



STOCK ASSESSMENT OF NAFO SUBDIVISION 3Ps POLLOCK (*POLLACHIUS VIRENS*)



Image: *Pollachius virens*.

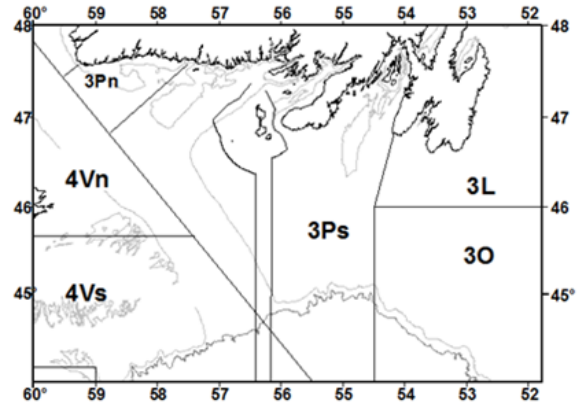


Figure 1. Map of the stock area of Subdivision 3Ps.

Context:

Pollock occur on both sides of the North Atlantic, on the North American side from southern Labrador around Newfoundland into the Gulf of St. Lawrence, and south to Cape Hatteras. Pollock is a member of the cod family (Gadidae), but unlike most gadids they are pelagic in nature spending little time near the bottom. They are voracious eaters and often congregate in large numbers. As pelagic larvae they feed mainly on copepods, but as they settle and move inshore, crustacea, mainly amphipods, are the preferred food. As they increase in size euphausiids, shrimp and small fish become part of the diet. In the offshore areas sand lance, herring, silver hake, redfish and lanternfish make up a large proportion of the diet.

Pollock prefer waters from 0°C to 10°C however maturation of sex organs and incubation of eggs requires temperatures in the upper range. This places Newfoundland waters at the northern end of the Pollock range. Research on Pollock in the Newfoundland area shows that mature fish occur along the slopes of St. Pierre Bank and the slopes of the southern Grand Bank. In summer months schools of young Pollock are occasionally found in harbours along Newfoundland's south coast. Pollock do not generally occur in Newfoundland waters in sufficient numbers to support a commercial fishery.

This Science Advisory Report is from the December 12-13, 2018 Assessment of Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps Pollock. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

SUMMARY

- Pollock in the Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps have been under moratorium since 1993. Bycatches from 2014-17 were in the range of 600 t or less.
- Due to the fact that they are at their northern limit within 3Ps, Pollock do not generally occur in Newfoundland waters in sufficient numbers to support a commercial fishery.

- Pollock are semi-pelagic in nature and are at their northern range limit in 3Ps. Given this, research vessel (RV) surveys in this area using bottom otter trawls catch very few Pollock, and may not give a reliable index of abundance or biomass. Until a reliable index is available it is not possible to provide advice on population status.
- The ecosystem in Subdivision 3Ps remains under reduced productivity conditions. Spring bloom magnitude and zooplankton biomass have shown very low levels since 2014, with late spring blooms from 2013-17. These conditions could negatively impact transfer of energy to higher trophic levels.

BACKGROUND

The Pollock fishery in NAFO Subdivision 3Ps has generally been a bycatch fishery since 1991 with the majority of catches being taken in gillnet, longline, and otter trawl fisheries. Landings of Pollock in the 1960s declined from 4,500 t in 1960 when most of the catch was taken by Spain to 187 t in 1969 (Fig. 2). Since the extension of jurisdiction, catches have been mainly taken by Canada and France (St. Pierre). Catches were generally low from 1967-82 being less than 1,000 t annually. Catches gradually increased after 1982 peaking at 7,500 t in 1986 with the entry of the French Metropolitan fleet to the cod fishery (Fig. 2).

During the 3Ps groundfish moratorium (1993-96) bycatches of Pollock declined to pre-1980s levels and were less than 500 t annually (Fig. 2). Although Pollock remains under moratorium, the 3Ps Atlantic Cod fishery reopened in 1997. Since 1997 bycatch of Pollock increased slightly but was generally less than 1,000 t annually (other than 1,132 t in 2007). In recent years (2009-17) Pollock bycatches were in the range of 250 to 600 t annually (Fig. 2).

