Seafood Watch
Seafood Report

MONTEREY BAY AQUARIUM®

Black Sea Bass
Centropristis striata

Northeast Region

Final Report
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About Seafood Watch® and the Seafood Reports

Monterey Bay Aquarium's Seafood Watch® program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch® defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. Seafood Watch® makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from the Internet (seafoodwatch.org) or obtained from the Seafood Watch® program by emailing seafoodwatch@mbayaq.org. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Report. Each report synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic to arrive at a recommendation of "Best Choices", "Good Alternatives" or "Avoid". The detailed evaluation methodology is available upon request. In producing the Seafood Reports, Seafood Watch® seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch® Fisheries Research Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch's sustainability recommendations and the underlying Seafood Reports will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Reports in any way they find useful. For more information about Seafood Watch® and Seafood Reports, please contact the Seafood Watch® program at Monterey Bay Aquarium by calling (831) 647-6873 or emailing seafoodwatch@mbayaq.org.

Disclaimer

Seafood Watch® strives to have all Seafood Reports reviewed for accuracy and completeness by external scientists with expertise in ecology, fisheries science and aquaculture. Scientific review, however, does not constitute an endorsement of the Seafood Watch® program or its recommendations on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

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Executive Summary

Black sea bass (*Centropristis striata*) represents an important species in both commercial and recreational fisheries along the entire U.S. Atlantic coast and especially throughout the mid- and north-Atlantic. The total annual landings of black sea bass are almost equivalent for commercial and recreational fishing. Inhabiting Atlantic coastal waters from the Gulf of Maine to the Gulf of Mexico, black sea bass are most prevalent from Cape Cod, Massachusetts to Cape Canaveral, Florida. Two distinct stocks of black sea bass are recognized: a mid-Atlantic stock (north of Cape Hatteras, North Carolina), and a south-Atlantic stock (south of Cape Hatteras). There is a third group of black sea bass, a subspecies, which occurs in the Gulf of Mexico. Black sea bass of the northern stock winter offshore between New Jersey and North Carolina and migrate north to inshore waters in the summer, where they are associated with natural and man-made structured bottom habitat. Black sea bass of the southern stock do not exhibit a migratory pattern and usually occur inshore with other tropical reef fish, such as snapper and grouper.

Black sea bass exhibit characteristics of resiliency to fishing pressure; they are relatively fast-growing and short-lived (<15 years). Black sea bass are protogynous hermaphrodites, changing from female to male, and mature within 2-4 years. Trawling, pots and traps, and hook and line are the most common methods utilized in capturing black sea bass. Some environmental disturbance, such as habitat destruction and bycatch, is associated with trawling and pots/traps. The severity of disturbance is dependent on gear components, the resiliency of the habitat being trawled, and the fish being targeted. Managers have tried to limit disturbance by placing regulations on trawling areas, fish size, and discard amount and type. Managers must now take into consideration the recent 2004 stock assessment presented for the northern stock, which indicated an improving stock rather than the 'overfished' and declining stock previously described. Despite management efforts for the southern stock, the stock remains overfished with overfishing occurring.

Northern stock

The status of the northern black sea bass stock has been determined largely by commercial and recreational landings, although the Northeast Fisheries Science Center (NEFSC) has conducted spring and autumn offshore surveys since 1972. Since the peak landing of 22 million pounds reported in the 1950s, commercial landings of black sea bass have declined substantially. Annual landings have fluctuated minimally over the past decade and remain equally divided between the commercial and recreational fisheries, mainly due to regulations and quota restrictions. Since the 1970s, commercial landings have varied between two and four million pounds (lbs). Recreationally, landings fluctuated between 6.5 and 19.6 million pounds from 1990 to 2000. The fishery has been subjected to early and lengthy closures over the past decade. In 1998 the stock assessment review committee (27th SARC) deemed the available data inadequate and insufficient for conducting an appropriate stock assessment. However, the black sea bass stock was deemed overfished with overfishing likely occurring. This stock status was consistent with the 2003 National Marine Fisheries Service (NMFS) Report to Congress, which stated that the stock was overfished with overfishing occurring. Recommendations included reducing mortality and continued rebuilding on an 8/10 year plan. Conversely, a tagging study conducted from 2001-2003 by the NEFSC and cooperative scientists produced opposite data.

The 2004 stock assessment workshop (SAW) results indicate that the stock is no longer overfished and that overfishing is no longer occurring.

The Atlantic States Marine Fisheries Commission (ASMFC) and the Mid-Atlantic Fishery Management Council (MAFMC) under the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan (FMP) manage black sea bass jointly. The joint plan includes all black sea bass in U.S. waters in the western Atlantic Ocean from Cape Hatteras, North Carolina, northward, including Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. Black sea bass is managed using an annual quota set by the MAFMC and ASFMC and distributed through an ASMFC-approved state-by-state allocation system. This joint management is an effort to coordinate management actions in both state and federal waters. States are responsible for the management of black sea bass.

Addendum VI to the Summer Flounder, Scup, and Black Sea Bass FMP coordinates fishing and quota restrictions. Currently, annual quotas are 51% for the recreational fishery and 49% for the commercial fishery. The main types of commercial gear used to harvest black sea bass are otter trawls and fish pots. Since the black sea bass trawl fishery is a mixed fishery, early closures may actually result in increased discards of legal-sized black sea bass during the closed period. Considerable discards are thought to occur in this mixed fishery, and habitat damage is thought to result from trawl gear. Little discard mortality is known to occur when using fish pots, although ghost fishing during the off-season may contribute to discards of black sea bass.

Overall, the northern stock of black sea bass is at an improved level, recently promoted from an 'overfished' status. Effects from the gears used in the black sea bass fishery include moderate bycatch, discards due to the nature of the mixed fishery, and habitat impacts from trawls and pots/traps. Management continues to adapt and change regulations in an effort to increase total biomass and spawning stock biomass as well as expand the age distribution within the population, as recommended by the 27th SARC (1998) (SARC 39, 2004 – NMFS, 2004d). Although the stock status has improved, there is a high degree of uncertainty in the new estimates. This results in an overall recommendation of Good Alternative for the northern stock of black sea bass.

Southern stock

The southern stock of black sea bass is severely overfished. Sharing basic life history characteristics with black sea bass of the northern stock, black sea bass of the southern stock are less migratory. The main fishing methods used in the fisheries of the southern stock are pots/traps and hook and line. Trawling was banned in the southern black sea bass fishery in 1998. This ban reduces bycatch potential and is designed to improve the numbers and size of the southern black sea bass population. The southern black sea bass stock is managed under the Snapper-Grouper FMP, established by the South Atlantic Marine Fisheries Council (SAMFC). Commercial and recreational landings are approximately equal. Though the fishery has made improvements over the years, these improvements have been minimal. The southern stock is currently listed as overfished with overfishing occurring. This is of critical conservation concern and results in an overall seafood recommendation of Avoid for the southern black sea bass stock.

Table of Sustainability Ranks

	Conservation Concern			
Sustainability Criteria	Low	Moderate	High	Critical
Inherently Vulnerability	√			
Status of Stocks		√ Northern		√ Southern
Nature of Bycatch	√ Pots/traps	√ Trawl		
Habitat Effects		√ Pots/traps	√ Trawl	
Management Effectiveness		√ MAFMC	√ SAFMC	

About the Overall Seafood Recommendation:

- A seafood product is ranked "**Avoid**" if two or more criteria are of High Conservation Concern (red) OR if one or more criteria are of Critical Conservation Concern (black) in the table above.
- A seafood product is ranked "**Good Alternative**" if the five criteria "average" to yellow (Moderate Conservation Concern) OR if the "Status of Stocks" and "Management Effectiveness" criteria are both of Moderate Conservation Concern.
- A seafood product is ranked "**Best Choice**" if three or more criteria are of Low Conservation Concern (green) and the remaining criteria are not of High or Critical Conservation Concern.

Overall Seafood Recommendation:

Black sea bass, northern stock (north of Cape Hatteras, North Carolina):

Best Choice | **Good Alternative** | Avoid

Black sea bass, southern stock (south of Cape Hatteras, North Carolina):

Best Choice | Good Alternative | **Avoid**

Introduction

Black sea bass (*Centropristis striata*) is a member of the order Perciformes and family Serranidae. Black sea bass (BSB) inhabit nearshore waters along the U.S. Atlantic coast and the Gulf of Mexico. Within this geographical range, the species is identified by one of three stocks: northern or mid-Atlantic (north of Cape Hatteras, North Carolina to Nova Scotia); southern or south-Atlantic (south of Cape Hatteras to southern Florida); and the Gulf of Mexico (Steimle et al. 1999). The mid-Atlantic stock is considered distinct from the south Atlantic stock and there is probably little overlap in habitat use by these two populations (ASMFC and MAFMC 1996). The Gulf of Mexico stock is considered a distinct subspecies within the southern range. These distinct genetic stocks result from a fairly long period of population separation by many tens or hundreds of thousands of years (Bowen and Avise 1990). This seafood report focuses mainly on the northern/mid-Atlantic black sea bass stock and associated fishery with additional information to help guide consumers of black sea bass from the southern stock. Overall, commercial and recreational landings are much greater for the northern stock than for the southern stock.

Like other members of the Serranidae family, black sea bass are protogynous hermaphrodites, changing from female to male as they age. BSB undergoing sexual transition can be found throughout the year. The transformation from female to male generally occurs between ages 2 and 5. BSB are associated with hard substrates such as pilings, artificial reefs, and natural reefs at depths ranging from 2-120 meters (m). Black sea bass are a strictly saltwater species, although estuaries do serve as important habitat for young part of the year. Black sea bass of the northern stock migrate in response to seasonal temperature changes (ASMFC and MAFMC 1996). Their depth range varies with the season as the northern stock migrates offshore (greater depths) and southward in the fall and winter, and inshore and northward during the spring and summer. During the inshore summer months, black sea bass of the northern stock are generally found in waters less than 36 m deep, on hard bottom substrate. While offshore, they are generally found adjacent to ledges and banks with hard rock and coral substrate. Northern populations are known to be more migratory than the populations south of Cape Hatteras (McGovern et al. 2002). Spawning for the northern stock progresses seasonally from south to north, and starts as early as April off the coast of North Carolina and Virginia (Able et al. 1995). Spawning continues from June through October, peaking in August. In the northern stock, black sea bass spawn primarily on the intercontinental shelf between Virginia and Massachusetts at depths of 10-50 m.

