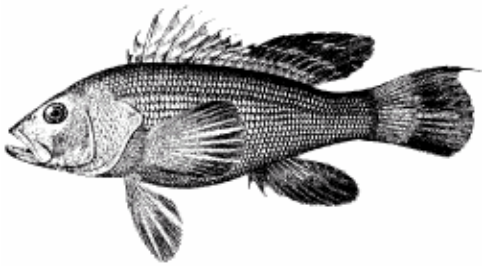

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Black Sea Bass

by

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Distribution, Biology and Management

Black sea bass, *Centropristis striata*, are distributed in the Northwest Atlantic from Maine to Florida (Figure 16.1), with Cape Hatteras, NC serving as a geographic boundary between northern and southern stocks (Musick and Mercer 1977, Shepherd 1991). Sea bass are members of the family *Serranidae*, which includes groupers commonly found in tropical and sub-tropical waters. Structures such as reefs, wrecks or oyster beds are preferred habitats. Black sea bass may attain sizes up to 60 cm (23.5 in) and 3.6 kg (8 lbs) with maximum age of 10-12 years. Sexual maturity is attained between ages 2 to 4 for females. Black sea bass are protogynous hermaphrodites, meaning that they change sex from female to male. Born as females, most fish will change sex to males between ages 2 to 5 (Musick and Mercer 1977). The factors that lead to the sex change have not been proven although it has been speculated that the relative scarcity of males in a spawning group may be the stimulus for a female to switch sex. Spawning in the northern stock generally occurs from April to June after fish have migrated into coastal habitats (Collette and Klein-MacPhee 2002). Males develop a pronounced blue hump on their heads during spawning season and aggressively defend territory, although actual spawning behavior is not well documented. Larvae and juveniles develop and grow in inshore habitats, and juveniles attain lengths of 10-14 cm by fall. Sea bass remain in coastal habitats until water temperatures decrease in fall into early winter, and then migrate to deeper offshore water along the edge of the continental shelf. In the spring, most fish return to the same area vacated the previous fall. Juvenile sea bass experience little if any growth throughout the winter. Adult black sea bass are omnivorous, feeding on a variety of benthic invertebrates, squid and fish (Steimle et al.1999).

Black sea bass are jointly managed under the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan developed jointly by the Atlantic States Marine Fisheries Commission (ASMFC) and the Mid-Atlantic Fishery Management Council. Management for the commercial fisheries involves annual quotas, size limits and gear restrictions, while the recreational fisheries are controlled by size and bag limits.

The Fishery

Total recreational landings in 2005 were 787 mt, similar to the 2004 estimated of 760 mt (Table 16.1, Figure 16.2) and a substantial decrease from the 2002 landing of 1,987 mt and below the 1981-2004 average of 1,700 mt. Recreational fisheries over the past decade have accounted for 50% of the total landings, by weight. The recreational fishery generally occurs in coastal areas from May until November and is presently subject to a 12" (30 cm) minimum size and a 25 fish bag limit. In 2004-2005, 65% of the recreational landings were from the state of New Jersey, 11% from Delaware, and 9% from Maryland. The average length of sea bass in recreational landings in 2005 was 34 cm. Black sea bass discards in the recreational fishery amounted to 5.7 million and 5.8 million fish in 2004 and 2005, respectively. The highest estimates of discards occurred during 2000-2002 when the discards ranged between 11.6 million and13.2 million fish. As with landings, New Jersey accounts for the largest percent of discards.

Commercial fisheries occur in two distinct seasons; a spring through fall inshore fishery, and a winter offshore fishery. The inshore fishery is prosecuted primarily with hook and line and pot gear. Since 2000, these gears have accounted for 11% and 37%, respectively, of total commercial landings. Commercial landings in 2005 were 1,310 mt, only slightly less than in 2004 and 2003 (Table 16.1, Figure 16.2). By comparison, landings in 1952 were nearly 10,000 mt, but declined to 566 mt by 1971 (Figure 16.3). Since 2000, NJ, VA and MA have together accounted for 60% of black sea bass commercial landings. The average length of sea bass in commercial landings in 2005 was 35 cm. Since 2000 commercial discard estimates have ranged from 33 mt to 202 mt but these values are likely conservative estimates.

