A Summary of Mutton Snapper Discard Length Data Collected from At-Sea Observers in Recreational Fishery Surveys in Florida

Ellie Corbett

SEDAR79-DW-14

16 August 2023

Please cite this document as:

Corbett, Ellie. 2023. A Summary of Mutton Snapper Discard Length Data Collected from At-Sea Observers in Recreational Fishery Surveys in Florida. SEDAR79-DW-14. SEDAR, North Charleston, SC. 20 pp.

A Summary of Mutton Snapper Discard Length Data Collected from At-Sea Observers in Recreational Fishery Surveys in Florida

Prepared by:
Ellie Corbett
Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute
Saint Petersburg, Florida

For: SEDAR 79 Mutton Snapper Data Workshop, August 2023.

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. For-hire 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 Mutton Snapper collected by trained observers since 2005 during at-sea surveys on for-hire vessels in the eastern Gulf of Mexico.

At-Sea Observer Survey Coverage

Age and length information included here were collected from at-sea observer surveys between 2005 and 2022. No sampling occurred between April 2020 and May 2021 due to the COVID-19 pandemic.

Gulf Coast of Florida (NWFL, SWFL)

Headboat observer surveys were conducted on the Gulf coast of Florida from 2005 to 2007, funded by the Gulf Fisheries Information Network (GulfFIN). 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. Data collected in these regions in 2014 was omitted from these analyses, as the observers only sampled a subset of the for-hire fleet that may not be representative of the fleet as a whole in that year.

South Atlantic coast of Florida (NEFL, SEFL)

On the South Atlantic coast, at-sea headboat sampling has been conducted continuously since 2004 funded by the Atlantic Coast Cooperative Statistic Program (ACCSP), with this report including data collected between 2005 and 2022. At-sea sampling on Atlantic coast charter boats was funded with a 3-year MARFIN grant from 2013-2015.

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.

At-Sea Observer Survey Methods

Florida – 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, 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 – 2009-2022

Similar to methods described above, charter and headboat vessels were randomly selected each week from a list of participating vessels in the northwestern region and central western regions of Florida. 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, another vessel is randomly 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/or degrees and minutes latitude and longitude) for each fishing station during each observed trip.

For each fish, 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. 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.

Release Condition was coded as:
Good – Fish that were able to submerge and swim away immediately after release
Fair – Fish that re-submerged and swam away with minor difficulty
Bad – Fish released that demonstrated extreme difficulty re-submerging or swimming
Dead – Fish that were released dead, preyed upon by mammals or preyed upon by birds

Area fishes was coded as:
For southeast and northeast Florida:
1: 3 miles or less from shore; or
2: more than 3 miles from shore
For Keys, western peninsula, and northwest Florida:
3: 10 miles or less from shore; or
4: more than 10 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 3% of 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 2022 (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 in each region, divided by the total number of headboat trips reported in the same region (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 one cm length bin categories (40 cm bin = fish 40.0 cm to 41.9 cm) 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 Mutton Snapper 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 2022 in Florida, headboat observers sampled 1279 trips positive for Mutton Snapper, and 957 trips for discarded Mutton Snapper. There were 295 charter trips positive for Mutton Snapper, and 200 trips for discarded Mutton Snapper. The number of sampled trips by year and region for at-sea observer trips were 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 region of Florida (Table 4). A total of 2714 discarded fish and 2011 harvested fish were measured during headboat at-sea observer trips between 2005 and 2022 in the coastal regions of Florida. For Florida charter trips, observers sampled 542 discarded fish and 455 harvested fish. 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) Mutton Snapper by year are presented for southeastern Florida headboats (Figure 1) and southeastern Florida charter boats (Figure 2).

Table 1. Sampling coverage for At-sea observer trips in the southeastern US, 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.

Headboat Areas	**2005**	**2006**	**2007**	**2008**	**2009***	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020***	**2021***	**2022**
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
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
Florida Keys	H	H	H			H,C	H,C	H,C	H,C	C	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,C	H,C	H,C	H	H	H	H	H	H	H
Northeast Florida	H	H	H		H	H	H	H	H,C	H,C	H,C	H	H	H	H	H	H	H

Table 2. Florida sampled HEADBOAT at-sea observer trips positive for Mutton Snapper and for Mutton Snapper discards by year and region. Sampling in 2009 represents June to December, sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

YEAR	SOUTHWEST FLORIDA		FLORIDA KEYS		SOUTHEAST FLORIDA		NORTHEAST FLORIDA	
	Positive	*Discard*	*Positive*	*Discard*	*Positive*	*Discard*	*Positive*	*Discard*
2005	5	4	18	11	52	29	3	1
2006	16	5	22	13	31	18	.	.
2007	10	3	31	21	39	25	3	3
2008	.	.	.	.	48	38	9	5
2009	2	0	.	.	54	37	4	2
2010	1	0	8	7	34	18	5	0
2011	2	0	8	5	24	3	1	1
2012	2	0	7	4	25	2	1	0
2013	.	.	8	7	32	20	2	1
2014	.	.	.	.	51	42	5	2
2015	2	2	1	1	48	40	10	7
2016	8	5	26	23	49	42	2	2
2017	2	1	26	25	49	44	5	3
2018	7	6	51	50	61	56	5	5
2019	6	4	41	40	60	59	5	3
2020	.	.	5	5	14	13	1	1
2021	.	.	12	9	69	57	15	8
2022	2	0	19	17	95	89	20	13

Table 3. Florida sampled CHARTER BOAT at-sea observer trips positive for Mutton Snapper and for Mutton Snapper discards by year and region. Sampling in 2009 represents June to December, sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

