Updates on Selected Gulf of St. Lawrence Groundfish Stocks in 2000

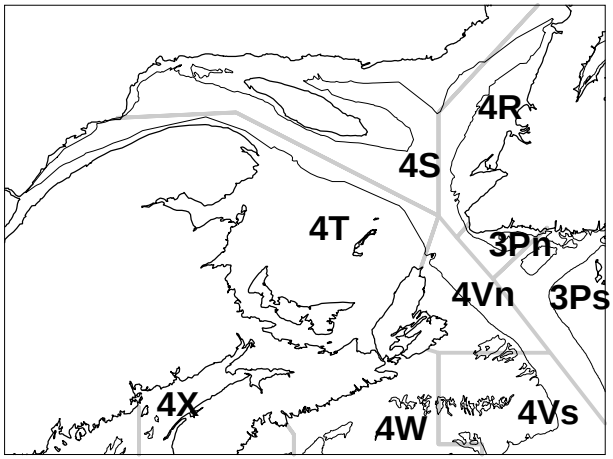
February 2000

Canada

Updates on Selected Gulf of St. Lawrence Groundfish Stocks in 2000

Background

The most recent full assessments of the status of the following stocks were conducted in 1998 and 1999: 4T plaice, 4T white hake, 4RST witch flounder, 4T winter flounder and 4T yellowtail flounder. The SSR reference for the last complete assessment and most recent update is listed under the "Background" section of each update. This report provides a brief update of stock status based on fishery and survey data on these stocks for 1999.



Summary

- **American plaice** abundance and recruitment remain poor; the stock is concentrated in eastern 4T which makes it vulnerable to exploitation. In spite of recent catches in the range of 1200-1500 t, the stock has not recovered.

- The **white hake** resource in NAFO Div. 4T remains at low abundance and concentrated in a small part of the range it occupied before the early 1990s. The abundance of hake between 20-35 cm has increased but the abundance of commercial-size animals remains low. Recovery of this stock to the levels of abundance observed in the late 1980s will only occur if all sources of fishing mortality (including the sentinel survey) are kept at a very low level.

- Biomass of **witch flounder** appears to be relatively high in the Cape Breton Trough but relatively low throughout the remainder of the 4RST area. A sharp increase in research survey catches in the Cape Breton Trough in 1999 might reflect an anomalous survey result, or recruitment of witch flounder from the Scotian Shelf, where the abundance of pre-recruits has been high in recent years. A better understanding of stock structure in the Gulf of St. Lawrence and its approaches is needed to determine the outlook for witch flounder in the different regions of the Gulf. Given the uncertainties in stock status and stock structure, it would be prudent to ensure that landings in 2000 do not exceed the current levels.

- Survey data suggest that **winter flounder** abundance is below average throughout 4T relative to estimates since 1971 and their average size and weight have declined. Winter flounder abundance varies differently in sectors of 4T. In telephone surveys of fishers, stakeholders express the view that the abundance of this resource is increasing. The survey does not cover the full range of the distribution of the resource and the mean numbers in the different inshore areas are highly variable. Nevertheless, the stock biomass in the aggregate has declined. Thus, there should be no increase in fishing effort.

- **Yellowtail flounder** abundance has been fairly stable since 1985, but length frequencies from the groundfish surveys show modal lengths less than 24 cm for the last 3 years. It would not be prudent to increase the current fishing effort or TAC.

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 reduced discarding; however, the practice persists in 4T. The uncertainty in plaice landings caused by discarding has limited the effectiveness of stock assessment and management. Discarding has made it difficult to estimate the level of fishing mortality in relation to a target of $F_{0.1}$

The most recent assessment of this stock was conducted in spring 1998 (SSR A3-26 (1998)). An update was conducted in 1999 (SSR A3-36 (1999)).

The Fishery

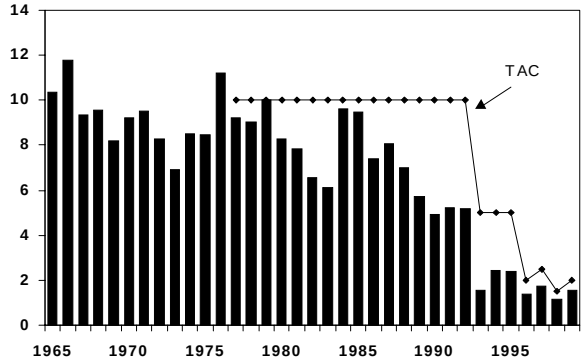
Landings and TAC's (tonnes)

Year	1993	1994	1995	1996	1997	1998*	1999*
TAC	5000	5000	5000	2000	2500	1500	2000
Total	1547	2420	2397	1381	1724	1168	1537

* Preliminary statistics

An index fishery for cod was initiated in 1998, followed in 1999 by a limited commercial cod fishery. This may have led to a redirection of fishing effort, contributing to the drop in plaice landings that has occurred since 1997. The fleet sector of competitive vessels less than 45 feet (seines and trawls) was most active in the fishery, reaching their allocated catch. In June 1999, a new management cycle for groundfish stocks in the southern Gulf of St. Lawrence was approved. The new fishing season began on May 15, 1999 and permits the plaice quota to be captured before May 14, 2000.

Landings and TAC's (000s tonnes)

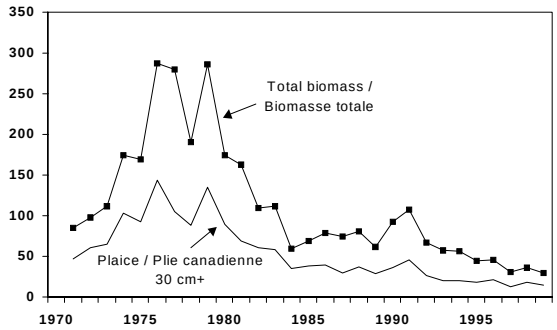


Resource Status

Research surveys in 1997 and in 1999 have recorded the lowest levels of abundance and biomass of 4T plaice since the survey began in 1971. The survey trawlable biomass, based on the research survey and unadjusted for catchability, was approximately 30,000 tonnes in 1999, of which commercial-size

plaice (minimum 30 cm) contributed 14,000 tonnes. This index should reflect changes in plaice biomass over time but should not be taken as a measure of the actual biomass in the area.

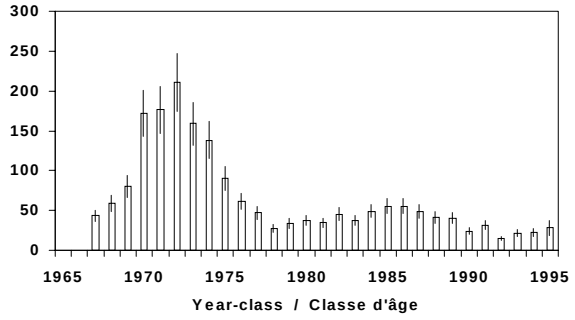
Survey trawlable biomass for total stock and plaice of commercial size (000s tonnes)



In 1999, catches averaged 131 plaice per tow, the lowest catch in the survey time series, and the same catch level as was registered in 1997.

