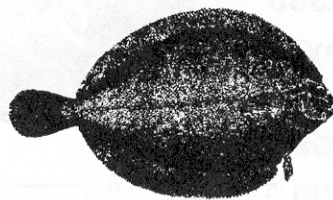


Witch Flounder

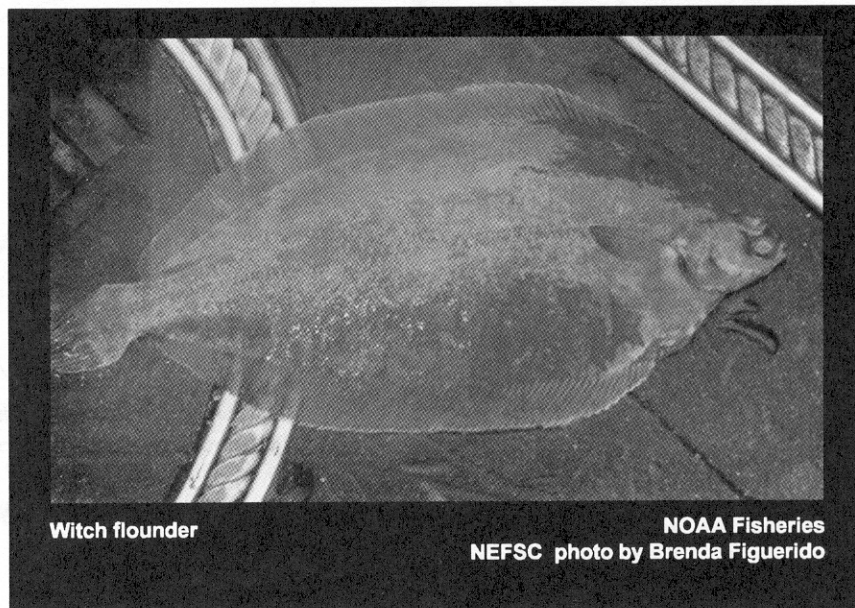


by S. Wigley

The witch flounder or gray sole, *Glyptocephalus cynoglossus*, is common throughout the Gulf of Maine and also occurs in deeper areas on Georges Bank and along the shelf edge as far south as Cape Hatteras. Research vessel survey data suggest that the Gulf of Maine-Georges Bank population may be relatively discrete from populations in other areas. Witch flounder appear to be sedentary, preferring moderately deep areas; few fish are taken shallower than 27 m (15 fathoms) and most are caught between 110 and 275 m (60 and 150 fathoms). Spawning occurs in late spring and summer. Witch flounder attain lengths up to 78 cm (31 in.) and weights of approximately 2 kg (4.5 lb).

The principal fishing gear used to catch witch flounder is the otter trawl. Recreational catches are insignificant. The U.S. fishery is managed under the New England Fishery Management Council's Multispecies Fishery Management Plan. Management measures include a moratorium on permits, days-at-sea restrictions, time/area closures, gear restrictions, and minimum size limits.

Historically, significant proportions of the U.S. nominal catch have been taken both on Georges Bank and in the Gulf of Maine; but in recent years most of the U.S. catch has come from the Gulf of Maine area. Canadian landings from both areas have been minor (never more than 68 mt annually). Distant-water fleet catches averaged 2,700 mt in 1971-1972, but subsequently declined sharply and have been negligible since 1976. Total landings peaked at over 6,000 mt in 1971, declined to an annual average of 2,800 mt during 1973-1981, and then increased sharply to 6,500 mt in 1984. Landings then declined steadily



Witch flounder

NOAA Fisheries
NEFSC photo by Brenda Figuerido

to only 1,500 mt in 1990, the lowest value since 1964. Landings for 1991-1996 averaged 2,300 mt annually. Total landings in 1996 were 2,100 mt, a decrease of 6% from 1995 (2,200 mt).

The NEFSC autumn bottom trawl survey index declined from an average of 3.6 kg per tow in 1966-1970 to 0.9 kg per tow in 1976 following heavy exploitation by distant-water fleets. The index increased in 1977-78 but then declined steadily to the lowest level on record. The 1996 value of 1.0 kg per tow represents an increase over the record low 1992 value of 0.2 kg per tow; however, witch flounder biomass remains at a low level.

Prior to the 1980s, witch flounder was primarily a by-catch species. In the early 1980s, U.S. commercial LPUE (landings per unit effort for all trips landing witch flounder) indices increased and peaked in 1983 as effort became more directed towards witch flounder. As abundance declined, catch rates declined to at or near record lows in the early 1990s.

Between 1982 and 1993, 8.7 million witch flounder were discarded in the northern shrimp fishery and large-mesh otter trawl fisheries. Discards in the northern shrimp fishery consist primarily of ages 1-4 witch flounder, while discards in the large mesh otter trawl fishery are largely comprised of fish age 3 and older. Almost all age 6 and older fish are landed.

