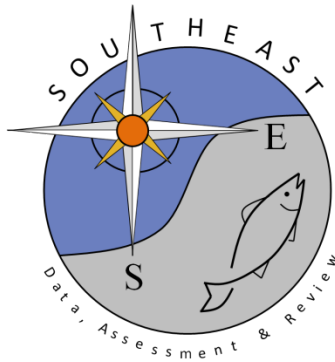


Black Seabass Length Frequencies and Condition of Released Fish from At-Sea Headboat
Observer Surveys, 2005 to 2020.

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SEDAR76-WP06

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Black Seabass Length Frequencies and Condition of Released Fish from At-Sea Headboat Observer Surveys, 2005 to 2020.

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From 2004 to 2020, headboats in South Carolina and North Carolina participated in an at-sea observer survey. From 2005 to 2020, headboats along the Atlantic coast of Florida and Georgia also participated in an at-sea observer survey. The purpose of the headboat at-sea survey was to collect detailed information on both harvested and discarded fish during recreational fishing trips on board working headboats. In 2013, Florida expanded their at-sea observer program to include charter vessels. This report is a summary of information collected on the sampling, size, and disposition of black seabass collected by trained observers during at-sea in the for-hire fleet along the south Atlantic coastline.

Sample Methods

Cooperative vessels were randomly selected each month from six sample regions: North Carolina, South Carolina, Georgia, northeast Florida (Nassau to Brevard), southeast Florida (Indian River to Dade), and Florida Keys (including Monroe County prior to 2013). Funding for the Florida Keys was discontinued after 2007. Operators from selected vessels were contacted by state biologists and a trip was arranged. Dependent upon the number of customers on board, one or two biologists accompanied passengers during the scheduled trip. The captain and mates cooperated by making sure fish caught by their anglers were observed by one of the biologists before they were stored in the fish hold or released overboard. Biologists would assist with dehooking fish for data collection, but were not permitted to influence the decision to keep or release a fish. For each fish, biologists recorded the species, disposition, and size (fork length in mm).

Data Elements

Trip level information for each trip included the area fished, duration of fishing (to the nearest half hour), and disposition of fish.

Region fished for states of the south Atlantic was coded as:

- North Carolina (NC): headboat area 01, 03, 10
- South Carolina (SC): headboat area 05

- Northeast (NE): Georgia and northeast Florida headboat area 06, 07, 08
- Southeast (SE): southeast Florida headboat area 11
- Keys (KY): Florida Keys headboat area 12, 17 (including Monroe County up to 2013)

Characterization of Trips duration:

- Half-Day (H): < 6 hours
- Three-Quarter-Day (Q): 6 to 8.5 hours
- Full-day (F): 9 or more hours

Disposition was coded as:

1. Discard
 - a. thrown back alive, legal
 - b. thrown back alive, not legal
2. Harvest
 - a. plan to eat
 - b. used for bait or plan to use for bait
 - c. sold or plan to sell
 - d. thrown back dead or plan to throw away

Sample Weighting

Headboat vessels report fishing effort in logbook trip reports, and effort data were provided by the NMFS Southeast Fisheries Science Center in Beaufort, NC which were combined with Florida headboat data (Table 1). Sample data was weighted to account for the difference in sampling by trip types throughout the south Atlantic regions described (Table 2).

To obtain the trip duration (trip type) sample weight (Wt), proportional fishing effort for a given trip type was divided by the proportional sampling effort for the same trip type:

$$Wt = Nt / N / nt / n$$

Where Nt / N is the number of trips of trip type t divided by total number of trips reported on logbook trip reports, and nt / n is the number of trips of trip type t sampled during fishery observer surveys divided by the total number of sampled trips. Trip-types with $Wt < 1$ are down-weighted to account for oversampling, and trip-types with $Wt > 1$ are inflated to account for under sampling. Weights were calculated including region to account for differences in the number of trips sampled in the south Atlantic.

Characterization of Headboat Discards:

Fish mid-line lengths were placed in one cm length bin categories (100 cm bin = fish 99.51cm to 100.50cm). Fish in each length bin category were merged with calculated discard weights and summed by year for the south Atlantic jurisdiction. The weighted frequency of fish in a single length bin (x) was calculated as follows:

$$L_{x_{1...n}} = \sum L_H * W_H + \sum L_Q * W_Q + \sum L_F * W_F$$

Where L_H equals the number of fish in each length bin x for discarded fish collected on half day trips, L_Q corresponds with $\frac{3}{4}$ day trips, and L_F corresponds with full day trips.