The southern black sea bass stock demonstrates a less migratory pattern than the northern stock. The greatest percentage of females in the southern stock spawns from March through May. Black sea bass of the southern stock can tolerate temperatures from 6 to 29.8°C and a minimum salinity of 7.7 ppt (parts per trillion), though they usually cannot tolerate salinity less than 12 ppt (Musick and Mercer 1977).

Availability of Science

Life history information is widely available for black sea bass. However, few resources report identical information regarding life history, fecundity, size, and longevity. Intrinsic rate of increase was not found in any data researched for this report. With the exception of life history

data, information on the southern stock and its management is limited. Additionally, stock reports are limited regarding management parameters, such as B_{MSY}. Reports on stock status are highly variable due to limited data, with fishery commissions, councils, government reports, and academic journals reporting inconsistently on stock status.

Market Availability

Common and market names:
Black sea bass is also known as Atlantic sea bass, Black will, Chub, Sea Bass, Black fish, Tally-wag, hannahil, Black-Harry, black perch, black bass, blue fish, pin bass, and rock bass (ASMFC and MAFMC 1996; fishbase.org). There are many types of sea bass and it may be difficult for the consumer to locate black sea bass if the market identifies the product only by 'sea bass'.

Seasonal availability:
Black sea bass is available year-round. The highest landings of black sea bass occur in the fall prior to their movement offshore (Shepherd et al. 2002).

Product forms:
Black sea bass is sold whole, fresh, or frozen. Its taste and texture is similar to that of croaker, scup, sea trout, spot, and snapper (Virginia Seafood). It is marketed fresh and eaten fried, broiled, or baked (fishbase.org).

Import and export sources and statistics:
No black sea bass is imported into the U.S. There are no records on the trade of black sea bass, only sea bass in general.

Analysis of Seafood Watch® Sustainability Criteria for Wild-caught Species

Criterion 1: Inherent Vulnerability to Fishing Pressure

Like most members of the family Serranidae, black sea bass are protogynous hermaphrodites. They mature as females but change sex to males as their size increases. Black sea bass are relatively short-lived and attain their maximum size slowly (K=0.231) (Mercer 1989). They also exhibit faster growth as females than after they change to males. A variety of data on the life history characteristics of black sea bass are reported. For example, Shepherd (2000) reports that females are rarely found older than 8 years (>35 cm or 14 in), and reports a maximum age for black sea bass of 15 years (>60 cm or 24 in), while Steimle et al. (1999) reports that Mid-Atlantic Bight black sea bass can live up to 20 years and reach lengths of 24 inches. The maximum age for black sea bass reported by Fishbase.org is 10 years. Fishbase.org also reports lengths rarely exceeding 20 inches (ASMFC 2003b). Black sea bass in the Mid-Atlantic Bight begin to mature at age 1 (8-10 cm total length) and 50% are mature at age 2-3 (~19 cm standard length). Females reach maturity between ages 1 and 3 (Hood et al. 1994), and transform to males when they reach the size range of 23.9-33.7 cm total length (TL), between the ages of 2

and 5 (SAFMC 2003). The availability of males may be an important factor limiting reproductive potential.

Black sea bass migrate between estuarine and offshore areas. Northern black sea bass undertake seasonal migrations north of Cape Hatteras, moving inshore and north in the spring and offshore and south in the fall. In the spring, adults inhabit coastal spawning areas and subadults return to estuarine nursery areas. Black sea bass primarily spawn in the Mid-Atlantic Bight between Chesapeake Bay and Massachusetts between the late spring and mid-summer at depths of 20-140 feet. In the southeastern U.S., black sea bass spawn from January through July with the greatest percentage of females spawning between March and May (SEDAR). Female black sea bass are estimated to spawn every 2.69 to 4.56 days or 34 to 20 times, respectively, during the spawning period (McGovern et al. 2002). Fecundity estimates range from 17,000 to 1 million eggs per female (USFWS 1999), with a population doubling time of 1.4-4.4 years. Mercer (1989) reports that 2-5-year-old fish release 191,000 to 369,500 eggs each.

Black sea bass, like many coastal marine fishes, utilize coastal and estuarine habitats for juvenile development. Both juveniles and adults migrate to offshore areas in the fall (Bowen and Avise 1990). These seasonal migrations are in sync with other temperate species, such as scup, summer flounder, northern sea robin, spotted hake, butterfish, and smooth dogfish, which are intolerant of the colder inshore winter waters (Steimle et al. 1999). As the waters in the north cool with the season, the northern population appears to migrate offshore during October and November to the deeper (73-165 m) and warmer waters of the Chesapeake Bight (Lux and Nichy 1971). It reappears with the re-warming of the water in the early weeks of May (Mercer 1989). The highest landings of black sea bass occur in the fall, prior to their movement offshore (Shepherd et al. 2002).

Synthesis

Black sea bass are short-lived, highly fecund, and relatively fast-growing, maturing in less than 5 years. While their narrow range and seasonal migrations make them somewhat more susceptible to fishing pressures during certain times of the year, overall, their life history characteristics make black sea bass inherently resilient to fishing pressure.

Table 1. Life history characteristics of black sea bass

Common Name	Species Range	Growth Rate/Max Size	Age at Maturity	Longevity	Fecundity
Northern BSB	Nova Scotia to Cape Hatteras, NC	26 in TL, 5 lbs 66.0 cm TL, 2.3 kg	2-5 years 19 cm TL	Various reports: 15-20 years	17K – 1M eggs
Southern BSB	Cape Hatteras, NC to southern Florida	24 in TL, 6 lbs 61 cm, 2.7 kg	2-5 years 19 cm TL	Various reports: 15-20 years	30K – 500K

Inherent Vulnerability Rank: **Resilient** Neutral/Unknown Vulnerable

Criterion 2: Status of Wild Stocks

Northern stock

Black sea bass is one of four species managed jointly by the Atlantic States Marine Fisheries Commission (ASMFC) and the Mid-Atlantic Fishery Management Council (MAFMC). The northern stock assessment includes North Carolina (north of Cape Hatteras), Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine. A fishery management plan was initially established in 1996 due to overexploited stocks and low levels of abundance. The recent stock assessment workshop (SAW July 2004) reported that the black sea bass stock is not overfished (current index > $0.5*B_{MSY}$ proxy index) and overfishing is not presently occurring ($F_{2003}<F_{MAX}$ proxy for F_{MSY}) (NMFS 2004d). The preceding stock assessment workshop (SAW June 1998) had declared the stock over-exploited and at a low biomass level (NEFSC 1998). The 27th SARC Report (1998) and the 2003 National Marine Fisheries Service (NMFS) Report to Congress declared the northern stock of black sea bass overfished with overfishing occurring (NFMS 2004e). The current change in population status is based on the results of a tagging study performed by the Northeast Fisheries Science Center.

In 1998, the Stock Assessment Review Committee (SARC) found the black sea bass stock to be over-exploited and at a low biomass level (SAW 27). Fishing mortality rates between 1984 and 1987 were estimated to be well above F_{MAX} (F=0.32) with a mean value of F=0.68. The age structure in these years was highly truncated, possibly resulting in a shortage of males and disruption of reproduction. However, the SARC concluded that the data were insufficient and inadequate for making an assessment using either age-based or surplus production models (ASMFC 2003; Shepherd pers. comm.). Insufficient sea and biological sampling was blamed for the insufficient data. The stock status determination of overfished with overfishing occurring was based on landings data and survey indices (Toni Kerns, pers. comm.).

Black sea bass was added to the joint ASMFC/MAFMC Summer Flounder and Scup FMP in 1996. The MAFMC approved regulations for black sea bass as Amendment 9 to the Summer Flounder and Scup FMP in May 1996 and the ASMFC approved the black sea bass (BSB) FMP in October 1996. Amendment 8 established management measures for scup. The final and current FMP is for summer flounder, scup and black sea bass. The goal of the BSB FMP was to reduce fishing mortality rates from 1996 levels (1.05) to F_{MAX} (0.29 – now 0.32) over an 8-year time frame. It was believed that this reduction in fishing mortality, along with regulations on minimum fish size and gear could rebuild the stock such that sustainable yields were possible (ASMFC 2003).

Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass FMP, approved in 1999, revised the overfishing definitions for black sea bass based on National Standards (8, 9, and 10) and the Sustainable Fisheries Act. Amendment 12 established F at 0.32 (previously 0.29) and the biomass threshold as the maximum value of a three-year moving average based on a NEFSC spring 2003 survey (1977-1979 average of 0.9 kg/tow). The reported 2002 biomass index was 1.26 (2001-2003 average; 40% above threshold), indicating the stock was no longer overfished. However, these numbers are questionable as one single tow can severely alter resulting indices (ASMFC 2003b). In addition to fishery-independent data, recreational landings data supported an improvement in the fishery with an increase in landings per hour fished of 48% from 1999 to

2001 (ASMFC 2003b). Based on the spring survey, exploitation rates in 2002 decreased relative to the 1998 values; assuming a 48% rate for 1998 using length-frequency data, the exploitation rate for 2002 was 29%, 8 percentage points below the target exploitation rate of 37%.

The 39th SAW report, based on a two-year Cooperative Tagging Study, concluded the stock is no longer overfished and overfishing is not occurring. The average exploitable biomass between 2002 and 2004 (1.43 kg/tow) exceeded the biomass threshold of 0.98 kg/tow (1977-1979 average) (NMFS 2004d). Although the 2004 recruitment index was below the average, the highest indices in the series occurred in 2000 and 2002 (NMFS 2004d). Results from the 29th SAW report also support lower exploitation rates, although the numbers differ slightly from the ASMFC 2003 report referenced above. These results show a level of exploitation at or below the management target and biomass levels compared to the 1970s (NMFS 2004d). Tag recapture data indicate an exploitation rate less than 17% (F=0.21) from October 2002 to October 2003 and a rate less than 21% (F=0.26) from May 2003 to August 2004 (NMFS 2004d). The assessment group concluded that the stock appeared to be below the target exploitation rate and target F. The assessment group recommends exercising caution when setting quotas because of an unknown degree of uncertainty in these estimates.