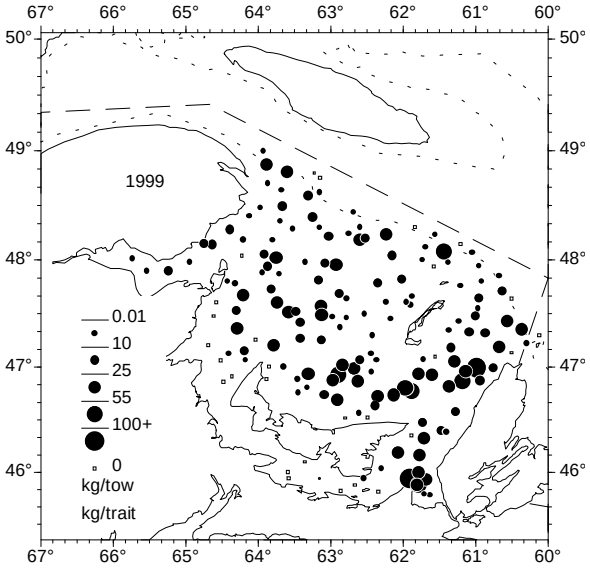
Year-class strength remains at a low level for this stock. Year-classes were evaluated by their abundance in the survey at ages that were not fully recruited to the commercial fishery (ages 4-7). Results indicate strong year-classes born in the early 1970s, with declining year-class strength from the mid 1980s to the early 1990s. Recent year-classes are low but stable.

Survey mean number per tow at age-5



The most abundant catches in the 1999 survey were off the coast of Cape Breton. Plaice catches on the slope of the Laurentian Channel were stronger than in most recent years; however, the resource remains below average on the central Magdalen Shallows and is particularly weak in Chaleur Bay.

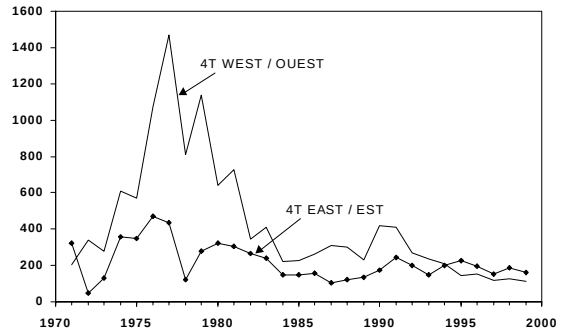
Catches of plaice (kg) in standard tows of the 1999 research survey.



Research surveys and commercial catches continue to indicate a change in the **distribution of plaice** within 4T since the early 1990s. Catch rates of plaice have declined in the western half of 4T and plaice are now relatively more abundant in the east. As concluded in the previous assessment, we cannot attribute this pattern to the occurrence of separate stocks in 4T. Studies of plaice genetics and the analysis of biological characteristics of 4T plaice suggest that there is a single stock in 4T.

Survey data indicate that plaice abundance has varied more widely in the western half of 4T. Abundance has declined during the 1990s in western 4T, while it has remained relatively stable in the east.

Survey mean number of plaice per tow



Outlook

Several factors indicate that this stock is at a low level of abundance and that it should be exploited with caution. Commercial catches are concentrated in the eastern part of 4T. The concentration of the stock in eastern 4T makes it vulnerable to excessive exploitation. Recruitment remains poor. The last assessment concluded that chances of stock conservation would improve if catches were maintained well below average landings in the most recent period of stock decline (2,000 tonnes over 1994-97 period). In spite of recent catches in the range of 1200 to 1500 tonnes, the stock has not recovered.

For More Information

Contact: Roderick Morin
Marine Fish Division
Gulf Fisheries Centre
P.O. Box 5030, Moncton
New Brunswick, E1C 9B6

TEL: (506) 851-2073
FAX: (506) 851-2620
E-Mail: morinr@mar.dfo-mpo.gc.ca

References

DFO 1998. American plaice in the southern Gulf of St. Lawrence. DFO Science Stock Status Report A3-26 (1998).

DFO, 1999. Updates on selected Gulf of St. Lawrence Groundfish Stocks in 1999. DFO Sci. Stock Status Report A3-36 (1999).

Morin, R., G.A. Chouinard, I. Forest and G.A. Poirier. 1998. Assessment of NAFO Division 4T American plaice in 1996 and 1997. DFO Can. Stock Assess. Sec. Res. Doc. 98/06.

Poirier, G.A., G.A Chouinard, D.P. Swain, T. Hurlbut, C. LeBlanc and R. Morin. 1999. Preliminary results from the September 1999 groundfish survey of the Southern Gulf of St. Lawrence/Résultats préliminaires du relevé de septembre 1999 sur les poissons de fond dans le sud du golfe du Saint-Laurent. DFO Can. Stock Assess. Sec. Res. Doc. 99/162.

White Hake (Div. 4T)

Background

White hake (Urophycis tenuis) are found from southern Labrador and the Grand Bank southward to North Carolina. This species is exploited throughout its geographical range by directed, seasonal fisheries. The most important catches have been taken in the southern Gulf of St. Lawrence (NAFO Division 4T). Temperatures of 5 - 11°C seem to be favored, as well as soft bottoms. White hake are among the most fertile of the commercial groundfish species, with a single female producing several million eggs per spawn. In the southern Gulf, male and female white hake reach sexual maturity at different sizes (at about 41 cm and 44 cm respectively) and at ages of 2 to 5 years. Spawning commences in the southern Gulf in early June and peaks in the second half of the same month. The diet of white hake is dominated by other fish species (such as cod, herring and flatfish).

The fishery for white hake in NAFO Division 4T has historically been the third or fourth most important groundfish fishery in the southern Gulf, with annual landings averaging 5,675 t between 1960 and 1994. The hake fishery is carried out mainly by small inshore vessels and is strongly affected by weather and local market conditions. Both fixed and mobile gears are used in the hake fishery, which is concentrated in the Northumberland Strait, on the western end of P.E.I., and between P.E.I. and Cape Breton Island.

Stock structure has been a long-standing issue with this resource. The combined evidence from several studies indicates that there are at least two different stock components in NAFO Division 4T, one occupying shallow inshore areas in summer, principally the Northumberland Strait area (the 'Strait' component) and another occupying deep water along the Laurentian Channel in summer (the 'Channel' component). The extent of mixing between these two stock components is presently unknown and recent analyses indicate that the distribution of southern Gulf white hake extends outside of NAFO Division 4T in winter.

The most recent full assessment of this resource was conducted in 1998 (Hurlbut et al. 1998; SSR A3-12 (1998)). An update was conducted in 1999 (SSR A3-36 (1999)).