The proportion of fish in a single length bin (p_x) was calculated as follows:

$$p_x = \frac{\sum L_{NC} * W_{NC} + \sum L_{SC-GA} * W_{SC-GA} + \sum L_{SEFL} * W_{SEFL}}{\sum (bin = i = 1 \dots n [\sum L_{NC} * W_{NC} + \sum L_{SC-GA} * W_{SC-GA} + \sum L_{SEFL} * W_{SEFL}]}$$

Where the numerator is the weighted frequency of fish in a single length bin (x) and the denominator is the sum of all weighted frequencies of fish from length bin 1 to length bin n .

Characterization of Charter Harvest / Discards:

The length frequency for charter vessels was calculated by summing the raw number of fish by disposition (harvest or discard) and length bin and dividing this by the total number of fish by disposition. Data for the charter fleet was available for 2013, 2014, and 2015. Surveying effort did not occur from 2016 to 2020. No weights were generated for the charter fishery.

Results

**Outputs do not match previous black seabass SEDAR numbers. Previous weighting included inaccurate numbers caused from duplicate trip records, and incorrect use of data variables in weighting formulas. These errors have been corrected and are reflected in the following tables and figures.*

Length summary statistics for harvested and discarded fish are presented in Table 3. Weighted length frequency histograms for discarded black seabass in the South Atlantic region, by year, are presented in Figure 1. The unweighted proportions of harvested and discarded fish observed in the Florida at-sea observer charter fleet are presented in Figure 2, with summary statistics described in Table 4.

Table 1: Sampled headboat at-sea observer trips by year, and region.

| Year | NC | SC | NE | SE | KY | All |
|-------------|-----------|-----------|-----------|-----------|-----------|------------|
| 2005 | 152 | 71 | 49 | 95 | 36 | 403 |
| 2006 | 104 | 61 | 47 | 71 | 52 | 335 |
| 2007 | 129 | 96 | 62 | 71 | 45 | 403 |
| 2008 | 129 | 69 | 56 | 76 | . | 330 |
| 2009 | 121 | 63 | 65 | 76 | . | 325 |
| 2010 | 165 | 52 | 51 | 74 | 20 | 362 |
| 2011 | 143 | 34 | 51 | 73 | 16 | 317 |
| 2012 | 145 | 42 | 66 | 72 | 25 | 350 |
| 2013 | 116 | 41 | 67 | 82 | 16 | 322 |
| 2014 | 145 | 40 | 73 | 83 | . | 341 |
| 2015 | 100 | 25 | 62 | 82 | 2 | 271 |
| 2016 | 115 | 29 | 60 | 71 | 44 | 319 |

| | | | | | | |
|--------------|-------------|------------|------------|-------------|------------|-------------|
| 2017 | 130 | 36 | 58 | 79 | 48 | 351 |
| 2018 | 95 | 31 | 57 | 84 | 66 | 333 |
| 2019 | 109 | 29 | 56 | 80 | 67 | 341 |
| 2020 | 1 | . | 10 | 16 | 8 | 35 |
| Total | 1899 | 719 | 890 | 1185 | 445 | 5138 |

Table 2. Sample weights applied to Florida headboat discards, based on length of trips (trip types) and region (North Carolina, South Carolina, Northeast (Georgia and Northeast Florida), Southeast (Southeast Florida), Florida Keys).

