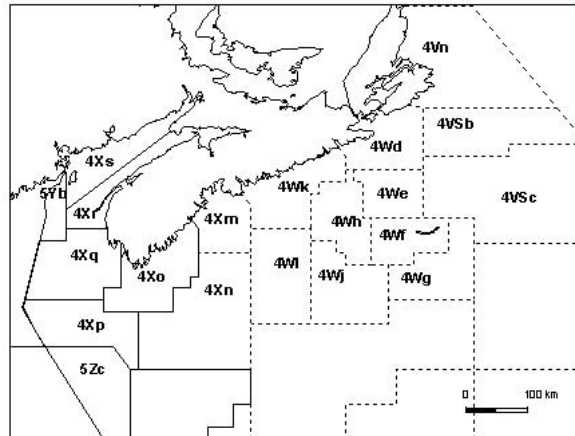
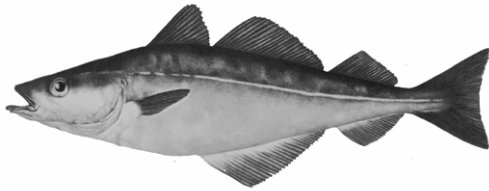




POLLOCK IN DIV. 4VWX AND 5Zc



The pollock management unit, showing unit areas comprising the Western Component (solid lines) and Eastern component (dashed lines).

Context

Pollock (*Pollachius virens*) 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.

An evaluation of stock structure completed in 2003 indicated that the management unit is comprised of two parts: a slower-growing Eastern Component including Divs. 4V and 4W, as well as Unit Areas 4Xm and 4Xn, and a faster-growing Western Component including 4Xopqrs as well as Canadian portions of Subarea 5. Pollock are mature at ages 3 to 5 depending on the area.

A variety of fishing gear is used to fish pollock, primarily otter trawl and gillnets, but also handlines and longlines. Pollock are also landed as by-catch in the small-mesh silver hake and redfish fisheries.

A comprehensive review of the assessment framework, stock structure and biology was completed in 2004.

SUMMARY

- 2005 landings in the fishery from April 1 through October 27, 2005 are 4698 t. Peak landings in 1987 were 46,000 t; landings since 1999 have been less than 10,000 t.
- A review of stock structure has identified Eastern and Western components. For the Eastern Component, large scale directed pollock fisheries should not be considered until the Eastern Component rebuilds.

The following results pertain to the Western Component:

- The 1999 year-class was the strongest at age 2 since 1990. Initial indications for the 2002 year-class is that it is the weakest in the series.
- The fishery weight at age has been decreasing from about 1984, and the trend is most apparent for the younger ages (ages 3-5).
- Biomass declined from about 60,000 t in 1984 to about 10,000 t in 1999. Biomass has been rebuilding since 1999, doubling to about 20,000 t in 2003, but the rebuilding has been arrested.
- Reduced quotas and harvests have contributed to a decline in fishing mortality rates for older fish (ages 6-9), but fishing mortality remains high, and above the F_{ref} of 0.2.
- The fishing industry expressed considerable concern that the assessment for pollock is divergent from their observations.
- The range of harvest strategies in the fishing year that are risk averse (25% risk of exceeding F_{ref}) to risk neutral (50% risk of exceeding F_{ref}) are about 1400 to 1800 t. If the 2002 year-class is as weak as estimated, biomass will decrease in 2006 to 13,000 t, before increasing again to about 17,000 t in 2007.
- Several factors indicate a more conservative harvesting strategy than recently implemented is urgently required.
- The achievement of rebuilding objectives for cod and pollock may constrain the harvesting of haddock.

