



Black Sea Bass Fishery Information Document

August 2019

This document provides a brief overview of the biology, stock condition, management system, and fishery performance for black sea bass (*Centropristis striata*) with an emphasis on 2018. Data sources include unpublished National Marine Fisheries Service (NMFS) fisheries-independent trawl survey data, commercial fish dealer reports, vessel trip reports (VTRs), permit data, and Marine Recreational Information Program (MRIP) data. All data should be considered preliminary. For more resources on black sea bass management, including previous Fishery Information Documents, please visit <http://www.mafmc.org/sf-s-bsb>.

Key Facts

- Black sea bass is not overfished and overfishing is not occurring. In 2015 (the most recent year for which peer reviewed and approved stock status information is available), spawning stock biomass was more than double the target level and fishing mortality was 25% below the threshold level which defines overfishing. An updated stock assessment was peer reviewed in August 2019; however, final results from that peer review are not currently available.
- About 3.41 million pounds of black sea bass were landed by commercial fishermen in 2018. In 2018, commercial fish dealers paid an average of \$3.49 per pound for black sea bass.
- Recreational fishermen harvested an estimated 7.92 million pounds of black sea bass in 2018, mostly from private vessels.

Basic Biology

Black sea bass are distributed from the Gulf of Maine through the Gulf of Mexico. Genetic studies have identified three stocks within that region. This document focuses on the black sea bass stock from the Gulf of Maine through Cape Hatteras, North Carolina.

Adult and juvenile black sea bass are mostly found on the continental shelf. Young of the year (i.e., fish less than one year old) can be found in estuaries. Adults show strong site fidelity during the summer and prefer to be near structures such as rocky reefs, coral patches, cobble and rock fields, mussel beds, and shipwrecks. Black sea bass migrate to offshore wintering areas starting in the fall. During the winter, young of the year are distributed across the shelf and adults and juveniles are found near the shelf edge. During the fall, adults and juveniles off New York and north move offshore and travel along the shelf edge to as far south as Virginia. Most return to northern inshore areas by May. Black sea bass off New Jersey to Maryland travel southeast to the shelf edge during the late fall. Black sea bass off Virginia and Maryland travel a shorter distance due east to the shelf edge, which is closer to shore than in areas to the north.^{1,2}

Black sea bass are protogynous hermaphrodites, meaning they are born female and some later transition to males, usually around 2-5 years of age. Male black sea bass are either of the dominant or subordinate type. Dominant males are larger than subordinate males and develop a bright blue nuchal hump during the spawning season. About 25% of black sea bass are male at 15 cm (about 6 inches), with increasing proportions of males at larger sizes until about 50 cm, when about 70-80% of black sea bass are male. Results from a simulation model highlight the importance of subordinate males in the spawning success of this species. This increases the resiliency of the population to exploitation compared to other species with a more typical protogynous life history. About half of black sea bass are sexually mature by 2 years of age and 21 cm (about 8 inches) in length. Black sea bass reach a maximum size of about 60 cm (about 24 inches) and a maximum age of about 12 years.^{2, 3}

Black sea bass in the mid-Atlantic spawn in nearshore continental shelf areas at depths of 20-50 meters. Spawning usually takes place between April and October. During the summer, adult black sea bass share habitats with tautog, hakes, conger eel, sea robins and other migratory fish species. Essential fish habitat for black sea bass consists of pelagic waters, structured habitat, rough bottom, shellfish, sand, and shell, from the Gulf of Maine through Cape Hatteras, North Carolina. Juvenile and adult black sea bass mostly feed on crustaceans, small fish, and squid. The Northeast Fisheries Science Center (NEFSC) food habits database lists spiny dogfish, Atlantic angel shark, skates, spotted hake, summer flounder, windowpane flounder, and monkfish as predators of black sea bass.¹

Status of the Stock

A benchmark stock assessment for black sea bass was peer-reviewed and approved in December 2016. An updated stock assessment model was peer reviewed in early August 2019; however, final results from that assessment were not available at the time of writing this document. The protogynous life history, structure-orienting behavior, and potential spatial stock structure of black sea bass posed challenges for previous analytical assessments of this species, resulting in several prior assessments not being approved for management use. The 2016 benchmark stock assessment was successful in evaluating and addressing many of these concerns and subsequently was approved through a peer review process.

The 2016 benchmark assessment indicated that the stock north of Cape Hatteras, North Carolina was not overfished and overfishing was not occurring in 2015, the terminal year of the assessment. Spawning stock biomass (SSB; i.e., mature female and male biomass) averaged around 6 million pounds from the late 1980's and early 1990's and then steadily increased from 1997 to 2002 when it reached 18.7 million pounds. SSB then declined until 2007 (8.9 million pounds), followed by a steady increase through 2015 with SSB at its highest estimated level (Figure 1). SSB in 2015 was 48.89 million pounds (22,176 mt), 2.3 times SSB at maximum sustainable yield, $SSB_{MSY} = 21.31$ million pounds (9,667 mt).²

