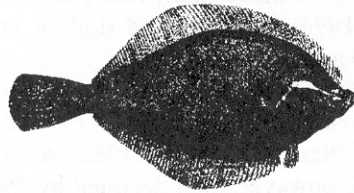


# Yellowtail Flounder



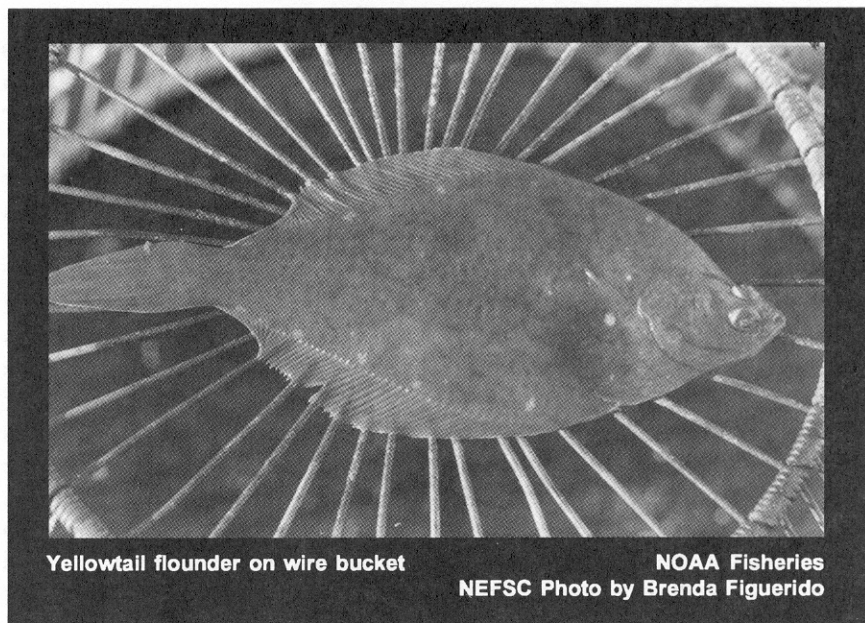
by W. Overholtz  
S.X. Cadrin

Yellowtail flounder, *Limanda ferruginea*, range from Labrador to Chesapeake Bay. Off the U.S. coast, commercially important concentrations are found on Georges Bank, off Cape Cod, and off Southern New England, generally at depths between 40 and 70 m (20 to 40 fathoms). Some yellowtail are also taken in the New York Bight and in the Gulf of Maine. Yellowtail grow to 55 cm (22 in.) total length and attain weights of 1.0 kg (2.2 lb), but high rates of fishing mortality have greatly reduced average size and age. Yellowtail appear to be relatively sedentary, although seasonal movements have been documented. Spawning occurs during spring and summer, peaking in May. Larvae drift for a month or more, then develop demersal form and settle to the bottom.

Historical tagging data, larval distributions, geographical patterns of landings and bottom trawl survey data indicate relatively discrete stocks off Southern New England, on Georges Bank, off Cape Cod and in the Middle Atlantic. Intermingling among these groups is probably very limited but has not been quantified.

The principal fishing gear used to catch yellowtail flounder is the otter trawl. Total landings of yellowtail flounder by the U.S. in 1996 were 2,300 mt. These landings were 14% of the 1977-1986 average and 7% of the 1969 historical maximum. An additional 500 mt was taken by Canada on Georges Bank. Recreational landings are negligible.

The U.S. fishery is managed under the New England Fishery Management Council's Multispecies Fishery Management Plan (FMP). Under this FMP yellowtail are included in a



Yellowtail flounder on wire bucket

NOAA Fisheries  
NEFSC Photo by Brenda Figuerido

complex of 10 groundfish species which have been managed by time/area closures, gear restrictions, minimum size limits, and, since 1994, direct effort controls including a moratorium on permits and days-at-sea restrictions under Amendments 5 and 7. The ultimate goal of the management program is to reduce fishing mortality to levels which will allow stocks within the complex to rebuild to above minimum spawning biomass thresholds. The Canadian fishery on Georges Bank is managed under an individual quota system.