Both commercial and recreational fisheries impact the status of black sea bass stocks. From 2002 to 2003, most commercial landings in the northern stock were taken with fish pots (42%), otter trawls (40%), and hook and line gear (12%). Since 1981, commercial landings have varied without trend; recreational landings have remained steady. Figure 1 illustrates commercial and total landings data since 1960, including exploitable biomass of black sea bass from 1968 to 2000 (see also Figure 2). The 2002 commercial landings of 3.6 million pounds were an increase of 33% relative to the 2001 landings of 2.8 million pounds. Figure 3 demonstrates commercial landings data from 1970 to 2002. Although numbers have fluctuated over the years, short-term results indicate that stocks are improving. The 2003 landings were equal to the 1981-2000 average, 3.1 million pounds, substantially below the estimated landings of 21.8 million pounds in 1952 (NEFSC 1998). A significant increase in biomass over the past six years was indicated by the spring and winter trawl survey results (39th SAW Assessment Report).

Historically, black sea bass has been a major component of recreational fisheries along the U.C. East Coast. The peak season for recreational fishing on the Atlantic coast runs from May to September. In 1987, black sea bass was the most numerous reported species caught by ocean anglers on private boats in South Carolina (southern stock) and the second most numerous in the state's overall marine recreational landings (Low and Waltz 1991). Recreational landings have increased since the early to mid 1990s and are now comparable in magnitude to commercial fishery landings data (Figure 4). Between 1981 and 1997, recreational landings averaged 2000 metric tons (mt) per year, accounting for 31 to 79% of the total landings of black sea bass. A decrease in catch of 68% occurred between 1997 and 1998, but this was most likely due to an increase in minimum size from 9 in to 10 in TL (Shepherd 2000). In total, landings were estimated at 4.5 million pounds in 2002 or about 0.6 million lbs above the 1981-2002 average.

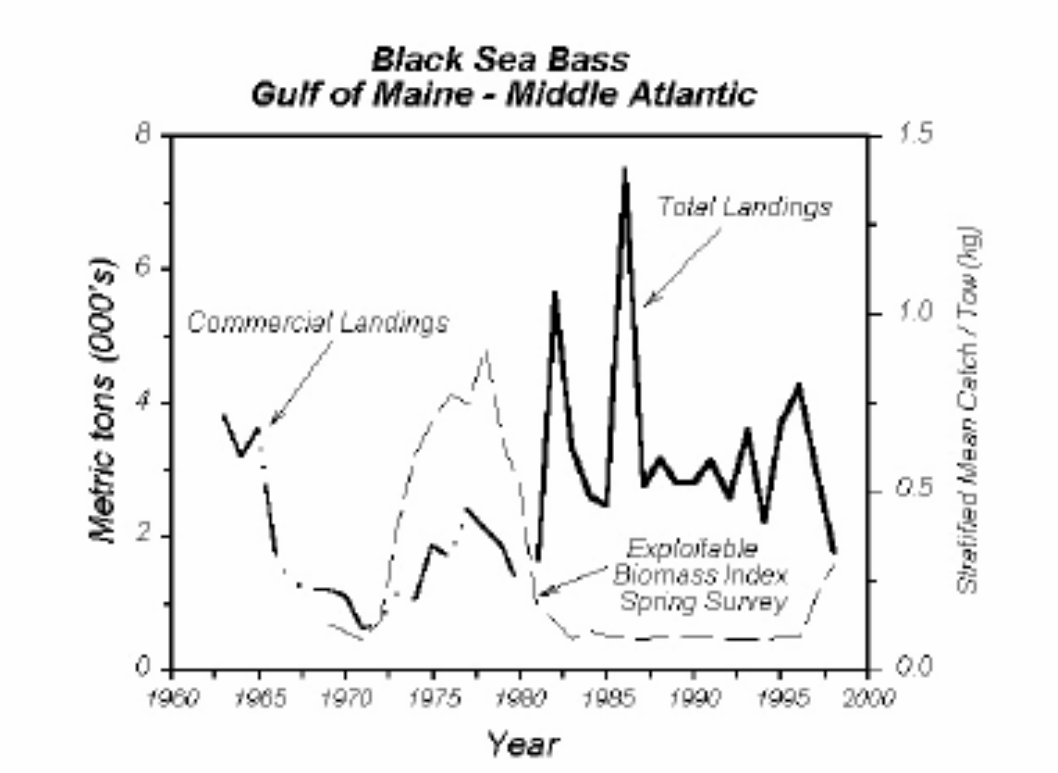


Figure 1: Recreational and commercial landings (metric tons). Graph from Shepherd, 2000. www.nefsc.noaa.gov

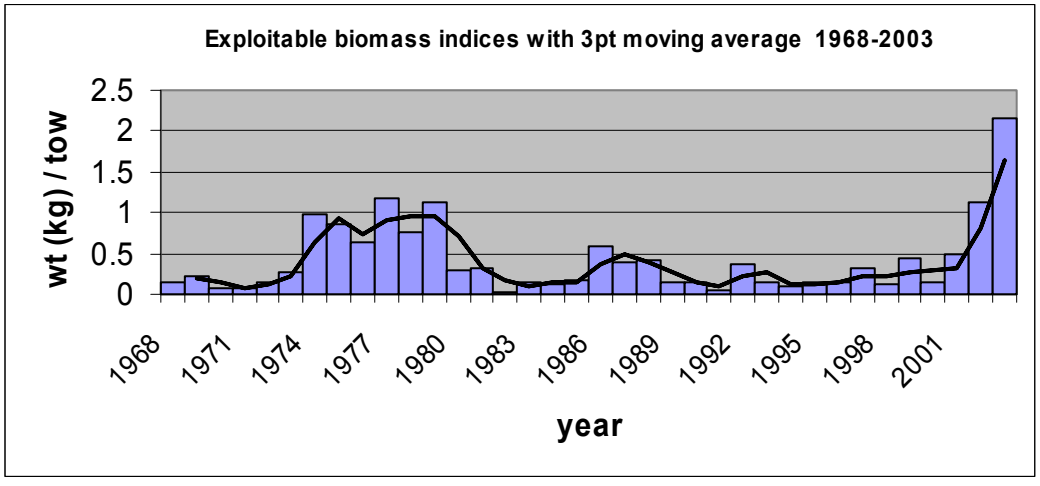


Figure 2: Exploitable biomass indices with 3pt moving average. Data from Moore, 2003.

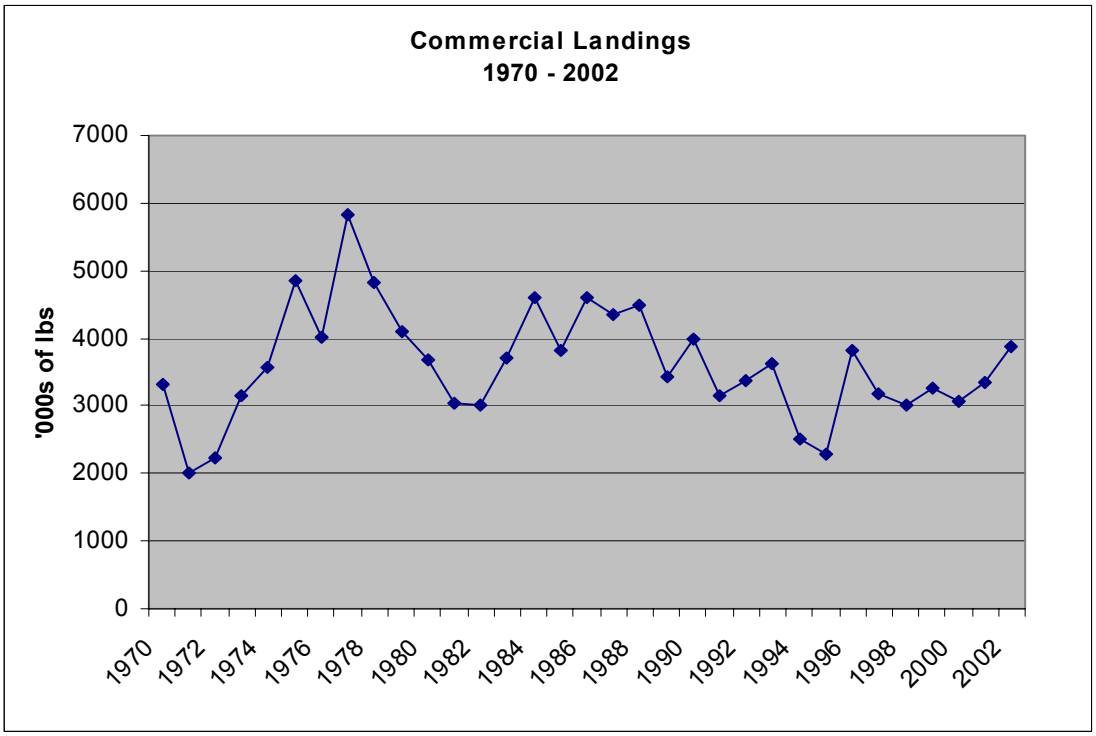


Figure 3: Commercial landings of BSB, 1970 – 2002. Data from NMFS.