The fishing mortality rate (F) in 2015 was 0.27, 25% below the fishing mortality threshold reference point that defines overfishing ($F_{MSY\ proxy} = F_{40\%} = 0.36$; Figure 2). Fishing mortality was very high in the early 1990's but declined and stabilized after 1997 once joint management by the Mid-Atlantic Fisheries Management Council (Council) and Atlantic States Marine Fisheries Commission (Commission) began. Fishing mortality has been below the F reference point since 2011.²

Recruitment was relatively constant during 1989-2015, with the exception of large spikes from the 1999 and 2011 year classes (i.e., fish spawned in those years). The 1999 year class was estimated at 37.3 million fish. The 2011 year class was estimated at 68.9 million fish, nearly three times the 1989-2015 average. The 2011 year class had a major impact on recent stock dynamics and was much more prevalent in the states of Massachusetts through New York compared to New Jersey and south.²

Final peer reviewed and approved estimates of SSB, fishing mortality, and recruitment after 2015 are not available at this time. Fishery and fishery-independent survey data through 2017 indicate that biomass continues to be high and the 2015 year class appears to be above average both in northern areas (ME-NY) and southern areas (NJ-NC).⁴

Black sea bass recently underwent an operational assessment for use in management for 2020 and beyond and will be final by the end of August. The assessment will include the revised MRIP values and is expected to change the current biological reference points and estimated biomass and fishing mortality. New assessment information was not available during the development of this fishery information document.

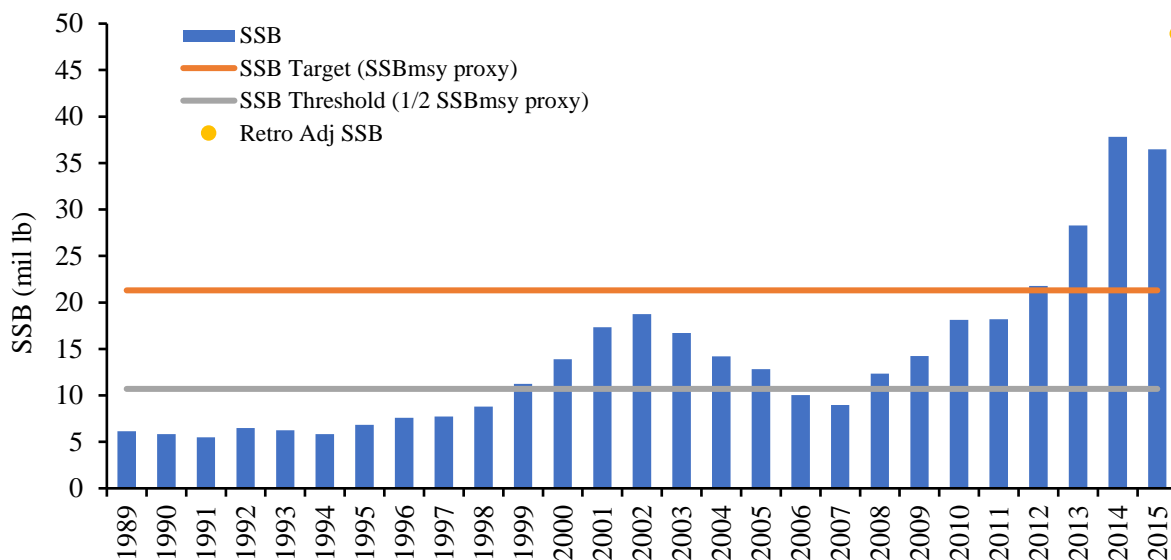


Figure 1: Black sea bass spawning stock biomass, 1989 - 2015, and biomass reference points from the 2016 benchmark stock assessment. The 2015 retro-adjusted spawning stock biomass value was generated to correct for retrospective bias in the assessment model and is used as the estimate to compare to the reference points.²