The Fishery

Landings and TAC's (tonnes)

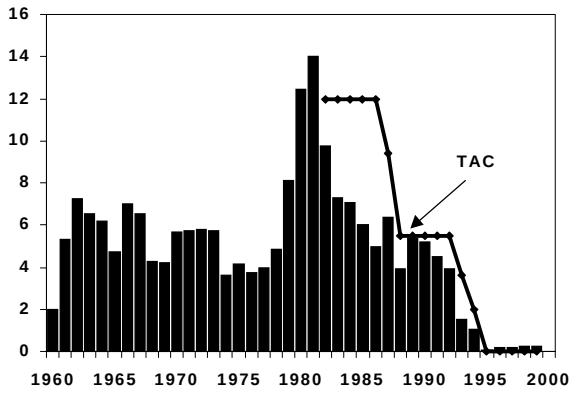
Year	1993	1994	1995	1996	1997	1998*	1999*
TAC	3,600	2,000	0**	0**	0**	0**	0**
Total	1,497	1,036	71	157	195	241	244

* Preliminary statistics
** Bycatch and sentinel survey only (Moratorium)

Aside from the sentinel survey, the NAFO 4T white hake fishery remained closed to directed fishing in 1999, as it has since 1995.

In 1999, 244 t were landed, of which 87 t were taken in the sentinel survey. The remainder was taken as bycatch in groundfish fisheries. The sentinel survey landings from 1996 to 1998 were 105t, 112t and 115t respectively. Detailed historical information on the NAFO 4T white hake fishery is available in Hurlbut et al. (1998).

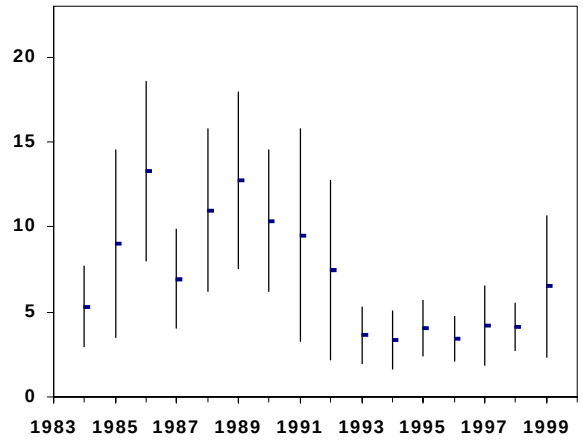
Landings and TAC's (000s tonnes)



Resource Status

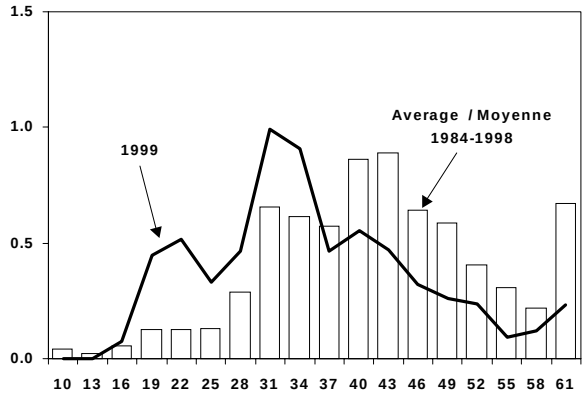
The survey abundance (mean number per tow) of all ages of white hake increased to the highest level observed since 1992 (6.5 in 1999 compared to 7.5 in 1992) but it remains below the historical average of 7.2 since 1984.

Survey mean number per tow



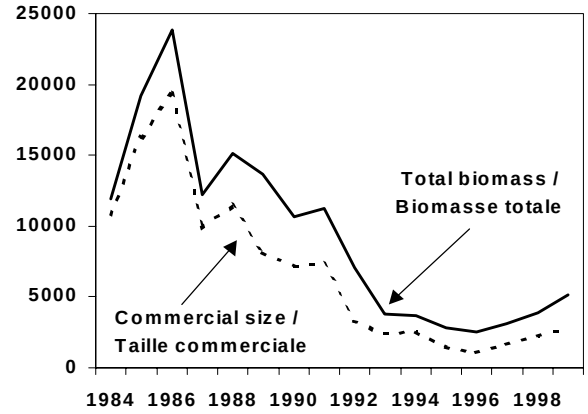
The higher catch rate in 1999 was largely due to the catch of small fish between 20 and 35 cm. The abundance of commercial-size fish (45 cm and larger) has increased marginally each year since 1996 but remains well below average.

Survey length frequency



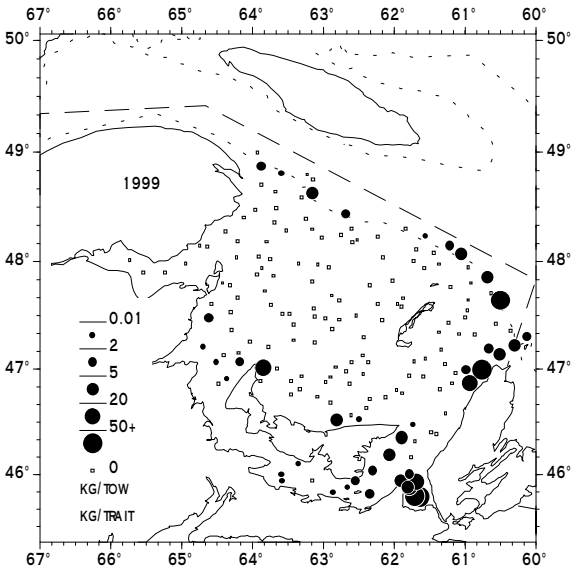
The survey trawlable biomass, which should not be interpreted as a measure of the absolute biomass but rather as another index of relative abundance, declined sharply from 1986 to 1993. The total biomass and the biomass of commercial-size fish (45 cm and larger) have gradually increased from historical lows in 1996 but remain at low levels.

Survey trawlable biomass (tonnes)



The **distribution of white hake** in the 1999 survey was similar to that of recent years, with the main areas of concentration occurring in St. George's Bay and the Cape Breton Trough. Concentrations were also present along the Laurentian Channel near 4Vn. Historically, hake were frequently encountered in the western regions of the southern Gulf, but they were again virtually absent from that area in 1999.

Catches of white hake (kg) in standard tows of the 1999 research survey.



Catch rates in the 1999 **sentinel survey** suggest that white hake continued to be most abundant in St. George's Bay and, to a lesser extent, off the coasts of northern and eastern

PEI and western Cape Breton. White hake were relatively rare in most other areas of the southern Gulf. The highest catch rates were again recorded by longliners in St. George's Bay, but they were lower than those observed from 1996 to 1998 for the months of August and September.

Outlook

Although abundance has increased it remains below average. The increase was mainly due to the abundance of small fish between 20 and 35 cm. The distribution of white hake continues to be concentrated in a small part of the range it occupied before the early 1990s. The abundance of hake between 20-35 cm has increased but the abundance of commercial-size animals remains low. Recovery of this stock to the levels of abundance observed in the late 1980s will only occur if all sources of fishing mortality (including the sentinel survey) are kept at a very low level.

