.
Condition (surveys, 1988-1998)	Unchanged	Interpretation difficult.
Resource concentration (surveys, 1970 -1999)	More concentrated (less evenly distributed)	Less concentrated than that observed during 1970s and 1980s.
Geographic range (surveys, 1970-1999)	Decreasing	Followed increasing trend until 1993, decreasing until present.
Growth rate (fishery, 1990 - 1998)	Increasing	Highest observed.
Age/size range (fishery and surveys, 1970 - 1999)	Decreasing	Fewer larger/older fish in catch and surveys.
Catch rates (mobile gear, 1982-1999)	Decreasing	Lowest observed.
Fishermens' reports (1999 compared to recent past)		Fishery poorer than average for most sectors and areas; positive reports from eastern 4X, 4W.

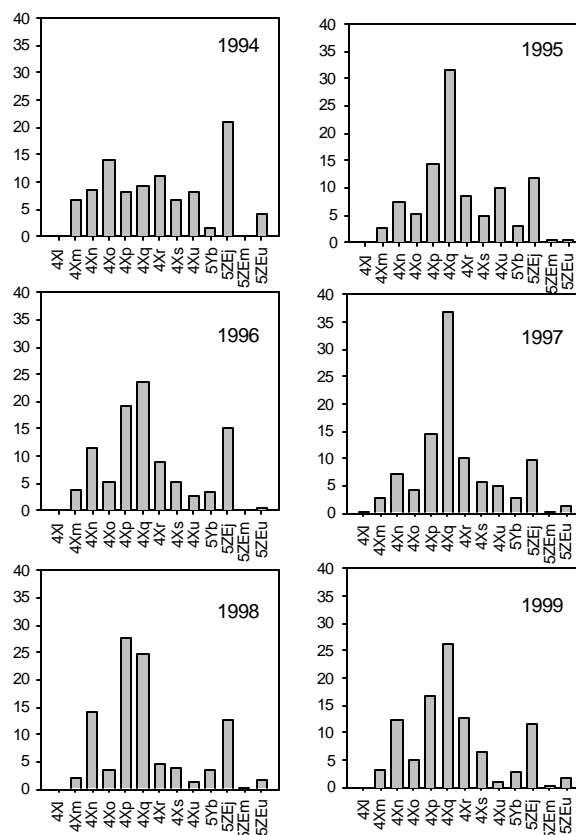
*The Fishery*

Landings (thousand tonnes)

Year	1993	1994	1995	1996	1997	1998	1999
TAC	21.0	24.0	14.5	10.0	15.0	20.0	12.0
Canada	20.3	15.2	9.7	9.1	11.9	14.4	
TOTAL	21.1	15.2	9.8	9.3	12.0	14.4	

The recent pollock fishery continues to undergo significant changes in both area fished and in dominant gear type. During the 1980s, landings from 4VW accounted for about 30% of landings from the management unit. In 1998, they accounted for about 12% of total landings. Within 4X, the proportion of landings from the western half (Unit Areas 4Xpqrs) has increased from 31% in 1991 to 65% in 1997 and declined slightly to 61% in 1998 and 1999. Unit Areas 4Xpq currently contribute the greatest proportion of pollock landings within the western half of the management unit.

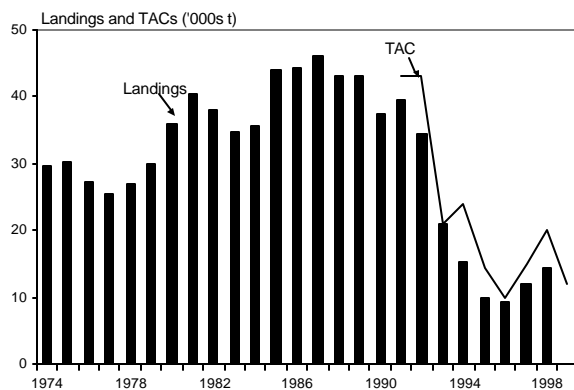
Proportion of Landings From 4X5 Unit Areas



The contribution of larger trawlers to total landings (Tonnage Class (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 1998, **landings** increased to 14,371t from 11,936t in 1997. 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 6t in 1999 from 10t in 1998. Landings of pollock in the domestic redfish fishery, which also uses relatively small mesh gear, were 436t.

In 1999, the TAC of 12,000t was prorated to a 15 month fishing year ending March 31, 2000 (13,440t). Landings to the end of August 1999 were 5,054t. Most gear sectors indicated that they would not be able to catch their quota.



The **size composition** of landings in 1998 had a narrower range than in 1997 for the aggregate fishery. Thus far, the catch at age in 1999 diverged from expectations for certain ages, with considerably fewer age 7 and older fish caught than projected and considerably more age 5 fish. Average weights at age from the fishery have been stable in recent years.