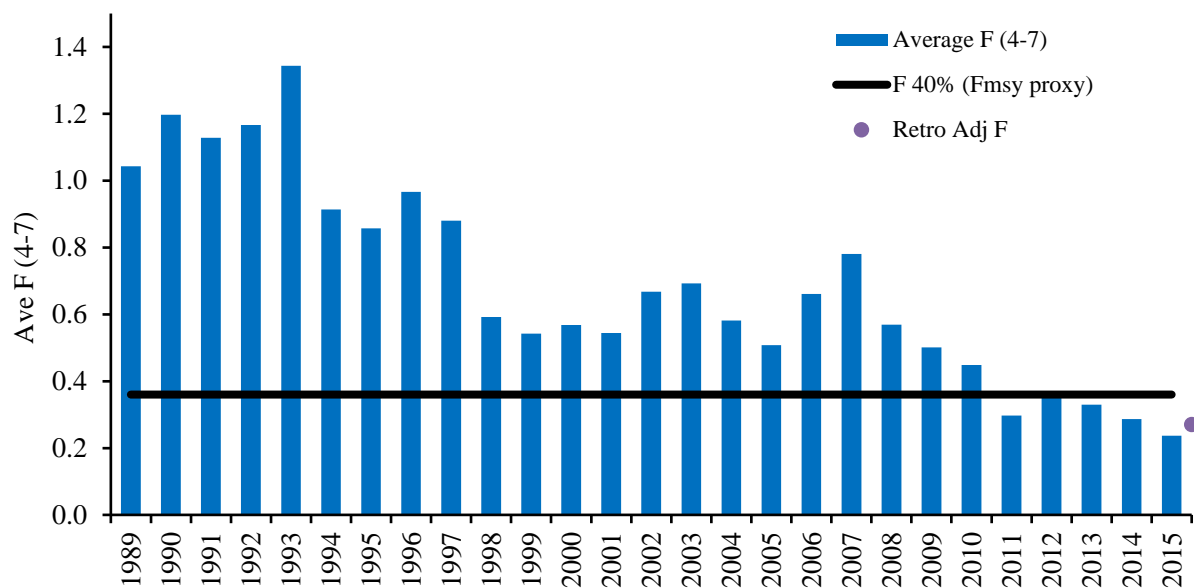


Figure 2: Fishing mortality rate on black sea bass ages 4-7 and the FMSY PROXY reference point from the 2016 benchmark stock assessment. The 2015 retro-adjusted fishing mortality rate was generated to correct for retrospective bias present in the assessment model and is used as the estimate to compare to the reference points.²

Management System and Fishery Performance

Management

The Council and the Commission work cooperatively to develop commercial and recreational fishery regulations for black sea bass from Maine through Cape Hatteras, North Carolina. The Council and Commission work in conjunction with NMFS, which serves as the federal implementation and enforcement entity. This cooperative management endeavor was developed because a significant portion of the catch is taken from both state waters (0-3 miles offshore) and federal waters (3-200 miles offshore). This joint management program began in 1996 with the approval of amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP). The original FMP and subsequent amendments and frameworks are available at: www.mafmc.org/fisheries/fmp/sf-s-bsb.

Commercial and recreational black sea bass fisheries are managed using catch and landings limits, commercial quotas, recreational harvest limits (RHLs), minimum fish sizes, open and closed seasons, gear regulations, permit requirements, and other provisions.

The Council's Scientific and Statistical Committee recommends annual Acceptable Biological Catch (ABC) levels for black sea bass. The Council and Commission must either approve the ABC recommended by the Scientific and Statistical Committee or approve a lower ABC. The ABC is divided into commercial and recreational Annual Catch Limits (ACLs), based on the landings allocations prescribed in the FMP (i.e., 49% commercial, 51% recreational) and the recent distribution of discards between the commercial and recreational fisheries. The Council first implemented recreational and commercial ACLs, with a system of overage accountability, in 2012.

The Council and Commission also approve commercial and recreational annual catch targets (ACTs), which are set equal to or less than the respective ACLs to account for management uncertainty. To date, the black sea bass ACTs have always been set equal to the ACLs. The ABC, ACLs, and ACTs are catch limits which account for both landings and discards, while the commercial quota and RHL are landing limits. The commercial quota and RHL are calculated by subtracting expected discards from the respective ACTs.

Table 1 shows black sea bass catch and landings limits from 2009 through 2019, as well as commercial and recreational landings through 2018. Total landings (commercial and recreational) peaked in 2017, when approximately 15.5 million pounds of black sea bass were landed. About 11.3 million pounds of black sea bass were landed by commercial and recreational fishermen from Maine through Cape Hatteras, North Carolina in 2018 (Figure 3).^{5,6}

Recreational data are available from MRIP. In July 2018, MRIP released revisions to their time series of recreational catch and landings estimates based on adjustments for a revised angler intercept methodology and a new effort estimation methodology, including a transition from a telephone-based effort survey to a mail-based effort survey. The revised estimates of catch and landings are several times higher than the previous estimates for shore and private boat modes, substantially raising the overall black sea bass catch and harvest estimates, as shown on page 13. The RHLs and other management measures through 2019 were based on the previous MRIP estimates. Once the revised estimates are incorporated into a peer reviewed and accepted stock assessment (expected August 2019), they will be used to derive RHLs and other management measures for future years.

Table 1: Summary of catch and landings limits, and landings for commercial and recreational black sea bass fisheries from Maine through Cape Hatteras, NC 2009 through 2019. All values are in millions of pounds unless otherwise noted.

Management measure	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ABC	--	4.50	4.50	4.50	5.50	5.50	5.50	6.67	10.47	8.94	8.94
Commercial ACL	--	--	--	1.98	2.60	2.60	2.60	3.15	5.09	4.35	4.35
Commercial quota ^a	1.09	1.76	1.71	1.71	2.17	2.17	2.21	2.71	4.12	3.52	3.52
Commercial landings	1.18	1.68	1.69	1.72	2.40	2.18	2.46	2.59	3.99	3.41	--
% of commercial quota landed	108%	95%	99%	101%	111%	100%	111%	96%	97%	97%	--
Recreational ACL	--	--	--	1.86	2.90	2.90	2.90	3.52	5.38	4.59	4.59
RHL ^a	1.14	1.83	1.78	1.32	2.26	2.26	2.33	2.82	4.29	3.66	3.66
Recreational landings, previous MRIP estimates	2.56	3.19	1.17	3.18	2.46	3.67	3.79	5.19	4.16	3.82	--
% of RHL harvested (based on previous MRIP estimates) ^b	225%	174%	66%	241%	109%	162%	163%	184%	97%	104%	--
Recreational landings, revised MRIP estimates	5.70	8.07	3.27	7.04	5.68	6.93	7.82	12.05	11.48	7.92	--

^a The commercial quotas and RHLs for 2006-2014 account for deductions for the Research Set Aside program.