YEAR	SOUTHWEST FLORIDA		FLORIDA KEYS		SOUTHEAST FLORIDA		NORTHEAST FLORIDA	
	Positive	*Discard*	*Positive*	*Discard*	*Positive*	*Discard*	*Positive*	*Discard*
2010	.	.	.	.	1	1	.	.
2011	1	0	1	0	.	.	.	.
2012	1	1	4	2	3	3	.	.
2013	.	.	16	6	24	18	2	0
2014	.	.	10	4	38	33	5	1
2015	5	3	15	6	31	23	3	1
2016	3	2	12	10	.	.	.	.
2017	9	7	26	15	.	.	.	.
2018	1	1	21	15	.	.	.	.
2019	3	3	28	20	.	.	.	.
2020	1	1	.	.	.	.	.	.
2021	1	1	4	4	3	3	1	1
2022	4	4	8	5	8	5	2	1

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

YEAR	SOUTHWEST FLORIDA				FLORIDA KEYS				SOUTHEAST FLORIDA			NORTHEAST FLORIDA		
	Half Day	*Three-Quarter Day*	*Full Day*	*Multi Day*	*Half Day*	*Three-Quarter Day*	*Full Day*	*Multi Day*	*Half Day*	*Three-Quarter Day*	*Full Day*	*Half Day*	*Three-Quarter Day*	*Full Day*
2005	1.524	0.680	2.004	0.001	0.401	0.260	.	0.965	0.078	0.112	0.629	1.605	0.002	1.198
2006	1.265	1.046	0.559	0.008	0.395	0.683	3.379	.	0.069	0.027	.	1.430	0.006	2.480
2007	1.930	0.775	0.749	0.064	0.780	0.430	.	0.245	0.095	0.000	.	1.217	0.016	1.837
2008	.	.	.	.	.	.	.	.	0.721	0.161	1.322	1.836	0.138	1.577
2009	4.933	1.192	0.174	0.037	.	.	.	.	0.953	0.404	.	1.267	0.050	2.947
2010	3.385	0.952	0.133	0.045	0.871	0.557	.	.	0.969	0.425	.	1.041	0.001	1.859
2011	1.761	1.145	0.197	0.037	0.933	0.602	2.545	.	0.993	0.378	.	1.216	0.285	1.925
2012	1.471	1.151	0.481	0.037	1.165	0.282	.	.	1.071	0.219	.	1.256	0.353	1.895
2013	1.074	12.183	0.867	0.112	1.034	0.459	.	.	0.928	0.564	0.354	1.148	0.567	1.530
2014	.	.	.	.	.	.	.	.	0.957	.	.	0.701	0.709	1.781
2015	0.803	2.052	1.215	0.490	0.780	.	.	.	0.961	2.380	0.846	0.927	0.763	1.264
2016	0.971	1.368	1.006	0.387	1.027	0.715	2.421	.	0.754	2.276	0.531	0.707	1.211	1.175
2017	0.827	1.522	1.255	0.555	0.832	3.656	.	.	0.932	1.475	.	0.838	0.828	1.248
2018	1.175	1.800	0.679	0.484	0.798	.	.	0.621	0.896	.	.	1.213	0.623	1.232
2019	1.166	1.033	0.867	0.518	0.804	.	.	0.454	0.968	1.023	2.802	0.613	1.027	1.356
2020	1.040	0.981	0.837	.	0.758	.	.	.	0.892	.	.	0.762	0.459	2.709
2021	1.288	2.063	0.509	.	0.781	.	.	.	0.890	6.879	.	0.743	0.946	1.312
2022	1.405	1.632	0.568	1.032	0.861	11.009	0.380	0.201	0.847	2.646	.	1.413	0.952	0.896

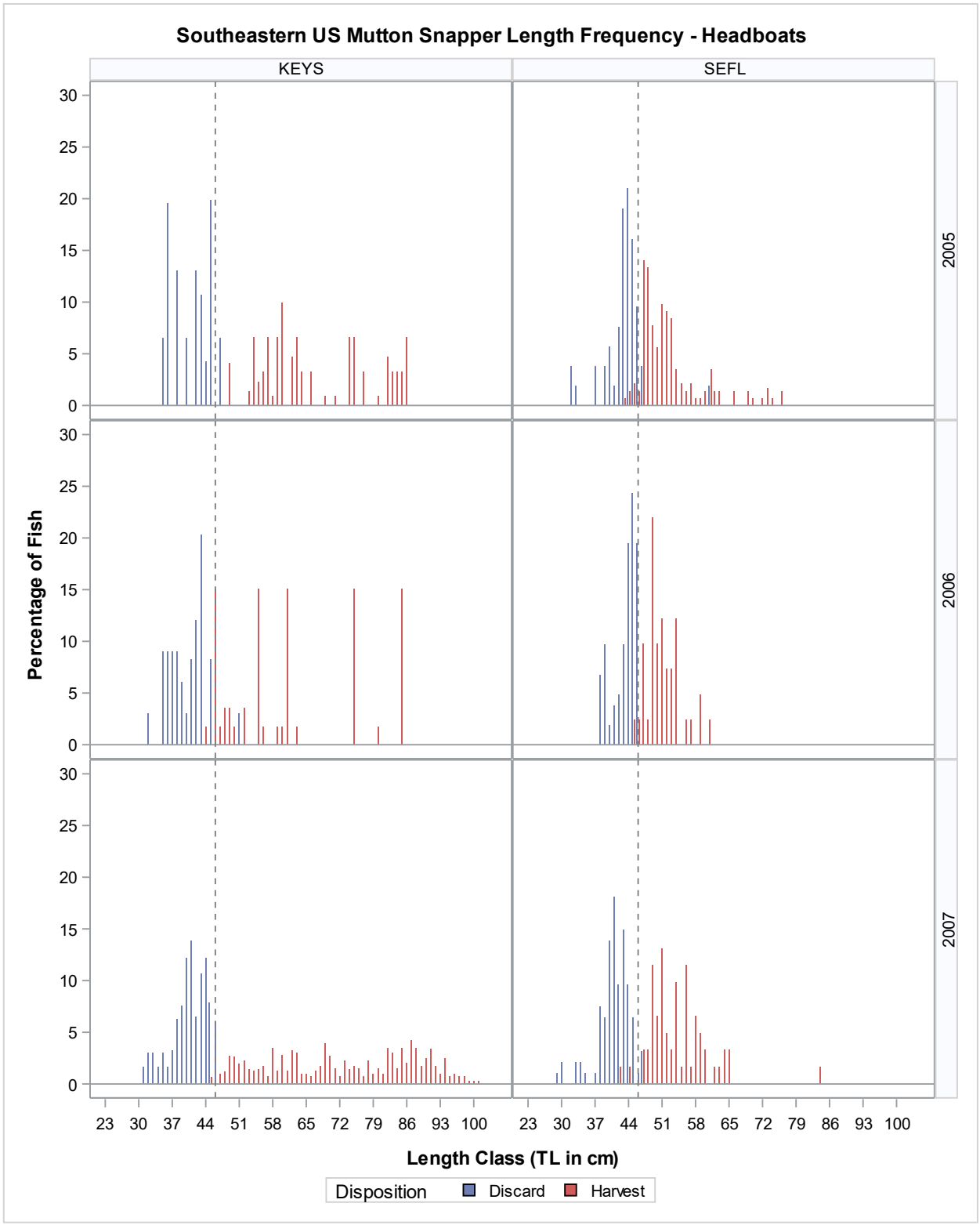
Table 5. Length summaries for discarded and harvested Mutton Snapper observed on HEADBOAT trips in the southeastern US, by year and region. Sampling in 2009 represents June to December, sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

