Observer reported size distribution and discard characteristics of Gulf of Mexico Gag from the commercial vertical line and bottom longline fisheries

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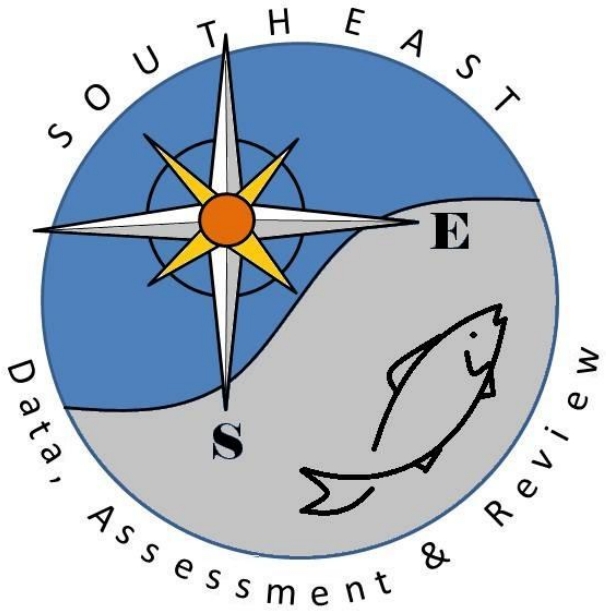

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Introduction

Fishery observer data have been collected from the Gulf of Mexico reef fish fishery since July, 2006. Data collection efforts have been primarily directed towards the vertical line and bottom longline fisheries. Vessels were randomly selected for observer coverage within gear (handline/electric/hydraulic reel vertical line and bottom longline), region (eastern and western Gulf of Mexico), and season (Jan-Mar, Apr-Jun, etc.) strata. Sampling within each gear/region/season stratum was apportioned by the fishing effort (days at sea) reported within each stratum for the previous year. Strata with the highest effort received greater observer coverage (more observer days at sea) than did those strata with lower reported effort.

The observer data were more detailed than the self-reported fishing effort and landings data included in the coastal logbook data set. For example, total catch, including discarded fish, was recorded for each set; where set was defined as fishing at a specific location. A new set began when the vessel moved to a new location and the fishing gear was again deployed. A majority (96.5% longline and 97% vertical line) of fish were measured (fork length) and the disposition (kept, discarded dead, discarded alive, kept for bait, unknown) of each fish was recorded.

Methods

Observer data were used to examine the catch and discard characteristics of the two fisheries that catch gag using data during 2006-2012. Tables were constructed for number of sets, number of gag caught, and number of discards by subregion, year, and month and by year for statistical zones. Subregions were defined as Gulf of Mexico statistical areas 1-8 (southeast), 9-12 (northeast) and 13-21 (west).

Fate (discarded or kept) of fish was examined in relationship to condition (dead on arrival, damaged, or undamaged). Previous stock assessments suggested that depth and size were factors in mortality of fish so depth in relation to size was examined by plotting fishing depth x 5mm size class and condition of fish.

The available observer reported gag size and disposition data were used to construct size frequency histograms of caught and discarded fish for each gear. Gears included vertical lines (handline and electric/hydraulic reels) and bottom longlines. No attempt was made to account for the fraction of fish that was not measured (e.g., if 70% of discarded fish within a stratum were measured while 95% of kept fish were measured in the same stratum, no adjustment was made for that difference in sampling fraction). Length data is presented in fork length. Less than 1% of the data were in total length and these were not used in the size composition histograms (0.6% in the bandit gear and 0.2% in the longline). None of the longline discard data was in total length and 35 observations of the vertical line discards were in total length (1%).

Beginning in 2010, the gag commercial fishery has been managed through the use of Individual Fishing Quotas (IFQs). In addition to region/gear stratification, data reported during the period 2010-2012 were further stratified by the amount of gag allocation available to the observed vessel and size frequency histograms constructed. Allocation categories were defined by dividing the data (number of measured fish) into roughly equal groups within each region and gear stratum. A "no allocation" stratum was defined for each region and gear. Other allocation strata approximated low, medium, and high amounts of allocation; based upon the range of allocation available to individual vessels in the fishery.

Finally, yearly changes in the size frequency of discarded and caught gag were examined. Histograms were produced following stratification of the data by year, subregion, gear, and allocation category. There were too few fish to stratify by open and closed seasons prior to when the allocation program was initiated.

In some cases when data was pooled by subregions, months, seasons, and years, there were few numbers of vessels fishing within a category. Thus, data was pooled to maintain confidentiality as covered under NOAA Administrative Order 216-100 and indicated as confidential data in tables. Cells with less than 3 vessels are not shown.

Results

Sampling effort

Table 1 shows the number of sets sampled by observers by year for each subregion for the bottom longline gear. Sampling began in July 2006 for the vertical line and in August 2006 for the longline and data extends to December

2012. There were 6,400 sets observed in the longline gear. Eighty-five percent (5,477 sets) of the longline observer effort was conducted in the southeastern (SE) subregion, 8% (499 sets) were in the western (W) subregion and 7% (424 sets) were in the northeast (NE) subregion. Longline coverage in the NE subregion was absent or low 2006-2008 and 2012 in the NE subregion and in the W subregion 2006-2007 and 2012. Sample sizes were highest during 2010-2011 due to increased funding for observer coverage of the bottom longline fishery.
Table 2 shows the number of sets sampled by observers by year for each subregion for the vertical line gear. There were 22,631 sets observed in the vertical gear. Sample sizes were larger in the vertical line than in the bottom longline fishery partly because set time was shorter. Seventy percent of the vertical line observations occurred in the SE subregion (15,724 sets), 22% were in the NE subregion (5,030 sets), and 8% were in the W subregion (1,877 sets). There was greater coverage in the vertical line fishery than the longline fishery with weakest coverage in the W subregion in 2009-2010.

Tables 3 and 4 show the number of positive gag sets, number of sets, and frequency of occurrence of gag by year and statistical zones within subregions for the longline and vertical line gears. There were 1644 positive longline sets for gag which gave a frequency of occurrence of 0.26. In the longline gear, gag frequency was 0.28 in the SE subregion, 0.21 in the NE subregion, and 0.03 in the W subregion. There were 3,000 positive vertical line sets for gag which gave a frequency of occurrence of 0.13. In the vertical line, gag frequency was 0.16 in the SE subregion, 0.09 in the NE subregion, and 0.03 in the W subregion. There was observed coverage during all years and all months in the vertical line fishery although there months within particular years where there was no coverage.
Table 5 shows the monthly number of longline gag caught, number of discards, and number/set of catches by subregion in observed sets across years. There were 3,405 gag caught in observer reported sets and 1,222 gag discards across years and subregions (Table 5). Discards comprised 35.9% of the gag caught in the longline. Percent discards was 37% in the NE subregion and 36% in the SE subregion. Only 25 gag were caught in the W subregion and three of these were discarded (12%) out of 499 longline sets indicating that fish are not common in this subregion.

Table 6 shows the monthly number of vertical line gag caught, number of discards, and number/set of catches by subregion in observed sets across years. There were 8,334 gag caught in observer reported sets and 3,517 gag discards across years and subregions (Table 8). Discards comprised 42.2% of gag caught in the vertical line fishery. Percent discards was 11% in the NE subregion and 49% in the SE subregion. Only 84 gag were caught in the W subregion observed vertical line sets from 2006-2012 and 15 of these were discarded (18%) out of 1,877 observed vertical line sets indicating that fish are not common in this subregion. The SE subregion had the highest number of gag/set (0.43) compared to the NE subregion (0.29) and the W subregion (0.04).

Table 7 shows the number of gag grouper caught and number/set by subregion and year in the observed longline fishery. While the SE had the highest number of observed fish caught, the number/set of both the NE and SE subregions were similar (0.58 vs. 0.57). In general, gag grouper were W subregion. Catch/set for the SE and NE

subregion were 11-12 times that of W subregions. Table 8 shows the number of gag grouper discards by subregion and year. The number of discards showed similar patterns as catches with the SE and NE subregion having the same discards/set (0.21). There were only 3 discards in the observed western subregion longline.
Table 9 shows the number of gag vertical line catches and number/set by subregion and year. Vertical line gag catches /set were highest in the SE subregion and 1.5 times that of the NE subregion (0.43 vs. 0.29). As in the longline, catch/set were lowest in the W subregion (0.04). Table 10 shows the number of gag vertical line discards and sets by subregion and year. Discards/set in the SE and NE region were identical to that in the longline (0.21) and low in the W subregion.

Size composition of gag caught, discarded, and kept in the longline fishery

A total of 3.405 gag grouper were caught in the observed longline fishery and fork length data for 96.5% of these were available for analyses. Size frequency histograms of caught, discarded and kept gag from the observed eastern Gulf of Mexico commercial bottom longline vessels are shown in Figure 1. The most frequently caught and discarded fish were 29-29.9 inches fork length. The size most frequently kept (landed) was 29-29.9 inches. Figure 2 shows size frequency by year. The majority of observed effort and fish caught occurred in 2010 and 2011. Figure 3 shows observed size frequency of discards by year. The number of sampled/measured fish was low in the majority of years except for 2011. Discard size was affected by size limits during 2006-2010. Larger fish were discarded in 2011 and 2012. Figure 4 (A and B) shows size composition of discards grouped before (2006-2009) and after (2010-2012) the ifq program was initiated when the fishery began being regulated by using allocation. Only 42 discarded fish were measured in the observer program prior to allocation regulations and most of these fish were small (16-24.99 inches). The most frequently discarded size was 29-29.99 inches after the allocation program began. Figure 4 (C and D) show the length frequency of all fish measured (kept and discarded) in observer sampling. The most frequently caught size was larger before allocation (32-33.9 inches) than after allocation (29-29.99 inches).
Figure 5 shows size frequency of discarded gag in the NE and SE Gulf subregions. Data for only 77 discarded gag were available for the NE Gulf and the most common size of discards were 23-24.99 and 29-29.99 inches but this was based on 8-9 fish within a size class. A greater sample size was available for the southeastern Gulf and the most common size of discards was 29-30.99 inches. Only five discarded gag were measured in the western Gulf subregion and these were 45-51.99 inches in length (not shown).

Size composition of gag caught, discarded, and kept in the vertical line fishery

A total of 8,340 gag grouper were caught in the observed vertical line fishery and fork length data for 97% of these were available for analyses. Size frequency histograms of gag grouper caught, discarded and kept (landed) across years from the observed Gulf of Mexico commercial bottom long line vessels are shown in Figure 6. The small number of discards of larger fish (24-34 inches) was likely discards from those vessels with no allocation, although a few discards resulted from closed seasons. The most frequently caught and discarded fish were 20-20.99 inches fork

length. Kept (landed) fish were larger than discards, 24-27.99 inches were the most frequently observed size classes. Figure 7 shows size frequency by year. The majority of observed effort occurred in 2010-2012. Figure 8 shows observed size frequency of discards by year. The number of measured fish was low in 2006. Figure 9 (A and B) shows size composition of discards grouped before (2006-2008) and after (2010-2012) the ifq program was initiated when the fishery began being regulated by using allocation. Discard size was larger before (22-23.99 inches) than after new regulations (20-20.9 inches) based on modal length. Figure 9 (C and D) show the length frequency of all fish measured (kept and discarded) in observer sampling. Most frequently caught size was similar before and after allocation than before (22-22.9 inches) based on modal length. Gag grouper caught in the vertical line fishery tended to be smaller than those taken in the longline fishery.