^b The percent of RHL harvested is based on a comparison of the RHL to the previous or old MRIP estimates. The RHLs did not account for the new MRIP estimates, which were released in July 2018 and were not incorporated into a stock assessment until 2019; therefore, it would be inappropriate to compare past RHLs to the revised MRIP estimates.

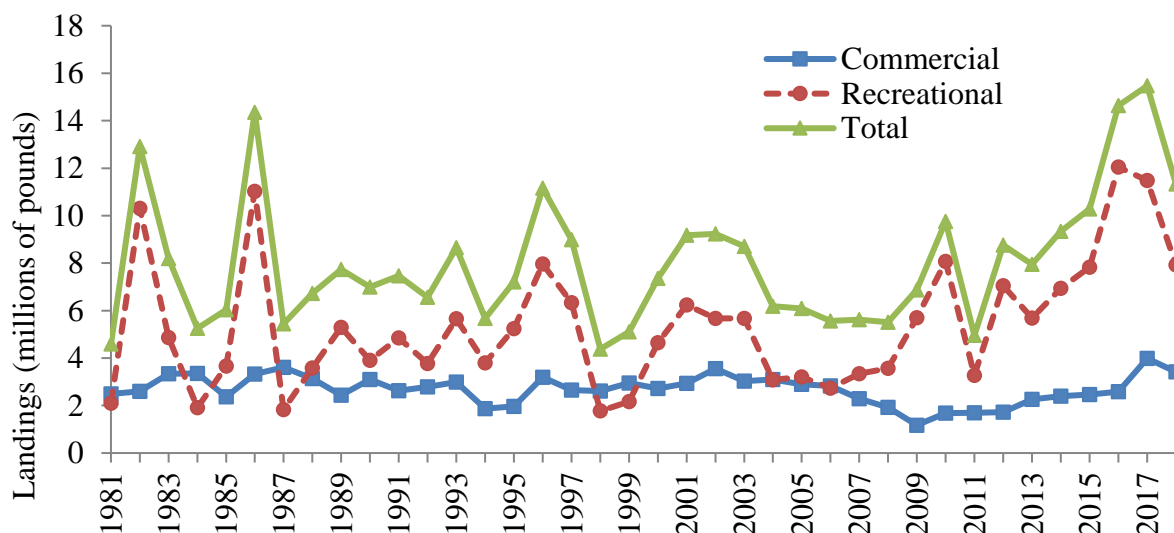


Figure 3: Commercial and recreational black sea bass landings in millions of pounds from Maine through Cape Hatteras, North Carolina, 1981-2018. Recreational landings are based on the revised MRIP numbers.^{5,6}

Commercial Fishery

Commercial landings of black sea bass peaked in 2017 at 3.99 million pounds, and reached a low of 1.18 million pounds in 2009 (Figure 3). About 3.42 million pounds of black sea bass were landed by commercial fishermen in 2018, corresponding to approximately 97% of the commercial quota (Table 1).⁶

Black sea bass are a valuable commercial species. Their value has increased disproportionately compared to moderate increases in landings in recent years. Total black sea bass ex-vessel value (adjusted to 2018 dollars to account for inflation) from Maine through North Carolina increased steadily from 1994 through 2006, followed by a few years of decline. Ex-vessel value again rose steadily from 2009 through 2018. Ex-vessel value peaked in 2017 at \$12.0 million and was only slightly lower at \$11.9 million in 2018. Average price per pound also increased steadily during 1994-2018 and peaked at \$3.49 per pound, on average, during 2018 (Figure 4).⁶

According to federal VTR data, statistical area 616, which includes important fishing areas near Hudson Canyon, was responsible for the largest percentage of commercial black sea bass catch (landings and discards) in 2018 (i.e., 49%). Statistical area 621, off southern New Jersey, Delaware, and Maryland accounted for the second highest proportion of catch (8%), followed by statistical area 537, south of Massachusetts and Rhode Island (6%), and statistical area 613, south of Long Island (5%; Table 2, Figure 5). Statistical area 539, off Rhode Island, accounted for only 4% of total catch, but had the highest number of trips which reported black sea bass catch on federal VTRs in 2018 (1,848 trips).⁸

In 2018, most commercial landings from state and federally-permitted vessels occurred in New Jersey (20%) and Virginia (18%).⁶ The percentage of landings by state is driven by and closely matches the state-by-state commercial quota allocations managed by the Commission (Table 3). These allocations are not contained in the Council's FMP. States set measures to achieve their state-specific commercial quotas.

At least 100,000 pounds of black sea bass were landed in each of 12 ports in 8 states from Maine through North Carolina in 2018. These 12 ports accounted for over 70% of all commercial black sea bass landings in 2018 (Table 4).⁶ Detailed community profiles developed by the NEFSC Social Science Branch can be found at www.mafmc.org/communities/.

A total of 213 federally-permitted dealers from Maine through North Carolina purchased black sea bass in 2018. More dealers bought black sea bass in New York than in any other state (Table 5).⁶

A moratorium permit is required to fish commercially for black sea bass in federal waters. In 2018, 662 federal commercial black sea bass permits were issued.⁷

A minimum commercial black sea bass size limit of 11 inches total length has been in place since 2002. There is no federal waters black sea bass possession limit; however, states set possession limits for state waters.

