

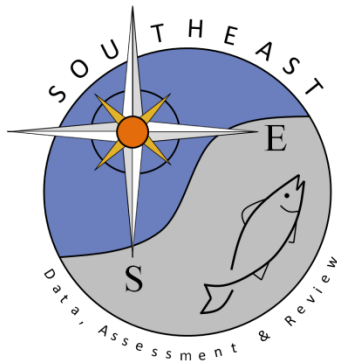
Commercial Discards of South Atlantic Black Sea Bass and Associated Weighted Discard Length Composition

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SEDAR 108 Working Paper

Commercial Discards of South Atlantic Black Sea Bass and Associated Weighted Discard Length Composition

SEDAR108-DW-05

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Introduction

Following an analysis of discard logbook data reliability, the Southeast Fisheries Science Center (SEFSC) no longer recommends using these data to estimate discards for SEDAR (Alhale et al. 2024). The preferred data source for discard estimation is commercial observer data. However, a key limitation of observer data is that it only covers bottom longline and vertical line gears (handline, bandit rig, and trolling). For South Atlantic Black Sea Bass, pots are the dominant gear for harvest. In the logbook data this gear is reported under the more general category trap. For consistency between previous analyses (McCarthy 2011), Black Sea Bass pots will be referred to as “traps” in this working paper. The only source of discards from the trap fishery are discard logbook data. For this reason, commercial discards were estimated using gear-specific methods: the observer data methodology was applied to the vertical line fleet, while trap discards were calculated using the standard discard logbook methodology.

Relevant Management History of South Atlantic Black Sea Bass

There were two key management changes relevant to discard estimation:

1. The establishment of a minimum size in 1983 of 8 inches total length (TL) which lasted until February 1999 when the size limit was increased to 10 inches TL. The minimum size limit was increased again in 2012 to 11 inches TL.
2. A series of closures from 2009 to 2013 were implemented that applied to all gears. In 2013, closures continued through April 2016 for the South Atlantic Black Sea Bass pot fishery. In November 2016, the Black Sea Bass trap fishery closures were limited spatially to account for primary right whale calving grounds in the South Atlantic Exclusive Economic Zone (EEZ). These spatial Black Sea Bass trap prohibitions were not considered in discard analyses because (a) the fishery was open for the rest of the South Atlantic EEZ and (b) the logbook data does not have reliable depth data to categorize trips by open and closed season.

Spatial Domain

Discard estimates from the commercial vertical line fishery were conducted for fishing areas defined in Figure 1A to include catch and discards of Black Sea Bass south of Cape Hatteras, NC. Following data filters applied to SEDAR 25, data from the commercial trap fishery were subset to include logbook effort and discard logbook reports from fishing areas defined in Figure 1B (McCarthy 2011). Black Sea Bass traps are not set south of 28° North; therefore, this filter was mainly important to limit the logbook trap effort data used for fleet expansion since effort is not limited to trips catching only Black Sea Bass.

Observer Data Methodology

The general approach for estimating vertical line discards for the commercial reef fish fleet utilizes catch-per-unit-effort (CPUE) from the coastal reef fish observer program and total fishing effort from the commercial reef logbook program to estimate total catch,

$$totalCatch = CPUE * totalEffort.$$

For discard estimation, CPUE is computed for total discards, including fish released alive, released dead, released in unknown condition, and used for bait. The primary metric for the coastal observer program is CPUE by species and gear. The principal focus of this study was to apply the discard estimation methods developed for Gulf of America (formally Gulf of Mexico, hereafter the Gulf) Red Grouper in working paper SEDAR61-WP15 (Smith et al. 2018), Gulf Gray Triggerfish in working paper SEDAR62-WP07 (Smith et al. 2019a), and Gulf Vermilion Snapper in working paper SEDAR67-WP12 (Smith et al. 2019b) to South Atlantic Black Sea Bass. Weighted discard length composition methods developed for Gulf Red Snapper (SEDAR 74) were also applied to South Atlantic Black Sea Bass, though this method was first documented in working paper SEDAR85-WP06 for Gulf Yellowedge Grouper (Atkinson et al. 2023).

Data Sources

Vertical line observer data were collected by the Gulf and South Atlantic Fisheries Foundation (GSAFF) from 2007-2016 and the Southeast Fisheries Science Center (SEFSC) from 2014-2025. Data collected by GSAFF target vessels with valid Snapper-Grouper permits exclusively fishing bandit reels. Fishers voluntarily participated in the project and were compensated for each day an observer was aboard a vessel. Additionally, one crew member may have been displaced to allow space for the observer during the fishing trip (GSAFF, 2008). Mandatory observer coverage began in 2014 under a Marine Fisheries Initiative (MARFIN) grant which funded 62 sea days from February 2014 through January 2015 (Enzenauer et al. 2015). In 2018, the SEFSC South Atlantic Reef Fish Observer Program began continuous mandatory coverage for the vertical line portion of the South Atlantic reef fish fishery. Decossas & Mathers (2023) documents in more detail the vessel selection procedures for this program. All observer data from 2007-2025 were considered for estimating discards of South Atlantic Black Sea Bass. For both observer programs, scientific observers on commercial fishing vessels record detailed information on catch and effort for a subset of trips. Catch by species was recorded according to the disposition category: kept (landed), released alive, released dead, released undetermined, and used for bait. Length and weight were recorded for a subsample of individual fish. The methodology is defined by the start year of the observer program, with the pre-observer time period representing years prior to 2007, and the observer time period representing years 2007 and beyond.

Total fleet effort was determined from the commercial Coastal Fisheries Logbook Program in which fishers report basic information on effort and catch by species for every trip (Atkinson et al. 2021). The coastal logbook program began in 1990 for a subset of vessels in Florida and expanded to all vessels in 1993. For South Atlantic Black Sea Bass discard estimation, complete calendar years 1993-2025 were considered.

Trip-Level Catch for Observer Data

Observers collected catch data at a sub-trip level (e.g., a specific set and line for vertical line gear), but it was not feasible to sample every set, line, etc., for every trip. Gear-specific

procedures were applied to estimate the trip-level landed catch from the observer data (Smith et al. 2018). All data were converted to total length (mm) and whole weight (lbs) using the previously accepted equations from SEDAR 25 or SEDAR 56.

Trip-Level Effort for Observer and Logbook Data

For observer data, trip-level effort for vertical lines was computed as the cumulative daily fishing time (hours) from first hook in to last hook out; this time metric included the active fishing time as well as transit time between fishing locations during a given trip day. This effort variable generally matched trip fishing time reported in vessel logbook data (Smith et al. 2018).

Catch Expansion Procedures and Verification

Observer CPUE was calculated using trip-level nominal effort and catch for a given time period. Statistical estimation of total catch $\hat{C}$ and associated variance followed procedures for a (Horvitz-Thompson) survey design ratio estimator (Jones et al. 1995; Lohr 2010):

$$\hat{C} = CPUE * \hat{X},$$

where $CPUE$ is observer mean CPUE and $\hat{X}$ is total logbook nominal effort. Species- and gear-specific logbook total effort $\hat{X}$ was calculated in two steps. First, logbook trip effort by gear was summed over trips reporting landings of the target species. Second, to obtain $\hat{X}$, logbook trip effort was adjusted by the proportion of observer trip effort that reported only discards of the target species. Logbook total trips N were calculated in a similar manner.

Mean CPUE was estimated by

$$CPUE = \frac{\bar{y}}{\bar{x}}$$

where $\bar{x}$ is average effort $\bar{y}$ is average catch. Average catch was estimated by

$$\bar{y} = \frac{1}{n} \sum_i y_i$$

where y_i is observed catch per trip i and n is the number of observer trips. Average effort is estimated by

$$\bar{x} = \frac{1}{n} \sum_i x_i$$

where x_i is observer effort per trip i . Variance of total catch was estimated using

$$var[\hat{C}] = var[CPUE] * \hat{X}^2$$

where the variance of mean CPUE is

$$var[CPUE] = (1 - \frac{n}{N}) \frac{s^2(y|x)}{n\bar{x}^2}$$

N is the total number of logbook trips, and sample variance is

$$s^2(y|x) = \frac{\sum_i (y_i - \bar{CPUE} x_i)^2}{n - 1}.$$

Standard error of total catch was calculated as

$$SE[\hat{C}] = \sqrt{var[\hat{C}]}.$$

The CV of total catch $\hat{C}$ was estimated by

$$CV[\hat{C}] = \frac{SE[\hat{C}]}{\hat{C}}.$$

A verification step compared annual total landed catch from logbook data with the estimated observer annual total catch $\hat{C}$. Once verified, the catch expansion procedure was used to estimate annual total discards in weight and number.