Research Vessel Survey Indices

NEFSC survey indices from the spring and winter offshore survey in the Middle Atlantic are used to index abundance since the fish are most vulnerable to trawl gear during this season. NEFSC spring abundance indices for adult sea bass ($\log_e$ retransformed stratified mean number per tow for fish $\geq$ 22 cm) have varied considerably since the beginning of the time series in 1968 (Figure 16.4). Indices between 1968 and 2001 averaged 0.39 fish per tow, with the exception of 1974 (with a mean value of 1.23 sea bass per tow). The index increased to 1.25 and 1.61 fish per tow in 2002 and 2003, respectively, but declined to 0.46 fish per tow in 2006. Abundance indices of juvenile sea bass ($\log_e$ re-transformed stratified mean #/tow for fish $\leq$14 cm) in both the winter and spring surveys indicate large 1999 and 2001 cohorts (Figure 16.5). In both surveys, the 2005 cohort appears below average.

Assessment Results

Uncertainty in the results of a recent tagging study prevented determination of current fishing mortality (NEFSC 2006b). However, survey biomass indices suggests that the relative exploitation (catch weight from fisheries / survey index of fish biomass of exploitable sizes) of black sea bass has been below the time series average (Figure 16.6) but increasing in 2005. The NEFSC survey $\log_e$ re-transformed biomass indices peaked at 0.62 kg per tow but subsequently declined through 2006. The 2006 biomass index (0.29) remains above the times series average of

0.17 kg per tow. Landings in the commercial fishery have remained stable while recreational landings have recently declined.

Biological Reference Points

F_{max} (F= 0.33) (Figure 16.7, Table 16.2) is used in the FMP as a proxy for Fmsy. However, there are no estimates of current fishing mortality to evaluate to this reference point. The biomass reference point defined in the FMP is based on average NEFSC survey biomass indices for 1977-1979. However, a recent scientific review of that reference point concluded that it was not suitable as a basis for determining stock status. Alternative measures are currently being explored.

Summary

Total black sea bass landings have been relatively stable over the past decade despite recent declines in recreational landings. Adult survey abundance indices increased in 2002 and 2003 but have recently declined to average levels. The appearance of several recent strong year classes in recent years has likely contributed to the spikes in adult abundance. The current status of the stock relative to biological reference points cannot be determined at this time.

Table 16.1 Recreational and commercial landings of black sea bass (thousand metric tons).

Category	1986-95 Average	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
U. S. Recreational	2.0	1.8	1.9	0.5	0.7	1.8	1.6	2.0	1.5	0.8	0.8
Commercial											
United States	1.3	1.6	1.2	1.2	1.3	1.2	1.3	1.6	1.4	1.4	1.3
Canada	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total Nominal Catch	3.3	3.4	3.1	1.7	2.0	3.0	2.9	3.6	2.9	2.2	2.1

Table 16.2 Yield per Recruit Reference Points for black sea bass.

Yield per Recruit Reference Points		
$F_{0.1}$	=	0.19
F_{max}	=	0.33

For further information

Collette, B.B. and G. Klein-MacPhee (ed.). 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine. 3rd edition. Smithsonian Inst. Press. Washington, D.C. 748 p.

Musick, J. A. and L. P. Mercer. 1977. Seasonal distribution of black sea bass, *Centropristis striata*, in the Mid-Atlantic Bight with comments on the ecology of fisheries of the species. *Transactions of the American Fisheries Society* 106(1):12-25.

NEFSC. 2006. 43rd Northeast Regional Stock Assessment Workshop (43rd SAW) 43rd SAW Assessment Summary Report. July 2006. (NEFSC Reference Document 06-14).

Shepherd, G.R. 1991. Meristic and morphometric variation in black sea bass north of Cape Hatteras, North Carolina. North American Journal of Fisheries Management. 11:139-148.

Steimle, F.W., C.A.Zetlin, P.L. Berrien and S. Chang.1999. Essential Fish Habitat Source Document: Black Sea Bass, *Centropristis striata*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-143.

