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## Summer Flounder

by  
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The summer flounder or fluke, *Paralichthys dentatus*, occurs from the southern Gulf of Maine to South Carolina. Important commercial and recreational fisheries exist within the Mid-Atlantic Bight (Cape Cod to Cape Hatteras). Summer flounder are concentrated in bays and estuaries from late spring through early autumn, when an offshore migration to the outer continental shelf is undertaken. Spawning occurs during autumn and early winter, and the larvae are transported toward coastal areas by prevailing water currents. Development of post-larvae and juveniles occurs primarily within bays and estuarine areas, notably Pamlico Sound and Chesapeake Bay. Most of the population is sexually mature by age 2. Female summer flounder may live up to 20 years, but males rarely live for more than 7 years. Growth rates differ appreciably between the sexes with females attaining weights up to 11.8 kg (26 lb).

The resource is now managed under the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan (FMP) as a unit stock from North Carolina to Maine. Amendment 2 to the original Summer Flounder FMP implemented several major regulatory provisions, including annual commercial quotas, recreational harvest limits, a commercial vessel permit moratorium, minimum fish size and gear restrictions, and a recreational fishery possession limit. Amendment 12 to the FMP, approved in 1999, revised the overfishing definition for summer flounder. The target/threshold fishing mortality reference point of  $F_{MSY}$  is defined to be  $F_{max}$ , currently at  $F = 0.26$ , and the target and threshold biomass reference points are currently estimated to be 106,400 mt and 53,200 mt, respectively.

Total landings averaged 20,600 mt annually during 1981-1988, peaking at 26,100 mt in 1983. Since 1989, landings have been much lower, ranging between 6,500 in 1990 and 10,800 mt in 1998. The principal gear used in commercial fishing for summer flounder is the otter trawl. Commercial landings of summer flounder averaged 13,100 mt during 1981-1988, reaching a high of 17,100 mt in 1984. Commercial landings during 1989-1998 have been markedly lower (4,000 to 8,100 mt per year). In 1998, commercial landings were 5,100 mt. The recreational fishery for summer flounder harvests a significant proportion of the total catch, and in some years recreational landings have exceeded the commercial total. Estimated recreational landings have historically constituted about 40 percent of the total landings. Recreational landings averaged 7,500 mt during 1981-1988, and peaked at 12,700 mt in 1983. Since 1988, recreational landings have been considerably lower, although recent trends have been upward. In 1998, recreational landings increased to 5,700 mt, greater than the commercial landings, and the highest level estimated since 1988.

Catch curve analyses of NEFSC survey and commercial fishery age composition data for 1976 through 1983 indicated that fishing mortality rates during this period were about 0.6 to 0.7 (41 to 46% exploitation rates), well in excess of the current overfishing definition for the stock,  $F_{\max} = 0.26$  (21% exploitation rate). Recent virtual population analyses (VPA) have used NEFSC survey age composition data, survey age composition data from the states of Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina, and commercial and recreational fishery age composition data to estimate fishing mortality rates and stock sizes. Current VPA results indicate that fishing mortality was very high during the early 1990s, peaking at  $F = 2.1$  (82% exploitation rate) in 1992. Recently, fishing mortality declined from 0.9 (55% exploitation rate) in 1995 to 0.5 (36% exploitation rate) in 1998, although it still exceeded the overfishing definition  $F_{\text{THRESHOLD}}$  by a substantial margin.

Spawning stock biomass declined 75% from 1983 to 1989 (19,000 mt to 5,100 mt), but has since increased to 25,000 mt in 1998, with an accompanying expansion of the age structure. The 1995 year class was above average and was the largest since 1986, but the 1997 and 1998 year classes are estimated to be below average. Recent recruitment per unit of SSB has been lower than that estimated at a comparable level of SSB during the early 1980s. Total stock biomass was estimated by VPA to be 48,500 mt in 1983, before falling to 16,000 mt in 1989. Total stock biomass has increased substantially since 1991, and in 1998 was estimated to be 38,600 mt, about 36% of the target biomass reference point. The NEFSC spring survey stock biomass index (1968-1999) peaked at 1.9 kg per tow during 1976-1977, and then declined to 0.3 kg from 1989-1991. The index has since increased and in 1999 was at about 50% of the mid-1970s peak, 40% above the time series average.

The summer flounder stock is at an intermediate level of historical (1968-1996) abundance. Recent assessment results indicate the stock to be overfished, and that overfishing was occurring in 1998 with respect to the FMP Amendment 12 overfishing definition.

### **For further information**

Terceiro, M. 1999. Stock assessment of summer flounder for 1999. Northeast Fish. Sci. Cent. Ref. Doc. 99-19. 178p.