Figure 10 shows size frequency of gag taken in the vertical line and size frequency of discarded in the NE and SE Gulf subregions. Data for only 141discarded gag was available for the northeastern Gulf and the most common size of discards were 22-22.9. A greater sample size was available for the southeastern Gulf and the most common size of discards was 20-20.9 inches. Only 14 discarded gag were measured in the western Gulf subregion and these were small, 12-29 inches in length (not shown).

Fate of gag grouper and relationship with depth

Figure 11 shows the size composition of fish by fishing depth for the longline gear. Modal length ranged from 26 to 37 inches. The majority of fish were caught between 40-80 m. In general, smaller fish tended to be in shallower waters and larger fish in deeper waters. Modal length at depth for those depths with at least 270 fish showed a progression of size with depth. However, sample sizes were small at the shallowest (<40 m) and deepest (>80m). Figure 12 shows the size composition of fish by fishing depth for the vertical line gear. Modal length ranged from 22 to 31 inches. Smallest modal length (22-22.9 inches) was at depth less than 40 m. At depths 40-49.9m, the modal length was 27-27.9 inches. At depths greater than 50 m, modal lengths ranged between 29-31.9 inches. Figure 13A shows the fate of fish (kept or discarded) in relationship to condition when landed for the vertical line. About 58.5% of vertical line fish caught were kept. About 61% of the vertical line fish when landed were reported as being alive and about 39% were reported to be damaged. Less than 1% of the fish were reported dead (n=50) when landed. Sixty-nine of damaged fish were kept, 2% of dead fish were kept, and 52% of alive fish were kept. Figure 13B shows the fate of fish (kept or discarded) in relationship to condition when landed for the longline. About 63% of the longline fish caught were kept. About 42% of the longline fish caught when landed were reported as being alive and 67% were reported to be damaged. Only 1% of the fish caught (n=34) were reported dead when landed and 67% of those were kept. Sixty-two percent of damaged fish were kept and 66% of alive fish were kept. Figure 14A and B shows the percent of gag grouper caught in longline and vertical line reported damaged by depth. There seems to be an increase in damaged fish as a function of depth.

Size frequency by gag grouper allocation

The size frequency of discarded and kept gag grouper varied among gag allocation categories. Sizes of fish observed in the Gulf of Mexico bottom longline fishery for vessels by gag allocation (2010-2012) are shown in Figure 15. Fork lengths of measured fish with no allocation ranged from 19 to 51.99 inches with a mode of 29-29.99 inches. Approximately 47% percent of the observed fish from vessels with no gag allocation were reported as "kept". Trips with 1-250 pounds of allocation, kept 16% of their catches. Trips with 251-1350 pounds of allocation kept 60% of the fish and trips with allocation greater than 1350 pounds kept 92% of their catches. The size frequencies of kept and discarded gag grouper among Gulf of Mexico bottom longline vessels with none or small amount of gag allocation less than 250 lbs were slightly smaller (modal length 29 vs. 30 inches) than the size frequency of fish discarded from vessels with greater amount of allocation . Kept and discarded fish were influenced by both size limits and allocation.

Table 11 shows the number of observed trips and sets by subregion for the bottom longline by region and gag allocation. Observed sample sizes (trips or sets) in the western or northeastern Gulf of Mexico bottom longline were much smaller than in the southeastern Gulf. The highest observed effort occurred in the SE subregion with allocation greater than 1,350 pounds. Data from trips with no allocation from the NE and W subregions cannot be shown due to confidentiality restrictions.

Figure 16 shows the size composition of gag grouper in the vertical line gear by gag allocation. The size range of observed gag grouper in the commercial vertical line Gulf of Mexico fishery was 11 –57 inches fork length. Modal sizes of kept fish were similar among allocation categories (26-28.9 inches) but slightly smaller for trips with no allocation (24-24.9 inches). Modal size of discards were smaller (20-20.9 inches) for trips with allocation and trips without allocation (18-18.9 inches). As in the longline data, the size frequency distribution of kept and discarded fish was influenced by minimum size limits (22-24 inches).

Table 12 shows the number of observed trips and sets by subregion for the vertical line observed trips by gag allocation. Observed sample sizes (trips or sets) in the western or northeastern Gulf of Mexico vertical line were much smaller than in the southeastern Gulf. As in the longline, the number of observed trips was highest for vessels with higher amounts of gag allocation (>1,350 pounds) in the southeast subregion Data from trips with no allocation from the NE and W subregions cannot be shown due to confidentiality restrictions. The size frequencies of kept and discarded fish in the vertical line were influenced by both size limits and allocation.

Fishing Season

Table 13 shows the number of observed longline sets by subregion, year, and fishing season (open or closed). Only 1% of sets (71 sets) occurred during the closed season and these occurred in 2008 and 2009. The SE subregion had

the lowest number of sets in the closed season (0.4% of sets) while the NE and W subregions had 4.7% and 5.6% of the sets. Low number of sets precluded any meaningful analyses of the data.

Table 14 show the number of observed vertical line sets by subregion, year, and fishing season. Only 1% of the sets (304 sets) occurred during the closed season and these occurred during 2007-2009. The SE subregion had the lowest number of sets in the closed season (0.2% of the sets), followed by the NE subregion (2.9%), and the W subregion (6.4% of the sets). As in the longline, the low number of sets prevented any meaningful analyses of the data.

Table 1. Number of observed longline sets in the Gulf of Mexico (2006-2012) by year and subregion. CD=confidential data.

Year	SE	NE	West	Total
2006	189	CD	CD	201
2007	194	0	0	194
2008	307	0	CD	356
2009	1,121	84	122	1,327
2010	1,492	70	191	1,753
2011	1,980	228	127	2,335
2012	194	CD	CD	234
Total	5,477	424	499	6,400

Table 2. Number of observed vertical line sets in the Gulf of Mexico (2006-2012) by year and subregion.

Year	SE	NE	West	Grand Total
2006	675	232	233	1,140
2007	1,850	760	319	2,929
2008	1,089	275	287	1,651
2009	1,253	349	69	1,671
2010	2,034	360	48	2,442
2011	2,734	1,018	324	4,076
2012	6,089	2,036	597	8,722
Total	15,724	5,030	1,877	22,631

Table 3. Number of positive gag grouper sets and frequency of occurrence by year and subregion in longline. CD= confidential data

Positive gag sets

Year	SE	NE	West	Grand Total
2006	30	CD	CD	CD
2007	66	0		66
2008	54	0		54
2009	155	15	CD	CD
2010	405	17	3	425
2011	765	41	2	808
2012	65	CD	CD	75
Total	1,540	87	17	1,644

Frequency

Year	SE	NE	West	GrandTotal
2006	0.16	CD	CD	CD
2007	0.34			0.34
2008	0.18		CD	CD
2009	0.14	0.18	0.10	0.14
2010	0.27	0.24	0.02	0.24
2011	0.39	0.18	0.02	0.35
2012	0.34	CD	CD	0.32
Total	0.28	0.21	0.03	0.26

Table 4. Number of positive gag grouper sets and frequency of occurrence by year and subregion in vertical line

Positive gag sets

Year	SE	NE	West	Grand Total
2006	32	21	8	61
2007	285	42	12	339
2008	178	49	18	245
2009	188	40	2	230
2010	394	16	3	413
2011	469	60	7	536
2012	925	241	10	1,176
Total	2,471	469	60	3,000

Frequency

Year	SE	NE	West	GrandTotal
2006	0.05	0.09	0.03	0.05
2007	0.15	0.06	0.04	0.12
2008	0.16	0.18	0.06	0.15
2009	0.15	0.11	0.03	0.14
2010	0.19	0.04	0.06	0.17
2011	0.17	0.06	0.02	0.13
2012	0.15	0.12	0.02	0.13
Total	0.16	0.09	0.03	0.13

Table 5. Monthly catch of gag grouper, number of discards, percent discards, number of sets, and number/set in observed longline gear in the Gulf of Mexico by region. Nogag=number of gag

subregion	month	nogag	discards	%discards	Sets	No./set
ne	1	Confidential data				
ne	2	Confidential data				
ne	3	2	1	50%	54	0.04
ne	4	33	10	30%	125	0.26
ne	5	Confidential data				
ne	6	Confidential data				
ne	7	Confidential data				
ne	8	Confidential data				
ne	9	Confidential data				
ne	10	Confidential data				
ne	11	Confidential data				
ne	12				0	
	all months	244	90	37%	424	0.58

subregion	month	nogag	discards	%discards	Sets	No./set
se	1	266	101	38%	243	1.09
se	2	561	313	56%	606	0.93
se	3	401	191	48%	519	0.77
se	4	610	354	58%	984	0.62
se	5	264	63	24%	436	0.61
se	6	127	7	6%	270	0.47
se	7	114	37	32%	180	0.63
se	8	107	2	2%	224	0.48
se	9	261	26	10%	541	0.48
se	10	208	19	9%	428	0.49
se	11	111	12	11%	272	0.41
se	12	106	4	4%	780	0.14
	all months	3,136	1,129	36%	5,483	0.57

subregion	month	nogag	discards	%discards	Sets	No./set
w	1	Confidential data				
w	2	Confidential data				
w	3	Confidential data				
w	4	Confidential data				
w	5	Confidential data				
w	6	Confidential data				
w	7	Confidential data				
w	8	Confidential data				
w	9	Confidential data				
w	10	Confidential data				
w	11	Confidential data				
w	12	Confidential data				
	all months	25	3	12%	499	0.05

All area totals	
no. gag	3,405
discards	1,222
%discards	35.9%
sets	6,406
no./set	0.53

Table 6. Monthly catch of gag, number of discards, percent fish caught discarded, number of sets, and number fish caught/set in observed vertical line gear inthe Gulf of Mexico by region. Nogag=number of gag

subregion	month	nogag	discards	%discards	Sets	No./set
ne	1	106	10	9%	447	0.24
ne	2	109	30	28%	394	0.28
ne	3	279	14	5%	623	0.45
ne	4	312	24	8%	545	0.57
ne	5	54	15	28%	505	0.11
ne	6	12	0	0%	98	0.12
ne	7	300	17	6%	407	0.74
ne	8	171	26	15%	670	0.26
ne	9	39	18	46%	498	0.08
ne	10	29	3	10%	325	0.09
ne	11	30	5	17%	262	0.11
ne	12	10	1	10%	257	0.04
	all months	1,451	163	11%	5,031	0.29

subregion	month	nogag	discards	%discards	Sets	No./set
se	1	760	297	39%	1,188	0.64
se	2	507	201	40%	671	0.76
se	3	1,130	484	43%	1,620	0.70
se	4	1,009	568	56%	1,718	0.59
se	5	781	415	53%	1,831	0.43
se	6	338	203	60%	1,124	0.30
se	7	419	230	55%	1,874	0.22
se	8	235	158	67%	1,820	0.13
se	9	267	158	59%	1,401	0.19
se	10	91	41	45%	589	0.15
se	11	592	291	49%	930	0.64
se	12	670	293	44%	958	0.70
	all months	6,799	3,339	49%	15,724	0.43

subregion	month	nogag	discards	%discards	Sets	No./set
w	1	4	1	25%	143	0.03
w	2	8	0	0%	188	0.04
w	3	6	0	0%	179	0.03
w	4	2	1	50%	114	0.02
w	5	3	1	33%	86	0.03
w	6	3	3	100%	90	0.03
w	7	40	1	3%	315	0.13
w	8	0	0		194	0.00
w	9	7	3	43%	151	0.05
w	10	6	2	33%	106	0.06
w	11	1	1	100%	99	0.01
w	12	4	2	50%	212	0.02
	all months	84	15	18%	1,877	0.04

All area totals	
no. gag	8,334
discards	3,517
%discards	42.2%
sets	22,632
no./set	0.37

Table 7. Number of gag grouper caught and number/set by year and subregion in longline. CD= confidential data.