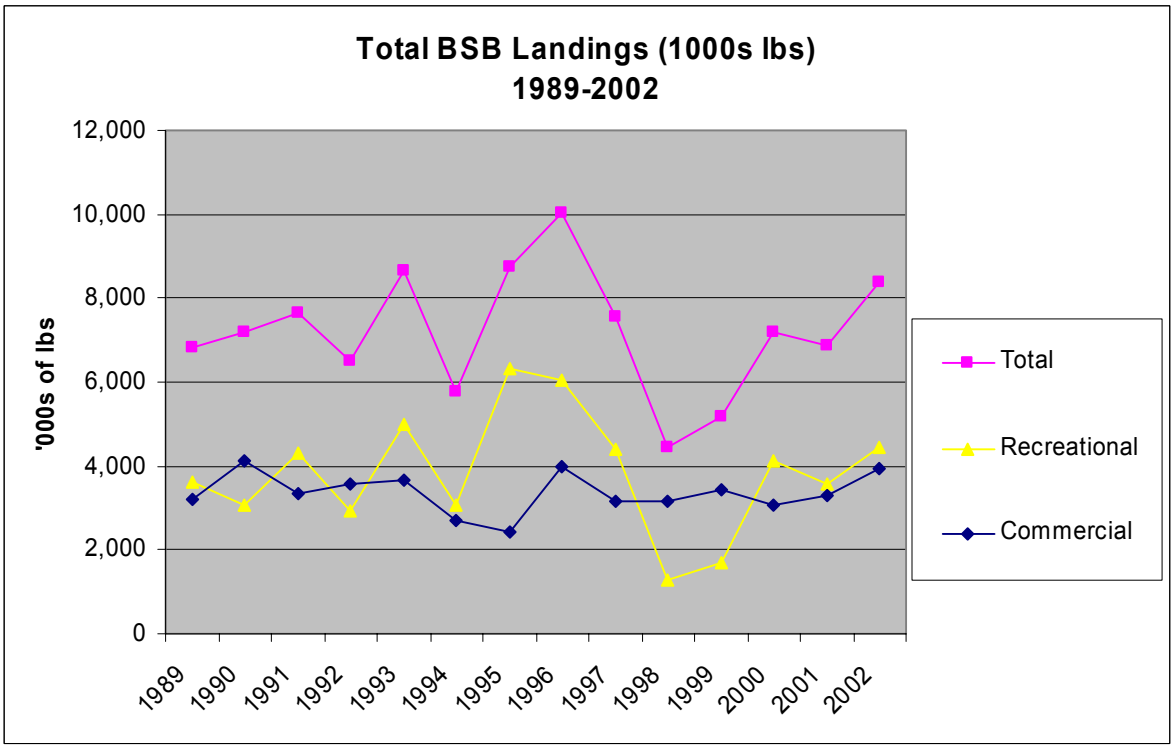


Figure 4: Total black sea bass landings, 1989-2002, commercial and recreational. All data from NMFS (Statistics and MRFSS).

The 2003 Northeast Fisheries Science Center (NEFSC) spring survey also indicates good 1988, 1990, 1991, and 1992 year classes. The year 1995 represented a moderate year class, whereas poor classes existed in 1993, 1994, and 1996-1998. Both 2000 and 2002 results indicated good year classes, with the 2002 index about three times the average for the period and the fourth largest value since 1968. Results for 2003 indicated a moderate year class (ASMFC 2003).

Southern stock

The southern stock of black sea bass is 'overfished' with overfishing occurring. A stock assessment workshop conducted in January 2003 estimated the stock at 30% minimum stock size threshold (MSST) (2002 spawning stock size 22% of spawning stock biomass, SSB_{MSY}, and 2001 fishing mortality rate of 628% F_{MSY}). F relative to F_{MSY} peaked in 1999 at about 10X F_{MSY}, reducing to 5X F_{MSY} by 2001. SSB decreased from 35% of SSB_{MSY} in the early 1980s to 13% in 2002. Population size of black sea bass decreased from about 4 million during 1979 to about 2.2 million in 1986, followed by an increase of over 3 million in 1988 and 1989 before a decrease to 1.4 million in 1995 (Vaughan et al. 1995). Since black sea bass are protogynous, the use of total mature biomass is recommended for estimation of spawning biomass rather than female mature biomass. Figure 5 demonstrates the results of SSB assessment conducted by the Southeast Fisheries Science Center (SEFSC) in 2003.

The South Atlantic Fisheries Management Council (SAFMC) manages black sea bass south of Cape Hatteras along the eastern shores of Florida under Amendment 9 to the Snapper-Grouper FMP. Black sea bass are targeted by recreational, headboat, and commercial fisheries. Both the recreational and headboat fisheries use mainly hook and line gear. The commercial fisheries commonly use traps or pots, and hook and line gear (Figure 6); trawling for black sea bass was banned in January 1989 (SAMFC 2003). Decreased landings and increased size were the expected results of the measure to ban trawling for BSB (McGovern et al. 2002). The assessment period (1979-2001) indicates little trend in landings over the past 20 years in either the trap or hook and line commercial fishery. The trap fishery peaked in 1981 at 455 mt and has averaged around 236 mt; the line fishery averages around 90 mt. Similar to the northern fishery, commercial and recreational landings of black sea bass are approximately equal in the southern fishery (Figure 7).

McGovern et al. (2002) found that the CPUE of black sea bass declined from the early 1980s to 1993 and then began to increase in 1997. The mean length of black sea bass also decreased until 1998. Declines in the mean size and CPUE of black sea bass are possibly due to minimum size limits implemented in 1983, additional restrictions, and the banning of trawling in 1989. Heavy fishing in the region possibly altered black sea bass sex ratios and removed the larger, faster-growing fishes from the population over generations (McGovern et al. 2002). Despite these attempts to successfully manage the southern stock, it remains overfished with overfishing occurring.

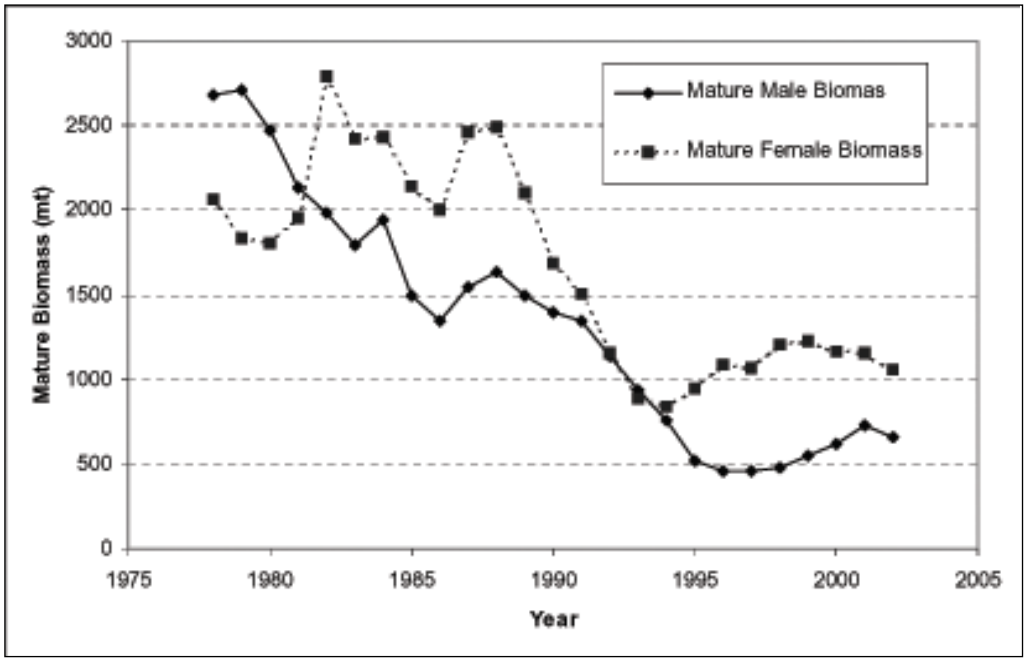


Figure 5: Mature SSB by sex from the central run of BSB 2003. SEFMC 2003. Based on runs of the age-structured model.

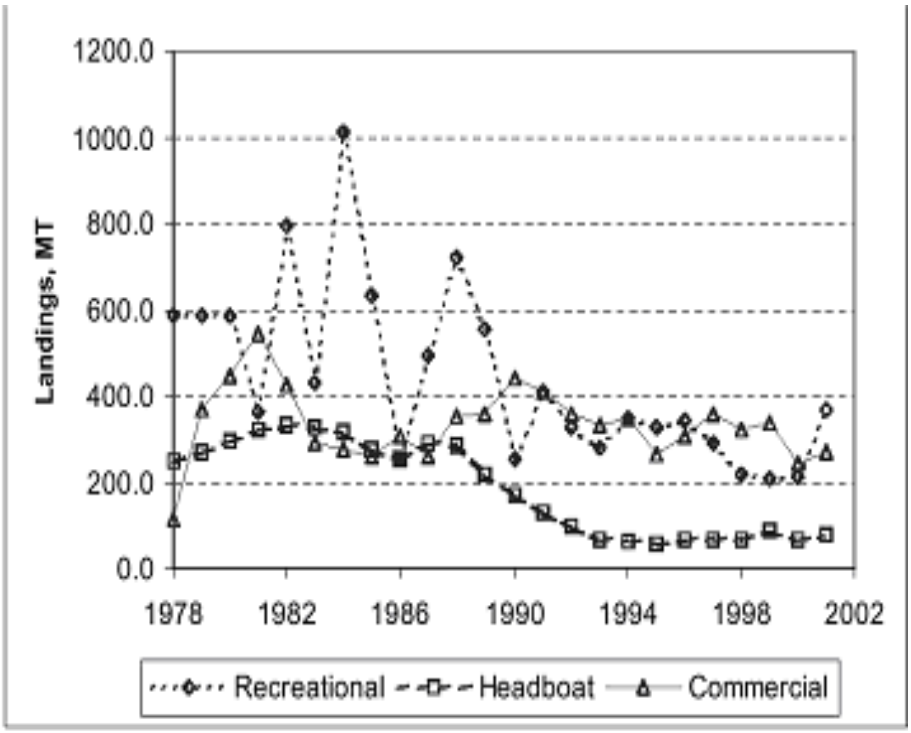


Figure 6: Types of gear used in southern black sea bass fishery (SAFMC 2003)