Federal VTR data indicate that 72% of the black sea bass caught by federal commercial permit holders from Maine to North Carolina in 2018 was caught with bottom otter trawl gear. About 18% was caught with fish pots and traps, 4% in lobster traps, and 3% with hand lines. Other gear types each accounted for 1% or less of total commercial catch.⁸

Any federally-permitted vessel which uses otter trawl gear and catches more than 500 pounds of black sea bass from January through March, or more than 100 pounds from April through December, must use nets with a minimum mesh size of 4.5-inch diamond mesh applied throughout the codend for at least 75 continuous meshes forward of the end of the net. Pots and traps used to commercially harvest black sea bass must have two escape vents with degradable hinges in the section known as the parlor. The escape vents must measure 1.375 inches by 5.75 inches if rectangular, 2 inches by 2 inches if square, or have a diameter of 2.5 inches if circular.

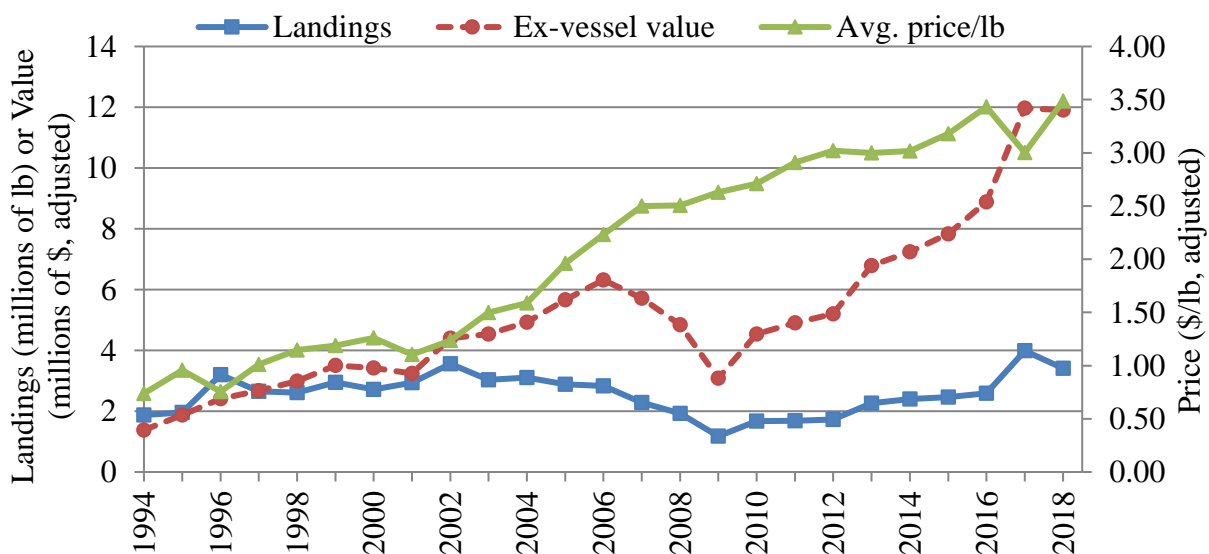


Figure 4: Landings, ex-vessel value, and average price for black sea bass, ME-NC, 1994-2018. Ex-vessel value and price are adjusted to real 2018 dollars using the Gross Domestic Product Price Deflator.⁷

Table 2: Statistical areas that accounted for at least 5% of the total commercial black sea bass catch in 2018, with associated number of trips.⁹

Statistical Area	Percent of 2018 Commercial Black Sea Bass Catch	Number of Trips
616	49%	812
621	8%	300
537	6%	882
613	5%	1,037