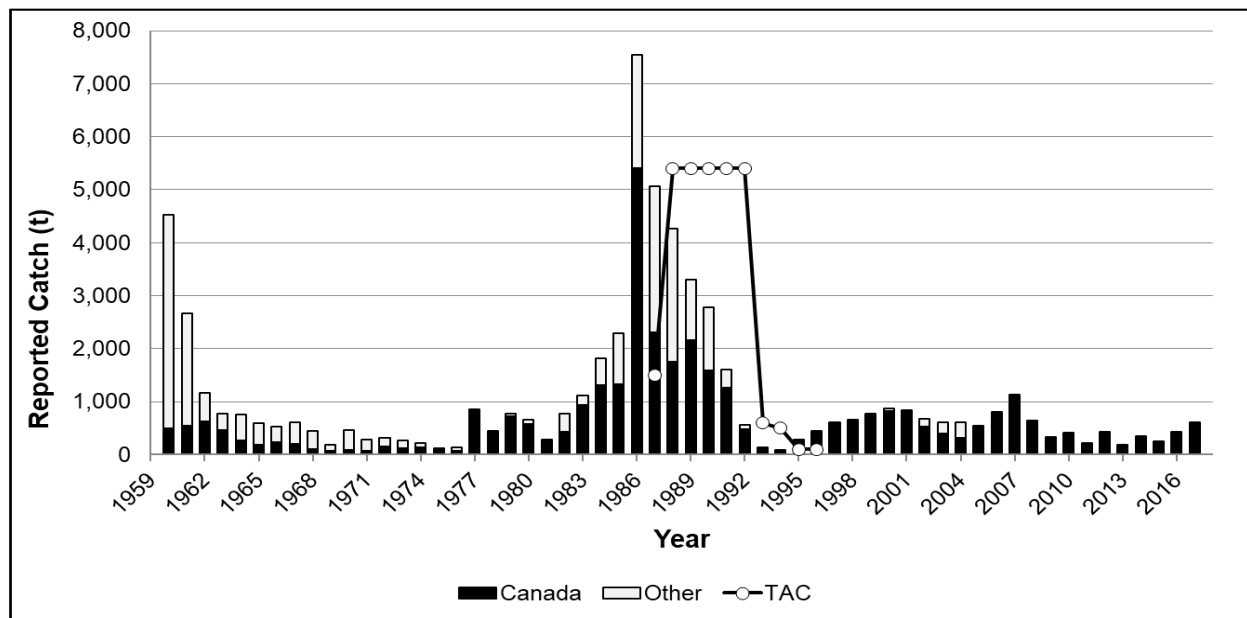


Figure 2. NAFO Subdivision 3Ps Pollock landings and total allowable catches (TACs) from 1960 to 2017.

ASSESSMENT

Fisheries and Oceans Canada has conducted RV surveys in NAFO Subdivision 3Ps using the stratified random design since 1972. Surveys were conducted mainly in February to March prior to 1993 but since then have been conducted in April.

Mean number per tow (abundance) and mean weight (kg) per tow (biomass) were calculated and presented but not utilized to evaluate stock status. There is no population dynamics model for this stock.

The use of the RV otter trawl time series as an indicator of stock status is complicated by various vessel and gear changes and the lack of conversion factors among trawl types. An additional factor is that due to the semi-pelagic nature of Pollock, currently used bottom trawl surveys may not give a reliable index of biomass.

Abundance indices (mean #/tow) for the first time series (Yankee 41.5) were generally low during the early 1970's but showed an increasing trend during the late-1970s and early-1980s (Fig. 3). Abundance indices for the second time series (Engel 145) gradually increased during the 1980's to the highest values of the overall time series in 1987 but then indicated a steep decreasing trend towards the mid-1990s (Fig. 3). Abundance indices for the Campelen time series increased from the mid-1990s to 2001, declined from 2001 to 2008, exhibited a variable but generally increasing trend from 2009 to 2013, a decreasing trend from 2013 to 2017, followed by an increase in 2018 (Fig. 3).

