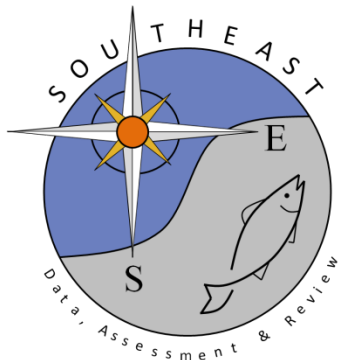


Spanish Mackerel Length Frequency Distributions from At-Sea Headboat and Charter Observer  
Surveys in the South Atlantic, 2005 to 2020.

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SEDAR78-WP10

Received: 11/3/2021



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Please cite this document as:

Lazarre, Dominique, Andrew Cathey and Kelly Fitzpatrick . 2021. Spanish Mackerel Length Frequency Distributions from At-Sea Headboat and Charter Observer Surveys in the South Atlantic, 2005 to 2020. SEDAR78-WP10. SEDAR, North Charleston, SC. 8 pp.

## **Spanish Mackerel Length Frequency Distributions from At-Sea Headboat and Charter Observer Surveys in the South Atlantic, 2005 to 2020.**

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SEDAR 78 Spanish Mackerel Data Workshop, November 2021.

Detailed information on the size and release condition of discarded fish is not collected in traditional dockside surveys of recreational fisheries. At-Sea observer surveys have been implemented to fill this data gap, providing valuable information on the size and condition of discarded fish. These surveys have been conducted on headboat vessels in the south Atlantic Ocean since 2004, with data for this report including data collected between 2005 and 2020. In this region, most headboat trips engage in bottom fishing for reef fish species, but sometimes encounter Spanish Mackerel. At-Sea coverage was expanded to include charter vessels on the east coast of Florida from 2013-2015. This report provides a summary of available information on the size and disposition of Spanish Mackerel collected on headboats and charter boats along the south Atlantic coast from North Carolina to Florida.

### **Sample Methods**

#### *At-Sea Observer Sampling*

Cooperative vessels were randomly selected each month from six sample regions: North Carolina, South Carolina, Georgia, northeast Florida (Nassau to Brevard County), southeast Florida (Indian River County to Dade County), and the Florida Keys (Monroe County). Operators from selected vessels were contacted by state biologists and were scheduled to sample a single trip in a selected week. 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 de-hooking 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, size (fork length in mm), the condition of fish that were released (Florida only), and depth (Florida only).

## Data Elements

Trip level information for each trip included the area fished, duration of fishing (to the nearest half hour), number of anglers, and depths (meters) of the fishing sites. Site specific fishing depths have been recorded since 2011 in Florida.

*Area fished for North Carolina, South Carolina, southeast and northeast Florida, and Florida Keys was coded as:*

- 1: 3 miles or less from shore; or
- 2: more than 3 miles from shore

*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 codes are recorded for all fish and represent the final fate (e.g. kept or discarded) of each observed fish.

*Disposition was coded as:*

- 1: thrown back alive, legal;
- 2: thrown back alive, not legal;
- 3: plan to eat;
- 4: used for bait or plan to use for bait;
- 5: sold or plan to sell;
- 6: thrown back dead or plan to throw away.

## Length Frequencies

*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 (Table 1). These data were used to produce sample weights to account for the difference in sampling effort relative to total effort. To generate the sample weights ( $W_r$ ), the proportion of total fishing effort ( $N_r/N$ ) in the south Atlantic was divided by the proportional sampling effort ( $n_r/n$ ) for the following regions: North Carolina, South Carolina, Georgia and northeast Florida, Southeast Florida, and the Florida Keys (Table 2).

$$W_r = \frac{N_r/N}{n_r/n}$$

$W_r$  values <1 are down-weighted to account for oversampling, and those with values >1 are up-weighted to account for undersampling.

No weights were generated for the charter fishery data from Florida.

### *Characterization of Discards:*

Fish mid-line lengths (in mm) for discarded fish were placed in one cm length bin categories (e.g. 99 cm = 99.51 to 100.50 cm). The raw length frequencies for each region were multiplied by region specific sample weights and the weighted proportion of fish in each length bin ( $p_x$ ) in a given year was calculated as follows:

$$p_x = \frac{\sum_{r=1}^n L_r W_r}{\sum_{r=1}^n \sum_{bin=1}^n L_r W_r}$$

Where  $L_r$  equals the raw number of fish in length bin  $x$  measured in region  $r$ , and  $W_r$  is the corresponding sample weight for region  $r$ .