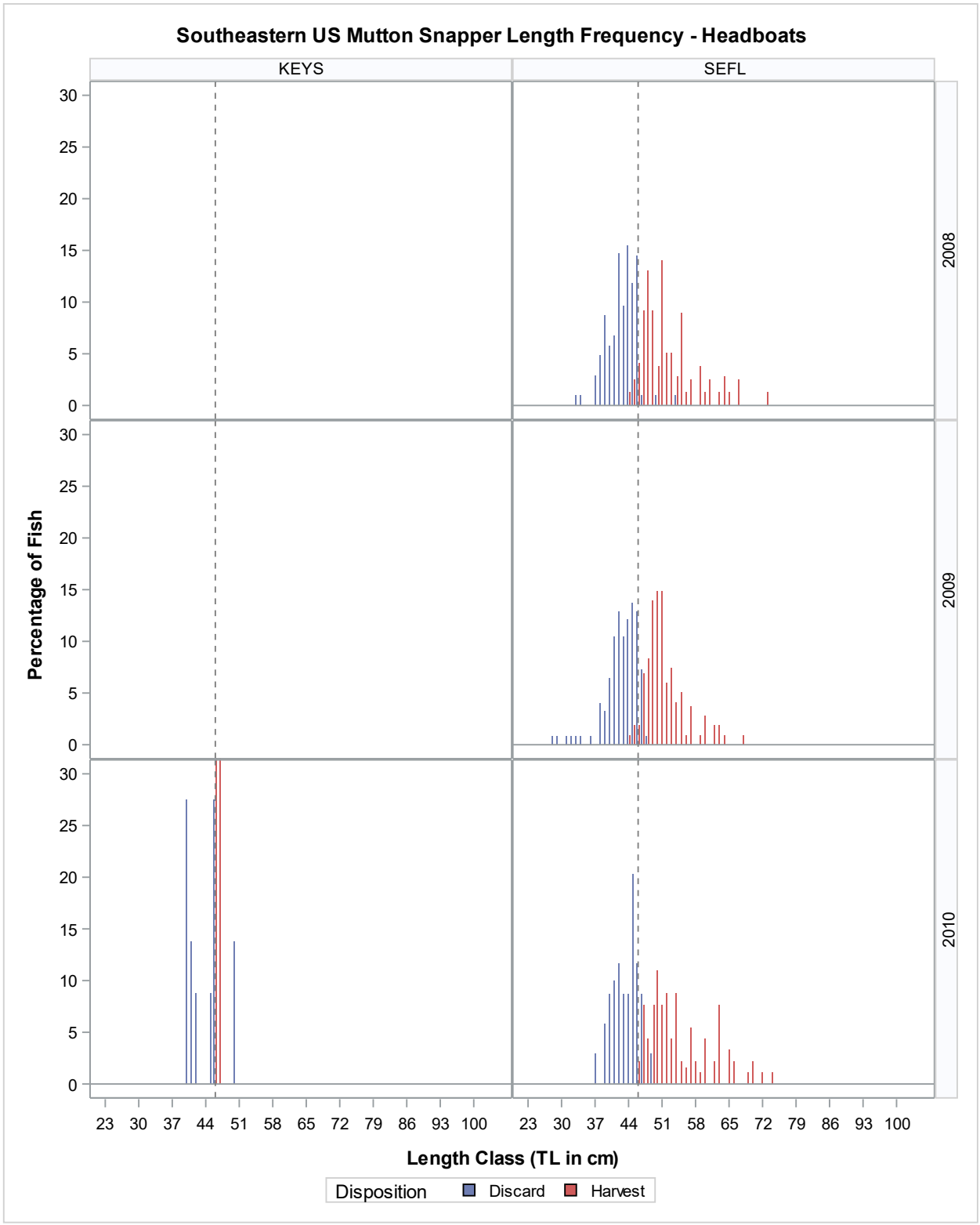
YEAR	DISCARDS				HARVEST			
	N	Min	Mean	Max	N	Min	Mean	Max
SOUTHWEST FLORIDA								
2005	4	348	415	457	6	487	708.2	955
2006	8	370	453.4	498	107	358	711.3	1004
2007	6	447	465.2	481	53	475	689.2	1055
2009	.	.	.	.	3	669	859.7	972
2010	.	.	.	.	1	889	889	889
2011	.	.	.	.	2	640	799	958
2012	.	.	.	.	4	740	774	855
2015	10	371	411	457	3	493	627.7	884
2016	8	334	401.6	506	38	518	703.6	988
2017	2	376	403	430	1	481	481	481
2018	8	359	450.9	518	7	383	615.4	823
2019	13	383	462.5	530	22	408	654	889
2022	.	.	.	.	5	641	705	791
FLORIDA KEYS								
2005	15	352	407.1	468	38	486	659.6	859
2006	31	322	399.4	510	19	443	567.9	854
2007	47	315	407.4	462	377	446	738.2	1015
2010	8	398	438.9	501	2	465	467.5	470
2011	6	299	389.5	469	5	460	534.2	628
2012	14	321	365.2	443	5	342	585.2	872
2013	14	322	386.5	458	1	470	470	470
2015	1	449	449	449	3	609	656	695
2016	56	250	412.4	493	21	460	606.2	893
2017	95	297	393.9	512	7	486	660.6	930
2018	165	315	412.6	537	32	521	628.4	867
2019	125	288	433.1	540	38	518	664.3	878
2020	13	359	449.6	506	4	517	534.3	548
2021	20	308	424	529	8	561	630.3	744
2022	38	288	410.3	530	13	347	657.1	888
SOUTHEAST FLORIDA								
2005	52	323	430.3	606	142	433	526.7	758
2006	23	383	430.7	465	41	448	513.1	609
2007	98	292	408.8	471	64	316	538.9	839
2008	105	332	426.6	542	83	442	524.3	729
2009	124	278	426.8	481	110	444	516.5	679
2010	35	367	433.9	486	92	459	548.7	745

