A Summary of Florida Hogfish Discard Length Data Collected from At-Sea Observers in For-Hire Fishery Surveys in Florida 2005-2024

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SEDAR94-DW-10

10 July 2025

Please cite this document as:

Corbett, Ellie and Leonardo Eguia. 2025. A Summary of Florida Hogfish Discard Length Data Collected from At-Sea Observers in For-Hire Fishery Surveys in Florida 2005-2024. SEDAR94-DW-10. SEDAR, North Charleston, SC. 18 pp.

A Summary of Florida Hogfish Discard Length Data Collected from At-Sea Observers in For-Hire Fishery Surveys in Florida 2005-2024

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For: SEDAR 94 Florida Hogfish Data Workshop, July 2025.

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 provide valuable information on the size and condition of discarded fish, and such surveys have been conducted on for-hire vessels in Florida since 2005. At-sea observer surveys have not been consistently funded on both coasts of Florida, which has led to short breaks in the time series in some regions. The majority of these observer trips were conducted on headboat vessels, with charter vessels being surveyed intermittently starting in 2009 (Table 1). This report provides a summary of available information on the size and disposition of Hogfish collected by trained observers since 2005 during at-sea surveys on for-hire vessels in southeastern US waters.

At-Sea Observer Survey Coverage

Trip and length information included here were collected from at-sea observer surveys between 2005 and 2024. No sampling occurred between April 2020 and May 2021 due to the COVID-19 pandemic.

Gulf Coast of Florida (NWFL, SWFL)

From 2005-2007, at-sea observer survey coverage on headboats operating from Alabama and the Gulf coast of Florida, from the panhandle through the Keys, was funded by the Gulf Fisheries Information Network (Gulf FIN). There was a gap in funding from January 2008 through May 2009. In June 2009, the state of Florida secured alternative funds to continue at-sea observer coverage in the northwest panhandle and central peninsula, including both the charter and headboat fleet. In 2014, coverage on headboats was limited to a small number of vessels participating in a pilot study for IFQ shares. Thus, data from this year are not considered representative of the fishery as a whole. Since 2015, there has been consistent coverage of both charter and headboats from the panhandle through the Florida Keys.

South Atlantic coast of Florida (NEFL, SEFL)

On the South Atlantic coast, at-sea headboat sampling has been conducted continuously since 2005 funded by the Atlantic Coast Cooperative Statistic Program (ACCSP), with this report including data collected between 2005 and 2024. At-sea sampling on Atlantic coast charter boats was funded with a 3-year MARFIN grant from 2013-2015, and there was a gap in funding from January 2016-May 2020. In July 2020, the state of Florida secured funds through the State Reef Fish Survey to expand coverage to east Florida but trips were not observed through this funding until April 2021 due to the COVID-19 pandemic. There has been consistent coverage of charter boats since sampling coverage was re-initiated in April 2021.

Florida Keys (KEYS)
Headboat observer surveys were conducted in the Florida Keys from 2005 to 2007, funded by the Gulf Fisheries Information Network (GulfFIN) along with the Gulf coast. In 2010, headboat sampling coverage in the Florida Keys was re-initiated, along with the initiation of charter boat sampling. In 2014, representative at-sea observer data was only collected from charter vessels in the Florida Keys. Since 2015, there has been consistent coverage of both charter and headboats in the Florida Keys.

At-Sea Observer Survey Methods
Florida
East Coast – 2005 to 2010
West Coast – 2005 to 2007
Headboat vessels from Florida were randomly selected each week. Florida's western central region also had a separate sample quota for multi-day trips that fish in areas farther offshore. Operators from selected vessels were contacted by state biologists and a single trip was arranged 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 dehooking fish for data collection but were not permitted to influence the decision to keep or release a fish.

Trip level information collected included the area fished, duration of fishing (to the nearest half hour), number of anglers, and minimum and maximum depths (feet) of the fishing sites. For each fish in this analysis, biologists recorded the species, disposition, size (fork length in mm), and the condition of fish that were released. A brief interview with each angler observed during a trip was also conducted to collect information on primary and secondary target species, angler avidity, and state and county of residence.

Florida
East Coast – 2011 to 2024
West Coast – 2009 to 2024
Similar to methods described above, charter and headboat vessels were randomly selected each week from a list of participating vessels in each region statewide. Selected vessels are contacted in advance to schedule a single trip during the selected week. Trips are scheduled based on vessel capacity. For example, when 6-pack vessels are selected, a trip is scheduled on a day where the reservation is for a party of 5 or less anglers. If there is no room available on a selected vessel for any reserved trips during the selected week, the next randomly assigned vessel is selected.

Participating vessel operators permit up to two FWC biologists to board during a scheduled trip, and captains and mates actively assist biologists by permitting them to observe and collect data from fish as they are removed from anglers' gear and before fish are released or placed in the fish box. Vessel operators also provide biologists with information on depth and area fished (commercial statistical area and degrees and minutes latitude and longitude) for each fishing station during each observed trip.

For each fish in this analysis, biologists recorded the species, disposition, size (fork length in mm), and the condition of fish that were released in the same manner as 2005-2007/2010. Additionally, a subset of anglers was tracked by the biologist(s) for the entirety of the trip. For these anglers, hook type, hook size and hook location were recorded of the fish that they captured.

A project coordinator conducted quality assurance and quality control checks on all field data as it was collected and submitted. Following data entry, electronic data were proofed against field data sheets.

Data Elements

Disposition was coded as:
Discards
1: thrown back alive, legal;
2: thrown back alive, not legal;
Harvest
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;
7: EFP Sampled;

Area fished was coded as:
For southeast and northeast Florida, and Atlantic Keys:
1: 3 miles or less from shore; or
2: more than 3 miles from shore
For western peninsula, northwest Florida, and Gulf Keys:
3: 9 miles or less from shore; or
4: more than 9 miles from shore.

