A Summary of Observer Data from the Size Distribution and Release Condition of Scamp Discards from Recreational Fishery Surveys in the Eastern Gulf of Mexico

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A Summary of Observer Data from the Size Distribution and Release Condition of Scamp Discards from Recreational Fishery Surveys in the Eastern Gulf of Mexico

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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, release condition, and disposition of scamp collected by trained observers since 2005 during at-sea surveys on for-hire vessels in the eastern Gulf of Mexico. Mis-identification concerns regarding meristic similarities between scamp and yellowmouth grouper has necessitated that data from both species be aggregated for this assessment. The term "scamp" used in this report refers to an aggregate of fish identified as both scamp (*Mycteroperca phenax*) and yellowmouth grouper (*Mycteroperca interstitialis*).

At-Sea Observer Survey Coverage

In 2005, at-sea observer surveys coverage started on headboats operating from the Gulf coast of Florida from the panhandle through the Florida Keys. The At-sea headboat survey was funded by the Gulf Fisheries Information Network (Gulf FIN) continuously through 2007 and was discontinued in 2008. In June 2009 the state of Florida secured alternative funds to continue at-sea observer coverage on both headboats and charter vessels in the northwestern panhandle and central peninsula, and that coverage has continued through 2017.

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 – 2009-2017
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. Data from 2014 was omitted from the analysis because it was collected with a special permit, and not representative of the fishery as a whole.

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 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:

<u>Discards</u>
1: thrown back alive, legal;
2: thrown back alive, not legal;
<u>Harvest</u>
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:

<u>For southeast and northeast Florida:</u>
1: 3 miles or less from shore; or
2: more than 3 miles from shore

<u>For Keys, western peninsula, and northwest Florida:</u>
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 2017 (Table 2). Headboat effort data were provided by K. Fitzpatrick 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 in the sample population 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 fork lengths assigned to two 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 scamp in each length bin and dividing this number by the total number of discarded fishes, by year.

Summaries of release condition by fleet were created by summing the number of discarded fishes in each of four release conditions: Good, Fair, Bad, or Dead. The intersection of these release conditions and the hooking location for discarded fish were also calculated.

Lastly, the discard ratio and immediate release mortality for each fleet were calculated, all years combined. For the headboat fleet, a weighted discard ratio or immediate release mortality were also calculated.

Results
At-Sea Observer Trips
The number of sampled trips by year and trip duration 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- or over-sampling of different trip durations in each northwest and southwest Florida (Table 4). A total of 1252 discarded fish and 379 harvested were measured during

headboat At-sea observer trips between 2005 and 2017 in the coastal regions of west Florida. For charter trips, in western Florida, observers sampled 308 discarded fish and 140 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. A summary of capture depths for discarded scamp, by fishing fleet (headboats and charterboats) is provided in Tables 7 and Table 8. Length frequency histograms for harvested and released (discarded) scamp by year are presented for western Florida headboats (Figure 1) and western Florida charterboats (Figure 2).

The majority of scamp released from both headboat and charterboat vessels were released with a "Good" release condition and "Lip" hooking location, approximately 92% of fish (Table 9). Additionally, very few instances of immediate mortality were observed in the headboat or charter fleet upon release of scamp, less than 1% in both fleet (Table 10).

Table 1. Sampling coverage for At-sea observer trips in West Florida (Escambia County through Monroe County N. of US 1) , by region and Year. The * indicates that 2009 represents only a half year of coverage.

Headboat Areas	2005	2006	2007	2008	2009*	2010	2011	2012	2013	2014	2015	2016	2017
Northwest	H	H	H		H,C	H,C	H,C	H,C	H,C		H,C	H,C	H,C
Southwest	H	H	H		H,C	H,C	H,C	H,C	H,C		H,C	H,C	H,C
Keys	H	H	H			H,C	H,C	H,C	H,C	C	C	H,C	H,C

Table 2. West Florida sampled headboat at-sea observer trips positive for scamp by year and trip duration for 2005-2017 (northwest and southwest Florida combined). Sampling in 2009 only represents half of the year – June to December.

Year	Half Day	Three-Quarter Day	Full Day	Multi Day	Total
2005	1	48	13	12	*74*
2006	1	35	10	19	*65*
2007	3	43	7	20	*73*
2009*	0	16	3	6	*25*
2010	2	19	10	12	*43*
2011	3	19	3	13	*38*
2012	2	12	2	11	*27*
2013	6	7	8	9	*30*
2015	9	27	11	3	*50*
2016	10	19	14	6	*49*
2017	7	13	13	6	*39*
Total	*44*	*258*	*94*	*117*	*513*

Table 3. West Florida sampled charterboat at-sea observer trips positive for scamp by year and trip duration for 2009 – 2017. Sampling in 2009 only represents half of the year – June to December.