A raw length frequency distribution was created for Spanish Mackerel length data collected from the Florida charterboat fleet, by year.

## **Results**

The number of trips sampled within each region are provided, with Georgia combined with northeast FL. The sample weights by region and year are provided in Table 2. While there are sample weights provided, very few Spanish Mackerel were encountered during At-Sea observer trips in the South Atlantic. Weighted length frequency distributions for Spanish Mackerel released (discarded) and harvested during headboat trips were created to visualize length structure from available length data, with all years and regions combined due to the low sample size (Figure 1). Between 2005 and 2020 a total of 14 discarded Spanish Mackerel were observed on headboat trips. These discarded fish ranged in size from 199 to 487 mm in fork length (Table 3).

Additionally, unweighted length frequency distributions from three years of charterboat At-Sea sampling along the South Atlantic coast of Florida, are included (Figure 2). The total number of trips sampled in the charter fleet is lower than coverage of the headboat fleet in Florida (Table 4), but accounts for discard length measurements from 12 additional fish in 2014. Summary statistics for harvested and discarded fish observed during charter trips can be found in Table 5.

Spanish Mackerel were rarely encountered in headboat or charter At-Sea sampling in the South Atlantic. This may be a result of fishing practices geared towards bottom fish species.

Table 1. Headboat At-Sea observer trips sampled by region and year. Limiting sampling occurred in 2020 due to the COVID-19 pandemic.

<b>YEAR</b>	<b>NC</b>	<b>SC</b>	<b>GA-NEFL</b>	<b>SEFL</b>	<b>FL KEYS</b>
2005	97	58	49	95	37
2006	88	45	45	71	52
2007	91	52	57	71	50
2008	78	39	55	76	-
2009	69	34	61	76	-
2010	83	26	51	74	20
2011	79	22	50	73	16
2012	78	36	62	72	25
2013	55	41	60	82	16
2014	70	41	67	83	-
2015	57	27	59	82	3
2016	76	28	57	71	43
2017	74	28	56	79	49
2018	61	29	55	84	67
2019	62	28	53	80	69
2020	1	0	10	16	8

Table 2. Sample weights applied to South Atlantic Spanish Mackerel discards by region and year.

<b>YEAR</b>	<b>NC</b>	<b>SC</b>	<b>GA-NEFL</b>	<b>SEFL</b>	<b>FL KEYS</b>
2005	0.260	0.656	0.803	1.654	2.060
2006	0.201	1.077	0.795	1.963	1.148
2007	0.221	1.193	0.868	1.978	0.978
2008	0.166	1.334	0.864	1.194	-
2009	0.210	1.493	0.889	1.025	-
2010	0.202	2.223	0.901	1.245	2.067
2011	0.178	2.710	0.798	1.154	2.632
2012	0.201	1.638	0.666	1.463	2.069
2013	0.229	1.043	0.615	1.417	2.849
2014	0.162	0.971	0.425	1.585	-
2015	0.184	1.164	0.404	1.412	15.490
2016	0.163	1.567	0.500	1.994	1.132
2017	0.245	2.027	0.727	1.238	1.480
2018	0.239	1.987	0.722	1.226	1.210
2019	0.240	2.288	0.710	1.139	1.221
2020	1.999	-	0.425	0.700	1.030

Table 3. Summary statistics for Spanish Mackerel measured in the South Atlantic headboat fishery (estimated total length in millimeters). Results are aggregated for confidentiality.

YEAR	DISCARDS				HARVEST			
	<i>N</i>	<i>Min</i>	<i>Mean</i>	<i>Max</i>	<i>N</i>	<i>Min</i>	<i>Mean</i>	<i>Max</i>
2005	-	-	-	-	10	323	536	654
2006	1	487	487	487	6	327	492	631
2007	2	247	356	465	9	171	431	618
2008	1	295	295	295	13	371	476	612
2009	2	235	259	283	9	331	473	568
2010	1	396	396	396	3	510	525	538
2011	-	-	-	-	3	435	491	554
2012	-	-	-	-	10	332	486	665
2013	-	-	-	-	4	348	420	472
2014	-	-	-	-	2	477	483	488
2015	-	-	-	-	7	367	521	631
2016	1	270	270	270	7	403	485	660
2017	6	199	376	480	25	309	393	615
2018	-	-	-	-	8	358	456	534
2019	-	-	-	-	2	333	371	408
2020	-	-	-	-	2	333	379	424

Table 4. The number of east Florida charter trips sampled that were positive for Spanish Mackerel, by year.