Number of fish

Year	NE	SE	West	Grand Total
2006	CD	52	CD	CD
2007	0	225	0	225
2008	0	78	CD	CD
2009	39	310	15	364
2010	56	826	7	889
2011	111	1533	3	1,647
2012	CD	112	CD	146
Total	244	3136	25	3,405

Number/set

Year	NE	SE	West	GrandTotal
2006	CD	0.28	CD	CD
2007		1.16		1.16
2008		0.25	CD	CD
2009	0.46	0.28	0.12	0.27
2010	0.80	0.55	0.04	0.51
2011	0.49	0.77	0.02	0.71
2012	CD	0.58	CD	0.62
Total	0.58	0.57	0.05	0.53

Table 8. Number of gag grouper discards and number discards/set by year and subregion in longline. CD= confidential data

Discards

Year	NE	SE	West	Grand Total
2006	CD	5	CD	CD
2007	0	7	0	7
2008	0	7	CD	CD
2009	4	24	0	28
2010	0	45	0	45
2011	71	1004	CD	1,078
2012	CD	37	CD	50
Total	90	1129	3	1,222

Discards/set

Year	NE	SE	West	GrandTotal
2006	CD	0.03	CD	CD
2007	0.00	0.04	0.00	0.04
2008	0.00	0.02	CD	CD
2009	0.05	0.02	0.00	0.02
2010	0.00	0.03	0.00	0.03
2011	0.31	0.51	CD	0.46
2012	CD	0.19	CD	0.21
Total	0.21	0.21	0.01	0.19

Table 9. Number of gag grouper caught and number/set by year and subregion in observed vertical line

Number of fish

Year	NE	SE	West	Grand Total
2006	46	44	8	98
2007	83	949	16	1,048
2008	202	482	37	721
2009	117	636	2	755
2010	21	1077	3	1,101
2011	102	1122	7	1,231
2012	880	2489	11	3,380
Total	1451	6799	84	8,334

Number/set

Year	NE	SE	West	GrandTotal
2006	0.20	0.07	0.03	0.09
2007	0.11	0.51	0.05	0.36
2008	0.73	0.44	0.13	0.44
2009	0.34	0.51	0.03	0.45
2010	0.06	0.53	0.06	0.45
2011	0.10	0.41	0.02	0.30
2012	0.43	0.41	0.02	0.39
Total	0.29	0.43	0.04	0.37

Table 10. Number of gag grouper discards and number/set by year and subregion in observed vertical line.

Discards

Year	NE	SE	West	Grand Total
2006	6	4	4	14
2007	11	397	7	415
2008	21	159	0	180
2009	33	414	0	447
2010	8	672	0	680
2011	22	637	2	661
2012	62	1,056	2	1,120
Total	163	3,339	15	3,517

Discards/set

Year	NE	SE	West	GrandTotal
2006	0.01	0.01	0.02	0.01
2007	0.21	0.21	0.02	0.14
2008	0.15	0.15	0.00	0.11
2009	0.33	0.33	0.00	0.27
2010	0.33	0.33	0.00	0.28
2011	0.23	0.23	0.01	0.16
2012	0.17	0.17	0.00	0.13
Total	0.21	0.21	0.01	0.16

Table 11. Longline effort in Gulf of Mexico observer program by gag allocation category. CD=confidential data

Allocation category	Subregion					
	NE		SE		W	
	Trips	Sets	Trips	Sets	Trips	Sets
0 lbs	CD	CD	8	216	CD	CD
1-250 lbs	3	72	34	976	3	107
251-1,350 lbs	6	112	39	1,171	5	107
>1,350 lbs	11	125	51	1,303	4	99

Table 12. Vertical line effort in Gulf of Mexico observer program by gag allocation category. CD=confidential data

Allocation category	Subregion					
	NE		SE		W	
	Trips	Sets	Trips	Sets	Trips	Sets
0 lbs	CD	CD	8	524	CD	CD
1-250 lbs	34	679	45	1,838	17	180
251-1,350 lbs	37	1,036	65	2,862	12	184
>1,350 lbs	48	1,629	91	5,609	18	565

Table 13. Number of observed longline sets by subregion, year, and fishing season, total sets, and percent closed season sets.

	NE				SE				W			
Year	Closed	Open	Total	%closed	Closed	Open	Total	%closed	Closed	Open	Total	%closed
2006	CD	CD	CD	0.0%	0	189	189	0.0%	0	0	0	
2007	0	0	0		0	194	194	0.0%	0	0	0	
2008	0	0	0		CD	CD	307	2.6%	CD	CD	CD	CD
2009	CD	CD	84	23.8%	CD	CD	1,121	1.3%	0	122	122	0.0%
2010	0	70	70	0.0%	0	1,492	1,492	0.0%	0	191	191	0.0%
2011	0	228	228	0.0%	0	1,980	1,980	0.0%	0	127	127	0.0%
2012	CD	CD	CD	0.0%	0	194	194	0.0%	CD	CD	CD	CD
	20	404	424	4.7%	23	5,454	5,477	0.4%	28	471	499	5.6%

	All regions			
Year	Closed	Open	Total	%closed
2006	0	201	201	0.0%
2007	0	194	194	0.0%
2008	36	320	356	10.1%
2009	35	1,292	1,327	2.6%
2010	0	1,753	1,753	0.0%
2011	0	2,335	2,335	0.0%
2012	0	234	234	0.0%
	71	6,329	6,400	1.1%

Table 14. Number of observed vertical line sets by subregion, year, and fishing season, total sets, and percent closed season sets. CD=confidential data

	NE				SE				W			
Year	Closed	Open	Total	%closed	Closed	Open	Total	%closed	Closed	Open	Total	%closed
2006	0	232	232	0.0%	0	675	675	0.0%	0	233	233	0.0%
2007	CD	CD	CD	10.1%	38	1,812	1,850	2.1%	CD	CD	CD	8.5%
2008	CD	CD	CD	13.8%	0	1,089	1,089	0.0%	91	196	287	31.7%
2009	CD	CD	CD	8.3%	1	1,252	1,253	0.1%	CD	CD	CD	4.3%
2010	0	360	360	0.0%	0	2,034	2,034	0.0%	0	48	48	0.0%
2011	0	1,018	1,018	0.0%	0	2,734	2,734	0.0%	0	324	324	0.0%
2012	0	2,036	2,036	0.0%	0	6,089	6,089	0.0%	0	597	597	0.0%
	144	4,886	5,030	2.9%	39	15,685	15,724	0.2%	121	1,756	1,877	6.4%

	All regions			
Year	Closed	Open	Total	%closed
2006	0	1,140	1,140	0.0%
2007	142	2,787	2,929	4.8%
2008	129	1,522	1,651	7.8%
2009	33	1,638	1,671	2.0%
2010	0	2,442	2,442	0.0%
2011	0	4,076	4,076	0.0%
2012	0	8,722	8,722	0.0%
	304	22,327	22,631	1.3%

Figure 1. Size composition of gag caught, discarded, and kept gag grouper in observed Gulf of Mexico longline (2006-2012). Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

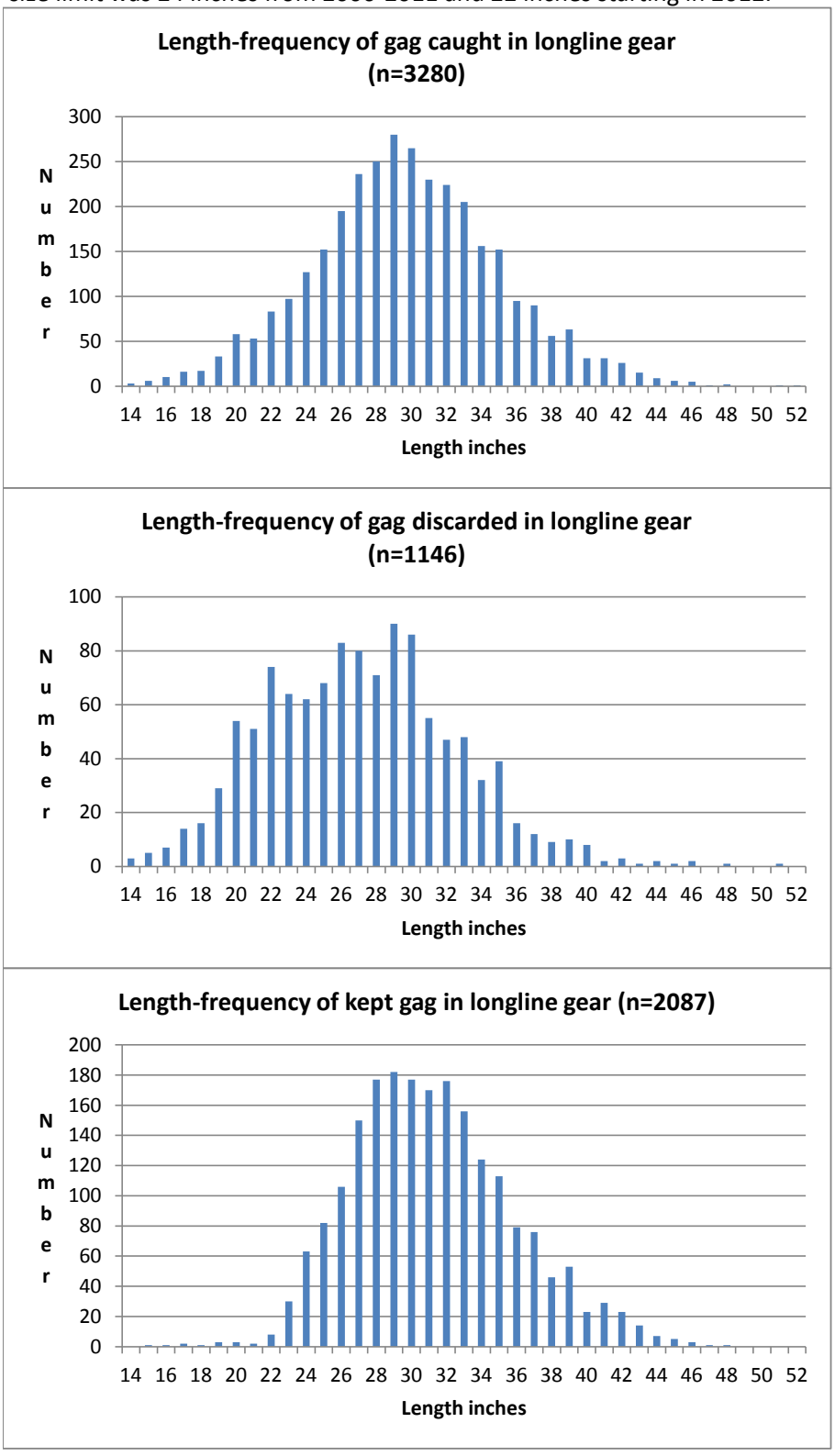


Figure 2. Size composition of gag grouper caught in observed Gulf of Mexico longline by year. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