Characterization of Trip Duration:
Sampled trips were categorized into the following trip-types based on the duration of the sampled trip:

- Single-Day Trips (<24 hours)
    - Half-Day: < 6 hours
    - Three-Quarter-Day: 6 – 8 hours
    - Full-day: 9 – 24 hours
- Multi-Day Trips (>24 hours)

At-Sea Observer Survey Data Analysis
Proportional Fishing Effort for Headboats
Headboat trips were not sampled proportional to fishing effort. For example, multi-day trips represent less than 2% of reported headboat fishing effort in Florida but were sampled at a much higher rate in at-sea observer surveys. In the northwestern region of Florida, half-day trips were

under-sampled with respect to headboat effort. We generated weighting factors for different trip-types using fishing effort data reported on headboat logbook trip reports for the years 2005 through 2024 (Table 4). Headboat effort data were provided by R. Cheshire from NMFS Southeast Fisheries Science Center in Beaufort, NC.

Proportional fishing effort was calculated as the total numbers of trips reported on logbook trip reports for a given trip-type, divided by the total number of headboat trips reported (Table 2). To obtain the sample weight (W_t):

$$W_t = \frac{N_t/N}{n_t/n}$$

Where N_t/N is the number of trips of type t divided by total trips reported on logbook trip reports, and n_t/n is the number of trips of type t sampled during fishery observer surveys divided by the total number of sampled trips in each year. Trip-types with $W_t < 1$ are down weighted to account for oversampling and trip-types with $W_t > 1$ are inflated to account for undersampling. No multi-day charter trips were sampled, and weights were not generated for charter samples (Table 3).

Characterization of Discards:
Fish total lengths were assigned to two-cm length bin categories (20 cm bin = fish 20.0 cm to 21.9cm) and the number of lengths in each length bin category were summed by region, trip-type, and disposition (harvested and discarded).

For fish observed from headboats, counts of fish in each length bin were multiplied times the sample weight (W_t) for each trip-type and sample region. The weighted proportion of fish in a length bin (p_x) was calculated as follows:

$$p_x = \frac{\sum L_H * W_H + \sum L_F * W_F + W_Q * W_Q + W_M * W_M}{\sum (bin = i = 1 \ldots n[\sum L_H * W_H + \sum L_F * W_F + W_Q * W_Q + W_M * W_M]}$$

Where L_H equals the number of fishes in length bin x for a given disposition in each region observed during half-day trips (H); and W_H is the weighting factor for half-day trips in the same region. Q = ¾-day trips, F = full-day trips, and M = multi-day trips. The denominator is the sum of all numerators for length bin 1 to length bin n. The number of discarded fishes was summed by trip type and multiplied by the weighting factor for each trip-type, by year, to construct the weighted discard length frequency distribution. For charter vessels, the discard length frequency was calculated by summing the raw number of discarded Hogfish in each length bin and dividing this number by the total number of discarded fishes, by year.

Results

At-Sea Observer Trips

From 2005 to 2024 in the west Florida stock, headboat observers sampled 298 trips positive for Hogfish, and 204 trips for discarded Hogfish. There were 70 charter trips positive for Hogfish, and 47 charter trips for discarded Hogfish from 2010 to 2024. The number of sampled trips by year and region for at-sea observer trips are provided in Tables 2 & 3. Sampling weights were used to adjust the number of headboat discards, as a function of under-sampling or over-sampling of different trip durations in each stock of Florida (Table 4). A total of 693 discarded fish and 538 harvested fish were measured during headboat at-sea observer trips from 2005 to 2024 in the western Florida stock. For west Florida charter trips, observers sampled 126 discarded fish and 136 harvested fish from 2010 to 2024. Summary statistics for the length distribution of discarded and harvested fish observed during headboat and charter trips are provided in Tables 5 and 6. Length frequency histograms for harvested and released (discarded) Hogfish by year and stock are presented for Florida headboats (Figure 1) and Florida charter boats (Figure 3). Length frequency histograms for released (discarded) Hogfish by year from the west Florida stock are presented for Florida headboats (Figure 2) and Florida charter boats (Figure 4).

Table 1. Sampling coverage for At-sea observer trips in Florida, by region and year. The * indicates partial years of coverage. Sampling occurred from July to December in 2009, from January to March in 2020, and from June to December in 2021. + Indicates sampling occurring only in Tampa Bay area, exclude southern counties of SW FL. *H* indicates data is removed from analysis due to under representation of the fleet sampled.

Headboat Areas	**2005**	**2006**	**2007**	**2008**	**2009***	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020***	**2021***	**2022**	**2023**	**2024**
Northwest Florida	H	H	H		H,C	H,C	H,C	H,C	H,C	*H,*C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C
Southwest Florida	H	H	H		H^+,C^+	H^+,C^+	H^+,C^+	H^+,C^+	H^+,C^+	*H,*C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C
Florida Keys	H	H	H			H,C	H,C	H,C	H,C	C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C	H,C
Southeast Florida	H	H	H	H	H	H	H	H	H,C	H,C	H,C	H	H	H	H	H	H,C	H,C	H,C	H,C
Northeast Florida	H	H	H	H	H	H	H	H	H,C	H,C	H,C	H	H	H	H	H	H,C	H,C	H,C	H,C

Table 2. Florida sampled HEADBOAT at-sea observer trips for all species, positive for Hogfish, and for Hogfish discards by year and stock. Sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

	KEYS/EAST FLORIDA STOCK			WEST FLORIDA STOCK		
YEAR	*Trips Sampled*	*Positive Trips*	*Discard Trips*	*Trips Sampled*	*Positive Trips*	*Discard Trips*
2005	175	8	3	162	2	1
2006	161	6	2	188	1	0
2007	170	7	4	165	1	0
2008	128	1	0	.	.	.
2009	128	2	0	72	1	1
2010	.	.	.	94	1	0
2011	136	3	1	119	7	0
2012	148	3	1	109	7	2
2013	147	2	1	104	5	2
2015	133	1	0	184	10	3
2016	162	3	2	231	19	7
2017	173	4	2	216	20	11
2018	201	3	3	219	34	24
2019	195	7	7	226	30	23
2020	34	2	1	31	5	4
2021	237	5	4	165	46	39
2022	297	6	6	222	50	40
2023	335	11	11	199	26	22
2024	240	8	7	247	33	25

Table 3. Florida sampled CHARTER BOAT at-sea observer trips for all species, positive for Hogfish and for Hogfish discards by year and stock. Sampling in 2021 represents June to December.