YEAR	POSITIVE TRIPS	DISCARD TRIPS
2013	2	0
2014	7	2
2015	4	0

Table 5. Summary statistics for Spanish Mackerel measured in the east Florida charter fishery (fork length in millimeters).

YEAR	DISCARDS				HARVEST			
	<i>N</i>	<i>Min</i>	<i>Mean</i>	<i>Max</i>	<i>N</i>	<i>Min</i>	<i>Mean</i>	<i>Max</i>
2013	-	-	-	-	6	319	379	409
2014	12	232	262	302	19	332	441	689
2015	-	-	-	-	4	390	559	719



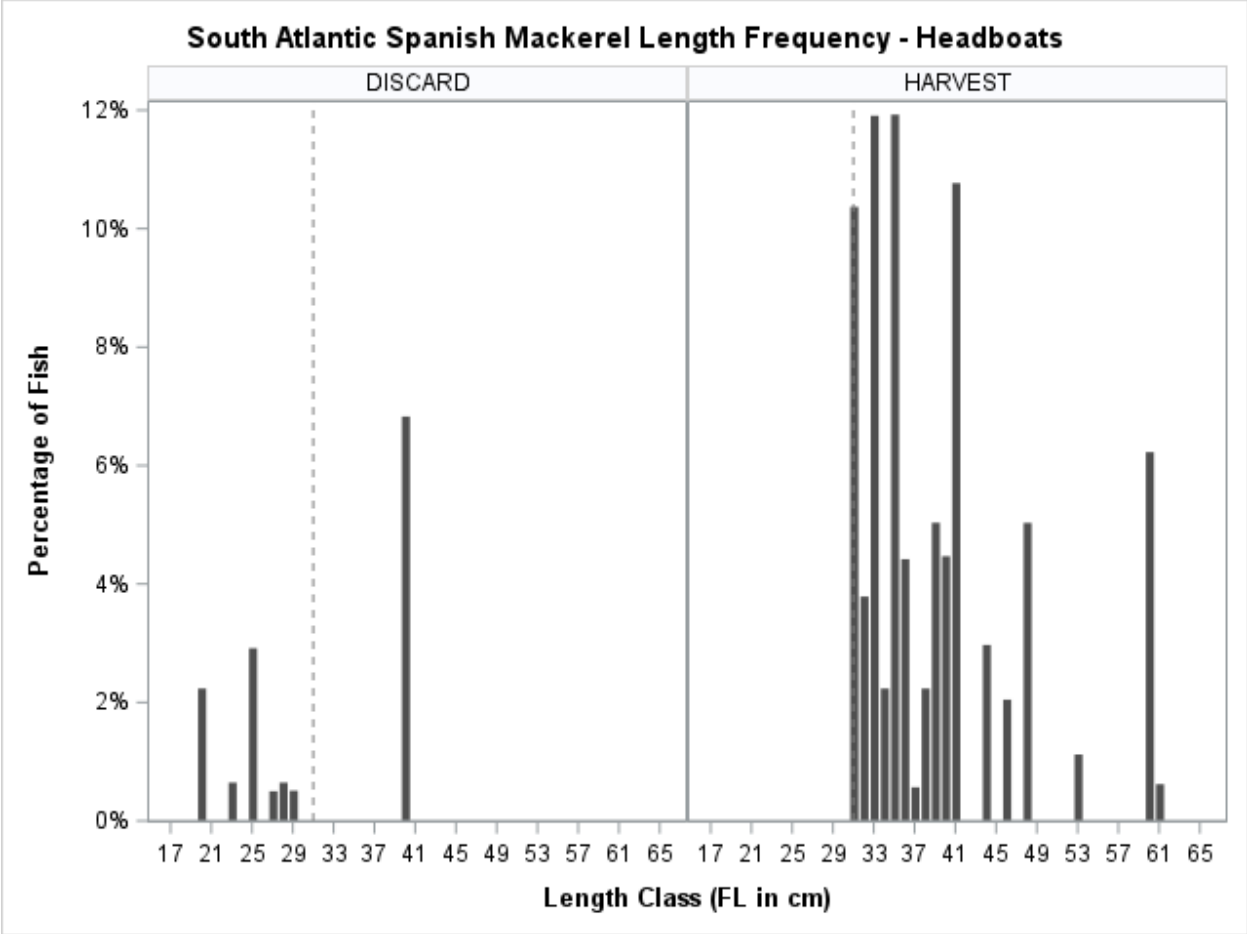


Figure 1. Weighted discard length frequency distributions from headboats observed from North Carolina to Florida, all years combined. The reference line corresponds with a 12-inch fork length measurement.