Year	Half Day	Three-Quarter Day	Full Day	Multi Day	Total
2009*	1	9	12	0	*22*
2010	3	19	11	1	*34*
2011	3	11	6	0	*20*
2012	3	16	8	0	*27*
2013	5	6	4	0	*15*
2014	4	3	8	0	*15*
2015	8	11	24	0	*43*
2016	4	5	7	0	*16*
2017	5	9	15	1	*30*
Total	*36*	*89*	*95*	*2*	*222*

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

Headboat Region	Year	Trip Duration			
		Half Day	*Three-Quarter Day*	*Full Day*	*Multi-Day*
NWFL	2005	1.992	0.833	1.188	-
	2006	1.983	0.746	1.592	-
	2007	2.044	0.683	2.184	-
	2009	2.383	0.643	-	-
	2010	1.626	1.058	0.488	-
	2011	1.359	0.844	1.988	-
	2012	0.834	0.984	2.222	-
	2013	0.82	0.842	1.812	-
	2015	1.182	0.616	2.109	-
	2016	1.227	0.638	1.941	-
	2017	0.851	0.743	2.539	-
SWFL	2005	1.928	0.861	2.536	0.002
	2006	1.584	1.31	0.699	0.01
	2007	2.408	0.967	0.935	0.001
	2009	4.957	1.198	0.175	0.037
	2010	3.534	0.994	0.138	0.047
	2011	1.789	1.163	0.2	0.038
	2012	1.477	1.155	0.483	0.037
	2013	1.074	12.183	0.867	0.112
	2015	0.803	2.052	1.215	0.491
	2016	0.964	1.357	0.998	0.439
	2017	0.835	1.516	1.25	0.553

Table 5. Length summaries for discarded and harvested scamp observed on headboats trips in West Florida (Escambia County through Monroe County N. of US 1), by year and region (2009 represents a half year of data June through December).

Year	DISCARD				HARVEST			
	N	Min	Mean	Max	N	Min	Mean	Max
NORTHWEST FLORIDA								
2005	160	210	331.5	817	14	370	415.1	478
2006	60	195	325.9	395	22	362	410.2	477
2007	86	200	327.7	400	24	220	393.8	513
2009*	16	200	315.6	371	1	430	430.0	430
2010	33	268	342.0	510	2	371	458.0	545
2011	46	300	363.7	451	6	395	422.5	490
2012	13	240	328.4	390	10	345	421.7	480
2013	34	195	315.0	384	4	390	400.0	410
2015	19	271	332.6	368	14	368	410.9	522
2016	33	221	313.6	366	3	400	416.0	427
2017	19	295	337.5	373	7	383	401.4	440
SOUTHWEST FLORIDA								
2005	86	249	330.4	455	19	346	461.9	694
2006	52	235	342.1	421	28	391	478.6	752
2007	169	205	345.2	786	76	224	433.6	780
2009*	40	212	327.5	392	12	382	431.0	552
2010	141	232	350.9	554	45	322	406.7	690
2011	49	235	340.4	457	10	390	497.5	625
2012	51	231	347.4	466	36	386	450.3	590
2013	45	320	368.8	556	8	392	463.3	560
2015	15	256	328.1	380	4	410	444.0	489
2016	59	200	312.6	421	11	310	427.2	699
2017	26	216	312.8	369	23	375	510.7	770

Table 6. Length summaries for discarded and harvested scamp observed on charterboat trips West Florida (Escambia County through Monroe County N. of US 1), by year and region (2009 represents a half year of data June through December).

Year	DISCARD				HARVEST			
	N	Min	Mean	Max	N	Min	Mean	Max
NORTHWEST FLORIDA								
2009*	10	309	374.2	521	15	445	481.2	548
2010	46	265	348.1	471	14	380	435.0	628
2011	7	341	361.1	372	6	381	426.7	550
2012	6	270	339.8	386	14	400	504.3	695
2013	14	250	332.9	368	5	359	382.2	451
2015	20	205	340.3	435	37	381	480.7	631
2016	9	270	310.8	345	1	365	365.0	365
2017	10	297	351.1	385	14	386	551.9	743
SOUTHWEST FLORIDA								
2009*	42	223	331.1	380	4	382	420.5	479
2010	28	297	339.6	475	11	382	577.1	675
2011	14	275	319.1	365	1	375	375.0	375
2012	22	280	324.5	362	1	375	375.0	375
2013	8	290	335.0	368	3	450	509.3	608
2015	29	255	329.2	455	8	390	510.6	645
2016	13	265	314.2	390	1	380	380.0	380
2017	30	135	297.7	352	5	380	484.6	790

Table 7. Summary of capture depths (in meters) for scamp discarded and harvested on headboats in West Florida, by year and region (2009 represents a half year of data June through December). The sample size, N, corresponds with the number of fishes caught at a given depth.

Year	DISCARD				HARVEST			
	N	Min	Mean	Max	N	Min	Mean	Max
NORTHWEST FLORIDA								
2009*	16	24	42	61	1	51	51	51
2010	33	19	40	60	2	56	63	69
2011	46	28	46	68	6	29	40	61
2012	13	21	31	59	10	27	50	58
2013	34	21	27	37	4	26	28	28
2015	19	23	32	46	14	24	35	55
2016	33	20	31	61	3	26	30	37
2017	19	28	39	55	7	21	36	72
SOUTHWEST FLORIDA								
2009*	40	15	25	57	12	27	44	84
2010	141	12	40	55	45	30	40	51
2011	49	13	40	65	10	30	51	80
2012	51	10	39	65	36	34	53	70
2013	45	16	40	53	8	26	44	62
2015	15	13	17	34	4	20	46	55
2016	59	12	32	60	11	12	36	67
2017	26	13	28	42	23	25	54	65

Table 8. Summary of capture depths (in meters) for scamp discarded and harvested on charterboats in West Florida, by year and region (2009 represents a half year of data June through December). The sample size, N, corresponds with the number of fishes caught at a given depth.