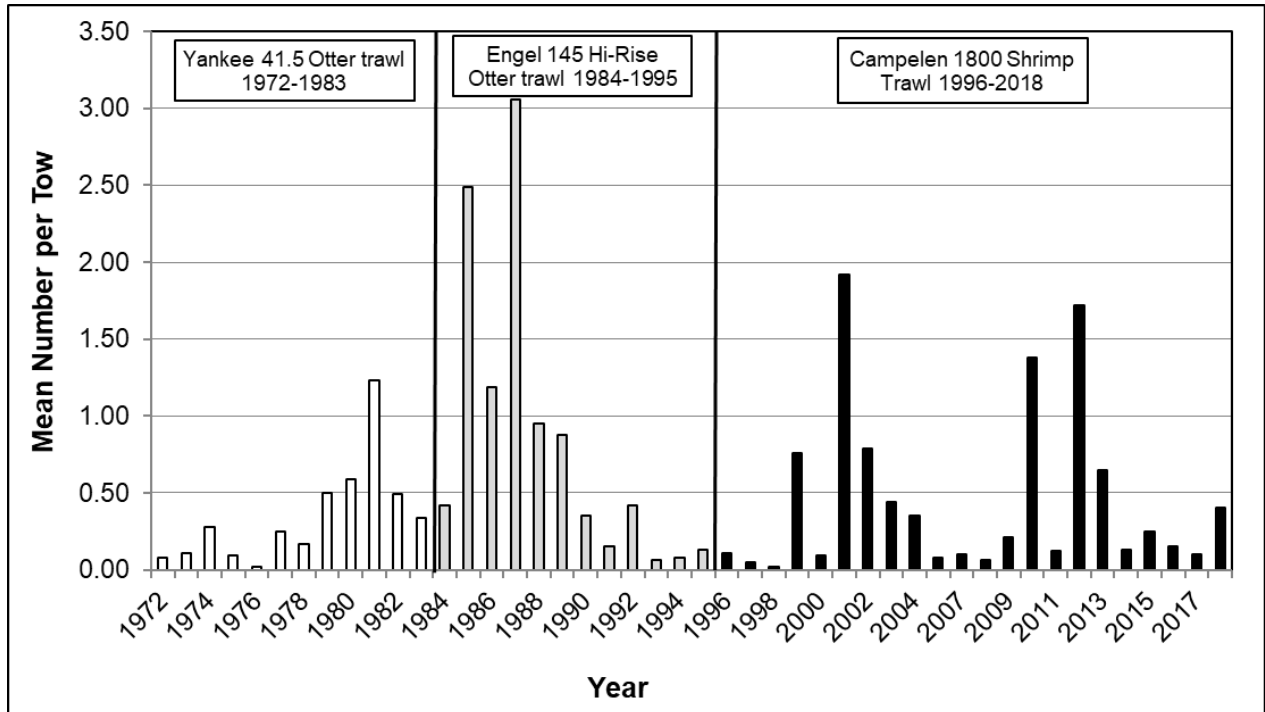


Figure 3. Abundance index for Pollock from winter/spring Canadian RV surveys 1972-2018 in NAFO Subdivision 3Ps. Due to a lack of conversion factors the data from the different gear types are not statistically comparable.

Biomass indices (mean weight (kg)/tow) for the first time series (Yankee 41.5) were generally low during the early 1970s but showed an increasing trend during the late-1970s and early-1980s (Fig. 4). Biomass indices for the second time series (Engel 145) gradually increased during the 1980's to the highest values of the overall time series in 1987 but then indicated a steep decreasing trend towards the mid-1990s (Fig. 4). Biomass indices for the Campelen time series increased from the mid-1990's to 2001, declined from 2001 to 2008, exhibited a variable but generally increasing trend from 2009 to 2013, and a decreasing trend from 2013 to 2017 which was followed by an increase in 2018 (Fig. 4).