| Year | NC | | | SC | | | NE | | | SC | | | KY | | |
|------|----------|---------|----------|----------|---------|----------|----------|---------|----------|----------|---------|----------|----------|---------|----------|
| | Half Day | 3/4 Day | Full Day | Half Day | 3/4 Day | Full Day | Half Day | 3/4 Day | Full Day | Half Day | 3/4 Day | Full Day | Half Day | 3/4 Day | Full Day |
| 2005 | 0.255 | 0.009 | 0.322 | 0.878 | 1.419 | 0.346 | 1.126 | 0.004 | 1.442 | 2.087 | 0.241 | 4.692 | 2.376 | 0.966 | . |
| 2006 | 0.154 | 0.067 | 0.303 | 1.027 | 0.558 | 0.73 | 1.069 | 0.008 | 2.175 | 2.346 | 0.43 | . | 1.012 | 1.495 | 11.785 |
| 2007 | 0.101 | 0.131 | 0.552 | 0.757 | 0.293 | 1.571 | 0.842 | 0.243 | 2.109 | 2.615 | 0.645 | . | 1.203 | 0.689 | . |
| 2008 | 0.075 | 0.83 | 0.286 | 0.796 | 2.418 | 2.171 | 2.139 | 0.152 | 1.932 | 1.723 | 0.436 | 2.775 | . | . | . |
| 2009 | 0.087 | 0.038 | 0.717 | 0.836 | 0.758 | . | 2.004 | 0.079 | 2.943 | 1.415 | 0.614 | . | . | . | . |
| 2010 | 0.108 | 0.025 | 0.263 | 1.205 | 3.239 | . | 1.484 | 0.044 | 2.254 | 1.808 | 0.809 | . | 2.594 | 1.651 | . |
| 2011 | 0.111 | 0.013 | 0.237 | 3.268 | 0.362 | 11.876 | 1.25 | 0.266 | 2.17 | 1.587 | 0.598 | . | 3.376 | 2.174 | 9.093 |
| 2012 | 0.157 | 0.021 | 0.165 | 1.758 | 1.869 | 2.068 | 0.947 | 0.334 | 1.313 | 2.103 | 0.415 | . | 3.55 | 0.971 | . |
| 2013 | 0.096 | 0.151 | 0.177 | 1.03 | 1.969 | . | 1.168 | 0.517 | 0.689 | 1.891 | 1.039 | 0.645 | 3.798 | 1.672 | . |
| 2014 | 0.044 | 0.15 | 0.413 | 0.957 | . | . | 0.381 | 0.438 | 0.689 | 1.996 | . | . | . | . | . |
| 2015 | 0.06 | 0.129 | 0.64 | 1.088 | . | . | 0.437 | 0.374 | 0.53 | 1.658 | 4.007 | 1.456 | 21.548 | . | . |
| 2016 | 0.063 | 0.183 | 0.25 | 1.903 | 1.303 | 1.511 | 0.372 | 0.792 | 0.626 | 2.291 | 5.335 | 1.338 | 1.313 | 0.946 | 3.574 |
| 2017 | 0.104 | 0.135 | 0.302 | 1.797 | 0.664 | 7.754 | 0.822 | 0.639 | 1.043 | 1.435 | 2.267 | . | 1.54 | 7.036 | . |
| 2018 | 0.077 | 0.162 | 0.328 | 2.579 | 0.541 | 3.429 | 0.941 | 0.51 | 0.919 | 1.252 | . | . | 1.09 | . | . |
| 2019 | 0.137 | 0.077 | 0.21 | 2.534 | 2.672 | 2.742 | 0.602 | 0.945 | 0.858 | 1.301 | 1.376 | 3.771 | 1.161 | . | . |
| 2020 | . | . | 1.186 | . | . | . | 0.362 | 0.187 | 1.125 | 0.636 | . | . | 0.775 | . | . |

Table 3. Summary statistics for harvested and discarded Atlantic coast black seabass lengths.