Virtual population analyses indicate that fishing mortality on fully-recruited ages (7 to 9+) increased from $F=0.19$ in 1982 to $F=0.55$ in 1985, declined to 0.24 in 1990 and 1991 and increased to 0.45 (34% exploitation rate) in 1993, above the overfishing reference level of $F_{20\%} = 0.39$ (30% exploitation rate).

Since the mid-1980s, the age structure of the stock has become severely truncated. The NEFSC 1980 autumn survey indicated that 34% of the witch flounder population was age 11 or older; for 1984, this figure had declined to 14%, and by 1995, less than 1% of the population was 11 years or older. This trend is also

“The NEFSC 1980 autumn survey indicated that 34% of the witch flounder population was age 11 or older...by 1995, less than 1% of the population was 11 years or older.”

reflected in the commercial landings; 16% of witch flounder in 1984 landings were age 11 or older, while by 1993, this figure had dropped to 8 percent.

Spawning stock biomass (SSB) declined sharply from 26,000 mt in 1982 to about 6,300 mt in 1990 and subsequently fluctuated at about 7,000 mt through 1993. Due to continued growth and maturation of the strong 1990 year class, SSB is expected to increase in the short term, but will thereafter decline unless fishing mortality is reduced. The stock is overexploited and at a low biomass level.

For further information

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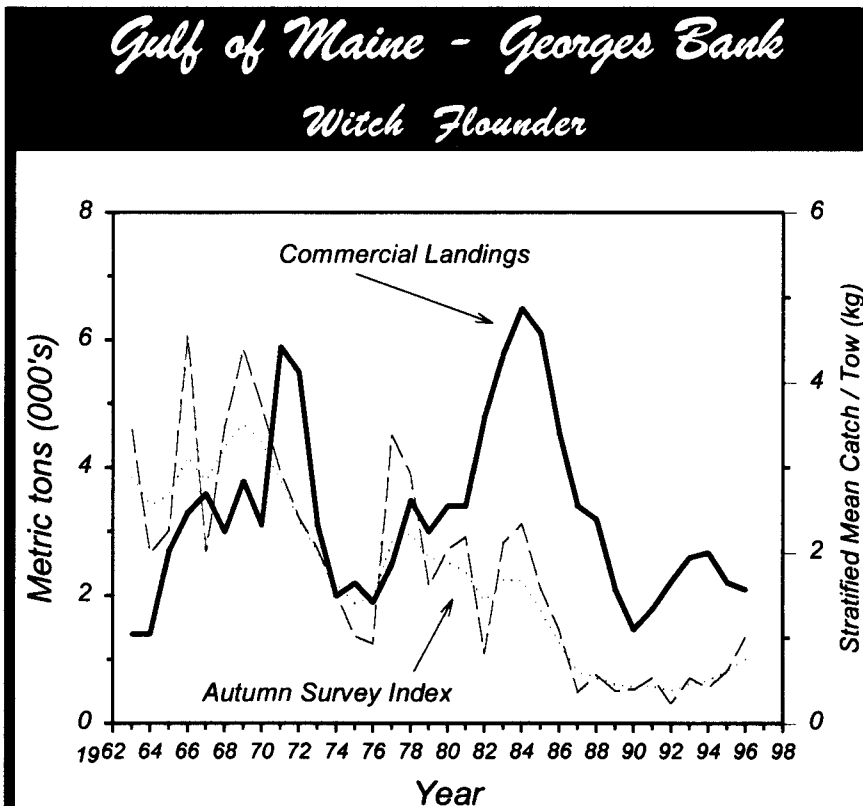


Table 10.1 Recreational and commercial landings (thousand metric tons)

| Category | Year | | | | | | | | | | | |
|---------------------|-----------------|------|------|------|------|------|------|------|------|------|------|--|
| | 1977-86 Average | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | |
| U.S. recreational | - | - | - | - | - | - | - | - | - | - | - | |
| Commercial | | | | | | | | | | | | |
| United States | 4.4 | 3.5 | 3.2 | 2.1 | 1.5 | 1.8 | 2.2 | 2.6 | 2.7 | 2.2 | 2.1 | |
| Canada | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | |
| Other | <0.1 | - | - | - | - | - | - | - | - | - | - | |
| Total nominal catch | 4.4 | 3.5 | 3.2 | 2.1 | 1.5 | 1.8 | 2.2 | 2.6 | 2.7 | 2.2 | 2.1 | |

Summary Status

| | | |
|--|---|--|
| Long-term potential catch | = | <3,000 mt |
| SSB for long-term potential catch | = | Unknown |
| Importance of recreational fishery | = | Insignificant |
| Management | = | Multispecies FMP |
| Status of exploitation | = | Overexploited |
| Age at 50% maturity | = | 3.6 years, males 4.4 years, females |
| Size at 50% maturity | = | 25.3 cm (10 in.), males 30.4 cm (12 in.), females |
| Assessment level | = | Age structured |
| Overfishing definition | = | 20% MSP |
| Fishing mortality rate corresponding to overfishing definition | = | F _{20%} = 0.39 |
| M = 0.15 | | F_{0.1} = 0.15 |
| | | F_{max} = 0.27 |
| | | F_{19%} = Unknown |