## Georges Bank

The Georges Bank yellowtail stock has been exploited since the late 1930s. Landings gradually increased to 7,300 mt in 1949, decreased to 1,600 mt in 1956, and subsequently increased again to an average of 13,600 mt during 1962-1976, some of which

was taken by distant water fleets. No yellowtail have been taken by distant water fleets since 1977. U.S. landings declined to approximately 6,000 mt between 1978 and 1981 and then rose to over 10,500 mt in 1982-1983 with strong recruitment and intense fishing effort. Landings then fell to a low of 1,100 mt in 1989, averaged 2,200 from 1990 to 1994 and dropped to 300 and 800 mt in 1995 and 1996, respectively. Canadian landings were negligible before 1989, but subsequently increased to 2,100 mt in 1994, exceeding the U.S. total for the first time. In 1995 and 1996, Canada set a total allowable catch (TAC) of 400 mt, and landings totalled under 500 mt.

Abundance indices from NEFSC spring and autumn bottom trawl surveys have declined at average rates of about 10% per year since 1963. Several large year classes have temporarily reversed the overall rate of decline but the general trend has persisted. Between 1963 and 1969,

## Georges Bank Yellowtail flounder

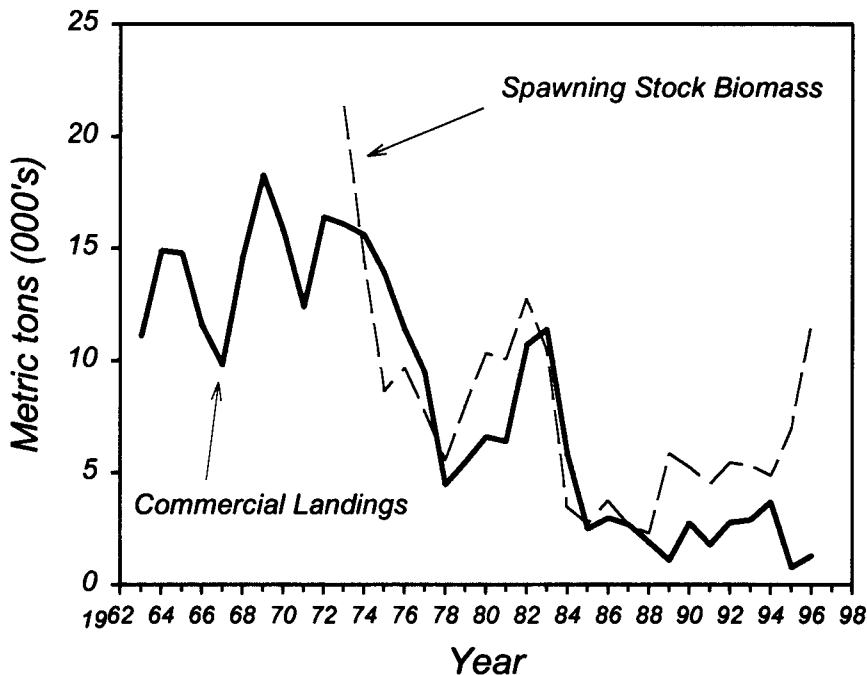


Table 7.1 Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S. recreational	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States	6.6	2.7	1.9	1.1	2.7	1.8	2.9	2.1	1.6	0.3	0.8
Canada	<0.1	-	-	-	-	-	<0.1	0.8	2.1	0.5	0.5
Other	<0.1	-	-	-	-	-	-	-	-	-	-
Total nominal catch	6.6	2.7	1.9	1.1	2.7	1.8	2.9	2.9	3.7	0.8	1.3

### Summary Status

Long-term potential catch	=	13,000 mt
Biomass for long-term potential catch	=	38,000 mt
Importance of recreational fishery	=	Insignificant
Management	=	Multispecies FMP
Status of exploitation	=	Fully exploited
Age at 50% maturity	=	1.3 years, males 1.8 years, females
Size at 50% maturity	=	21.4 cm (8.4 in.), males 25.8 cm (10.2 in.), females
Assessment level	=	Age structured
Overfishing definition	=	20% MSP
Fishing mortality rate corresponding to overfishing definition	=	$F_{20\%} = 0.69$