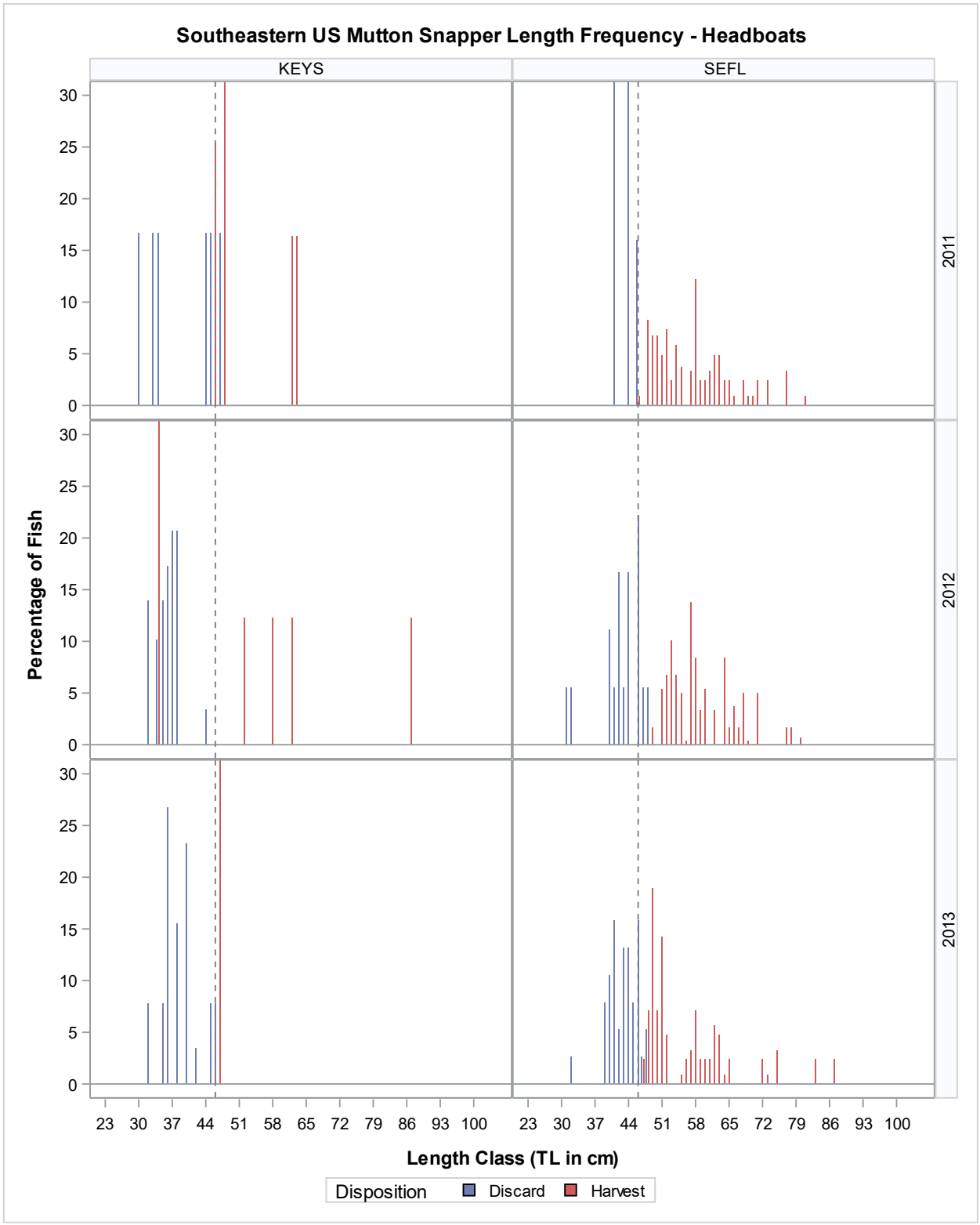
2011	3	415	439	462	52	463	578.2	809
2012	18	314	424.2	477	66	495	599.6	804
2013	38	316	428.5	480	46	471	571.7	873
2014	121	293	425	531	48	463	533.8	783
2015	82	293	426.3	495	48	465	527	646
2016	121	323	415.8	628	60	347	581.5	829
2017	204	316	430.3	682	27	389	581.4	945
2018	189	275	431.6	572	27	526	619.7	945
2019	191	304	426.4	520	32	521	583.9	801
2020	54	323	397.1	515	1	553	553	553
2021	161	316	457.1	559	39	525	600.1	835
2022	254	323	445.8	551	70	510	621.2	916
NORTHEAST FLORIDA								
2005	1	465	465	465	3	521	602	644
2007	3	432	433	435	.	.	.	.
2008	10	348	418	469	17	444	521.9	689
2009	3	441	459.3	471	11	520	581.7	631
2010	.	.	.	.	8	480	568.5	682
2011	3	320	341.7	366	.	.	.	.
2012	.	.	.	.	1	739	739	739
2013	1	425	425	425	1	521	521	521
2014	3	463	470.7	475	7	471	540.1	619
2015	21	396	440.6	482	24	376	543.8	677
2016	8	391	438.8	462	5	482	603	668
2017	7	367	406.3	447	10	465	520.3	620
2018	10	319	407.7	471	3	581	681	789
2019	3	372	395	419	5	586	606.2	666
2020	2	388	429.5	471	.	.	.	.
2021	23	288	415.8	512	14	537	655.5	800
2022	36	235	431.5	519	29	531	626.9	833

