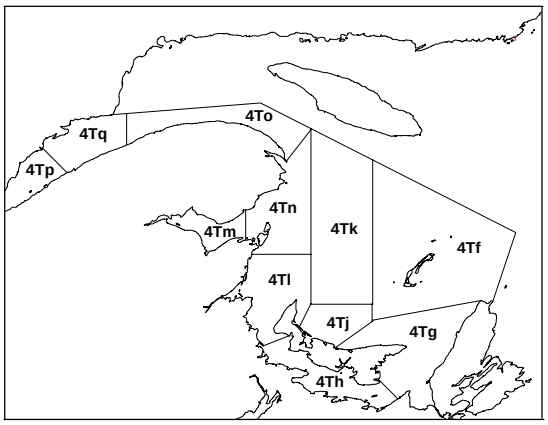
American Plaice (Div. 4T)

Background

American plaice are widely distributed throughout the Northwest Atlantic, from West Greenland to the Gulf of Maine. Throughout their range, they are associated with intermediate depths (about 80-250 m) and cold waters (usually from below 0°C to 1.5°C). Male and female plaice differ in their life-history traits: females grow faster and attain larger sizes than males; male plaice have shorter lives than females. Sexual maturity is reached at 7-15 years of age for females and between 5 and 7 years of age for males. Spawning occurs from early spring to summer with each female releasing hundreds of thousands of eggs. The fertilized eggs float near the water surface for several days. After hatching, plaice are pelagic until they reach a minimum length of 18 mm, when metamorphosis occurs and they become benthic. Plaice consume a wide range of organisms throughout their life cycle: young plaice consume bottom organisms such as mysid shrimp, amphipods, polychaetes, echinoderms and molluscs; older plaice consume other small fish species and invertebrates.

In the southern Gulf of St. Lawrence (NAFO Division 4T), American plaice has been under quota management since 1977. The resource was exploited mainly by longlines in the 1930s, but by the 1960s most landings were made by seines and otter trawls. Plaice are now caught by a diverse fishery of fixed and mobile gear, with the dominant sector being seines operated by vessels less than 45 feet. With the growth of mobile gear sectors during the 1960s, a large component of plaice catches in 4T (30-40% by weight) was commercially-undersized and discarded at sea. Recent measures, including increased mesh sizes and mandatory landing of all catches, have likely reduced discarding.



Summary

- In 2000, landings of plaice totalled 1285t, near the lowest level since 1965. Plaice-directed effort also declined.
- Commercial catch rates of seines showed declines in western 4T (4Tlmno) and an increasing trend in eastern 4T (4Tfg) where the fishery has concentrated since 1993.
- The survey abundance index indicates that the stock in the whole of its 4T range is at its lowest level in 30 years. The survey index also indicates declining abundance in western 4T, with an increasing proportion of the stock located in eastern 4T.
- Recruitment has been at a low level throughout the 1990s and well below the long-term average.
- With poor recruitment and with total mortality and exploitation rates near average levels, no improvement can be expected in the short to medium-term.

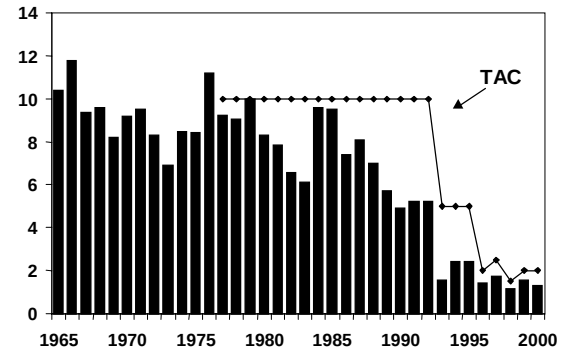
The Fishery

Landings and TAC's (thousands of tonnes)

Year	1980-89 Avg.	1990-95 Avg.	1996	1997	1998	1999	2000*
TAC	10.0	7.5	2.0	2.5	1.5	2.0	2.0
Total	7.6	3.6	1.4	1.7	1.1	1.5	1.3

* Preliminary statistics

Landings and TAC's (thousands of tonnes)

