



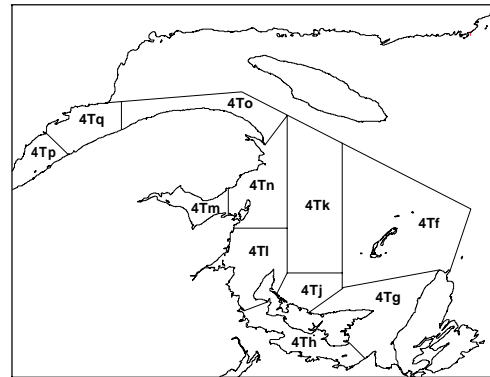
Winter Flounder in the Southern Gulf of St. Lawrence

Background

Winter flounder is a coastal flatfish distributed in the west Atlantic from southern Labrador to Georgia. In the southern Gulf of St. Lawrence (NAFO Division 4T), winter flounder are limited to the Magdalen Islands and to southern parts of 4T: Chaleur Bay, the Shediac Valley-Miramichi area, Northumberland Strait, and St. George's Bay. They are associated with soft or moderately hard bottoms and depths less than 40 m. They occupy a range of water temperatures and are capable of inhabiting freezing water conditions. Spawning occurs in late winter or early spring. Female winter flounder release several hundreds of thousands of eggs that settle to the bottom, adhering to rocks and vegetation. The larvae drift in surface waters for 2-3 months before metamorphosis. Growth rates vary widely between regions, with female winter flounder reaching sexual maturity by about 25 cm and with males maturing by approximately 20 cm. Winter flounder feed opportunistically on a variety of benthic organisms, mainly mollusks and small crustaceans. They also feed on the eggs of other aggregations of spawning fish, in particular capelin and herring. In the southern Gulf, localized fisheries using modified gillnets (tangle nets) are set on the spring and fall spawning beds of herring to capture winter flounder.

Winter flounder in 4T came under quota management for the first time in 1996. With the closure of the Atlantic cod fishery in 1993, concern was expressed that species without quota restrictions, such as winter flounder, would become subject to increased directed effort. The first assessment of the stock status was made in 1994.

The 4T winter flounder resource supports localized fisheries for lobster bait and limited food markets. Winter flounder was also a by-catch in fisheries for cod, white hake and American plaice; however, since closure of the cod fishery, winter flounder has become a mainly directed fishery. The fishery in 4T is prosecuted mainly by mobile gear operated by vessels less than 45 feet, although the importance of gillnets has grown since the mid 1980s. The flesh of winter flounder is of good quality and in certain parts of their range, as in northeastern US, winter flounder are commercially valued in sport and commercial fisheries.



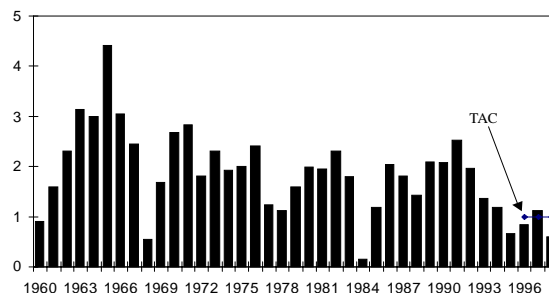
Summary

- Winter flounder in 4T probably comprise several stock units. The information base for assessing this resource remains limited.
- Commercial catch rates calculated from trawlers in unit area 4Tg since 1991 peaked in 1994, declined to 1997, and remained at the same level in 1998. Catch rates from the single vessel catching winter flounder in the sentinel program in 4Tg indicate increased catch rates in 1998.
- DFO groundfish surveys suggest that winter flounder abundance is below average throughout 4T relative to estimates since 1971. The size composition has shifted to smaller fish, mean weight has declined and analyses indicate relatively high fishing mortality.
- Through consultations and telephone surveys of fishers, stakeholders appear to view the status of this resource favorably, particularly in 4Tg. Industry views the DFO groundfish survey with scepticism, as it does not provide adequate coverage of inshore winter flounder habitat and fails to indicate recruitment.

The Fishery

A precautionary **quota** of 1000 t was introduced in 1996. In Northumberland Strait and the Magdalen Islands, the approved mesh size for mobile gear in winter flounder-directed fisheries was 130-mm square mesh in codends. The approved mesh size was 135 mm square in Chaleur Bay and 145-mm square on Miscou Bank. Fishers report using larger mesh sizes than the minimum legal size. Gillnets were required to have a minimum mesh size of 140 mm. Restrictions on the minimum size of winter flounder have been in effect since 1993. Regulations allow for fishery closures when at-sea observers confirm that winter flounder measuring less than 25 cm exceed 15% by number of the total winter flounder catch. In 1997, vessels directing for winter flounder were allocated 200 t of cod by-catch. Cod by-catch was permitted to a limit of 20% of the total catch weight in the directed fishery (formerly 10%). The by-catch limit for American plaice was reduced to 5% in September 1998 when the plaice quota was attained by the mobile competitive fleet. In 1995, special licenses for bait fishing were eliminated in the southern Gulf to reduce the catches of juvenile flatfish.