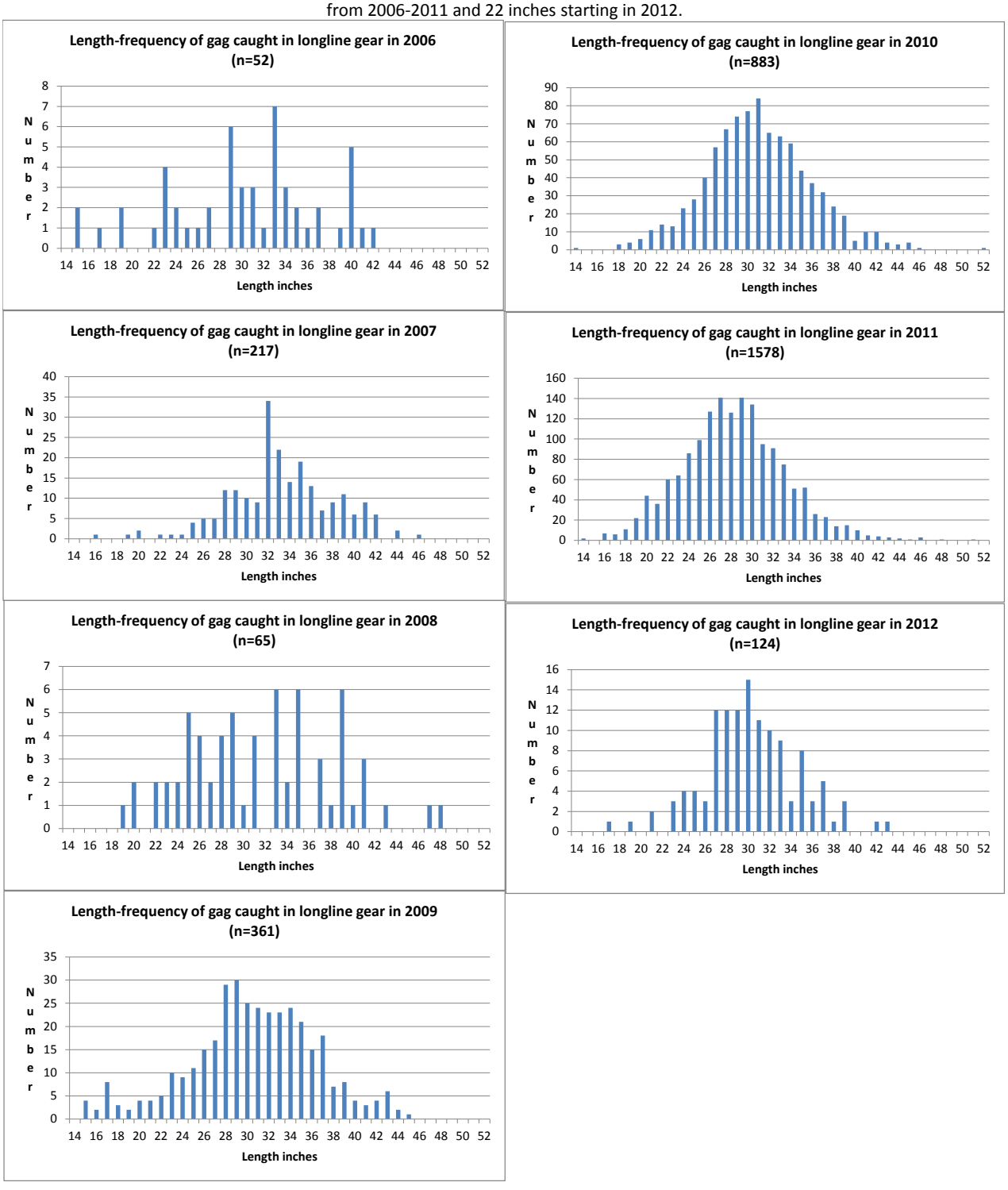


Figure 3. Size composition of discarded gag grouper in observed Gulf of Mexico longline by year. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

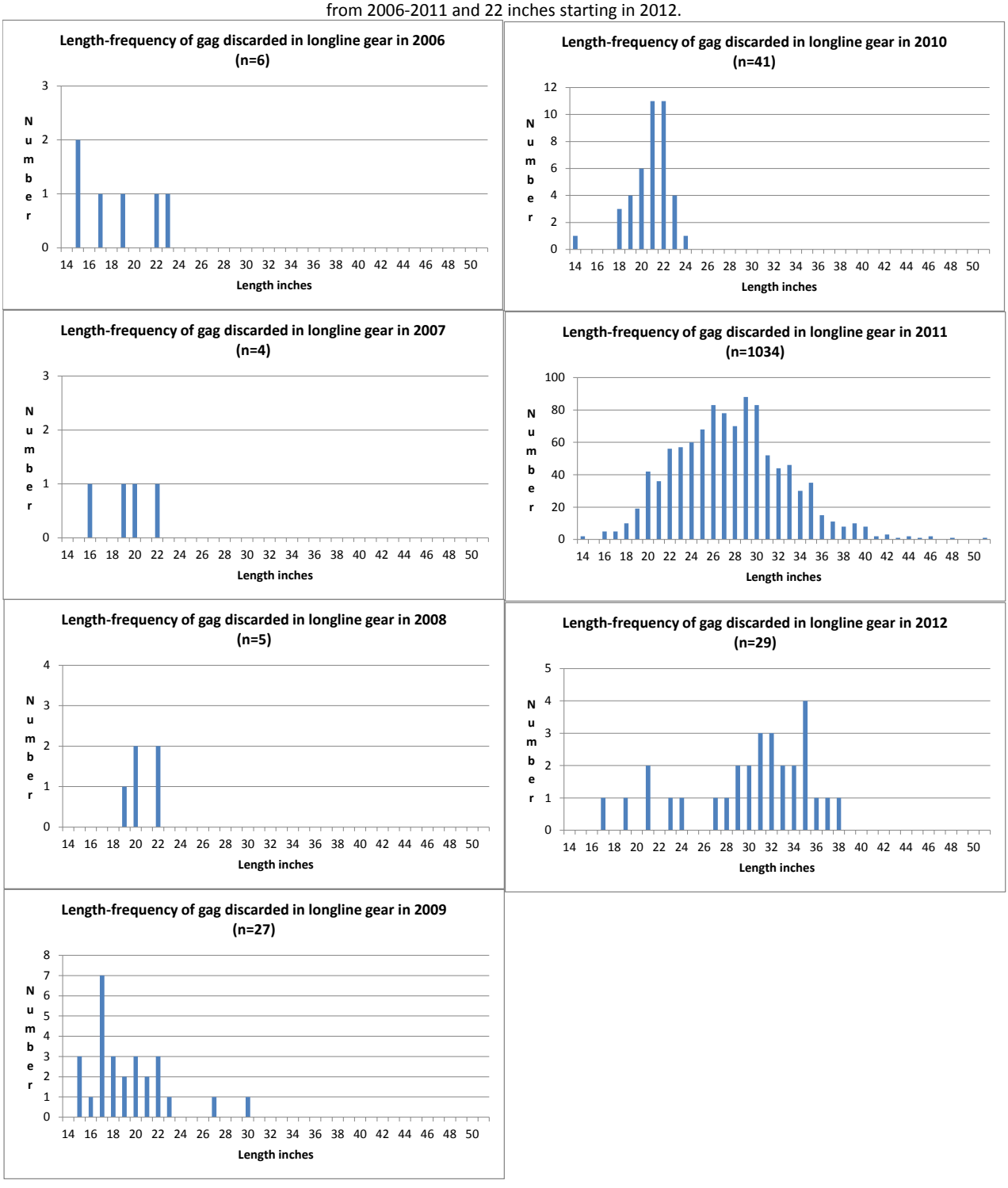


Figure 4. Size composition of discarded and caught gag grouper in observed Gulf of Mexico longline before (2006-2009) and after (2010-2012) ifq program. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

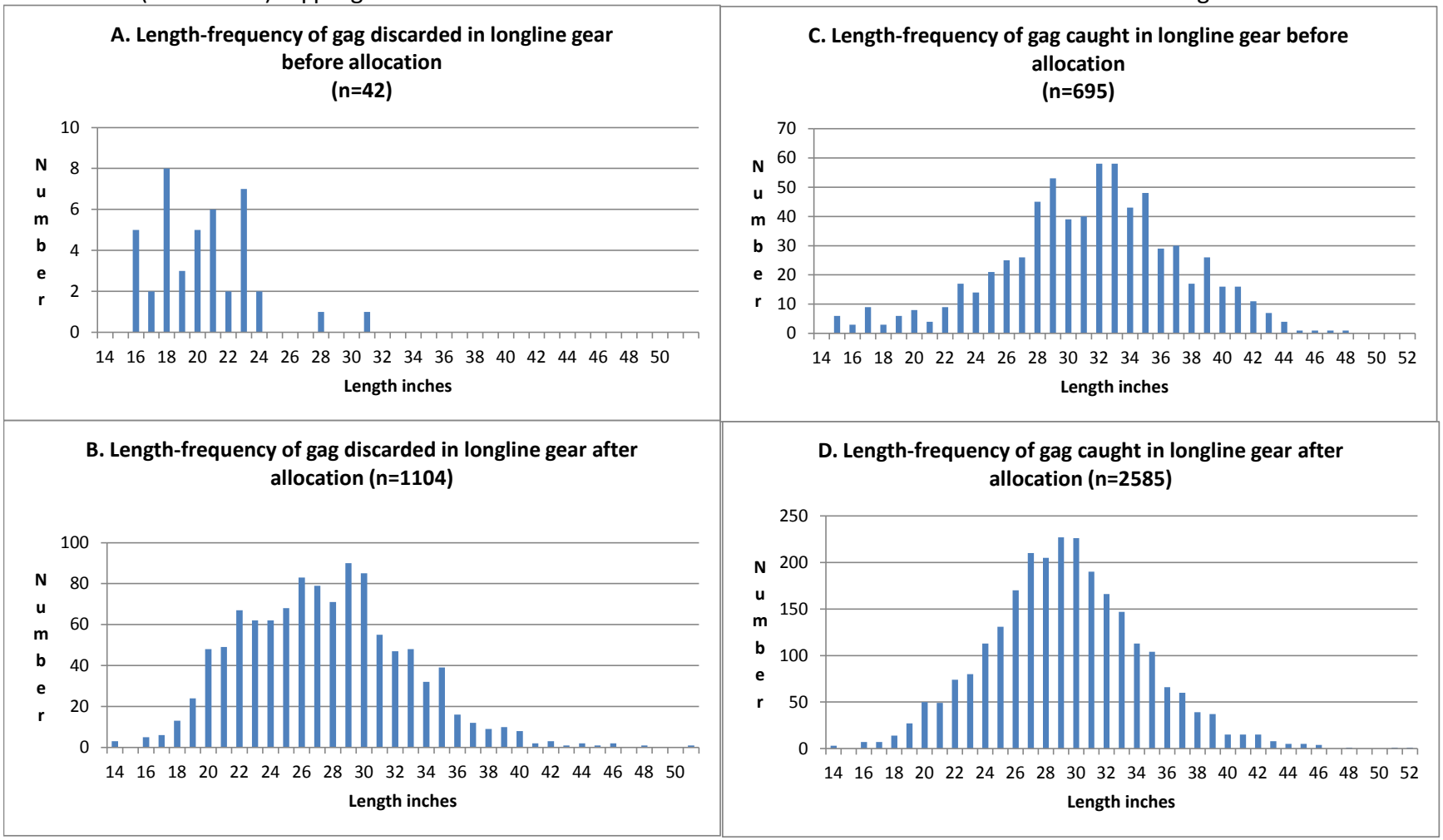


Figure 5. Size composition of discarded gag grouper in observed longline in northeastern and southeastern Gulf of Mexico (2006-2012). Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

