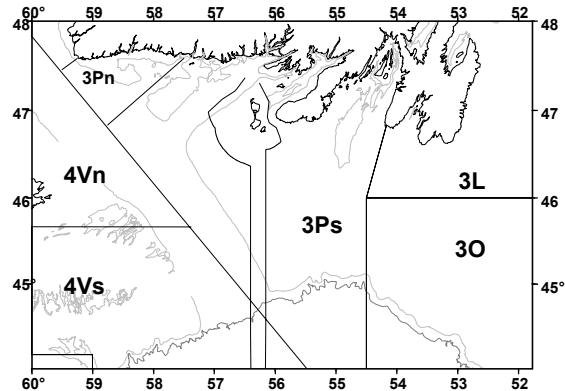




American plaice in Subdivision 3Ps



Background

American plaice, which occurs on both sides of the North Atlantic, is a bottom dwelling flatfish. In the western Atlantic, the species ranges from U.S.A. waters to the Arctic, with the largest population occurring on the Grand Bank off Newfoundland. American plaice are found over a wide range of depths and temperatures.

Female American plaice in 3Ps mature at about age 9 and 36 cm while male plaice mature at about age 4 and 16 cm. This is a relatively slow growing species with fish not reaching 40 cm until nearly age 10.

Catches from this stock were highest from 1968 to 1973, during which time they averaged over 10,000 t. Since 1980, catches have exceeded 5000 t only twice. Through the 1980's the majority of this fishery occurred in the offshore. Both offshore and inshore catch declined substantially in the early 1990's and since 1995 the offshore catch has constituted less than 50% of the total. The stock has been under moratorium since September 1993.

Summary

- This stock has been under moratorium since September of 1993.
- Since 1992 stock size as measured by the research vessel surveys has been very low compared to the beginning of the time series in 1983.
- There has been a slight increase since 1993 in both biomass and abundance indices but current biomass is only 20% and abundance 30% of the 1983-87 average.
- The indices from the surveys conducted by GEAC since 1998 have also increased over the time period.
- Current female SSB calculated from the research vessel index is only 26% of the 1983-87 average.
- Analyses of recruitment from survey data indicated that year class strength declined until 1995 but has increased since then.

- Recruitment levels from survey data were estimated to increase with increasing SSB and the best observed recruitment occurred above an SSB index of 20. Current SSB is at an index of 9.
- Catch to survey biomass ratios indicate that exploitation rate has been increasing since the mid 1990's even though a moratorium has been in place.
- In the next few years the weak 1994-1997 year classes will be moving into the age range of the biomass subject to the bycatch fishery. This will likely result in a decrease in exploitable biomass. At current levels of catch this should result in a further increase in fishing mortality.
- More recent year classes appear stronger but these will not contribute to the exploitable biomass or SSB for several more years.

Species biology

Long term trends in **growth** as measured by mean length at age from research vessel survey data from 1983-2002 have not been evident (Figure 1). Mean weight at age has also shown little trend over the 1990-2002 time period.

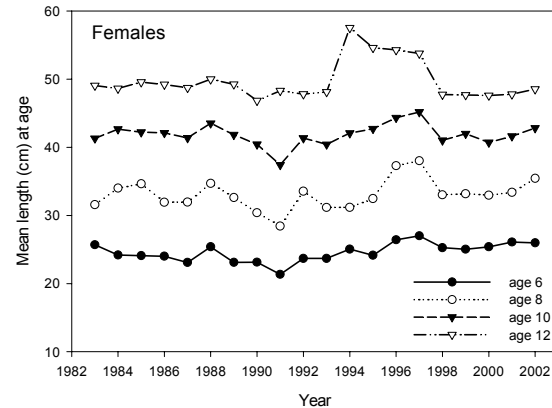


Figure 1. Mean length at age of female American plaice from research vessel surveys.

Males mature at a substantially younger age than females and at a smaller size. **Age at maturity** for both males and females declined significantly since the beginning of the time series (Figure 2). Currently the age at 50% maturity for females is 8.5 years compared to 11 at the beginning of the time series and 4 for males compared to 7. **Length at maturity** has also shown a decline since the start of the time series. Male length at 50% maturity has declined from 27 cm to 19 cm while for females it has declined from 40 cm to 36 cm.