Landings (000's tonnes)



Landings of winter flounder in 4T reached 1129 t in 1997, surpassing the 1000-t quota that was set in 1996. In 1998, landings dropped to 597 t. The average since 1960 has been 1848 t. Maximum annual landings of 4T winter flounder were reported in 1965, at 4412 t; lowest landings occurred in 1984 at 149 t. Winter flounder landings have declined since 1991. The fishery, particularly with mobile gear, has concentrated in the southeastern part of 4T (unit area 4Tg). The importance of gillnets in the fishery has increased through the 1990s. Otter trawls, historically the dominant gear in the fishery, landed slightly more than half of landings in 1997 and 1998. Gillnets and otter trawls together contributed over 90% of annual landings since 1993.

Landings have varied widely from year to year for this resource due to a number of factors. Codend mesh sizes have increased considerably over the past three decades, probably affecting annual landings. Misreported and non-reported catches may have caused winter flounder landings to be underestimated in several years. Winter flounder were important in bait fisheries where catches were not fully accounted for in official landing statistics. Several measures have been taken to improve landing statistics for winter flounder in recent years through improved identification of the species caught

Landings (000's tonnes)

Year	1970-1979 Avg	1980-1989 Avg	1990-1994 Avg	1995	1996	1997*	1998*
TAC					1.0	1.0	1.0
Total	2.0	1.7	1.8	0.7	0.8	1.1	0.6

* preliminary statistics

and the introduction of logbooks for fixed gears in 1998.

The drop in landings in 1998 was caused by several factors affecting the fishery. The opening of an index fishery for 4T Atlantic cod caused a redirecting of fishing effort away from winter flounder. St. Georges Bay, an important area for the fishery, was closed to winter flounder in August and September due to excessive by-catch of white hake. Other closures occurred in the witch flounder and American plaice fisheries in October that may have further restricted fishing on winter flounder. Fishers also reported that poor weather conditions in 1998 reduced the number of sea days in 4Tg.

Nominal **effort** in the winter flounder fishery was evaluated since 1991 for otter trawls, from vessel logbooks recording the number of days fishing. Data from vessel logbooks before 1991 were insufficient to evaluate nominal effort. More than half of the effort data for trawls was for unit area 4Tg. Nominal effort in 4Tg and throughout 4T has declined since 1991, declined sharply in 1993 following the cod moratorium and again in 1998. Vessels targeting winter flounder in 4T during 1991 fished for approximately 2000 days; by 1998, nominal effort had declined to 205 days. In unit area 4Tg, effort decreased from 590 days at sea in 1991 to 140 days in 1998.

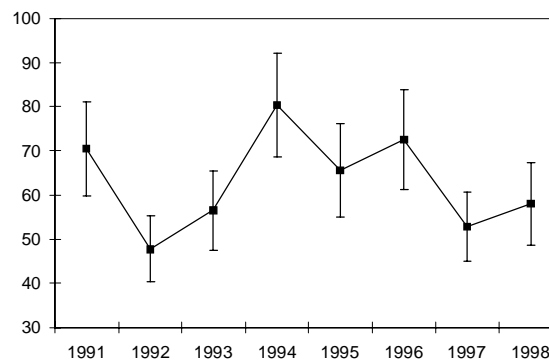
A comparison was made of the size composition of winter flounder catches in relation to **codend mesh size**. The data originated from commercial and sentinel catches in unit area 4Tg where 135 mm, 140 mm and 145 mm square mesh sizes were used by trawlers. Catches with 135 mm mesh contained more than the legal limit of 15% of

winter flounder under 25 cm. Catches of small winter flounder were less than 13% of total catch with 140 and 145-mm square meshes.

Resource Status

In **consultations** with industry and through telephone surveys conducted yearly since 1995, the majority of fishers report that in 4Tg winter flounder is as abundant or more abundant now than in the previous five years. **Commercial catch rates** for 10 trawlers that have fished in unit area 4Tg since 1991 indicate a drop in catch rates since 1994.

