

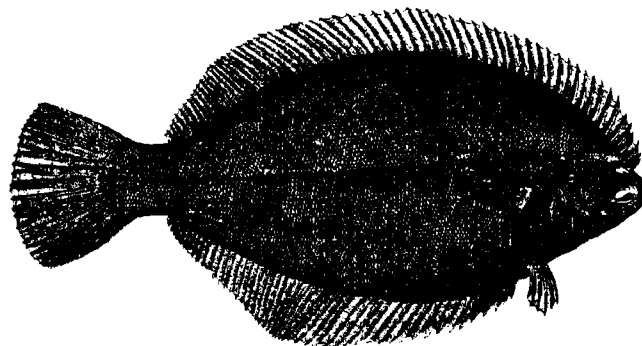
Winter Flounder

by R. Brown
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The winter flounder, blackback, or lemon sole, *Pseudopleuronectes americanus*, is distributed in the Northwest Atlantic from Labrador to Georgia. Abundance is highest from the Gulf of St. Lawrence to Chesapeake Bay. Winter flounder may attain sizes up to 58 cm (23 in.) total length. The diet consists primarily of benthic invertebrates. Movement patterns are generally localized. Winter flounder undertake small-scale migrations into estuaries, embayments, and saltwater ponds in winter to spawn, subsequently moving to deeper water during summer. Winter flounder tend to return to the same spawning locations in consecutive years. Restricted movement patterns, and differences in growth, meristic, and morphometric characteristics suggest that relatively discrete local groups exist.

Tagging and meristic studies indicate separate groups of winter flounder north of Cape Cod, east and south of Cape Cod, and on Georges Bank. Recently, three groups have been recognized for assessment purposes; these being a Gulf of Maine, Southern New England - Middle Atlantic, and a Georges Bank group. Additional studies of stock structure are needed.

Winter flounder are typically exploited in coastal locations, although offshore shoal areas, particularly Georges Bank and Nantucket Shoals, support important winter flounder fisheries. The principal commercial fishing gear used is the otter trawl. Recreational catches are significant, especially in the southern parts of the range. U.S. commercial and recreational fisheries are managed under the New England Fishery Management Council's Multispecies Fishery Management Plan (FMP) and the At-



lantic States Marine Fisheries Commission's Fishery Management Plan for Inshore Stocks of Winter Flounder. Management measures under the Multispecies FMP include a moratorium on permits, days-at-sea restrictions, time/area closures, gear restrictions, and minimum size limits. Total commercial landings in 1996 (4,800 mt) increased from 1994 and 1995 levels, but remained near a record low.

Gulf of Maine

Commercial landings from the Gulf of Maine increased from a steady 1,000 mt for the period 1961 to 1975 to nearly 3,000 mt in 1982. Recreational landings estimates, first available in 1979, combined to produce a total catch of 3,400 mt for that year; and combined landings rose to 5,000 mt in 1981 before declining to an average of 2,700 mt during the mid-1980s. Since 1989, landings have continued to trend downward. Combined landings in 1995-1996 were only 700 mt, and were 600 mt in 1994, a record low for the 1979-1996 time series. Estimated recreational catches in 1994-1996 (<100 mt) were the lowest since 1979.

Bottom trawl survey abundance indices from the Massachusetts Divi-

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sion of Marine Fisheries spring survey decreased after 1983, and reached a record-low in 1994. Since 1988, survey indices have remained stable at a low level. Estimates of fishing mortality based on that survey were near or above 1.0 (58% exploitation rate) from 1989-1994. Commercial catch per unit effort (CPUE) indices (for Tonnage Class 2 otter trawlers) peaked in the late 1960s to early 1970s, averaging 3.0 mt per day fished (df) between 1968 and 1971. CPUE has since declined steadily, with 1992-1993 values (0.7 mt per df) being the lowest in the 30-year time series. Estimates from surplus production modeling (ASPIC) suggest that biomass declined from 19,600 mt in 1979 to a low of 6,000 mt in 1991. Biomass has since increased to 8,900 mt in 1997.