During **industry consultations** in September and October of 1999, fishermen reported mixed success with the pollock fishery this

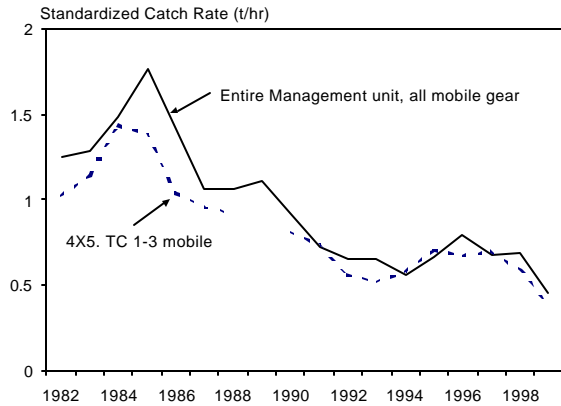
year. In general, fishing was considered poor throughout much of the management unit. It was noted that there were few large pollock. However, unlike 1997 and 1998, a relatively good fishery was noted in 4W and eastern 4X by some gillnet fishermen. Another exception was the large mobile gear sector, who reported that they were able to meet market requirements in 1999.

In the last assessment, it was noted that the pollock **fishery distribution** was atypical in 1998 and that appeared consistent with anomalous ocean conditions, particularly the influx of Labrador Slope water onto the central and western Scotian Shelf. This year, reports of unusual distributions of the fishery were less frequent, coincident with a return to more normal oceanographic conditions.

### *Resource Status*

The stock status evaluation was based, in part, on an analytical assessment using landings statistics, sampling for size and age composition of the commercial catch, and trends in commercial fishery catch rate. Other indicators of stock health such as fishery and resource distributions, size and age structure, fish condition and growth rate were also reviewed and integrated into the assessment where possible. The current assessment includes updated 1998 information and the current year catch rates, landings and size and age composition of the commercial catch through to August 31.

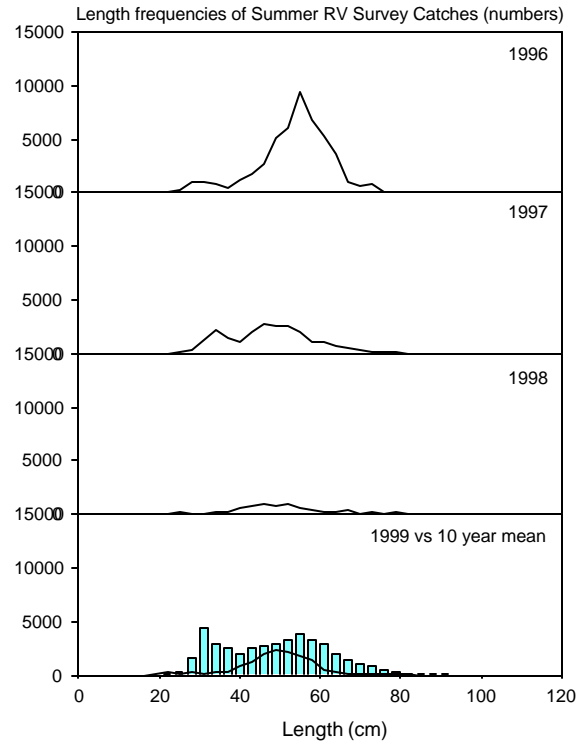
The index of abundance used in this assessment is the **standardized catch rate series**, and with the decreased importance of TC4+ vessels in the fishery since 1991, a new series that employs 4X5 TC 1-3 data was developed. The standardized catch rate series accounts for differences in catch rate by vessel tonnage class, mesh type, unit area, month and year.



The catch rate series peaked in 1985 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. The catch rate series is considered indicative of population trends in general.

The **growth rate** of pollock, as determined from weight at age in the fishery, has followed an increasing trend since 1992 and is now the highest observed during the 1990s.

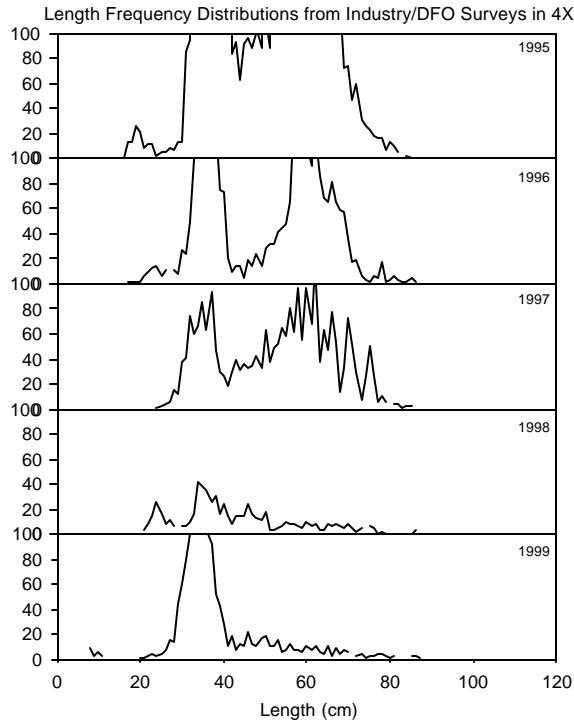
**Summer research vessel survey** data are not currently used as an index of abundance in this assessment, because there is considerable unexplained interannual variation of many year-classes, which is inconsistent with our knowledge of fisheries dynamics. However, the research survey information provides 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.



