A Summary of Red Grouper Size Distribution Data from Recreational Fishery Surveys in the Gulf of Mexico

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SEDAR61-WP-13

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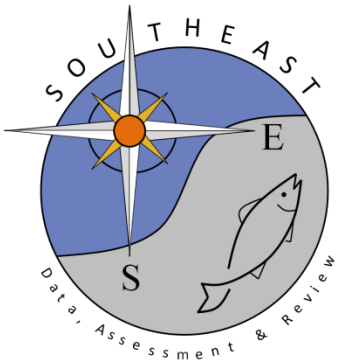

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A Summary of Red Grouper Size Distribution Data from Recreational Fishery Surveys in the Gulf of Mexico

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Discarded fish are unavailable at the time of landing and 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 distribution and condition of discarded fish, and such surveys have been conducted on for-hire headboat and charter vessels in the Gulf of Mexico since 2004. However, funding for observer surveys of the for-hire fleet has not been consistnent and most available data are from the eastern Gulf of Mexico. This report provides a summary of available information on the size distributioni of red grouper collectd by trained observers since 2005 during at-sea surveys on for-hire vessels in the Gulf of Mexico.

At-Sea Observer Survey Coverage

In 2004, at-sea observer surveys were conducted on headboats in Alabama, and coverage was extended in 2005 to include 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 both states 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

Alabama and Florida, 2005 to 2007

Headboat vessels from Alabama and three subregions in Florida were randomly selected each week (Figure 1). 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 during a selected week. Dependent upon the number of customers on board, one or two biologists accompanied passengers during a 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, size (fork length in mm), and the condition of fish that were released. 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.

Trip level information for each trip 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. Area fished was coded differently for Alabama and Florida regions.

Area fished for Alabama were coded as:
1: 3 miles or less from shore; or
2: more than 3 miles from shore

Area fished for Keys, western peninsula, and northwest Florida were coded as:
3: 10 miles or less from shore; or
4: more than 10 miles from shore.

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 collection in 2009 does not represent a full year of data collection, but are included below because they are representative of the fishery in the months data was collected. The records from 2014 were omitted from the analysis because they were 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 trips, 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.

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.

At-Sea Observer Survey Data Analysis

Characterization of Trips:

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)

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. Weighting factors were generated for different trip-types using fishing effort data reported on headboat logbook trip reports for the years 2005 through 2016. 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 a given region, divided by the total number of headboat trips reported in the same region. 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. 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.

Characterization of Discards:

Fish mid-line lengths assigned to one cm length bin categories (40 cm bin = fish 39.6 cm to 40.5 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 fish in length bin x for a given disposition in a given 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.

Fish discarded by release condition were summed by trip type and multiplied by the weighting factor for each trip-type. The weighted sum of discarded fish in each release condition category was divided by the weighted sum for all fish discarded in all release condition categories to get proportions of discards in each release condition category.

Results

The number of sampled trips by month and trip duration for headboat and charterboat trips are provided in Tables 1 & 2. Summary statistics for length frequencies of discarded fish are provided in Table 3. The depth range and distance from shore for trips positive for red grouper are provided in Table 4. The weighted length frequency histograms for harvested and released (discarded) red grouper by year are presented for Florida headboats (Figure 2) and Florida charterboats (Figure 3).

Table 1. Florida sampled headboat at-sea observer trips by month, year, and trip duration for 2005-2017.

YEAR	FLORIDA-HEADBOAT	MONTH												YEARLY TOTAL
		JAN	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	
2005	HALF DAY	1	2	2	2	3	1	2	5	0	1	1	2	22
	THREE-QUARTER DAY	0	1	1	4	3	2	1	1	2	2	1	2	20
	FULL DAY	0	6	8	10	11	17	15	7	6	10	7	4	101
	MULTIDAY	0	1	0	2	3	2	2	2	2	2	1	2	19
	MONTHLY TOTAL	1	10	11	18	20	22	20	15	10	15	10	10	162
2006	HALF DAY	2	3	1	6	4	4	2	6	2	1	2	1	34
	THREE-QUARTER DAY	0	0	3	2	0	5	1	1	1	1	1	0	15
	FULL DAY	7	7	11	6	15	10	13	9	11	7	6	9	111
	MULTIDAY	1	2	2	2	1	2	3	3	2	2	1	2	23
	MONTHLY TOTAL	10	12	17	16	20	21	19	19	16	11	10	12	183
2007	HALF DAY	2	3	3	3	3	5	4	3	0	2	2	0	30
	THREE-QUARTER DAY	1	1	2	1	1	3	1	1	0	1	0	1	13
	FULL DAY	6	5	8	7	8	8	10	9	11	8	7	10	97
	MULTIDAY	1	1	2	1	1	2	1	2	1	4	5	2	23
	MONTHLY TOTAL	10	10	15	12	13	18	16	15	12	15	14	13	163
2009	HALF DAY	0	0	0	0	0	0	3	1	1	0	1	2	8
	THREE-QUARTER DAY	0	0	0	0	0	7	4	0	1	0	1	0	13
	FULL DAY	0	0	0	0	0	8	6	7	6	6	6	3	42
	MULTIDAY	0	0	0	0	0	0	1	3	1	2	1	1	9
	MONTHLY TOTAL	0	0	0	0	0	15	14	11	9	8	9	6	72
2010	HALF DAY	0	1	0	0	3	1	5	2	1	0	0	0	13
	THREE-QUARTER DAY	1	2	2	1	0	4	5	1	1	1	3	0	21
	FULL DAY	4	3	3	6	3	5	3	5	7	6	1	2	48
	MULTIDAY	1	1	1	2	0	3	1	0	1	0	0	2	12
	MONTHLY TOTAL	6	7	6	9	6	13	14	8	10	7	4	4	94
2011	HALF DAY	0	0	2	1	5	4	2	2	1	4	1	8	30
	THREE-QUARTER DAY	0	0	0	1	0	5	1	0	1	0	0	0	8
	FULL DAY	4	7	6	6	3	5	7	6	5	5	5	7	66
	MULTIDAY	0	1	0	3	0	4	1	1	1	2	1	1	15
	MONTHLY TOTAL	4	8	8	11	8	18	11	9	8	11	7	16	119