DESCRIPTION OF THE ISSUE

Rationale for Assessment

Advice was requested by Fisheries Management on the stock status of pollock in order to determine a TAC that would be consistent with the management plan. Specifically:

- Report on the status of southwest pollock (DFO Unit Areas 4Xopqrs and 5Yb and NAFO Subdivision 5Zc), updating results for the latest information from fisheries, including all by-catch and discard estimates, and from research surveys.
- For a range of southwest pollock TAC options in 2006/07, estimate the risk that the
 - 2006/07 fishing mortality rate would exceed the $F_{ref} = 0.2$; and
 - biomass at the beginning of April 2007 would not achieve a 0%, 10% or 20% increase compared to the beginning of April 2006.
- Report on the status of northeastern pollock (NAFO Divisions 4VW and DFO Unit Areas 4Xmn), updating results with the latest research survey for trends of abundance, total mortality rates and biomass ratio of northeastern to southwestern pollock.
- Examine the implications on the biological stocks as defined in the assessment framework of maintaining the current management unit. Comment on how Fisheries Management could accommodate these implications.

The Fishery

Landings (000s t)^{*}

Year	1970-1979 avg.	1980-1989 avg.	1990-1999 avg.	2000	2001	2002	2003	2004	2005
TAC	46.9	24.2	10.0	10.0	10.0	10.0	10.0	10.0	6.5
EAST	7.8	21.2	7.8	0.7	0.8	0.4	0.2	0.4	
WEST	13.9	16.5	11.6	4.8	5.4	7.0	8.1	8.6	
TOTAL	21.7	37.7	19.4	5.5	6.2	7.4	8.3	9.0	

^{*}Commencing in 2000, fishing year, landings and TAC refer to the period April 1st of the current year to March 31st of the following year.

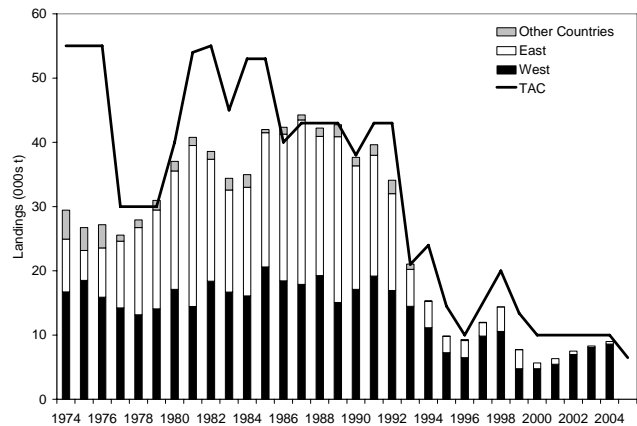


Figure 1. Canadian landings and TACs* for pollock in 4VWX5Zc, for the Eastern and Western components. Foreign landings are also included.

For 2005, landings in the fishery from April 1 through October 27, 2005, are 4698 t. Peak landings in 1987 were 46,000 t; landings since 1999 have been less than 10,000 t.

The pollock fishery has had significant changes in both area fished and in dominant gear type. Landings from the Eastern Component traditionally come from the Tonnage Class (TC) 4+ sector, and have been following a declining trend. Since 1993, much of the Eastern Component was closed to cod-directed fishing, which further reduces pollock landings from that area.

The Western Component of the management unit contributed 95% of total landings in 2005. The contribution of larger trawlers to total landings (TC 4+) has been steadily declining since 1981 and accounted for less than 1% of total removals in 2005. The offshore sector is now using smaller vessels (TC 2-3, under the Temporary Vessel Replacement Program) to catch their allocation. Therefore, the contributions of TC 2-3 trawlers have increased and now account for 80% of the total landings. The proportion of gillnet landings comprising the total has decreased and now comprises 17% of the total landings in 2005. Landings now come mostly from two unit areas (4Xp and 5Zc), whereas as recently as 1997, landings were spread among different unit areas to a greater extent (Figure 2).