For More Information

Contact: Tom Hurlbut
Fisheries and Oceans
Gulf Fisheries Centre
P.O. Box 5030
Moncton, N.B.
E1C 9B6

TEL: (506) 851-6216
FAX: (506) 851-2620
E-Mail: hurlbutt@mar.dfo-mpo.gc.ca

References

DFO. 1998. White Hake in the southern Gulf of St. Lawrence. DFO Science Stock Status Report A3-12 (1998).

DFO, 1999. Updates on selected Gulf of St. Lawrence Groundfish Stocks in 1999. DFO Sci. Stock Status Report A3-36 (1999).

Hurlbut, T., G. Poirier and G. Chouinard. 1998. The Status of White Hake (Urophycis tenuis Mitchill) in the southern Gulf of St. Lawrence (NAFO Division 4T) in 1997. DFO Can. Stock Assess. Sec. Res. Doc. 98/01.

Poirier, G.A., G.A. Chouinard, D.P. Swain, T. Hurlbut, C. LeBlanc and R. Morin. 1999. Preliminary results from the September 1999 groundfish survey of the Southern Gulf of St. Lawrence/Résultats préliminaires du relevé de septembre 1999 sur les poissons de fond dans le sud du golfe du Saint-Laurent. DFO Can. Stock Assess. Sec. Res. Doc. 99/162.

Witch Flounder (Divs. 4RST)

Background

Witch flounder are found in the deeper waters of the North Atlantic. In the Northwest Atlantic, witch range from the lower Labrador coast to Cape Hatteras, North Carolina. Relative to other flounders, witch are slow-growing and long-lived. Spawning occurs from spring to late summer, depending on the region, and in the Gulf of St. Lawrence (NAFO Division 4RST), spawners aggregate in channel waters in January and February. Spawning in the Gulf is believed to occur in deep water in late spring or early summer. The females are highly fertile, releasing as many as 500,000 eggs in a single spawn. In the late 1970s and early 1980s, 50% of females reached maturity at lengths of 40-45 cm (9-14 years of age) and 50% of males matured at lengths of 30-34 cm (5-8 years of age, Bowering and Brodie 1984). The fertilized eggs float and hatching occurs after several days, followed by a lengthy pelagic stage that may last a year. Juveniles eventually settle to the bottom in deep waters. In northern areas of their range, including the Gulf of St. Lawrence, witch flounder move into deep water during winter months and cease feeding. Witch grow faster in the Gulf of Maine and Georges Bank, where water temperature is higher and feeding occurs year-round.

Commercial fisheries for witch flounder developed significantly with the introduction of otter trawling to Newfoundland in the 1940s. Stocks in the Gulf of St. Lawrence became exploited in the 1950s when declining stocks caused Danish seiners in Fortune Bay, Newfoundland (NAFO Division 3Ps) to move to St. George's Bay in 4R. A small directed fishery for witch developed in St. George's Bay during the summertime, with offshore, winter catches of witch gaining in importance as bycatch in cod- and redfish-directed fisheries. The witch fishery expanded in the Gulf from St. George's Bay during the 1970s to the Esquiman Channel and the northern shores of Cape Breton Island.

Witch flounder in the northern Gulf of St. Lawrence (NAFO Division 4RS) came under quota management in 1977, with a precautionary quota of 3500 t. The first detailed assessment of 4RS witch was conducted in 1978 and continued yearly until 1981. During the 1980s, 4T landings increasingly dominated Gulf witch landings; however, the management unit remained as 4RS. In 1979, the TAC on 4RS was increased to 5000 t to remove an old and slow-growing component of the stock. This measure succeeded in reducing the age composition of the stock; however, landings declined and by 1982, the TAC was reduced to 3500 t. Stock assessments resumed in 1991 and following the recommendation of the Fisheries Resource Conservation Council in 1994, the management unit was extended to 4RST in 1995.

The most recent full assessment of this stock was conducted in January 1998 (SSR A3-20 (1998)). An update was conducted in winter 1999 (SSR A3-36 (1999)).

The Fishery

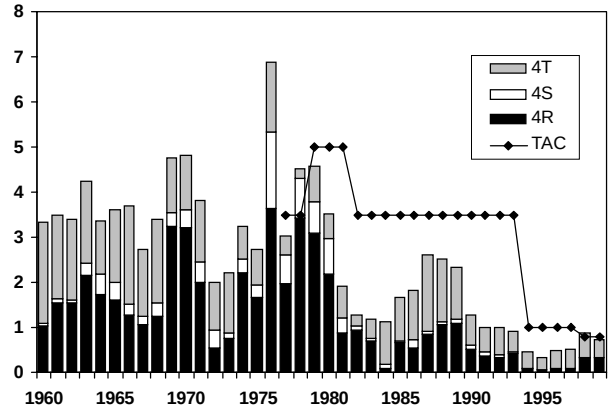
Landings and TAC's (tonnes)

Year	1993	1994	1995	1996	1997*	1998*	1999*
TAC	3500	1000	1000	1000	1000	800	800
TOTAL	897	445	327	498	528	865	731

* Preliminary statistics

Landings dropped to very low levels in 1994-1997, especially in 4R. Landings were higher in 1998 and 1999. Most of this recent increase occurred in 4R. Total landings in 1999 remained well below the 3000-3500 t range sustained throughout the 1960s, though landings were limited by catch quotas and fishery closures in 1999. Danish seiners fishing in 4R caught their entire 333t quota, and the <65' mobile fleet based in 4T had caught 98% of their 300 t quota when their fishery was closed on October 1.

Landings and TAC's (000s tonnes)

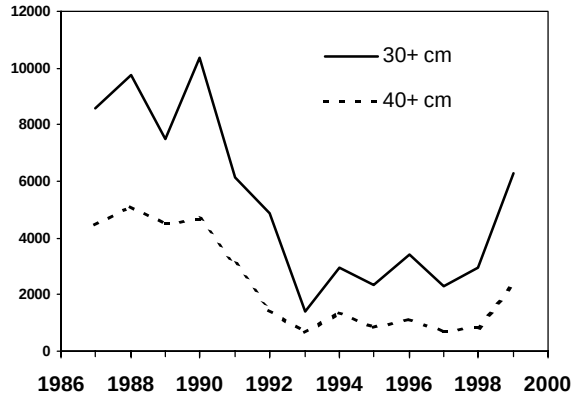


Resource Status

Abundance indices for witch flounder over the entire 4RST area are calculated by combining data from **research surveys** conducted in the southern Gulf each September and in the northern Gulf each August. Trawlable biomass in these surveys

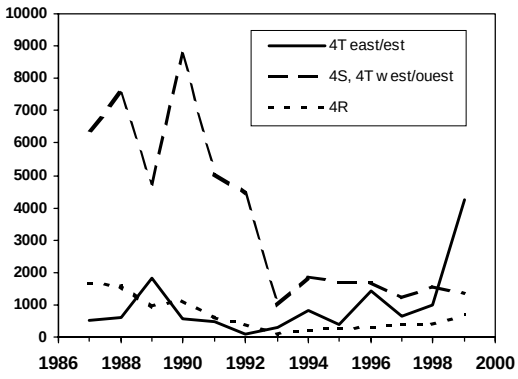
(the catch per tow expanded to the area surveyed) provides an index of relative abundance in the 4RST area. This index should reflect changes in witch flounder biomass over time but should not be taken as a measure of the actual biomass present in the area. A sharp decline in trawlable biomass occurred from 1990 to 1993. Biomass remained at a low but steady level from 1993 to 1998 but appeared to increase sharply in 1999.