2012	HALF DAY	1	4	2	2	4	5	5	5	2	2	0	3	35
	THREE-QUARTER DAY	1	1	0	0	0	3	0	0	0	0	0	0	5
	FULL DAY	8	3	3	7	4	3	5	4	4	5	6	5	57
	MULTIDAY	0	1	1	1	0	2	3	1	1	0	1	1	12
	MONTHLY TOTAL	10	9	6	10	8	13	13	10	7	7	7	9	109
2013	HALF DAY	4	2	5	2	2	4	5	4	3	2	0	5	38
	THREE-QUARTER DAY	3	1	0	3	2	5	2	4	2	3	4	2	31
	FULL DAY	1	4	4	1	2	4	1	1	1	4	0	0	23
	MULTIDAY	1	1	1	1	0	4	1	1	1	0	0	0	11
	MONTHLY TOTAL	9	8	10	7	6	17	9	10	7	9	4	7	103
2015	HALF DAY	1	4	7	5	8	3	6	11	7	8	3	10	73
	THREE-QUARTER DAY	5	1	2	5	4	3	2	4	2	2	2	5	37
	FULL DAY	4	5	6	6	7	4	8	4	6	6	5	8	69
	MULTIDAY	0	0	0	0	0	2	1	0	0	0	1	0	4
	MONTHLY TOTAL	10	10	15	16	19	12	17	19	15	16	11	23	183
2016	HALF DAY	6	8	7	6	7	6	8	6	8	5	11	11	89
	THREE-QUARTER DAY	7	8	3	4	2	4	5	3	3	4	4	6	53
	FULL DAY	9	5	11	8	4	4	7	8	8	11	3	3	81
	MULTIDAY	0	1	1	0	1	2	0	1	0	0	0	0	6
	MONTHLY TOTAL	22	22	22	18	14	16	20	18	19	20	18	20	229
2017	HALF DAY	10	10	10	5	11	7	6	13	6	12	10	4	104
	THREE-QUARTER DAY	5	3	2	1	7	2	3	2	2	4	4	3	38
	FULL DAY	6	6	6	5	5	7	4	7	7	3	4	5	65
	MULTIDAY	0	1	1	0	0	1	3	1	0	0	1	0	8
	MONTHLY TOTAL	21	20	19	11	23	17	16	23	15	19	19	12	215

Table 2. Florida sampled charterboat at-sea observer trips by month, year, and trip duration between 2009-2017.

YEAR	FLORIDA-CHARTERBOAT	MONTH												YEARLY TOTAL
		JAN	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	
2009	HALF DAY	.	.	.	.	.	.	.	.	.	.	1	1	2
	THREE-QUARTER DAY	.	.	.	.	.	1	8	1	5	3	4	1	23
	FULL DAY	.	.	.	.	.	5	3	5	8	4	3	1	29
	MULTIDAY	.	.	.	.	.	.	.	.	.	.	.	.	.
	MONTHLY TOTAL	.	.	.	.	.	6	11	6	13	7	8	3	54
2010	HALF DAY	1	.	1	1	.	4	2	2	1	1	4	1	18
	THREE-QUARTER DAY	.	1	1	.	5	5	1	.	.	8	5	.	26
	FULL DAY	3	3	4	3	5	6	4	4	5	10	7	2	56
	MULTIDAY	.	1	.	.	.	1	.	.	.	.	.	.	2
	MONTHLY TOTAL	4	5	6	4	10	16	7	6	6	19	16	3	102
2011	HALF DAY	.	3	6	1	4	4	1	.	4	4	2	3	32
	THREE-QUARTER DAY	2	.	.	2	.	5	2	1	1	4	1	1	19
	FULL DAY	3	5	4	6	8	8	7	10	8	5	6	8	78
	MULTIDAY	.	.	.	.	.	.	.	.	.	.	.	.	.
	MONTHLY TOTAL	5	8	10	9	12	17	10	11	13	13	9	12	129
2012	HALF DAY	3	.	3	.	.	4	3	1	1	7	1	3	26
	THREE-QUARTER DAY	.	1	2	3	3	1	4	1	4	2	3	1	25
	FULL DAY	3	8	4	5	7	5	8	10	4	7	10	4	75
	MULTIDAY	.	.	.	.	.	.	.	.	.	.	.	.	.
	MONTHLY TOTAL	6	9	9	8	10	10	15	12	9	16	14	8	126
2013	HALF DAY	2	1	8	5	3	2	7	6	5	1	3	3	46
	THREE-QUARTER DAY	4	1	.	4	3	4	2	.	2	6	2	.	28
	FULL DAY	2	5	7	4	4	12	9	4	2	2	2	2	55
	MULTIDAY	.	.	.	.	.	.	.	.	.	.	.	.	.
	MONTHLY TOTAL	8	7	15	13	10	18	18	10	9	9	7	5	129
2015	HALF DAY	4	2	6	2	9	7	6	8	9	7	6	10	76
	THREE-QUARTER DAY	1	.	2	3	3	18	9	6	7	6	.	6	61
	FULL DAY	3	.	7	5	5	6	5	9	7	6	9	4	66
	MULTIDAY	.	.	.	.	.	.	.	.	.	.	.	.	.
	MONTHLY TOTAL	8	2	15	10	17	31	20	23	23	19	15	20	203