Stratification by Trip Catch or Effort Level

Computations of mean CPUE, total catch, and associated standard errors were generalized to include strata for trip catch and/or effort levels of Black Sea Bass. This enabled accurate estimation of total catch (and discards) in cases where observer sampling was not proportional to the fleet with respect to trip catch or effort (Smith et al. 2019a), e.g., observers sampled fewer or more low-catch trips with respect to logbook low-catch trips, etc. Comparisons of observer vs. logbook frequency distributions for trip-level catch, effort, and CPUE were used to delineate strata for trip catch and/or effort levels (e.g., low, moderate, high, etc.).

Hindcast Procedures

For years prior to the observer data used for the verification procedure, the hindcast discard estimation procedures described in Smith et al. (2019a) were applied to Black Sea Bass. For this method, the ratio of observer CPUE in weight to logbook CPUE was computed for the observer time period, and then multiplied by the annual logbook CPUE for the hindcast time period to produce an estimated annual observer CPUE. Next, the annual observer CPUE was multiplied by annual logbook effort for the pre-observer time period to estimate total catch $\hat{C}$ in weight. An additional step computed the ratio of the observer CPUE in number to observer CPUE in weight. This ratio was then used to compute the observer estimated discards in number from the discards in weight for the hindcast period. Standard errors for the hindcast period were estimated using the respective CVs of total estimated catch $\hat{C}$ kept and discarded as described in Smith et al. (2019a). Both the annual length compositions for kept and discarded fish and management history informed the selection of the observer time period used in the hindcasting procedure. Verification compared total landed catch from logbook data with the estimated total catch $\hat{C}$ and standard error from observer data for the hindcast time period.

Accounting for Changing Minimum Size Regulations

The standard hindcasting procedure was applied to 2012 and on where the minimum size limit of Black Sea Bass was 11" TL. Methods for hindcasting Black Sea Bass catch and discards to 1993 were modified to approximate the historical 10" and 8" TL management regimes. This follows the same method most recently used for Gulf Gag (Thompson et al. 2026). Key steps were:

- 1) The disposition for individual fish recorded by observers was re-assigned according to the associated minimum legal size, with fish smaller than the minimum size assigned as discards, and fish at or above the minimum size assigned as kept. Fish recorded without lengths were assigned their original disposition. Standard procedures were then carried out to create an observer trip-level catch-effort dataset for the 20" TL management regime.
- 2) Standard computational formulae were used to compute observer mean CPUE and variance, and the proportions of observer trips and effort with kept fish, for each management regime. 5
- 3) The ratio of observer catch for the historical management regime to the current regime, $C_{11"}/C_{10"}$, and $C_{11"}/C_{8"}$ was used to adjust the annual reported logbook catch during the observer time period for the historical regime.
- 4) Computations of discards for the hindcasting time period were carried out following the procedures for the Trending CPUE method.

Discard Length Composition

The length frequency distribution for discards for a given management time frame was computed in the following manner. Average discard CPUE in stratum h was scaled to stratum total effort $\hat{Y}_h$.

$$\hat{Y}_h = CPUE_h * \hat{X}_h$$

and multiplied by stratum proportion of length L to obtain the stratum total discards $\hat{Y}_h$ at length L ,

$$\hat{Y}(L)_h = \hat{Y}_h * p(L)_h.$$

These were summed over all strata to obtain the survey frame total $\hat{Y}$ at length L

$$\hat{Y}(L)_{st} = \sum_h \hat{Y}(L)_h,$$

and then converted to relative proportion of length L ,

$$p(L)_{st} = \frac{\hat{Y}(L)_{st}}{\sum_h \hat{Y}_h} (1)$$

Annual discards-at-length were computed by multiplying eq. (1) and annual estimates of total discards. Discard length compositions were calculated in total length (cm).

Discard Logbook Data Methodology

Discard data from the SEFSC coastal fisheries Discard Logbook Program were used to calculate the number of Black Sea Bass discards from commercial trap vessels. The technique used to calculate discards followed the methods recommended in SEDAR 32 (the standard method) by calculating discard rates directly from the discard logbook data. Total effort of the trap fishery as reported to the coastal logbook program was used to calculate total discards of Black Sea Bass. Those methods developed for SEDAR 32 have become the standard approach for commercial fishery discard calculation in cases where observer reported data are insufficient for discard calculation.

Data Sources

In August 2001, SEFSC initiated a program to collect commercial fishing vessel discard data from the Gulf of America and South Atlantic fisheries. A reporting form was developed that supplements the existing vessel coastal logbook forms that are currently mandatory for those fisheries (see Alhale et al. 2024 for a description of the Discard Logbook Program and the sampling design over time). Data collection involves, each year, a 20% random sample of vessels with Gulf reef fish, South Atlantic snapper-grouper, King Mackerel, Spanish Mackerel, Dolphin/Wahoo, and shark permits.

The selected fishers were instructed to complete a supplemental discard form for every fishing trip that they made. Trips with no discards were reported as such. Reported data included the numbers of discards by species, estimated condition of the fish when released, reason for release (due to regulations or unmarketable/unwanted), and the fishing area where the animal was discarded. There are six options for the condition of released fish: all animals are dead, majority of the animals are dead, all animals are alive when released, majority of animals are alive, the fish are kept but not sold, and the condition of the animals is unknown.

Total effort was determined from the commercial Coastal Fisheries Logbook Program in which fishers reported basic information on effort and catch by species for every trip (Atkinson et al. 2021). The coastal logbook program began in 1990 for a subset of vessels in Florida and expanded to all vessels in 1993. For South Atlantic Black Sea Bass discard estimation, complete calendar years 1993-2025 were considered.

The main concern about using discard logbook data is the increasing percentage of trips reporting “no discards”. With an increasing percentage of trips reporting “no discard” interactions, it becomes significantly difficult to determine a true discard versus a fisher reporting “no discards” to meet reporting requirements. In Figure 3 of Alhale et al. (2024), the percentage of trips reporting “no discard” interactions were lowest for the trap fishery at 22 percent. While discard logbook data is the only available source for the trap fishery, the issue of reports of “no discards” may not be as applicable to this gear.

Data Filtering

Coastal logbook data filtering followed the methods recommended during SEDARs 32 and 41 (McCarthy, 2013 and 2015). Data were filtered to exclude trips landing only mackerel species (*Scomberomorus cavalla*, *Scomberomorus maculatus*, *Scomberomorus regalis*, *Scomber japonicus*, *Scomber scombrus*, *Auxis thazard*, and *Decapterus macarellus*) because it was generally believed by the SEDAR 32 and 41 panels that for trips targeting mackerel only, the likelihood of catching species other than mackerel was extremely low. This decision was largely focused on vertical line trips so this filter had no impact on the results for trips using trap gear. Trips with effort values greater than the 99.5 percentile of the distribution of the trap data were also filtered out of analyses.

To address possible underreporting of commercial discards, the following recommendations from SEDARs 32 (South Atlantic Blueline Tilefish and Gray Triggerfish) and 41 (South Atlantic Red Snapper and Gray Triggerfish) were applied to the discard logbook data. These filters became standard practice following those SEDAR Data Workshops. Fishers remain in reporting compliance by returning discard logbooks with reports of “no discards.” During the SEDAR 32 Data Workshop the issue of possible underreporting of commercial discards was discussed at length. The working group recommended that data be filtered to remove records from vessels that never reported discards of any species during a year. The SEDAR 32 working group acknowledged that some commercial fishing trips may not have had discards of any species and discussed the likely maximum number of trips by a vessel without a report of discards. Following the SEDAR 32 and 41 commercial working groups’ recommendations, data were excluded from trap vessels that reported more than 4 trips without reporting discards of any species (the mean number of trips prior to the first trip with reported discards plus two standard deviations above that mean).