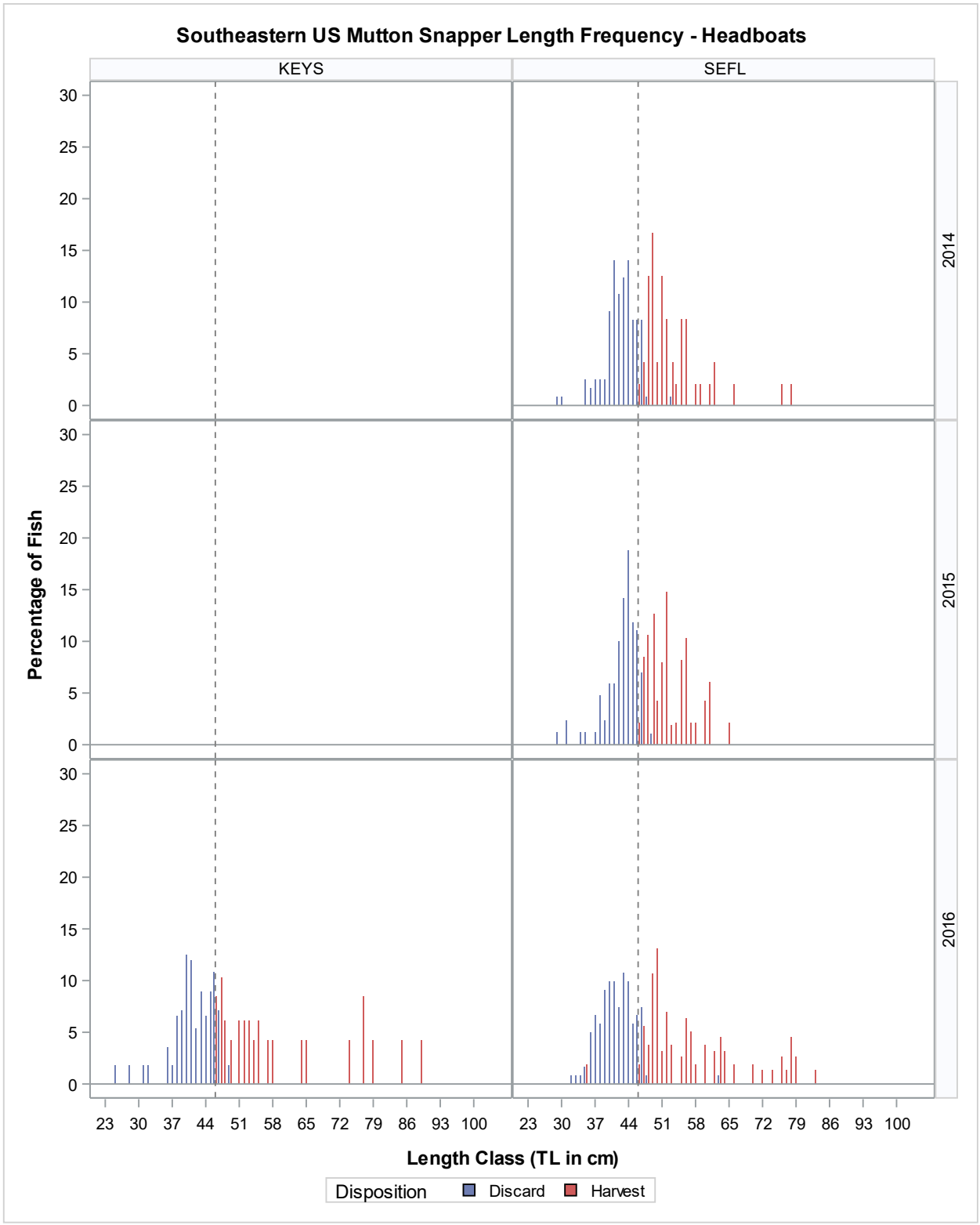
Table 6. Length summaries for discarded and harvested Mutton Snapper observed on CHARTER BOAT trips in the southeastern US, by year and region. Sampling in 2009 represents June to December, sampling in 2020 represents January to March, and sampling in 2021 represents June to December.