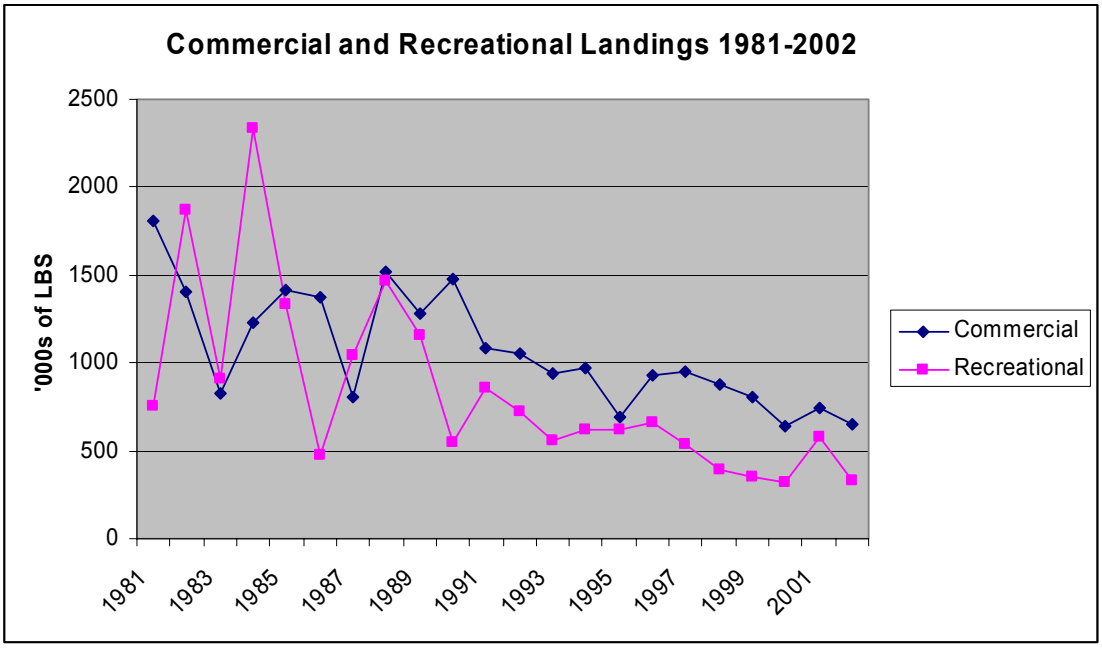


Figure 7: Commercial v. recreational landings in the southern black sea bass fishery. Data from NFMS Fisheries Statistics and MRFSS

A comparison of the commercial (Figure 8) and recreational (Figure 9) fisheries between the northern and southern stocks demonstrates a much greater fishery in the northern stock.

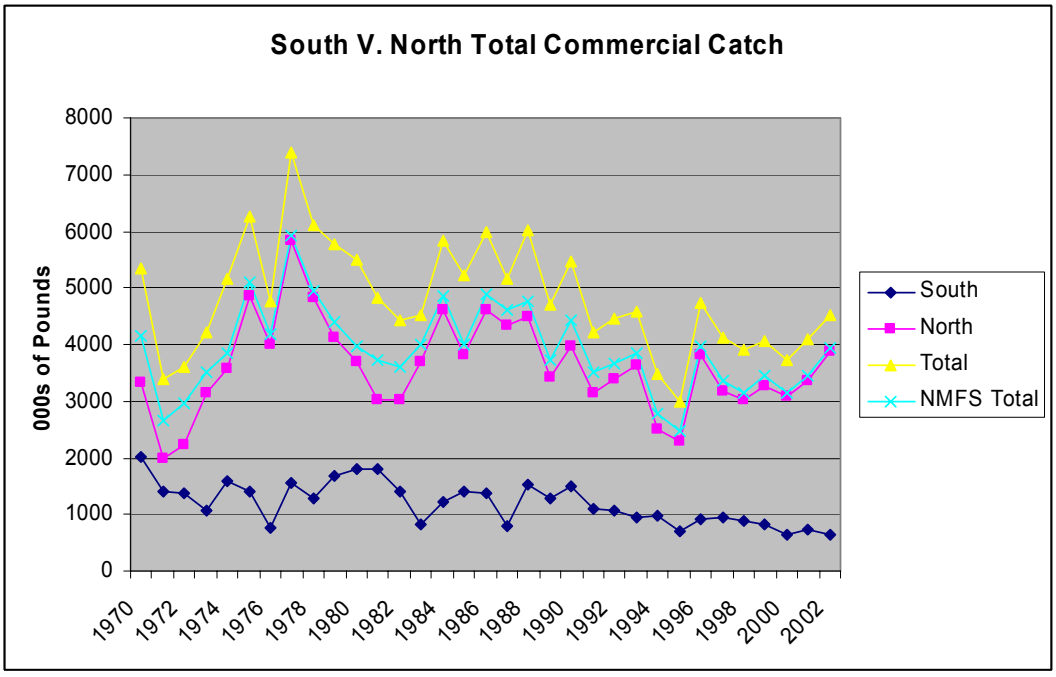


Figure 8: Commercial catch by southern, northern, and total BSB stock. The total stocks differ because management includes all of NC catch in both the southern and northern assessments. Data from NMFS.

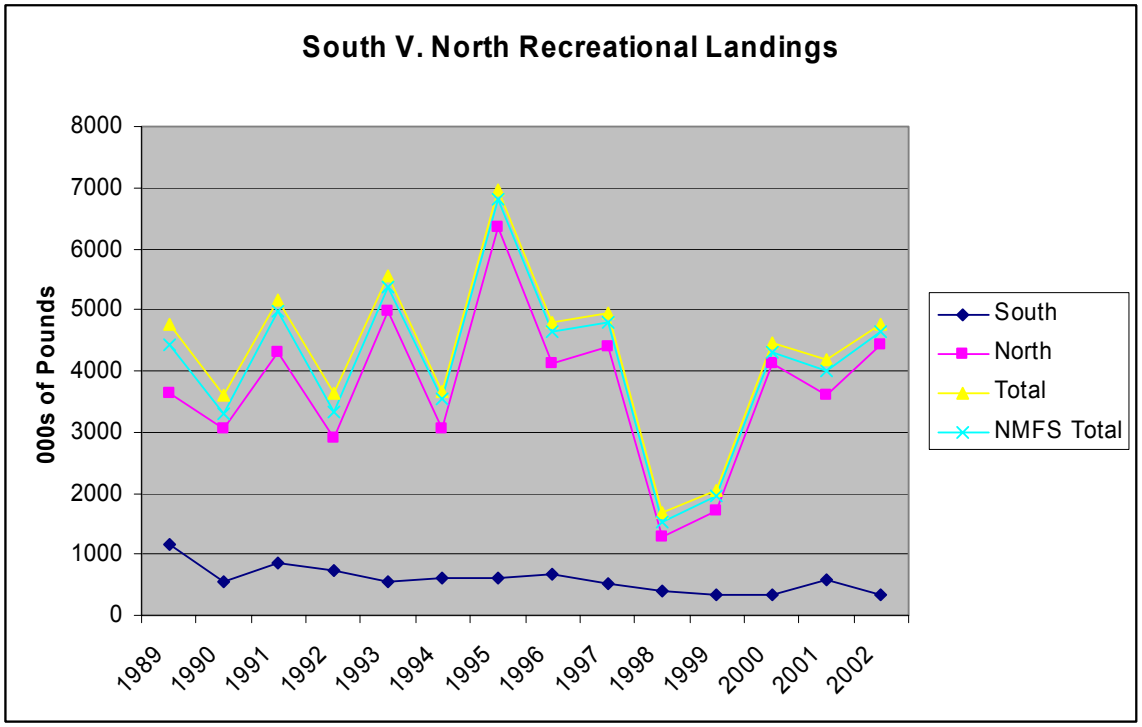


Figure 9: Recreational catch by southern, northern, and total stock. The total stocks differ because management includes all of NC catch in both the southern and northern assessments. Data from NMFS, MRFSS.

Synthesis

Northern stock

The northern stock of black sea bass is no longer overfished. Labeled overfished in the 1990s, an FMP was developed in 1996 with an 8-year recovery plan for the stock. The 1998 SARC meeting was unable to assess the stock due to insufficient data as a result of inadequate sampling. The 2004 SARC meeting indicated the stock was no longer overfished, although there is some degree of uncertainty in the estimates. Long-term landings data show that catch and biomass have been low since the 1950s. However, in the short-term, the trend is increasing. No information was found regarding the current age, size, or sex distribution of the northern BSB stock relative to natural conditions. Due to its current improving status, the status of the northern black sea bass stock is ranked a 'moderate' conservation concern.

Southern stock

The southern black sea bass stock is overfished with overfishing occurring. Trends do not indicate any improvement. Therefore, the status of the southern black sea bass stock is ranked a 'critical' conservation concern.

Status of Wild Stocks Rank:

Healthy	**Moderate/Rebuilding (Northern)**	Poor	**Critical (Southern)**

Criterion 3: Nature and Extent of Bycatch

Seafood Watch® defines sustainable wild-caught seafood as marine life captured using fishing techniques that successfully minimize the catch of unwanted and/or unmarketable species (i.e., bycatch). Bycatch is defined as species that are caught but subsequently discarded (injured or dead) for any reason. Bycatch does not include incidental catch (non-targeted catch) if it is utilized, accounted for and/or managed in some way.

The major gears used to land black sea bass are otter trawls, fish pots and traps, and hand lines (hook and line gear). Percentages of the total landed weight of black sea bass by gear type (1990-1999) are shown in Table 2. In 2000, 45.82% of the black sea bass landed in the commercial fishery was done so using bottom/midwater otter trawls, 44.72% was landed using pots and traps, and 7.75% was landed using hand lines.

Table 2. BSB commercial landings by gear, Maine to Cape Hatteras, North Carolina, 1990-1999 combined. Data from FMP Amendment 13 (ASMFC 2003b).