Within each minimum size limit and season (open and closed), the mean discard rate from 2002-2025 was calculated as the number of discards per trap used for trap vessels. Following McCarthy (2011) decisions, the number of traps used is the only reliable effort measure for fish traps. Other fishing effort data (e.g. number of hauls and trap soak time) was not considered due to inconsistency in how those data were collected and interpreted by fishermen overtime. Annual total effort (number of traps) of all logbook trips from vessels reporting trap fishing was multiplied by the mean discard rate from the appropriate minimum size limit management regime to calculate total discards of Black Sea Bass.

For years prior to 2002 (the first year of discard data), the mean discard rate from the 10-inch minimum size limit during the open season was used to calculate discards for the years 1999-2001 when effort data were available. Prior to 1999, the minimum size limit was 8 inches total length. Since trap fishing is highly selective, it was not appropriate to use a discard rate from a 10-inch size limit and apply it to the 8-inch size limit management regime.

Results and Discussion

Vertical Line

The observer database included 1,031 vertical line trips with corresponding trip and set information. Observer sampling effort is summarized in Table 1, distinguishing all trips from the subset of trips that captured Black Sea Bass. While observer data began in 2007, low sample sizes and an inability to validate the logbook landings with observer data in the earlier years led to the observer data only being used after 2014 when data collection was more robust.

Discard estimates generally consider changing size limits when possible. However, the time period for reliable observer data for this region begins in 2014 with an 11-inch size limit which stayed consistent until the terminal year of 2025. During this time period, most discarded fish were near or below the minimum size limit, and kept fish were mostly above the minimum size limit (Fig. 2). In addition, legal-sized fish were discarded on some of the same trips that kept legal-sized fish. It was not possible to directly investigate the effects of the 8-inch (1983-1999) or 10-inch (1999-2012) size limits on discard behavior, but it is likely that distributions of discards were generally being below the size limits. Comparisons between open and closed seasons were not possible for this species, given that closures were from 2009-2012 and therefore do not overlap with the observer data being used. As such, the discard estimates here are for open seasons only.

Inspection of the annual nominal CPUE (catch in whole pounds per hour) from logbook trips reporting Black Sea Bass were low and stable for the beginning of the time series with significant increase in 2010 from which it's been steadily declining (Fig. 3). Catch-effort data for observer trips catching Black Sea Bass were pooled across years for the full observer time period (2014-2025). Logbook catch-effort data for Black Sea Bass trips were pooled in the same manner. These observer and logbook datasets were the basis for subsequent analysis and estimation of catch and discards for the different size-limit based management regimes.

Observer and logbook frequency distributions of trip-level catch, effort, and CPUE showed some discrepancies between the two datasets for the observer time period used. Further analysis showed that observers sampled a higher proportion of low catch (<2 lbs.) and high catch (>15 lbs) Black Sea Bass trips relative to the commercial fleet with agreement at the medium catch level (between 2 and 15 lbs; (Table 2). To account for this discrepancy, observer and logbook trips were grouped into strata according to low (L), moderate (M), and high (H) catches for subsequent analysis and estimation.

The proportions of observer trips and effort encountering Black Sea Bass that had kept fish are given in Table 3a for the 11-inch management regime and catch level strata. These proportions were used to adjust annual logbook total Black Seabass trips and effort (Table 4) to account for logbook trips that only had discarded fish. The 10-inch and 8-inch management regimes used ratios of observer catch for historical management regimes (C_8 or C_{10}) to the current management regime (C_{11}) shown in Table 3b to adjust logbook catches and CPUE estimates (Table 4) during hindcasting procedures. Estimates of observer mean CPUE for the 11-inch

management regime and catch level strata are given in Table 5. These CPUEs were the basis for expansion estimates of Black Sea Bass catch and discards where observer data are available.

CPUE expansion estimates of annual total landed catch of South Atlantic Black Sea Bass compared favorably with reported logbook landings for 1993-2025 (Fig. 4). CPUE expansion estimates for annual discards in numbers and weight of South Atlantic Black Sea Bass 1993-2025 are provided in Table 6. Estimated discards in number ranged from 3,000 to 4,000 in the beginning and end of the time series, with a peak from 2012-2018 where discards were as high as over 40,000 fish (Fig. 5A). Discards in weight accounted for about 3-5% of the total catch (kept + discards) during 1993-2011 and 10-13% of the total catch starting in 2012 (Fig. 5B).

Annual discard length frequencies were provided in 3 cm fork length bins using the catch and effort strata by management regime (Fig. 6).

Trap

The percentage of discard reports returned with “no discards” from trap vessels between 2002 and 2025 range from 1 to 80 percent (Table 7). The number of discard logbook trips being reported by trap vessels has decreased significantly overtime. A breakdown of the number of trips and vessels removed for each reason are summarized in Table 8. After standard filtering was applied to the coastal and supplemental discard logbook data, each source was categorized by management actions to calculate nominal discard rates and total effort (in number of traps fished) by minimum size limit and season (open vs. closed; Table 9).

Black Sea Bass dominate the trap fishery, comprising 98 percent of the logbook South Atlantic trap catch. Because of this high target specificity, traps are rarely deployed during seasonal closures. This lack of off-season activity is evident in Table 9, which contains very few discard logbook trips during the closed season. Furthermore, the logbook effort expansion did not include a large portion of trips where Black Sea Bass were not caught on a trip.

Table 10 and Figure 7 display the total estimated commercial discards from the trap fishery between 1999 and 2025. Due to a lack of discard data during the 8-inch minimum size limit era (1993–1998), estimates were hindcasted back to 1999, which marked the implementation of the 10-inch size limit. The sharp decline in estimated discards over the time series is driven by a severe drop in logbook effort for this gear. Discards peaked at 190,000 fish in 1999 before falling to just 4,000 fish in 2025.

Compare to Previous Assessment

Beginning with SEDAR 25, commercial trap and vertical line discards for Black Sea Bass were estimated using discard logbook data and a delta-lognormal modeling technique. Subsequent assessments maintained this approach for continuity, even after SEDAR 32 and 41 established a standardized nominal rate methodology. For SEDAR 108, however, we departed from this approach. Commercial discard estimates presented for SEDAR 108 utilized observer data for the vertical line fishery and discard logbook data for the trap fishery using the standard nominal rate methodology.

Comparisons to the previously provided vertical line estimates in SEDAR 76U were generally agreeable until 2009 when closed seasons were being implemented until 2013 (Figure 8). As previously discussed, the lack of observer coverage during this time doesn't allow for discard estimation during closed seasons. The sample sizes are inadequate and any attempt to use the observer data lead to catch verification issues and subsequent discard estimation problems throughout the entirety of the time series. As the previous estimates came from discard logbook data, which is no longer recommended for this gear, this discrepancy is unavoidable in our final estimates for this species and gear.

Trap discards were compared by open and closed season between assessments with all differences stemming from differences in the discard logbook methodologies (Figure 9). Some main differences include the following:

- The methodology to calculate discard rates are fundamentally different with SEDAR 76 Update being a modeled discard rate and SEDAR 108 being nominal.
- For the years 1998 to 2001, SEDAR 76U applied an average discard rate using 2002-2011 discard logbook data weighted by the number of trips reporting discards. For this assessment (SEDAR 108), the average discard rate was not weighted leading to an overall higher discard rate for SEDAR 108 compared to SEDAR 76 Update.
- Starting in 2016, fishing was limited to certain depths seasonally to minimize the risk of interactions of North Atlantic Right Whales with Black Sea Bass pot gear. During December through March, the closed area applies to federal waters shallower than 25 meters off Florida and Georgia and federal waters shallower than 60 meters from South Carolina to Cape Hatteras, North Carolina. During November and April, the closed area applies to federal waters shallower than 25 meters for the entire South Atlantic coast (North Carolina to east Florida). For SEDAR 76U, these spatial closures were considered in the analyses; however, they were not considered in the SEDAR 108 analyses. This is because there are federal waters where Black Sea Bass pots are permitted and based on the logbook data, most of the landed Black Sea Bass are during the months with the area closure, indicating fishing is occurring at deeper depths. This is shown in Figure 9 where SEDAR 108 does not have any discard estimates during the "closed" season starting in 2016.