| Region | Year | HARVEST | | | | DISCARDS | | | |
|---|------|------------------------|------------------------|------------------------|---------------------|------------------------|------------------------|------------------------|---------------------|
| | | <i>Number Measured</i> | <i>Minimum (mm FL)</i> | <i>Maximum (mm FL)</i> | <i>Mean (mm FL)</i> | <i>Number Measured</i> | <i>Minimum (mm FL)</i> | <i>Maximum (mm FL)</i> | <i>Mean (mm FL)</i> |
| North Carolina | 2005 | 392 | 251 | 482 | 295.5 | 994 | 81 | 328 | 196.6 |
| | 2006 | 267 | 216 | 461 | 293.6 | 1391 | 88 | 776 | 211.3 |
| | 2007 | 40 | 303 | 438 | 333.5 | 939 | 101 | 393 | 214.7 |
| | 2008 | 207 | 234 | 461 | 334.6 | 1118 | 108 | 324 | 208.6 |
| | 2009 | 143 | 208 | 400 | 322.2 | 1615 | 111 | 328 | 222.4 |
| | 2010 | 805 | 222 | 503 | 335.4 | 2466 | 112 | 355 | 239.7 |
| | 2011 | 277 | 304 | 486 | 340.2 | 2691 | 103 | 401 | 230.9 |
| | 2012 | 322 | 153 | 480 | 353.7 | 1428 | 102 | 495 | 245 |
| | 2013 | 116 | 213 | 475 | 365.7 | 1598 | 101 | 370 | 234.3 |
| | 2014 | 171 | 193 | 486 | 362.1 | 1349 | 91 | 410 | 231.9 |
| | 2015 | 125 | 320 | 438 | 348.5 | 1680 | 111 | 340 | 235.8 |
| | 2016 | 70 | 203 | 450 | 362 | 1802 | 102 | 370 | 238.5 |
| | 2017 | 95 | 295 | 452 | 359.3 | 1217 | 120 | 340 | 247.9 |
| | 2018 | 38 | 329 | 414 | 355.5 | 1011 | 105 | 342 | 234.4 |
| | 2019 | 26 | 246 | 385 | 346.7 | 670 | 117 | 331 | 232.7 |
| South Carolina | 2005 | 67 | 230 | 361 | 288.1 | 189 | 143 | 258 | 205.7 |
| | 2006 | 134 | 165 | 383 | 279.7 | 499 | 99 | 296 | 207.1 |
| | 2007 | 68 | 275 | 415 | 322 | 859 | 114 | 331 | 223.6 |
| | 2008 | 42 | 258 | 372 | 319.3 | 638 | 102 | 307 | 218.6 |
| | 2009 | 72 | 301 | 380 | 324.6 | 905 | 128 | 305 | 234.8 |
| | 2010 | 51 | 301 | 405 | 332.8 | 597 | 92 | 378 | 228.1 |
| | 2011 | 153 | 273 | 444 | 343.1 | 666 | 123 | 480 | 255.6 |
| | 2012 | 71 | 221 | 469 | 340.4 | 609 | 113 | 358 | 216.7 |
| | 2013 | 13 | 234 | 388 | 336.3 | 241 | 102 | 318 | 206.6 |
| | 2014 | 37 | 314 | 384 | 344.8 | 649 | 108 | 340 | 233.5 |
| | 2015 | 53 | 330 | 388 | 344.7 | 356 | 95 | 327 | 225.3 |
| | 2016 | 22 | 331 | 453 | 360.5 | 512 | 45 | 375 | 238.9 |
| | 2017 | 17 | 330 | 481 | 365.4 | 570 | 42 | 443 | 230.1 |
| | 2018 | 29 | 330 | 433 | 348.6 | 397 | 100 | 332 | 241.1 |
| | 2019 | 11 | 330 | 421 | 366.9 | 247 | 104 | 334 | 236.6 |
| Northeast (Georgia and Northeast Florida) | 2005 | 299 | 172 | 452 | 290.3 | 297 | 55 | 392 | 233 |
| | 2006 | 498 | 179 | 420 | 293.1 | 307 | 151 | 721 | 236.4 |
| | 2007 | 391 | 166 | 432 | 312.5 | 1065 | 106 | 374 | 238.1 |
| | 2008 | 175 | 104 | 497 | 323.3 | 931 | 110 | 401 | 251.9 |
| | 2009 | 470 | 218 | 483 | 326.5 | 1456 | 102 | 372 | 253.1 |
| | 2010 | 1234 | 208 | 555 | 326.4 | 3819 | 104 | 395 | 253 |
| | 2011 | 341 | 234 | 449 | 328.3 | 2821 | 121 | 435 | 265.6 |
| | 2012 | 190 | 182 | 438 | 339.4 | 1780 | 102 | 584 | 274.1 |
| 2013 | 337 | 158 | 448 | 348.3 | 1500 | 122 | 452 | 277.2 | |