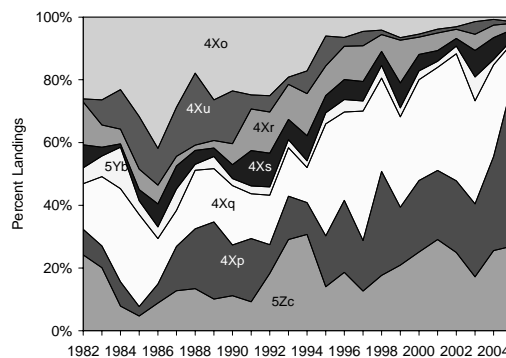


Figure 2. Landings in the Western Component, by Unit Area. Landings in the fishing year 2005/06 are through October 27, 2005.

RESOURCE ASSESSMENT

Stock Trends and Current Status

A Framework Assessment was completed in 2004, and resulted in the definition of Western and Eastern components for the pollock resource in the Canadian Maritimes. An age-structured population model was developed for the Western Component that incorporated indices of abundance from both the DFO summer research vessel (RV) survey and standardized CPUE from the commercial fishery. As the current fishery is almost exclusively based on the Western Component, the comments in this section pertain to that component. The population model results presented here include indices and catch through August 31, 2005.

Age-specific **indices of abundance** from the mobile gear sector of the fishery indicate a reduction in the abundance of older (7+) fish since 1996. In recent years, the 1999 year-class was relatively strong, while early indications suggest that the 2002 year-class is weak (Figure 3).

Consistent with the CPUE indices, the RV indices show that the 1999 year-class was strong in the 2003, 2004 and 2005 surveys and that the 2002 year-class is the smallest observed at age 3 for the RV time series since 1987 (Figure 4).

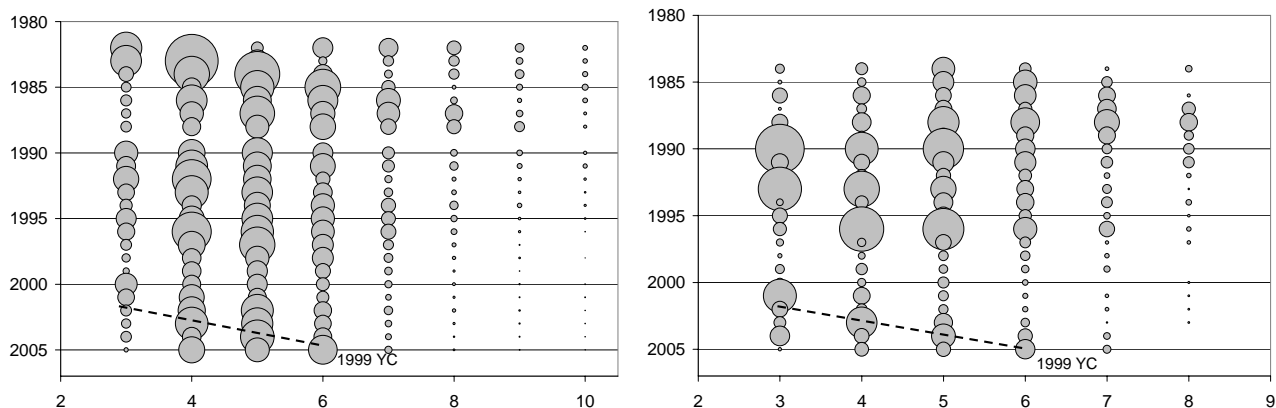


Figure 3. Mobile gear (TC 2-3) standardized catch rates at age. The index value is proportional to bubble area.

Figure 4. RV survey indices at age. The index value is proportional to bubble area.

Concerning **recruitment**, the 1999 year-class was the strongest at age 2 since 1987 (Figure 5). Initial indications for the 2002 year-class is that it is the weakest in the series.

Estimates of 4+ (considered spawning stock) **biomass** declined from about 60,000 t in 1984 to about 10,000 t in 1999. Biomass has been rebuilding since 1999, doubling to about 20,000 t in 2003, but the recovery has been arrested (Figure 5).