$M = 0.20$        $F_{0.1} = 0.25$        $F_{max} = 0.63$        $F_{1996} = 0.10$

**“...biomass remains low relative to historic levels, but is increasing.”**

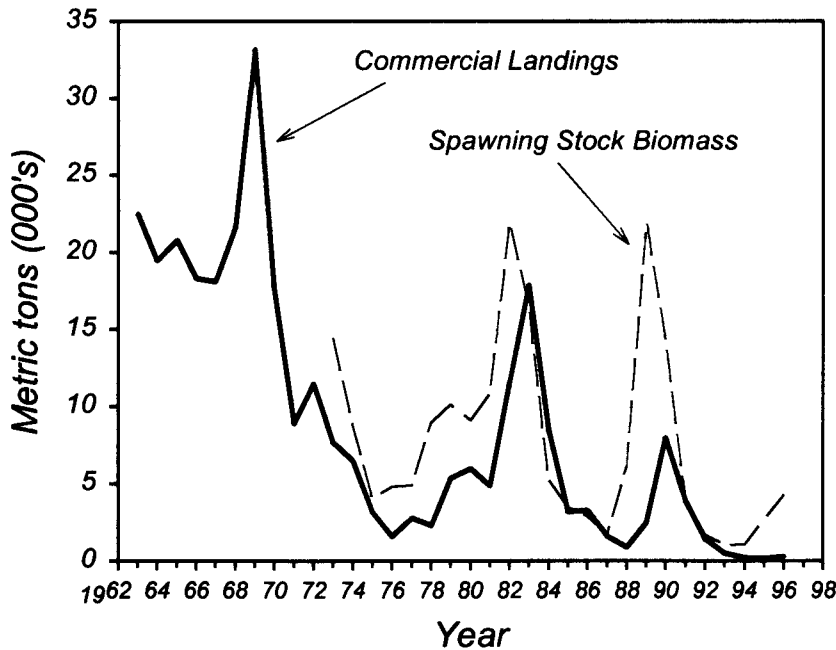
NEFSC autumn survey indices averaged 26 fish per tow; but for the last ten years the average was less than 4 yellowtail per tow. Declines in average weight per tow have been less pronounced but suggest that current biomass levels are about 14% of levels observed in the 1960s.

Recent cooperative assessments with Canada indicate that stock biomass remains low relative to historic levels, but is increasing. Virtual population analysis or VPA indicates that the stock was abundant in the early 1970s and was supported by several strong year-classes. Stock size rapidly declined in the early to mid 1980s from poor recruitment and extremely high fishing mortality, but has since gradually increased to about half the levels observed in the mid-1970s. Fishing mortality was extremely high from 1973 to 1994, but decreased from 1.7 (76% exploitation rate) in 1994 to less than 0.2 (16% exploitation rate) in 1996 and 1997, well below the management target ( $F_{0.1} = 0.25$ , 20% exploitation rate) chosen to allow stock rebuilding. Spawning stock biomass declined from 21,400 mt in 1973 to less than 4,000 mt from 1984-1988. Spawning biomass fluctuated below 6,000 mt from 1989 to 1994, and then increased to 15,700 mt in 1997. The stock is considered to be fully exploited and rebuilding from an overfished state.

### Southern New England

Landings of yellowtail flounder from the Southern New England stock averaged 20,000 mt during 1963-1968 but declined abruptly after 33,200 mt were landed in 1969. Landings dropped to 8,900 mt in 1971 and have exceeded that level only three times in the past 24 years. Landings increased rapidly between 1981 and 1983 to 17,000 mt due to strong

## Southern New England Yellowtail flounder



**“...the stock is at low levels, but is increasing slightly.”**

recruitment of the 1980 year class. Landings subsequently declined to only 900 mt in 1988, rose to 8,000 mt in 1990 with recruitment of the strong 1987 year class, and subsequently declined to only 200 mt in 1994-1995. The apparent recoveries in the early 1980s and 1990 resulted in landings roughly one-half of preceding maximum values. In 1996, landings totalled only 300 mt.