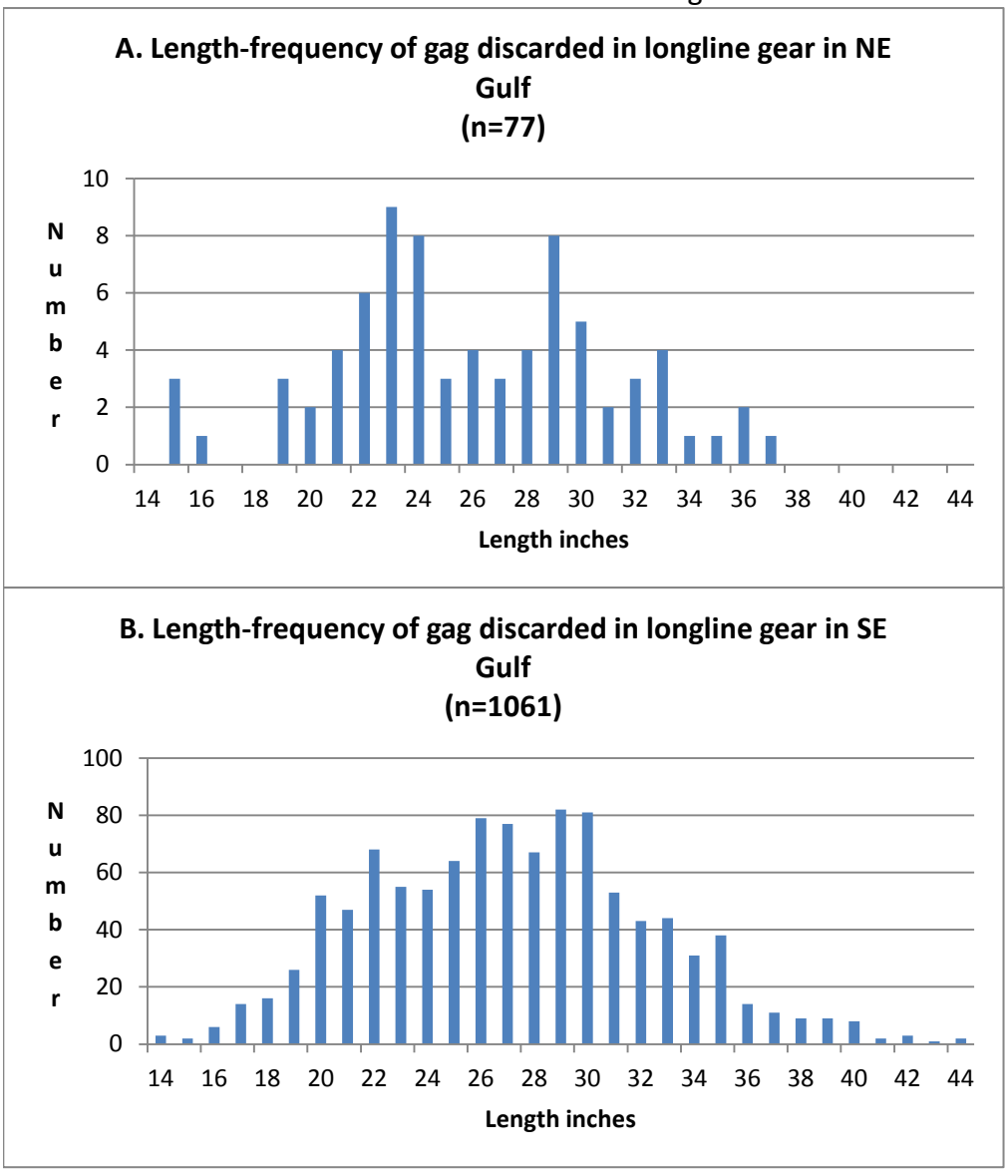


Figure 6. Size composition of caught, discarded, and kept gag grouper in observed Gulf of Mexico vertical line. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

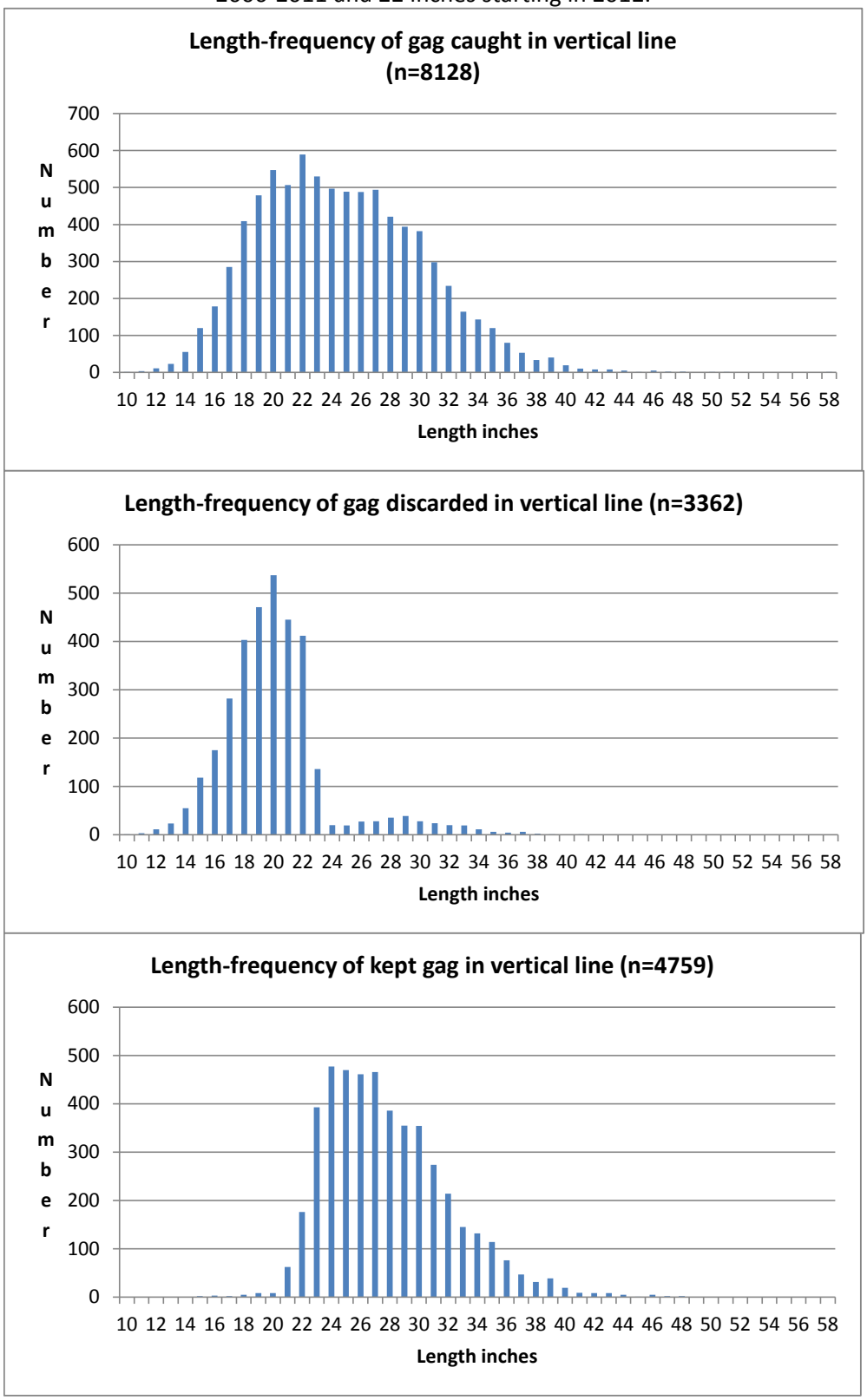


Figure 7. Size composition of caught, discarded, and kept gag grouper in observed Gulf of Mexico vertical line by year. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

