Observer reported size distribution of Gulf of Mexico red snapper from the commercial vertical line and bottom longline fisheries

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SEDAR31-DW32

11 September 2012

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Sustainable Fisheries Division Contribution SFD-2012-018

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 was 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 (usually >70%) of fish were measured and the disposition (kept, discarded dead, discarded alive, kept for bait, unknown) of each fish was recorded.

Methods

The available observer reported red snapper size and disposition data were used to construct size frequency histograms of discarded and kept fish for each region and gear. Regions were defined as Gulf of Mexico statistical areas 1-12 (east) and 13-21 (west). 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).

Observer reported red snapper size frequency histograms were initially constructed using data collected during July – December, 2006. During those months, the commercial fishery was subject to seasonal closures. Data collected during 2006 were stratified by season (open and closed) in addition to region and gear.

Beginning in 2007, the red snapper commercial fishery has been managed through the use of Individual Fishing Quotas (IFQs). In addition to region/gear stratification, data reported during the period 2007-2011 were further stratified by the amount of red snapper 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. All region/gear/allocation strata are defined in Table 1.

Finally, yearly changes in the size frequency of discarded and kept red snapper were examined. Histograms were produced following stratification of the data by year, region, and gear. Data were not stratified by the amount of red snapper allocation available to each vessel due to sample size limitations.

Results

2006 size composition

Size frequency histograms of discarded and kept red snapper from the eastern Gulf of Mexico commercial bottom longline vessels observed during 2006 are shown in Figure 1. Sample size (number of fish) was low (127 total). The most frequently discarded fish during the closed season were 18-18.99 inches total length. Few fish were reported as discarded during the red snapper open season. The distribution of kept fish lengths was bimodal, with 18-18.99 and 23-23.99 inch fish most frequent. There was no observer coverage of commercial bottom longline vessels in the western Gulf of Mexico during 2006.

Observed size frequencies of red snapper from the commercial vertical line fishery in the eastern and western Gulf of Mexico are provided in Figures 2 and 3. Sample sizes were larger than in the bottom longline fishery. Closed season discards were larger in the eastern Gulf of Mexico than in the west (vertical line vessel western Gulf of Mexico closed season data cannot be shown due to confidentiality restrictions), but were similar during the open season. Fish of total length 16-16.99 inches were most frequently kept in the eastern Gulf of Mexico, but slightly smaller 15-15.99 inches total length fish were the most frequently observed as kept in the west. The number of observed trips within each gear, red snapper season, and region are provided in Table 2.

Size frequency by red snapper allocation

The size frequency of discarded and kept red snapper varied among red snapper allocation categories. Sizes of fish observed in the eastern Gulf of Mexico bottom longline fishery for vessels with no red snapper allocation are shown in Figure 4. Total lengths of measured fish ranged from 13 to 35.99 inches with a mode of 21-21.99 inches. Approximately nine percent of the observed fish from vessels with no red snapper allocation were reported as "kept". Further investigation of the data is needed to determine if the fish were actually kept or if there were data entry errors. The size frequencies of kept and discarded red snapper among eastern Gulf of Mexico bottom longline vessels with any amount of red snapper allocation were similar to the size frequency of fish discarded from vessels with no allocation (Figure 4). The numbers of observed bottom longline trips in the eastern region by red snapper allocation category are provided in Table 3A.

Sample sizes in the western Gulf of Mexico bottom longline were smaller than in the eastern Gulf. Among those vessels with red snapper allocation, the amount of allocation available was much higher for vessels in the western Gulf of Mexico. Few discards were observed from vessels with red snapper allocation in the western Gulf (Figure 5). Data from trips with no allocation and from trips with 17,909-28,810 pounds of allocation cannot be shown due to confidentiality restrictions. The high number of observed kept red snapper among trips with no red snapper allocation may, as stated above, be due to data error or a mismatch between the observer data and the allocation data. This issue is being investigated. The size distribution of kept fish was bimodal on trips with no red snapper allocation (modes at 19-19.99 and 26-26.99 inches total length). Observed trips with 1-17,908 pounds of red snapper allocation had a kept red snapper size distribution with higher frequencies of larger fish (mode = 28-28.99) than did trips with 17,909-28,810 pounds of red snapper allocation (mode = 16-16.99). Sample size (number of fish) was lowest for trips with >28,810 pounds of allocation and the size frequency of kept fish in that allocation category had a mode of 23-23.99 inches. The numbers of observed bottom longline trips in the western region by red snapper allocation category are provided in Table 3A.

Size frequencies of red snapper observed on commercial vertical line vessels in the eastern Gulf of Mexico are provided in Figure 6. As noted above, kept fish observed on trips with no allocation may be erroneous. Sample sizes were fairly large across all allocation categories. The frequencies of discarded 14 – 17.99 inch red snapper in the 1-2,582 and 2,583-7,048 pound allocation categories were low relative to fish of similar size observed on trips with no allocation. This may result from selective retention of 14 – 18 inch fish, while larger fish were discarded more frequently. That pattern was not apparent on trips with higher amounts of red snapper allocation. Observed vertical line trips in the eastern Gulf of Mexico are summed by red snapper allocation category in Table 3B.

The size range of observed red snapper in the commercial vertical line western Gulf of Mexico fishery was 7 – 41 inches total length. Size frequency distributions of kept fish were similar among the 1-3,909 pound; 3,910-19,807 pound; and 19,808-61,124 pound allocation categories (Figure 7). The size frequency distribution of kept fish

observed in the >61,124 pound allocation category had a mode of slightly larger fish than in the other allocation categories. Possible data errors among trips with no allocation are being investigated. The size frequency distributions of discarded red snapper in this fishery do not suggest selective retention of fish 14-18 inches total length with larger fish discarded at a higher frequency, although such selective discarding by size has been reported by commercial fishers. Observed vertical line trips in the western Gulf of Mexico are summed by red snapper allocation category in Table 3B.

Size frequency by year

Yearly size frequency distributions of red snapper observed in the eastern Gulf of Mexico bottom longline fishery are provided in Figure 8. During 2007 and 2008 sample sizes (observed fish) were low, particularly during 2008. Data from 2008 cannot be shown due to confidentiality restrictions. Sample sizes were highest during 2011 due to increased funding for observer coverage of the bottom longline fishery. The proportion of kept fish was highest during 2010 and 2011. No clear changes in the size frequency distribution of discards were apparent across the years 2009-2011. The numbers of observed longline trips in the eastern Gulf of Mexico are summed by year in Table 4A.

The number of observed red snapper was low in the bottom longline fishery in the western Gulf of Mexico with total measured, observed fish greater than 500 only during 2009 and greater than 200 during 2010. During 2007, no bottom longline trips in the western Gulf of Mexico had observers onboard. The data from 2008 cannot be shown due to confidentiality restrictions. The majority of observed discarded red snapper in this fishery was larger than 25 inches total length and was observed during 2010 and 2011 (Figure 9). During 2009, smaller fish (<24 inches) were kept; but during 2008 and 2010 a higher frequency of larger fish were kept. Sample sizes of observed longline trips in the western Gulf of Mexico are summed by year in Table 4A.

Size frequency distributions of red snapper observed in the eastern Gulf of Mexico vertical line fishery by year are shown in Figure 10 for the period 2007-2011. Sample sizes exceeded 1,200 fish each year, with 6,903 observed fish measured during 2007. More measured, observed fish were discarded than kept in 2009; but in all other years the number of kept fish exceeded discarded fish. Relatively few fish larger than 15.99 inches total length were discarded during 2007; however, a higher proportion of fish larger than 16 inches were discarded in all other years. The modal size of kept fish varied over time: 16-16.99 during 2007, 2009, and 2010; 14-14.99 during 2008; and 18-18.99 during 2011. Total vertical line trips with observed red snapper in the eastern Gulf of Mexico are summed by year in Table 4B.

In the western Gulf of Mexico commercial vertical line fishery the size frequency distribution of discards was similar during 2007 and 2008 (Figure 11), was limited to fish less than 14 inches total length during 2009, and included larger fish during 2010 and 2011; particularly during 2011. The size frequency of kept fish was, also, similar during 2007 and 2008. During the period 2009-2011, however, higher frequencies of larger kept fish were observed in the fishery. Total vertical line trips with observed red snapper in the eastern Gulf of Mexico are summed by year in Table 4B.

Table 1. Red snapper allocation categories by region and gear.

Region	Vertical line	Longline
East	No allocation 1-2,582 pounds 2,583-7,048 pounds 7,049-16,762 pounds >16,762 pounds	No allocation 1-688 pounds 689-3,436 pounds >3,436 pounds
West	No allocation 1-3,909 pounds 3,910-19,807 pounds 19,808-61,124 pounds >61,124 pounds	No allocation 1-17,908 pounds 17,909-28,810 pounds >28,810 pounds

Table 2. Number of trips with observed red snapper by gear, region, and red snapper season during 2006. There was no observer coverage of bottom longline trips in the western Gulf of Mexico during 2006.

Gear	Red snapper season	East	West
Bottom longline	Closed	6	N/A
	Open	6	
Vertical line	Closed	8	Confidential data
	Open	12	10

Table 3. Number of trips with observed red snapper by gear, region, and red snapper allocation in pounds.

A. Bottom longline.

Red snapper allocation	East	West
0	51	N/A
1-688	49	
689-3,436	39	
>3,436	44	
0	N/A	Confidential data
1-17,908		5
17,909-28,810		Confidential data
>28,810		4

B. Vertical line.

Red snapper allocation	East	West
0	87	N/A
1-2,582	104	
2,582-7,048	43	
7,048-16,762	22	
>16,762	40	
0	N/A	14
1-3,909		19
3,910-19,807		15
19,808-61,124		14
>61,124		10

Table 4. Number of trips with observed red snapper by gear, year, and region.