For this species decreased age and size at maturity have been found to be related to decreased population size, increased temperature and increased growth.

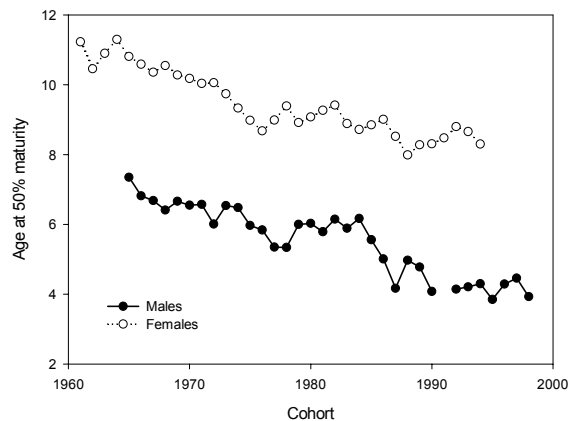


Figure 2. Age at 50% maturity for male and female American plaice.

Distribution of American plaice in 3Ps has changed in recent years. Until the late 1980's most American plaice were found on the central and eastern portions of St. Pierre Bank. Since then most fish have been found in warmer, deeper waters of slopes of the bank and in Halibut Channel.

The Fishery

Catches from this stock were highest from 1968 to 1973, exceeding 12,000 t in three years (Figure 3). Catches by non-Canadian vessels peaked at about 8800 t in 1968, due mainly to the USSR catch, but have not exceeded 800 t since 1973. Since 1977 only Canada and France have been involved in this fishery. Catches averaged just under 4000 t during the 1980's but rapidly declined after 1991. Based on a recommendation by the FRCC the fishery has remained closed since September of 1993. From 1994 to 1998 the catch was 400 t or less. Catch since that time has increased substantially. The catch in both 1999 and 2000 was about 650 t. In 2001 the catch was greater than 1000 t and up to October 2002 it was over 900 t. Catch has been

mainly as bycatch in the cod and witch flounder directed fisheries.

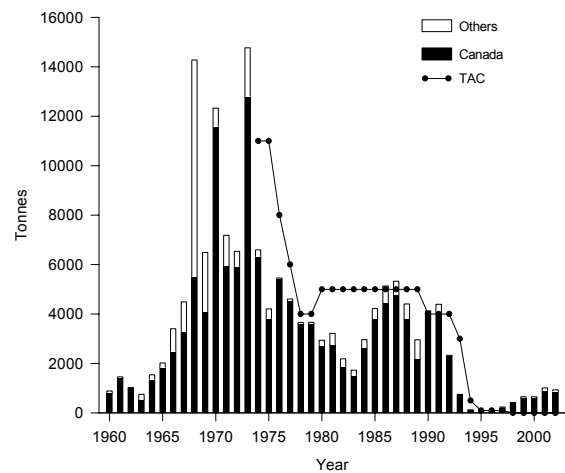


Figure 3. Reported catch and Total Allowable Catch for American plaice in 3Ps.

There have been substantial changes in this fishery over time. Throughout most of its history the majority of this fishery was prosecuted using mobile gears but since 1995 catch by this gear sector has constituted less than 50% of the total. The percentage of large fish taken in the fishery has been lower since 1994.

Industry perspective

The otter trawl fleet fishing witch flounder has had large bycatches of American plaice in recent years and interpret this as a sign of increased abundance.

Resource Status

Based on research vessel surveys both biomass and abundance showed a major decline from the mid 1980's to mid 1990's. Since 1992 stock size has been very low in comparison to the mid 1980's. There has been a slight increase since 1993 in both biomass and abundance indices but over the last

3 years average biomass is only 19% and abundance 30 % of the 1983-1987 average of total biomass from the surveys. For only the 7+ or exploitable portion of the survey index, the biomass is 19% and the abundance 18% of the 1983-87 average (Figure 4).

Since 1998 information is available from surveys sponsored by the Groundfish Enterprise Allocation Council (GEAC). The indices from these surveys have shown an increasing trend. However, the 1998 survey estimate is likely to be anomalously low. The biomass and abundance indices have both increased over the 1999 to 2001 time period. The increase in the biomass is 26% above the value in 1999, compared to a 25% increase in the DFO survey biomass index over this same period.