	KEYS/EAST FLORIDA STOCK			WEST FLORIDA STOCK		
YEAR	*Trips Sampled*	*Positive Trips*	*Discard Trips*	*Trips Sampled*	*Positive Trips*	*Discard Trips*
2009	.	.	.	55	.	.
2010	15	2	.	102	1	.
2011	12	.	.	131	.	.
2012	31	1	.	126	3	.
2013	212	1	1	133	.	.
2014	233	2	1	.	.	.
2015	219	4	4	203	6	4
2016	56	2	1	248	5	2
2017	68	.	.	209	6	4
2018	66	1	1	191	8	4
2019	61	1	1	223	8	6
2020	.	.	.	34	.	.
2021	47	.	.	126	4	4
2022	69	.	.	154	7	6
2023	89	.	.	134	5	4
2024	154	.	.	166	17	13

Table 4. Weights generated to correct length frequencies to account for uneven sampling of trips with varying duration, by stock, for HEADBOATS only.

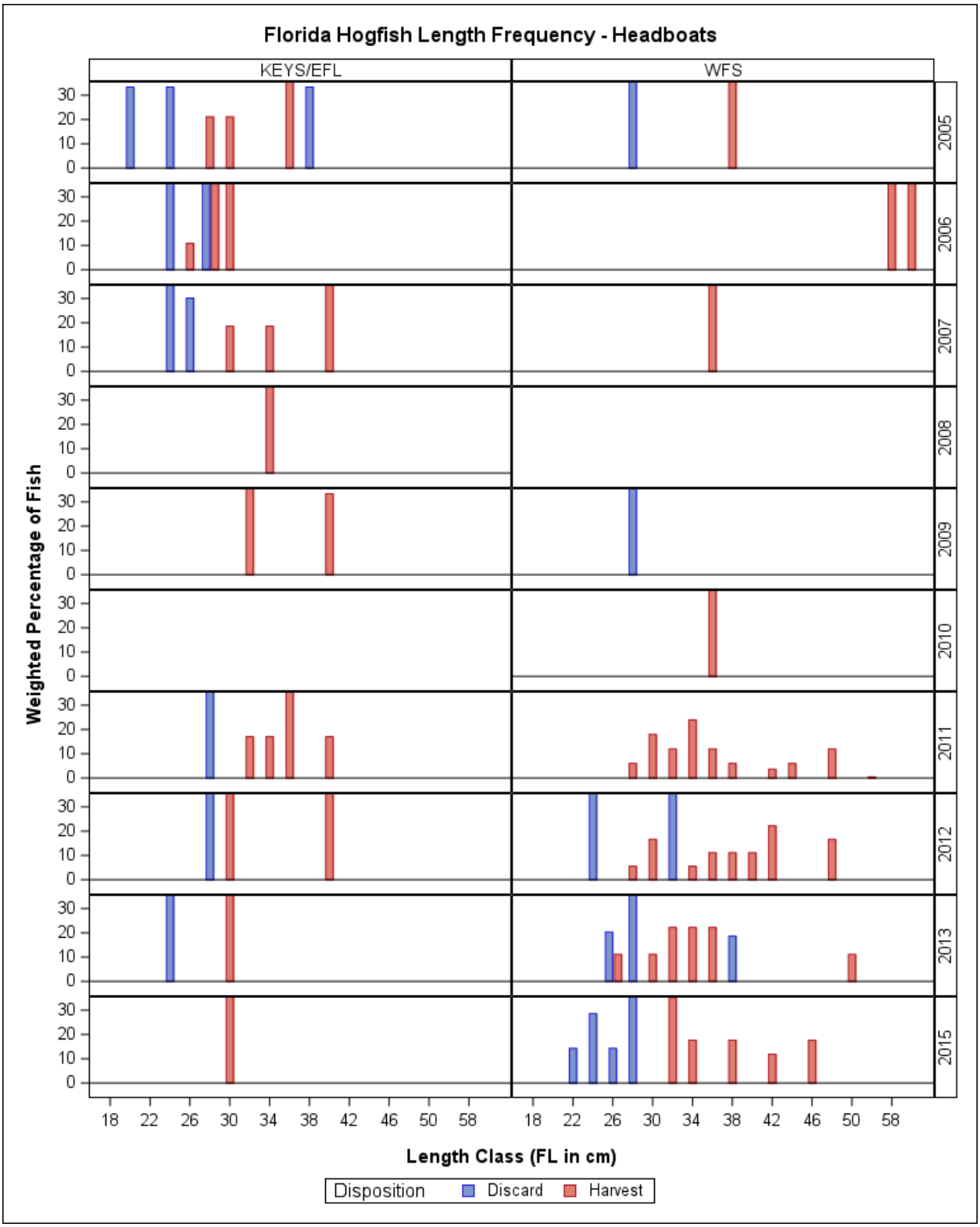
YEAR	KEYS/EAST FLORIDA STOCK				WEST FLORIDA STOCK			
	Half Day	*Three-Quarter Day*	*Full Day*	*Multi Day*	*Half Day*	*Three-Quarter Day*	*Full Day*	*Multi Day*
2005	0.827	0.412	2.666	1.439	2.099	0.809	1.682	0.027
2006	0.812	0.226	5.326	.	1.683	1.003	1.229	0.035
2007	0.923	0.274	3.836	0.379	2.323	0.788	1.379	0.037
2008	1.16	0.301	1.454	.	.	.	.	.
2009	1.097	0.243	2.895	.	3.652	0.883	0.4	0.057
2010	1.056	0.268	1.757	.	3.032	1.005	0.257	0.078
2011	1.093	0.381	1.682	.	1.653	0.957	0.582	0.072
2012	1.283	0.289	1.417	.	1.293	1.007	1.09	0.076
2013	1.184	0.451	0.922	.	1	1.279	1.092	0.16
2014	1.115	0.599	0.758	.	.	.	.	.
2015	1.153	0.679	0.512	.	1.059	0.639	1.577	0.901
2016	1.091	0.801	0.666	.	1.11	0.733	1.291	0.55
2017	0.957	1.215	1.105	.	0.857	0.914	1.581	0.702
2018	0.95	1.24	1.185	0.716	1.161	0.88	0.992	0.56
2019	0.92	1.694	1.209	0.524	0.99	0.904	1.243	0.562
2020	0.933	0.865	2.213	.	0.847	0.951	1.28	.
2021	0.971	1.36	0.901	.	1.208	1.041	0.701	.
2022	0.999	1.456	0.727	0.374	1.22	0.973	0.784	1.185
2023	1.055	1.465	0.566	0.653	1.424	0.643	1.12	0.69
2024	0.817	0.929	2.019	0.319	0.803	0.792	1.538	0.77