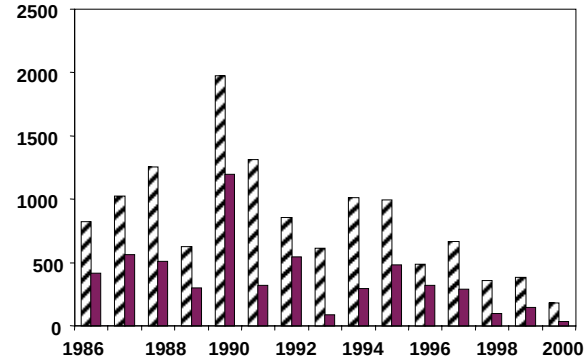


Annual **landings** since 1965 have averaged 6789 tonnes. The landed catch in 2000 was the second lowest recorded; the lowest catch was in 1998. In 2000, seines contributed about 70% of the total landings. Otter trawls contribute a smaller proportion of the landings than they did before 1993, when they landed over 1000 tonnes. Since 1993, otter trawls have landed between 140 and 350 tonnes annually. The competitive vessels under 45 feet continue to be the most active fleet component, usually reaching their allocated catch.

Effort in the plaice fishery, recorded in vessel logbooks as the number of days or hours spent fishing, has been monitored to detect changes in fishing pressure. Effort by seiners directing for plaice (defined as the main species caught) has declined through most of the 1990s, reaching its lowest point in 2000 at less than 200 days of fishing. Directed effort by trawlers has fluctuated throughout the past decade, also reaching its lowest level in 2000. Since 1992, the 4T plaice fishery has concentrated in unit areas 4Tg (southeastern Gulf) and 4Tf (off Cape Breton).

An index fishery for 4T cod was initiated in 1998, followed in 1999 and 2000 by a limited commercial cod fishery. Fishing effort may have been redirected to cod, contributing to the drop in plaice landings that occurred following 1997. In recent years, landings have been influenced by factors such as access to the cod resource, market prices for plaice, and quota allocations.

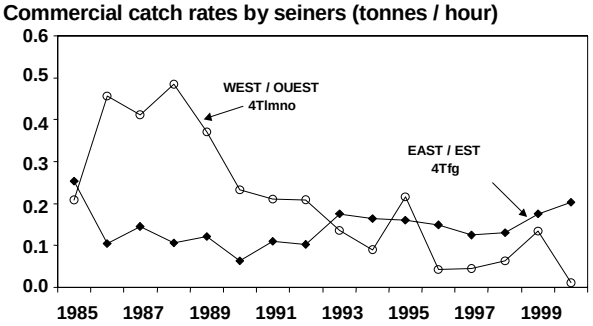
Directed effort (days) by seines (hatched) and trawls (solid).



Since 1995, the views of fishers on the status of the resource have been obtained through an annual **telephone survey**. Only fishers who have landed groundfish in the current year are contacted. As in previous years of this survey, the dominant view of the respondents who fished plaice as their first choice was that the resource is more abundant than in the past.

Commercial catch rates by seiners in the eastern part of 4T (4Tfg), where about 90% of the catches are made, support the views of respondents to the telephone survey. Catch rates in eastern 4T since 1993 have increased over the previous time period, while a decline occurred in the west.

Commercial catch rates by seiners (tonnes / hour)



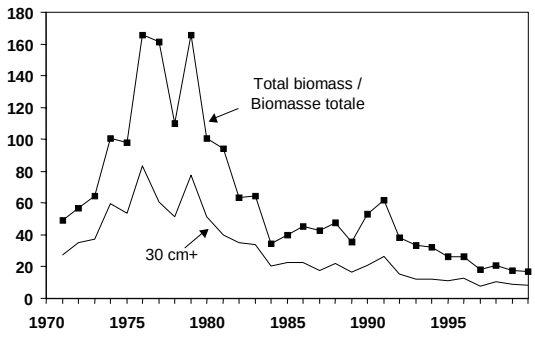
There are no strong year-classes appearing in the age structure of the commercial catch. The 1987 year-class appeared dominant in landings in 1994 and 1995, but has not persisted since 1997.