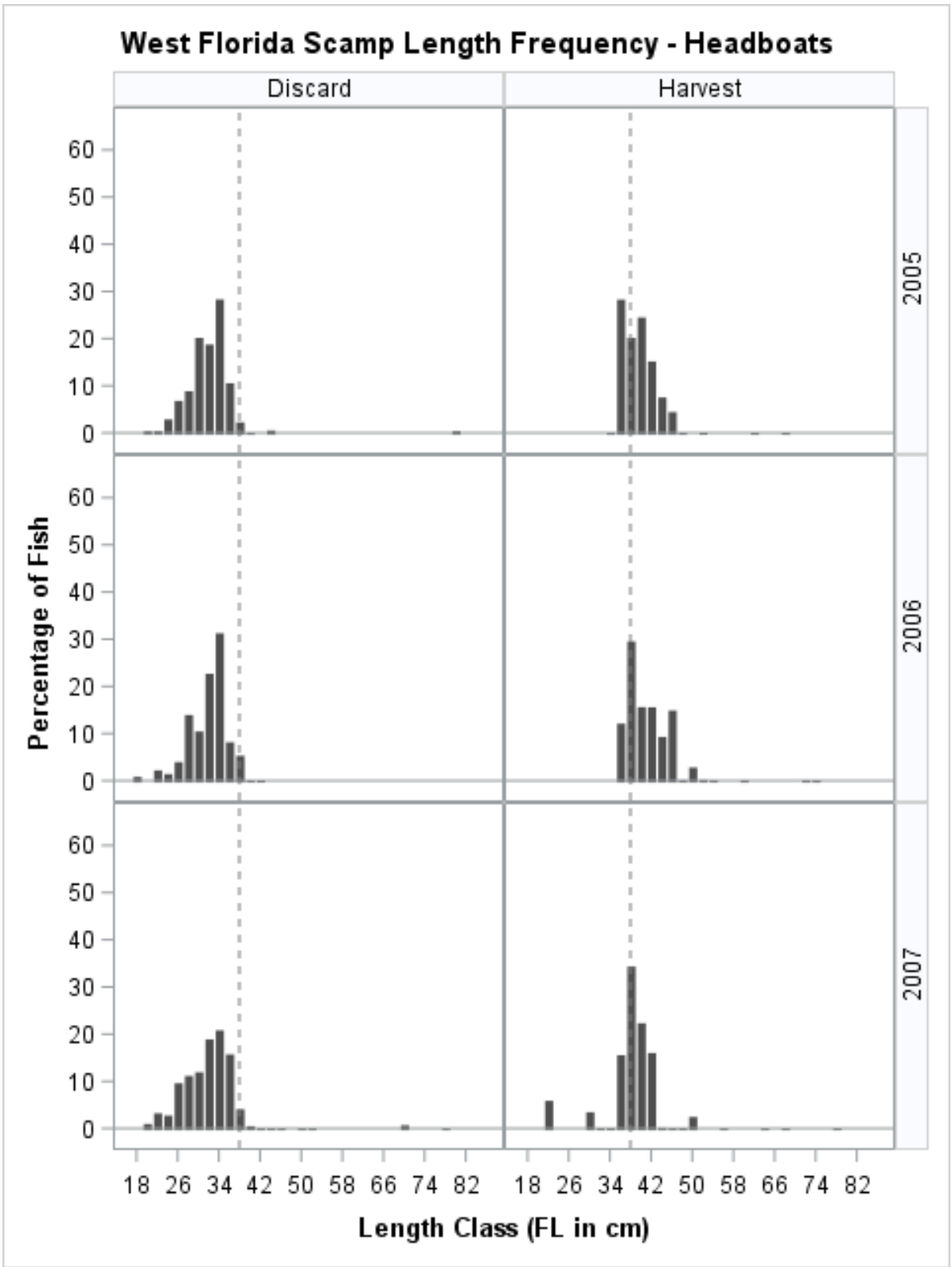
Year	DISCARD				HARVEST			
	N	Min	Mean	Max	N	Min	Mean	Max
NORTHWEST FLORIDA								
2009*	10	24	44	71	15	39	61	71
2010	46	21	34	72	13	18	48	97
2011	7	21	32	50	6	31	39	52
2012	6	26	40	54	14	31	65	122
2013	14	22	28	36	5	25	34	66
2015	20	14	32	54	37	19	67	102
2016	9	20	27	34	1	21	21	21
2017	10	9	29	45	14	23	72	109
SOUTHWEST FLORIDA								
2009*	42	14	23	50	4	24	39	50
2010	28	15	24	40	11	29	60	67
2011	14	17	24	30	-	-	-	-
2012	22	12	21	36	1	22	22	22
2013	8	13	20	33	3	65	65	65
2015	29	11	15	26	8	20	42	48
2016	13	14	23	30	1	18	18	18
2017	30	14	22	29	5	28	44	50