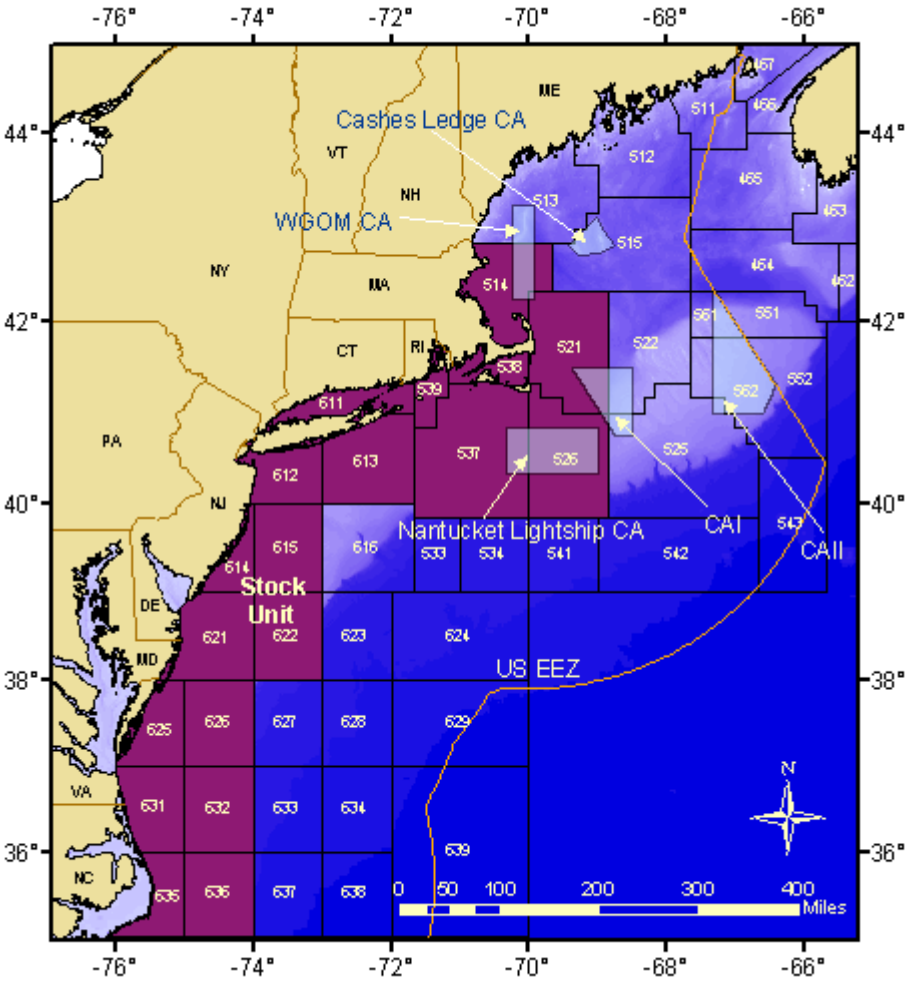

Figure 16.1. Statistical areas used to define the black sea bass stock.