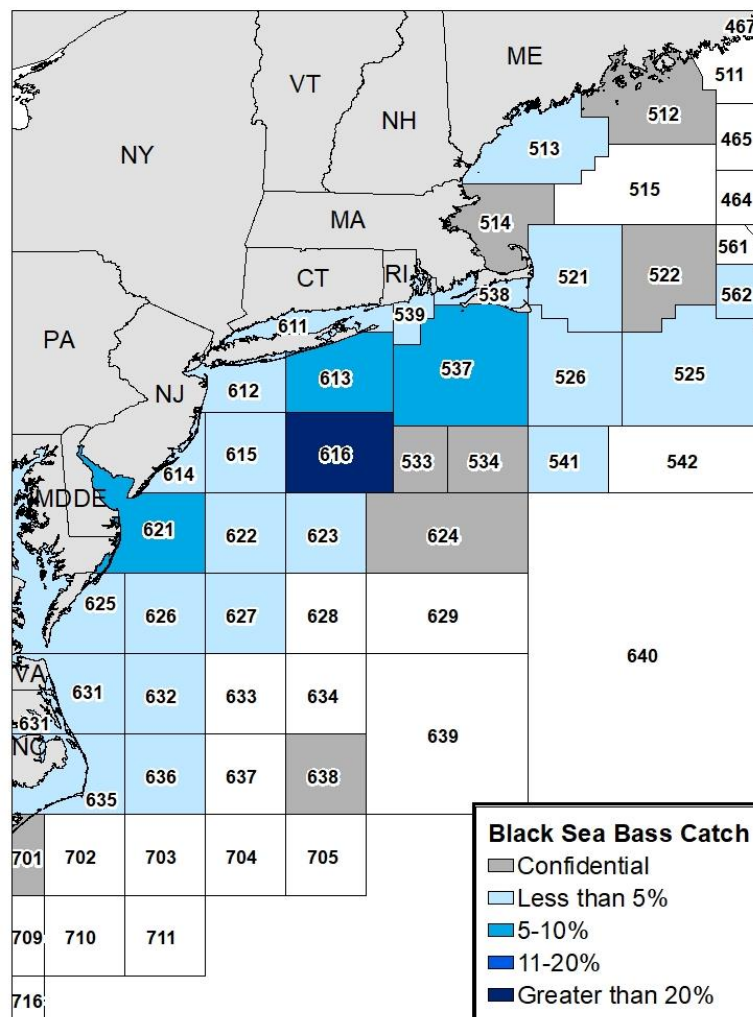


Figure 5: Proportion of black sea bass catch by statistical area in 2018 based on federal VTR data. Statistical areas marked “confidential” are associated with fewer than three vessels and/or dealers.

Table 3: Allocation of commercial black sea bass quota among states under the Commission’s FMP.

State	Allocation (percent)
Maine	0.5
New Hampshire	0.5
Massachusetts	13.0
Rhode Island	11.0
Connecticut	1.0
New York	7.0
New Jersey	20.0
Delaware	5.0
Maryland	11.0
Virginia	20.0
North Carolina	11.0
Total	100

Table 4: Ports reporting at least 100,000 pounds of black sea bass landings in 2018, associated number of vessels, and percentage of total commercial landings. Ports with more than 100,000 pounds of black sea bass, but fewer than three associated vessels and/or dealers are not shown.⁷

Port name	Pounds of black sea bass landed	% of total commercial black sea bass landed	Number of vessels landing black sea bass
POINT PLEASANT, NJ	415,020	12%	237
POINT JUDITH, RI	284,122	8%	2,829
OCEAN CITY, MD	253,410	7%	70
NEWPORT NEWS, VA	237,708	7%	19
BEAUFORT, NC	221,988	6%	155
NEW BEDFORD, MA	200,784	6%	858
HAMPTON, VA	198,406	6%	48
CAPE MAY, NJ	140,002	4%	125
MONTAUK, NY	137,263	4%	419
CHINCOTEAGUE, VA	106,651	3%	68

Table 5: Dealers, by state, reporting purchases of black sea bass in 2018.⁷

State	MA	RI	CT	NY	NJ	DE	MD	VA	NC
Number of dealers	33	34	14	51	30	3	8	14	26

Recreational Fishery

The Council develops coast-wide regulations for the recreational black sea bass fishery in federal waters, including a minimum size, a possession limit, and open and closed seasons (Table 6).

The Commission and member states develop recreational measures in state waters (Table 7).

As previously described, MRIP released a revised time series of recreational fishery data in July 2018. The revised catch, harvest, and effort estimates for black sea bass are substantially higher than the previous estimates, largely due to increased estimates for private anglers (Figure 6). Information presented in this section is based on the revised estimates.

Between 1981 and 2018, recreational catch of black sea bass from Maine through Cape Hatteras, NC was lowest in 1984 at 4.73 million fish and was highest in 2017 at about 41.0 million fish. Recreational harvest in weight was highest in 2016 at 12.05 million pounds; however, harvest in numbers of fish was highest in 1986 at 19.28 million fish. Recreational harvest in weight was lowest in 1981 at 1.53 million pounds, while harvest in numbers of fish was lowest in 1998 at 1.56 million fish.

In 2018, an estimated 3.99 million black sea bass, at about 7.92 million pounds, were harvested by recreational anglers from Maine through Cape Hatteras, North Carolina (Figure 3, Table 8). These numbers should not be compared against the RHLs in the respective years as the RHLs were based on the previous MRIP estimation methodology. Back-calculated estimates of harvest using the previous estimation methodology suggest that 3.82 million pounds of black sea bass were harvested by recreational anglers from Maine through Cape Hatteras, NC in 2018, about 104% of the 2018 RHL.⁵

In 2018, 58% of black sea bass harvested by recreational fishermen from Maine through North Carolina (in numbers of fish) were caught in state waters and about 42% in federal waters (Table 9). Most of the recreational harvest in 2018 was landed in New Jersey (26%), New York (21%), Rhode Island (18%), Massachusetts (17%), and Connecticut (10%; Table 10).⁵

For-hire vessels carrying passengers in federal waters must obtain a federal party/charter permit. In 2018, 806 party and charter boats held federal recreational black sea bass permits.⁷

About 87% of the recreational black sea bass harvest in 2018 was caught by anglers fishing on private or rental boats, about 12% from anglers aboard party or charter boats, and 1% from anglers fishing from shore (Table 11).⁵

Table 6: Federal black sea bass recreational measures, Maine - Cape Hatteras, NC, 2007 - 2019.