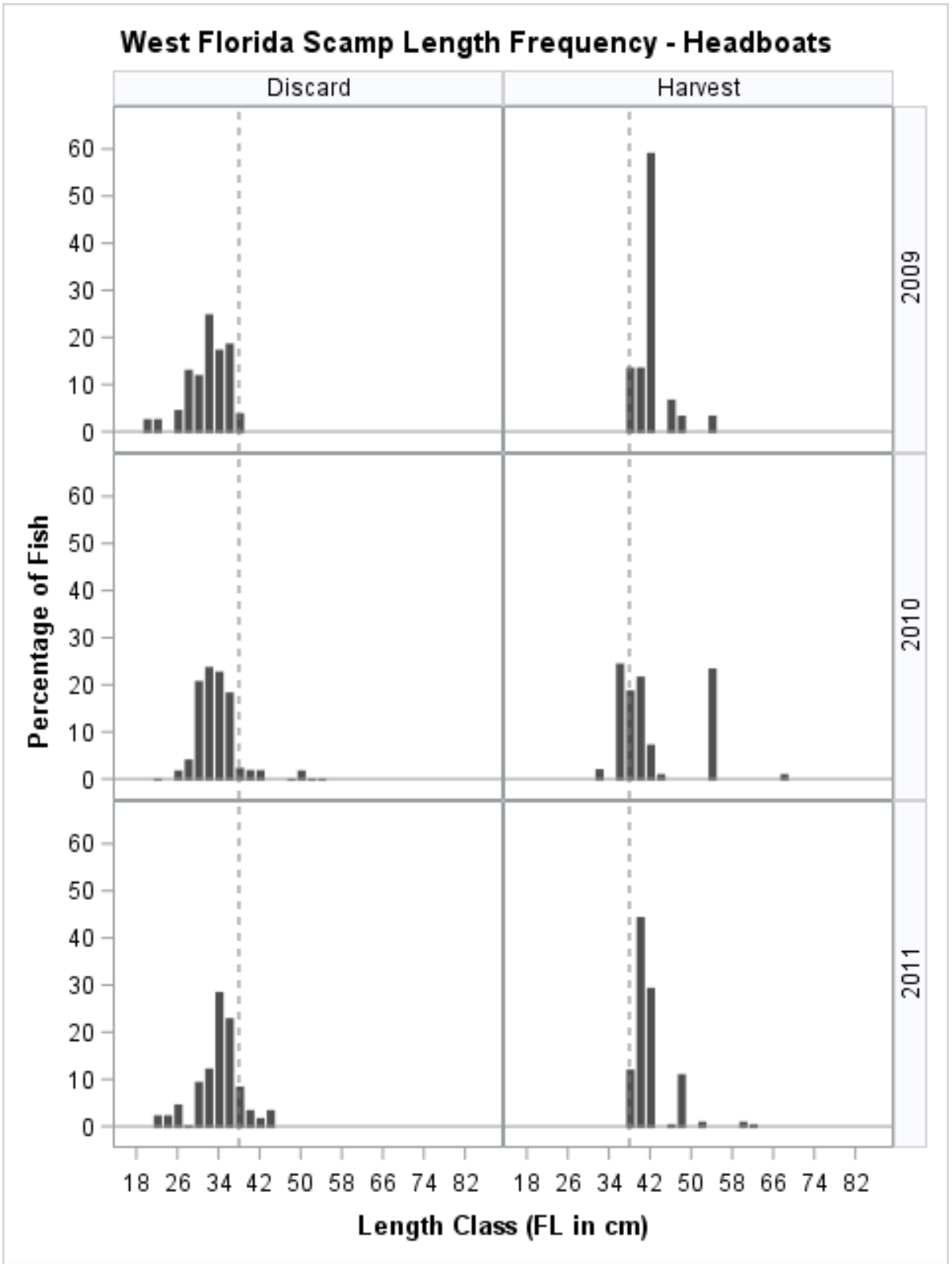
Table 9. Intersection of release condition and hook position for scamp released from the headboat and charter recreational fleets in West Florida (Escambia County through Monroe County N. of US 1).

Fleet	Hook Position	Good		Fair		Bad		Dead		Total
		No.	%	No.	%	No.	%	No.	%	
Headboat	Lip	574	92.0	23	3.7	21	3.4	6	1.0	624
	Foul	6	100.0	0	0.0	0	0.0	0	0.0	6
	Gill	1	100.0	0	0.0	0	0.0	0	0.0	1
	Throat	4	80.0	1	20.0	0	0.0	0	0.0	5
	Intestine	1	100.0	0	0.0	0	0.0	0	0.0	1
	Total	586	92.0	24	3.8	21	3.3	6	0.9	637
Charter	Lip	313	96.3	6	1.8	5	1.5	1	0.3	325
	Foul	2	100.0	0	0.0	0	0.0	0	0.0	2
	Gill	0	0.0	0	0.0	2	0.0	0	0.0	2
	Throat	2	100.0	0	0.0	0	0.0	0	0.0	2
	Intestine	2	100.0	0	0.0	0	0.0	0	0.0	2
	Total	319	95.8	6	1.8	7	2.1	1	0.3	333

Table 10. Immediate mortality and discard ratios by region and fishing fleet (Headboat – raw / weighted, Charter – raw), all years combined, for West Florida (Escambia County through Monroe County N. of US 1).