NEFSC autumn bottom trawl survey abundance and biomass indices fluctuated about high levels between 1963 and 1972, but declined sharply in 1973. Since then, survey indices have been augmented briefly by recruitment of the strong 1980 and 1987 year classes, but survey catches in the intervening years were among the lowest on record. By 1993 the NEFSC autumn survey index had fallen to the lowest level in the 30-year series and has since increased only slightly. The average rates of decline in the spring and autumn surveys are similar and indicate an average rate of decline of 11% per year. Current abundance is less than 5% of levels observed in the late 1960s.

A 1997 assessment indicated that the stock is at low levels, but is increasing slightly. Fishing mortality on fully recruited ages fluctuated between 0.6 and 1.1 between 1973 and 1979. Afterwards,  $F$  averaged 1.6 per year (74% exploitation rate) until the early 1990s. During these years yellowtail older than age 4 virtually disappeared from both commercial landings and bottom trawl survey catches. Fishing mortality has since declined sharply to 0.12 (10% exploitation rate) in 1996, well below the reference point ( $F_{0.1} = 0.27$ , 22% exploitation rate) chosen to allow stock rebuilding. Spawning stock biomass decreased from 21,900 mt in 1989 to only 1,000 mt in 1993, but has since increased to 4,300 mt in 1996. The stock is considered to be fully exploited.

Table 7.2 Recreational catches 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	6.6	1.6	0.9	2.5	8.0	3.9	1.5	0.5	0.2	0.2	0.3
Canada	-	-	-	-	-	-	-	-	-	-	-
Other	<0.1	-	-	-	-	-	-	-	-	-	-
Total nominal catch	6.6	1.6	0.9	2.5	8.0	3.9	1.5	0.5	0.2	0.2	0.3

### Summary Status

- Long-term potential catch = 23,000 mt<sup>1</sup>
- SSB for long-term potential catch = 75,000 mt
- Importance of recreational fishery = Insignificant
- Management = Multispecies FMP
- Status of exploitation = Fully exploited
- Age at 50% maturity = 1.8 years, males  
1.6 years, females
- Size at 50% maturity = 19.6 cm (7.7 in.), males  
25.5 cm (10.0 in.), females
- Assessment level = Age structured
- Overfishing definition = 20% MSP
- Fishing mortality rate corresponding to overfishing definition =  $F_{20\%} = 0.94$

$M = 0.20$        $F_{0.1} = 0.27$        $F_{max} > 2.00$        $F_{1996} = 0.12$

<sup>1</sup>Includes potential from Cape Cod and Mid-Atlantic groups

### Cape Cod

Traditionally, landings of yellow-tail flounder from the Cape Cod stock have been a small fraction of the landings from Southern New England and Georges Bank. Since 1993, however, landings from the Cape Cod stock have exceeded those from Southern New England and, since 1995, have exceeded those from Georges Bank. This situation is more indicative of the degree of decimation of the above stocks than of growth of the Cape Cod stock. Landings of Cape Cod yellow-tail fluctuated between 1,500 and 2,000 mt from the mid-1960s to the mid-1970s, increased to a record high of 5,000 mt in 1980, and then declined to only 600 mt in 1993. Landings from 1994-1996 averaged approximately 1,000 mt.

Trends in abundance and biomass for this stock have been monitored by Massachusetts Division of Marine Fisheries and NEFSC bottom trawl surveys. The Massachusetts DMF spring survey biomass index peaked in 1981, but then declined to one-third of peak levels by the late 1980s. Subsequently, stock biomass appears to have increased to one-half of former peak levels. These trends are generally reflected by NEFSC bottom trawl surveys.