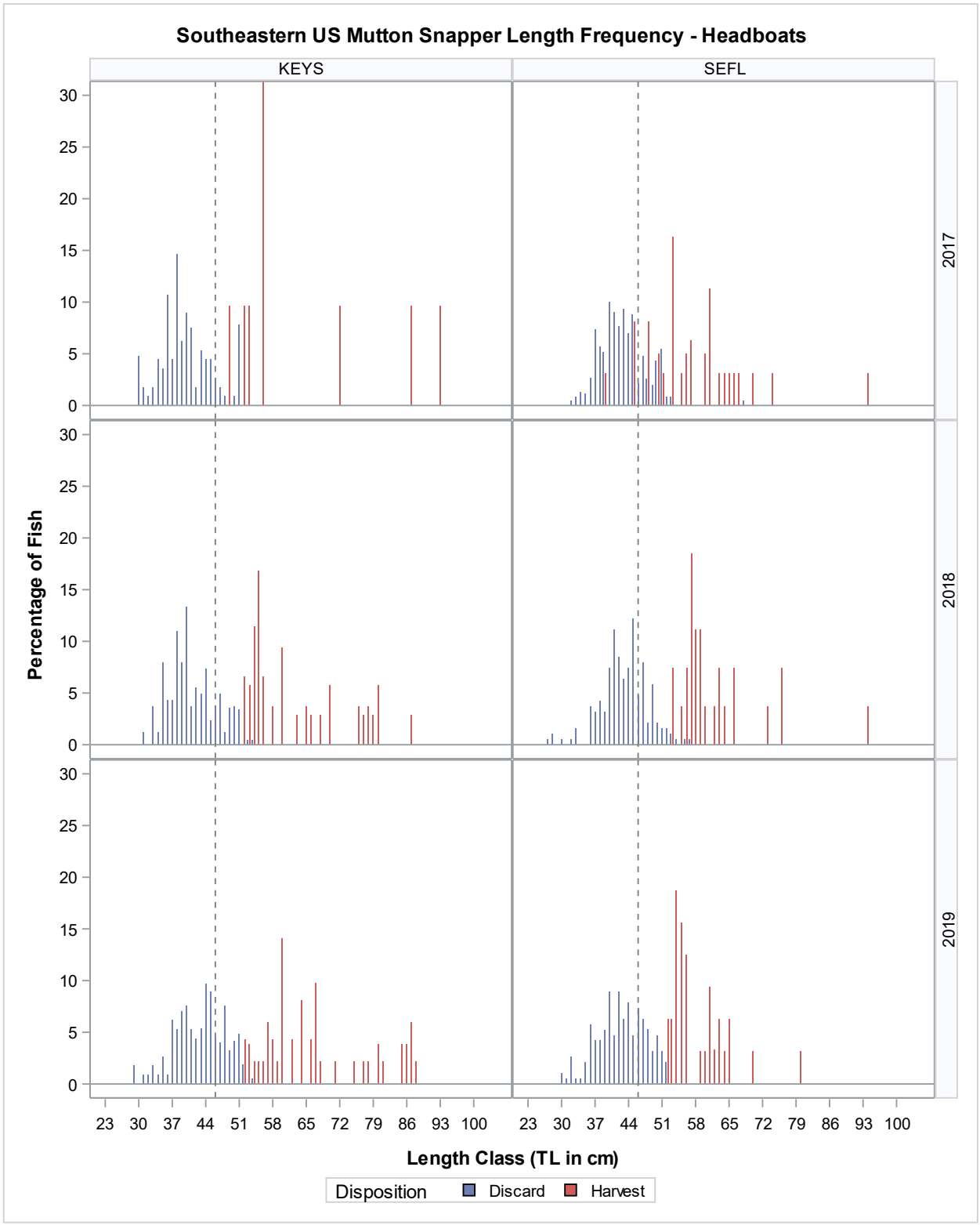
YEAR	DISCARDS				HARVEST			
	N	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*
SOUTHWEST FLORIDA								
2011	.	.	.	.	1	506	506	506
2012	7	279	319	366	.	.	.	.
2015	10	229	319	463	2	713	778	842
2016	2	334	364	394	1	829	829	829
2017	17	359	429	469	6	481	507	536
2018	7	420	469	518	4	664	680	701
2019	15	311	407	504	2	513	552	591
2020	1	322	322	322	.	.	.	.
2021	1	375	375	375	.	.	.	.
2022	8	273	336	444	.	.	.	.
FLORIDA KEYS								
2011	.	.	.	.	1	583	583	583
2012	2	455	458	460	3	523	590	668
2013	8	339	408	449	29	476	685	928
2014	12	352	390	451	23	497	715	848
2015	16	353	384	468	16	469	610	857
2016	16	330	421	866	14	388	598	886
2017	49	330	409	521	55	431	642	969
2018	24	292	421	508	23	525	742	931
2019	66	301	425	563	35	510	629	845
2021	22	341	424	542	1	589	589	589
2022	11	316	345	408	6	603	744	878
SOUTHEAST FLORIDA								
2010	2	347	370	392	.	.	.	.
2012	4	336	371	413	1	523	523	523
2013	40	385	436	470	58	463	528	718
2014	111	374	435	473	70	471	516	727
2015	63	370	435	476	71	462	527	818
2021	5	408	453	524	2	541	561	581
2022	16	367	436	519	5	535	612	783
NORTHEAST FLORIDA								
2013	.	.	.	.	3	751	800	870
2014	1	437	437	437	6	487	788	967
2015	1	433	433	433	9	470	570	706
2021	1	474	474	474	7	573	743	862
2022	4	273	348	389	1	767	767	767


Southeastern US Mutton Snapper Length Frequency - Headboats
KEYS
SEFL
2005
2006
2007
Percentage of Fish
0
5
10
15
20
25
30
23
30
37
44
51
58
65
72
79
86
93
100
Length Class (TL in cm)
Disposition
Discard
Harvest


Southeastern US Mutton Snapper Length Frequency - Headboats
KEYS
SEFL
2008
2009
2010
Percentage of Fish
0
5
10
15
20
25
30
23
30
37
44
51
58
65
72
79
86
93
100
Length Class (TL in cm)
Disposition
Discard
Harvest


Southeastern US Mutton Snapper Length Frequency - Headboats
KEYS
SEFL
2011
2012
2013
Percentage of Fish
0
5
10
15
20
25
30
23
30
37
44
51
58
65
72
79
86
93
100
Length Class (TL in cm)
Disposition
Discard
Harvest


Southeastern US Mutton Snapper Length Frequency - Headboats
KEYS
SEFL
2014
2015
2016
Percentage of Fish
0
5
10
15
20
25
30
23
30
37
44
51
58
65
72
79
86
93
100
Length Class (TL in cm)
Disposition
Discard
Harvest


Southeastern US Mutton Snapper Length Frequency - Headboats
KEYS
SEFL
2017
2018
2019
Percentage of Fish
0
5
10
15
20
25
30
23
30
37
44
51
58
65
72
79
86
93
100
Length Class (TL in cm)
Disposition
Discard
Harvest