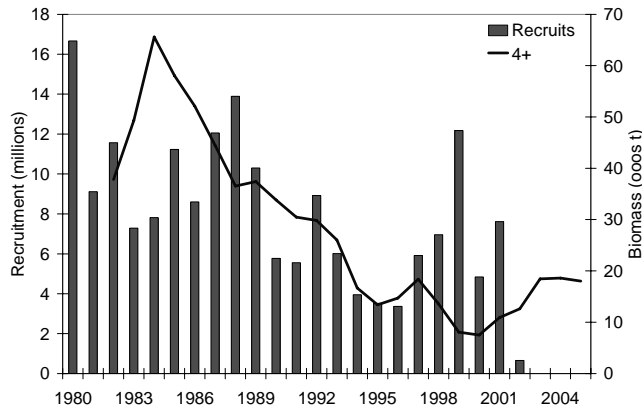


Figure 5: Trends in age 4+ biomass and recruitment of pollock in the Western Component.

The fishery **weights at age**, which are used as a proxy for population weights at age for ages 4+, has been decreasing from about 1984, and the trend is most apparent for the younger ages (ages 3-5, Figure 6).

Estimates of **fishing mortality** rates have steadily increased from the early 1980s until 1994, despite decreased landings. Fishing mortality rates declined in 1995 and 1996 but increased again to a maximum in 1998 when landings also increased. Subsequent reduced quotas and harvests have contributed to a decline in fishing mortality rates for older fish (ages 6-9), but fishing mortality remains high, and above the F_{ref} of 0.2 (Figure 7).

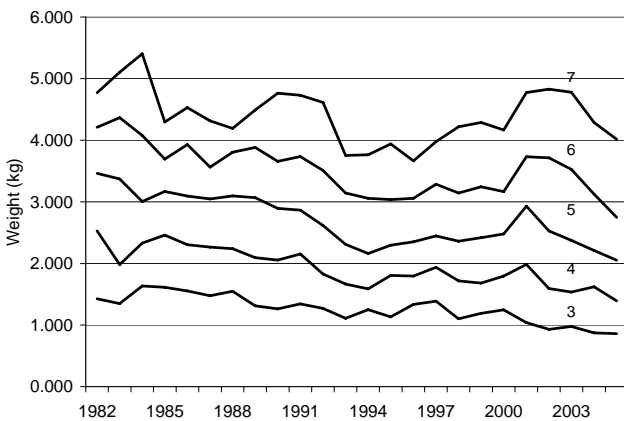


Figure 6. Commercial fishery weights at age in the Western Component.

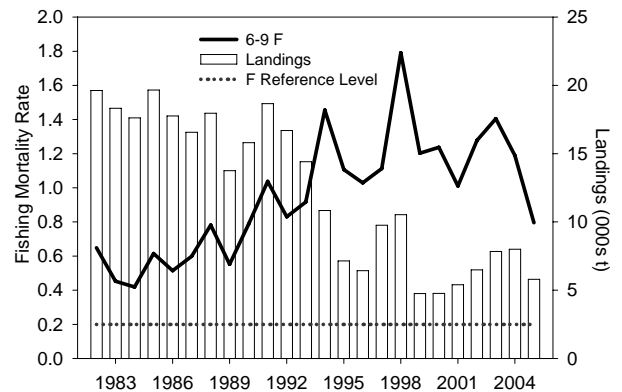


Figure 7: Trends in fishing mortality and landings, pollock in the Western Component.

Sources of Uncertainty

The results of the assessment depend, in part, on indices of abundance from the commercial fishery. Trends in catch rates may be confounded by changes in the fishery not associated with trends in abundance.

Pollock, being a semi-pelagic, schooling species, are less well sampled by the summer RV survey than other gadids.