Table 5. Length summaries for discarded and harvested Hogfish observed on HEADBOAT trips in Florida, by year and stock. Sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

YEAR	DISCARDS				HARVEST				DISCARDS				HARVEST			
	N	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*
	KEYS/EAST FLORIDA STOCK								WEST FLORIDA STOCK							
2005	3	214	284	385	4	299	339	376	1	295	295	295	1	390	390	390
2006	2	250	269	287	4	278	297	317	.	.	.	.	2	589	633	677
2007	5	250	259	270	3	308	354	404	.	.	.	.	1	362	362	362
2008	.	.	.	.	1	355	355	355	1	297	297	297	.	.	.	.
2009	.	.	.	.	3	327	354	409	.	.	.	.	1	361	361	361
2011	1	296	296	296	4	328	364	406	.	.	.	.	18	295	378	565
2012	1	280	280	280	2	310	358	405	2	250	288	326	18	293	392	492
2013	1	256	256	256	2	306	308	310	5	271	302	382	9	269	356	505
2015	.	.	.	.	1	306	306	306	7	230	267	292	6	327	384	475
2016	3	221	260	292	1	325	325	325	15	205	269	300	72	265	365	487
2017	2	361	392	423	2	313	338	363	23	193	277	340	51	295	368	460
2018	3	304	328	359	.	.	.	.	44	201	307	355	22	336	383	445
2019	11	223	315	374	.	.	.	.	53	232	310	355	49	348	392	485
2020	1	286	286	286	1	450	450	450	8	231	288	340	4	363	387	423
2021	4	281	318	386	1	395	395	395	113	203	307	356	71	254	385	450
2022	6	215	301	370	.	.	.	.	221	230	309	357	112	342	383	494
2023	12	212	276	401	.	.	.	.	91	223	304	364	38	346	383	445
2024	7	240	307	378	1	595	595	595	109	219	305	363	63	332	384	445

Table 6. Length summaries for discarded and harvested Hogfish observed on CHARTER BOAT trips in Florida, by year and stock. Sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

YEAR	DISCARDS				HARVEST			
	N	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*
KEYS/EAST FLORIDA STOCK								
2010	.	.	.	.	2	296	316	336
2012	.	.	.	.	1	320	320	320
2013	1	298	298	298	1	319	319	319
2014	22	247	281.8	319	15	289	333.4	380
2015	15	231	277.1	314	10	315	354.3	386
2016	7	248	279.3	298	7	309	331.4	386
2018	1	324	324	324	.	.	.	.
2019	7	261	303	371	.	.	.	.
WEST FLORIDA STOCK								
2010	.	.	.	.	1	447	447	447
2012	.	.	.	.	3	309	371.7	426
2015	12	261	281.1	310	26	312	375.7	445
2016	8	198	265.4	293	20	299	370.6	495
2017	6	204	277	304	12	294	377.1	490
2018	8	270	301.6	341	8	359	388.6	480
2019	11	230	308.1	349	4	355	419.5	489
2021	15	266	306	345	10	360	401.8	450
2022	18	215	304.7	346	12	356	416.2	463
2023	10	274	320.4	344	5	376	394.4	446
2024	38	259	313.3	347	35	353	398.7	444


Florida Hogfish Length Frequency - Headboats
KEYS/EFL
WFS
2005
2006
2007
2008
2009
2010
2011
2012
2013
2015
Weighted Percentage of Fish
0
10
20
30
18
22
26
30
34
38
42
46
50
58
Length Class (FL in cm)
Disposition
Discard
Harvest