Fleet	**Headboat Region**	**Immediate Mortality**	**Discard Ratio**	**Weighted Immediate Mortality**	**Weighted Discard Ratio**
Headboat	NWFL	0.00000	2.65196	0.00000	2.49053
	SWFL	0.00163	1.61478	0.00003	7.01645
Charter	NWFL	0.00000	1.13208	0.00000	1.13208
	SWFL	0.00000	5.30303	0.00000	5.30303


West Florida Scamp Length Frequency - Headboats
Discard
Harvest
2005
2006
2007
Percentage of Fish
0
10
20
30
40
50
60
18 26 34 42 50 58 66 74 82
Length Class (FL in cm)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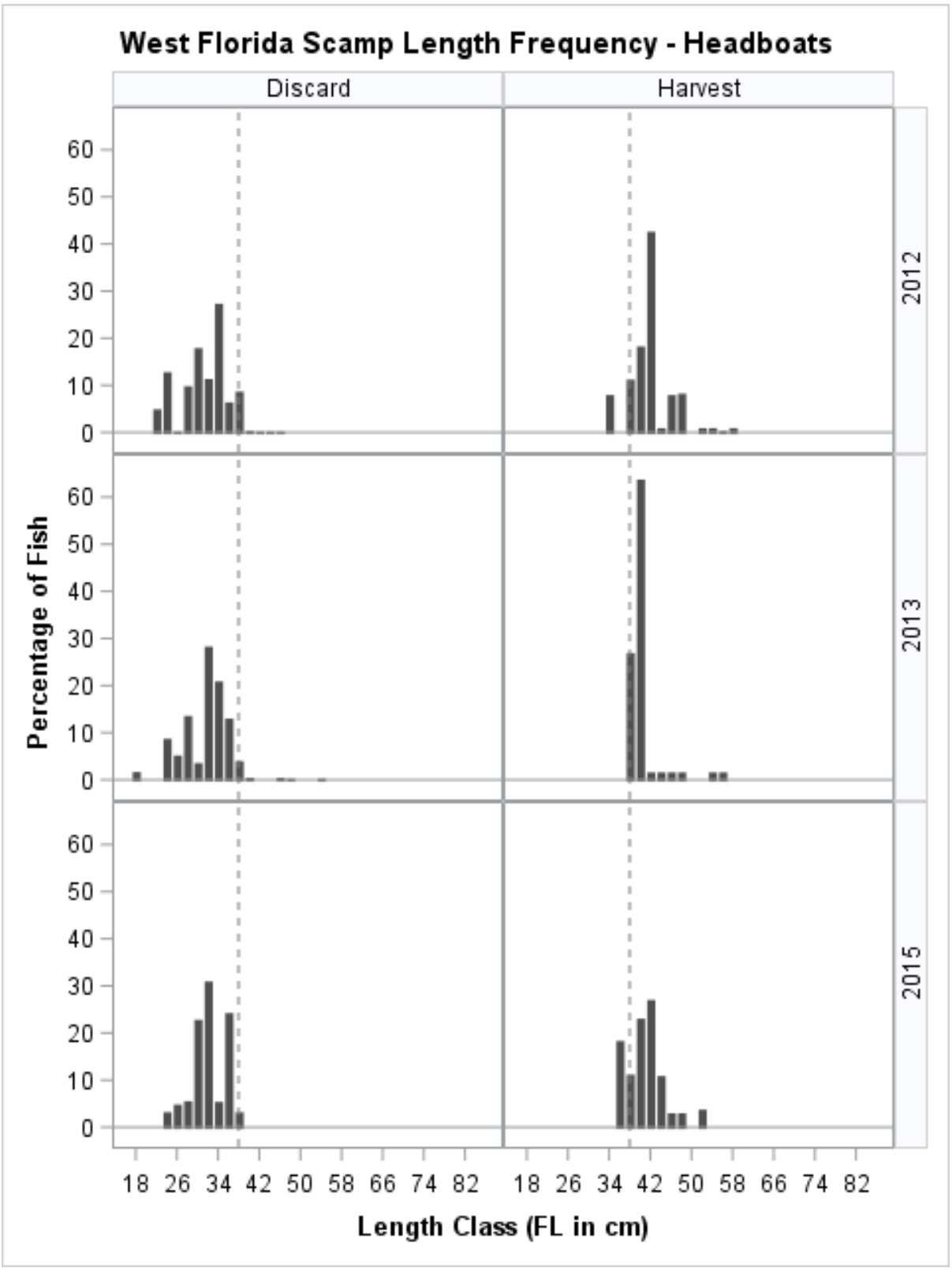
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Discard
Harvest
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2013
2015
Percentage of Fish
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50
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Length Class (FL in cm)