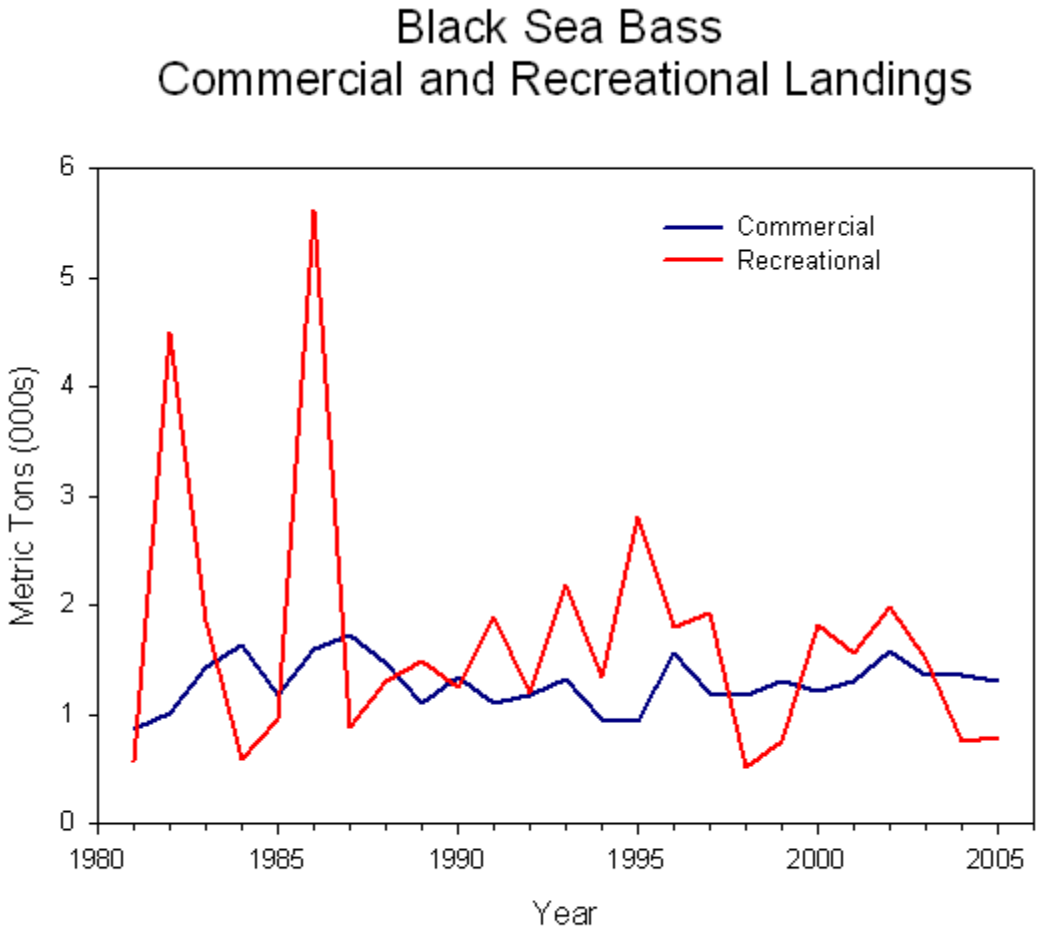

Figure 16.2. Black sea bass commercial and recreational landings (000s mt), 1981-2005.