% Landed	Gear Type
45.74	**Pots and Traps, Fish**
40.32	**Otter Trawl Bottom, Fish**
8.79	**Lines Hand, Other**
0.92	Pots and Traps, Lobster Inshore
0.91	Pots and Traps, Lobster Offshore
0.73	Pots and Traps, Other
0.73	Unknown Combined Gear
0.51	Floating Traps (Shallow)
0.37	Gill Nets Sink, Other
0.16	Otter Trawl Bottom, Scallop
0.13	Dredges, Sea Scallop
0.10	Lines Long set with hooks
0.09	Gill Nets Drift, Other
0.09	Pots and Traps, Conch
0.08	Pots and Traps, Blue Crab
0.08	Pound Nets, Fish
0.07	Lines Troll, Other
0.06	Otter Trawl Bottom, Other
0.03	Gill Nets, Sea Bass
0.03	Trawl Midwater, Paired
0.02	Gill Nets, Other
0.01	Gill Nets, Drift, Runaround

Commercial fishery

The principal gears used for commercial black sea bass fishery are pots/traps and otter trawls. Atlantic mixed species pots/traps are categorized as Category II, and mid-Atlantic mixed species trawl as Category III in the final List of Fisheries for 2004 (NOAA 2004c) for the taking of marine mammals by commercial fishing operations. Category II implies that these fisheries have an occasional likelihood of incidental mortality and serious injury of marine mammals, with documented cases of fin, humpback, minke, and harbor porpoise in the Atlantic mixed species pots/traps fishery. Category III implies that these fisheries have a remote likelihood of incidental mortality and serious injury of marine mammals, with no documented bycatch cases in the mid-Atlantic mixed species trawl fishery. Despite these category rankings and the fact that many protected and endangered species inhabit North Atlantic waters, the Atlantic States Marine Fisheries Commission (ASMFC) (2003b) states that minimal interaction is expected between commercial black sea bass gear and protected species.

The black sea bass fishery is a mixed fishery where squid, Atlantic mackerel, silver hake, skates, and other species are harvested with summer flounder, scup, and/or black sea bass using trawl gear. Because it is a mixed fishery, discards of targeted species and/or incidental species do occur. In trips that landed 100 or more pounds (including all gear types) of black sea bass in 1999, black sea bass contributed 18.5% of the total landings in weight (ASMFC 2003b). In the 1999 trips listed under NMFS Vessel Trip Report (VTR), considering all gear combined, a total of 90 species were harvested in addition to black sea bass. Commercial statistics for trips landing over 100 lbs of black sea bass in the 1999 trawl fishery, which accounts for 45.3% of black sea bass landed, the predominant species was Atlantic mackerel (23.7% of the catch), and 23 species were harvested in addition to black sea bass (Table 3). Of the total weight caught in these trips, approximately 55.9% was discarded with discard rates of over 50% for most species. Amendment 13 (ASMFC 2003b) indicates that this is actually a small percentage relative to the large amount of total catch. Discard statistics are contradictory and inaccurate. VTR data indicate that discards are minimal for all three species, less than 3%. Sea sample data indicate that nearly 55% of black sea bass was discarded. This lack of discard data has hindered the MAFMC and ASMFC from responding to potential discard problems in the fishery.

Of the entire catch for 1999 of trawl fisheries landing 100 pounds or more of black sea bass, the total percent discarded was 55%. The total number of species discarded in 1999 was 118% greater than the total number of species landed.

Table 3. Catch disposition for trips that kept 100 or more pounds of black sea bass, 1999, trawl gear. Data from Amendment 13 (ASMFC 2003b).

Species	Total catch (lbs)	Discarded (lbs)	Landed (lbs)	% total landed	% total discarded
Flounder, Summer	1944	1548	396	20.37	79.63
Flounder, Witch	9.5	9.5	0	0	100
Flounder, Fourspot	293	293	0	0	100
Hake, Red	3835	3015	820	21.382	78.618
Herring, Atlantic	220	220	0	0	100
John Dory	6	6	0	0	100
Mackerel, Atlantic	11985	612	11373	94.894	5.106
Scup	14930	12422	2508	16.798	83.202
Sea Bass, Black	**3976**	**2174**	**1802**	**45.322**	**54.678**
Sea Robin, Northern	378	1371	7	0.508	99.492
Weakfish	267	0	267	100	0
Dogfish, Spiny	640	640	0	0	100
Skate, Little	345	345	0	0	100
Hake, Silver	3261	704	2557	78.412	21.588
Hake, NK	405	150	255	62.963	37.037
Lamprey, NK	6	2	4	66.667	33.333
Crab, Jonah	11	7	4	36.364	63.636
Crab, Rock	96	91	5	5.208	94.792
Lobster	14	2	12	85.714	14.286
Scallop, Sea	1317	1275	42	3.189	96.811
Squid (Loligo)	1042	64	978	93.858	6.142
Squid (Illex)	10	10	0	0	100
Total	45050.5	25020.5	21030	AVG 31.81%	AVG 68.19%

Black sea bass are commonly associated with structure, such as reef habitats or boulder fields. This is particularly true of BSB in the mid-Atlantic range (part of the northern stock). Therefore, effectiveness of mobile gear is limited and fish traps are more applicable. Until recently, employed fish traps did not have escape vents and all sizes were caught and sorted after hauling traps to the surface. Shepherd et al. (2002) conducted a study to test the effect of escape vents on fish traps, recognizing the need to reduce fishing mortality and increase the yield per recruit in sea bass fisheries. In the mid-Atlantic, fish traps are in use from April to November at depths of 20-40 m. The traps used are approximately 51 cm X 74 cm X 122 cm and several hundred are set per fisherman and periodically hauled. Traditional traps are wire, have no escape vent, and are fished without bait. Sorting of sub-legal fish used to take place subsequent to hauling traps, but discarded sea bass most likely died of injuries from sorting, pressure changes, or predation while recovering after release. These discard mortalities resulted in stock reduction and foregone yield in the fishery (Shepherd et al. 2002). Shepard's study found that vent traps could significantly alter the quantity and size of the catch, with the greatest results using a vent of 2.86 cm. New regulations were enforced in 2003 requiring black sea bass pots to have ghost panels, degradable hinges, and escape vents. The goal of enforcing trap use is to increase spawning female biomass and yield per recruit in the population. At present, no comprehensive data currently exists regarding the benefits of escape vents to the population.

In additional to discards, a common practice known as 'wet storage' also has the potential to greatly impact population numbers of black sea bass. In wet storage, pot/trap fishermen allow their pots/traps to remain in the water when the black sea bass fishery is closed. Although the fishery is closed, the pots/traps still attract and capture fish. If black sea bass is not landed in a timely manner, the fish die. Although this seems inherently wasteful, the ASMFC has no information on the numbers of pots/traps fished by individual fishermen, nor do they know how long it takes for fishermen to deploy and haul back their pots/traps. Therefore, wet storage is allowed (MAFMC 1999).

Recreational fishery
In the recreational fishery the majority of fish are caught and released; however, it is estimated that 25% of the black sea bass that are caught and released by anglers die after release. Minimum size limits, bag limits, and seasons have proven effective management tools for controlling fishing mortality in the recreational fishery (ASMFC 2003b). A study by Bugley and Shepherd (1991) tested the impact of catch and release on BSB survival by examining black sea bass for 48 hours after capture. Their results refute the idea that a large majority of black sea bass die when released. They found that only 4.7% resulted in mortality and each of these was hooked in the esophagus. They concluded that survival is high among small caught-and-released black sea bass and that release of hooked fish has little effect on total fishing mortality. However, overall effects of recreational angling have been difficult to evaluate without catch and effort data for specific sites.

Synthesis
The black sea bass fishery is complex because it is a mixed fishery. Most of the bycatch is due to discards in trawl fisheries that target multiple species. Discards are also common in fish pots/traps without vents. Vents are now required in all sea bass pots. With improved trap technology, a great potential exists to alleviate any fear that pot/trap discards impact BSB populations and reproductive potential. Overall, there are little data indicating harm to protected species or population consequences to black sea bass due to bycatch. Therefore, the nature and extent of bycatch for the pot/trap fishery is ranked a 'low' conservation concern, while the trawl fishery is considered a 'moderate' conservation concern.

Nature of Bycatch Rank:

Low (pots/traps) | **Moderate (trawl fisheries)** | High | Critical

Criterion 4: Effect of Fishing Practices on Habitats and Ecosystems

Black sea bass utilize a variety of habitats. Essential Fish Habitat (EFH) for black sea bass includes pelagic waters, structured habitat (e.g., sponge beds), rough bottom shellfish, sand, and shell habitat. Estuaries and pelagic environments along the continental shelf serve as habitat for eggs and larvae, whereas estuaries (inshore) and warm waters (offshore) serve as suitable habitat for juveniles. Juveniles winter offshore from New Jersey south and are found in rough bottom

habitat, and shellfish and eelgrass beds. From May to October, adults are found inshore, and in the winter, between New York and North Carolina over the continental shelf.

Bottom otter trawls and pots/traps are the major gear used to land summer flounder, scup, and black sea bass. Most commercial catches of black sea bass are made with trawl nets on hard bottom in depths up to 300 ft. Wooden traps are also used offshore in depths of 65 to 110 ft (VA Seafood). NMFS weighout data indicate that bottom trawls accounted for 41% of the landings of MAFMC-managed species, from Maine to North Carolina, in 2000. Bottom otter trawls in this same region accounted for 30% of black sea bass landings in 2000 (MAFMC 2003). Although many commercial catches use trawl nets for black sea bass capture, up to 48% of the total catch in 2000 was caught using pots and traps (NMFS weighout data, MAFMC 2003).

Habitat damage from bottom otter trawls is well documented. Several studies on the effects of bottom trawling have focused on the heavily trawled fishing grounds in the northwest Atlantic (Collie et al. 1997; Collie et al. 2000). Prena et al. (1999), for example, conducted an experimental trawl study on the Grand Banks off Newfoundland and reported "otter trawling on a sandy bottom ecosystem can produce detectable changes on both benthic habitat and communities, in particular a significant reduction in the biomass of large epibenthic fauna." Trawling impacts sea-floor communities by scraping the ocean bottom, causing 1) sediment re-suspension (turbidity) and smoothing, 2) removal of and/or damage to non-target species, and 3) destruction of three-dimensional habitat (biotic and abiotic) (Auster and Langton 1999). The degree of impact is determined by many factors, most notably 1) the type and weight of gear used, 2) the resilience of the seabed, and 3) the amount and frequency of the disturbance. Impacts of otter trawls include ecological (exposure to prey and attraction of predators) and physical (loss of diatom mats, reduction of total organic carbon and nitrogen in the sediment-water interface, and the reduction of mud and epifauna in a boulder habitat) impacts. Otter trawl use is highly correlated with the distribution of summer flounder, scup, and black sea bass from Maine to Cape Hatteras (MAFMC 2003). Otter trawls are known to permanently destroy boulder mounds in hard bottom habitats and cause heavy damage to clay outcroppings. At a workshop to assess the effects of fishing gear on marine habitats off the northeastern U.S., experts concluded that the "greatest impacts from otter trawls occur in low and high energy gravel habitats and in hard clay outcroppings" (NEFSC 2001). Based on the results of this and other studies, it is apparent that otter/bottom trawling may alter the surrounding ecosystem, as well as inherently reduce survival of the target species by reducing or altering available habitat and food resources.

