

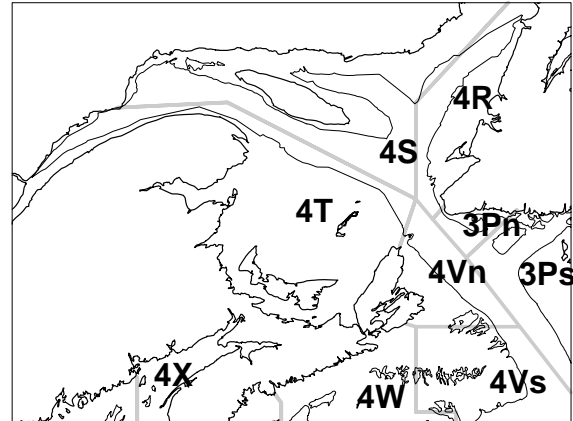
## 4RST Witch flounder (*Glyptocephalus cynoglossus*)

### 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.



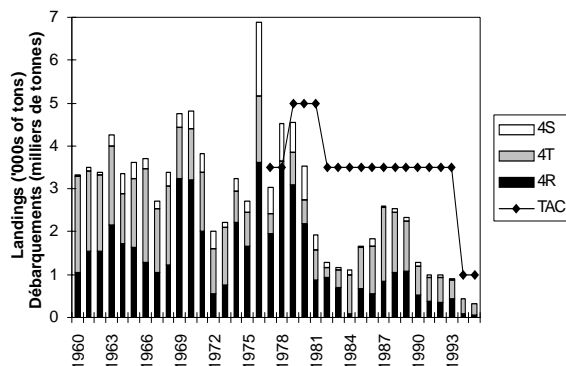
### The Fishery

**Management:** The quota for 4RST witch flounder was 1000 t in 1995. The fishery was concentrated in 4T during 1995. The minimum mesh size for all mobile gear fishing flatfish, other than winter flounder, was 145-mm square mesh in codends. Many fishers in 4T reported using larger mesh sizes, including 160 and 165 mm. The minimum size limit for witch flounder remained at 30 cm and the fishery was closed temporarily when more than 20% of witch catches were less than the minimum size. There were no fishery closures in 1995 caused by excessive catches of small witch flounder. Fishery closures were also imposed when bycatches of cod or white hake exceeded 10% of the total weight of the catch. Most of the 14 closures affecting flatfish fisheries in 1995 were caused by excessive bycatch of cod. The opening of the witch fishery was delayed by cod bycatches and the fishery was closed on November 1.

### Landings:

4RST witch flounder - landings in thousands of tons.

	71-80	81-91	92	93	94	95
Year	Avg.	Avg.				
TAC	4	4	4	4	4	1
Total	4	2	1	1	0.4	0.3



### Annual landings of 4RST witch flounder.

Landings of witch flounder totaled 320 t in 1995, their lowest level since 1960. All gear sectors reported witch landings that were well below their allocated quotas. Landings declined in all regions of the Gulf in recent years, especially off southwestern Newfoundland. Landings were concentrated in 4T in 1995 (263 t), particularly in the eastern Gulf. Witch landings in 4R declined to 54 t and in 4S only 2 t were landed. Seines have been the dominant gear landing witch flounder since 1981.

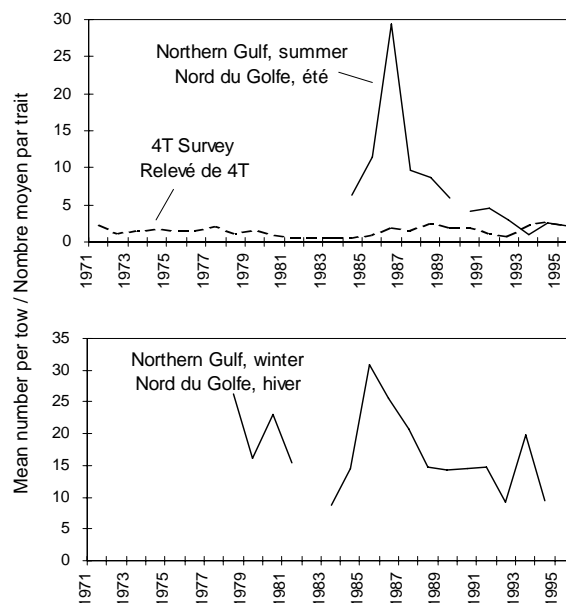
Nominal effort in the 4RST witch flounder fishery, determined from vessel logbooks, has declined in recent years. The number of fishing days of seiners, the most active gear component directing for witch flounder in 4R and 4T, declined from over 500 days in 1992 to approximately 220 days in 1995. Since 1993, the nominal effort by seiners directing for witch in 4T has varied between 180 and 260 fishing days.

**Biological data:** Since assessments of 4RST witch resumed in 1991, age determination has not been undertaken. Port sampling of commercial catches for the age-length composition has been conducted since the early 1960s; however, intensive sampling began in 1976 and coverage has been limited in several years since then.

### Resource status

**Inputs:** Stock status evaluation was based on trends in landed catches and nominal effort, combined with abundance trends in research surveys of 4RST. Research surveys of groundfish stocks in 4T have been conducted every September since 1971. The northern Gulf (4RS) has been covered in separate surveys, conducted every August since 1984. Surveys of 4RS were also conducted every January from 1976 to 1994.

**Surveys:** Research surveys of the northern Gulf conducted yearly in August have undergone changes to the vessel and sampling gear. Abundance indices since 1990 are not comparable to previous data and have been shown to differ from catches in the southern Gulf survey in the size composition and weight of witch flounder catches. Analyses are underway to determine ways to correct for these differences so that a combined index of witch abundance in 4RST may be presented in future assessments.



### Abundance indices for components of 4RST witch flounder, based on research surveys.

In 1995, the average catch of 4T witch flounder was 2 per standard tow, a slight decline from the number in 1994, but above the long-term average. In the summer survey of the northern Gulf, which includes 4R, 4S and the 4T Laurentian Channel, the abundance index also declined slightly in 1995. The catch rates of witch flounder in all three surveys indicate increasing abundance of witch during the mid- to late-1980s. Following peaks in abundance during the late 1980s, catch rates declined in the northern Gulf surveys. In the southern Gulf, catch rates declined following a maximum in 1988; since 1993, catch rates have recovered to levels near the long-term maximum. During years when the same research vessel and trawling gear were used in surveys of the northern and southern Gulf, witch appeared to be more widely distributed in the northern Gulf (Morin and Hurlbut 1994). The resource appears to be at low levels, particularly in the northern Gulf where most of the witch biomass is concentrated.

**Outlook:** Forecasts of the abundance of 4RST witch flounder are not currently possible. Catch rates from research surveys indicate that abundance declined in the late 1980s and early 1990s. While this was followed by an increase in the southern Gulf (4T), abundance remained low in the northern Gulf area. Landings of 4RST witch flounder have declined in all sectors since 1993, particularly in 4R. This decline has been accompanied by lower fishing effort by seines, the main gear sector landing 4RST witch flounder. The TAC has been maintained at a high level and has never restricted catch and effort. The observed trend in the abundance of the resource may require additional reductions in fishing effort.

### ***For more information***

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### ***References***

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