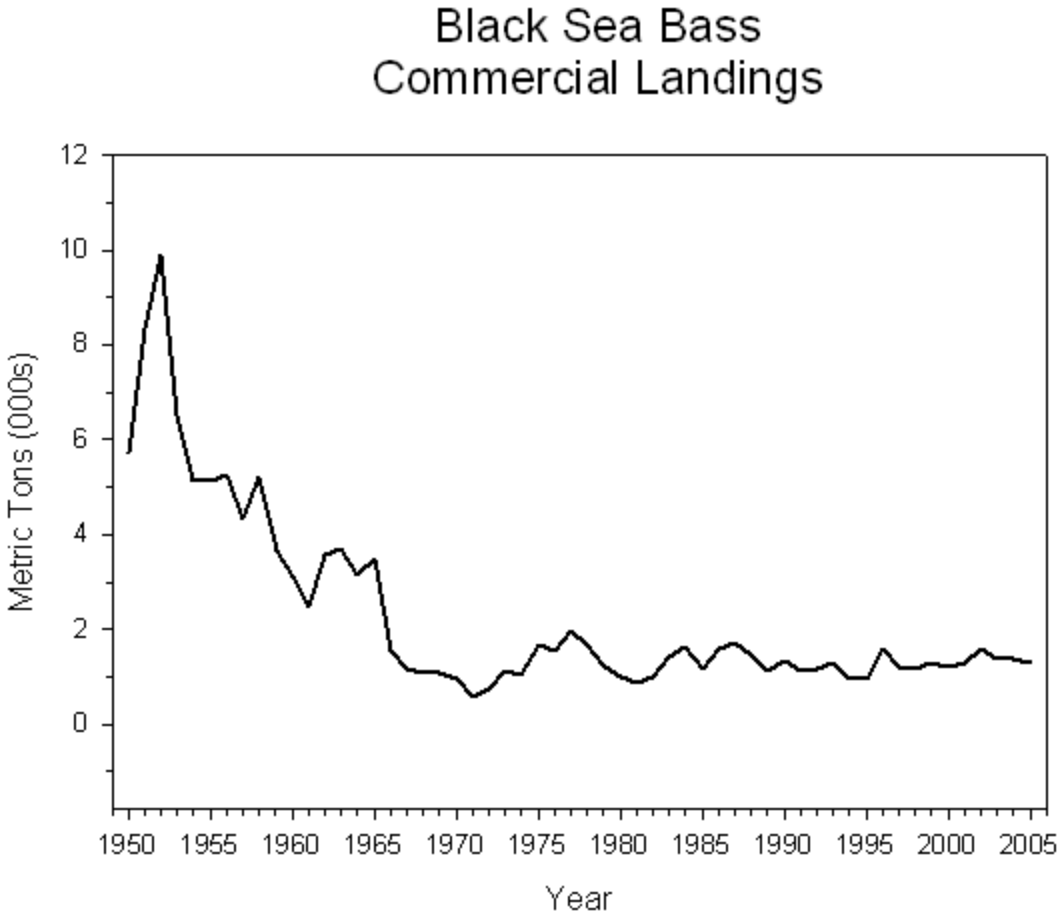

Figure 16.3. Black sea bass commercial landings (000s mt), 1950-2005.