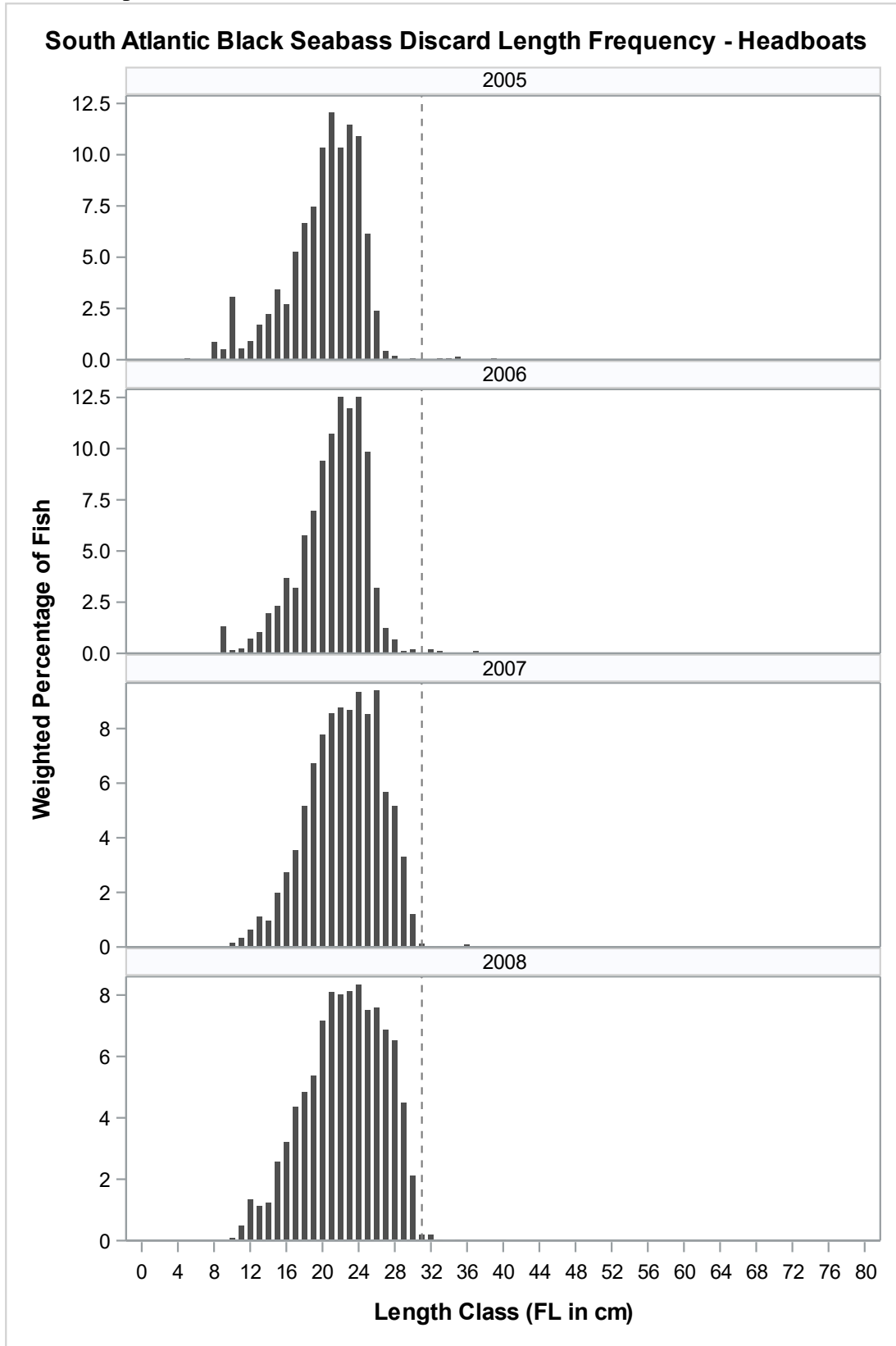
| | | | | | | | | | |
|--------------------------------------|------|-----|-----|-------|-------|------|-----|-------|-------|
| | 2014 | 401 | 169 | 468 | 352 | 1530 | 125 | 398 | 263.8 |
| | 2015 | 300 | 213 | 476 | 349.9 | 923 | 143 | 358 | 261.2 |
| | 2016 | 142 | 120 | 441 | 324.5 | 739 | 129 | 346 | 257.2 |
| | 2017 | 135 | 153 | 440 | 344.1 | 550 | 143 | 356 | 255.8 |
| | 2018 | 34 | 190 | 447 | 341.1 | 215 | 163 | 333 | 255.2 |
| | 2019 | 29 | 310 | 387 | 341.7 | 114 | 171 | 332 | 257 |
| | 2020 | 68 | 312 | 374 | 338.9 | 239 | 190 | 388 | 268 |
| <i>Southeast (Southeast Florida)</i> | 2005 | 174 | 123 | 380 | 289.9 | 576 | 109 | 301 | 211.9 |
| | 2006 | 248 | 103 | 397 | 278.6 | 654 | 135 | 321 | 224.5 |
| | 2007 | 78 | 265 | 376 | 296.8 | 376 | 109 | 303 | 231.3 |
| | 2008 | 84 | 228 | 347 | 299.4 | 861 | 109 | 334 | 233.2 |
| | 2009 | 95 | 260 | 432 | 313.4 | 890 | 115 | 330 | 238.3 |
| | 2010 | 412 | 230 | 379 | 320 | 2212 | 119 | 331 | 244.8 |
| | 2011 | 202 | 271 | 443 | 333.2 | 719 | 144 | 431 | 262.5 |
| | 2012 | 42 | 290 | 378 | 331.4 | 470 | 160 | 407 | 260.1 |
| | 2013 | 13 | 327 | 381 | 352.2 | 188 | 200 | 402 | 263.6 |
| | 2014 | 12 | 280 | 405 | 331.8 | 503 | 134 | 340 | 240.8 |
| | 2015 | 3 | 297 | 310 | 301.7 | 113 | 163 | 320 | 259.6 |
| | 2016 | 4 | 304 | 345 | 325.3 | 63 | 178 | 304 | 250.6 |
| | 2017 | 5 | 322 | 346 | 332 | 44 | 171 | 312 | 248.2 |
| | 2018 | 14 | 205 | 385 | 319.4 | 249 | 152 | 345 | 254.4 |
| 2019 | 2 | 330 | 331 | 330.5 | 62 | 190 | 380 | 256.5 | |

*There were no lengths recorded in the Keys region for years 2005-2020.