2016	HALF DAY	5	8	17	11	8	6	6	5	12	11	13	9	111
	THREE-QUARTER DAY	1	4	.	.	4	4	7	4	4	5	12	9	54
	FULL DAY	6	2	7	4	7	10	15	10	7	5	3	5	81
	MULTIDAY	.	.	.	.	.	.	.	1	.	.	.	.	1
	MONTHLY TOTAL	12	14	24	15	19	20	28	20	23	21	28	23	247
2017	HALF DAY	5	7	13	14	6	5	8	4	5	4	7	2	80
	THREE-QUARTER DAY	1	3	6	1	6	14	10	4	4	7	4	6	66
	FULL DAY	3	5	8	2	8	6	6	7	5	3	3	4	60
	MULTIDAY	.	1	.	.	.	1	.	.	.	.	.	.	2
	MONTHLY TOTAL	9	16	27	17	20	26	24	15	14	14	14	12	208

Table 3. Length summaries for discarded red grouper observed on headboats and charterboats in Florida (2008 and 2014 excluded).

Year	HEADBOAT				CHARTERBOAT			
	N	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*
2005	1319	159	352	656	-	-	-	-
2006	1059	135	350	530	-	-	-	-
2007	1633	85	332	774	-	-	-	-
2009	1966	129	344	586	1027	204	355	582
2010	2127	160	359	658	2320	212	357	548
2011	1671	161	388	744	1842	256	391	718
2012	1054	183	402	748	1330	208	409	765
2013	1072	165	397	801	1179	100	413	640
2015	631	167	347	570	1259	155	392	690
2016	1556	148	312	540	1260	200	356	582
2017	1641	152	310	500	1652	180	337	750

Table 4. Characterization of the station depth fished when red grouper were captured during At-Sea observer trips from 2009-2017 (2014 excluded).

Year	HEADBOAT				CHARTERBOAT			
	N	*Min*	*Mean*	*Max*	*N*	*Min*	*Mean*	*Max*
2009	1623	3	22	84	1028	11	23	50
2010	1639	10	22	58	2312	10	22	67
2011	1190	9	25	80	1940	9	20	60
2012	804	8	27	70	1466	7	21	60
2013	685	8	22	55	1274	7	18	65
2015	529	0	16	61	1533	8	22	50
2016	857	5	19	75	1476	9	19	59
2017	647	6	19	72	1727	7	20	56