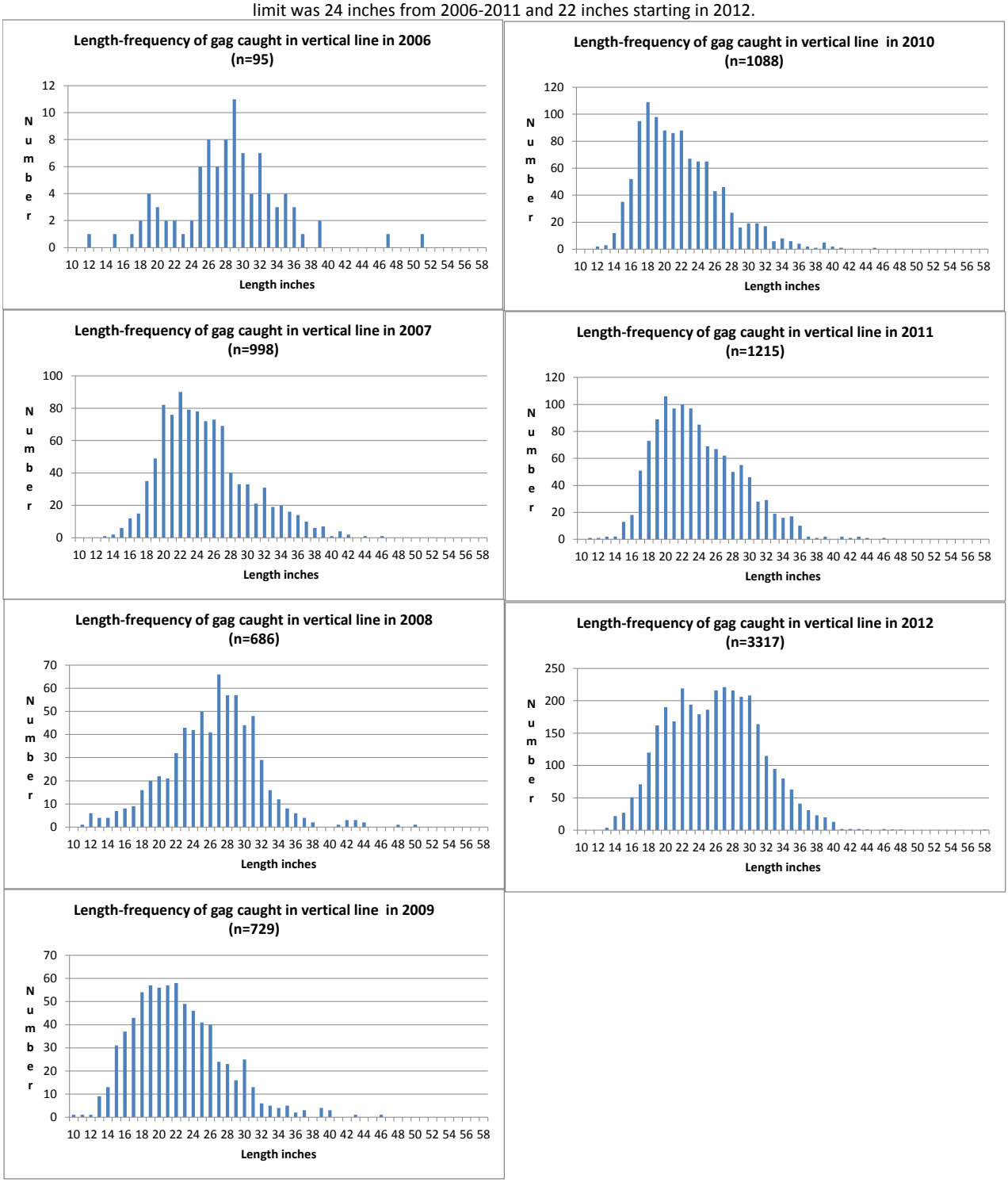


Figure 8. Size composition of discarded gag from observed vertical line in the Gulf of Mexico by year. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

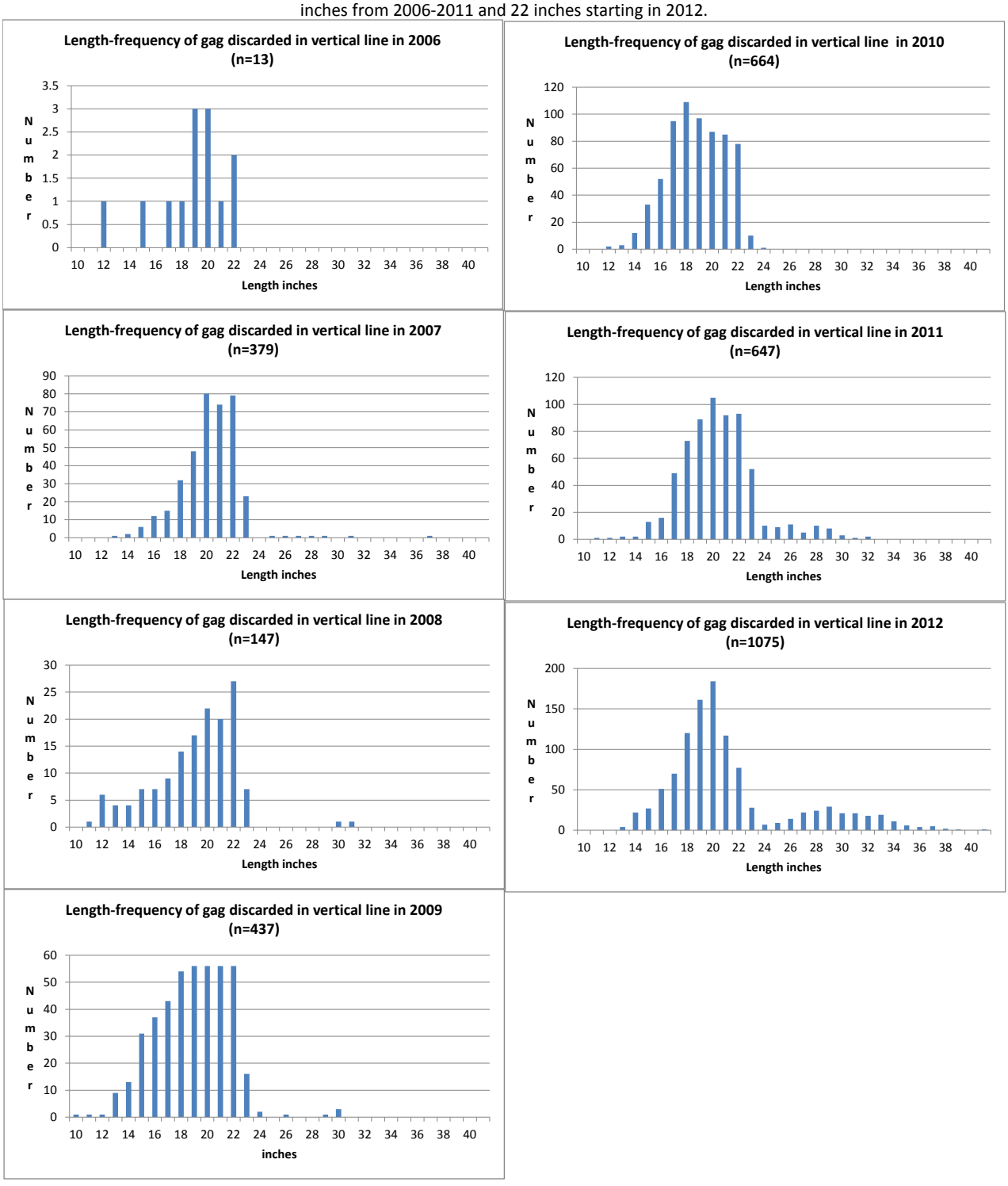


Figure 9. Size composition of discarded and caught gag grouper in observed Gulf of Mexico vertical line before (2006-2009) and after (2010-2012) allocation.

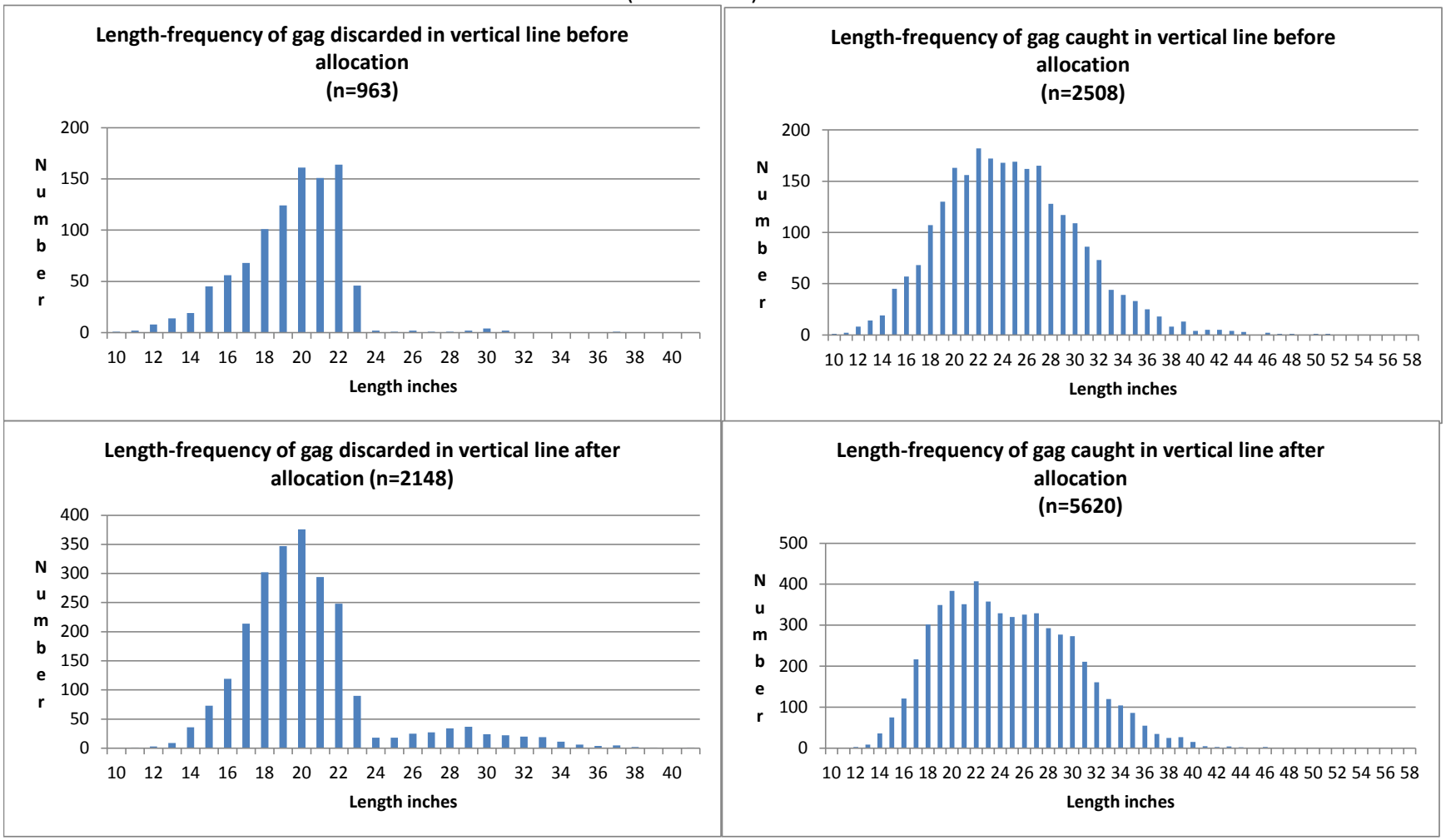


Figure 10. Size composition of discarded gag grouper in observed vertical line in northeastern and southeastern Gulf of Mexico. Note that size limit was 24 inches from 2006-2011 and 22 inches starting in 2012.

