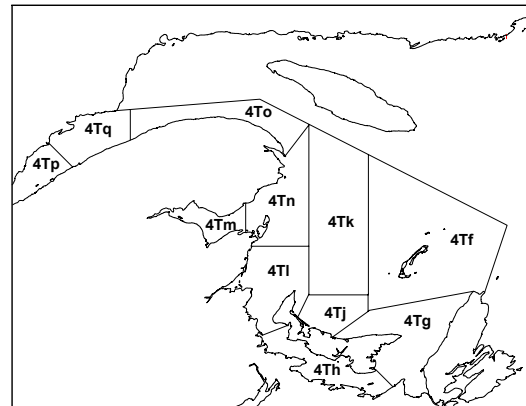


Winter Flounder in the Southern Gulf of St. Lawrence (Div. 4T)



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 sub-zero water conditions. Throughout their range, they migrate seasonally from the coast and in the southern Gulf they overwinter in estuaries. 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 molluscs and small crustaceans. They also feed on the eggs of other aggregations of spawning fish, in particular capelin and herring. In some areas of the southern Gulf, 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 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. 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

- Landings of **winter flounder** have been stable at about 600 tonnes since 1998. Directed effort on winter flounder has declined in the 1990s.
- In telephone surveys, harvesters have tended to view the status of this resource favorably. In 2000 and 2001, the dominant view of respondents was that the resource was at the same level of abundance as in the previous year.
- The survey indicates that the stock in the whole of 4T has been at near average abundance for the past three years.
- Winter flounder in 4T probably comprise several stock units. The survey abundance index shows regional differences in abundance trends. These regional trends differ from indices provided by commercial catch rates and an inshore survey in corresponding areas.
- The size of winter flounder in the survey has declined, but appears to have levelled off in recent years. An index of fishing mortality indicates that, since 1993, it has been below average.

The Fishery

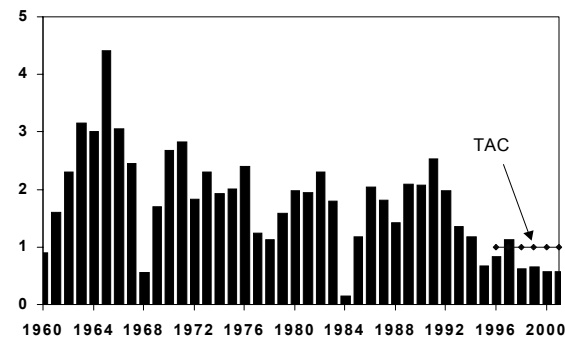
Landings and TAC's (thousands of tonnes)

Year	Average 1980-89	Average 1990-95	Average 1996-98	1999	2000	2001*
TAC			1.0	1.0	1.0	1.0
Landing	1.7	1.6	0.9	0.6	0.6	0.6

* Preliminary statistics

Winter flounder **landings** have remained close to 600 tonnes since 1997. The average since 1965 has been 1759 tonnes. Otter trawls have been the dominant gear landing winter flounder over the past four decades; however, gillnets have contributed at least one quarter of landings in most years since 1986.

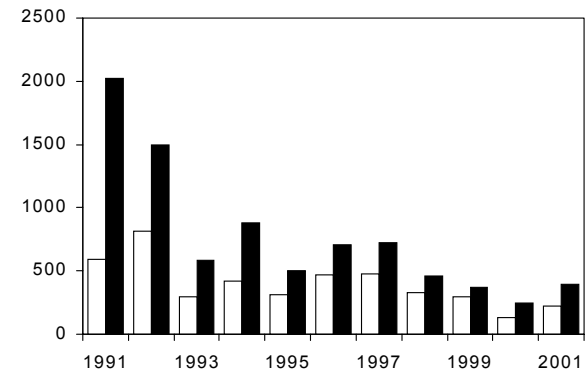
Landings and TAC's (thousands of tonnes)



Winter flounder landings have varied widely from year to year in the past due to a number of factors. Winter flounder has been used widely as bait in 4T, often reported as unspecified flounder or misreported as other species. Mesh sizes have increased considerably since the 1960s. In 2000, the minimum mesh size for mobile gears in most areas of 4T with directed fisheries for winter flounder was increased from 130 to 140 mm square. Several improvements were made to landing statistics in the 1990s, such as better identification of the species caught, dockside monitoring, and the introduction of fixed gear logbooks.

