

Last Revised: March 2001

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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 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 18,100 mt annually during 1981-1990, peaking at 26,100 mt in 1983. Since 1989, landings have been much lower, ranging between 6,500 in 1990 and 12,100 mt in 2000. The principal gear used in commercial fishing for summer flounder is the otter trawl. Commercial landings of summer flounder averaged 11,700 mt during 1981-1990, reaching a high of 17,100 mt in 1984. Commercial landings during 1991-2000 have been markedly lower (4,000 to 7,500 mt per year). In 2000, commercial landings were restricted to 5,000 mt. The recreational fishery for summer flounder harvests a significant proportion of the total catch, and in some years recreational landings have exceeded commercial landings. Estimated recreational landings constituted about 35 percent of the total landings during 1981-1990, averaging 6,400 mt during that period, and peaking at 12,700 mt in 1983. Recreational landings averaged 3,200 mt during 1990-1995. Since 1997, recreational landings have increased

above that level and usually exceeded the commercial landings. Recreational landings in 2000 were 7,100 mt, the highest estimated since 1986.

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 late 1980s and into the early 1990s, peaking above  $F = 2.0$  (81% exploitation rate) in that period. Recently, fishing mortality has declined from 1.3 (67% exploitation rate) in 1994 to 0.3 (24% exploitation rate) in 1999. However, overfishing is still occurring since fishing mortality exceeded the FMP overfishing definition  $F_{\text{THRESHOLD}}$ .

Spawning stock biomass declined 72% from 1983 to 1989 (18,800 mt to 5,200 mt), but has since increased over five-fold to 29,300 mt in 1999, with an accompanying expansion of the age structure. The 1995 year class was above average and was the largest since 1986. The 1996, 1997, and 1998 year classes are estimated to be of about average size. The 1999 year class is currently estimated to be below average and the smallest since 1988. 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 48,300 mt in 1983, before falling to 16,100 mt in 1989. Total stock biomass has increased substantially since 1991, and has been stable since 1994 at about 41,000 mt. The 1999 biomass was estimated to be 41,400 mt, about 23% below the FMP biomass threshold, and so the stock is still considered to be overfished. The NEFSC spring survey stock biomass index (1968-2000) 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 2000 was at about 90% of the mid-1970s peak.

### **For further information**

NEFSC [Northeast Fisheries Science Center]. 2000. [Report of the] 31<sup>st</sup> Northeast Regional Stock Assessment Workshop (31<sup>st</sup> SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fish. Sci. Cent. Ref. Doc. 00-15. 400 p.

### 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 1999	=	41,400 mt (Implies an overfished condition)
$F_{MSY} = F_{TARGET} = F_{max}$	=	0.26
Overfishing definition	=	$>F_{THRESHOLD} = F_{max} = 0.26$
$F_{1999}$	=	0.32 (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

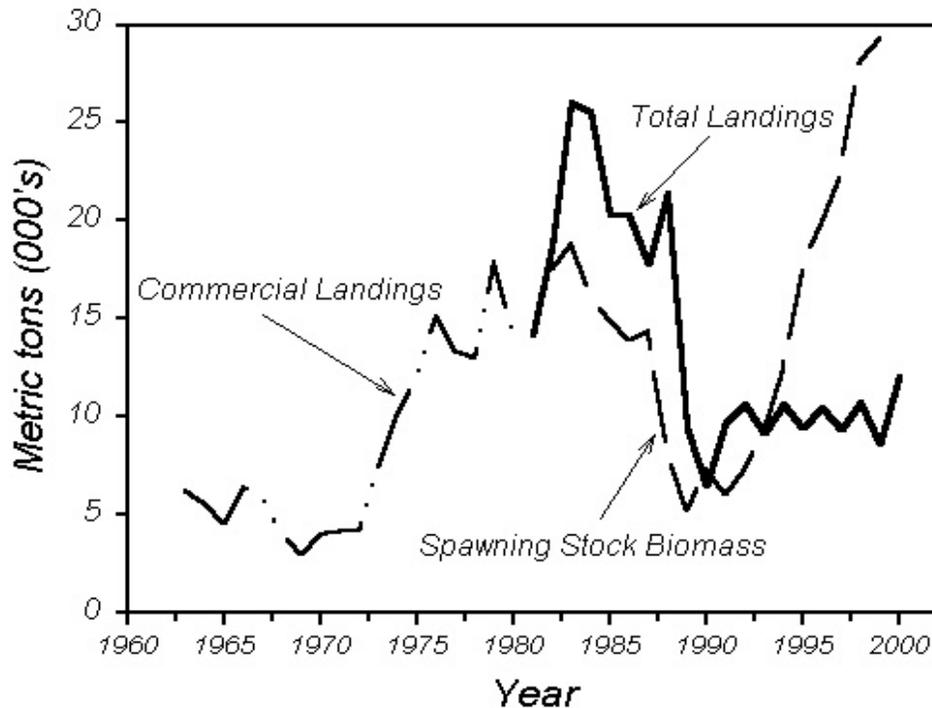


Table 8.1 Recreational and commercial catch (thousand metric tons)

Category	Year										
	1981-90 Average	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Recreational landings	6.4	3.6	3.2	3.5	4.1	2.5	4.7	5.4	5.7	3.8	7.1
Recreational discards	0.3 <sup>1</sup>	0.4	0.3	0.7	0.6	0.7	0.6	0.6	0.5	0.7	n/a
Commercial landings	11.7	6.2	7.5	5.7	6.6	7.0	5.8	4.0	5.1	4.8	5.0
Commercial discards	1.0 <sup>2</sup>	1.1	0.7	0.8	0.9	0.3	0.5	0.3	0.4	1.5	n/a
Total nominal catch	18.1	9.8	10.7	9.2	10.7	9.5	10.5	9.4	10.8	8.6	12.1

<sup>1</sup> 1982-1990.

<sup>2</sup> 1989-1990.