A. Bottom longline.

Year	East	West
2006	10	
2007	8	
2008	Confidential data	Confidential data
2009	22	4
2010	42	4
2011	71	4

B. Vertical line.

Year	East	West
2006	21	11
2007	73	17
2008	31	15
2009	33	5
2010	40	6
2011	75	12

Figure 1. Commercial bottom longline eastern Gulf of Mexico 2006 observed red snapper size composition. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

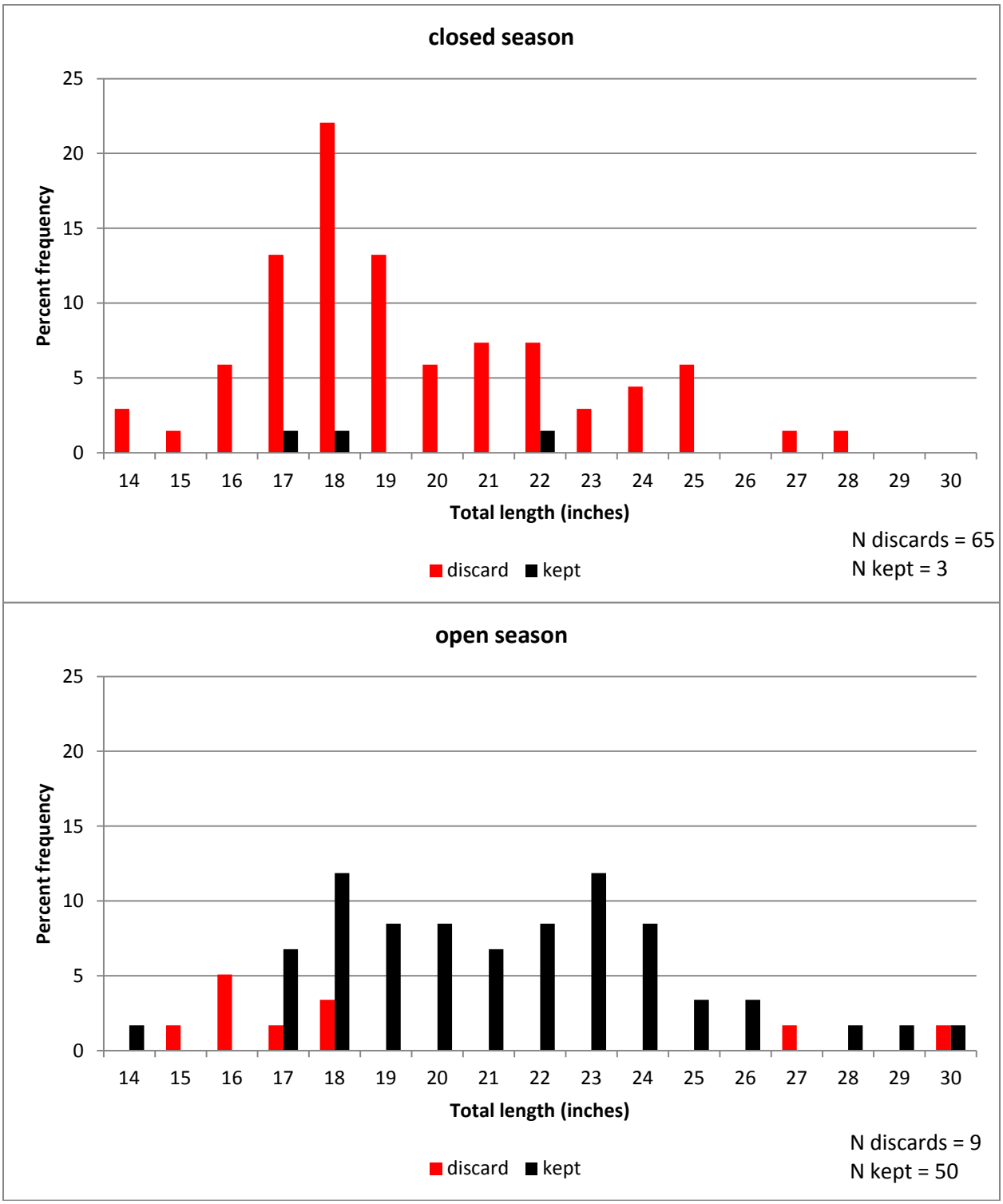


Figure 2. Commercial vertical line eastern Gulf of Mexico 2006 observed red snapper size composition. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

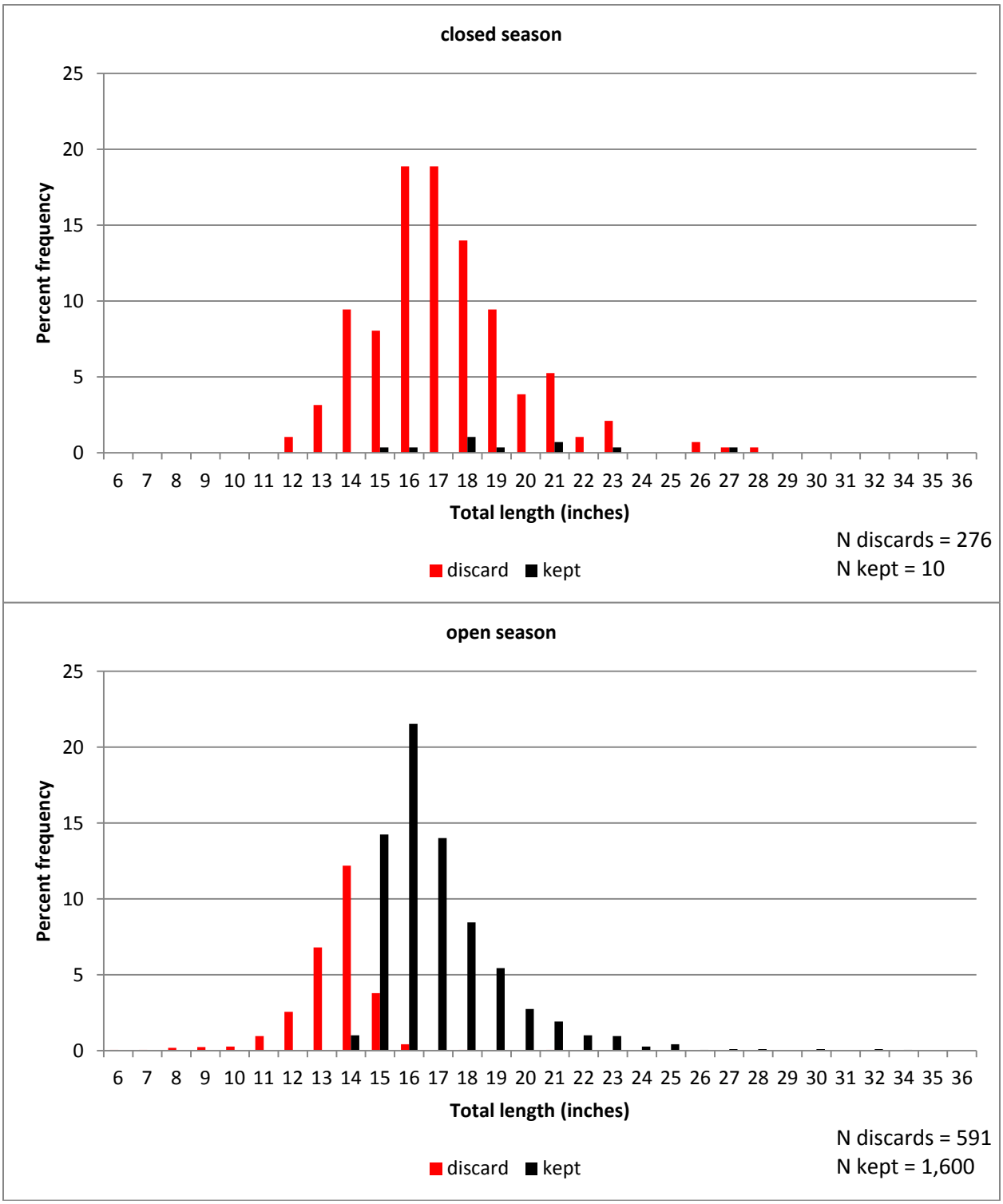


Figure 3. Commercial vertical line western Gulf of Mexico 2006 observed red snapper size composition. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches. Data collected during the closed season cannot be shown due to confidentiality restrictions.

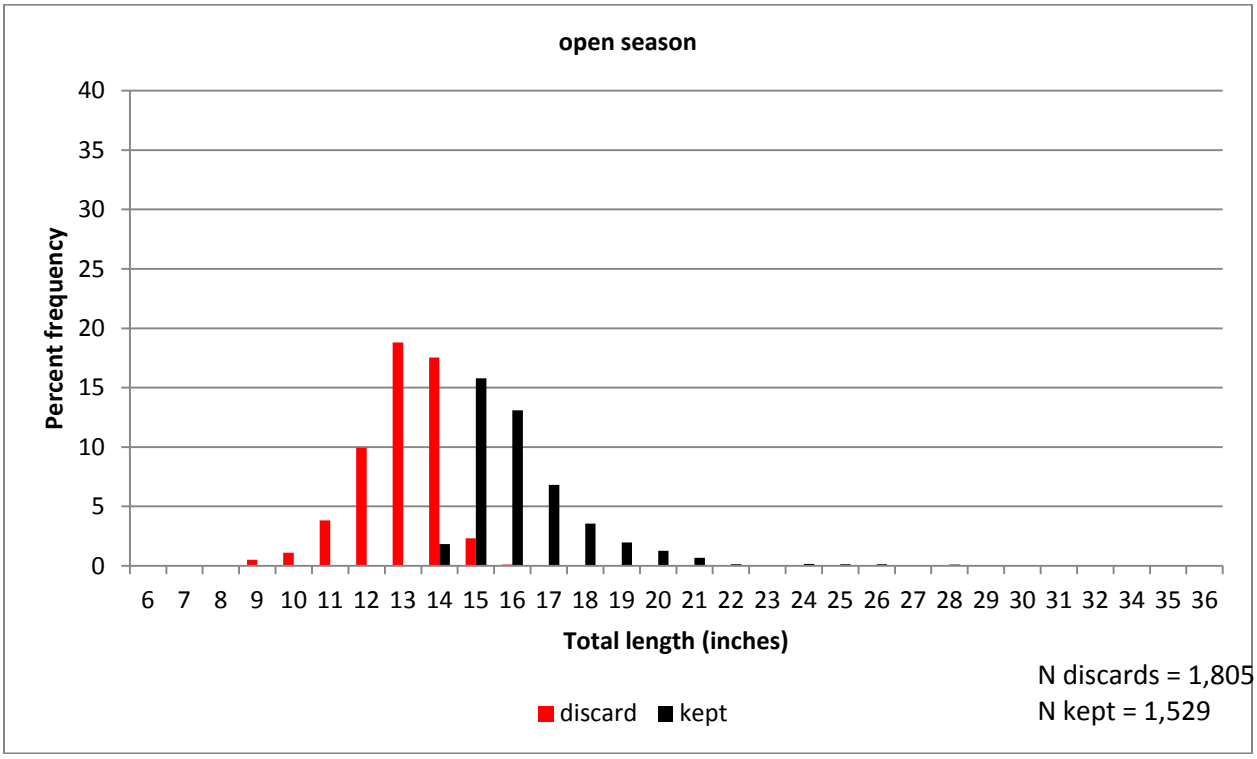


Figure 4. Commercial bottom longline eastern Gulf of Mexico observed red snapper size composition by red snapper allocation. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