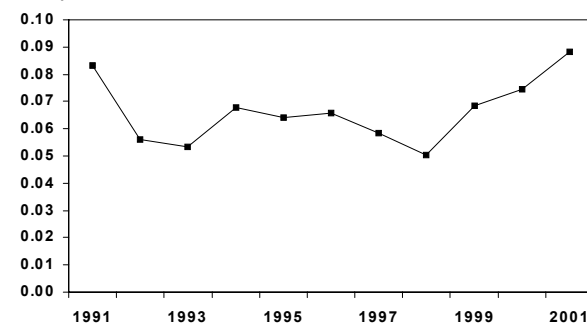
Effort data for mobile gear in the winter flounder fishery have been available since 1991. The number of fishing days by trawlers directing for winter flounder in 4T declined by more than half between 1991 and 1993. The effort decline in 4Tg, the main area landing winter flounder by trawlers, was less pronounced.

Directed Effort (days) by Trawls in 4T (solid) and 4Tg (white)



Commercial catch rates were examined for 10 trawlers that have fished in the same area of 4Tg over the past 11 years. Catch rates appear to have increased steadily since a low point in 1998, in spite of increased mesh size in 2000.

Commercial Catch Rates of Trawlers in 4Tg (tonnes / hour)



Resource Status

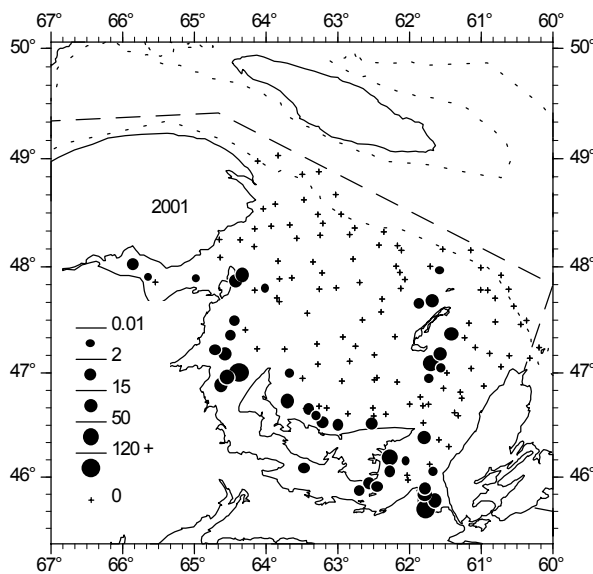
The status of the resource was evaluated using data from the annual research vessel survey (RV), commercial landings and effort, the size composition of commercial

and survey catches, and the annual telephone survey.

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 were contacted. In most years of this survey, the dominant view was that winter flounder were more abundant than in the previous year. In 2000 and 2001, the dominant view expressed by fishers was that the resource was at the same level of abundance as in the previous year of fishing. Since 1995, fishers have tended to view the abundance trend of this resource favourably.

RV surveys have been conducted annually in the southern Gulf since 1971. In 1984, three inshore strata were added to the survey; however, coverage by this survey does not extend to depths less than 20 m. Much of their habitat, particularly that of young winter flounder, is found in shallow waters.

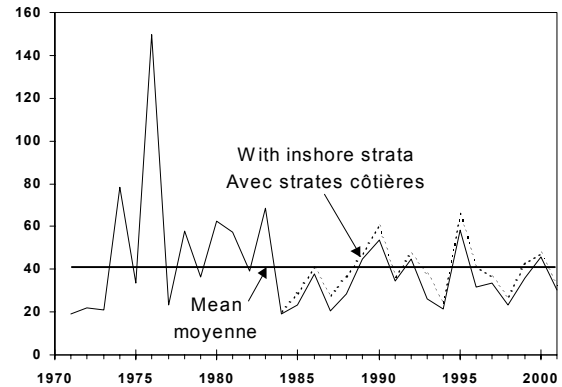
Catches of Winter Flounder (kg) in Standard Tows of the 2001 Research Survey



The annual RV survey in 2001 averaged 30 winter flounder per tow, less than the

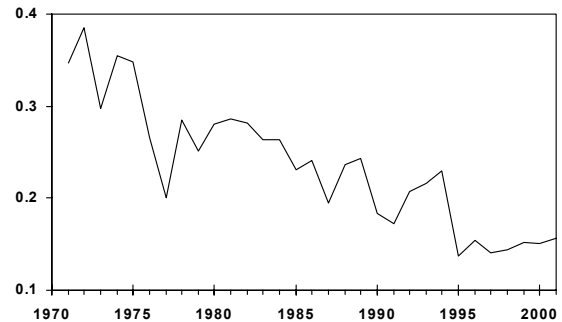
average of 41 per tow for strata sampled since 1971. Including the inshore strata, the survey averaged 35 winter flounder per tow in 2001. The annual pattern of abundance is similar, with or without the inshore strata. Since the inshore strata were added to the survey in 1984, winter flounder catches have averaged 29 per tow, so the catch level in 2001 was above average for that series.