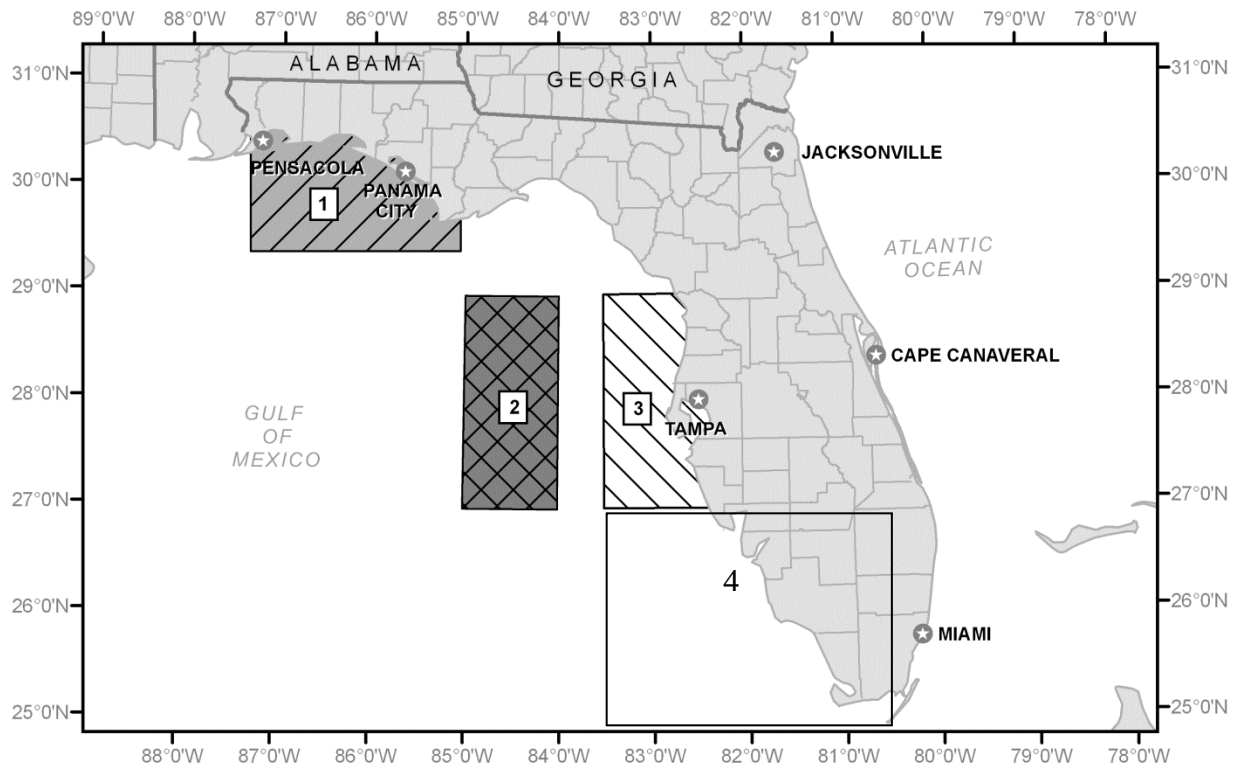
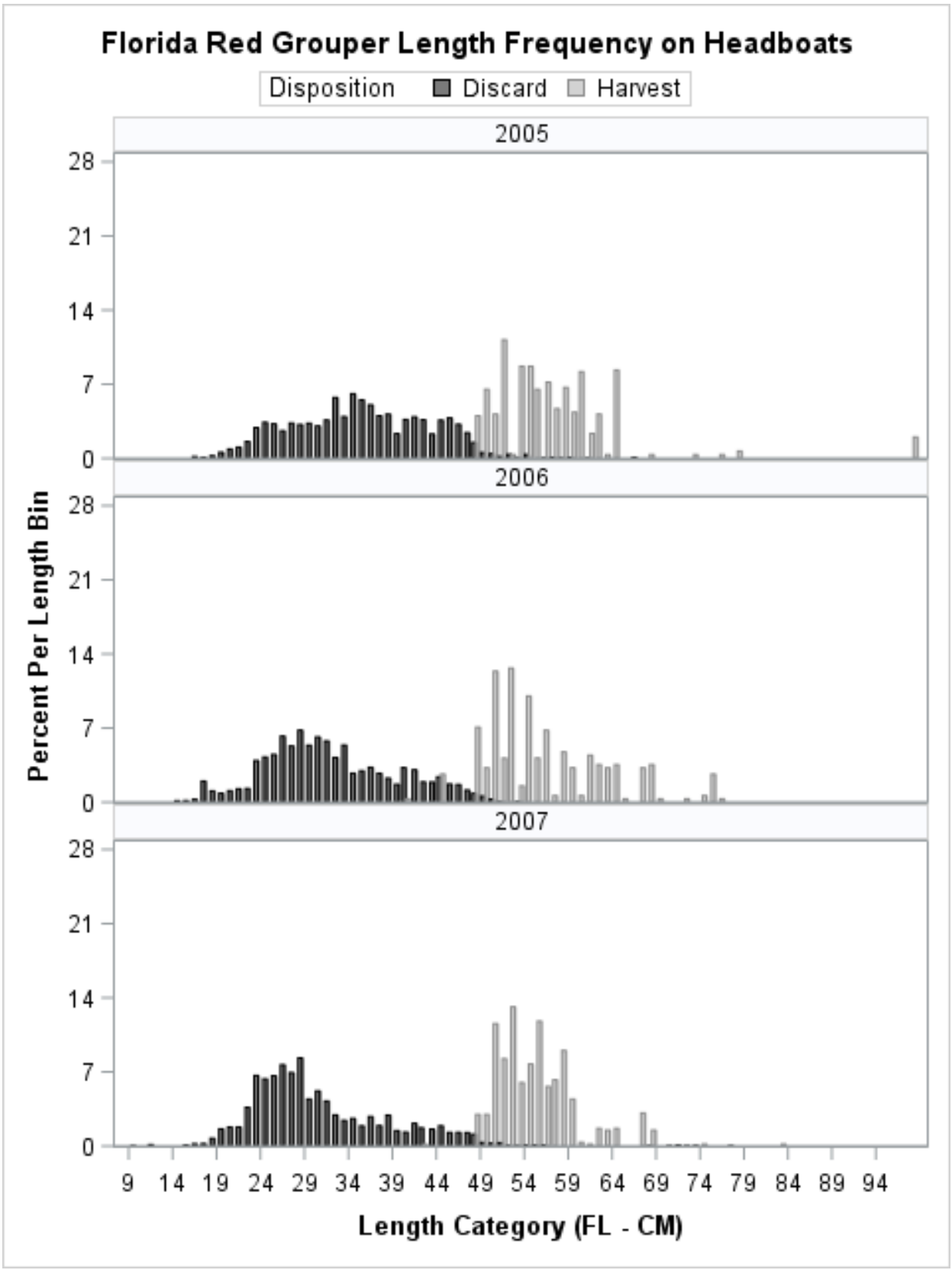