With respect to estimating trap discards, it should be noted that the discard logbook methodology will continue to be required to estimate discards for Black Sea Bass in the South Atlantic reef fishery because the Southeastern Fisheries Observer Program does not cover vessels utilizing trap gear. In order to cover the trap fishery, a separate program needs to be developed and more funds are needed. Observer collected discard data is the preferred data source for estimating discards numbers, as the methodology enables catch verification that other data sources cannot provide.

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Table 1. Number of total **vertical line** trips and trips with Black Sea Bass observed by the Southeastern commercial observer programs in the southeast US Atlantic by year.

Year	Total Observer Trips	Black Sea Bass Trips
2007	28	17
2008	5	4
2009	7	5
2010	6	5
2011	13	11
2012	1	0
2013	0	0
2014	31	11
2015	25	20
2016	16	6
2017	0	0
2018	18	6
2019	12	4
2020	16	2
2021	55	7
2022	281	54
2023	208	35
2024	133	20
2025	176	32

Table 2. Definition of trip strata levels for South Atlantic Black Sea Bass, and corresponding percentages of logbook and observer **vertical line** trips for each zone and management regime.

Management Regime	Season	Strata Level	Stratum Code	% Trips	
				Logbook	Observer
11-inch limit 2014-2025	Open	Low, Catch $\leq$ 2 lbs	L	10.0	30.3
11-inch limit 2014-2025	Open	Moderate, $2 < \text{Catch} \leq 15$ lbs	M	35.6	36.9
11-inch limit 2014-2025	Open	High, Catch > 15 lbs	H	54.4	32.8

Table 3. (A) South Atlantic Black Sea Bass **vertical line** trip and effort adjustment factors by management regime and catch strata levels defined in Table 2. The proportions of Black Sea Bass observer trips and effort with kept Black Sea Bass were used to respectively adjust annual logbook total trips and effort (Table 4) to account for logbook trips that only had discarded fish. (B) Adjustment factors for each catch strata level and size limit change (C8/C11 and C10/11). These ratios are used for hindcasting to the appropriate, smaller, size limit during the pre-observer time periods (8-inch total length size limit from 1993-1998 and 10-inch total length size limit from 1999-2011).

(A)

Management Regime	Season	Strata Type	Strata Level	Number of Observer Trips (n)	Proportion of Observer Data with Kept Black Sea Bass	
					Trips	Effort
11-inch limit 2014-2025	Open	Catch	L	59	0.593	0.753
11-inch limit 2014-2025	Open	Catch	M	72	1	1
11-inch limit 2014-2025	Open	Catch	H	64	1	1

(B)

Description	Strata Type	Strata Level	Ratio
C ₈ /C ₁₁	Catch	H	1.0940
C ₈ /C ₁₁	Catch	L	1.8958
C ₈ /C ₁₁	Catch	M	1.1774
C ₁₀ /C ₁₁	Catch	H	1.0645
C ₁₀ /C ₁₁	Catch	L	1.6107
C ₁₀ /C ₁₁	Catch	M	1.1130

Table 4. Annual time-series of **vertical line** logbook trips (number) and effort (hours) by catch/effort level strata for South Atlantic Black Sea Bass. Catch strata levels are defined in Table 2 and logbook total trips and effort are adjusted using observer proportions from Table 3 to account for logbook trips that only had discarded fish.

Year	Season	Strata Type	Strata Level	Logbook Trips		Logbook Effort	
				Reported	Adjusted (N)	Reported	Adjusted (X)
1993	Open	Catch	L	162	184	3,736	3,985
1993	Open	Catch	M	870	870	22,240	22,240
1993	Open	Catch	H	1,154	1,154	36,240	36,240
1994	Open	Catch	L	187	212	3,936	4,199
1994	Open	Catch	M	1,128	1,128	23,971	23,971
1994	Open	Catch	H	1,400	1,400	40,639	40,639
1995	Open	Catch	L	192	218	4,042	4,312
1995	Open	Catch	M	990	990	22,482	22,482
1995	Open	Catch	H	996	996	25,056	25,056
1996	Open	Catch	L	169	192	4,172	4,450
1996	Open	Catch	M	916	916	24,039	24,039
1996	Open	Catch	H	1,011	1,011	29,070	29,070
1997	Open	Catch	L	190	216	3,812	4,067
1997	Open	Catch	M	897	897	23,312	23,312
1997	Open	Catch	H	1,344	1,344	35,693	35,693
1998	Open	Catch	L	183	208	3,634	3,877
1998	Open	Catch	M	971	971	20,430	20,430
1998	Open	Catch	H	1,324	1,324	39,250	39,250
1999	Open	Catch	L	137	176	3,440	3,929
1999	Open	Catch	M	733	733	17,948	17,948
1999	Open	Catch	H	1,017	1,017	25,872	25,872
2000	Open	Catch	L	117	150	3,170	3,621
2000	Open	Catch	M	640	640	16,542	16,542
2000	Open	Catch	H	811	811	20,156	20,156
2001	Open	Catch	L	143	183	3,840	4,387
2001	Open	Catch	M	663	663	18,626	18,626
2001	Open	Catch	H	979	979	31,403	31,403
2002	Open	Catch	L	155	199	3,900	4,455
2002	Open	Catch	M	684	684	19,488	19,488
2002	Open	Catch	H	884	884	28,407	28,407
2003	Open	Catch	L	110	141	2,812	3,212

Year	Season	Strata Type	Strata Level	Logbook Trips		Logbook Effort	
				Reported	Adjusted (N)	Reported	Adjusted ($\hat{X}$)
2003	Open	Catch	M	543	543	16,076	16,076
2003	Open	Catch	H	753	753	28,284	28,284
2004	Open	Catch	L	100	128	2,106	2,406
2004	Open	Catch	M	520	520	13,114	13,114
2004	Open	Catch	H	863	863	29,958	29,958
2005	Open	Catch	L	94	121	2,216	2,532
2005	Open	Catch	M	570	570	16,040	16,040
2005	Open	Catch	H	727	727	23,846	23,846
2006	Open	Catch	L	88	113	2,274	2,598
2006	Open	Catch	M	578	578	19,334	19,334
2006	Open	Catch	H	695	695	24,280	24,280
2007	Open	Catch	L	174	223	4,269	4,877
2007	Open	Catch	M	548	548	15,784	15,784
2007	Open	Catch	H	547	547	17,545	17,545
2008	Open	Catch	L	143	183	3,548	4,053
2008	Open	Catch	M	604	604	16,964	16,964
2008	Open	Catch	H	604	604	20,622	20,622
2009	Open	Catch	L	142	182	3,596	4,108
2009	Open	Catch	M	687	687	18,274	18,274
2009	Open	Catch	H	768	768	28,109	28,109
2010	Open	Catch	L	45	58	1,376	1,572
2010	Open	Catch	M	302	302	7,258	7,258
2010	Open	Catch	H	532	532	18,548	18,548
2011	Open	Catch	L	13	17	196	224
2011	Open	Catch	M	71	71	1,548	1,548
2011	Open	Catch	H	296	296	7,871	7,871
2012	Open	Catch	L	23	39	608	808
2012	Open	Catch	M	187	187	4,420	4,420
2012	Open	Catch	H	637	637	16,940	16,940
2013	Open	Catch	L	66	111	1,689	2,244
2013	Open	Catch	M	321	321	6,504	6,504
2013	Open	Catch	H	1,086	1,086	29,322	29,322
2014	Open	Catch	L	145	244	2,749	3,652
2014	Open	Catch	M	641	641	12,172	12,172
2014	Open	Catch	H	1,363	1,363	33,944	33,944