Survey trawlable biomass (t)



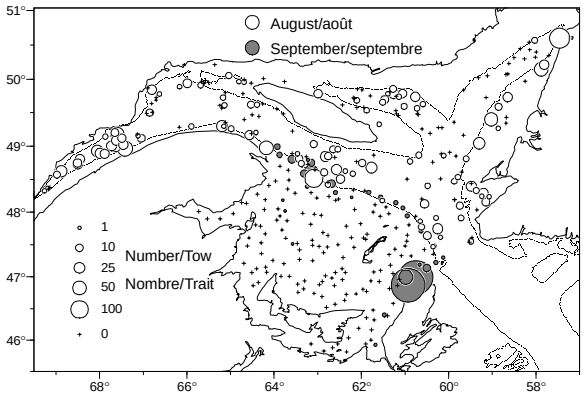
Changes in biomass have not occurred uniformly throughout the stock area. Biomass declined in 4R, 4S and western 4T but not in eastern 4T. In recent years, biomass has been relatively high in eastern 4T, but has remained very low in 4S and western 4T. The large increase in the biomass index in 1999 is confined to eastern 4T.

Survey trawlable biomass (t) (30+ cm)

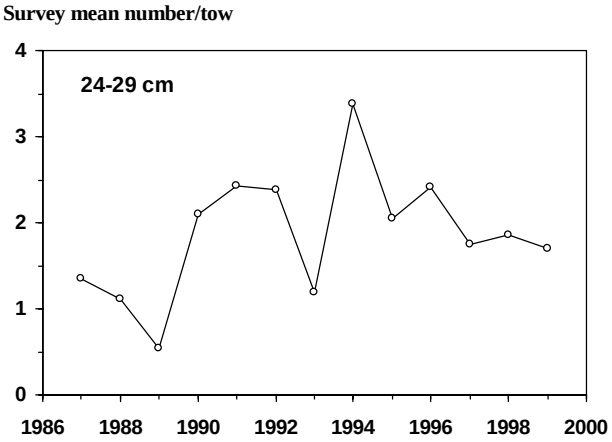


The increase in survey biomass in 1999 was due to very large catches at two sites in the Cape Breton Trough. Catch rates of witch flounder also tended to be moderately high to the northeast of the Gaspé Peninsula along the southern slope of the Laurentian Channel, in the estuary of the St. Lawrence River, and along the eastern slope of the Esquiman Channel. Witch flounder were widely dispersed throughout the relatively deep waters of the northern Gulf but were rare on the Magdalen Shallows.

Catches of witch flounder in standard tows of the 1999 research surveys.



Abundance of pre-recruit witch flounder (24-29 cm in length) in 1999 was similar to the 1998 level. **Recruitment** has remained fairly constant throughout the 1990s (except for fluctuations in 1993 and 1994), and has tended to be higher than in the late 1980s. However, the time series of pre-recruit abundance is short, and it is unknown how recent values compare to the longterm average. Recruitment has been high on the Scotian Shelf in recent years (DFO, 1999a), perhaps contributing to the increase in abundance of larger witch flounder in the Cape Breton Trough. This possibility highlights the need for a better understanding of the **stock structure** of witch flounder in the Gulf of St. Lawrence and its approaches.



Outlook

The biomass of witch flounder in Divs. 4RST appeared to increase sharply in 1999 from its recent low levels. This increase was largely confined to the Cape Breton Trough area in eastern 4T. The increase was due to very high catches in survey tows at two sites in this area. Future surveys will indicate whether this sharp increase in estimated biomass is anomalous or reflects a true increase in population biomass.

Pre-recruit abundance has been high on the Scotian Shelf (Divs. 4VWX) in recent years, and these fish may now be recruiting to the Cape Breton Trough area, accounting for the apparent increase in biomass of commercial-size fish in this area in 1999. A better understanding of witch flounder stock structure is needed to predict whether biomass will remain high in the Cape Breton Trough, and whether the recent increases in this area will spread to other areas of the Gulf.

Given the uncertainties in stock status and stock structure, it would be prudent to ensure that landings in 2000 do not exceed the current levels.

For More Information

Contact: Douglas Swain
Marine Fish Division
Gulf Fisheries Centre
P.O. Box 5030, Moncton
New Brunswick, E1C 9B6

TEL: (506) 851 6237
FAX: (506) 851 2620
E-Mail: swaind@mar.dfo-mpo.gc.ca

References

Bowering, W.R., and W.B. Brodie. 1984. Distribution of witch flounder in the northern Gulf of St. Lawrence and changes in its growth and maturity patterns. North Am. J. Fish. Manag. 4: 399-413.

DFO, 1998. 4RST witch flounder (*Glyptocephalus cynoglossus*). DFO Science Stock Status Report A3-20 (1998).

DFO, 1999a. Updates on selected Scotian Shelf groundfish stocks in 1999. DFO Sci. Stock Status Report A3-35 (1999).

DFO, 1999b. Updates on selected Gulf of St. Lawrence Groundfish Stocks in 1999. DFO Sci. Stock Status Report A3-36 (1999).

Poirier, G.A., G.A. Chouinard, D.P. Swain, T. Hurlbut, C. LeBlanc, and R. Morin. 1999. Preliminary results from the September 1999 groundfish survey of the Southern Gulf of St. Lawrence/Résultats préliminaires du relevé de septembre 1999 sur les poissons de fond dans le sud du golfe du Saint-Laurent. DFO Can. Stock Assess. Sec. Res. Doc. 99/162.

Swain, D.P., G.A. Poirier, and R. Morin. 1998. Status of witch flounder in NAFO Divisions 4RST, January 1998. DFO Can. Stock Assess. Sec. Res. Doc. 98/04.

Winter Flounder (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.

The most recent assessment of this stock was conducted in spring 1999 (SSR A3-22 (1999)).

