

B. ATLANTIC BUTTERFISH

State of Stock: According to the existing status determination criterion for this stock, which is a F_{MSY} proxy ($F_{0.1}=1.01$), overfishing is not occurring. There is no biomass reference point in the Fishery Management Plan. New biological reference points estimated for Atlantic butterfish are $F_{MSY}=0.38$ and $B_{MSY}=22,798$ mt. According to these estimates, fishing mortality in 2002 was near the overfishing definition, and stock biomass in 2002 was 8,700 mt, less than half of B_{MSY} , but the estimates of F and biomass are highly uncertain. Recruitment has declined since 1995 and was poor in 2001 and 2002. The last two NMFS autumn survey biomass per tow indices were among the lowest in the series, and the spring 2003 index was also low. Discards are estimated to be more than twice the landings.

Management Advice: Conservation and management measures should be implemented to reduce discards and discard mortality. The TAL setting-process currently ignores discards and should be revised to take this source of mortality into account.

Forecast for 2003: No forecasts were performed.

Landings and Status Table (weights in'000 mt): Butterfish

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	Max ¹	Min ¹	Mean ¹
US Comm landings	3.6	2.1	3.5	2.8	2.0	2.1	1.4	4.4	0.9	12.0	0.8	3.2
Foreign landings	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.7	0.0	3.9
USA Discards	3.7	8.6	6.8	3.9	3.3	4.1	2.4	7.3	1.8	19.0	0.3	4.4
Catch used in Assessment	7.3	10.7	10.4	6.6	5.2	6.2	3.8	11.7	2.7	34.3	2.7	11.5
Spawning Stock Biomass (age 1+)	22.3	31.3	12.4	10.8	8.2	7.8	24.5	24.1	8.7	62.9 ²	7.8 ²	23.2 ²
Average Biomass (mid-year)	41.2	21.4	18.0	13.2	12.0	31.6	31.6	16.7	7.8	77.2	7.8	33.4
Recruitment Biomass (age 0)	31.2	2.8	16.0	9.4	9.6	32.4	16.3	4.7	3.0	61.1	2.8	23.2
Fishing Mortality	0.18	0.50	0.58	0.50	0.43	0.20	0.12	0.7	0.34	0.93	0.09	0.40

¹1965-2002

²1968-2002

Catches: From 1965 to 2002, US commercial landings averaged 3,200 mt per year, peaking at 12,000 mt in 1984 (Figure B1). Foreign landings began in the mid-1960s and averaged 6,800 mt during 1965-1986 with a peak of 31,700 mt in 1973. Estimates of discards in the USA fishery increased from a few hundred mt in 1965 to a peak of 19,000 mt in 1984, and ranged between 1,000-8,600 mt thereafter. Total catch peaked in 1973 at 34,300 mt, declined, then increased again to 31,500 mt in 1984 (Figure B1). Since 1985, catches have averaged 8,100 mt, with discards averaging 5,100 mt. Butterfish catches in 2001 and 2002 were 11,700 mt (7,300 mt discards) and 2,700 mt (1,800 mt), respectively.

Data and Assessment: Atlantic butterfish were last assessed in August 1993 (SAW 17). The current assessment relies on NMFS survey biomass indices (wt/tow) [from NEFSC Winter, Spring, and Autumn research vessel surveys] (Figure B6), USA landings from the NMFS dealer database, USA discard estimates from the NMFS observer program, and foreign catch (Murawski and Waring 1979). The abundance and catch data provide a very noisy signal, due to the variable availability of butterfish to the survey and because 2/3rd of the catch is from imprecisely estimated discards. A delay-difference model was developed as a basis for stock assessment.

Fishing Mortality: Fishing mortality estimates averaged about 0.5 during 1967-1977 and then declined to an average of about 0.3 thereafter (Figure B2). Fishing mortality increased to 0.58 in 1996 and then declined to 0.12 in 2000. The average F during 2000-2002 was 0.39 and the F in 2002 was 0.34. There is an 80% probability that F in 2002 was between 0.25-1.02 (Figure B8).