Commercial catch rates in 4Tg (kg / hour)*

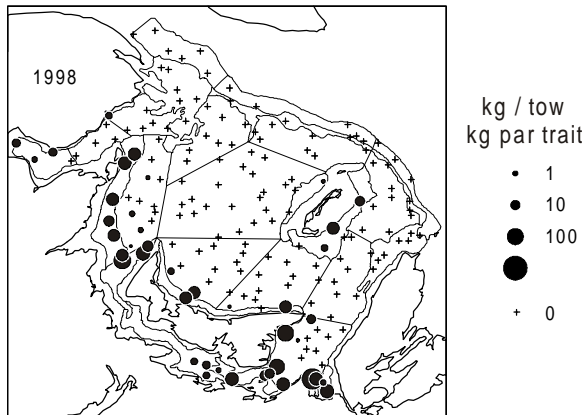


* \pm one standard error / \pm erreur type

In contrast, the catch rate of the single vessel catching winter flounder in the sentinel fishery in 4Tg from 1996 to 1998 increased in 1998.

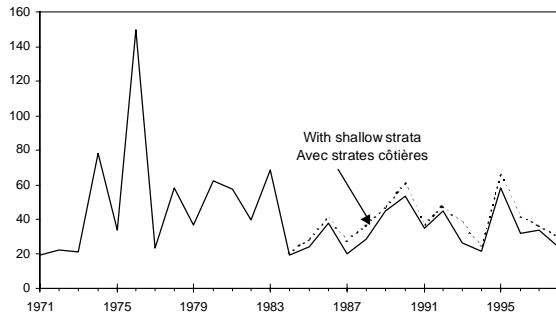
Winter flounder has a coastal distribution in the southern Gulf, as seen in DFO research surveys.

Catches of winter flounder in the 1998 research survey of 4T.



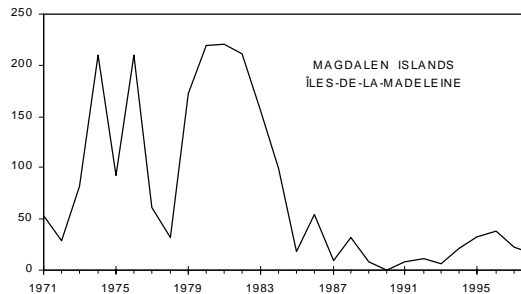
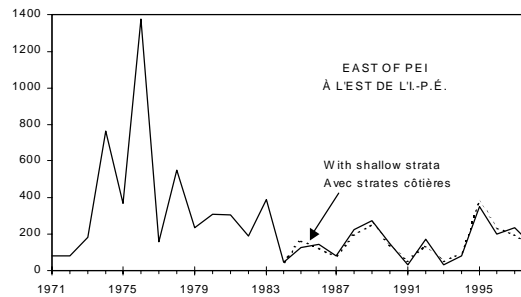
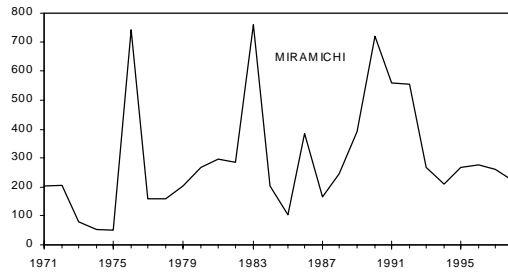
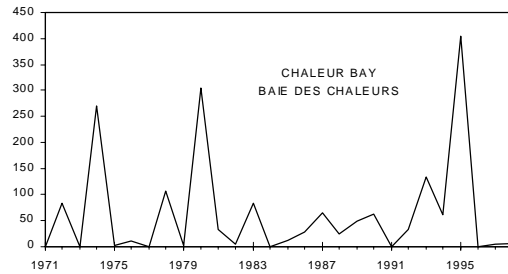
DFO trawl surveys have been conducted every year in September since 1971. In the 1998 DFO **research survey**, the average catch in the strata fished since 1971 was 24 winter flounder per tow. Catches since 1971 have averaged 42 per tow and lower estimates than the 1998 catch occurred 7 times in the previous 27 surveys. Beginning in 1984, three shallow-water strata were added to the survey. Including the shallow-water strata, the trend in abundance is similar to that without these strata.

Survey abundance (mean number per tow).



The pattern of abundance has varied among areas of 4T. In Chaleur Bay, catches have fluctuated widely, rising to an average of 404 per tow in September 1995, but averaging fewer than 10 per tow since 1996. Similar abrupt increases in the index occurred in 1974 and 1980. In the Miramichi

Survey abundance by area of 4T (mean number per tow; note different scales).