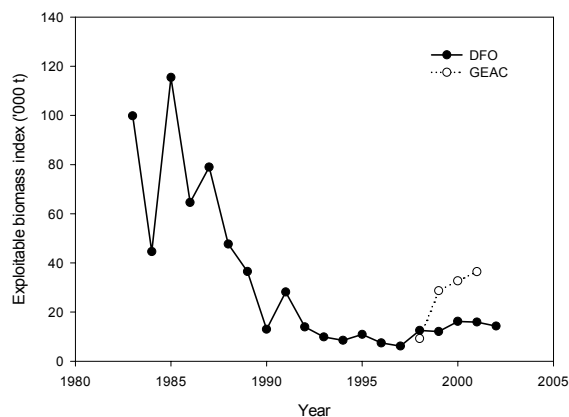


Figure 4. Exploitable biomass index of American plaice from DFO research vessel surveys from 1983-2002, as well as industry sponsored surveys (GEAC) from 1998-2001. Data from 1983-95 in the DFO time series are converted from the Engel data.

Age structure was relatively stable until 1994 when fish older than 14 years disappeared from the survey. By 1998 older fish began to reappear in the surveys and by 2002 the age structure was more similar to the historic pattern.

Estimates of total mortality from survey data increased from the mid 1980's to the early to mid 1990's. Total mortality remained high in 1994 and 1995 following the imposition of the moratorium despite low catches. This may indicate an increase in natural mortality over that time period. Estimates of total mortality have been lower since then. Average mortality on ages 6-13 increased from 10% in 1996-1998 to more than 30% in 1999-2001.

A female spawning stock biomass (SSB) index was calculated from survey information (Figure 5). The SSB index showed a major decline from the mid 1980's to the early 1990's but has shown a slight increase since 1997. The SSB index from 2000-2002 is only 26% of the 1983-1987 average.

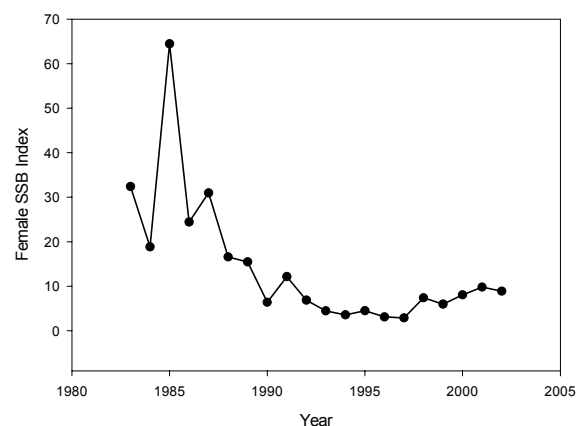


Figure 5. Female spawning stock biomass index of American plaice from DFO research vessel surveys. The Campelen data from 1983-95 are converted from the Engel series.

Estimates of **recruitment** from survey data indicated that cohort strength declined from the 1979 to the 1995 year class. Since then cohort strength has generally increased (Figure 6).

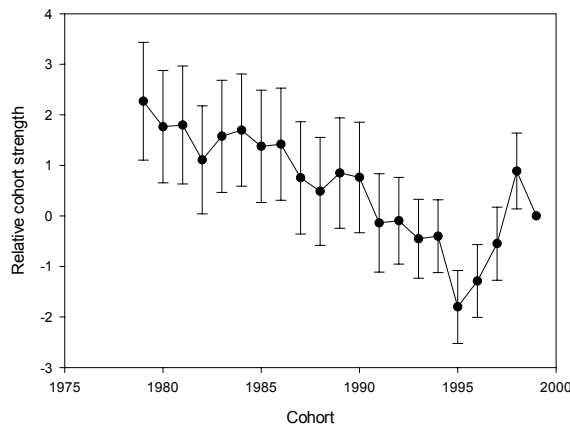


Figure 6. Estimates of relative recruitment (cohort strength) of American plaice from DFO research vessel surveys using Engel and Campelen data. Estimates are relative to the last cohort in the analysis. Error bars are ± 1 Std. err. of the model estimate of cohort strength.