### Summary Status

Long-term potential catch (MSY)	=	20,897 mt
Biomass corresponding to MSY	=	$B_{MSY} = 106,444$ mt (= $B_{TARGET}$ )
Minimum biomass threshold	=	$\frac{1}{2} B_{MSY} = 53,222$ mt
Stock biomass in 1998	=	38,600 mt (Implies an overfished condition)
$F_{MSY} = F_{TARGET} = F_{max}$	=	0.26
Overfishing definition	=	$>F_{THRESHOLD} = F_{max} = 0.26$
$F_{1998}$	=	0.52 (Implies overfishing was occurring)
Age at 50% maturity	=	1.0 years, males 1.5 years, females
Size at 50% maturity	=	24.9 cm (9.8 in.), males 28.0 cm (11.0 in.), females
Assessment level	=	Age structured
Management	=	Summer Flounder, Scup and Black Sea Bass FMP

$M = 0.20$

$F_{0.1} = 0.16$

$F_{max} = 0.26$

### Summer Flounder Middle Atlantic - Georges Bank

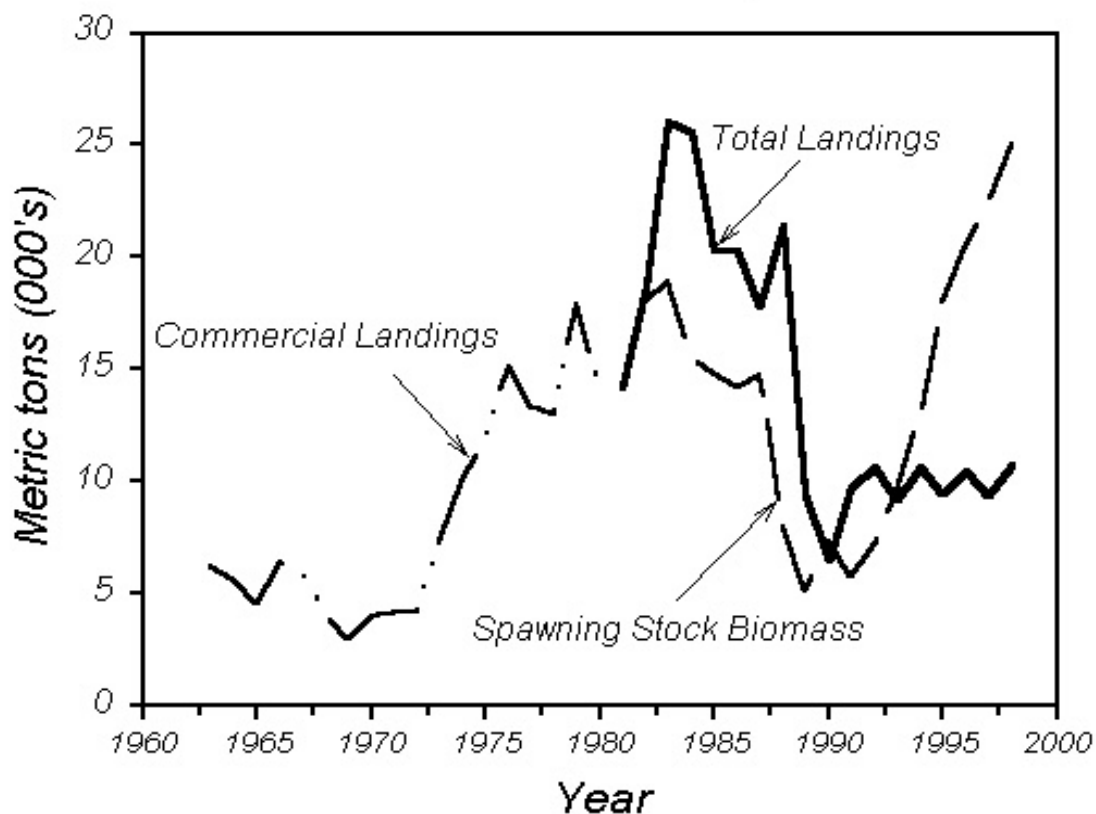


Table 8.1 Recreational and commercial catch (thousand metric tons)

Category	Year										
	1981-88 Average	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Recreational landings	7.5	1.4	2.3	3.6	3.2	3.5	4.1	2.5	4.7	5.4	5.7
Recreational discards	0.4	0.1	0.2	0.4	0.3	0.7	0.6	0.7	0.6	0.6	0.5
Commercial landings	13.1	8.1	4.2	6.2	7.5	5.7	6.6	7.0	5.8	4.0	5.1
Commercial discards	n/a	0.7	1.2	1.1	0.7	0.8	0.9	0.3	0.5	0.3	0.4
Total nominal catch	20.6	9.5	6.5	9.8	10.7	9.2	10.7	9.5	10.5	9.4	10.8