The Fishery

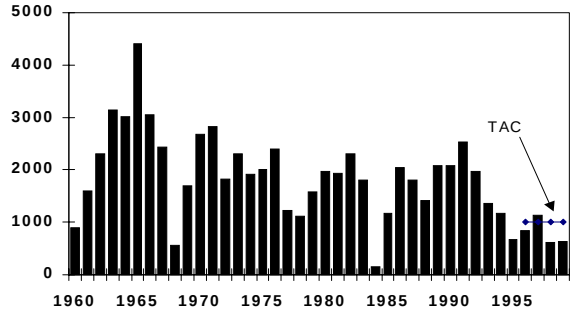
Landings and TAC's (tonnes)

Year	1993	1994	1995	1996	1997	1998*	1999*
TAC				1000	1000	1000	1000
Total	1358	1180	662	835	1129	621	627

* Preliminary statistics

Winter flounder **landings** declined sharply after 1997. An index fishery for cod was initiated in 1998, followed in 1999 by a limited commercial cod fishery. In addition, St. Georges Bay, an important area for the fishery, was closed to winter flounder through much of 1998 and 1999. In the 1990s, otter trawls have caught 50-60% of the annual landings, with most of the remainder caught by gillnets. Most of the respondents in a telephone survey felt that winter flounder were more abundant in 1999 than in 1998.

Landings and TAC's (tonnes)



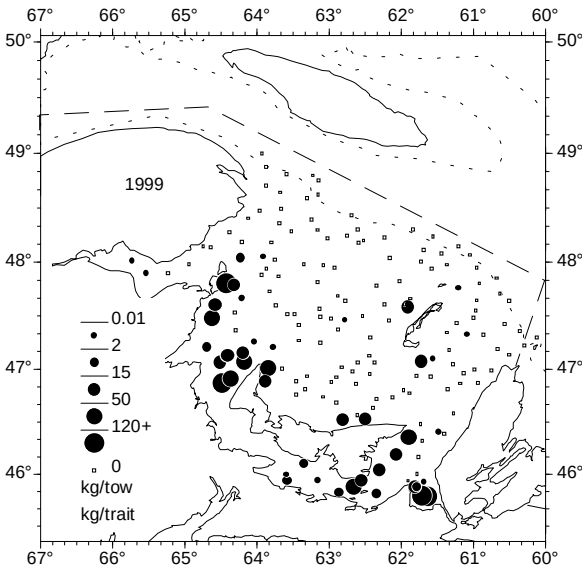
In the past, winter flounder landings have varied widely from year to year due to a number of factors. Winter flounder were widely used as bait, resulting in unreported catches, and they were frequently misreported as unspecified flounder or other species. Lastly, mesh sizes in the fishery have increased considerably since 1960, probably affecting the amounts landed. Several measures have been taken to improve landing statistics for winter flounder in recent years through improved identification of the species caught and the

introduction of logbooks for fixed gear in 1998.

Resource Status

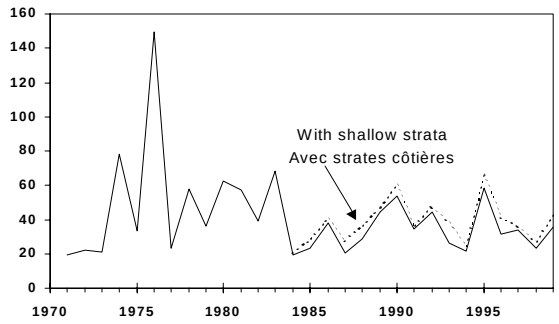
Winter flounder has a coastal distribution in the southern Gulf, as seen in **DFO research surveys.**

Catches of winter flounder (kg) in standard tows of the 1999 research survey.



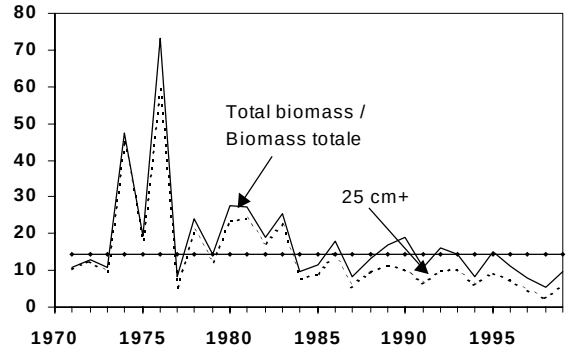
The research survey in 1999 averaged 36 winter flounder per tow. This value is somewhat higher than the low value observed in 1998, but still below the long-term average of 42 per tow. Beginning in 1984, three shallow-water strata were added to the survey. Including the shallow-water strata, the trend in abundance is similar to that without these strata.

Survey abundance (mean number per tow).



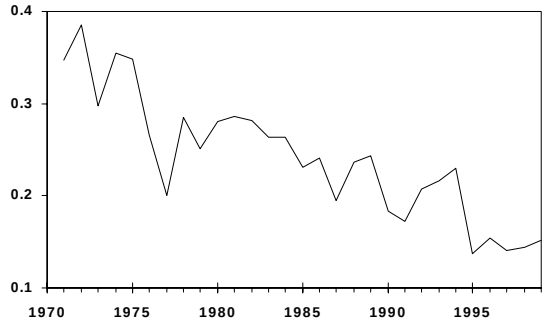
The survey trawlable biomass, based on the research survey and unadjusted for catchability, was approximately 10,000 tonnes in 1999, of which commercial-size winter flounder (minimum 25 cm) contributed 6,300 tonnes. This index should reflect changes in winter flounder biomass over time but should not be taken as a measure of the actual biomass present in the area. Trends in survey biomass suggest that the stock, for the whole of 4T, is presently below the average abundance for the past three decades.

Survey trawlable biomass for total stock, winter flounder of commercial-size (25 cm+), and mean of 1971-1999 ('000 tonnes).



The survey data indicate that winter flounder have become smaller in size and weight since 1971. The same pattern has not been observed in samples of commercial catches since 1983.

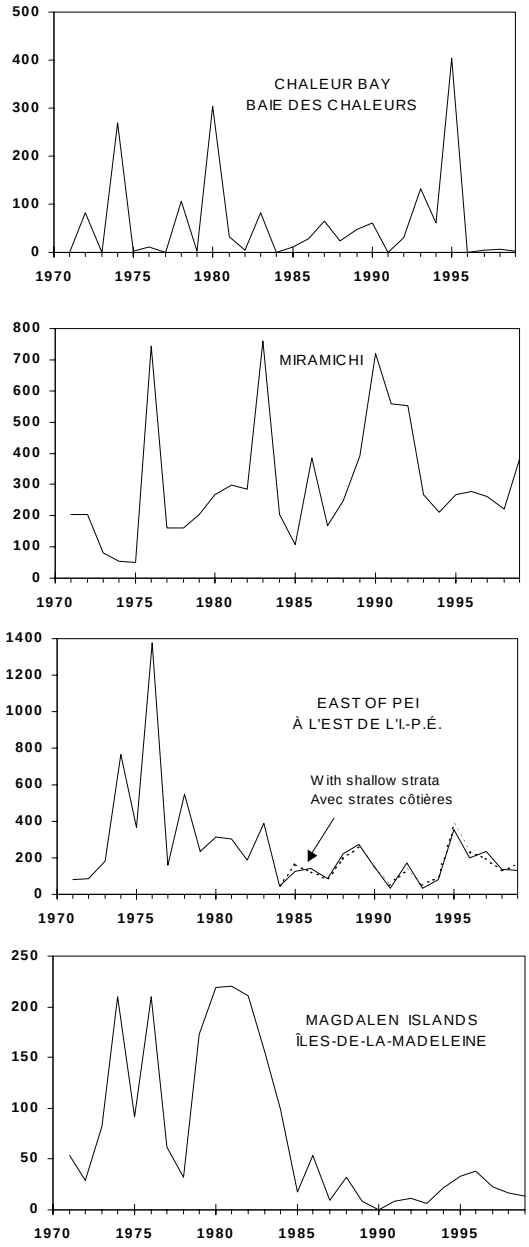
Mean weight (kg) of winter flounder in research surveys.