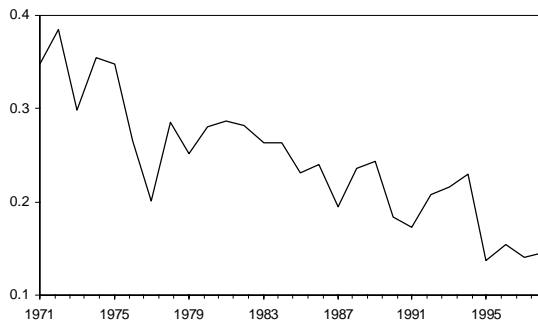


area, catch rates were relatively low in the early 1970s, with exceptional catches in 1976 and 1983. Catch rates rose during the late 1980s to peak levels in 1990-1992, then dropped to an intermediate level. In the area southeast of PEI, catch rates were highest in the mid-1970s, but declined to relatively low levels in recent years. Catches of winter

flounder near the Magdalen Islands reached high levels in several years during the 1970s and early 1980s, but have remained at a low level since then. Catch rates increased yearly between 1993 and 1996, but catches declined in 1997 and 1998. The exploitable biomass (25 cm +) for 1998 was the lowest recorded in the times series of the DFO research survey.

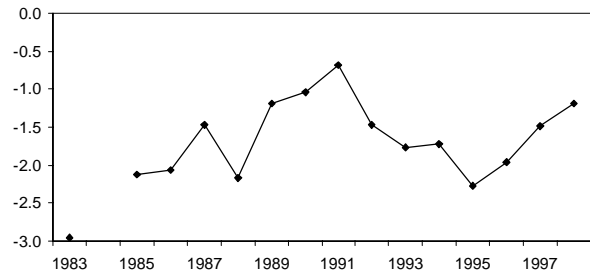
Winter flounder have become smaller in size and weight since the survey began in 1971. The same pattern has not been found in the size distribution or mean weight of winter flounder from sampling of commercial catches since 1983.

Mean weight (kg) of winter flounder in research survey.



Trends in **exploitation rate** in 4T were examined from an index of fishing mortality, based on the ratio of commercial catches to survey catches. The index was size-based, including only non-discarded winter flounder (lengths of 25 cm and greater). The size composition of winter flounder in the commercial fishery has been available since 1983, with the exception of 1984. Fishing mortality peaked in 1991, declined from 1991 to 1995, but has increased since then.

Index of fishing mortality for 30-cm winter flounder.



Sources of Uncertainty

Recent improvements have been made to landings statistics for this resource; however, data on landings from all sources in 4T are limited up to the mid-1990s. Logbook data from mobile gear are available since 1991, but mostly from one sector (4Tg).

The annual research survey of 4T does not cover the full distribution of winter flounder. Small, young winter flounder are found further inshore than the area covered by the survey. Length-frequencies of winter flounder from the research survey do not signal incoming recruitment, nor do they track size modes that indicate year-class strength.

Outlook

Landings of 4T winter flounder have declined since 1991, although the decline has been accompanied by lower fishing effort by otter trawls, one of the main gears landing 4T winter flounder. Survey data indicate that winter flounder in 4T has declined to a level that is well below average over the time series. The survey also indicates a declining trend in the size composition of winter flounder. In spite of relatively low landings since 1995, fishing mortality as indicated by the ratio of commercial to survey population

estimates appears to be increasing. This view contrasts with that of active fishers, who in interviews over the past four years continue to view the abundance of the stock favorably.

Several stock units of winter flounder probably occur in 4T and their abundance varies differently over time. The biological information necessary to define stock units within 4T is not available at present. Data on regional trends in recruitment and stock abundance are also lacking. In areas of 4T such as the Miramichi, research survey data indicate that the resource is at an intermediate level of abundance relative to the previous 27 years. Commercial catch rates are currently available for only one sector of 4T and some results from this source indicate different trends in abundance.

Research survey data indicate an overall decline in the abundance of winter flounder. Local trends within subareas of 4T suggest average or below average abundance. Other indications, such as reduced size and an increasing trend in fishing mortality are cause for concern.

Management Considerations

Measures have been taken to reduce the discarding at sea of commercially undersized winter flounder. However, current mesh size regulations that permit the use of 130 and 135-mm square meshes in mobile gear may not be compatible with this objective. There is a need to provide the advice by smaller geographic areas to match the stock structure.

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Reference

Morin, R., I. Forest and G.A. Poirier. 1999. Assessment of NAFO Division 4T winter flounder. DFO Canadian Stock Assessment Secretariat Res. Doc. 99/47.

This report is available from the:

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Internet address: www.dfo-mpo.gc.ca/csas
ISSN: 1480-4913

*La version française est disponible à
l'adresse ci-dessus.*



Correct citation for this publication

DFO, 1999. Winter Flounder in the southern
Gulf of St. Lawrence. DFO Science
Stock Status Report A3-22(1999).