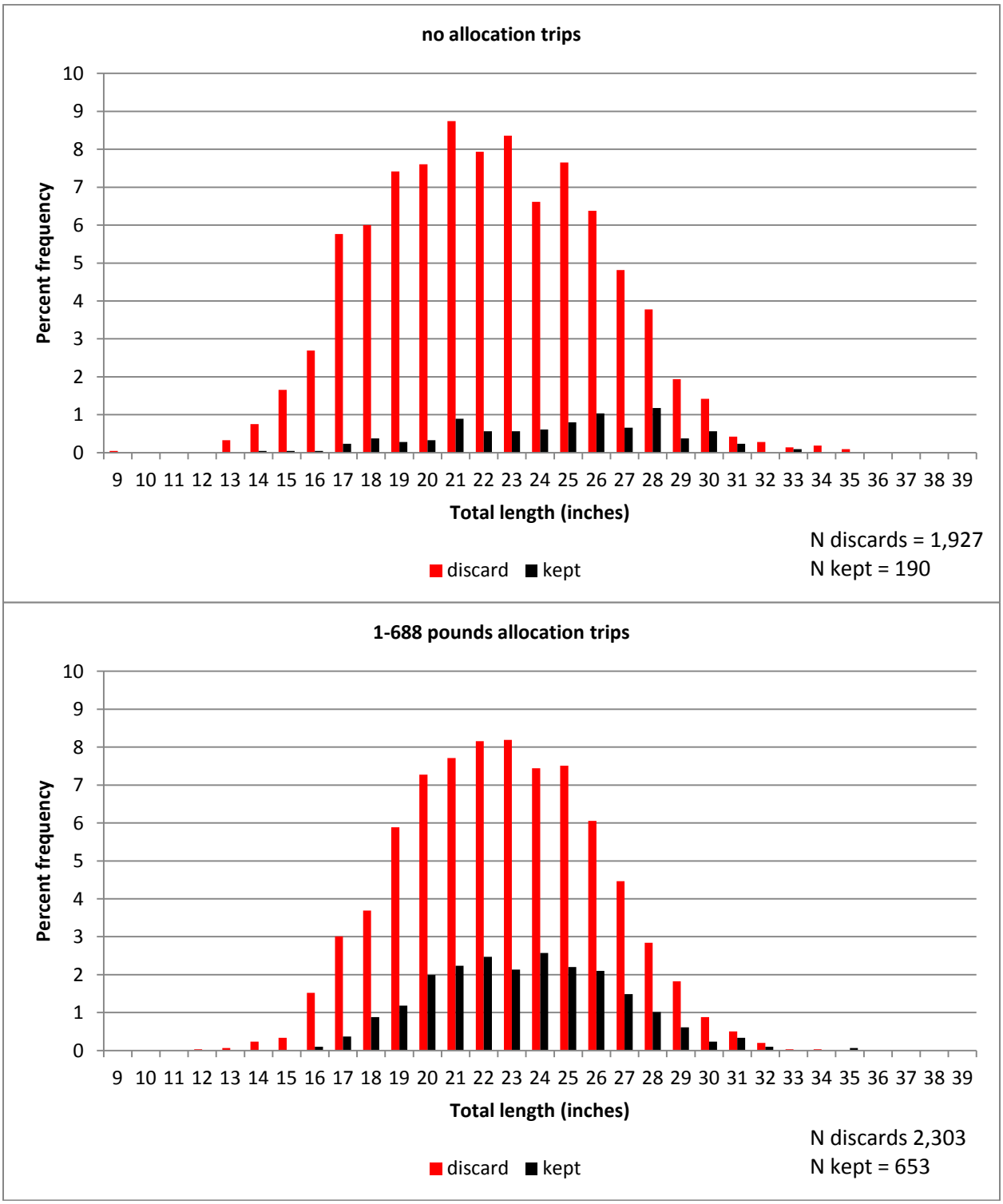


Figure 4. Commercial bottom longline eastern Gulf of Mexico observed red snapper size composition by red snapper allocation, continued.

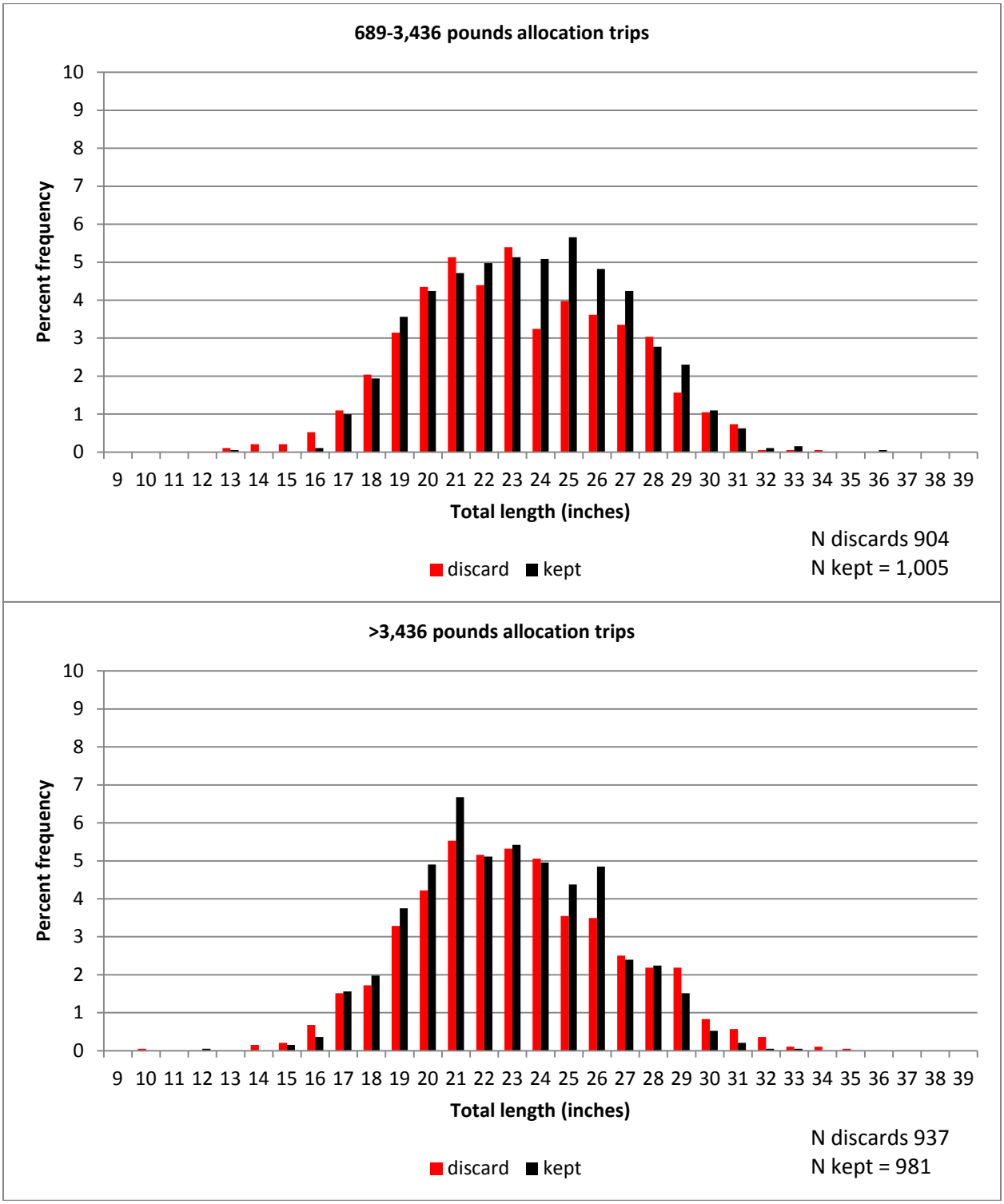


Figure 5. Commercial bottom longline western Gulf of Mexico observed red snapper size composition by red snapper allocation. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches. Data from trips with no allocation and from trips with 17,909-28,810 pounds of allocation cannot be shown due to confidentiality restrictions.