Recruitment increased with SSB index and the best observed recruitments occurred at a SSB index above 20. The average SSB index over the last 3 years has been 9 (Figure 7).

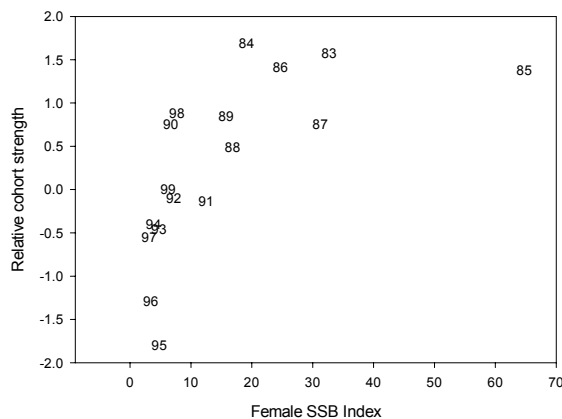


Figure 7. Estimated relative cohort strength (recruitment) and female SSB index from DFO research vessel surveys. The labels indicate the year class.

Catch to research vessel biomass ratios (C/B), used as an index of exploitation rate increased steadily through the 1980's and reached values of approximately 0.15 during the early 1990's. (The high value in 1990 was

caused by an anomalously low research vessel biomass estimate in that year). The ratio declined substantially as catches decreased, and reached a minimum in 1995. Since then there has been a fairly steady increase in C/B. Levels of the last few years are similar to those in the early to mid 1980's when there was a directed fishery on this stock (Figure 8).

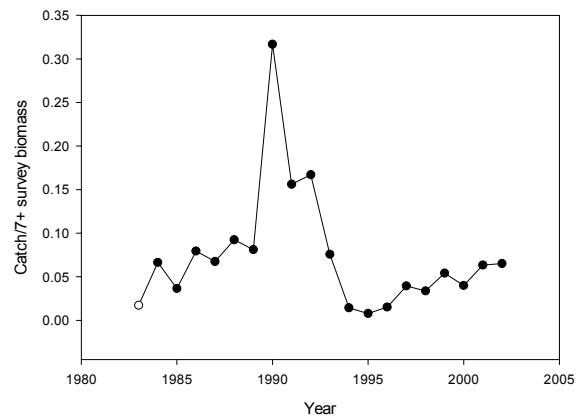


Figure 8. Commercial catch to research vessel biomass ratio. Research vessel data are from DFO research surveys from 1983 to 2002. The survey data are only for the exploitable portion of the biomass. Catch data for 2002 are incomplete.

Sources of uncertainty

This assessment is based solely on analyses of survey indices and trends in catch. There has been insufficient sampling of the commercial catch since 1993 to calculate catch at age. This means that it has not been possible to explore the use of age structured models to estimate total population size.

Outlook

In the next few years the weak 1994-1997 year classes will be moving into the age range of the biomass subject to the bycatch fishery. This will likely result in a decrease in exploitable biomass. At current levels of catch this should result

in a further increase in fishing mortality. More recent year classes appear stronger but these will not contribute to the exploitable biomass or SSB for several more years.

Management Considerations

Although most of the catch has come from cod directed fisheries, in the last 3 years 25 to 30 percent of the total American plaice catch has been taken in the directed witch flounder fishery being conducted by the otter trawl fleet. While the allowable bycatch of American plaice in this fishery is 50%, compared to 10% in other fisheries, actual bycatch rates have been in the range of 93% to 143% in the last 3 years. If bycatches in this fishery were limited to levels similar to other fisheries, the total catch of American plaice could decrease by more than 20%. This should result in increased prospects for stock rebuilding.

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References

McClintock, J. 2002. American plaice catch results from fall 2001 GEAC survey in NAFO Subdivision 3Ps. Canadian Science Advisory Secretariat Res. Doc. 02/039.

Morgan, M.J. and E.B. Colbourne. 1999. Variation in maturity at age and size in

three populations of American plaice. ICES J. mar. Sci. 56: 673-688.

Morgan, M.J., W.B. Brodie, D. Power, and S. J Walsh. 2002. An assessment of American plaice in Subdivision 3Ps. Canadian Science Advisory Secretariat Res. Doc. 02/093.

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