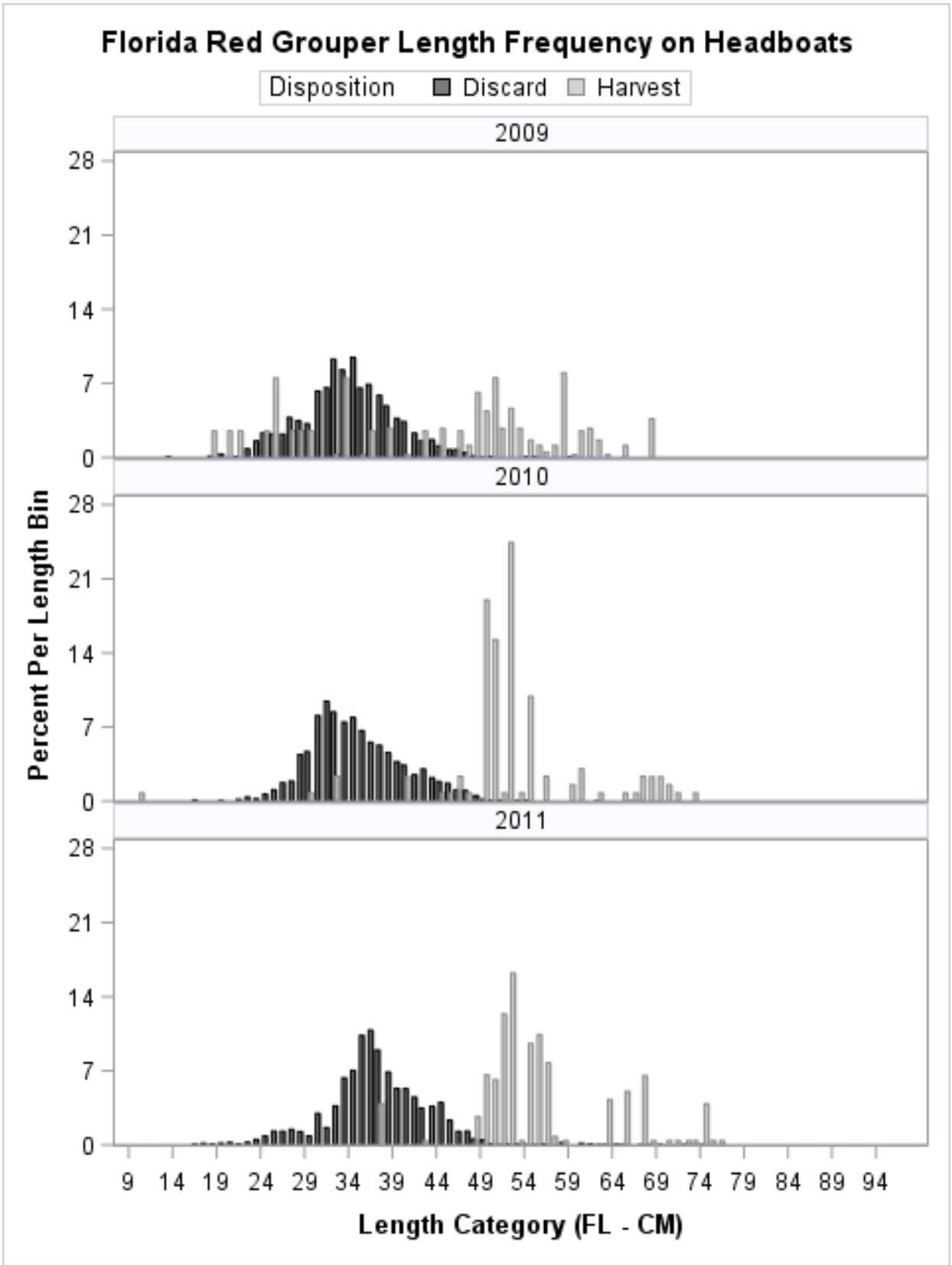
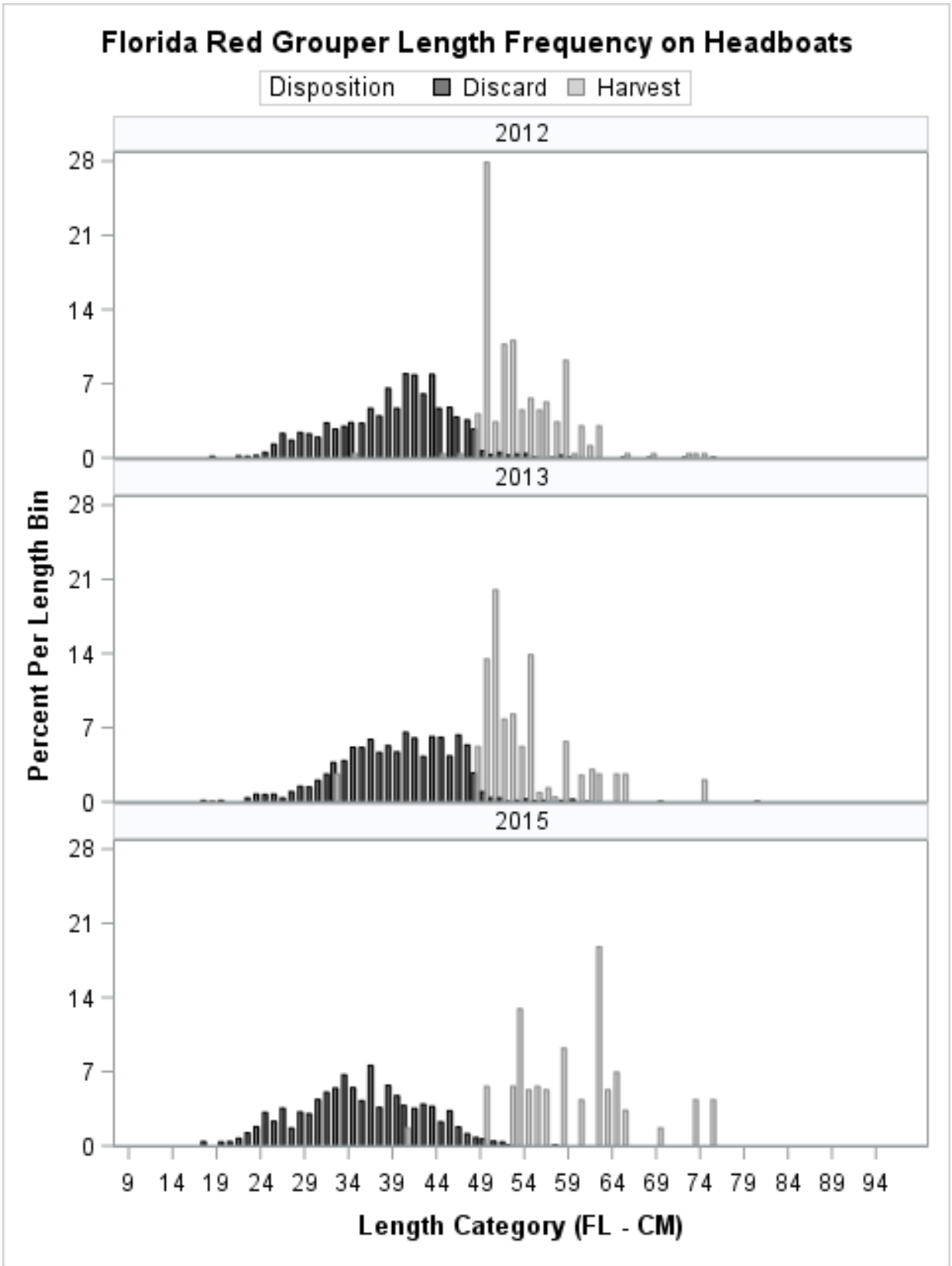