Recruitment: Recruitment biomass (Age 0) has been highly variable over a range of spawning biomass between 10,000 mt - 50,000 mt. Average recruitment biomass during 1968-2002 was 23,200 mt. Recruitment for this stock averaged 26,600 mt during 1968-1994 and more recently has declined to 5,000 mt and 3,000 mt in 2001 and 2002, respectively (Figure B3).

Spawning Stock Biomass: Butterfish spawning stock biomass (Age 0) has been variable during 1968-2002 (Figure B3), fluctuating between 7,800-62,900 mt and averaging 23,200 mt. Spawning stock biomass in 2002 was estimated to be 8,700 mt, one of the lowest in the time series.

Average Biomass: Average biomass fluctuated between 7,800 -77,200 mt during 1969-2002 (Figure B4), averaged 34,000 mt, and declined to 7,800 mt in 2002. There is an 80% probability that average biomass in 2002 was between 2,600-10,900 mt (Figure B7).

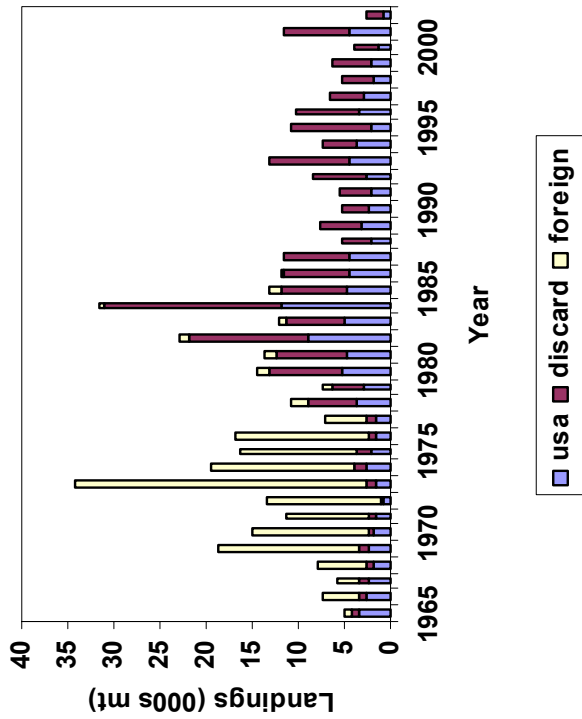
Biological Reference Points: Stock status determination is currently based on a F_{MSY} proxy ($F_{0.1}=1.01$) (Figure B5), and $M = 0.8$. B_{MSY} has not been previously estimated. New biological reference points were estimated in the delay-difference model for butterfish. A Fox model of surplus production for 1965-2002 produced an $MSY=12,200$ mt (including discards), $B_{MSY}=22,800$ mt, and $F_{MSY}=0.38$. However, there is considerable uncertainty in these estimates.

Special Comments: Further examination of existing the NEFSC Sea Sampling data is needed to evaluate butterfish discards. Other approaches to estimating discards could be explored and alternate sources of information should also be evaluated.

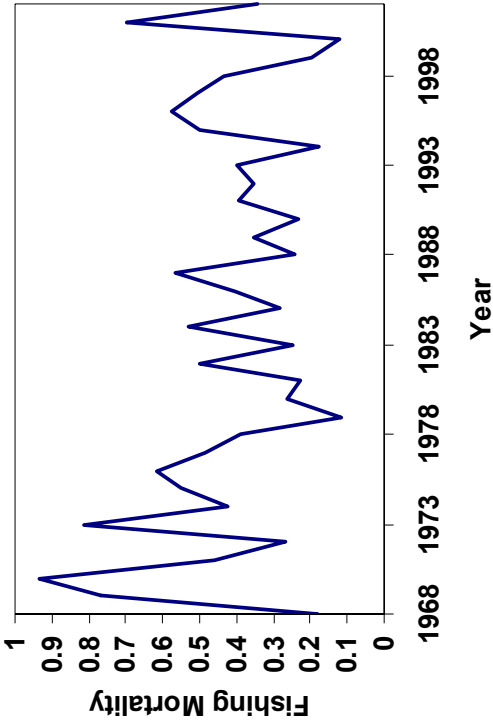
Butterfish are a major prey item for many finfish and marine mammal species. This should be considered for multispecies and ecosystem management.