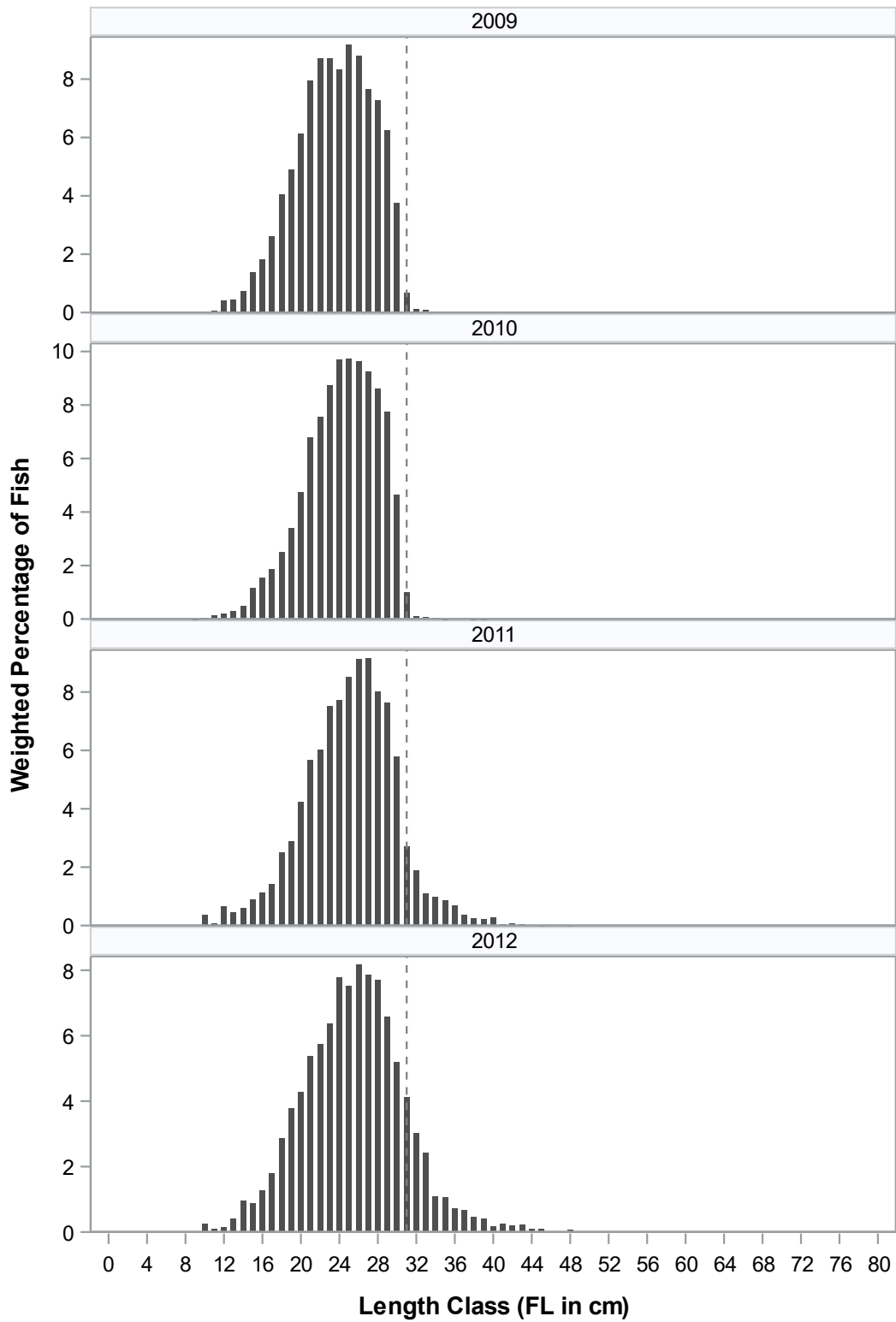
Table 4. Summary statistics for Atlantic coast black sea bass lengths (fork lengths) in the Florida charterboat fleet.