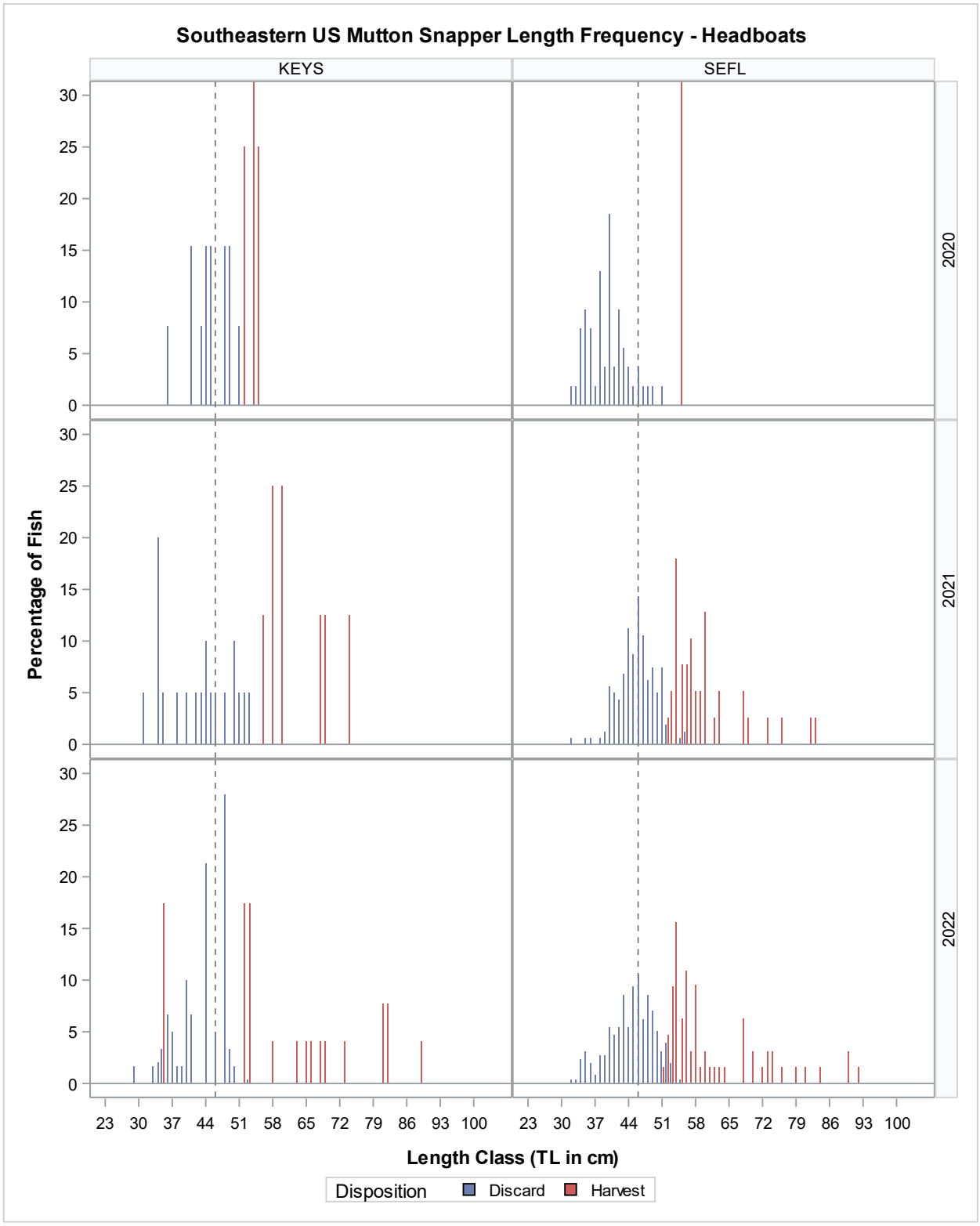
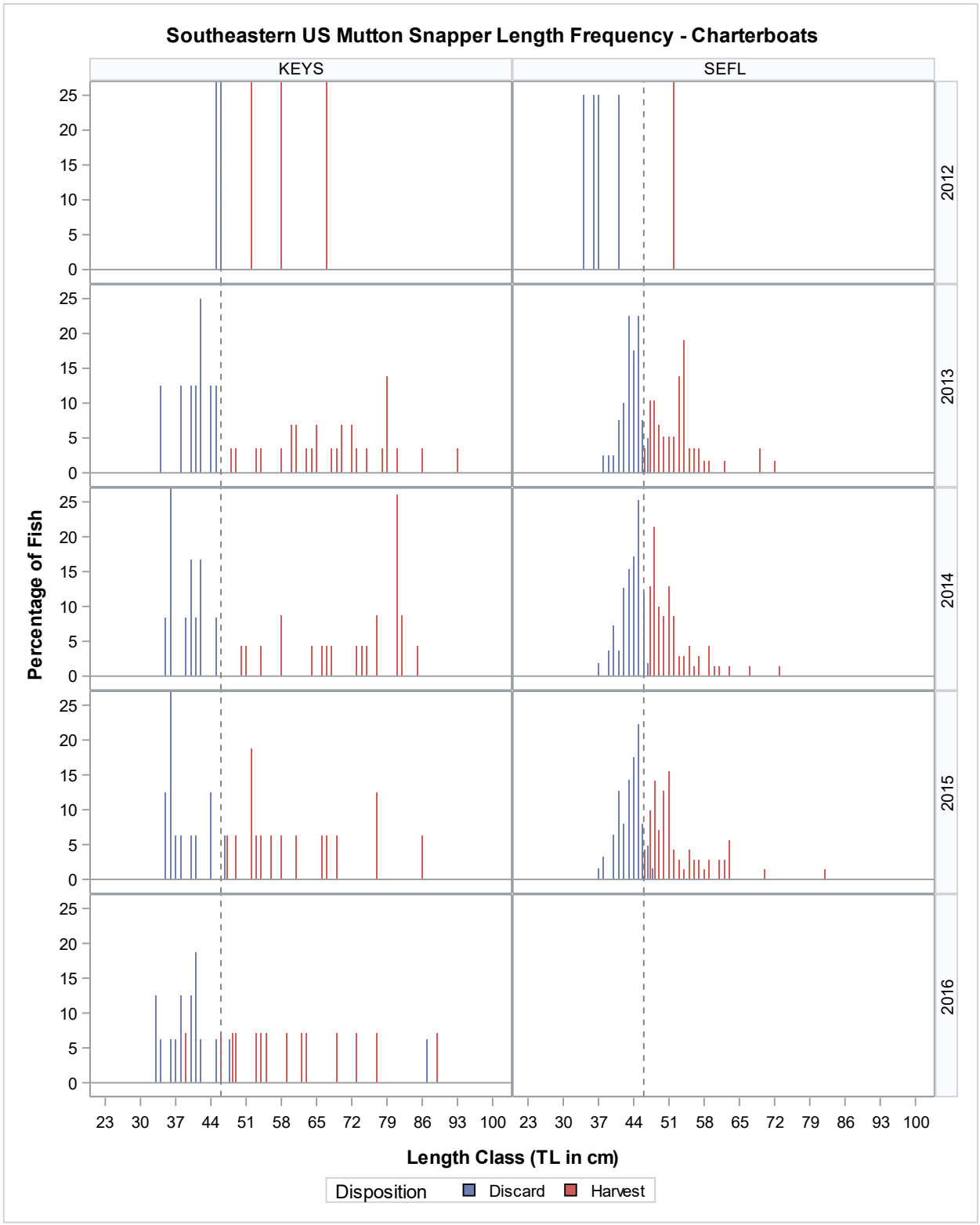