The annual research survey of 4T does not sample in shallow coastal waters where young winter flounder are found. Typically, the survey does not signal incoming recruitment, nor does it track size modes that indicate year-class strength.

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 research survey have varied among areas of 4T, also suggesting that winter flounder in 4T may comprise several stock units. In Chaleur Bay, catches have varied widely, rising to an average of 404 per tow in 1995, but averaging fewer than 10 per tow since 1996. Similar abrupt increases in the index occurred in 1974 and 1980. In the Miramichi area, catch rates were relatively low in the early 1970s with exceptional catches in 1976, 1983, and in the 1990-1992 period. 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 declined to relatively low levels in recent years. 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 since then.

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



Outlook

Survey data indicate that winter flounder biomass in 4T has declined to below the average for the past 29 years. The survey also indicates a declining trend in the size composition of winter flounder. This view contrasts with that of active fishers, who in

interviews over the past five years say that the abundance of the resource is increasing.

Several stock units of winter flounder probably occur in 4T and their abundance appears to vary differently over time. Since 1998, the FRCC has recommended that DFO Science, managers and industry work together to implement local management measures for this resource. The most recent assessment of 4T winter flounder identified the need for improved data on local trends in abundance, recruitment and the biological information necessary to identify stock units. Some progress was made in 1999 through development of an inshore trawling survey on the Magdalen Islands in collaboration with the local industry. In addition, approximately 1500 winter flounder were tagged and released from two sites in the southeastern Gulf in October and November 1999. Such initiatives should improve the information base required to improve the management of winter flounder in 4T.

The survey does not cover the full range of the distribution of the resource and the mean numbers in the different inshore areas are highly variable. Nevertheless, the stock biomass in the aggregate has declined. Thus, there should be no increase in fishing effort.

For More Information

Contact: Roderick Morin
Marine Fish Division
Gulf Fisheries Centre
P.O. Box 5030, Moncton
New Brunswick, E1C 9B6

TEL: (506) 851-2073
FAX: (506) 851-2620
E-Mail: morinr@mar.dfo-mpo.gc.ca

References

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

Morin, R., I. Forest, and G.A. Poirier. 1999. Assessment of NAFO Division 4T winter flounder / Évaluation de la plie rouge de la division 4T de l'OPANO. DFO Can. Stock Assess. Sec. Res. Doc. 99/47.

Poirier, G.A., G.A. Chouinard, D.P. Swain, T. Hurlbut, C. LeBlanc, and R. Morin. 1999. Preliminary results from the September 1999 groundfish survey of the Southern Gulf of St. Lawrence / Résultats préliminaires du relevé de septembre 1999 sur les poissons de fond dans le sud du golfe du Saint-Laurent. DFO Can. Stock Assess. Sec. Res. Doc. 99/162.

Yellowtail Flounder (Div. 4T)

Background

Yellowtail range from Labrador to Chesapeake Bay. In the southern Gulf of St. Lawrence (NAFO Division 4T), yellowtail flounder are most prevalent around the Magdalen Islands, and in the southern parts of 4T, including Chaleur Bay, the Shediac Valley-Miramichi area, Northumberland Strait, and St. George's Bay. They are associated with sand or sand and mud bottoms usually at depths of 37-91 m and temperatures between two and six degrees Celsius. Throughout their range, they migrate seasonally into shallower waters in the spring and back to deeper waters in the winter. Spawning occurs on or near the bottom in spring or early summer. Female yellowtail deposit large numbers of small eggs that float to the surface once fertilized. Growth rates vary widely between regions, and there is little information on the biology of yellowtail flounder in 4T. The small mouth of yellowtail flounder restricts its choice of food to polychaete worms, amphipods, and other small crustaceans such as shrimp. They feed in lesser quantities on fish such as sand lance.

The 4T yellowtail flounder resource supports localized bait fisheries. Yellowtail is also a bycatch in fisheries for cod, white hake, American plaice and winter flounder. The fishery in 4T is prosecuted mainly by mobile gear operated by vessels less than 45 feet around the Magdalen Islands, off the northeast coast of New Brunswick, and the north coast of Prince Edward Island.

A quota was imposed on yellowtail flounder in 4T for the first time in 1998.

The most recent full assessment of this resource was conducted in 1999 (Poirier and Morin, 1999; SSR A3-16 (1999)).

The Fishery

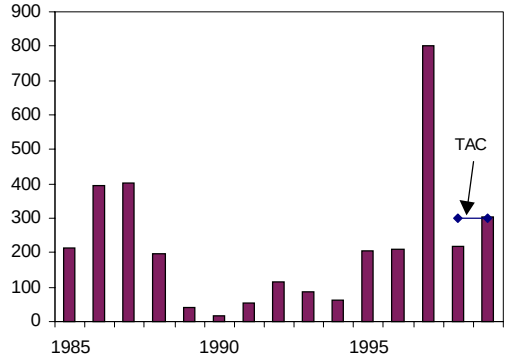
Landings and TAC's (tonnes)

Year	1993	1994	1995	1996	1997	1998*	1999*
TAC						300**	300**
Total	87	61	204	210	819	213	306

* Preliminary statistics
** For yellowtail landed on the Magdalen Islands

Landings of yellowtail flounder increased in 1999 from 1998. Most yellowtail are landed on the Magdalen Islands (over 90% since 1996), and seines and otter trawls continue to be the dominant gears in the 4T fishery.

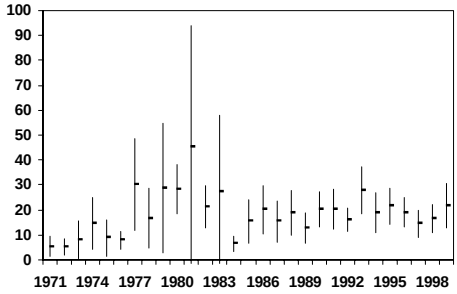
Landings and TAC's (tonnes)



Resource Status

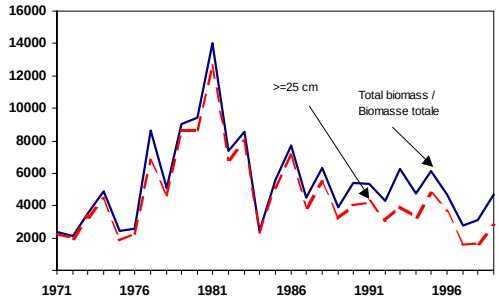
The abundance of yellowtail (mean number per tow) in the research surveys has been at a fairly stable level of about 19 fish/tow since 1985, with small increases from 1997 to 1999.