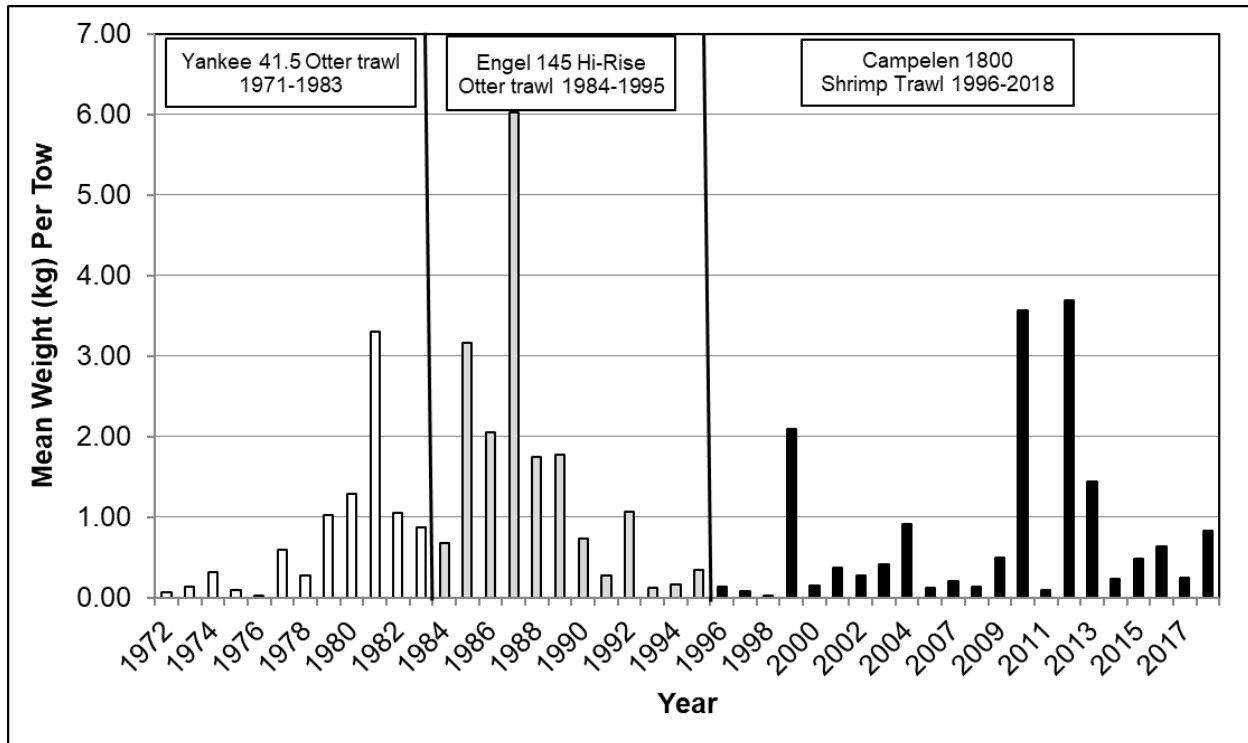


Figure 4. Biomass estimates for Pollock from winter/spring Canadian RV surveys 1972-2018 in NAFO Subdivision 3Ps. Due to a lack of conversion factors the data from the different gear types are not statistically comparable.

Oceanography and Ecosystem

Oceanographic conditions in Subdivision 3Ps are influenced by several factors, including local atmospheric climate conditions, advection by the Labrador Current from the east and the warmer and saltier Gulf Stream waters from the south as well as the complex bottom topography in the region. Near bottom temperatures, while showing significant variability from one year to the next, have experienced a general warming trend up to 1.5°C in some areas since 1990.

Satellite remote sensing data indicate that the spring bloom in 3Ps was lower in intensity and magnitude during 2015-18. The timing of peak magnitude of the bloom has been later than average over 2013-17, but returned to near historical levels in 2018. The biomass of both small and large size fractions of zooplankton in 3Ps continue to remain near the lowest levels observed in the 19-year time series. Reductions in standing stocks of phytoplankton and zooplankton observed in recent years indicate changes in the structure of the ecosystem and lower productivity conditions that may influence higher trophic levels.