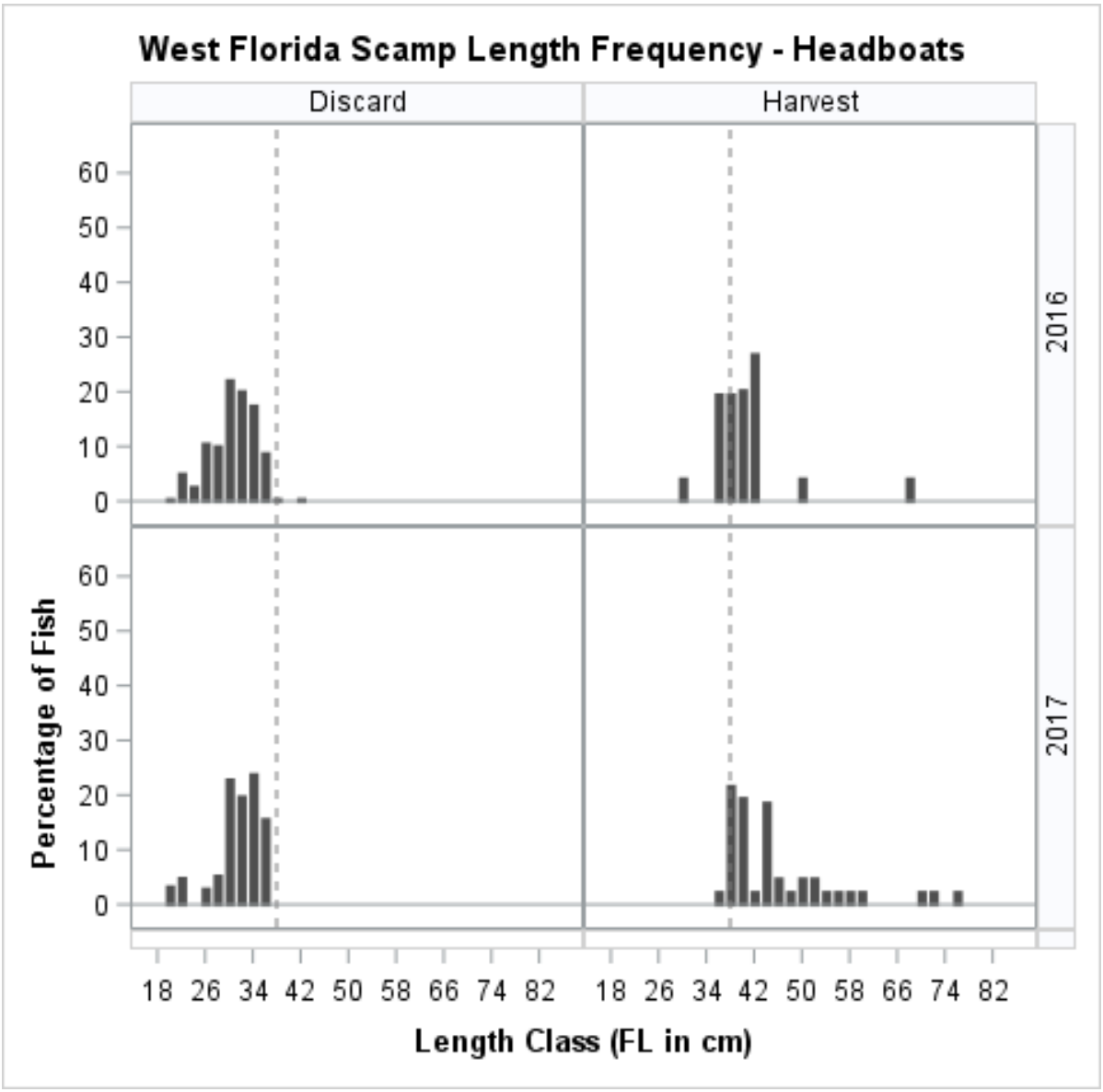
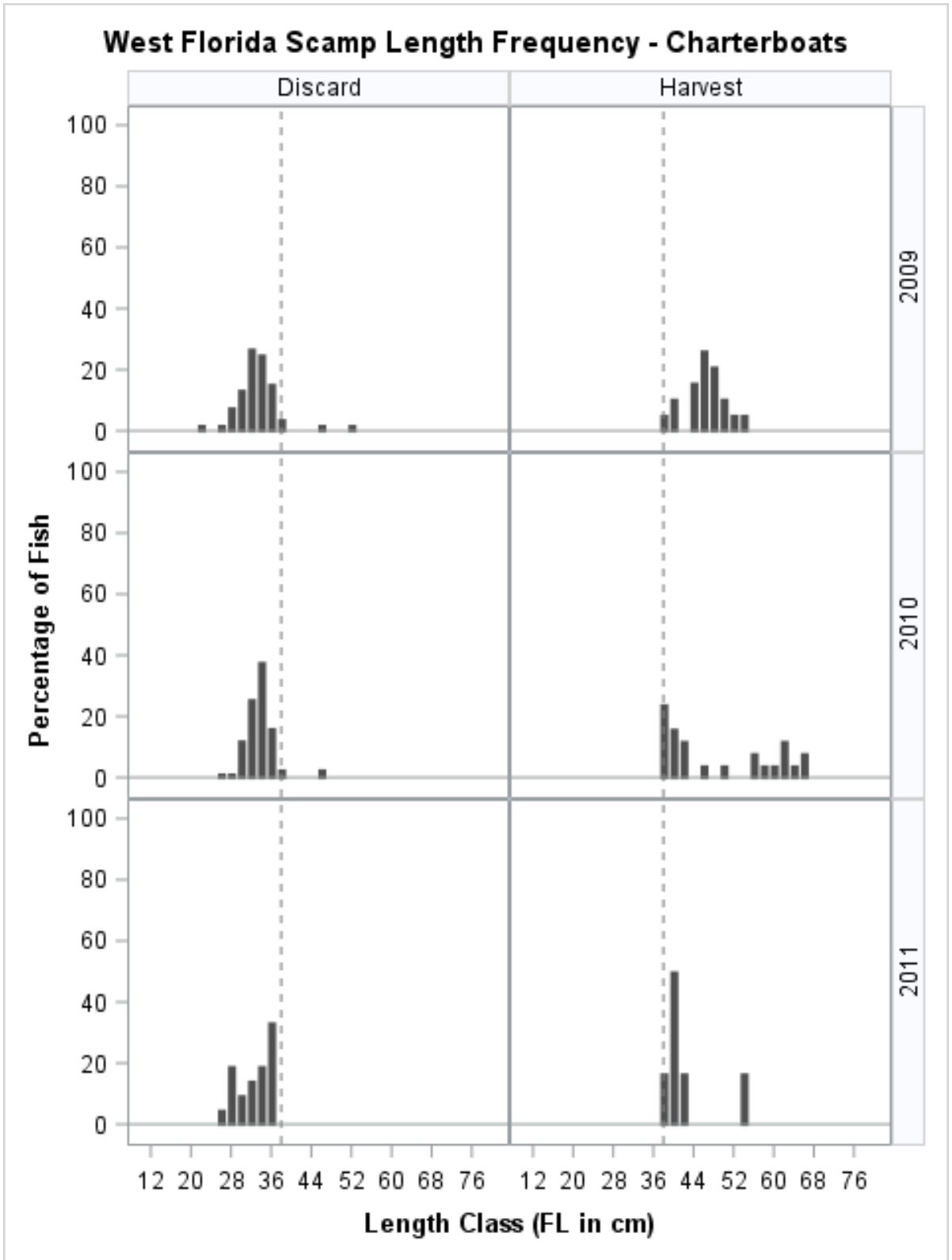