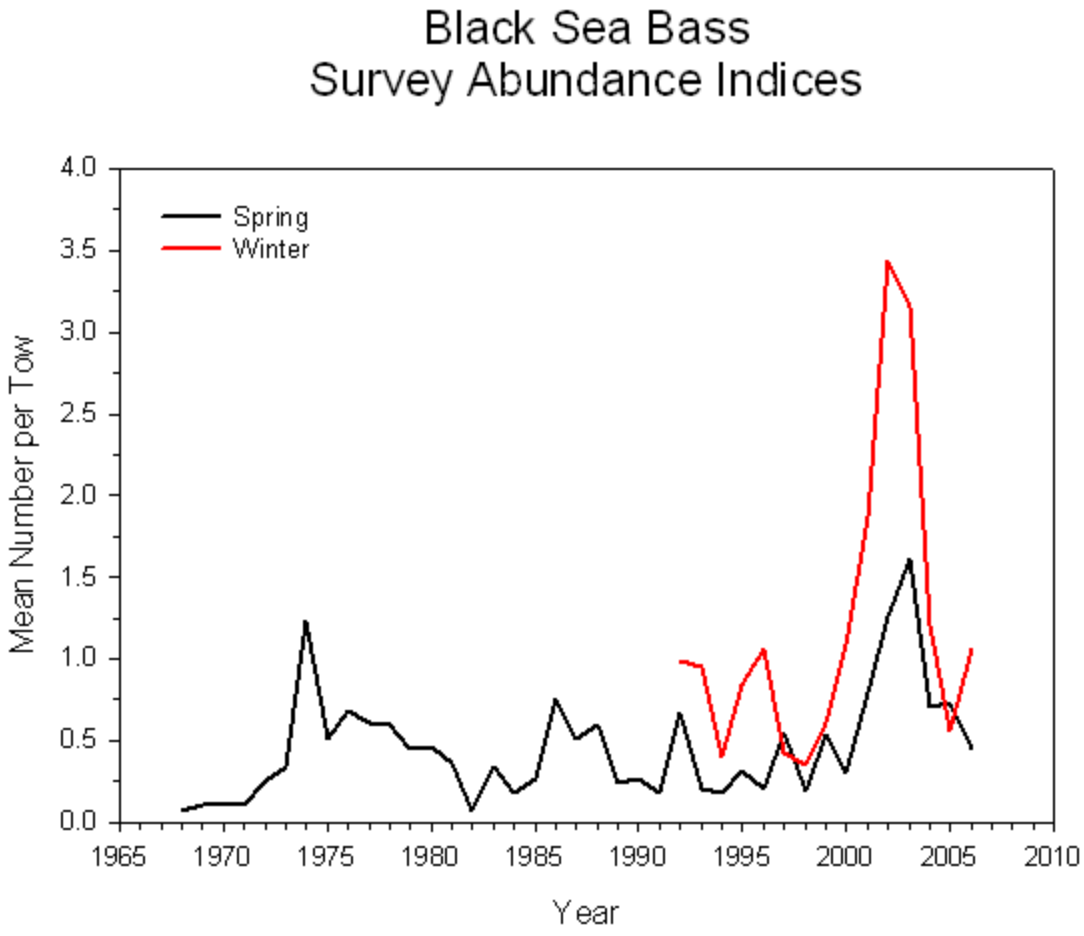

Figure 16.4. Black sea bass adult (>= 22 cm) abundance indices (re-transformed stratified mean number per tow) from NEFSC spring and winter surveys in the Mid-Atlantic strata.

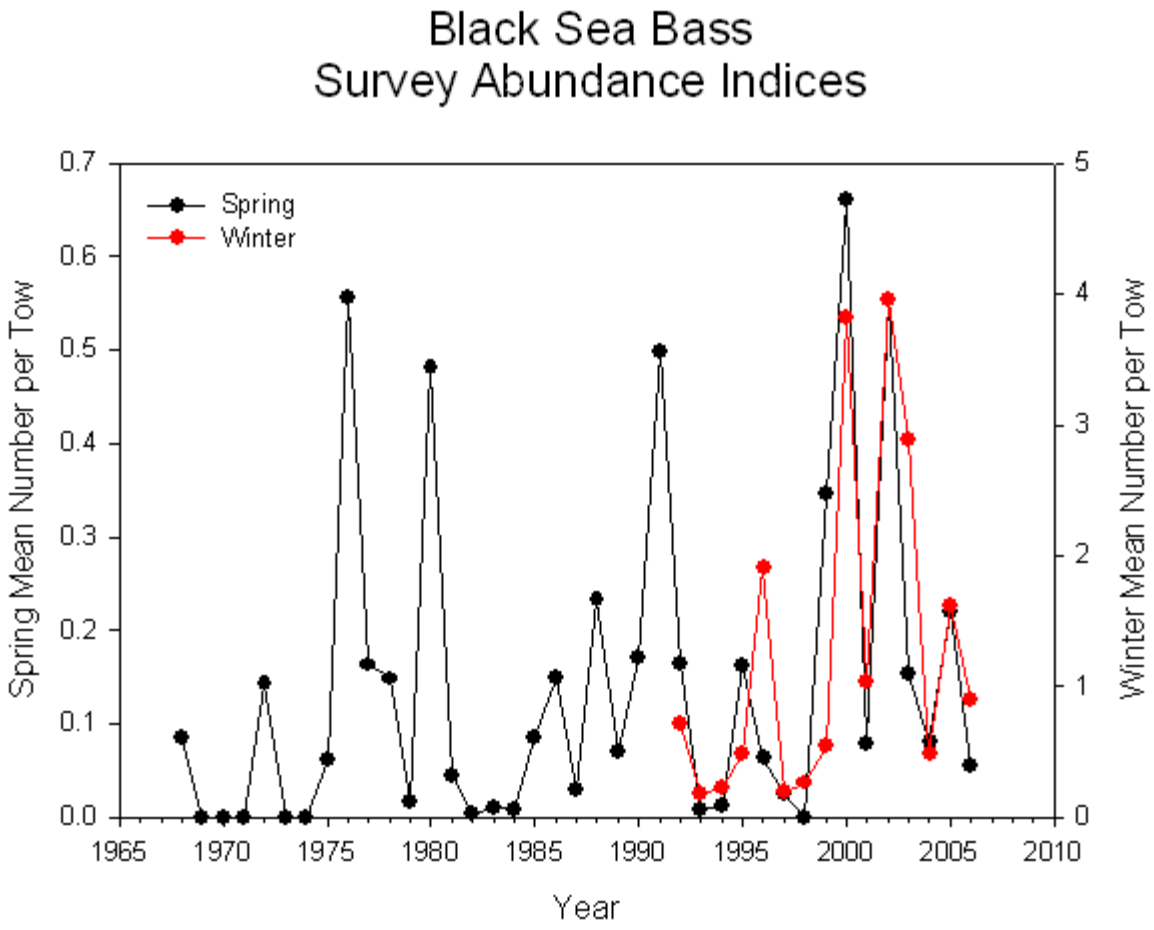

Figure 16.5. Mean number per tow of juvenile (<= 14 cm) black sea bass from NEFSC spring and winter surveys.