The overall biomass of the fish community in 3Ps has been relatively stable since the mid-1990s, but there were clear internal changes in the fish community with signals of reduced productivity in the 2010s. Ongoing warming trends, together with an increased dominance of warm water species and reduced fish sizes across many fish functional groups, indicate that this ecosystem is undergoing structural changes. The ecosystem still remains under reduced productivity conditions.

Sources of Uncertainty

The vessel and survey gear used to conduct the survey have changed over time. The A.T. Cameron conducted surveys from 1972 to 1983 using the Yankee 41.5 otter trawl. From 1984 to 1995 the Wilfred Templeman or its sister ship the Alfred Needler conducted the survey using the Engel 145 hi-rise otter trawl. Since 1996 the Wilfred Templeman, Teleost, and Alfred Needler have conducted the survey using the Campelen 1800 shrimp trawl. Conversion factors among trawls are not available, therefore, comparison among types over the entire series is not possible.

Due to the semi-pelagic nature of Pollock, RV (bottom trawl) surveys may not give a reliable index of abundance or biomass.

Recent information on growth rates and age at maturity are not available.

During previous Pollock stock assessments (DFO 2005, DFO 2014) there was some debate with respect to the degree of movement of Pollock between 3Ps and the Scotian shelf stock. A review of NL and Maritimes commercial fisheries data, tagging studies, and research survey data (Neilson et al. 2003) concluded that the current boundaries are appropriate and 3Ps Pollock should be managed as a separate population.

CONCLUSIONS

In light of issues identified with respect to gear variability and the use of bottom trawl surveys to survey Pollock (a semi-pelagic species) the information currently available is not sufficient to quantitatively assess stock level and provide catch options at this time. Until new source(s) of information such as a pelagic survey are available the 3Ps Pollock stock cannot be analytically assessed in the future.

Pollock have never occurred in NAFO Subdivision 3Ps in large numbers. Their contribution to the groundfish fishery is based on the infrequent occurrence and minimal survival of year-classes in the northern extent of their range.

Although Pollock remains under moratorium, the 3Ps Atlantic cod fishery reopened in 1997. Reported commercial bycatch of Pollock has remained relatively consistent from 1992 to 2017, ranging below 1,000 t (except for 1,132 t in 2007).

LIST OF PARTICIPANTS

NAME	Affiliation
Connie Korchoski	Center for Science Advice - NL Region
Dale Richards	Center for Science Advice - NL Region
David Coffin	DFO Resource Management NL Region
Jason Simms	DFO Resource Management NL Region
Melanie Barrett	DFO Science Maritimes Region
Monica Finley	DFO Science Maritimes Region
Irene Andrushchenko	DFO Science Maritimes Region
David Belanger	DFO Science NL Region
Eugene Colbourne	DFO Science NL Region
Gary Maillet	DFO Science NL Region
Mariano Koen-Alonso	DFO Science NL Region
Paul Regular	DFO Science NL Region

NAME	Affiliation
Bob Rogers	DFO Science NL Region
Karen Dwyer	DFO Science NL Region
Eugene Lee	DFO Science NL Region
Travis Van Leeuwen	DFO Science NL Region
Brittany Keough	DFO Science NL Region
Laura Wheeland	DFO Science NL Region
Rick Rideout	DFO Science NL Region
Joanne Morgan	DFO Science NL Region
Danny Ings	DFO Science NL Region
Keith Lewis	DFO Science NL Region
Lindsay Freeman	DFO Science NL Region
Krista Tucker	DFO Science NL Region
Roland Hedderson	FFAW
Justin Strong	FFAW
Juliette Chanpagnat	IFREMER

SOURCES OF INFORMATION

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DFO. 2014. Stock Assessment on Subdivision 3Ps Pollock. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/042.

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Centre for Science Advice (CSA)
Newfoundland and Labrador Region
Fisheries and Oceans Canada
PO Box 5667
St. John's, NL
A1C 5X1

Telephone: (709) 772-8892

E-Mail: DFONLCentreforScienceAdvice@df-mpo.gc.ca

Internet address: www.dfo-mpo.gc.ca/csas-sccs/

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