Figure 1. Weighted length frequencies of harvested and released scamp measured by at-sea observers on headboats along West Florida from 2005-2017. Harvest includes fish that were released dead. Reference line represents the fork length associated with a 16-inch fish (TL).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2011
Percentage of Fish
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80
100
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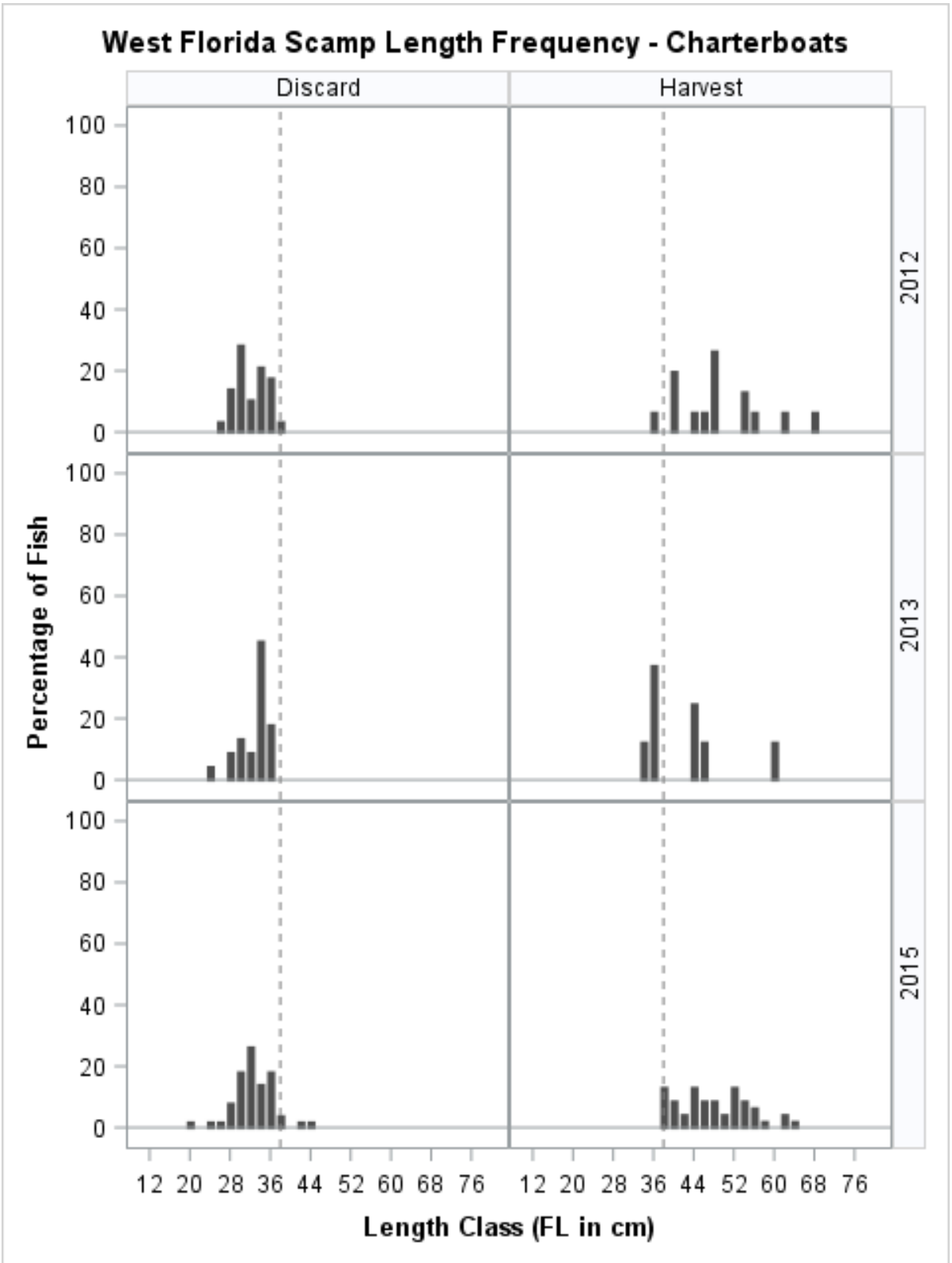
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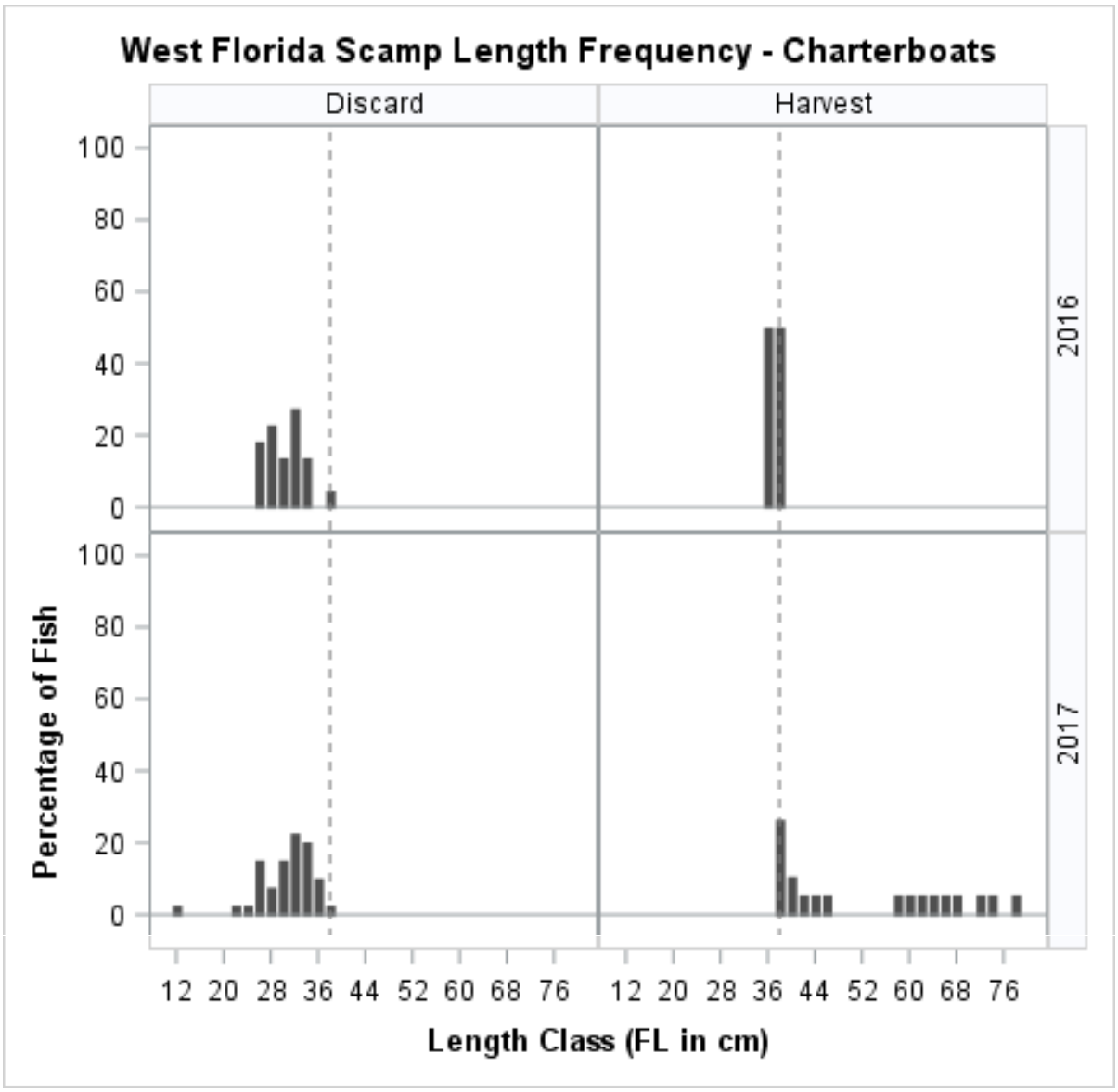

Figure 2. Length frequency of harvested and released scamp measured by at-sea observers on charterboats in West Florida 2009-2017. Harvest includes fish that were released dead. Reference line represents the fork length associated with a 16-inch fish.