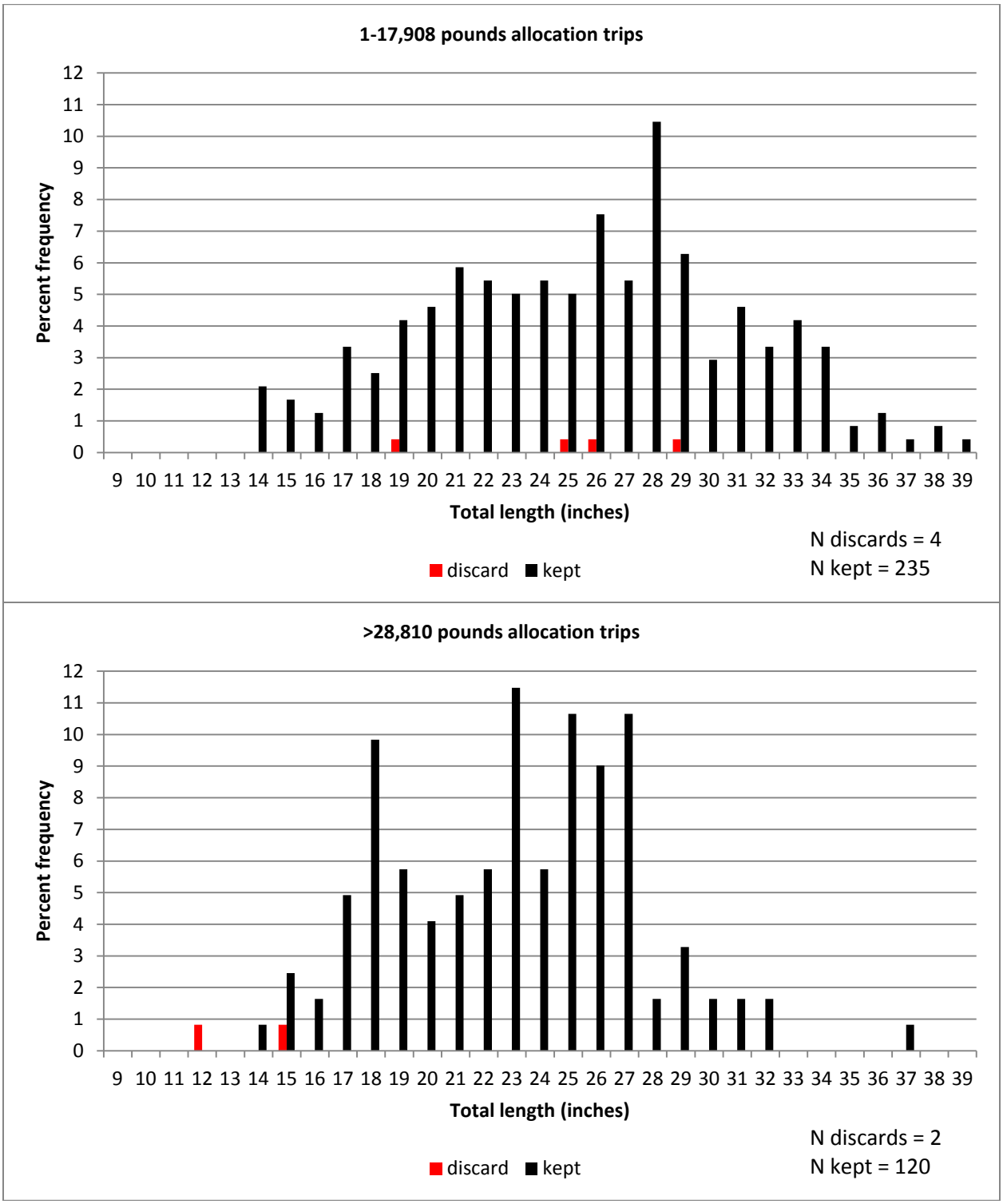


Figure 6. Commercial vertical line eastern Gulf of Mexico observed red snapper size composition by red snapper allocation. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

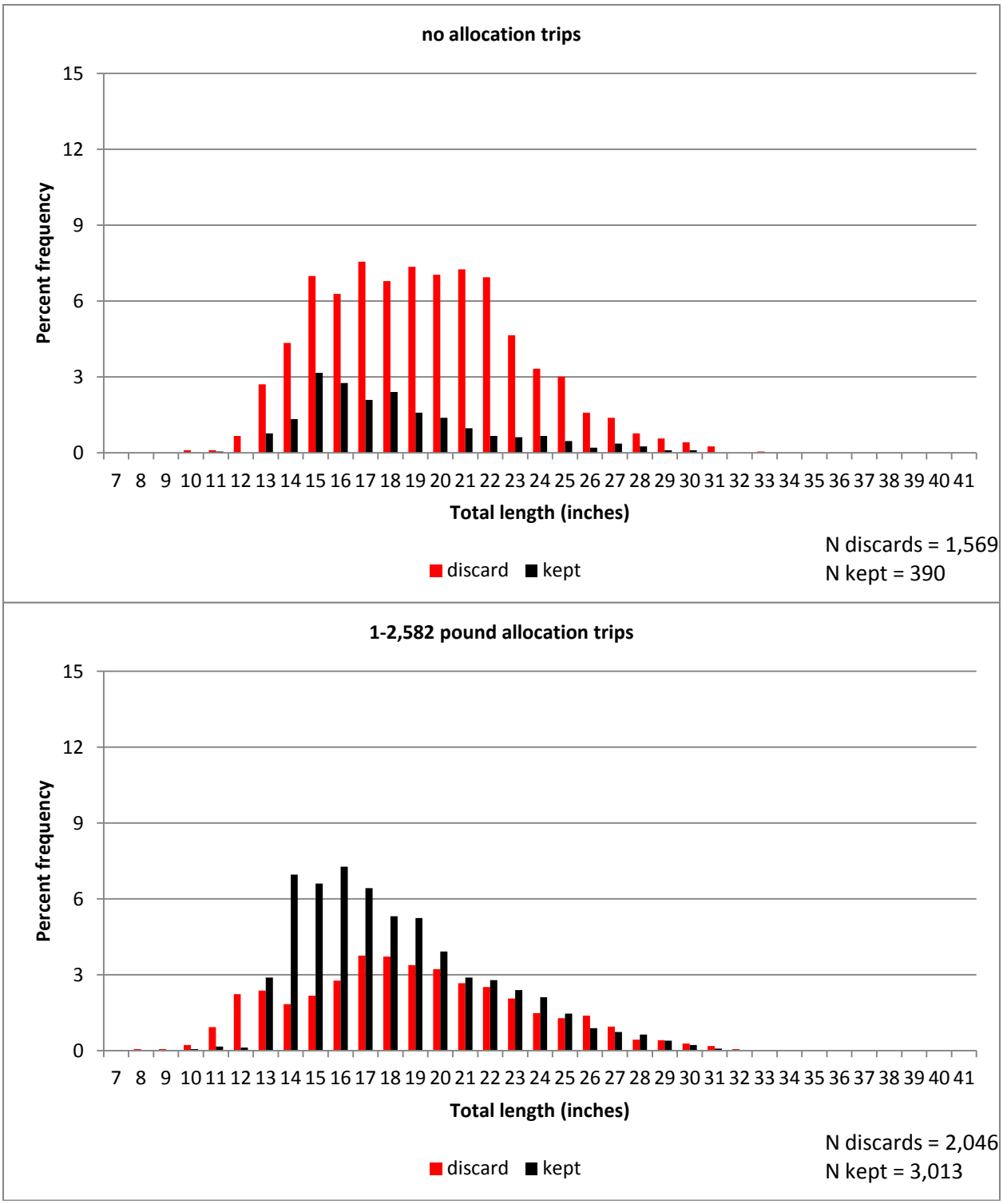
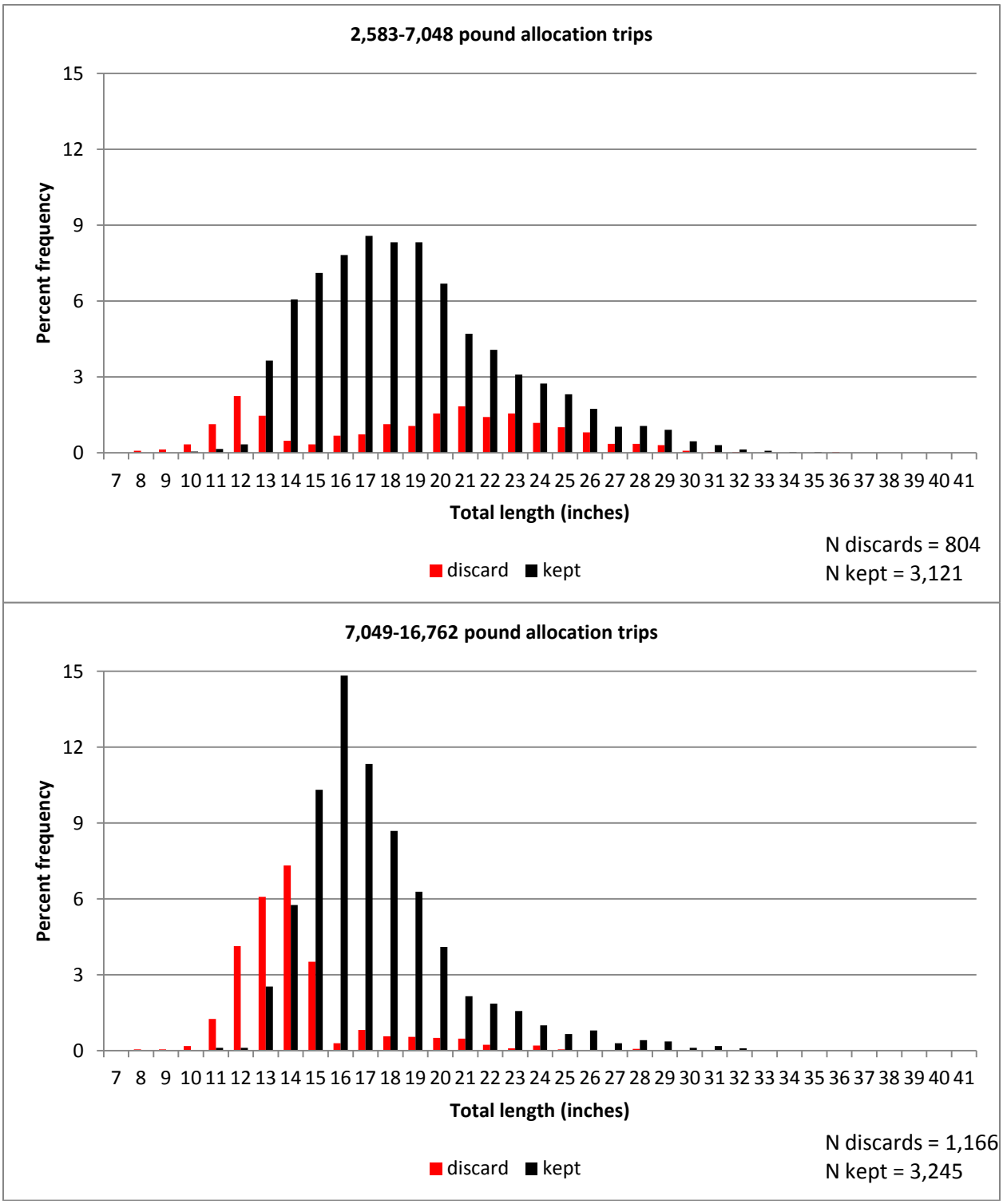


Figure 6. Commercial vertical line eastern Gulf of Mexico observed red snapper size composition by red snapper allocation, continued.