Resource Status

The status of the resource was evaluated using data from the annual research vessel survey, commercial landings and effort, the age and size composition of commercial catches, and the annual telephone survey. Research vessel surveys have been conducted annually in the southern Gulf since 1971.

The **research survey** index has been declining throughout the 1990s and reached its lowest level in the time series in 2000.

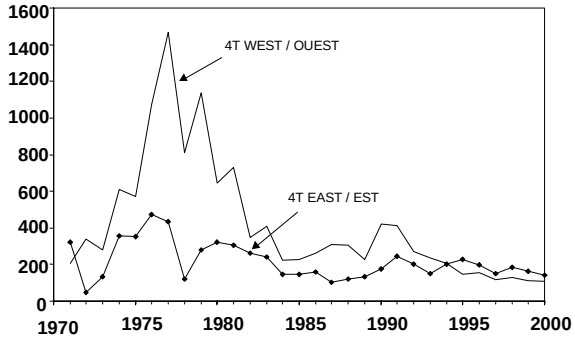
Survey biomass index (mean kg per tow)



However, there is a geographic component to this decline. Survey catch rates have declined in the western half of 4T, but have remained at a fairly stable level in the east.

This pattern is consistent with the trends in commercial catches and catch rates.

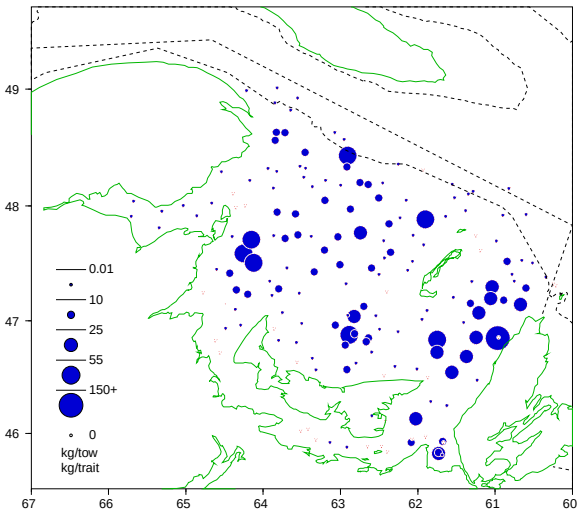
Survey mean number of plaice per tow



Almost half the survey biomass in 2000 comprised commercial-size plaice (minimum 30 cm).

The most abundant catches in the 2000 groundfish survey were off the coast of Cape Breton. Plaice catches in Chaleur Bay and off the Gaspé coast were very low and the resource remains below average on the central Magdalen Shallows.

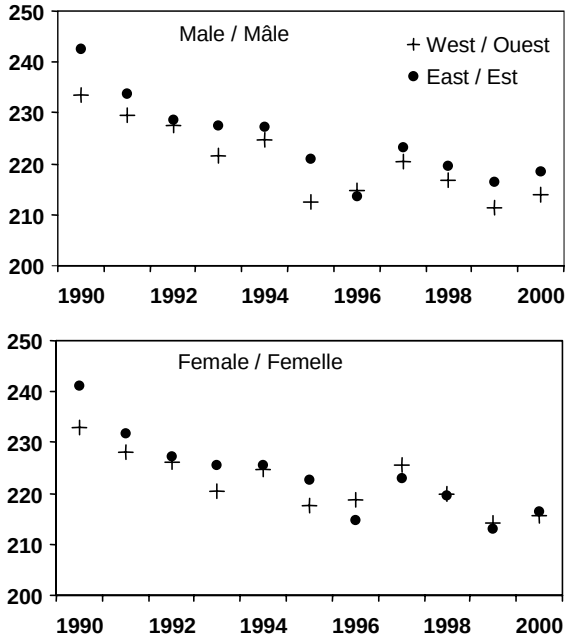
Catches of plaice (kg) in standard tows of the 2000 research survey.