The continuing low level of landings, CPUE indices, and survey indi-

Gulf of Maine Winter Flounder

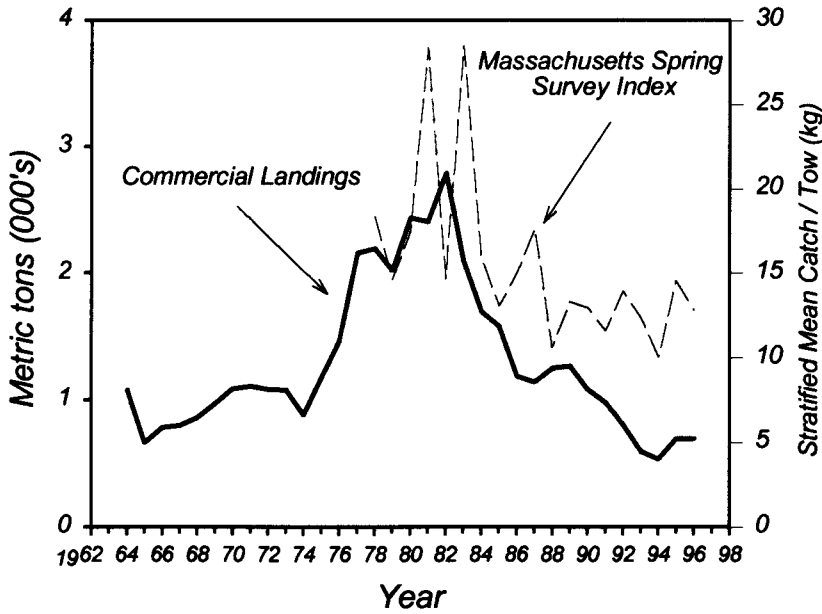


Table 11.1 Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S. recreational	1.4 ¹	1.7	0.6	0.6	0.4	0.1	0.1	0.1	<0.1	<0.1	<0.1
Commercial											
United States	2.0	1.1	1.3	1.3	1.1	1.0	0.8	0.6	0.5	0.7	0.7
Canada	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total nominal catch	3.5	2.9	1.8	1.9	1.5	1.1	0.9	0.7	0.6	0.7	0.7

¹1981-1986

Summary Status

Long-term potential catch	=	Unknown
SSB for long-term potential catch	=	Unknown
Importance of recreational fishery	=	Major
Management	=	Multispecies FMP FMP for Inshore Stocks of Winter Flounder (ASMFC)
Status of exploitation	=	Overexploited
Age at 50% maturity	=	3.3 years, males 3.5 years, females
Size at 50% maturity	=	27.6 cm (10.9 in.), males 29.7 cm (11.7 in.), females
Assessment level	=	Surplus production model
Overfishing definition	=	20% MSP (NEFMC) 40% MSP (ASMFC)
Fishing mortality rate corresponding to overfishing definition	=	Unknown

$M = 0.20$ $F_{0.1} = \text{Unknown}$ $F_{\max} = \text{Unknown}$ $F_{1996} = \text{Unknown}$

ces suggest that winter flounder abundance in the Gulf of Maine has been reduced substantially. Future improvements in the condition of the stock will depend on decreases in exploitation in both the recreational and commercial fisheries, and on improved recruitment. The stock is at a low biomass level and is considered to be overexploited.

Georges Bank

Commercial landings from the Georges Bank region increased from 1,900 mt in 1976 to near record high levels during 1980-1984 (average of 3,800 mt per yr). Between 1985 and 1988, landings averaged 2,400 mt per yr, but landings then declined steadily to approximately 700 mt in 1995. Landings increased to 1,300 mt in 1996 due to improved recruitment. No recreational catches have been reported from this stock.

The NEFSC autumn bottom trawl survey biomass index declined from the mid-1970s until 1991, when it reached an all-time low of 0.14 kg per

**“... stock rebuilding
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[but] stock levels
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tow. Since 1991, indices have increased steadily, reaching 1.76 kg in 1996. However, current survey indices remain significantly below former levels.