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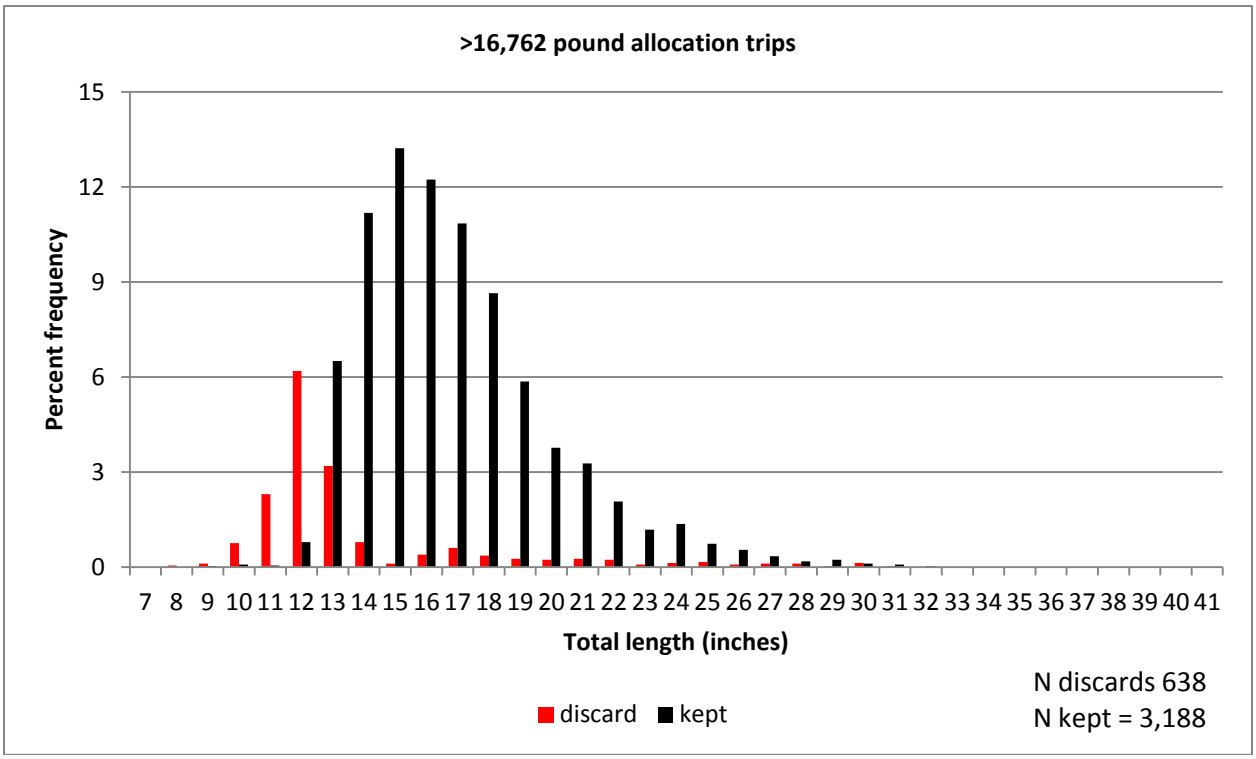


Figure 7. Commercial vertical line western Gulf of Mexico observed red snapper size composition by red snapper allocation. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

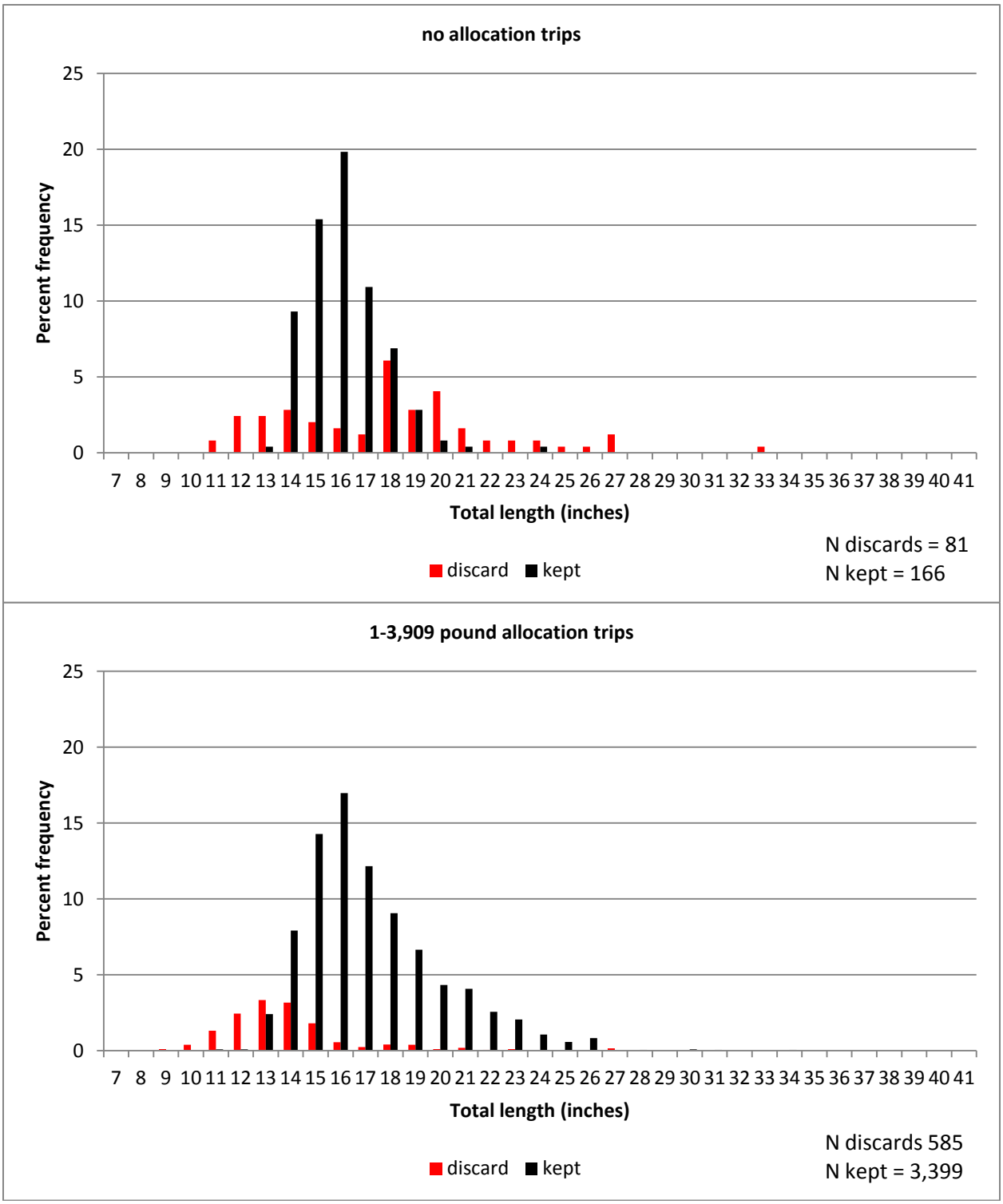


Figure 7. Commercial vertical line western Gulf of Mexico observed red snapper size composition by red snapper allocation, continued.

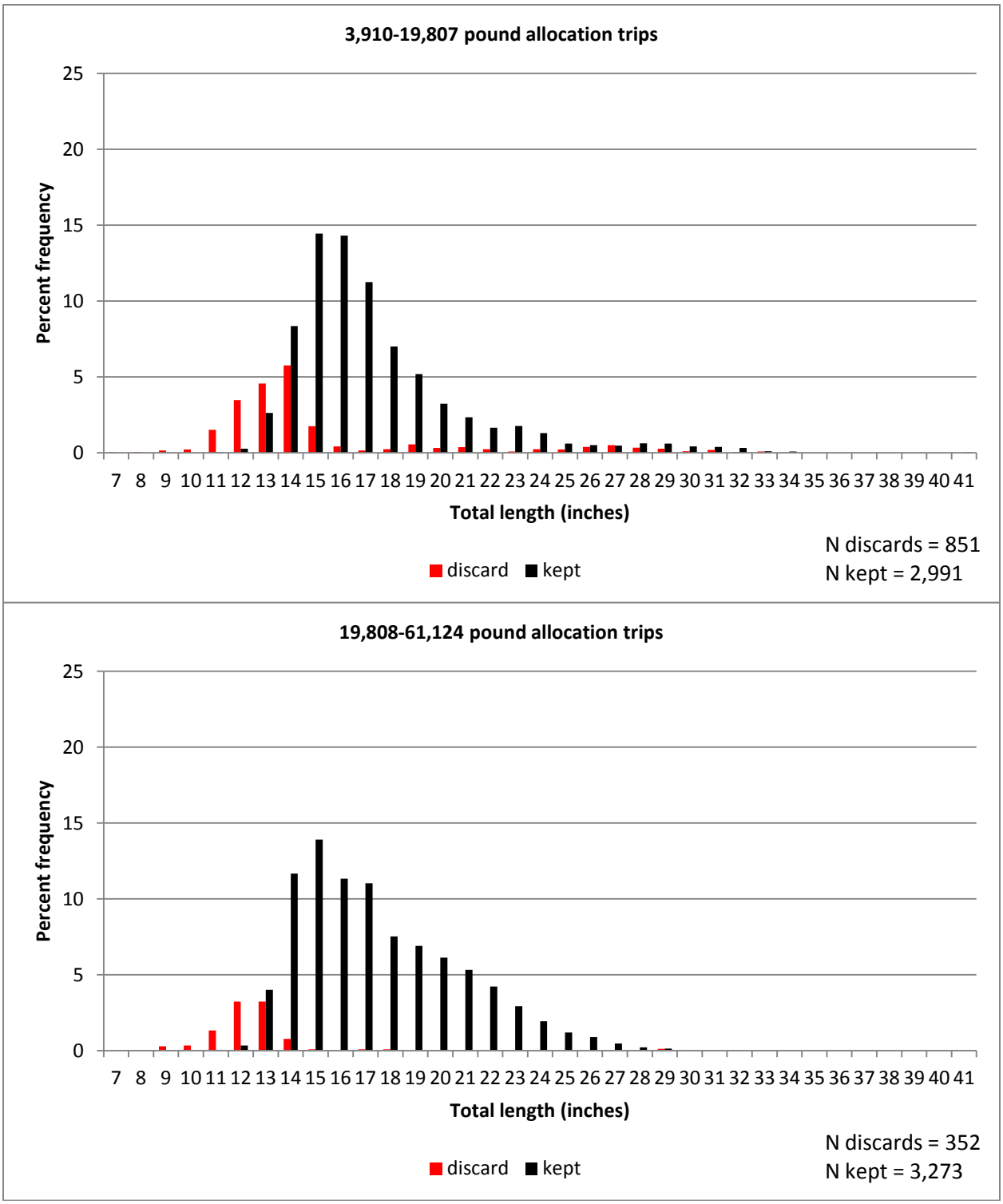


Figure 7. Commercial vertical line western Gulf of Mexico observed red snapper size composition by red snapper allocation, continued.