Figure 1. Areas in Florida with at-sea observer coverage. Area 1 is the northwestern panhandle region, area 2 is where multi-day trips from the western central region took place, and area 3 is where single-day trips from the western central region took place. From 2005-2007, headboats only were sampled from areas 1, 2, 3 and 4. From June 2009 through 2012, headboats and charter boats were surveyed from areas 1, 2 and 3. From 2013-2014 consistent sampling in area 4 was added again.


Florida Red Grouper Length Frequency on Headboats
Disposition
Discard
Harvest
2005
2006
2007
Percent Per Length Bin
0
7
14
21
28
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79
84
89
94
Length Category (FL - CM)


Florida Red Grouper Length Frequency on Headboats
Disposition
Discard
Harvest
2009
2010
2011
28
21
14
7
0
Percent Per Length Bin
9 14 19 24 29 34 39 44 49 54 59 64 69 74 79 84 89 94
Length Category (FL - CM)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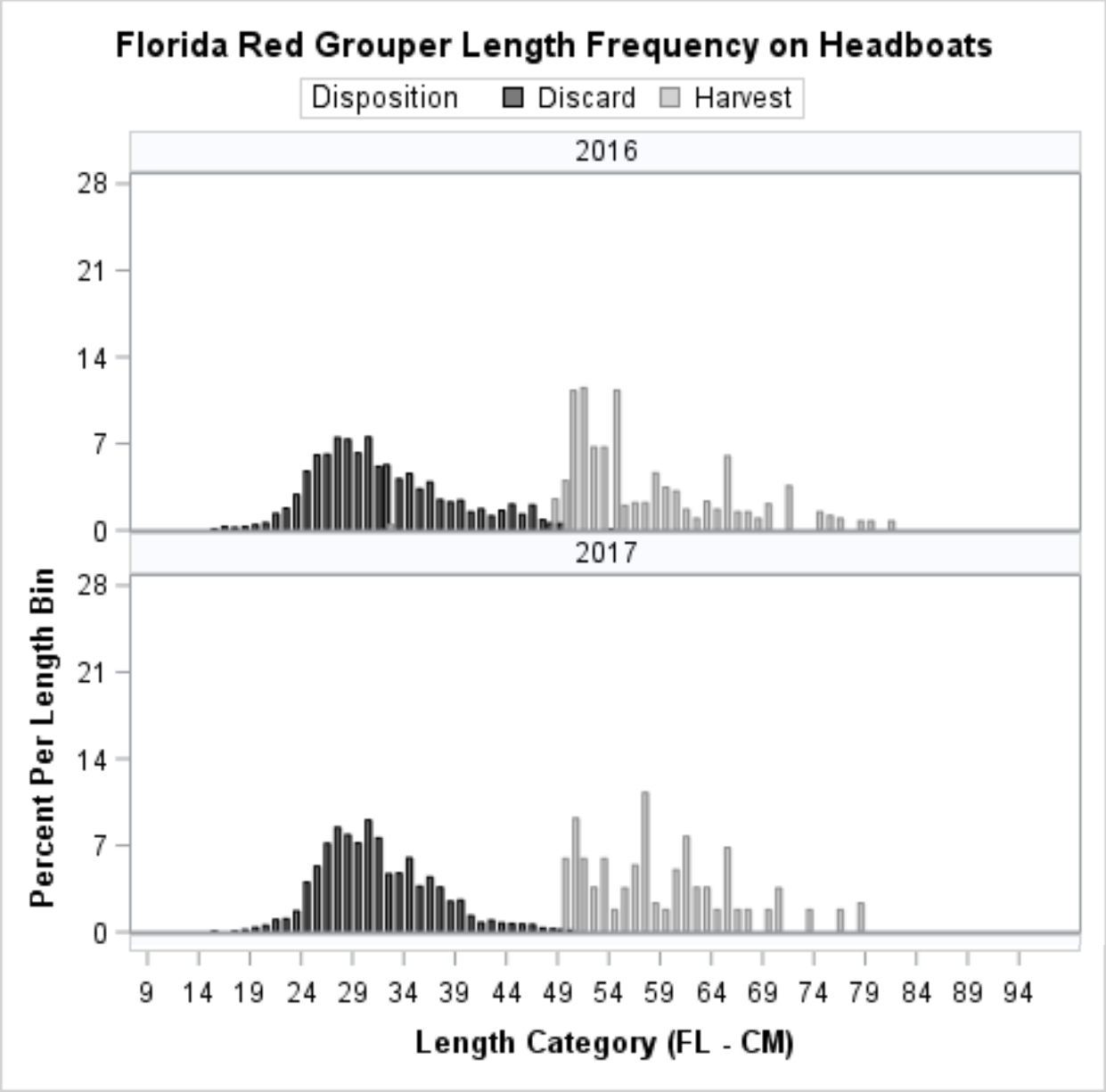
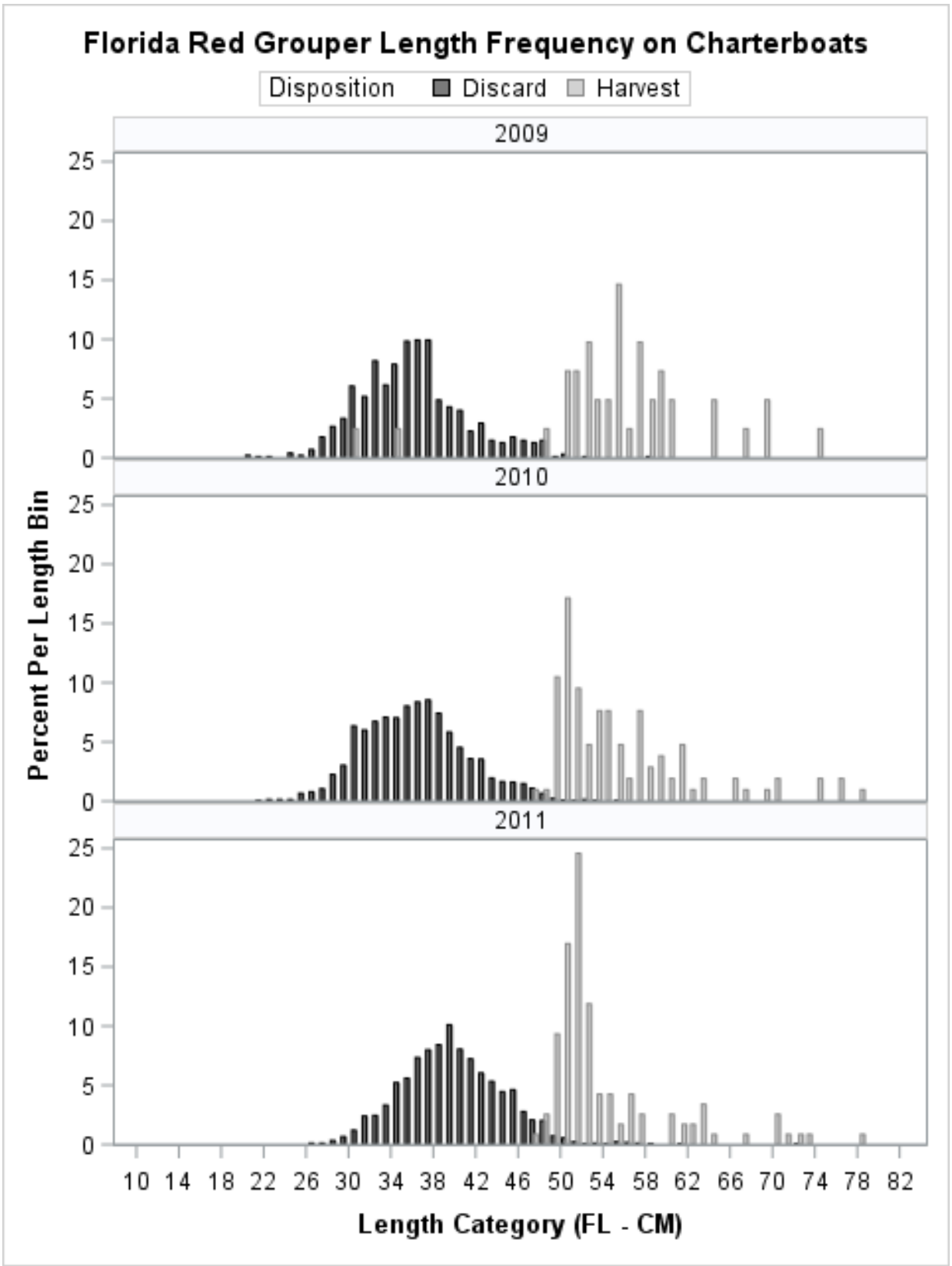