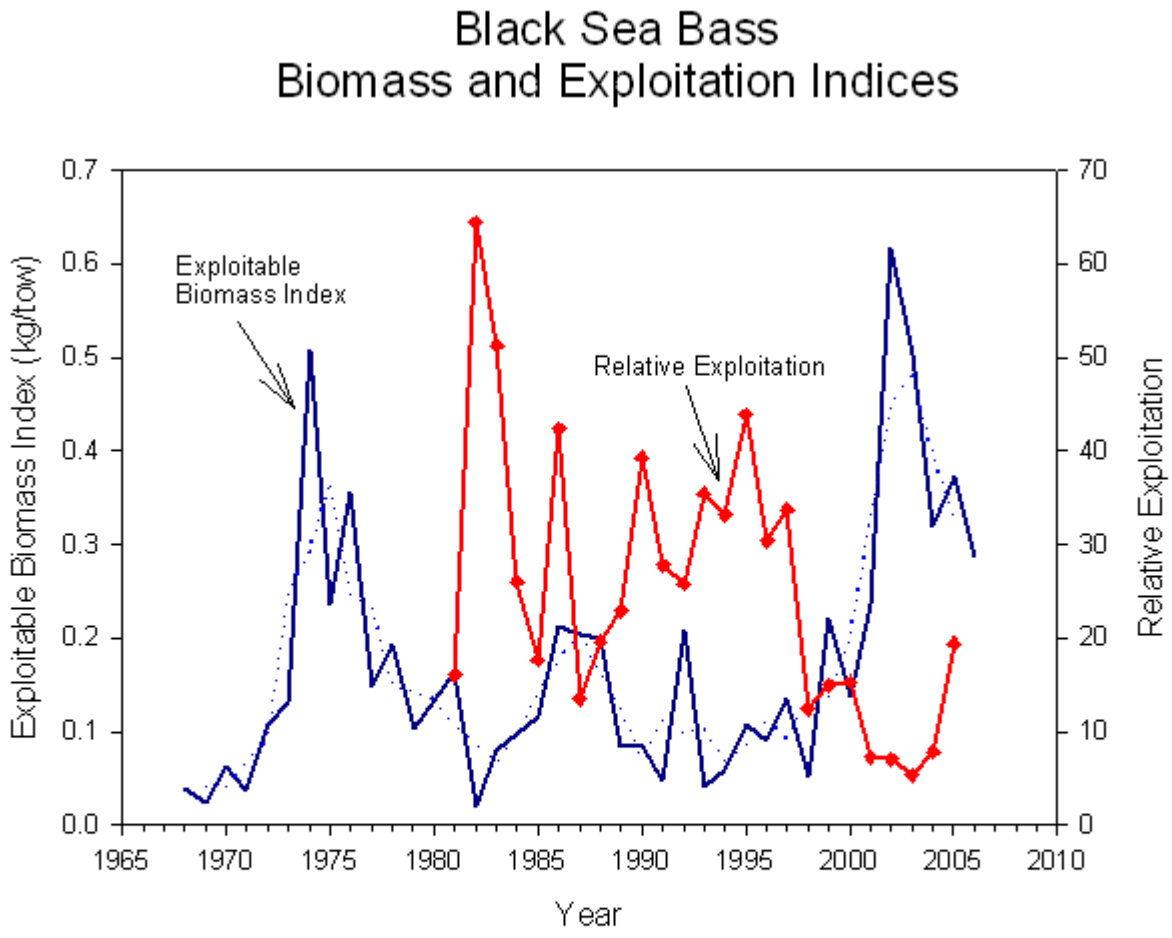

Figure 16.6. Black sea bass exploitable biomass index (NEFSC spring biomass index of fish >= 22 cm and relative exploitation index (catch/3 point moving average of exploitable biomass index survey). Three point moving average of index shown with dotted line.