| Year | HARVEST | | | | DISCARDS | | | |
|-------------|------------------------|------------------------|------------------------|---------------------|------------------------|------------------------|------------------------|---------------------|
| | <i>Number Measured</i> | <i>Minimum (mm FL)</i> | <i>Maximum (mm FL)</i> | <i>Mean (mm FL)</i> | <i>Number Measured</i> | <i>Minimum (mm FL)</i> | <i>Maximum (mm FL)</i> | <i>Mean (mm FL)</i> |
| 2013 | 146 | 214 | 477 | 351.1 | 784 | 129 | 493 | 258.9 |
| 2014 | 160 | 239 | 546 | 357.6 | 629 | 171 | 413 | 273.9 |
| 2015 | 80 | 191 | 426 | 353.6 | 255 | 164 | 325 | 272.6 |

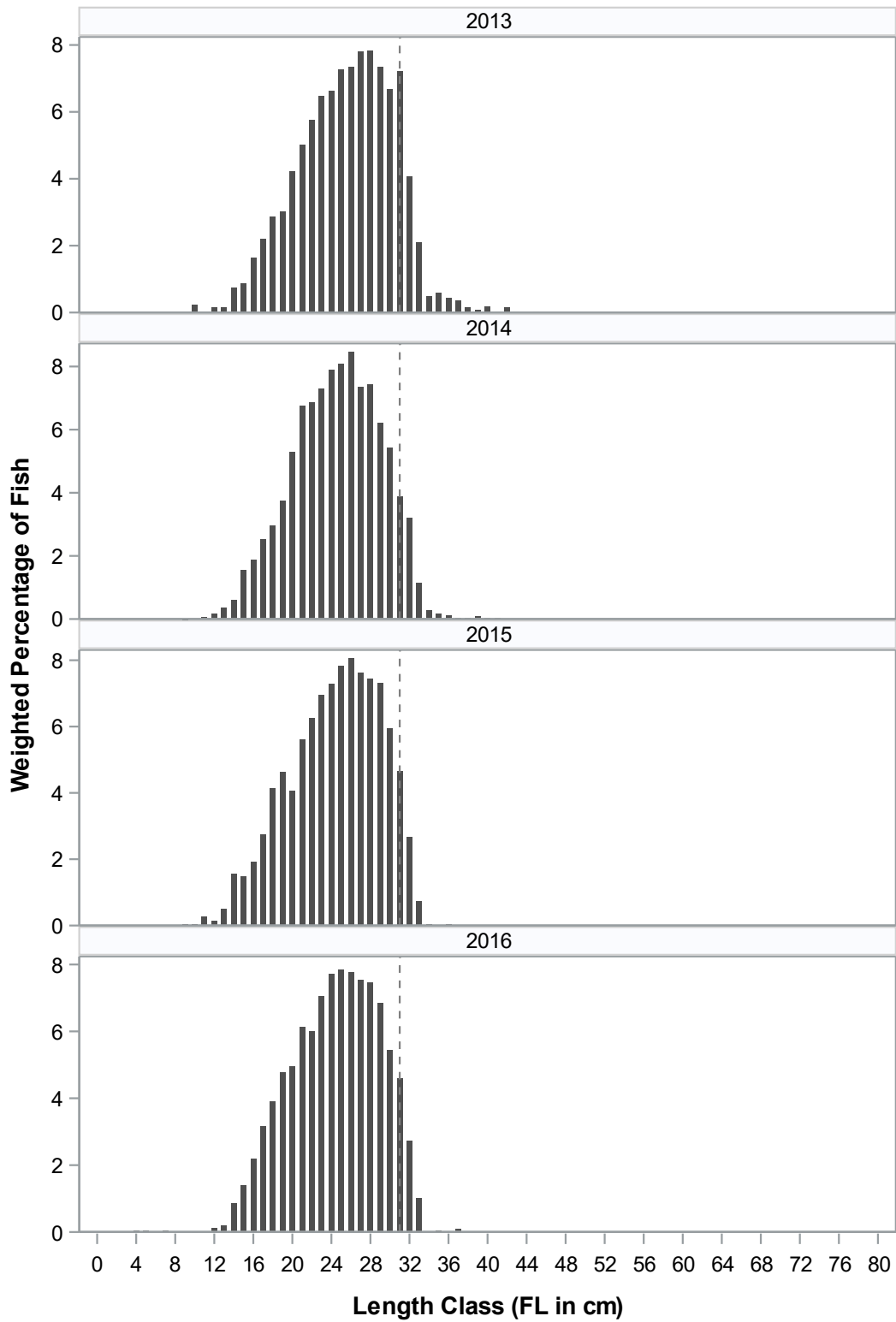
Figure 1. Weighted south Atlantic coast black seabass length frequencies from at-sea headboat observer trips.