Bottom trawl disturbance of the seabed is mainly a function of bottom type (rock, sand, mud, etc.) and gear type (dredge, beam, otter trawl, etc.). Some types of trawling gear cause less damage (e.g., otter trawls vs. scallop dredge) and some sediment types (and their associated ecosystems) are more resilient to disturbances caused by trawling. In a review of fishing effects, Collie et al. (2000) found that fauna associated with sandy (coarser) sediments were less affected by disturbance than those in soft, muddy (biogenic) sediments. Recovery rate appears to be slower in muddy and structurally complex habitats, while mobile sandy sediment communities can withstand 2-3 trawl passes per year without substantial (adverse) change (Collie et al. 2000). Otter trawling has been ranked as causing less disturbance to the sea floor than other types of trawling, such as inter-tidal and scallop dredging (Collie et al. 2000; NEFSC 2001), but it is

probable that repetitive trawling in these areas causes substantial, and possibly adverse changes to seabed ecosystems along the U.S. East Coast.

No changes were made in Amendment 12 to the ASMFC Summer Flounder, Scup, and Black Sea Bass FMP (1998) in relation to gear and EFH. Reasoning is based on the idea that a decrease in gear impacts occurs when less fish are available for catch, such as for black sea bass. Amendment 13 of the FMP states that the majority of habitat is sandy bottom in the mid-Atlantic regions and trawling has only a short-term ecological impact on these habitats.

The pots/traps fishing method is less destructive to habitats than trawling due to its stationary, rather than mobile, nature. Damage from traps/pots techniques is dependent on bottom type and traps/pots most likely have the greatest impact on corals, sponges, and gorgonians. The total impact of pots/traps is the 'footprint' of each pot/trap and the area over which it is dragged when hauled (NEFSC 2001). The degree of impact in mud, sand, and gravel habitats is generally thought to be low. However, panelists at the Workshop on the Effects of Fishing in the Northeastern U.S. agree that although "habitat impacts caused by individual pots (lobster) were minimal, the cumulative effects of so many pots could be significant, especially in sensitive habitats areas of high structural complexity" (NEFSC 2001). Any disadvantages of this gear type include changes to benthic prey and the nutrient enrichments of food availability from bait. The most vulnerable habitats include complex hard bottoms with abundant structural biota. Less vulnerable habitats include high-energy sand habitats. Data regarding pot/trap gear are limited because the only available data are reported frequency and intensity of gear from fishing trips (ASMFC 2003b). Amendment 13 also claims "for most stocks, there are no indications that poor habitat conditions caused by fishing gear contribute to overfishing or to the overfished status of the stock."

Table 4. Examples of impacts from otter trawls on black sea bass EFH. Data from Amendment 13.

EFH Type	Impacting Gear	Cited Impact
Sands (sand-mud, flat substrate, sand-silt, soft sediment, muddy sand, coarse sand, fine sand, gravel-sand, hard sandy substrate, sandy mud)	Otter trawl, scallop dredge, beam trawl, clam dredge, shrimp trawl	Decrease in epifauna and macrofauna; reduction in diversity and abundance in taxa; shift in species; physical damage to species; predators move in; burial of new recruits; flattened topography; physical damage to seafloor; recovery in weeks to months
Mud (sand-silt-mud, soft sediment, muddy sand, mud)	Scallop dredge, otter trawl with chain sweeps and roller gear	Decrease in epifauna; disrupted amphipod tub mats; physical damage to organisms; detached macrofauna; flattened topography; furrows, scours, depressions; lowered nutrient quality; variable recovery rates in months
Shell and shellfish beds (cited as sand-shell, mussel bed, cobble-shell, horse mussels)	Otter trawl, scallop dredge	Reduction of habitat complexity; smoothed bedforms; removed cover of hydrozoans; reduction in density of species; dispersed shell aggregates; disconnected mussels; reduced epibenthos; shift in species; burial of new recruits; reduction of cover; physical damage to organisms; change in sediment characteristics; changes in community structure
Structured habitat (cited as sponge, gravel-boulder, boulder-gravel, sponge-coral hard bottom, bryozoan bed)	Roller rigged trawls, shrimp trawl, otter trawl	Reduction in density of organisms; damage to organisms; reduced epifauna; removed boulders; reduction in density of structural component of habitat
Rough bottom (cited as gravel pavement, gravel-sand-mud, gravel-coarse sand, gravel and shell, gravel and sand)	General fishing, otter trawl, scallop dredge, beam trawl	Reduction in emergent epifauna; decline in biomass, individuals, species richness, and diversity; predators move in after fishing; observed physical changes to sea floor; buried gravel below sand; suspension of fine sediment; trawl tracks and replaced sediment

Synthesis

Bottom otter trawls
The negative effects of trawling on various habitats where black sea bass are found are highly documented in the published literature. Because these effects are detrimental to a variety of ecosystems and recovery times are long, the habitat and ecosystem effects of bottom otter trawls ranks a 'high' conservation concern.

Pots/traps
Although this gear is less mobile than trawls, little data exist from which to determine if pots/traps substantially damage environments in the long-term. Because of the lack of data, habitat impacts of this method rank a 'moderate' conservation concern.

Effect of Fishing Practices Rank:

Benign	**Moderate (pots/traps)**	**Severe (otter trawl)**	Critical

Criterion 5: Effectiveness of the Management Regime

A Fishery Management Plan (FMP) for black sea bass (BSB) was incorporated into the Summer Flounder and Scup FMP in 1996 as Amendment 9. The Black Sea Bass FMP is managed by both the ASMFC and the MAFMC and includes all black sea bass in U.S. waters in the western Atlantic Ocean from Cape Hatteras, North Carolina to the Canadian border. The objectives of the FMP are to: 1) reduce fishing mortality to prevent overfishing; 2) reduce fishing mortality on immature BSB to increase spawning stock biomass; 3) improve the yield of BSB; 4) promote compatible management regulations between state and federal jurisdictions; 5) promote uniform and effective enforcement of regulations; and 6) minimize regulations to achieve the above objectives. A number of regulations created by the two management agencies directly influenced these objectives. One of the major regulation changes over time is the quota system for black sea bass. Prior to the inclusion of BSB in the Summer Flounder and Scup FMP, the species was not managed and no regulations were set on quota or size limits for black sea bass.

FMP history
Amendment 9 to the Summer Flounder and Scup FMP established a management program for black sea bass, including commercial quotas, gear requirements, size limits, harvest limits, and permit and reporting requirements. This amendment established a coast-wide quota allocated over a year for BSB. The quota was allocated using 1988-1992 data and divided by quarters: Jan 1 – March 31; April 1 – June 30; July 1 – Sept 30, and Oct 1 – Dec 31.

For the past six years, the black sea bass fishery has been plagued with early closures and regulation changes. From 1999 to 2002, at least one quarter each year closed early due to completely harvesting the quota, including all four quarters in 2001. The premature closing of the fishery resulted in increased discards of legal size black sea bass in mixed fisheries. Management implemented Emergency Rules in 2001, which were eventually eliminated due to confusion among fishers and regulators. Finally, new limits were set with Addendum VI to the

FMP (ASMFC 2001). During this period, a decrease in landings occurred in the fishery. It is thought that this was due to the high bycatch of black sea bass in the January-March summer flounder fishery (ASMFC 2003).

From 1999 to present, changes in overfishing definitions and quota allocations have altered the black sea bass fishery. In 1999, Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass FMP was approved, changing the definition of overfishing to F_{MAX}=0.32 (from F_{MAX}=0.29 in the 1996 FMP). In 2002, Amendment 13 was approved, putting into effect a coast-wide quota to be managed by the ASMFC using a state-by-state allocation system. The current quota system in effect is a state-by-state allocation system implemented with Amendment 13. The ASMFC adopted this action to begin January 1, 2003 while the MAFMC adopted an annual coast-wide allocation system as a backup to facilitate the ASMFC's state-by-state allocation system. Since the fishery is a shared resource between state and federal governments and is multi-jurisdictional, it demands cooperation from both the MAFMC and ASMFC. Amendment 13 replaced the previous quarterly quota allocation system. Amendment 13 (ASMFC 2003b) established the following: a) a federal coast-wide quota established by the MAFMC and ASMFC with a state-by-state allocation system managed by the ASMFC; b) removal of the permit requirement that restricts fishermen from using a Southeast Regional Snapper/Grouper (SER S/G) permit during a northern closure (regulations previously restricted fishermen with the Northeast permit from fishing south of Cape Hatteras during a northern closure unless they relinquish their permits for a period of 6 months. Fishermen report this requirement to be burdensome as few have Northeast Regional Black Sea Bass (NER BSB) and SER S/G permits and because landings can be accurately tracked in both the north and south); c) no additional regulations regarding the wet storage of black sea bass pots/traps during a closure; d) no initiation of a pot/trap tagging program; e) no restrictions on the numbers of pots/traps used by fishermen; and f) reliance on current management measures to minimize adverse effects of fishing on EFH. The state-by-state allocation system began January 1, 2003. State-specific shares of the annual quota include: Maine and New Hampshire 0.5%; Connecticut 1%; Delaware 5%; New York 7% Rhode Island, North Carolina, and Maryland 11% each; Massachusetts 13%; New Jersey and Virginia 20% each. Amendment 13 (2003) requires states to establish management measures that will restrict landings to their share of the quota. Allocations will be reconsidered for 2005 and beyond. It is believed that this system allows for the most equitable distribution of the commercial quota to fishermen. The ASMFC recently extended the state-by-state allocation system to 2007 (Munden, pers. comm.).