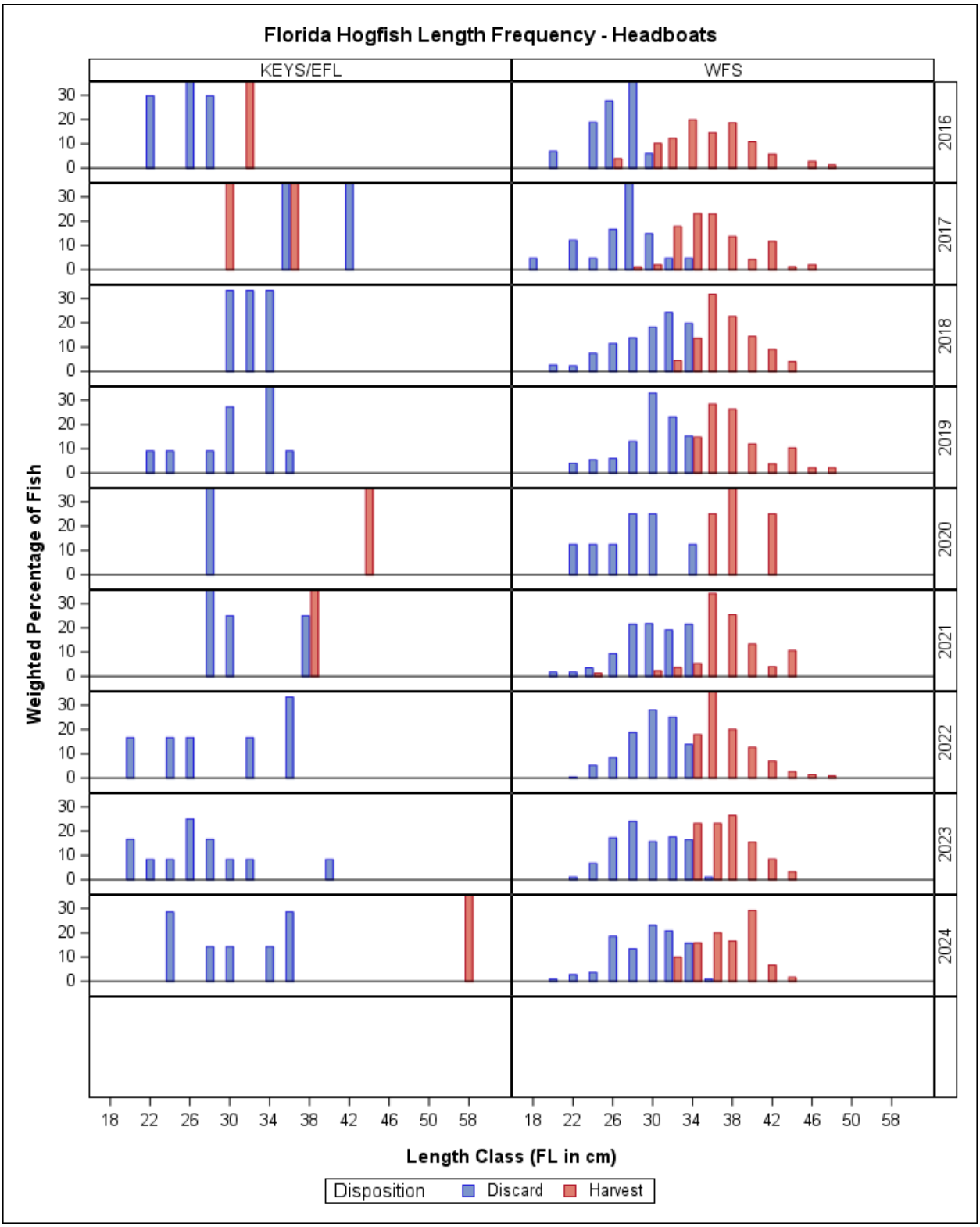
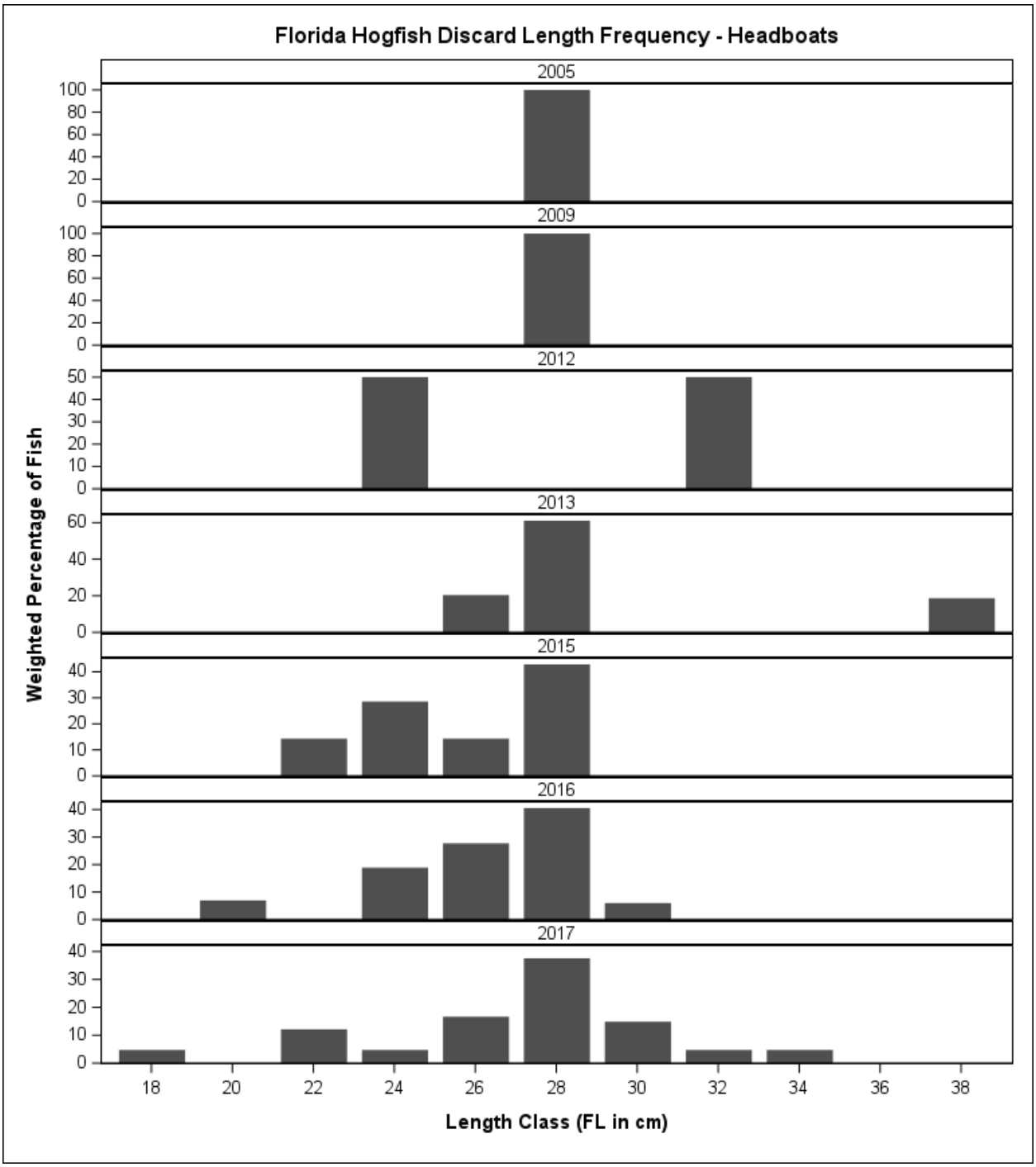