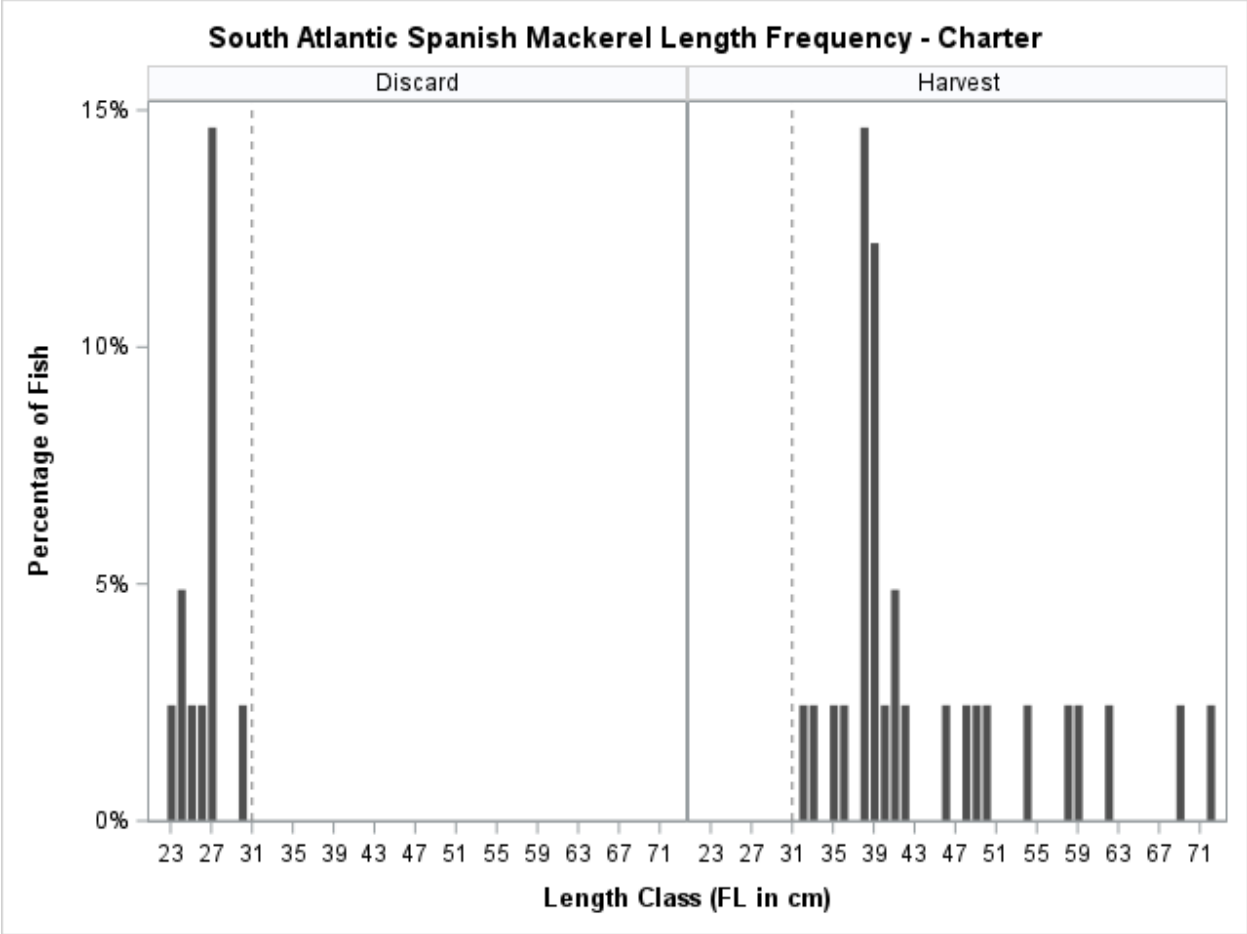


Figure 2. Raw length frequency distributions from charter boats observed in East Florida, all years combined. The reference line corresponds with a 12-inch fork length measurement.