Year	Min. size	Possession limit	Open season
2007-2008	12"	25	Jan 1 - Dec 31
2009	12.5"	25	Jan 1 - Oct 5
2010-2011	12.5"	25	May 22 - Oct 11; Nov 1 - Dec 31
2012	12.5"	25	May 19 - Oct 14; Nov 1 - Dec 31
2013	12.5"	20	May 19 - Oct 14; Nov 1 - Dec 31
2014	12.5"	15	May 19 - Sept 18; Oct 18 - Dec 31
2015-2017	12.5"	15	May 15 - Sept 21; Oct 22 - Dec 31
2018-2019	12.5"	15	May 15 - Dec 31

Table 7: State waters black sea bass recreational measures in 2018 and 2019. All measures remained unchanged from 2018 to 2019 except for the season in Massachusetts.

State	Min. Size (inches)	Possession Limit	Open Season
Maine	13	10 fish	May 19 - Sept 21; Oct 18 - Dec 31
New Hampshire	13	10 fish	Jan 1 - Dec 31
Massachusetts	15	5 fish	2018: May 19 - Sept 12 2019: May 18 - Sept 8
Rhode Island	15	3 fish	Jun 24 - Aug 31
		7 fish	Sept 1 - Dec 31
Connecticut private & shore	15	5 fish	May 19 - Dec 31
CT authorized party/charter monitoring program vessels	15	5 fish	May 19 - Aug 31
		7 fish	Sept 1 - Dec 31
New York	15	3 fish	Jun 23 - Aug 31
		7 fish	Sept 1 - Dec 31
New Jersey	12.5	10 fish	May 15 - Jun 22
		2 fish	Jul 1 - Aug 31
		10 fish	Oct 8 - Oct 31
	13	5 fish	Nov 1 - Dec 31
Delaware	12.5	15 fish	May 15 - Dec 31
Maryland	12.5	15 fish	May 15 - Dec 31
Virginia	12.5	15 fish	Feb 1 - 28; May 15 - Dec 31
North Carolina, North of Cape Hatteras (35° 15'N)	12.5	15 fish	Feb 1 - 28; May 15 - Dec 31