An index of **plaice condition** indicates an overall decline in the early 1990s. The weight of 30-cm plaice was significantly lower in the western half of 4T than in the east for males. For females, the difference in condition

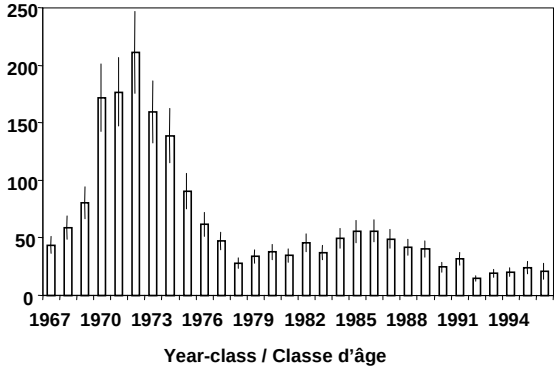
between the east and the west occurred in the early 1990s.

Weight (g) of 30-cm plaice



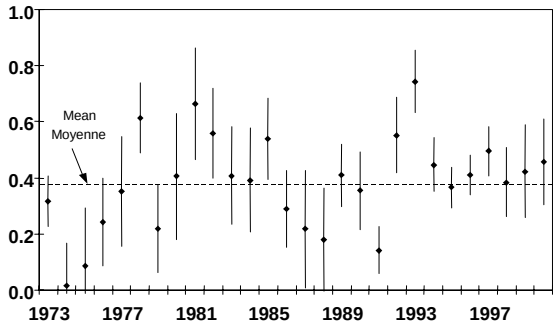
Recruitment continues to be low throughout the 1990s and well below the long-term average.

Survey mean number per tow at age-5 (± standard error).



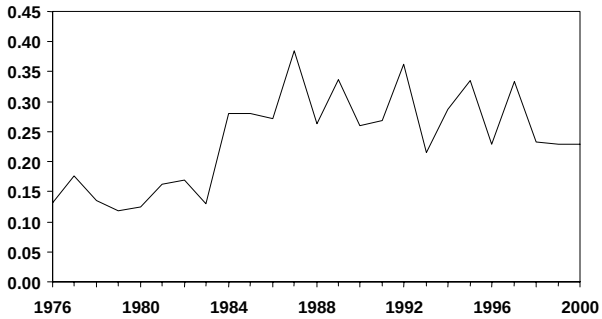
Total mortality as estimated from survey data has fluctuated considerably over time, but has been relatively stable since 1994, near the long-term average.

Total mortality (95% confidence limits as vertical bars) in 3-year periods (e.g. 1971 to 1973 = 1973)



Trends in **exploitation rate** were examined using an index (relative F) based on the ratio of commercial catches to survey catches. The index was calculated from catch-at-length data, including only non-discarded plaice (lengths of 30+ cm). Relative fishing mortality increased sharply in the mid-1980s and has fluctuated without an apparent trend since 1984.

Index of fishing mortality (relative F)



Uncertainties

The uncertainty in plaice catches caused by discarding in the past has limited the effectiveness of stock assessment and management. This complicates the interpretation of trends in fishing mortality and hinders the development of biological reference points.

There are differences in catch rates between the eastern and western parts of the southern Gulf. Both commercial and survey catch rates have declined in western 4T and now a higher

proportion of the stock is found in eastern 4T. We are unable at present to explain the causes of these changes. As concluded in a previous assessment, we cannot attribute this pattern to the occurrence of separate stocks in 4T. Studies of plaice genetics and comparisons of growth rates and year-class abundance in eastern and western 4T suggest that there is a single stock in 4T.

Outlook

Based on the indicators, the overall stock in 4T remains at a relatively low level, mainly a result of the decline in 4T west. There is little or no sign of recruitment. Without improved recruitment and at recent catch levels, no improvement in the stock can be anticipated in the short to medium term.

Management Considerations

Plaice less than the commercial size limit of 30 cm have composed 7-10% of the total catch in most years since 1993. From 1976 to 1992, undersized plaice usually composed from 0.5-5% of landed catches. This suggests some compliance with the regulation of mandatory landing of all catches that was imposed in 1993. Although improvements were made to fishing practices in the 1990s, including increases in mesh sizes that should reduce the capture of undersized plaice, discarding continues to be reported from this fishery.

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References

Morin, R., I. Forest and G.A. Poirier. 2001. Assessment of NAFO Division 4T American plaice, February 2001. Canadian Stock Assessment Secretariat Res. Doc. 2001/023.

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