Year	Season	Strata Type	Strata Level	Logbook Trips		Logbook Effort	
				Reported	Adjusted (N)	Reported	Adjusted ($\hat{X}$)
2015	Open	Catch	L	117	197	2,953	3,924
2015	Open	Catch	M	437	437	11,175	11,175
2015	Open	Catch	H	1,095	1,095	24,920	24,920
2016	Open	Catch	L	131	221	3,041	4,040
2016	Open	Catch	M	492	492	11,208	11,208
2016	Open	Catch	H	992	992	17,753	17,753
2017	Open	Catch	L	130	219	2,898	3,850
2017	Open	Catch	M	542	542	11,261	11,261
2017	Open	Catch	H	950	950	15,810	15,810
2018	Open	Catch	L	118	199	2,588	3,439
2018	Open	Catch	M	435	435	9,621	9,621
2018	Open	Catch	H	733	733	12,224	12,224
2019	Open	Catch	L	123	207	2,604	3,459
2019	Open	Catch	M	521	521	9,436	9,436
2019	Open	Catch	H	529	529	7,990	7,990
2020	Open	Catch	L	131	221	3,023	4,017
2020	Open	Catch	M	402	402	7,138	7,138
2020	Open	Catch	H	386	386	5,345	5,345
2021	Open	Catch	L	127	214	2,954	3,926
2021	Open	Catch	M	302	302	6,092	6,092
2021	Open	Catch	H	350	350	4,651	4,651
2022	Open	Catch	L	100	169	2,073	2,755
2022	Open	Catch	M	350	350	6,254	6,254
2022	Open	Catch	H	320	320	5,214	5,214
2023	Open	Catch	L	85	143	1,208	1,606
2023	Open	Catch	M	309	309	5,066	5,066
2023	Open	Catch	H	283	283	3,757	3,757
2024	Open	Catch	L	74	125	1,496	1,988
2024	Open	Catch	M	197	197	4,054	4,054
2024	Open	Catch	H	179	179	2,487	2,487
2025	Open	Catch	L	116	196	1,742	2,315
2025	Open	Catch	M	331	331	4,600	4,600
2025	Open	Catch	H	393	393	4,500	4,500

Table 5. Estimated observer mean CPUE in weight (lbs.) and number by management regime and catch/effort level strata for expansion estimates of **vertical line** South Atlantic Black Sea Bass catch and discards.

Management Regime	Season	Strata Type	Strata Level	Logbook CPUE	Observer CPUE		
					Kept (Weight)	Discard (Weight)	Discard (Number)
11-inch limit 2014-2025	Open	Catch	L	0.052	0.065	0.067	0.133
11-inch limit 2014-2025	Open	Catch	M	0.385	0.290	0.060	0.099
11-inch limit 2014-2025	Open	Catch	H	6.304	5.374	0.714	1.254

Table 6. Time-series of CPUE expansion estimates for South Atlantic Black Sea Bass **vertical line** discards in weight (lbs.) and number, with associated standard errors (SE).

Year	Estimated Discards in Weight	SE of Estimated Discards in Weight	Estimated Discards in Number	SE of Estimated Discards in Number
1993	2,642	734	3,946	858
1994	3,182	884	4,759	1,035
1995	2,190	608	3,317	721
1996	2,351	653	3,536	769
1997	3,745	1,040	5,549	1,207
1998	3,215	893	4,792	1,042
1999	5,211	1,024	9,648	1,824
2000	3,714	730	6,906	1,306
2001	3,997	786	7,435	1,406
2002	3,604	708	6,727	1,272
2003	3,381	665	6,280	1,187
2004	4,320	849	7,974	1,508
2005	3,090	607	5,751	1,087
2006	2,792	549	5,209	985
2007	2,277	448	4,298	813
2008	2,455	483	4,620	873
2009	3,472	682	6,478	1,225
2010	3,016	593	5,544	1,048
2011	2,284	449	4,163	787
2012	11,326	2,178	19,860	3,987
2013	20,181	3,882	35,399	7,105
2014	25,225	4,978	44,243	9,107
2015	18,736	3,698	32,867	6,766
2016	13,626	2,689	23,900	4,920
2017	12,228	2,413	21,444	4,414
2018	9,540	1,883	16,731	3,444
2019	6,506	1,284	11,409	2,348
2020	4,516	891	7,939	1,634
2021	3,951	780	6,954	1,431
2022	4,284	846	7,520	1,548
2023	3,095	611	5,423	1,116
2024	2,153	425	3,782	779
2025	3,646	720	6,403	1,318

Table 7. Total number of discard logbook trips reported from **trap** vessels as well as the percentage reporting “no discard” interactions.

Year	Total Trips	Percent Trips Reporting “No Discards”
2002	66	2
2003	96	2
2004	43	9
2005	22	0
2006	20	5
2007	80	26
2008	238	10
2009	228	10
2010	196	19
2011	86	38
2012	143	8
2013	176	2
2014	176	2
2015	130	17
2016	85	4
2017	138	10
2018	123	2
2019	76	1
2020	21	38
2021	21	81
2022	64	61
2023	31	32
2024	7	57
2025	17	18

Table 8. Standard discard logbook data filters applied to **trap** vessels for not reporting a discard of any species for the entire reporting year or taking more than 4 trips (2 standard deviations from the mean) to report a discard of any species.

Year	Not reporting for the entire year		Taking longer than 2 SD to report a discard	
	Trips	Vessels	Trips	Vessels
2002	1	1	-	
2004	2	1	-	
2008	8	1	-	
2010	28	6	12	1
2011	19	4	-	
2012	4	2	-	
2013	1	1	-	
2014	4	1	-	
2015	1	1	24	1
2017	11	1	-	
2020	8	1	-	
2021	17	1	-	
2022	2	1	45	2
2023	1	1	-	
2024	4	1	-	
2025	3	1	-	

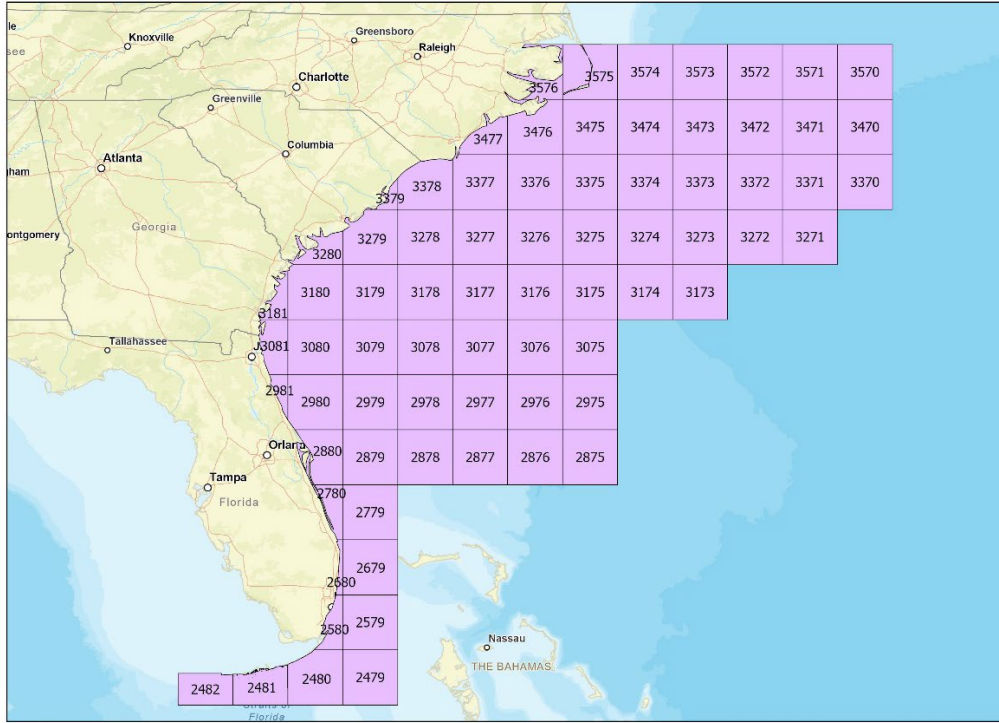
Table 9. Discard logbook average discard rate from **trap** vessels by management period (minimum size limit and season). CV is the coefficient of variation.

Minimum Size Limit	Season	Total Discard Logbook Trips	Mean Discard Rate	CV	N trips with reported BSB discards
10 in TL	Closed	42	1.718	0.164	36
10 in TL	Open	746	3.927	0.059	636
11 in TL	Closed	21	8.22	0.148	19
11 in TL	Open	928	5.87	0.035	882

Table 10. Calculated yearly total discards (in number) of South Atlantic Black Seabass from **trap** vessels, and associated standard errors (SE). Total logbook effort is in number of traps fished.