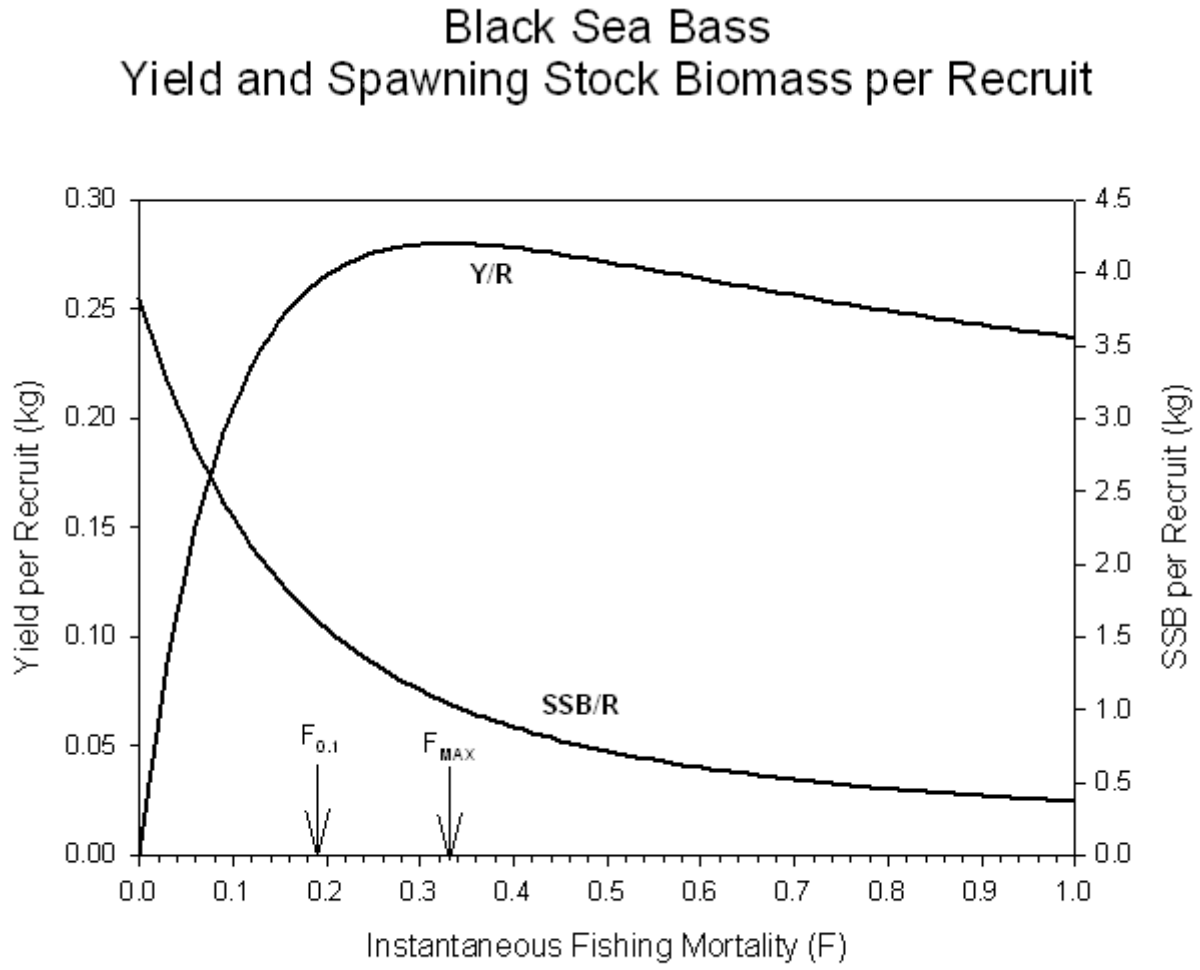

Figure 16.7 Yield and SSB per recruit reference points for black sea bass.