Declines in landings and relatively low survey indices (compared to those in the late 1970s) suggest that stock biomass was reduced by the high catches of the late 1970s and early 1980s. Continued recovery will be contingent on maintaining a conservative management program.

### Middle Atlantic

Trends for the Mid-Atlantic stock of yellowtail flounder have been generally similar to those observed for the Southern New England stock. Landings declined from more than 8,000 mt in 1972 to less than 1,000 mt between 1976 and 1980. As a result of improved recruitment, landings increased from 300 mt in 1980 to 2,200

## Cape Cod Yellowtail flounder

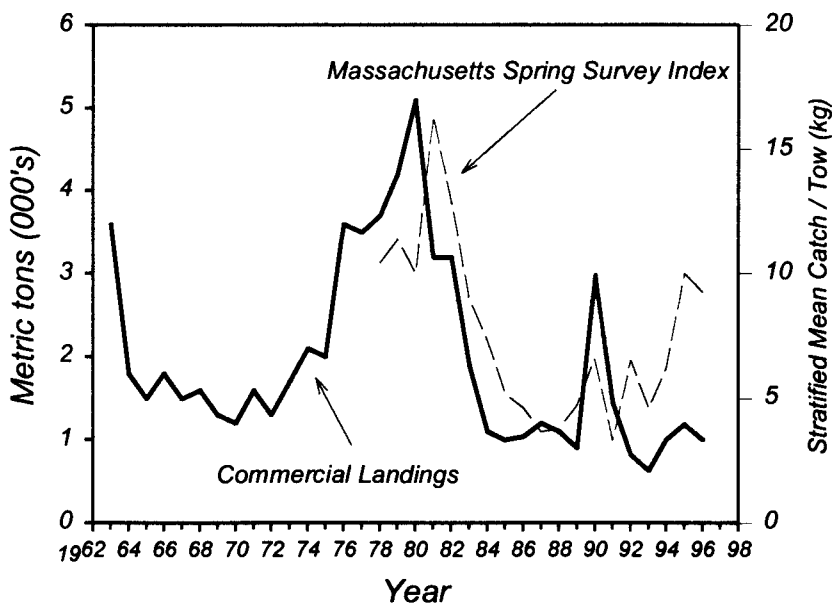


Table 7.3 Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S. recreational	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States	2.8	1.2	1.1	0.9	3.0	1.4	0.8	0.6	0.9	1.2	1.0
Canada	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total nominal catch	2.8	1.2	1.1	0.9	3.0	1.4	0.8	0.6	0.9	1.2	1.0

### Summary Status

- Long-term potential catch = Unknown
- SSB for long-term potential catch = Unknown
- Importance of recreational fishery = Insignificant
- Management = Multispecies FMP
- Status of exploitation = Overexploited
- Age at 50% maturity = 2.6 years (both sexes)
- Size at 50% maturity = 26.8 cm (10.6 in.), males  
27.3 cm (10.8 in.), females
- Assessment level = Yield per recruit
- Overfishing definition = None
- Fishing mortality rate corresponding to overfishing definition = N/A

**M = 0.20      F<sub>0.1</sub> = 0.2      F<sub>max</sub> = 0.55      F<sub>1996</sub> = Unknown**

**“Continued recovery will be contingent on maintaining a conservative management program.”**

mt in 1984. Subsequently, landings declined sharply and have since fluctuated about a low level, averaging 200 mt annually during the last three years.

Prior to 1973, average biomass per tow in NEFSC autumn bottom trawl survey indices in the Mid-Atlantic region was comparable to levels on Georges Bank. Subsequent to the removal of over 8,000 mt in 1972, survey indices fell to very low levels, with only slight increases in 1981-1982 and again in 1989-1990. In 1992, no yellowtail flounder were caught in the NEFSC autumn survey in the mid-Atlantic.

A quantitative assessment is not available for this stock. Qualitatively, survey and catch data suggest continued low abundance. Recovery to former levels will be contingent upon maintaining a conservative management program.