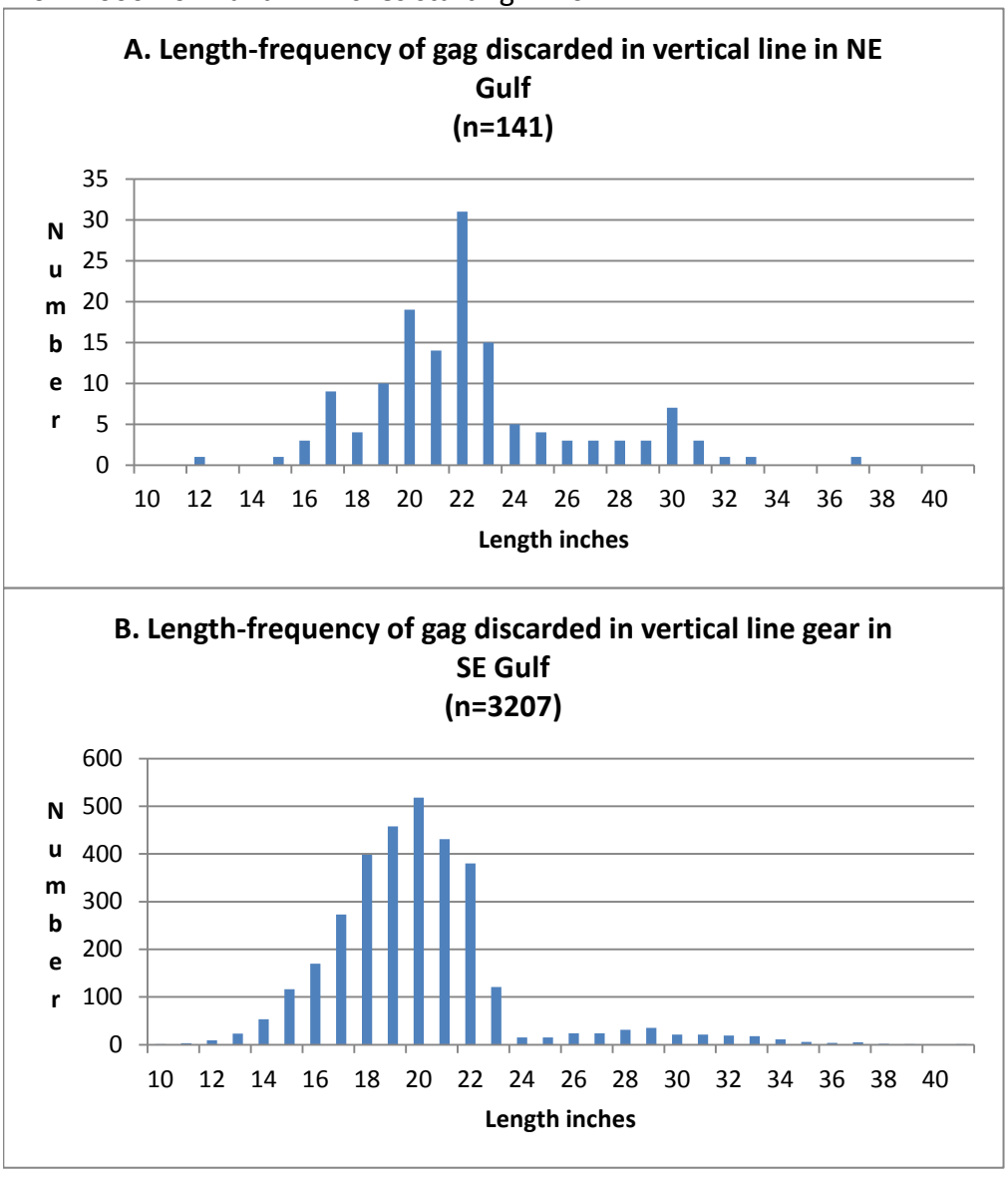


Figure 11. Size composition of gag grouper by fishing depth in observer longline gear.

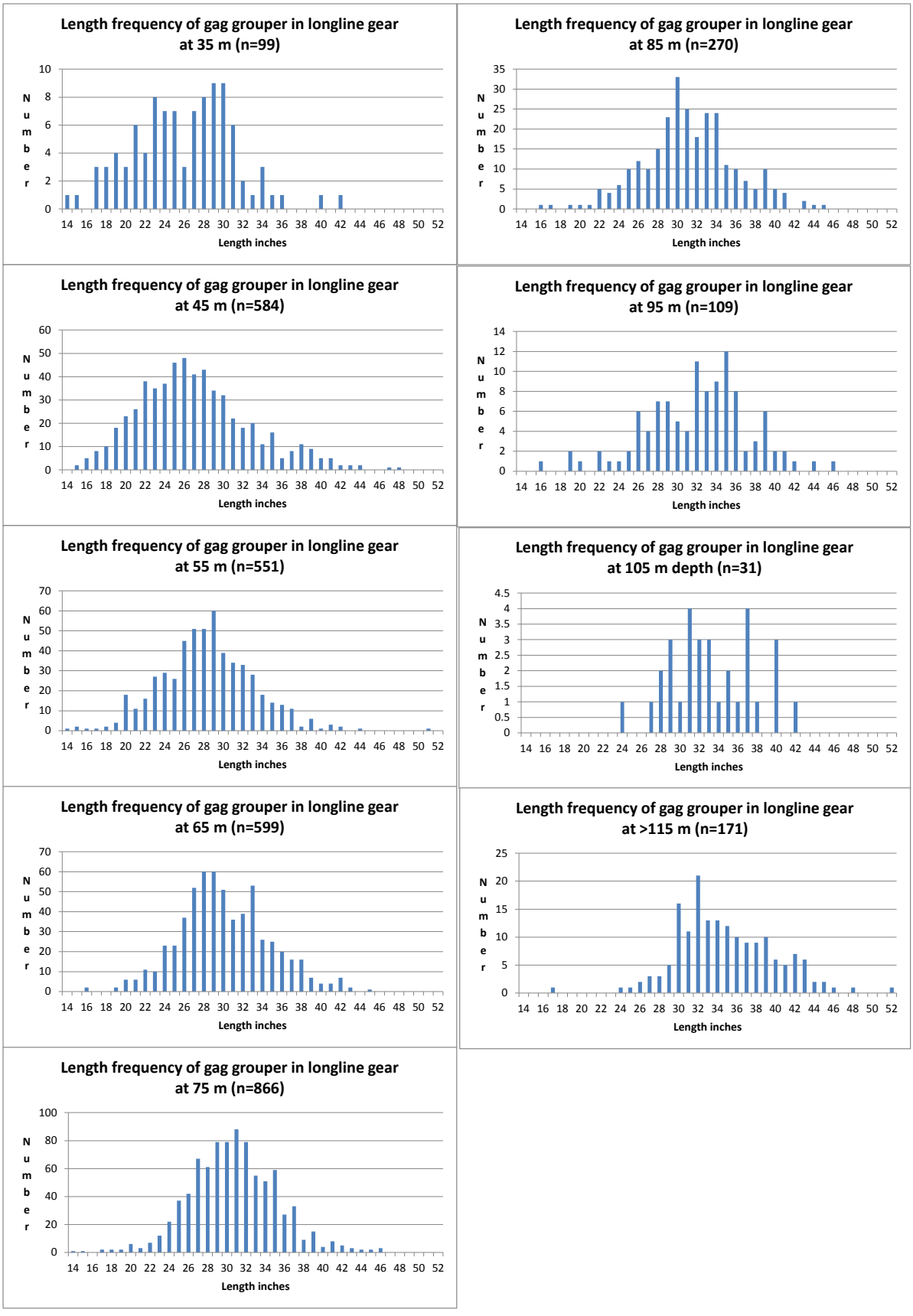
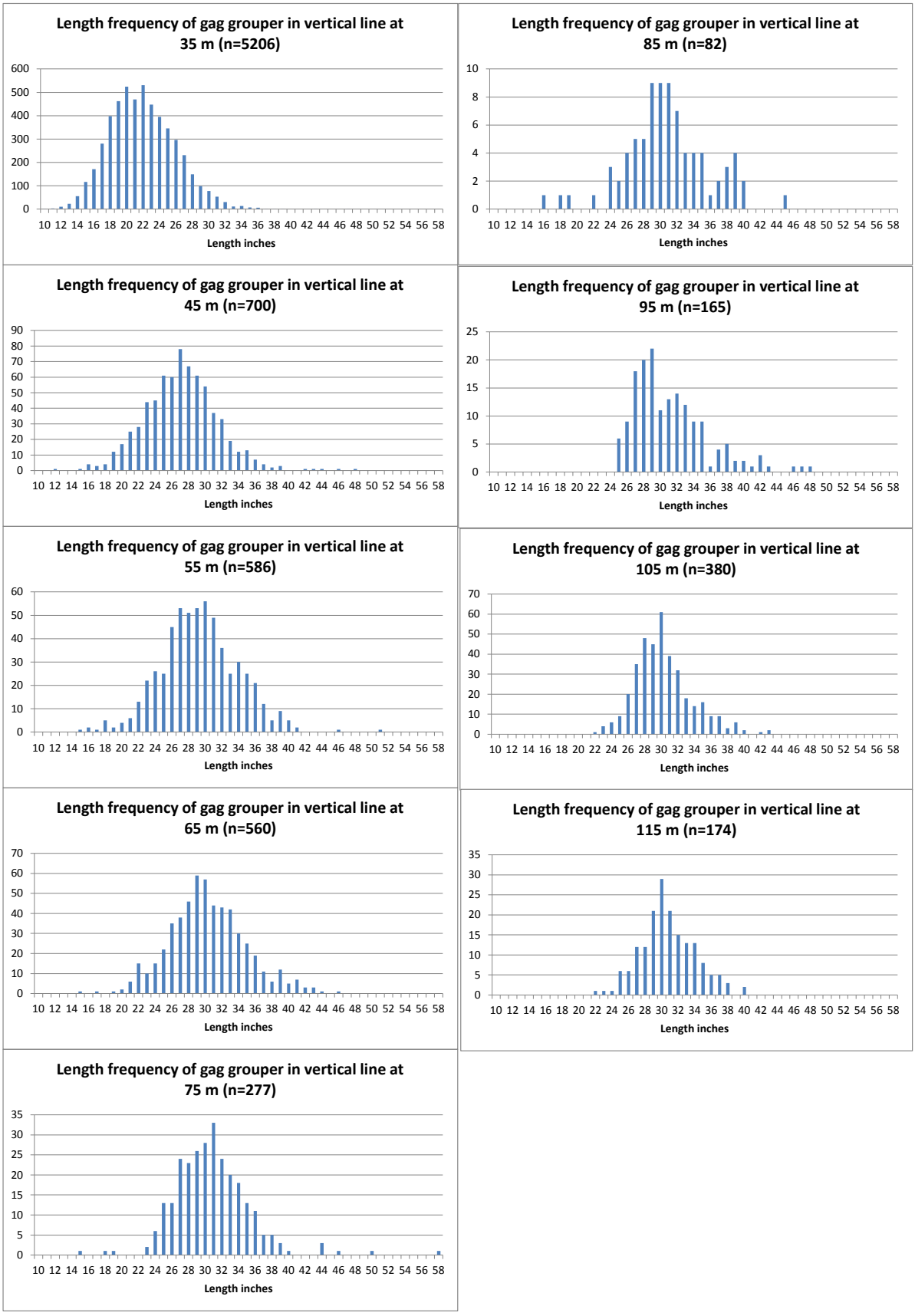


Figure 12. Size composition of gag grouper by fishing depth in observer vertical line gear.