Year	Total logbook effort	Discards in Number	Discard SE
1999	48,363	189,916	11,158
2000	36,096	141,745	8,328
2001	43,695	171,586	10,081
2002	34,774	136,554	8,023
2003	31,878	125,181	7,354
2004	31,806	124,899	7,338
2005	24,805	97,407	5,723
2006	31,798	124,867	7,336
2007	25,181	98,883	5,809
2008	18,946	74,399	4,371
2009	28,605	111,834	6,611
2010	15,577	55,175	3,732
2011	6,927	22,599	1,704
2012	8,585	52,409	2,616
2013	9,430	55,415	1,945
2014	7,665	44,976	1,552
2015	6,052	35,575	1,253
2016	4,947	29,056	1,014
2017	8,115	47,617	1,643
2018	5,869	34,438	1,188
2019	5,424	31,827	1,098
2020	1,621	9,512	328
2021	1,290	7,569	261
2022	1,629	9,559	330
2023	1,042	6,114	211
2024	665	3,902	135
2025	657	3,855	133

(A) Vertical Line



(B) Trap

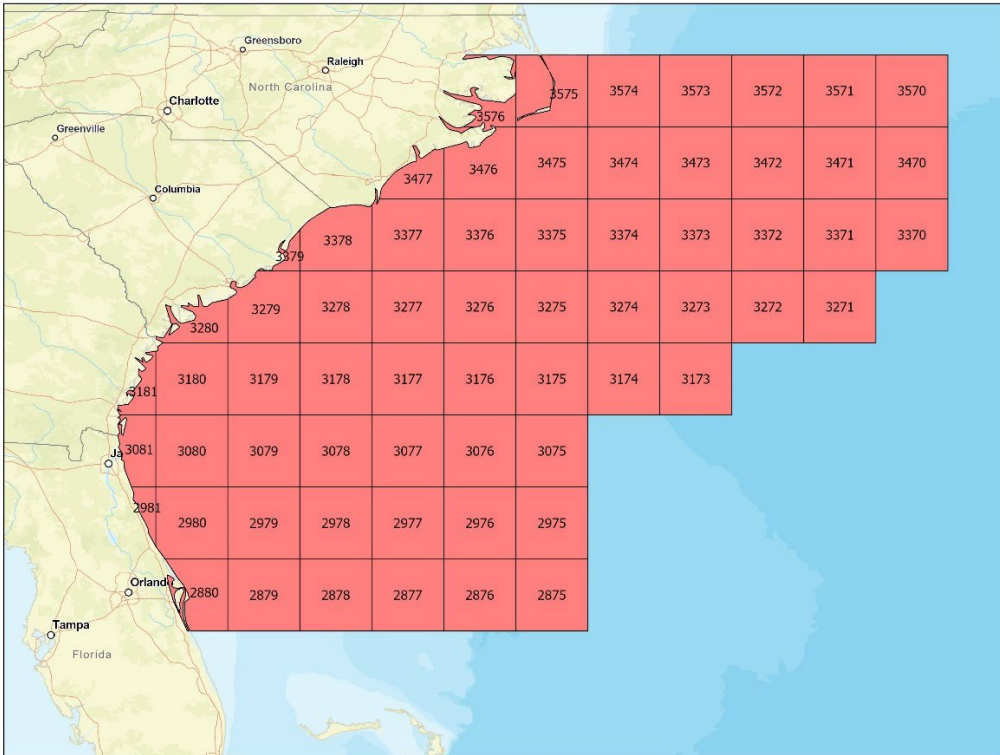


Figure 1. (A) Map of logbook fishing areas included from the commercial vertical line fishery for Black Sea Bass. (B) Spatial distribution of commercial trap fishery areas included in Black Sea Bass discard analyses.

11-inch limit 2014-2025

Min Size Limit = 11 inches Total Length (11 inches Total Length)

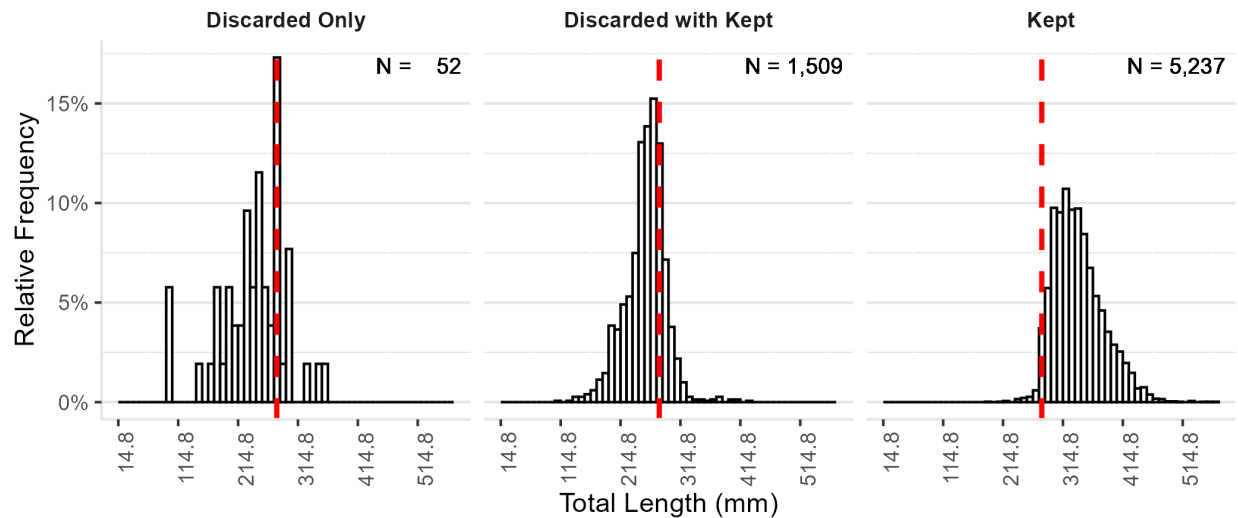


Figure 2. Length-frequency plots of observer **vertical line** South Atlantic Black Sea Bass by disposition (Kept or Discard) and management regime. “Discarded Only” were discards from trips with no kept Black Sea Bass; “Discarded with Kept” were discards from trips with kept Black Sea Bass; and “Kept” is showing the length distribution of the kept Black Sea Bass only. Vertical dashed line denotes the minimum size limit (11 in = 279 mm) in maximum total length (TL; mm); N is the number of measured fish.