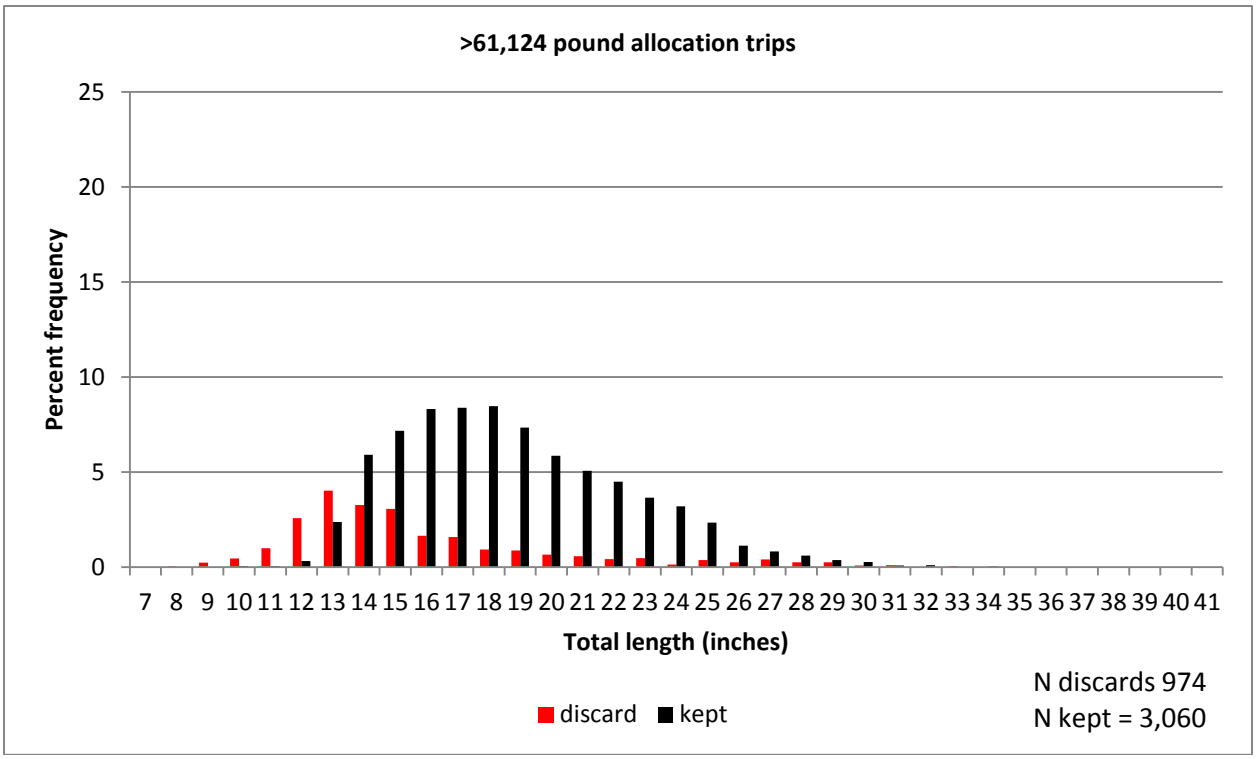


Figure 8. Commercial bottom longline eastern Gulf of Mexico observed red snapper size composition by year. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches. Data from 2008 cannot be shown due to confidentiality restrictions.

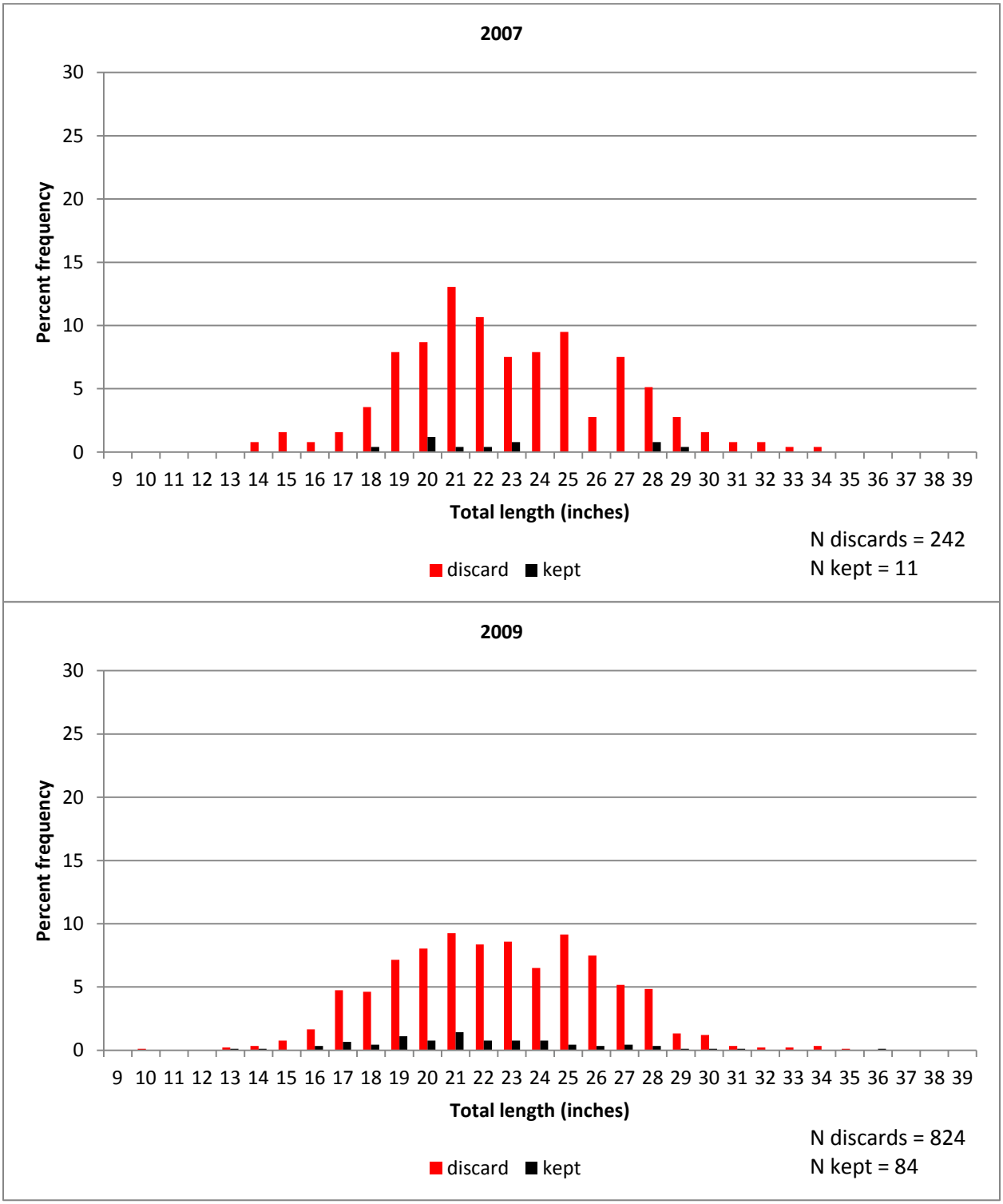


Figure 8. Commercial bottom longline eastern Gulf of Mexico observed red snapper size composition by year, continued.