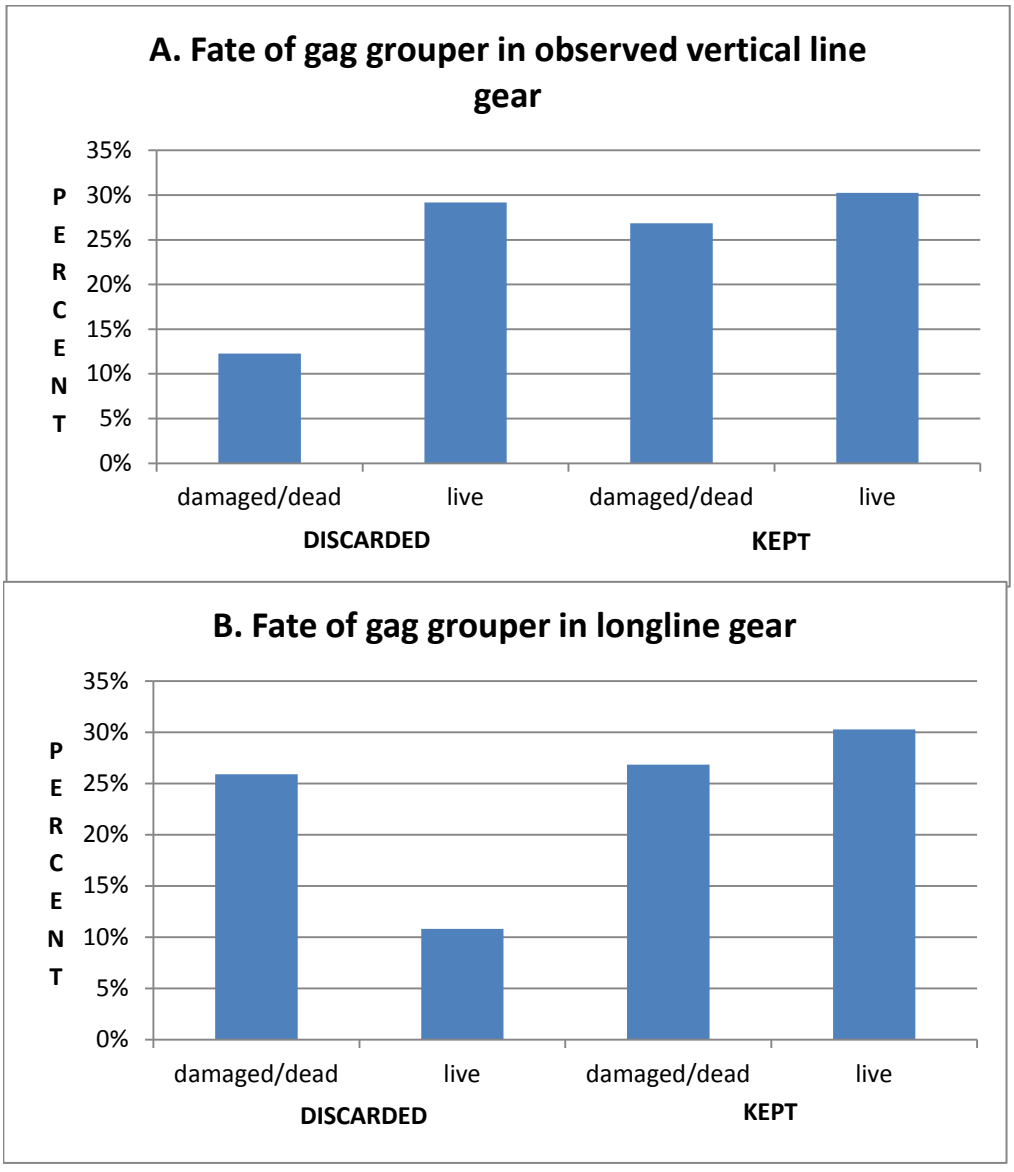


Figure 13. Fate (kept or discarded) of gag grouper in relationship to condition (damaged or dead, live) of fish in observed vertical line (A) and longline (B) gears

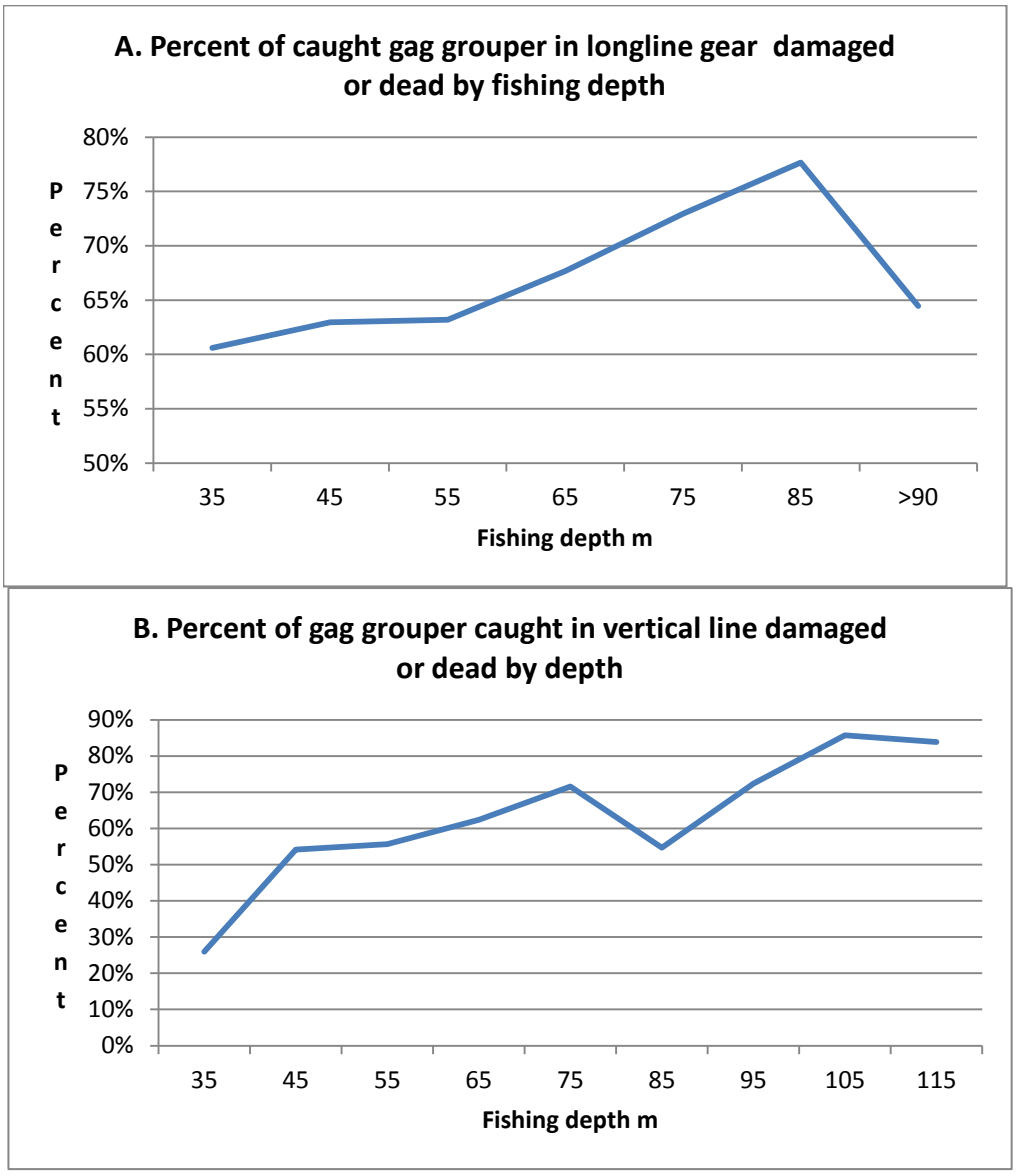


Figure 14. Percent of gag grouper caught in observed longline (A) and vertical line (B) fisheries in the Gulf of Mexico and reported damaged or dead by depth

Figure 15. Commercial bottom longline Gulf of Mexico observed gag grouper size composition by gag allocation (2010-2012).

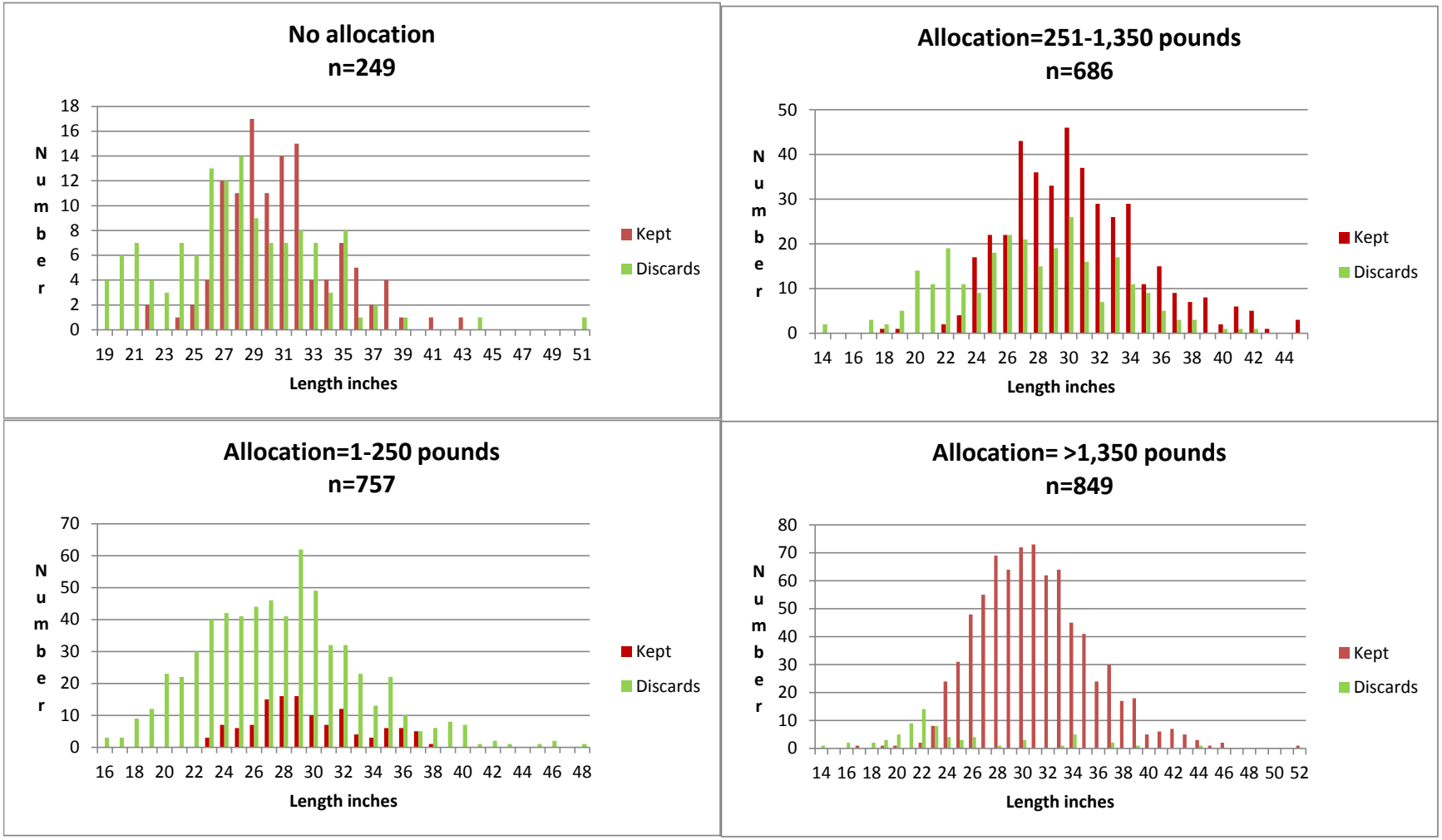


Figure 16. Commercial vertical line Gulf of Mexico observed gag grouper size composition by gag allocation (2010-2012).