**For further information**

NEFSC [Northeast Fisheries Science Center]. 1996. [Report of the] 21st Northeast Regional Stock Assessment Workshop (21st SAW), Stock Assessment Review Committee (SARC) consensus summary of assessments. Woods Hole, MA: NOAA/NMFS/NEFSC. *NEFSC Ref. Doc.* 96-05d.

NEFSC [Northeast Fisheries Science Center]. 1997. [Report of the] 24th Northeast Regional Stock Assessment Workshop (24th SAW), Stock Assessment Review Committee (SARC) consensus summary of assessments. Woods Hole, MA: NOAA/NMFS/NEFSC. *NEFSC Ref. Doc.* 97-12.

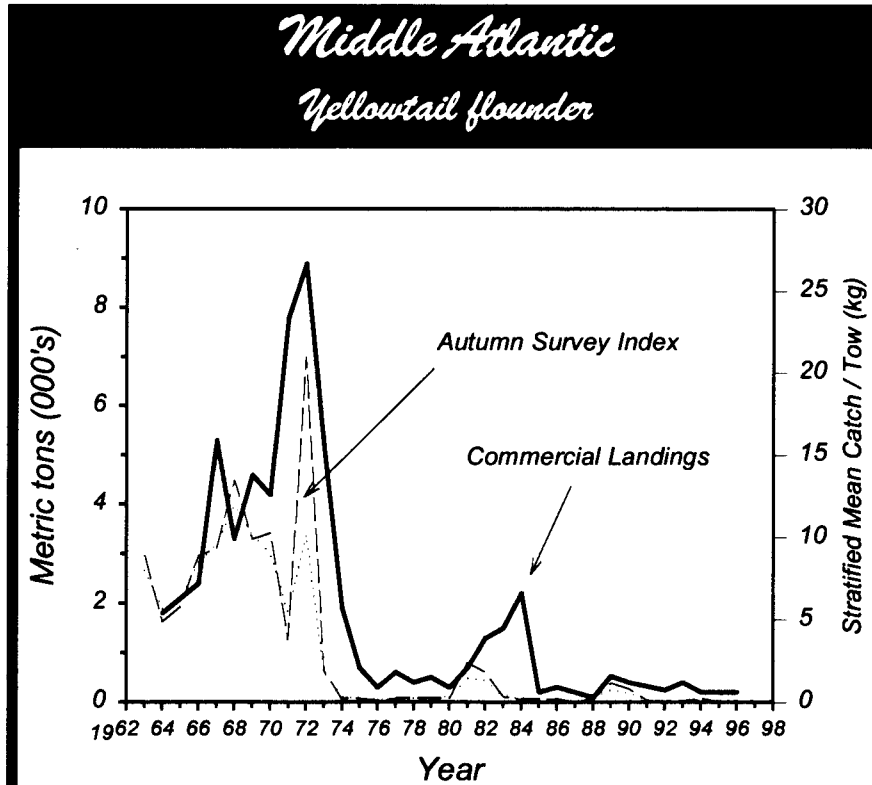


Table 7.4 Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S. recreational	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States	0.8	0.2	<0.1	0.5	0.4	0.3	0.2	0.4	0.2	0.2	0.2
Canada	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total nominal catch	0.8	0.2	<0.1	0.5	0.4	0.3	0.2	0.4	0.2	0.2	0.2

**Summary Status**

- Long-term potential catch = Unknown
- SSB for long-term potential catch = Unknown
- Importance of recreational fishery = Insignificant
- Management = Multispecies FMP
- Status of exploitation = Overexploited
- Age at 50% maturity = 1.8 years, males<sup>1</sup>  
1.6 years, females<sup>1</sup>
- Size at 50% maturity = 19.6 cm (7.7 in.), males<sup>1</sup>  
25.5 cm (10.0 in.), females<sup>1</sup>
- Assessment level = Index
- Overfishing definition = None
- Fishing mortality rate corresponding to overfishing definition = N/A

**M = 0.20    F<sub>0.1</sub> = 0.21    F<sub>max</sub> = 0.55    F<sub>1996</sub> = Unknown**

<sup>1</sup>Based on maturity data for southern New England yellowtail