Figure 1. Weighted length frequencies of harvested and released Hogfish measured by at-sea observers on HEADBOATS in Florida from 2005-2024. Some plots are truncated to improve resolution. Harvest includes fish that were released dead.


Florida Hogfish Discard Length Frequency - Headboats
2005
2009
2012
2013
2015
2016
2017
Weighted Percentage of Fish
Length Class (FL in cm)
18
20
22
24
26
28
30
32
34
36
38

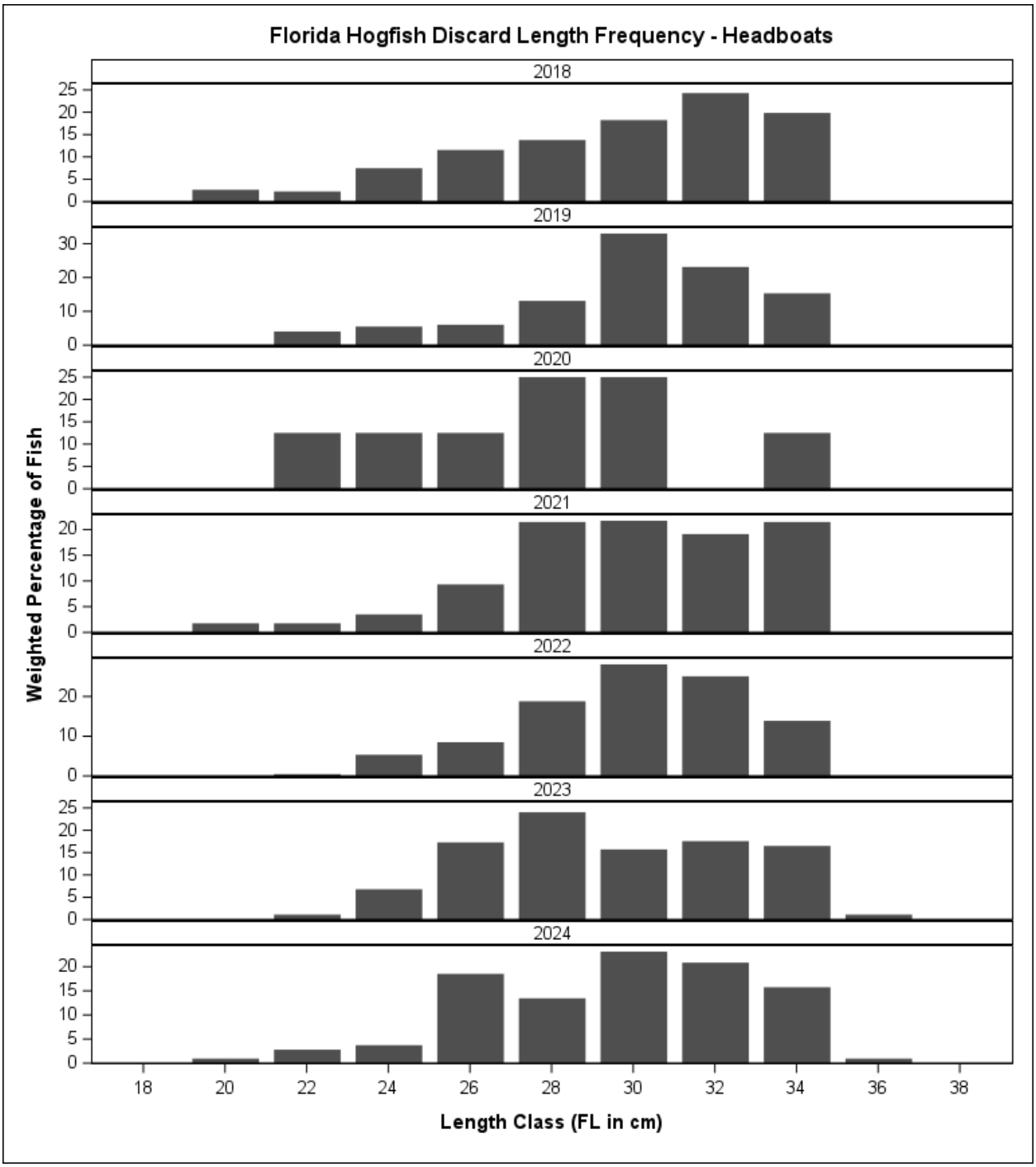
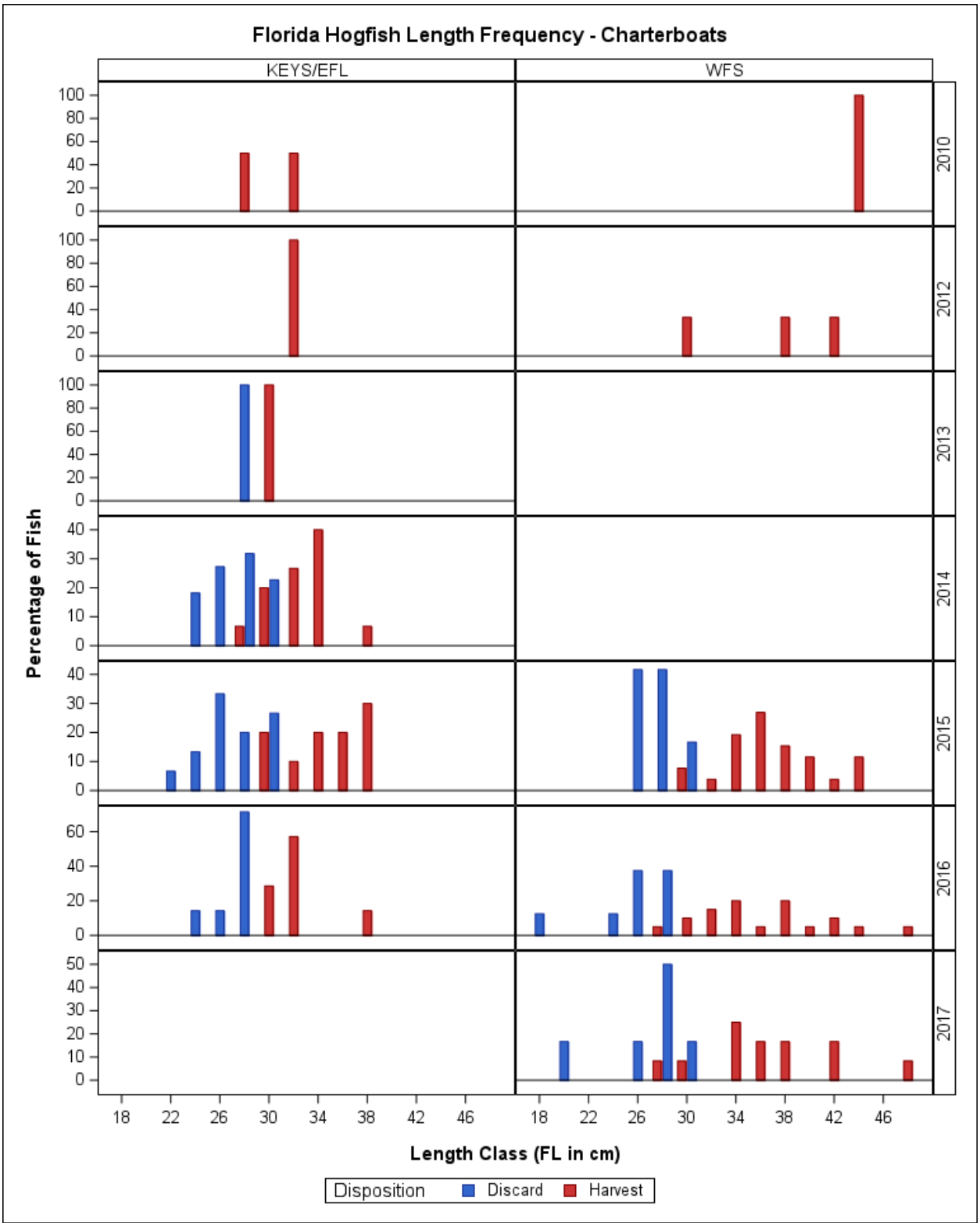