Survey Abundance Index (mean number per tow)



The RV survey indicates that winter flounder have become smaller in size and weight since 1971, although the decline appears to have levelled since 1995. A similar decline in winter flounder size has not been observed in samples of commercial catches since 1983.

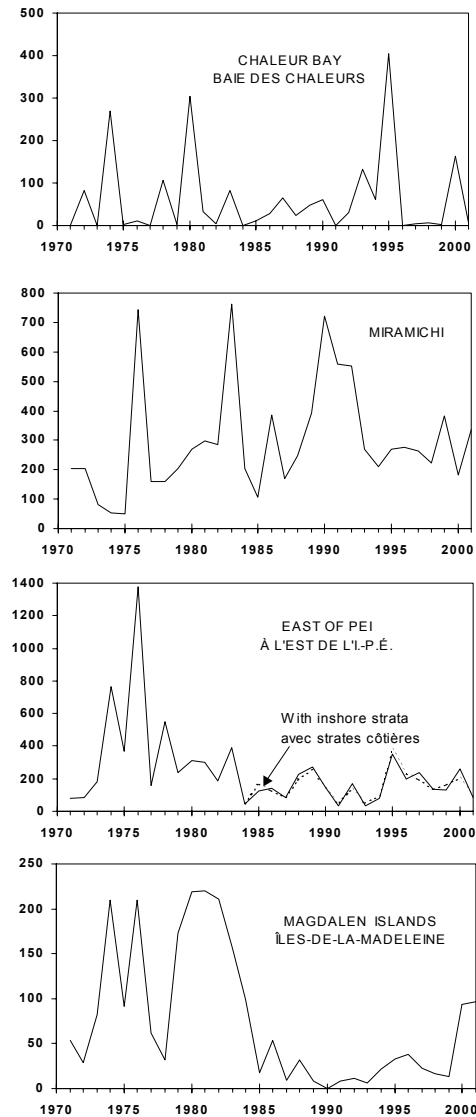
Mean Weight (kg) of Winter Flounder in Research Surveys



Winter flounder are believed to overwinter in estuaries of the southern Gulf. Migration studies conducted elsewhere indicate that they make limited seasonal movements, suggesting that several stock units may

occur in 4T. Patterns of abundance in the RV survey have varied among areas of 4T, also suggesting that 4T winter flounder may comprise several stock units. In Chaleur Bay, RV catches have varied widely, with abrupt increases in 1995 and 2000 followed by small catches of less than 10 winter flounder per tow. In the Miramichi area, RV catch rates were relatively low in the early 1970s, with exceptional catches in 1976, 1983, and during 1990-1992. RV catch rates since 1993 have been at an intermediate level. In the area east of PEI, catch rates were highest in the mid-1970s, but have fluctuated at relatively low levels since then. In the Magdalen Islands area, winter flounder catches were strong throughout most of the 1970s and early 1980s, but have remained at a low level for most of the period since then. In 2000 and 2001, catches in that area have risen to over 90 winter flounder per tow.

Survey Abundance by Area of 4T (mean number per tow; note different abundance scales on graphs)



Since 1999, an **inshore survey for flatfish** species has been conducted in waters surrounding the Magdalen Islands, in collaboration with local fishers. The number of stations sampled in this survey was 48 in 1999, 63 in 2000, and 68 in 2001. Sampling was made with a small otter trawl. Modifications were made to the gear in 2000, so results are not comparable between the first two years of the survey. The index of winter flounder abundance resulting from this survey indicates a decline in abundance and biomass

in the inshore waters of the Magdalen Islands between 2000 and 2001.

Sources of Uncertainty

Recent improvements have been made to landing statistics for this resource; however, data on landings from all sources in 4T are limited up to the mid-1990s. Logbook data are available for mobile gear since 1991, but mostly for one sector (4Tg). Fixed gear logbooks have been in use since 1998, but problems in data management have resulted in incomplete data.

The annual RV 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.

Commercial catch rates and an inshore survey produce indicators of stock abundance that contrast with local indices from the annual research survey. Longer time series from inshore surveys will be required before these differences can be reconciled.

Although there is uncertainty concerning the diet composition of seals in the southern Gulf of St. Lawrence, some analyses suggest that predation by seals on winter flounder in 4T may be considerable.

Outlook

Survey data indicate that the index of winter flounder abundance for the whole of 4T has been near or below average in the past three years, depending on the time series that is used. The survey indicates that there has been

a declining trend in the size composition of winter flounder over the past three decades, a decline that appears to have levelled since 1995. Fishing mortality since 1999 has been below the average observed since 1983.

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