Available data indicate that the stock declined to record low levels in the early 1990s, and was overexploited. Since 1993, this stock has benefitted from restrictive management measures including direct effort controls along with temporal and spatial expansion of closed areas. Although there is some evidence to suggest that stock rebuilding has been initiated, stock levels remain well below the historic average.

“Strong year classes in 1992 and 1994 have resulted in a gradual rebuilding of stock biomass...”

Southern New England-Middle Atlantic

Commercial landings from the Southern New England to Mid-Atlantic area increased from roughly 4,000 mt in the mid-1970s to over 11,000 mt in 1981. Recreational catches were not estimated before 1981. Commercial landings have since declined steadily, while recreational catches increased from 1981 to 1985, and then declined. Combined recreational and commercial landings decreased to 2,800 mt in 1994, the lowest in the 1979-1996 time series. Since then, combined landings have increased slightly, to 3,300 mt in 1995-1996.

The NEFSC spring bottom trawl survey biomass index shows trends similar to those for commercial landings since about 1975, increasing through 1981 and thereafter declining. The 1993 survey index value was the lowest in the 29-year time series. The commercial CPUE index (for Tonnage Class 3 otter trawlers) declined from the 1964-1983 average of 2.7 mt per df to only 0.6 mt per df in 1993, the lowest in the 1964-1993 time series.

Fishing mortality estimated from surplus production modelling (ASPIC) averaged 1.2 (65% exploitation rate) from 1984-1995, exceeding fishing mortality rates associated with the overfishing definitions for this stock ($F_{40\%} = 0.21$, 17% exploitation rate, $F_{20\%} = 0.46$, 34% exploitation rate). Fishing mortality is estimated to have declined to 0.36 (28% exploitation rate) in 1996.

Stock biomass (age 1+) gradually declined from 39,000 mt in 1981

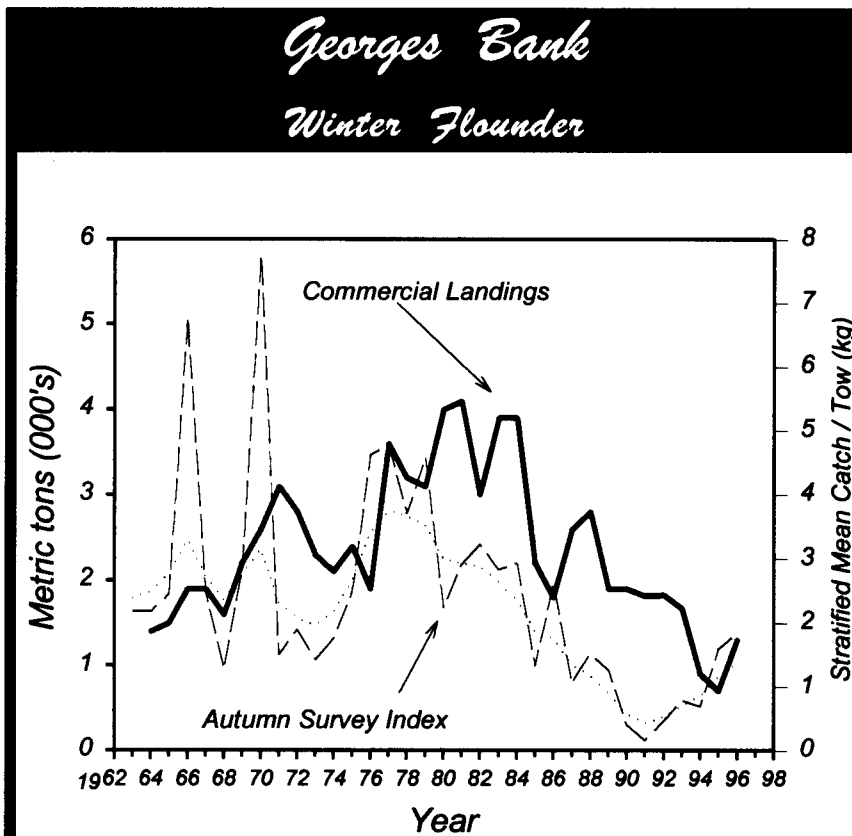


Table 11.2 Recreational catches and commercial landings (thousand metric tons)