Figure 2. Length frequency of released Hogfish measured by at-sea observers on headboats in west Florida (west Florida stock) from 2005-2024.


Florida Hogfish Length Frequency - Charterboats
KEYS/EFL
WFS
2010
2012
2013
2014
2015
2016
2017
Percentage of Fish
Length Class (FL in cm)
Disposition
Discard
Harvest

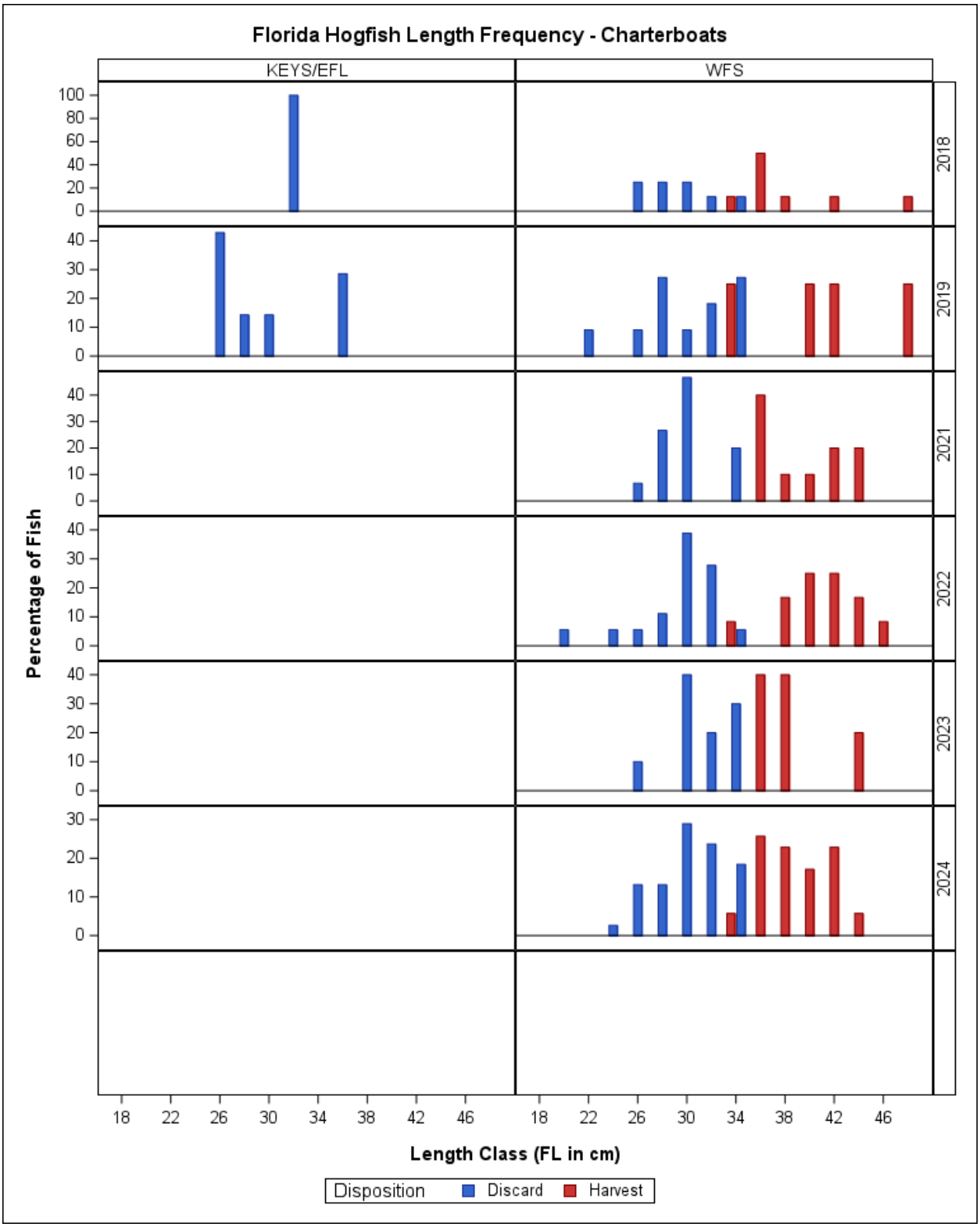