Figure 2. Length frequencies of harvested and released red grouper measured by At-Sea observers on headboats in Florida 2005-2017, weighted by trip type (excluding 2014). Harvest includes fish that were released dead.


Florida Red Grouper Length Frequency on Charterboats
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Harvest
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2010
2011
Percent Per Length Bin
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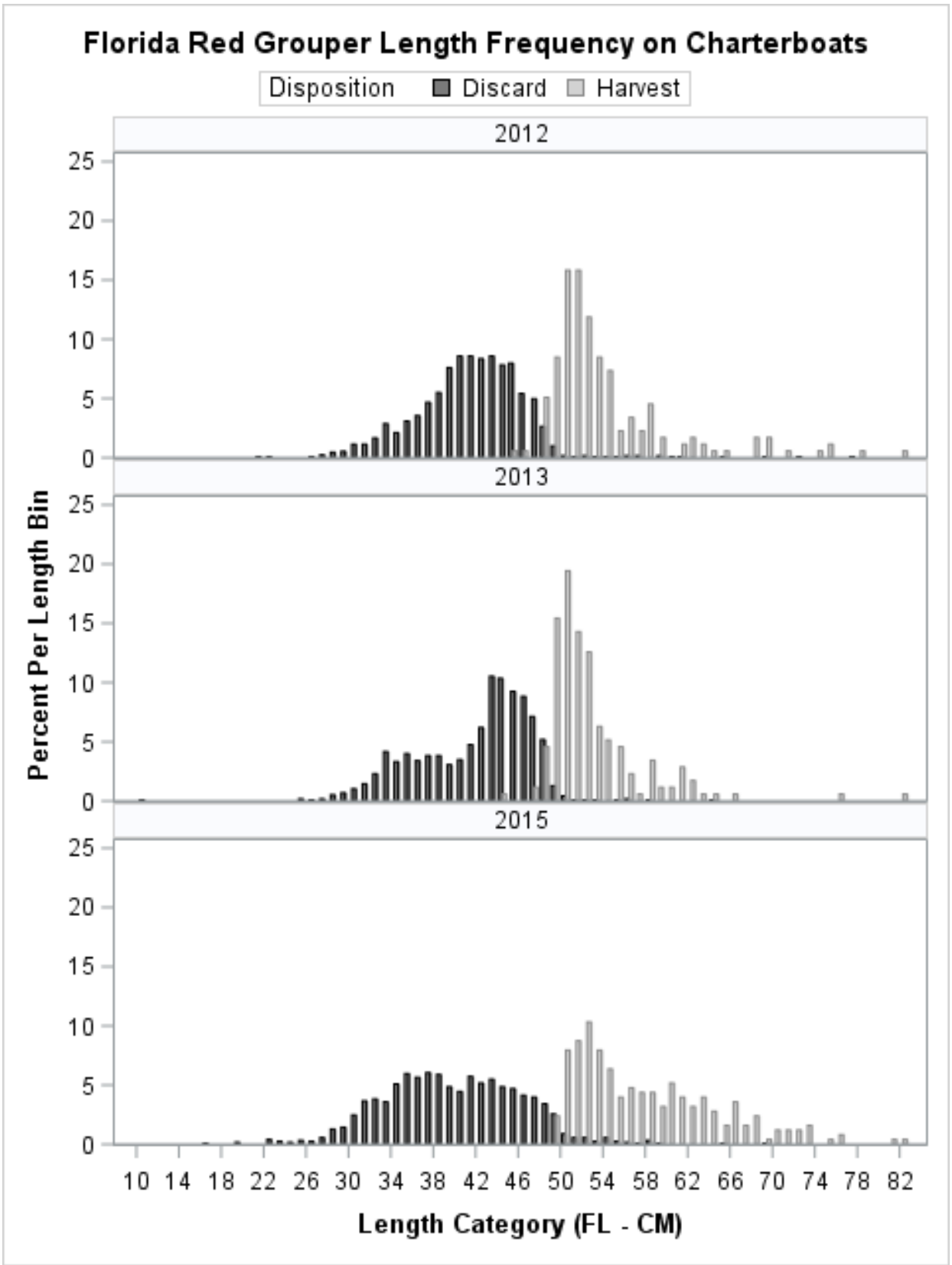
10
15
20
25
10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82
Length Category (FL - CM)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Length Category (FL - CM)