Category	Year											
	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
U.S. recreational	-	-	-	-	-	-	-	-	-	-	-	
Commercial												
United States	3.3	2.6	2.8	1.9	1.9	1.8	1.8	1.7	0.9	0.7	1.3	
Canada	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Other	-	-	-	-	-	-	-	-	-	-	-	
Total nominal catch	3.3	2.6	2.8	1.9	1.9	1.8	1.8	1.7	0.9	0.7	1.3	

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 = 1.9 years (both sexes)
- Size at 50% maturity = 25.6 cm (10.1 in.) male
24.9 cm (9.8 in.) females
- Assessment level = Index
- Overfishing definition = 20% MSP
- Fishing mortality rate corresponding to overfishing definition = $F_{20\%} = 0.37$

$M = 0.20$ $F_{0.1} = 0.17$ $F_{max} = 0.36$ $F_{1996} = \text{Unknown}$

to a record low level of 8,500 mt in 1992. Strong year classes in 1992 and 1994 have resulted in a gradual rebuilding of stock biomass to 18,000 mt in 1996. However, stock biomass remains low relative to historic levels and the stock remains overexploited relative to the ASMFC overfishing definition.

For further information

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Southern New England - Middle Atlantic Winter Flounder

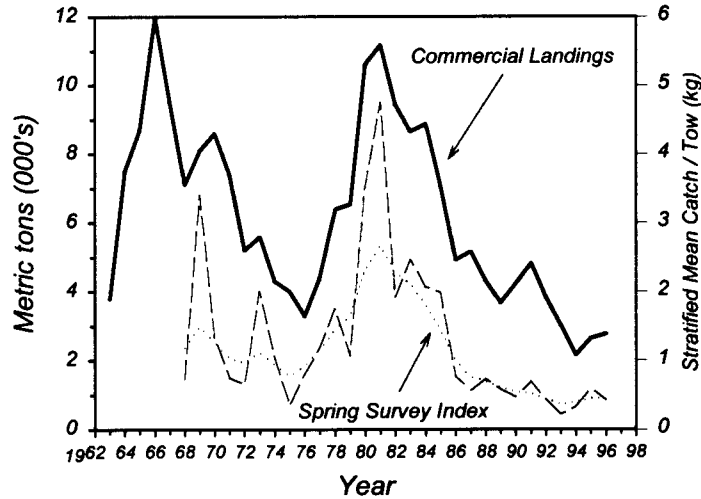


Table 11.3 Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1977-86 Average		1987	1988	1989	1990	1991	1992	1993	1994	1995
U.S. recreational	3.8 ¹	3.1	3.4	1.8	1.1	1.2	0.4	0.5	0.6	0.7	0.6
Commercial											
United States	7.8	5.2	4.3	3.7	4.2	4.8	3.8	3.0	2.2	2.6	2.8
Canada	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total nominal catch	11.6	8.3	7.8	5.5	5.3	6.0	4.2	3.6	2.8	3.3	3.3

¹1981-1986

Summary Status

- Long-term potential catch = Unknown
- SSB for long-term potential catch = Unknown
- Importance of recreational fishery = Significant
- Management = Multispecies FMP
FMP for Inshore Stocks of Winter Flounder (ASMFC)
- Status of exploitation = Overexploited
- Age at 50% maturity = 3.3 years, males
3.0 years, females
- Size at 50% maturity = 29.0 cm (11.4 in.), males
27.6 cm (10.9 in.), females
- Assessment level = Surplus production model
- Overfishing definition = 20% MSP (NEFMC)
40% MSP (ASMFC)
- Fishing mortality rate corresponding to overfishing definition = $F_{20\%} = 0.46$ (NEFMC)
 $F_{40\%} = 0.21$ (ASMFC)

$M = 0.20$ $F_{0.1} = 0.22$ $F_{max} = 0.54$ $F_{19\%} = 0.36$