The **condition** of fish examined during the surveys has been variable from year to year and recently exhibited no trend.

A measure of **resource concentration** is the proportion of the survey stations encompassing 75% of the annually estimated survey biomass. The pollock resource became more evenly distributed from 1970 to 1992, and has become less evenly distributed (more concentrated) from 1992 to the present. A measure of **geographic range** is the proportion of annual surveys sets where pollock occurs. The proportion of non-zero survey sets has followed an increasing trend until 1993, and decreased until 1998. For this resource, these measures of spatial distribution are relatively new, and their interpretation is still under development. Taken together, however, these two measures of the spatial distribution of pollock indicate considerable changes in the patterns of pollock distribution through the 1990s.

A joint industry/DFO Science survey conducted by the ITQ fleet in 4X also showed a comparative absence of fish larger than 40 cm in 1998 and 1999 compared with the three earlier years of the survey.

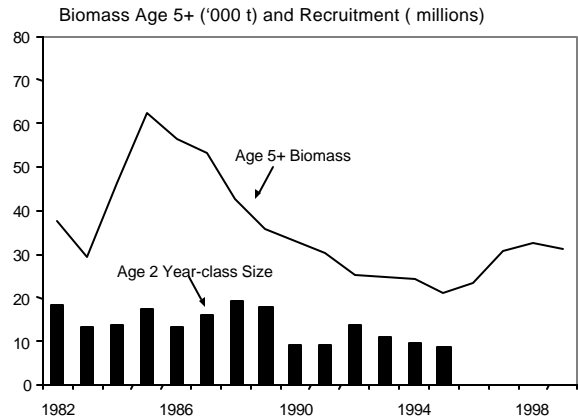


Overall, catch rates in this survey have followed a declining trend with a slight increase in the 1999 survey.

This year, the data used in the **Sequential Population Analysis (SPA)** include landings information and catch rates from 4X5 only. This exclusion recognizes the slower growth rate of pollock from the 4VW component and the increasingly small contribution from that area to total landings.

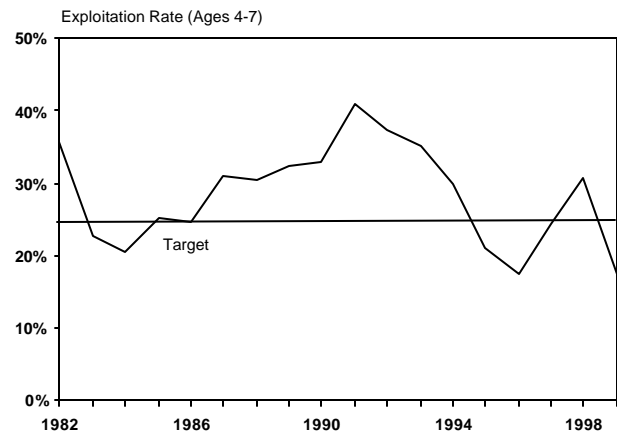
Last year's stock assessment noted considerable uncertainty in the recent estimates of exploitation rate and biomass. A major contributor to this uncertainty is a severe **retrospective pattern** in the population model, with successive estimates of year-class size often becoming considerably smaller as more data become

available. This year, it was shown that the problem could be significantly reduced by including fewer older ages in the index.



Age 5+ **population biomass** was at the maximum in 1985 then fell steadily to a minimum in 1995. With comparatively low quotas and the **recruitment** of the moderate 1992 year-class, the population has grown slightly since 1995. Recent recruitment has followed a declining trend since the 1992 year-class.

The **exploitation rate** at ages 4-7 reached a maximum in 1991, then declined until 1996. Since then, the exploitation rate has been variable, but close to the  $F_{0.1}$  target (24%,  $F_{0.1}=0.30$ ). The 1999 exploitation level is presently estimated to be the lowest observed since 1982.