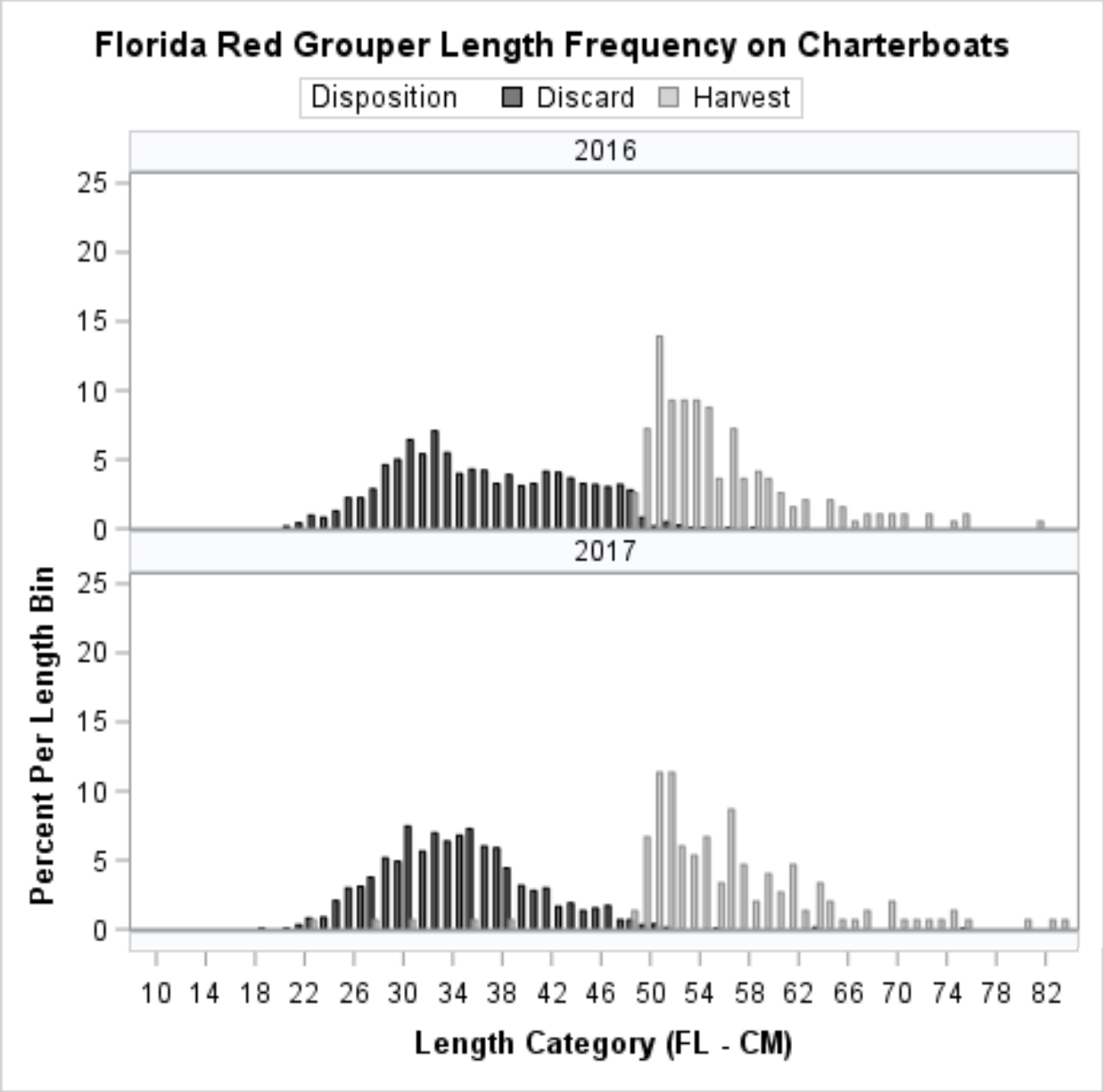

Figure 3. Length frequency of harvested and released red grouper measured by at-sea observers on charterboats in Florida 2009-2017 (excluding 2014). Harvest includes fish that were released dead.