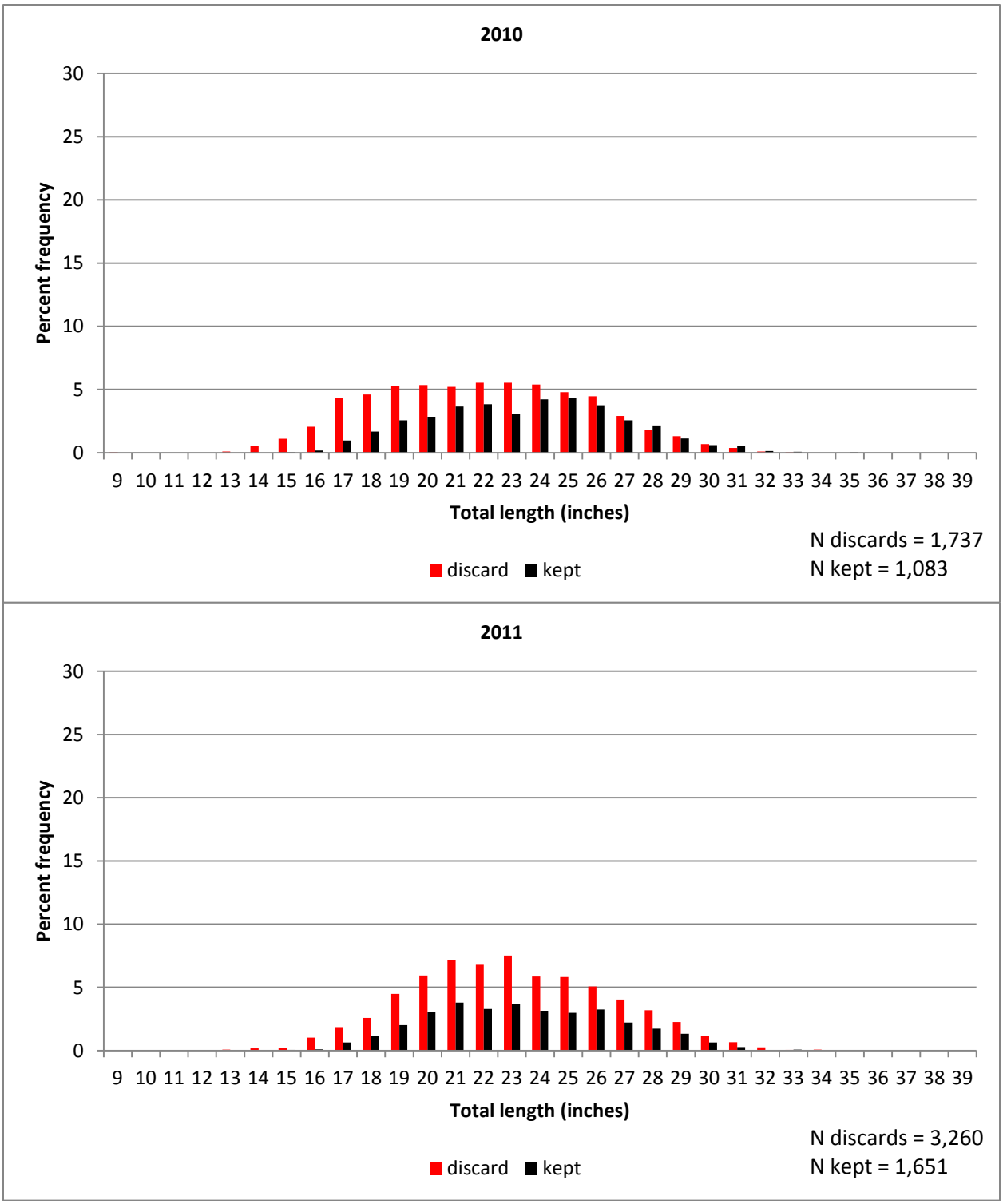


Figure 9. Commercial bottom longline western Gulf of Mexico observed red snapper size composition by year. No western Gulf of Mexico bottom longline trips had observers onboard during 2007. Data from 2008 cannot be shown due to confidentiality restrictions. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

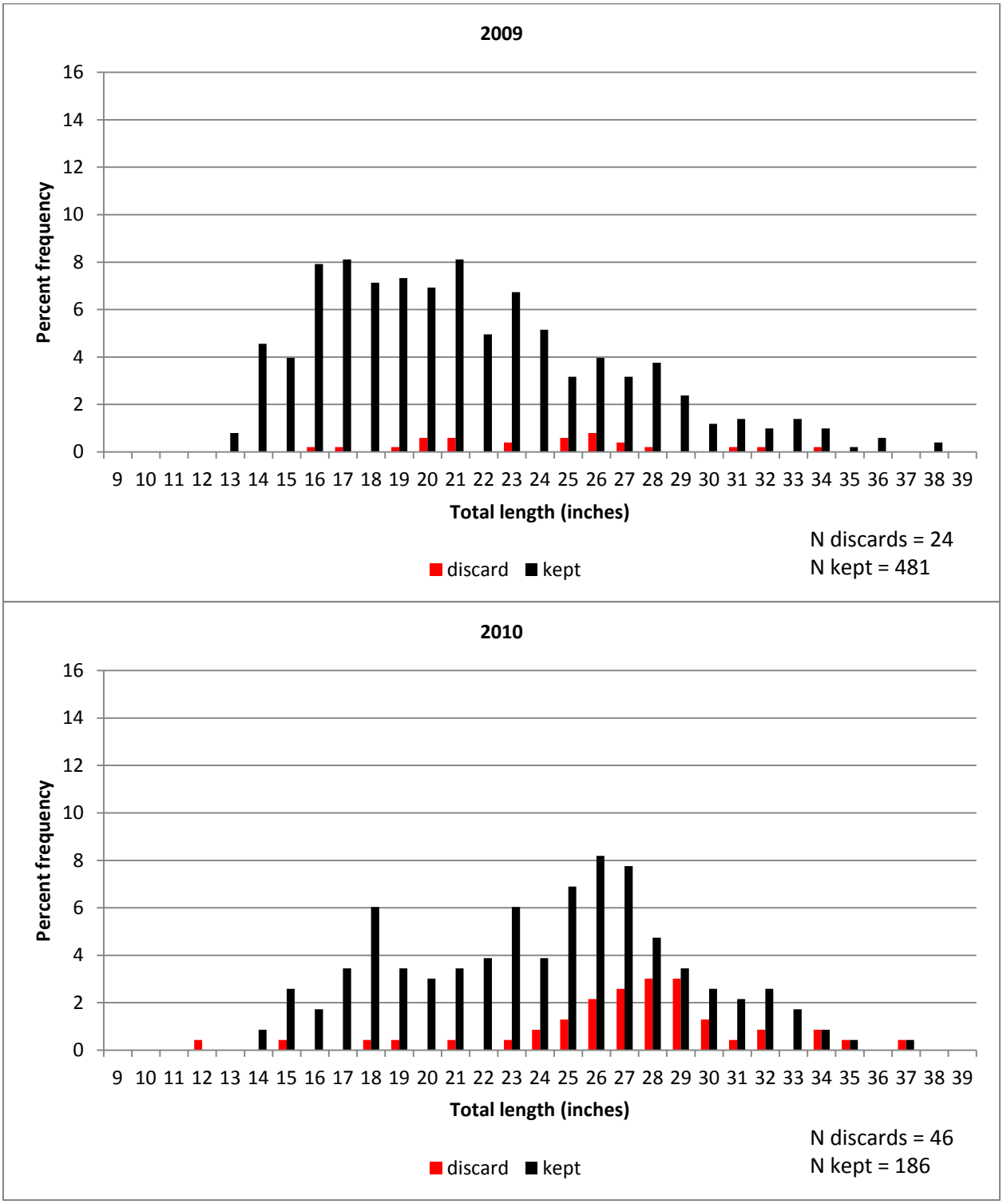


Figure 9. Commercial bottom longline western Gulf of Mexico observed red snapper size composition by year, continued.

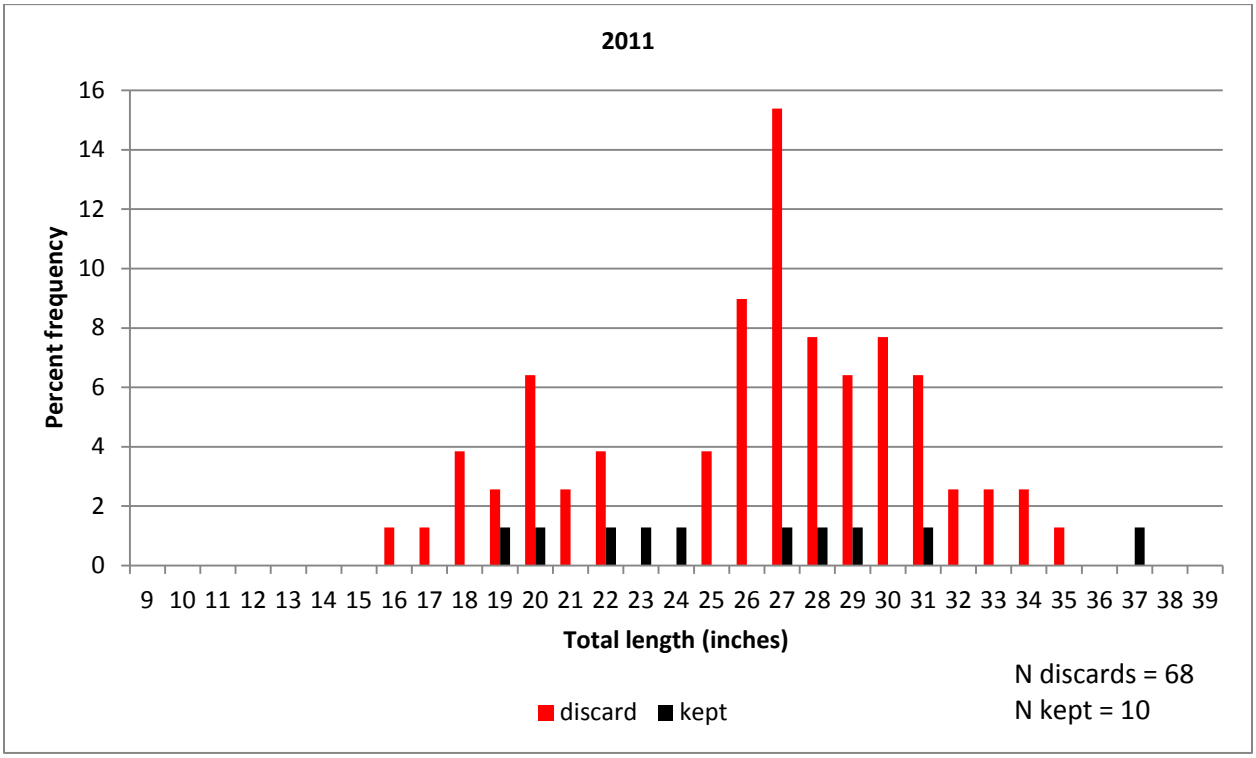


Figure 10. Commercial vertical line eastern Gulf of Mexico observed red snapper size composition by year. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