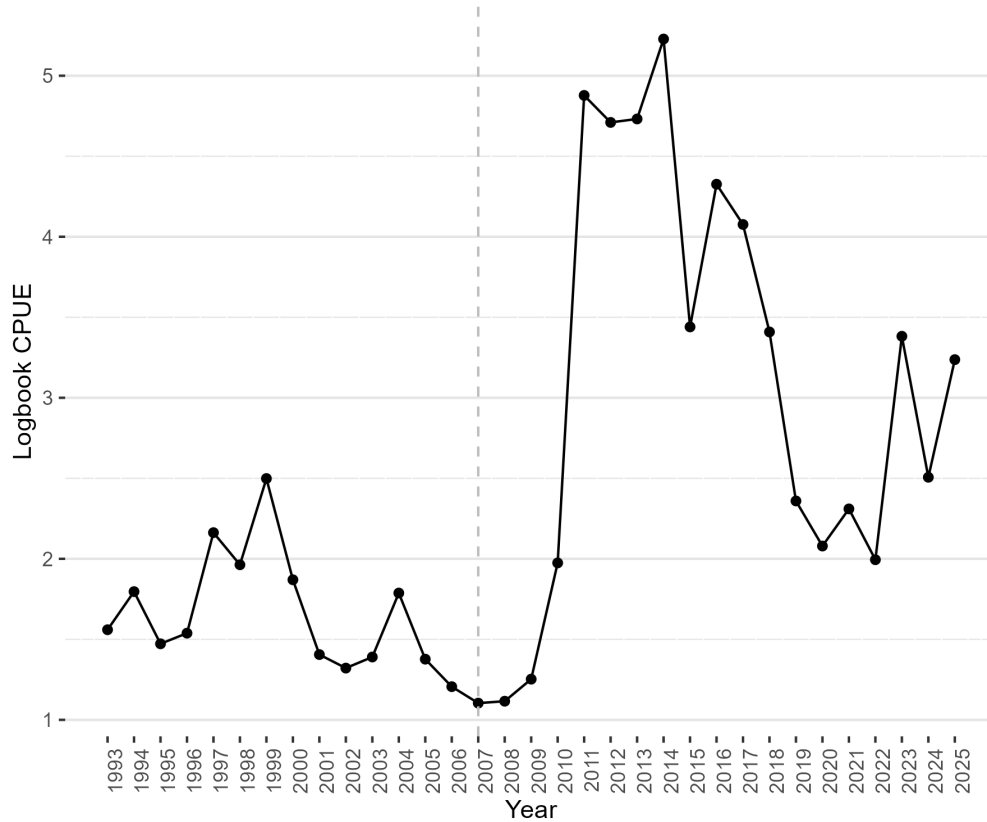


Figure 3. CPUE (catch in whole pounds per hour) time-series for logbook data from 1993 - 2025 for **vertical line** trips landing South Atlantic Black Sea Bass. The vertical dashed lines denote the observer time period (2007 - 2025).

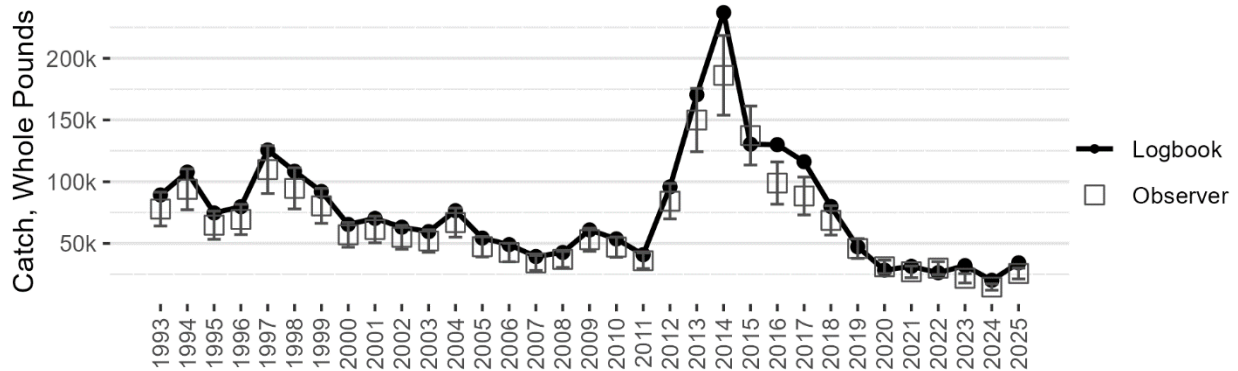
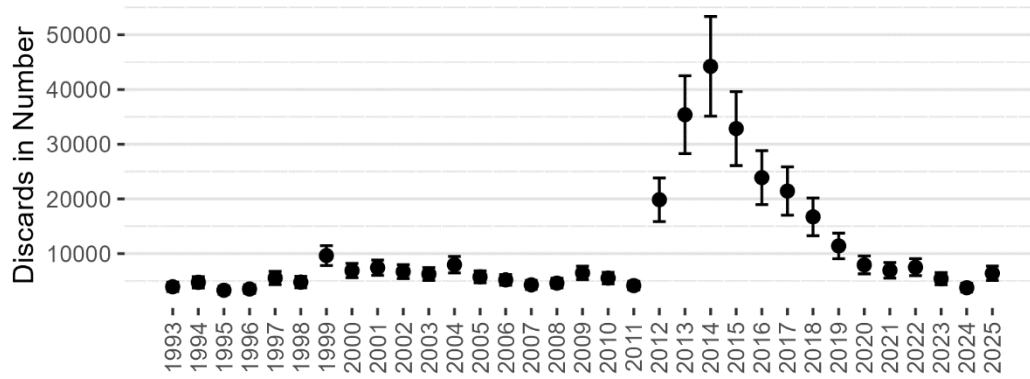


Figure 4. Comparison of **vertical line** reported annual logbook landings of South Atlantic Black Sea Bass (solid black line) with CPUE expansion estimates from observer data (open squares). Error bars (SE) are shown for observer estimates.

(A) Discards in Number



(B) Discards in Weight, Percentage of Total Catch

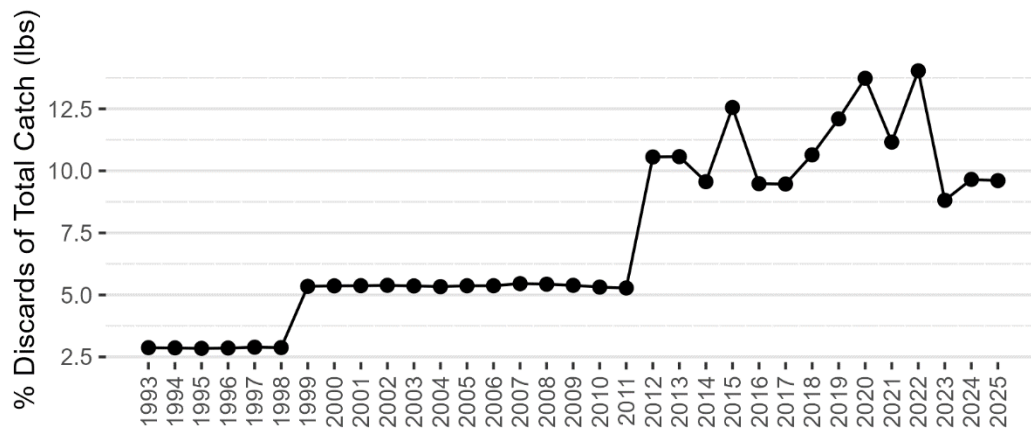


Figure 5. Observer CPUE expansion estimates of South Atlantic Black Sea Bass commercial **vertical line** annual discards (+/-SE) in (A) number and (B) weight expressed as percentage of total catch (kept + discards) for 1993 - 2025.