ADDITIONAL STAKEHOLDER PERSPECTIVES

The fishing industry expressed considerable concern that the assessment for pollock is divergent from their observations. Fishermen considered the fishery distribution to be anomalous in 2005, with pollock found in deeper water than usual. Fishermen noted that small pollock were abundant in inshore fisheries, outside of the area included in the indices of abundance. There have also been reports of discarding of pollock in 2005, but the extent of this problem is not known. Industry also expressed concern that while the Framework Assessment determined that the summer RV survey (which does not include Georges Bank) reflected population abundance accurately, the increased proportion of landings from Georges Bank in 2004 and 2005 bring this conclusion into doubt. There was a report that formerly productive pollock fisheries in the Bay of Fundy were no longer prosecuted.

CONCLUSIONS AND ADVICE

Harvest Strategy and Reference Points

The Framework Assessment examined yield per recruit analyses and stock-recruitment patterns to derive a fishing mortality reference point of $F_{ref} = 0.2$. Improved recruitment was noted at biomass levels greater than 30,000 t. When stock biomass is less than 30,000 t, exploitation may need to be further constrained to achieve rebuilding. It has been determined that a 4+ biomass of 10,000t may be tentatively considered as a biomass limit reference point, but a secure recovery from this level has not yet occurred.

Outlook

The range of harvest strategies in the fishing year that are risk averse (25% risk of exceeding F_{ref}) to risk neutral (50% risk of exceeding F_{ref}) are about 1400 to 1800 t (Figure 8). If the 2002 year-class is as weak as estimated, biomass will decrease in 2006 to 13,000 t, before increasing again to about 17,000 t in 2007.

Several factors indicate a more conservative harvesting strategy than recently implemented is urgently required. The modest population rebuilding observed in the past assessment has been arrested, fishing mortality rates remain high and there is a declining trend in weights at age. While there appears to be some improvement in the age composition of the population, there are still relatively few older fish. The population biomass is currently at a level lower than that associated with improved recruitment (30,000 t).

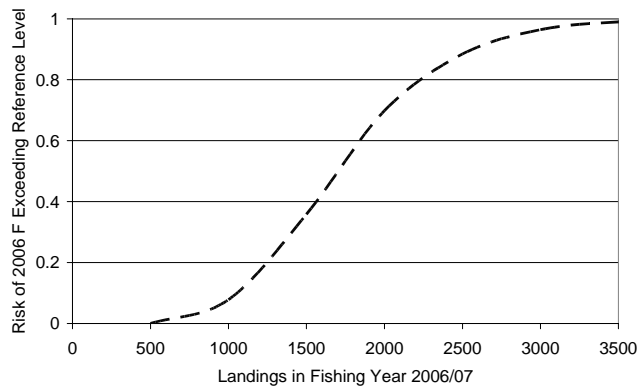


Figure 8: Probabilities of exceeding the F reference target with various harvesting scenarios, pollock in the Western Component.

OTHER CONSIDERATIONS

The results from the present assessment agree well with those presented in 2004 assessment.

Cod, pollock and haddock are often caught together in groundfish fisheries, although their catchabilities to the fisheries differ and they are not necessarily caught in proportion to their relative abundance. With current fishing practices and pollock/other species catch ratios, the achievement of rebuilding objectives for cod and pollock may constrain the harvesting of haddock. Additional efforts to protect the 2003 cod year-class which, from first indications, is estimated to be larger than has been seen in recent years are warranted. An imbalance in quotas creates potential for discarding and may require improved monitoring. Modifications to fishing gear and practices, with enhanced monitoring, may mitigate these concerns.

For the Eastern Component, indices from the summer research vessel surveys, while extremely variable, indicate that total mortality remains high and generally increasing, even with relatively small landings from the fishery. As noted last year, large scale directed pollock fisheries should not be considered until the Eastern Component rebuilds. In 2005, limits were placed on the fishery that appear consistent with the advice to constrain removals from the Eastern Component.

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