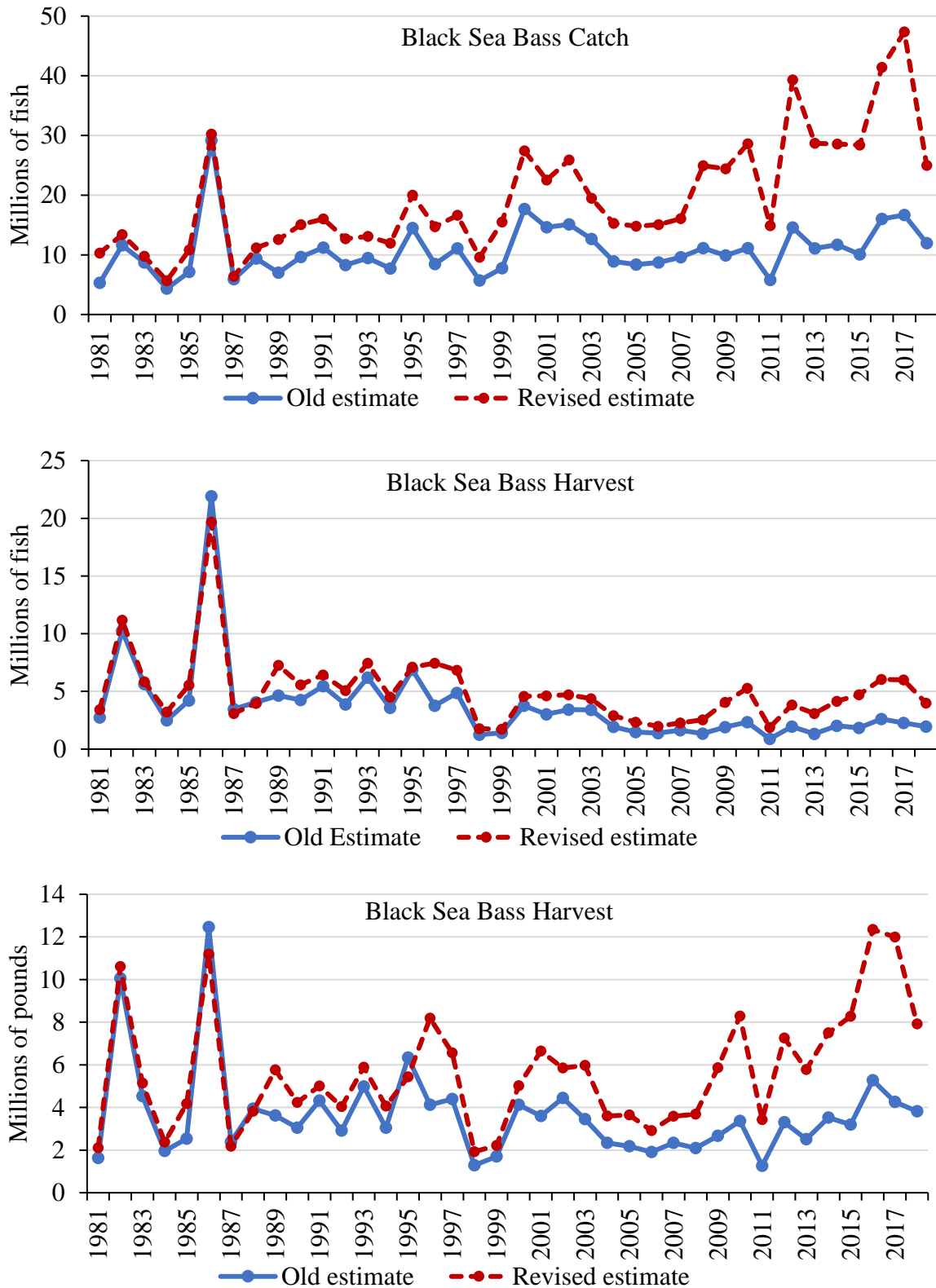


Figure 6: Recreational black sea bass catch in numbers of fish and harvest in numbers of fish and pounds, ME - NC, 1981 - 2017 based on old and revised MRIP estimates.⁵

Table 8: Estimated recreational black sea bass catch and harvest from Maine through Cape Hatteras, North Carolina, 2009-2018, based on the revised MRIP estimates.⁶

Year	Catch (millions of fish)	Harvest (millions of fish)	Harvest (millions of pounds)	% of catch retained
2009	23.12	3.92	5.70	17%
2010	26.42	5.10	8.07	19%
2011	12.47	1.78	3.27	14%
2012	34.95	3.69	7.04	11%
2013	25.71	3.01	5.68	12%
2014	23.29	3.81	6.93	16%
2015	23.17	4.39	7.82	19%
2016	35.80	5.84	12.05	16%
2017	41.00	5.70	11.48	14%
2018	24.99	3.99	7.92	16%

Table 9: Estimated percentage of black sea bass recreational landings (in numbers of fish) in state and federal waters, from Maine through North Carolina, 2009 through 2018, based on the revised MRIP estimates.⁶

Year	State waters	Federal waters
2009	56%	44%
2010	54%	46%
2011	50%	50%
2012	63%	37%
2013	60%	40%
2014	59%	41%
2015	67%	33%
2016	56%	44%
2017	39%	61%
2018	58%	42%
2009-2018 average	56%	44%
2016-2018 average	51%	49%

Table 10: State-by-state contribution (as a percentage) to total recreational harvest of black sea bass (in number of fish), Maine through Cape Hatteras, North Carolina, 2016 - 2018, based on the revised MRIP estimates.⁶

State	2016	2017	2018	2016-2018 average
Maine	0%	0%	0%	0%
New Hampshire	0%	0%	0%	0%
Massachusetts	13%	10%	17%	13%
Rhode Island	9%	6%	18%	11%
Connecticut	11%	9%	10%	10%
New York	52%	42%	21%	38%
New Jersey	9%	26%	26%	20%
Delaware	2%	2%	2%	2%
Maryland	4%	3%	4%	4%
Virginia	1%	2%	2%	2%
North Carolina	0%	0%	0%	0%

Table 11: Percent of total recreational black sea bass landings (in numbers of fish) by recreational fishing mode, Maine through North Carolina, 1981-2018, based on the revised MRIP estimates.⁶

Year	Shore	Party/charter	Private/rental	Total Number of Fish in Millions
1981	52%	19%	29%	5.85
1982	2%	57%	41%	15.04
1983	7%	62%	31%	6.89
1984	12%	29%	59%	6.39
1985	10%	35%	55%	7.98
1986	15%	52%	33%	21.33
1987	6%	15%	79%	4.26
1988	11%	26%	63%	4.69
1989	13%	30%	57%	8.65
1990	17%	30%	53%	6.01
1991	12%	31%	57%	7.28
1992	4%	39%	57%	5.89
1993	3%	56%	41%	8.00
1994	12%	34%	54%	5.54
1995	14%	49%	37%	7.64
1996	5%	64%	31%	8.33
1997	1%	73%	26%	7.41
1998	3%	43%	54%	2.17
1999	5%	14%	81%	2.18
2000	10%	26%	64%	5.17
2001	2%	42%	56%	5.61
2002	2%	33%	65%	5.34
2003	1%	34%	65%	4.86
2004	1%	18%	81%	4.53
2005	1%	21%	78%	3.47
2006	7%	21%	72%	3.10
2007	3%	30%	67%	3.02
2008	1%	17%	82%	3.33
2009	2%	11%	87%	4.59
2010	1%	9%	90%	6.41
2011	2%	14%	84%	2.64
2012	1%	17%	82%	4.37
2013	2%	7%	91%	3.63
2014	3%	14%	83%	4.92
2015	0%	11%	89%	5.12
2016	4%	8%	88%	6.39
2017	1%	9%	90%	6.30
2018	1%	12%	87%	4.34
1981-2018 average	7%	29%	64%	6.02
2016-2018 average	2%	10%	88%	5.68

References

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- ⁵ Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division. Accessed July 8, 2019. Available at: <https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index>
- ⁶ Unpublished NMFS commercial fish dealer data (i.e., “AA tables”, which include both state and federal dealer data).
- ⁷ Unpublished NMFS permit data.
- ⁸ Unpublished NMFS VTR data.