South Atlantic Black Seabass Discard Length Frequency - Headboats



South Atlantic Black Seabass Discard Length Frequency - Headboats



South Atlantic Black Seabass Discard Length Frequency - Headboats

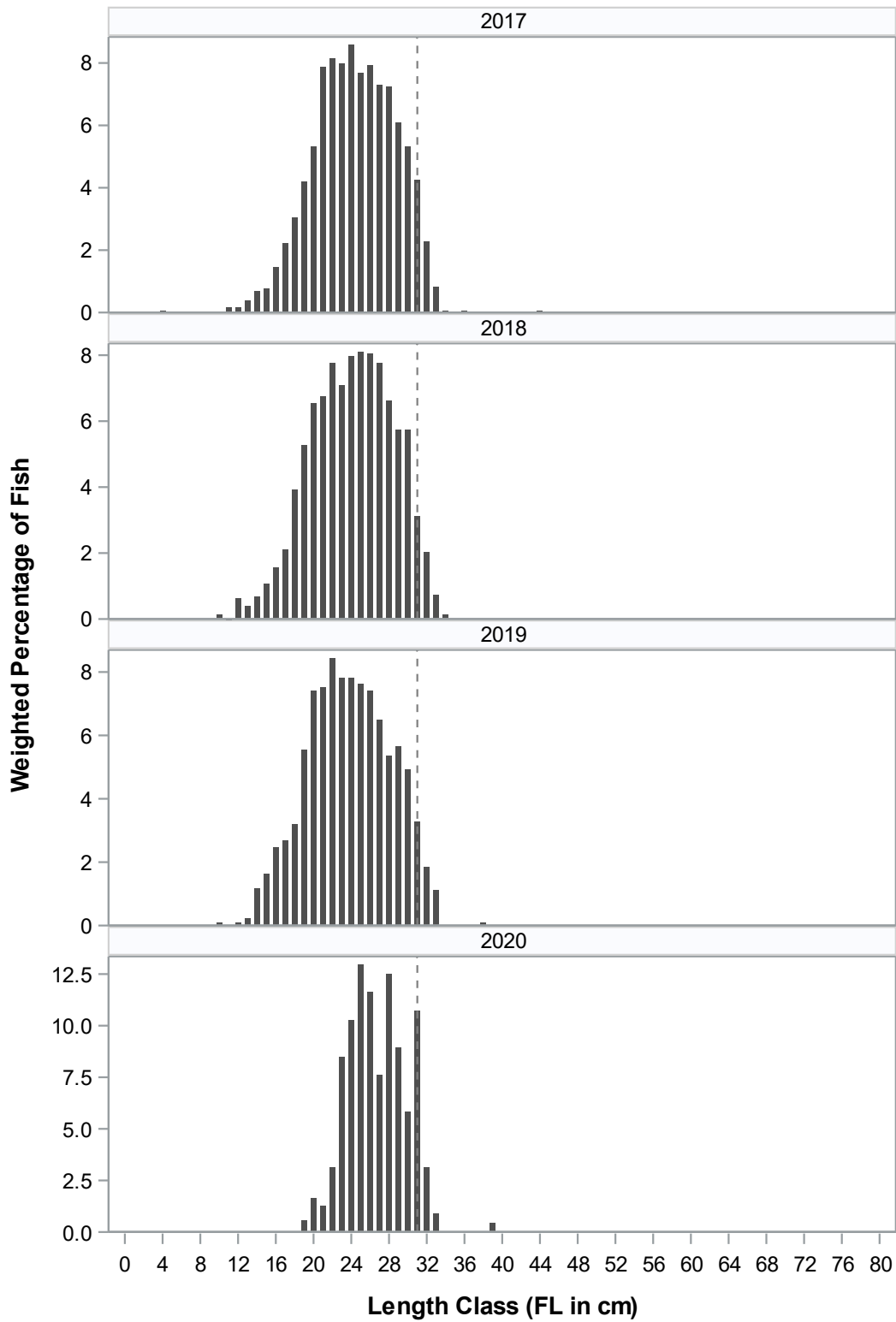


Figure 2. Florida Atlantic coast black seabass length frequencies from at-sea charter boat observer trips.