Table 5. 2004 black sea bass landings allocation. Data from NOAA 2004d. Quotas established by MAFMC

2004 TAL	Commercial Quota	Recreational Quota	Research Quota	Quota Overages
8 million lbs	3.8 million lbs	4.01 million lbs	134,792 lbs	85,376 lbs

TAL: Total Allowable Landings
Quota Overages: Overage determined based on landings from October 2002 – September 2003, plus any previously unaccounted for late-reported landings from January-September 2002.

Current 2004 regulations

Commercial (NOAA 2004e)

Minimum size: 11 inches (moratorium permits); 12 inches (non-moratorium) TL (Total Length)
Otter trawls: Specifications dependent on permit and total landings
Pots and traps: Ghost panels (3x6in), degradable hinges, escape vents, proper identification, and escape vents in lower corner of parlor (vent size varies with trap shape) required
Possession limits: No more than 25 on commercial vessels unless the vessel has a moratorium permit. Only vessels with a moratorium permit are allowed to sell black sea bass.
Reporting Requirements: VTR required for each trip. VTRs submitted monthly.

The National Marine Fisheries Service (NMFS) monitors harvest of commercial black sea bass quota and closes the fishery if data indicate harvesting beyond the set quota.

Recreational (FF-5-2004 Proclamation, NCDMF)

Minimum size limit: "No person may possess black sea bass less than 12 inches total length taken from the Atlantic Ocean for recreational purposes."
Possession Limit: "It is unlawful to possess more that twenty five (25) black sea bass per person per day taken in the Atlantic Ocean for recreational purposes."
Seasons: "The 2004 open seasons are January 1 through September 7, 2004 and September 22 through November 30, 2004."

Possession limits may vary by state (Table 6).

Table 6. Recreational regulations by state. Data from individual state divisions.

State	Size Limit (lbs)	Possession Limit	Open Season
MA	12	20	May 10 - Dec 31
RI	12	25	Jan 1 - Sept 1; Sept 16 - Nov 30
CT	12	25	Jan 1 - Sept 1; Sept 16 - Nov 30
NY	12	25	Jan 1 - Sept 22; Oct 8 - Dec 31
NJ	12	25	Jan 1 - Sept 7; Sept 22 - Nov 30
DE	12	25	Jan 1 - Sept 7; Sept 22 - Nov 30
MD	12	25	Jan 1 - Sept 7; Sept 22 - Nov 30
PRFC	12	25	Jan 1 - Sept 7; Sept 22 - Nov 30
VA	12	25	Jan 1 - Sept 7; Sept 22 - Nov 30
NC (north)	12	20	Jan 1 - Sept 7; Sept 22 - Nov 30

Managing adverse effects from fishing
The MAFMC has the ability to minimize the impacts of fishing gear on EFH through 1) area and/or seasonal closures, 2) specific gear modifications/restrictions, and 3) harvest limits. The current method is a "no action alternative" required by the National Environmental Policy Act (NEPA). However, the MAFMC has implemented regulations that have indirectly acted to reduce fishing gear impacts on EFH, including fishing effort restrictions, harvest limits, gear restricted areas, and restrictions on the size of roller rig gear (18" rollers for black sea bass). Additionally, management actions related to the fact that 40 of the 51 species managed by NMFS' Northeast Region are designated as overexploited severely decreases the gear impacts on habitat (ASMFC 2003b).

Current management systems for black sea bass include rebuilding schedules that establish annual fishing mortality needed to rebuild the stocks. Under the current management regime, black sea bass biomass is increasing in the northern stock and the stock population has improved. Once a stock is rebuilt, the fishing mortality will remain at F_{MSY}. As the stock size increases, fishing mortality quotas will increase.

Table 7. Black sea bass rebuilding schedule.

Year	FMP Year	Target Exploitation Rate	Actions
1996, 1997	1, 2	None	Minimum fish sizes and commercial gear restrictions
1998-2000	3, 4, 5	48%	Commercial quota and recreational harvest limit added to achieve targeted 48% exploitation rate.
2001	6	37%	
2002	7	37%	
2003+	8+	23%	Target exploitation rate is F_{MAX}

Research
In 2002, a comprehensive tagging study of black sea bass was initiated by Gary Shepherd of the Northeast Fisheries Science Center (NEFSC) in conjunction with the Summer Flounder, Scup, and Black Sea Bass Technical Committee. The results will provide important data on mortality and migration (ASMFC 2003) as well as the development of an analytical and age-based assessment. Fishery independent surveys are conducted in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and North Carolina. Additionally, the Virginia Game Fish Tagging Program has tagged black sea bass since 1997. NEFSC provides recruitment and stock abundance data from spring, fall, and winter surveys. The Summer Flounder, Scup, and Black Sea Bass FMP also requires federal dealer and vessel permitting and reporting, which contributes to NMFS VTR data.

Commercial landings information is collected by the Vessel Trip Reporting (VTR) system and dealer reports. States are required to collect and report data. Discards are estimated using the NEFSC sea sampling program. Recreational catch information is provided by the NMFS Marine Recreational Fisheries Statistics Survey.

Southern stock
McGovern et al. (2002) found that the CPUE of black sea bass declined from the early 1980s to 1993 and then began to increase in 1997. The mean length of black sea bass also decreased until 1998. Declines in the mean size and CPUE of black sea bass are possibly due to minimum size limits implemented during 1983, additional restrictions (Table 7), and the banning of trawling in 1989. Trawling was prohibited because it was destructive to live reef (Munden, pers. comm.). Heavy fishing in the region possibly altered black sea bass sex ratios and removed the larger, faster-growing fishes from the population over generations (McGovern et al. 2002). Despite any attempts to successfully manage the southern stock, it remains overfished with overfishing occurring. Table 8 lists the history of FMP actions taken in regard to black sea bass.

Table 8. FMP history of the southern stock. SEFMC 2003.

Date	Amendment	Regulation
August 31, 1983	Original FMP	8' TL min size limit and 4' trawl mesh size
January 12, 1989	1	Prohibits trawls
January 1, 1992	4	Prohibits fish traps, entanglement nets, and longline gear within 50 fathoms; black sea bass pot gear and identification requirements
December 1998	8	Limited entry program; transferable permits and 225-lb non-transferable permit
February 24, 1999	9	10' TL minimum size limit and 20 fish bag limit; escape panel

<u>Recreational measures for black sea bass of the southern stock</u>

State coastal waters
Minimum Length: 10" TL **Bag Limit:** 20/day
U.S. Exclusive Economic Zone (EEZ)
Minimum Length: 10" TL **Bag Limit:** 20/day

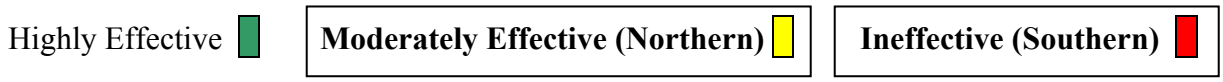
Synthesis
Management success for northern black sea bass has fluctuated over the years. Measures to rebuild the declining stocks are showing signs of success, such as the recent determination that the northern stock is no longer overfished and that overfishing is no longer occurring. Additionally, the MAFMC and ASMFC use both fishery-dependent and independent data to make management decisions; both the MAFMC and ASMFC require permitting and reporting.

A stock assessment for the northern BSB stock is complete, but the strength of the data is uncertain. There is currently a process in place that involves the collection and analysis of data with respect to the short and long-term stock abundance of the northern black sea bass stock. Management has followed scientific recommendations, which were somewhat lacking due to insufficient data. The new 2004 SAW report will influence management action for next year's northern black sea bass fishery. There is little effort in the fishery to mitigate bycatch issues; however, bycatch of endangered or threatened animals is low. In the northern fishery, some management efforts address mitigating the impacts of gear on habitats, but the effectiveness of

these efforts has yet to be demonstrated. Overall, the effectiveness of management in the northern fishery is uncertain. Until stocks are considered fully rebuilt (at B_{MSY}), management for the northern stock is considered 'moderately effective'.

Although management agencies for the southern stock of black sea bass have taken progressive actions to attempt to decrease BSB mortality, such as the banning of otter trawls in 1989, the southern BSB stock continues to suffer and decline. Additionally, efforts to research the southern stock are limited. There is a great concern for the conservation of southern black sea bass and the management of the southern stock is at present thus considered 'ineffective'.

Effectiveness of Management Rank:



Overall Evaluation and Seafood Recommendation

Black sea bass is an important commercial and recreational species along the U.S. Atlantic coast. The species is relatively fast-growing, short-lived (max 15 years), and matures quickly (2-5 years). Although the status of the northern stock was recently upgraded from overfished through a 2-year tagging study, the southern stock of black sea bass remains overfished with overfishing occurring. The commercial fishery of the northern stock employs trawls and pots/traps in harvesting black sea bass, while the southern fishery primarily uses traps/pots as trawls were banned in the southern fishery in 1989. Many studies have confirmed the negative impacts of trawls on species and habitats. Pots and traps have a lower impact on habitat than trawls. The bycatch associated with the black sea bass fishery is a product of discards from the mixed fishery, especially the summer flounder fishery. The success of management regulations has fluctuated over the years. The BSB fishery is complicated by the life history characteristics of black sea bass, including its being a protogynous hermaphrodite, the genetic stock divisions of black sea bass into northern, southern, and Gulf of Mexico stocks, multiple and diverse gear types employed in the capture of BSB, multiple management agencies, including the ASMFC and MAFMC, and variable assessments. The overall seafood recommendations for black sea bass reflect these complications, and are "Good Alternative" for black sea bass of the northern stock, and "Avoid" for black sea bass of the southern stock.

Table of Sustainability Ranks

	Conservation Concern			
Sustainability Criteria	Low	Moderate	High	Critical
Inherently Vulnerability	√			
Status of Stocks		√ Northern		√ Southern
Nature of Bycatch	√ Pots/traps	√ Trawl		
Habitat Effects		√ Pots/traps	√ Trawl	
Management Effectiveness		√ MAFMC	√ SAFMC	

Overall Seafood Recommendation:

Black sea bass, northern stock (north of Cape Hatteras, North Carolina):

Best Choice | **Good Alternative** | Avoid

Black sea bass, southern stock (south of Cape Hatteras, North Carolina):

Best Choice | Good Alternative | **Avoid**

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