*Sources of Uncertainty*

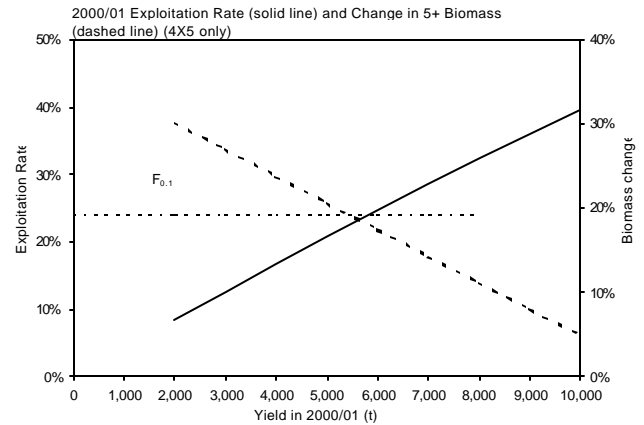
Unlike many stock assessments, the pollock assessment currently lacks a fishery independent index of abundance, and instead relies upon commercial fishery catch rates from mobile gear as an index of abundance. Commercial fishery catch rates can be influenced by technological change, changes in spatial distribution of the resource and availability of fish to the gear. To address this concern, industry and DFO have initiated a study to examine the feasibility of acoustic/trawl surveys for assessing this resource.

Sequential population analyses usually assume a proportional relationship between the index and the population. As noted above, there is considerable uncertainty in the commercial catch rate index series, and in particular, whether the relationship between index and population has remained constant throughout the 1990s.

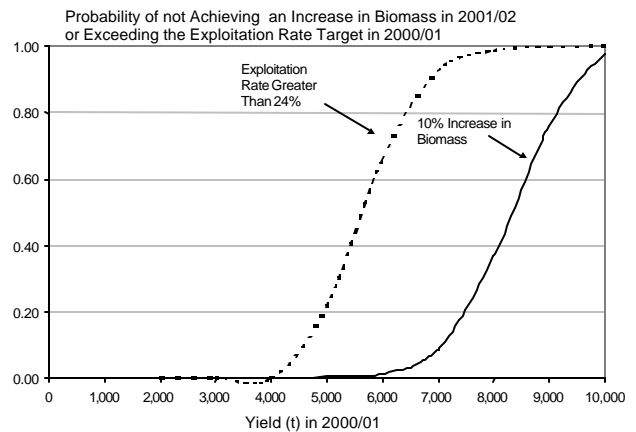
*Outlook*

During recent years, there has been a change in the pattern of partial recruitment to the fishery, with older ages less available. Projections assuming full recruitment for older ages have led to a mismatch between observed and predicted age compositions. To account for this, a dome shaped partial recruitment pattern was used. It was further assumed that total additional removals for the current fishing year ending March 31, 2000 will be 4000t.

With these conditions,  $F_{0.1}$  landings for the fishing year commencing April 1 2000 would be about 5700t in 4X5. Growth in biomass by the beginning of 2001 fishing year implied from the above fishing option would be about 20%.



In the fishing year starting April 1, 2000 a catch of 5700t implies a negligible probability of not obtaining a 10% increase in biomass by the beginning of fishing year 2001.



These results provide guidance for 4X/5 only. Using the proportions of pollock biomass observed during surveys of 4VW compared with 4X over the past four years as a rough approximation of the distribution of the resource, it is suggested that the estimated catch at  $F_{0.1}$  for 4X/5 be increased by 20% to about 7000t to give an estimated  $F_{0.1}$  catch for the management unit as a whole. It should be noted that the exclusion of the 4VW data from the SPA was not intended to reflect a change in our perception of stock structure.

In summary, the pollock resource remains depleted. As indicated in the resource status

table, biomass is less than average, recent recruitment has been poor, there is an absence of older fish in the population, and there are spatial changes in the resource and in the fishery distributions that are worrisome. Caution in establishing harvest levels is required.

### ***For More Information***

Contact:

John Neilson  
St. Andrews Biological Station  
St. Andrews, New Brunswick  
E0G 2X0

TEL: (506) 529-8854  
FAX: (506) 529-5862  
E-Mail: [neilsonj@mar.dfo-mpo.gc.ca](mailto:neilsonj@mar.dfo-mpo.gc.ca)

### ***References***

Neilson, J., Perley, P., and C. Nelson. 1999. The 1999 assessment of pollock (*Pollachius virens*) in NAFO Divisions 4VWX and Subdivision 5Zc. DFO Can. Stock Assess. Sec. Res. Doc. 99/160.

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Maritimes Provinces  
Regional Advisory Process  
Department of Fisheries and Oceans  
P.O. Box 1006, Stn. B203  
Dartmouth, Nova Scotia  
Canada B2Y 4A2  
Phone number: 902-426-7070  
e-mail address: [myrav@mar.dfo-mpo.gc.ca](mailto:myrav@mar.dfo-mpo.gc.ca)

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