Sources of Information: Murawski, S. A. and G. T. Waring. 1979. A population assessment of butterfish, *Peprilus triacanthus*, in the northwestern Atlantic Ocean. Trans. Am.Fish. Soc. 108:427-439.

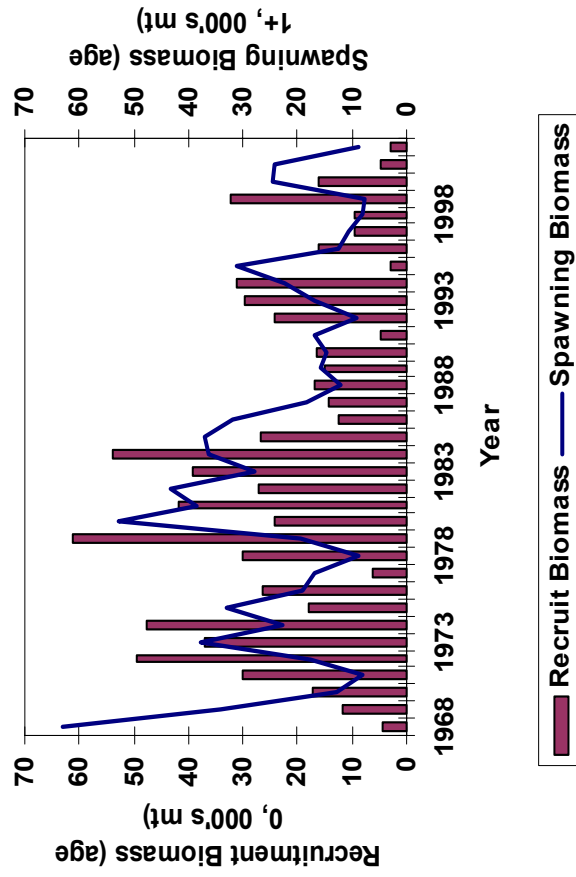
B1. Landings and Discards



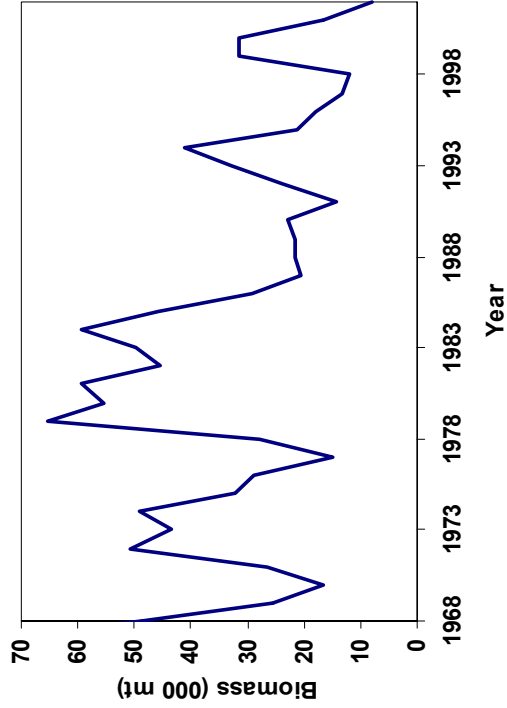
B2. Fishing Mortality