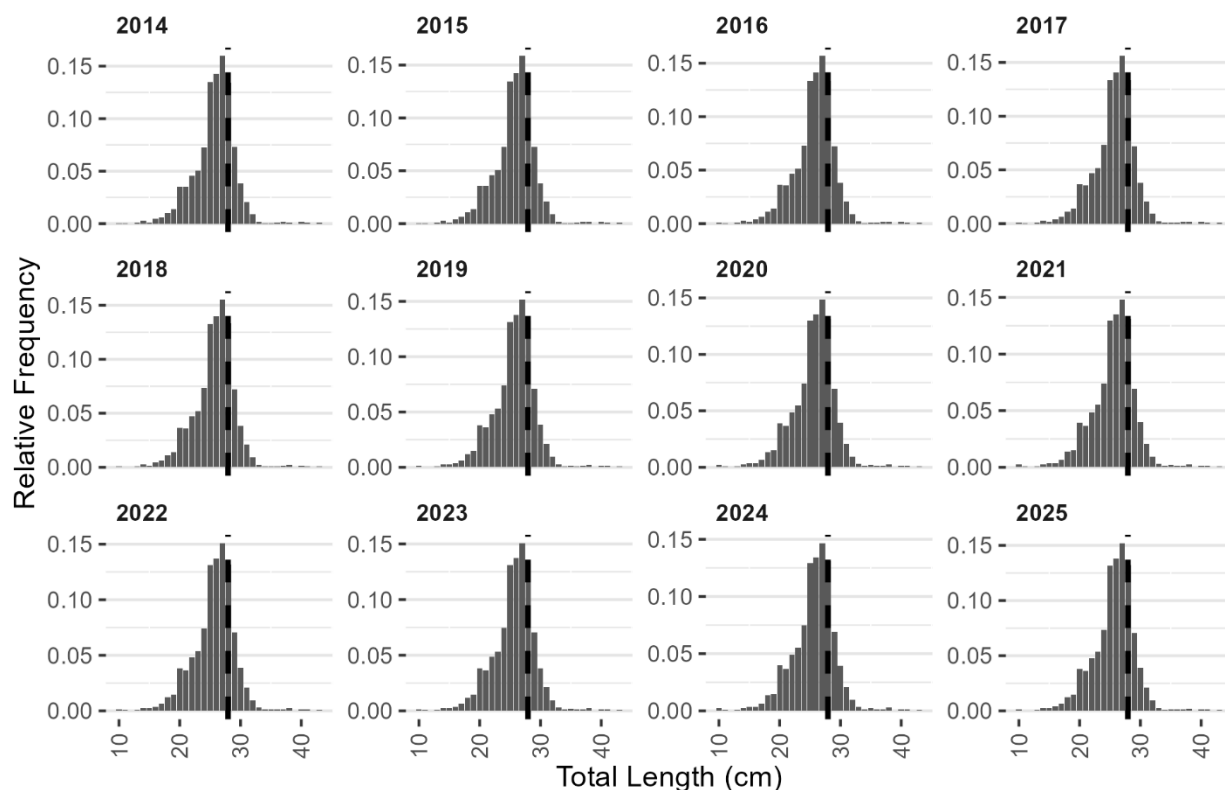


Figure 6. Commercial annual discard length compositions for the South Atlantic Black Sea Bass **vertical line** fishery, accounting for catch level stratification for this management period. The vertical dashed line denotes the minimum size limit (11 in = 27.9 cm).

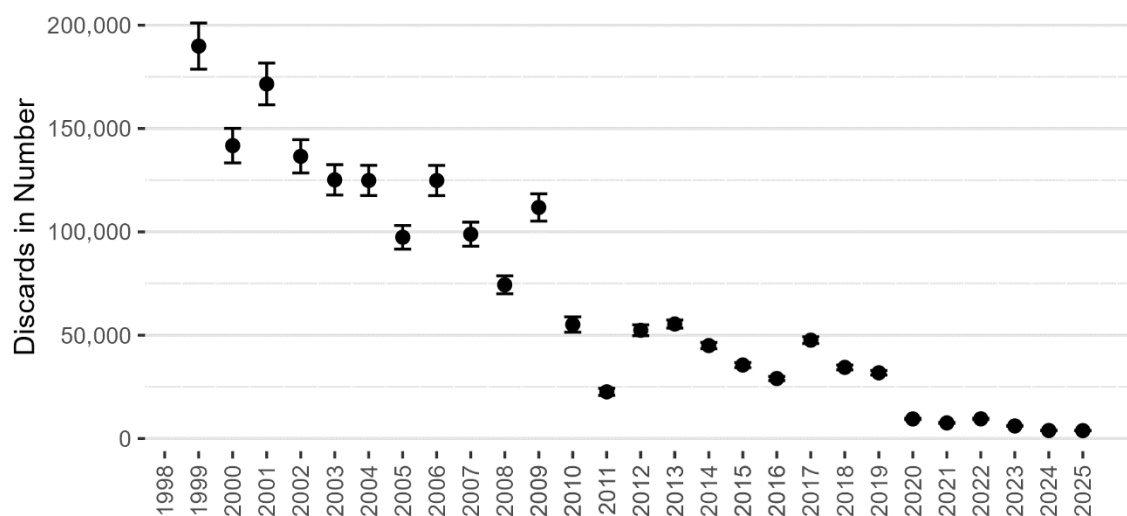


Figure 7. South Atlantic Black Sea Bass commercial **trap** annual discards (+/-SE) in number using Discard Logbook data.

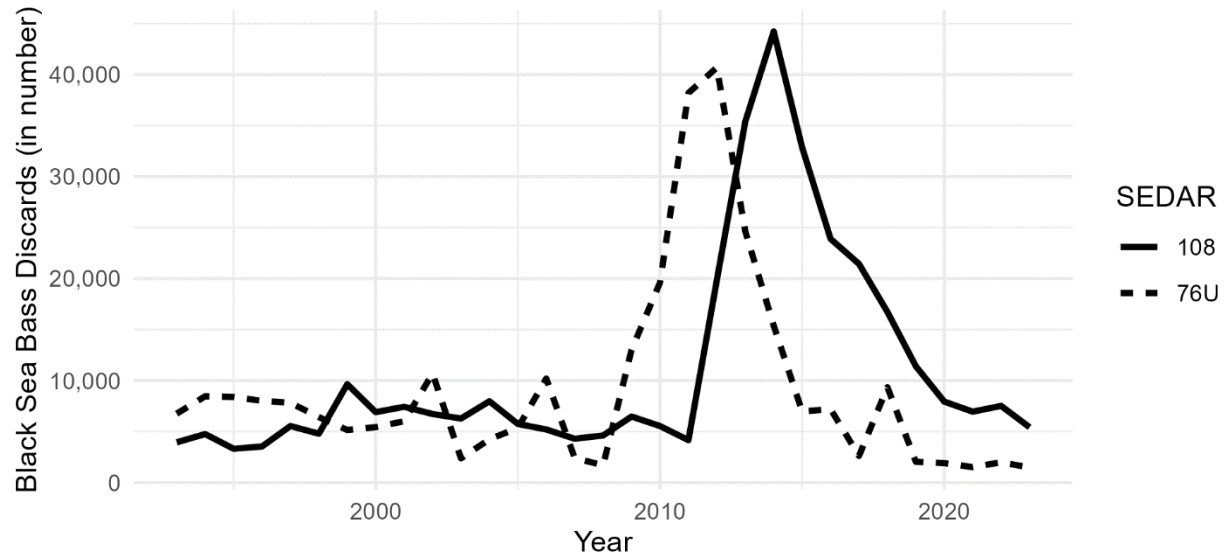


Figure 8. Commercial **vertical line** discard estimates of Black Sea Bass for SEDAR 108 compared to SEDAR 76 Update (SEDAR 2023). Because SEDAR 108 relied solely on an open-season discard rate, a comparison of discard estimates for open and closed seasons were not feasible.

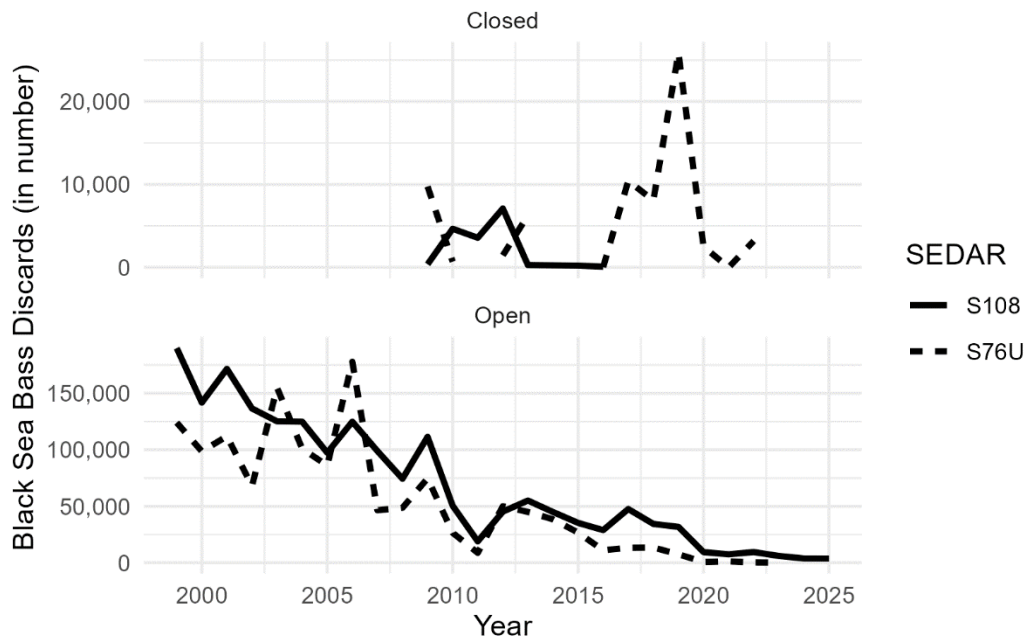


Figure 9. Commercial **trap** discard estimates of Black Sea Bass for SEDAR 108 compared to SEDAR 76 Update by open and closed season.