Figure 3. Length frequency of harvested and released Hogfish measured by at-sea observers on CHARTER BOATS in Florida from 2010-2024. Harvest includes fish that were released dead.

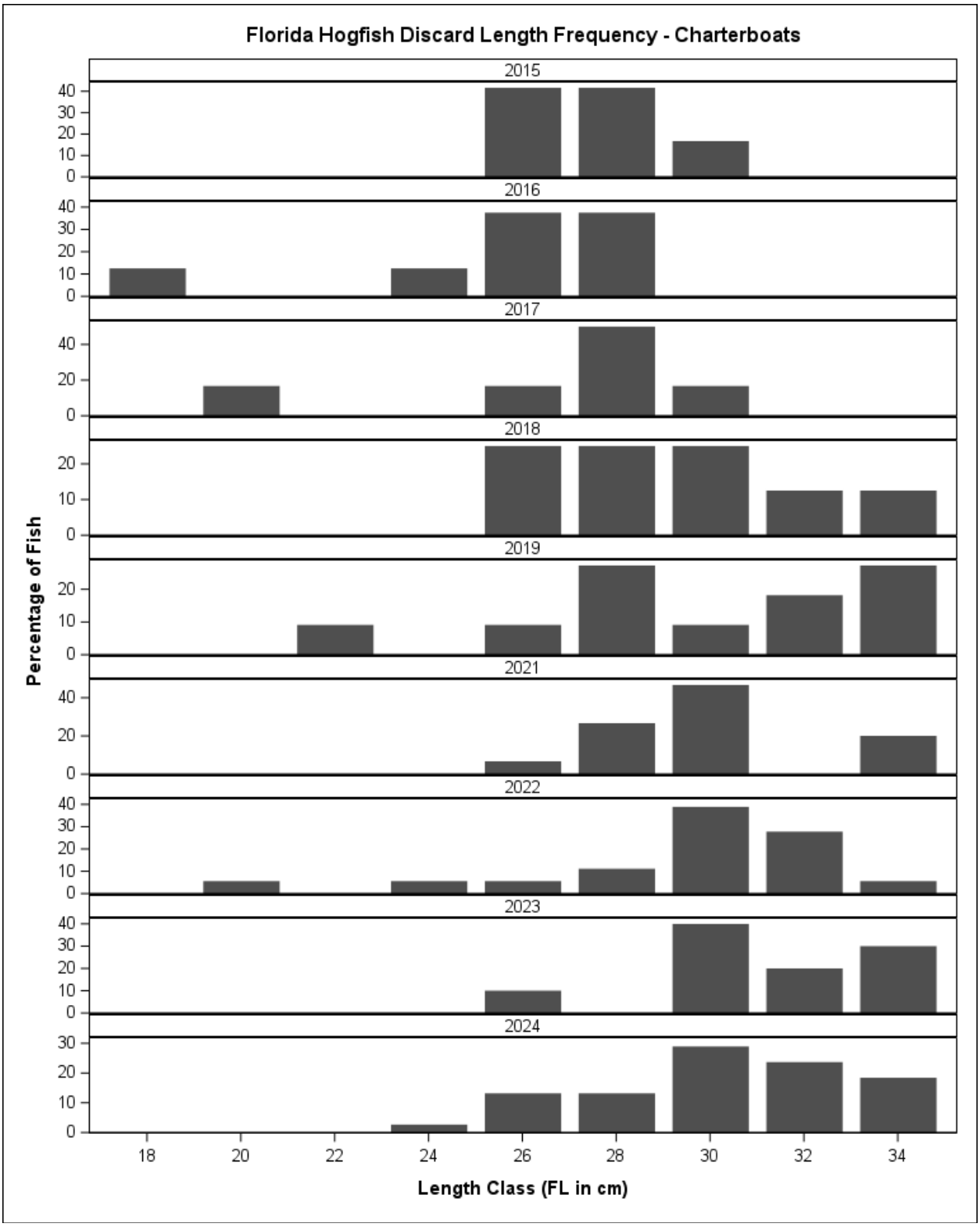


Figure 4. Length frequency of released Hogfish measured by at-sea observers on charter boats in west Florida (west Florida stock) from 2015-2024.