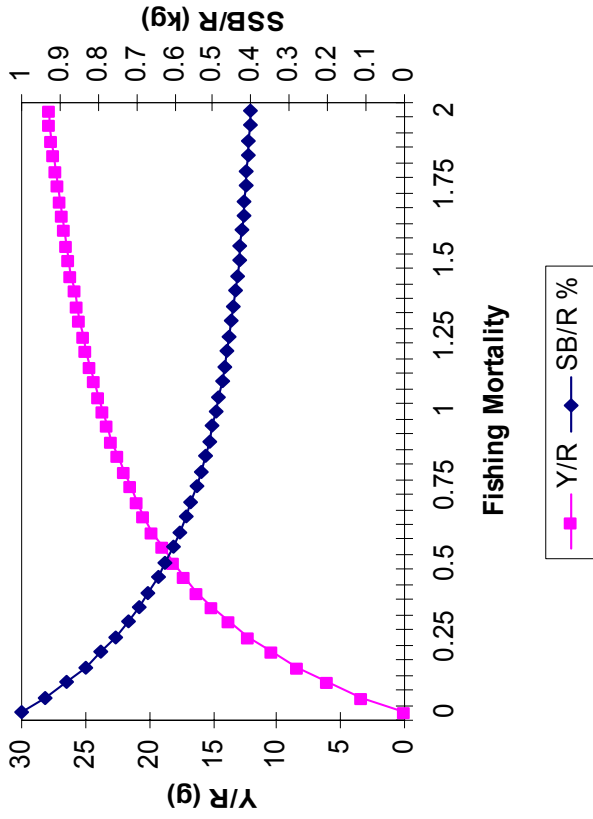
B3. Recruitment and Spawning Biomass



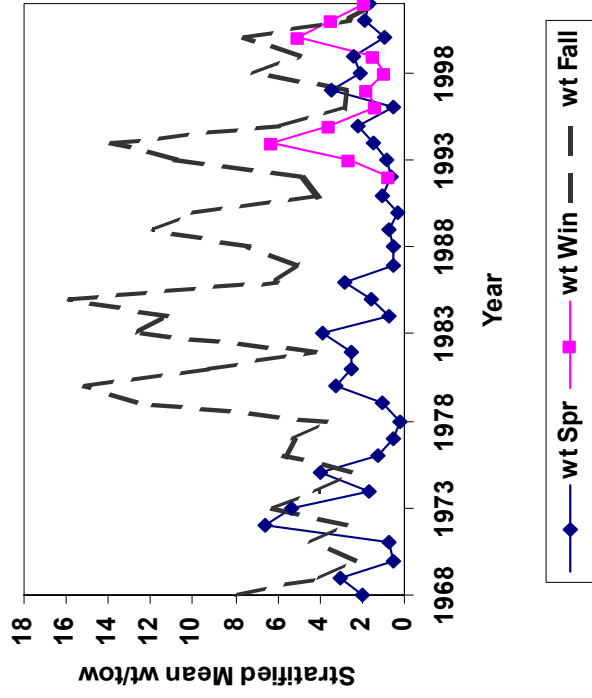
B4. Average Biomass (mid-year)



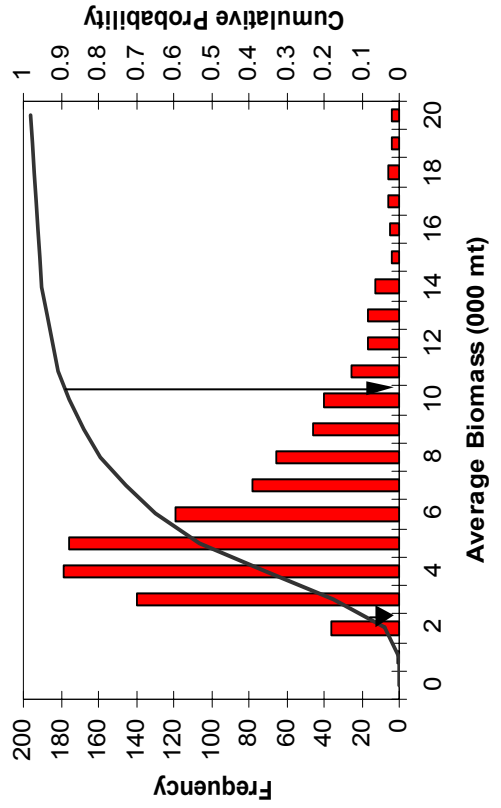
B5. Yield and SSB per Recruit



B6. NEFSC Survey wt/tow



B7. Precision of 2002 Average Biomass Estimate



B8. Precision of 2002 Fishing Mortality Estimate