Survey mean number of yellowtail per tow

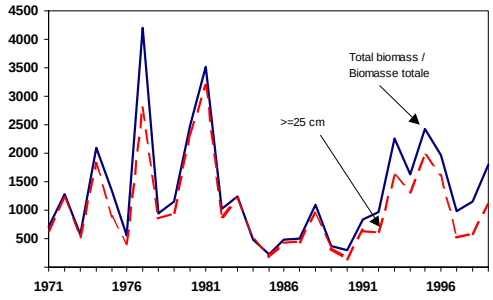


The survey trawlable biomass for the 4T area increased in the late 1970s to relatively high levels, decreased in the early 1980s, and has remained fairly stable since the mid-1980s. The trawlable biomass of yellowtail in the Magdalen Islands area increased from fairly low levels in the late 1980s to relatively high levels since the early 1990s. Survey trawlable biomass should reflect changes in yellowtail biomass over time but should not be taken as a measure of actual biomass present in the area.

4T survey trawlable biomass (tonnes)

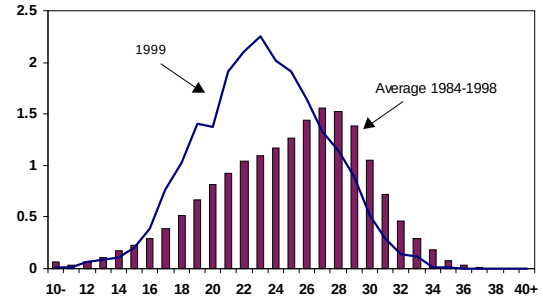


Magdalen Islands survey trawlable biomass (tonnes)



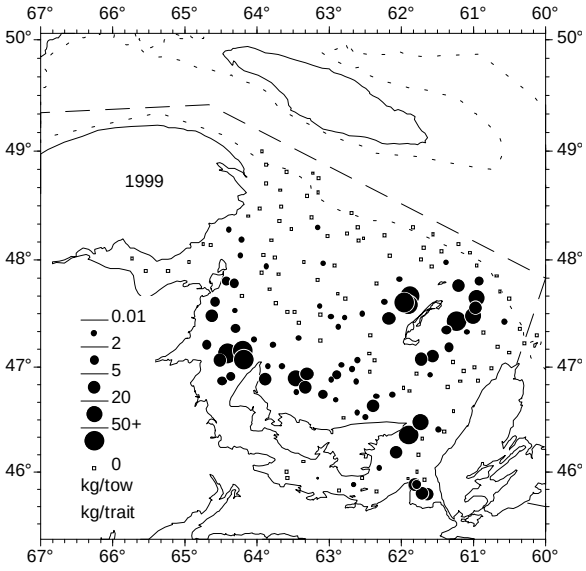
The length frequency of yellowtail caught in the survey continues to contain proportionally fewer large (>25 cm) fish than previously. The modal length in 1999 was 23 cm, compared to the 1984-1998 average modal length of 27 cm. This is the third year in a row with a modal length less than 24 cm.

Survey length frequency (numbers per tow)



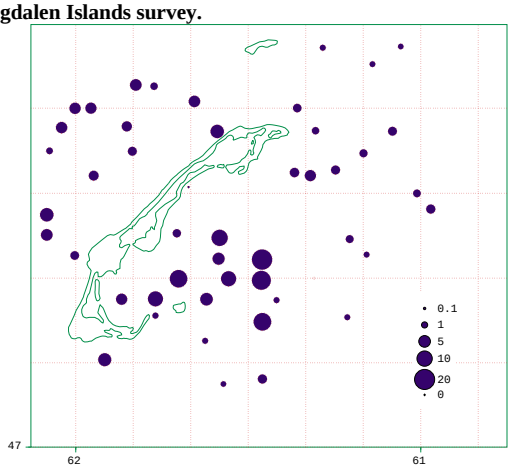
The **distribution of 4T yellowtail flounder** in the 1999 survey was very similar to that of recent years, with concentrations around the Magdalen Islands and off the eastern and western coasts of Prince Edward Island.

Catches of yellowtail flounder (kg) in standard tows of the 1999 research survey.



The DFO groundfish survey does not survey shallow water close to shore, therefore does not cover the entire distribution of yellowtail flounder. To develop indices of abundance and recruitment for yellowtail near the Magdalen Islands, the inshore area surrounding the Magdalen Islands was surveyed in July-August, 1999, as a result of a joint DFO-industry collaboration. Yellowtail were present in all but two of the sets, but the length frequency of the catches was similar to that of the September groundfish survey, with very few fish less than 15 cm.

Catches of yellowtail flounder (kg) in standard tows of the 1999 Magdalen Islands survey.



Outlook

From 1985 to 1996, abundance of 4T yellowtail was stable with landings of up to approximately 200 tonnes in the mid 1990s. Since an increased effort and harvest of over 800 tonnes from the area surrounding the Magdalen Islands in 1997, the length frequency distribution of yellowtail caught in the survey shows smaller proportions of commercial-size fish (>=25 cm). The abundance index from the 4T groundfish research survey has increased, somewhat, each year from 1997 to 1999. It would not be prudent to increase the current fishing effort or TAC.

For More Information

Contact: Gloria Poirier
Marine Fish Division
Gulf Fisheries Centre
P.O. Box 5030, Moncton
New Brunswick, E1C 9B6

TEL: (506) 851-2035
FAX: (506) 851-2620
E-mail: poirierg@mar.dfo-mpo.gc.ca

References

DFO, 1999. Yellowtail flounder in the southern Gulf of St. Lawrence. DFO Science Stock Status Report A3-16 (1999).

Poirier, G.A., G.A. Chouinard, D.P. Swain, T. Hurlbut, C. LeBlanc, and R. Morin. 1999. Preliminary results from the September 1999 groundfish survey of the Southern Gulf of St. Lawrence / Résultats préliminaires du relevé de septembre 1999 sur les poissons de fond dans le sud du golfe du Saint-Laurent. DFO Can. Stock Assess. Sec. Res. Doc. 99/162.

Poirier G.A, R Morin. 1999. The Status of Yellowtail Flounder in NAFO Division 4T in 1998 / État de la limande à queue jaune dans la division 4T de l'OPANO en 1998. DFO Can. Stock Assess. Sec. Res. Doc. 99/046.

This report is available from the:

Maritime Provinces
Regional Advisory Process
Department of Fisheries and Oceans
P.O. Box 1006, Stn. B203
Dartmouth, Nova Scotia
Canada B2Y 4A2
Phone number: 902-426-7070
e-mail address: myrav@mar.dfo-mpo.gc.ca

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, 2000. Updates on Selected Gulf of St. Lawrence Groundfish Stocks in 2000. DFO Sci. Stock Status Rep. A3-36 (2000).