Figure 1. Weighted length frequencies of harvested and released Mutton Snapper measured by at-sea observers on HEADBOATS in the Florida Keys and southeast Florida from 2005-2022. Harvest includes fish that were released dead.


Southeastern US Mutton Snapper Length Frequency - Charterboats
KEYS
SEFL
2012
2013
2014
2015
2016
Percentage of Fish
0
5
10
15
20
25
23
30
37
44
51
58
65
72
79
86
93
100
Length Class (TL in cm)
Disposition
Discard
Harvest

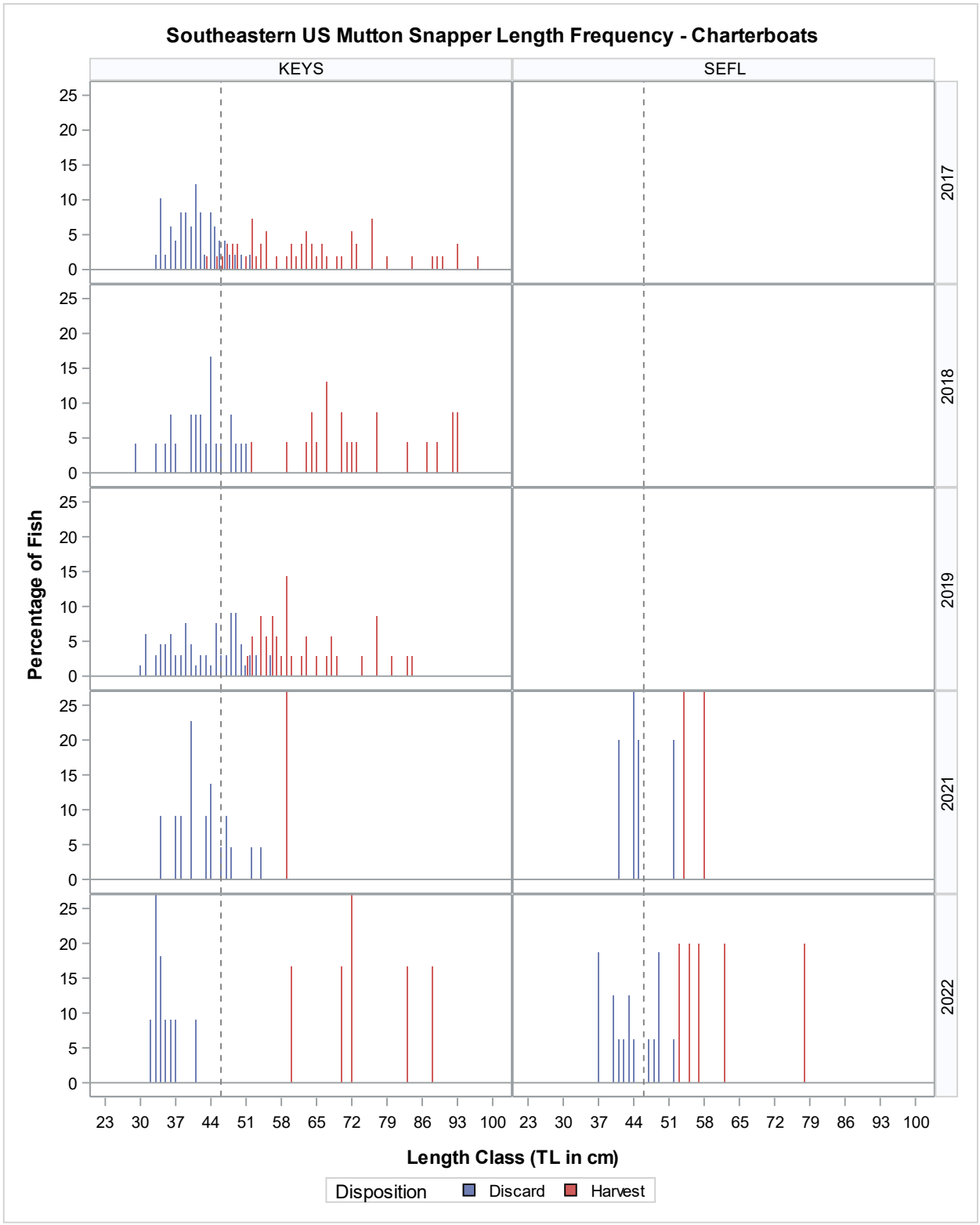


Figure 2. Length frequency of harvested and released Mutton Snapper measured by at-sea observers on charterboats in the Florida Keys and southeast Florida (areas with low discards and harvest omitted), from 2012-2022 (years with discards). Harvest includes fish that were released dead.