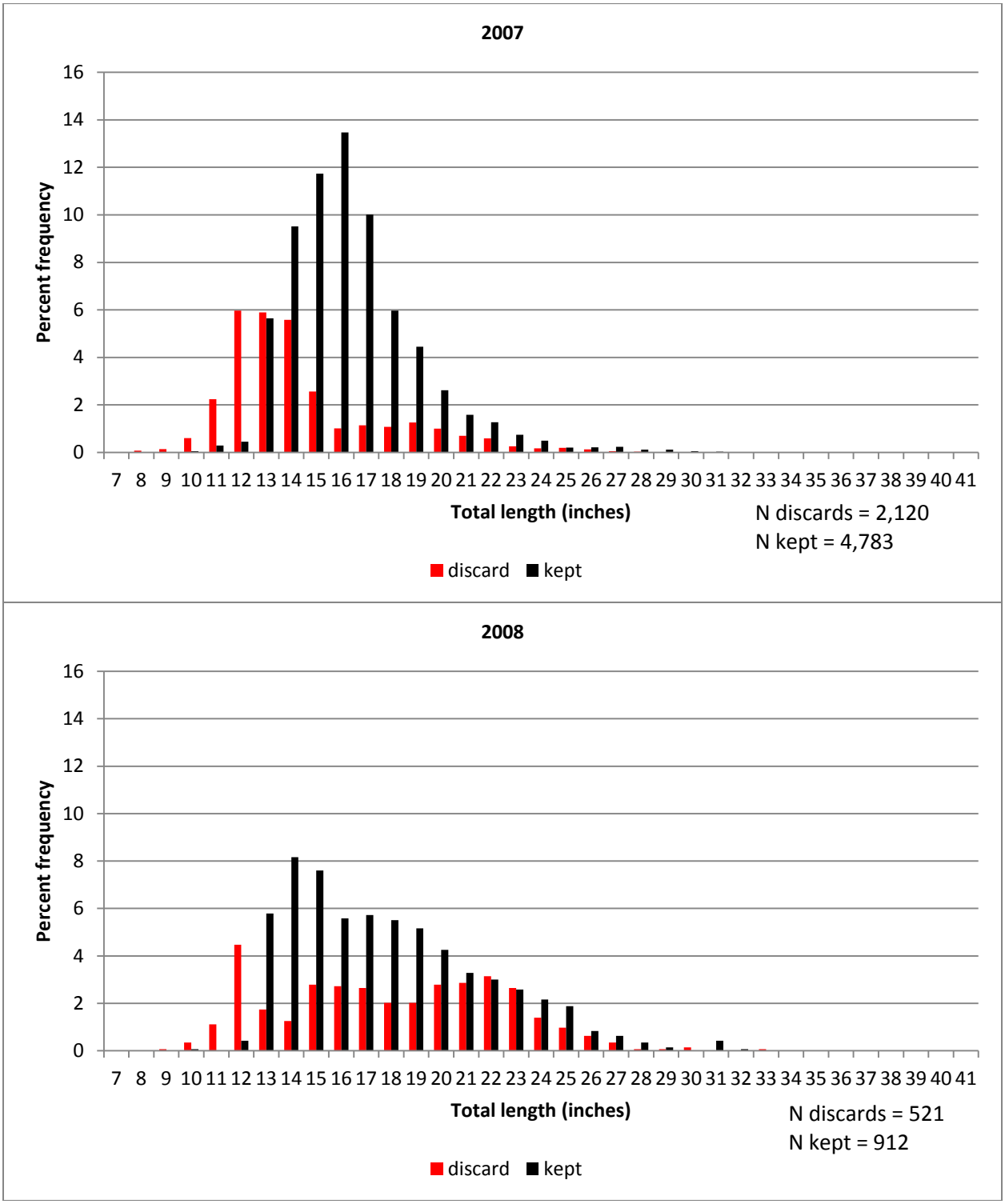
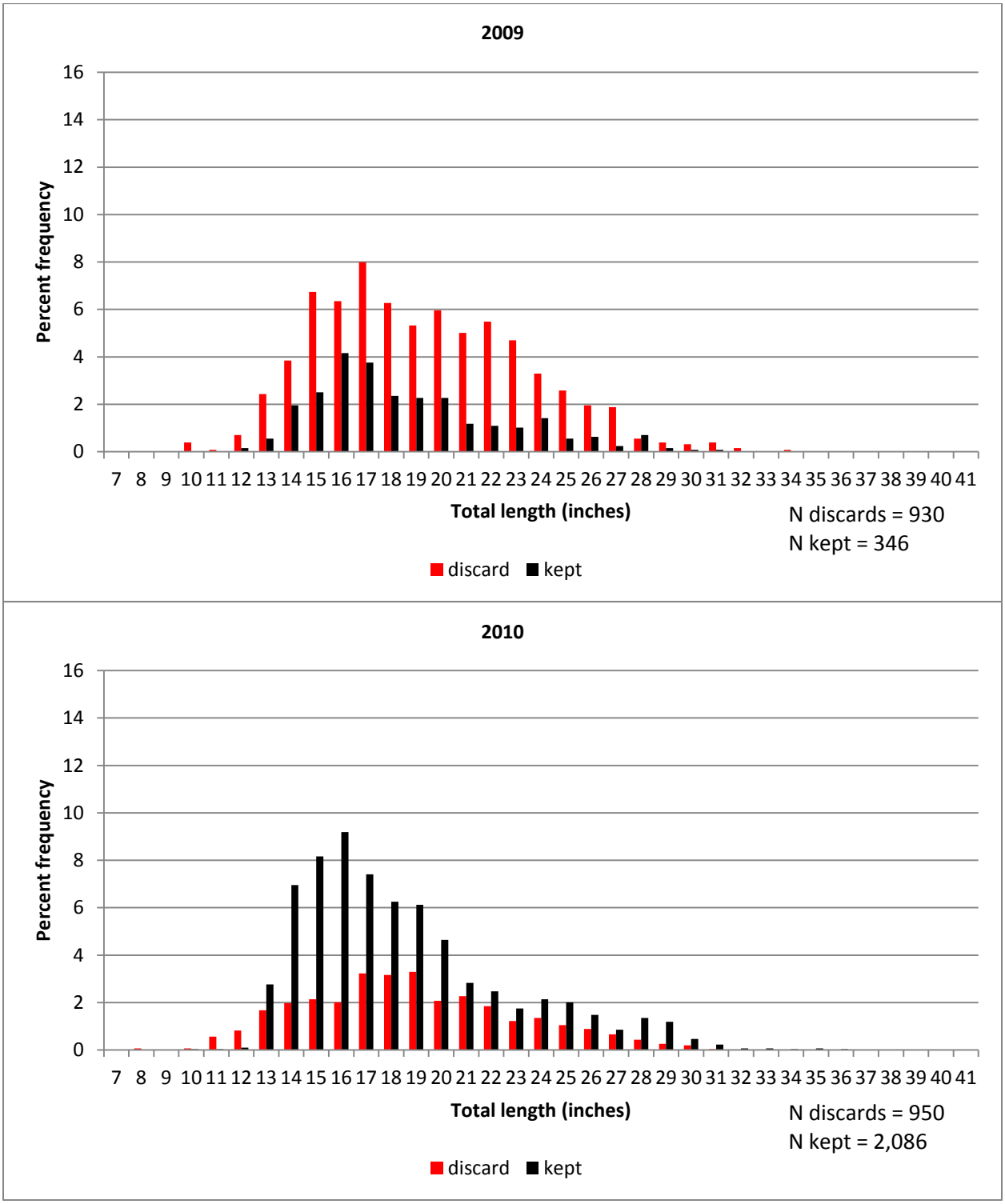


Figure 10. Commercial vertical line eastern Gulf of Mexico observed red snapper size composition by year, continued.



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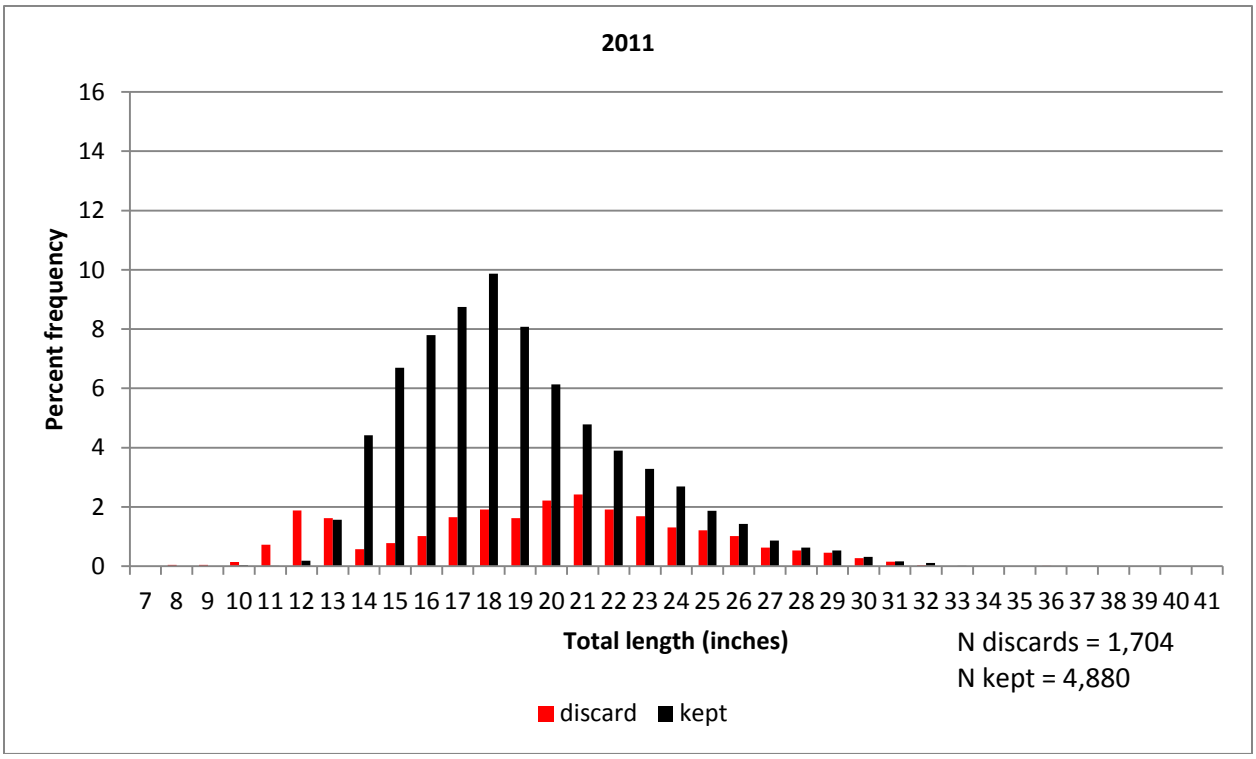

Figure 11. Commercial vertical line western Gulf of Mexico observed red snapper size composition by year. Sizes are in inches total length, where bins are one inch increments; e.g., 15 = 15-15.99 inches.

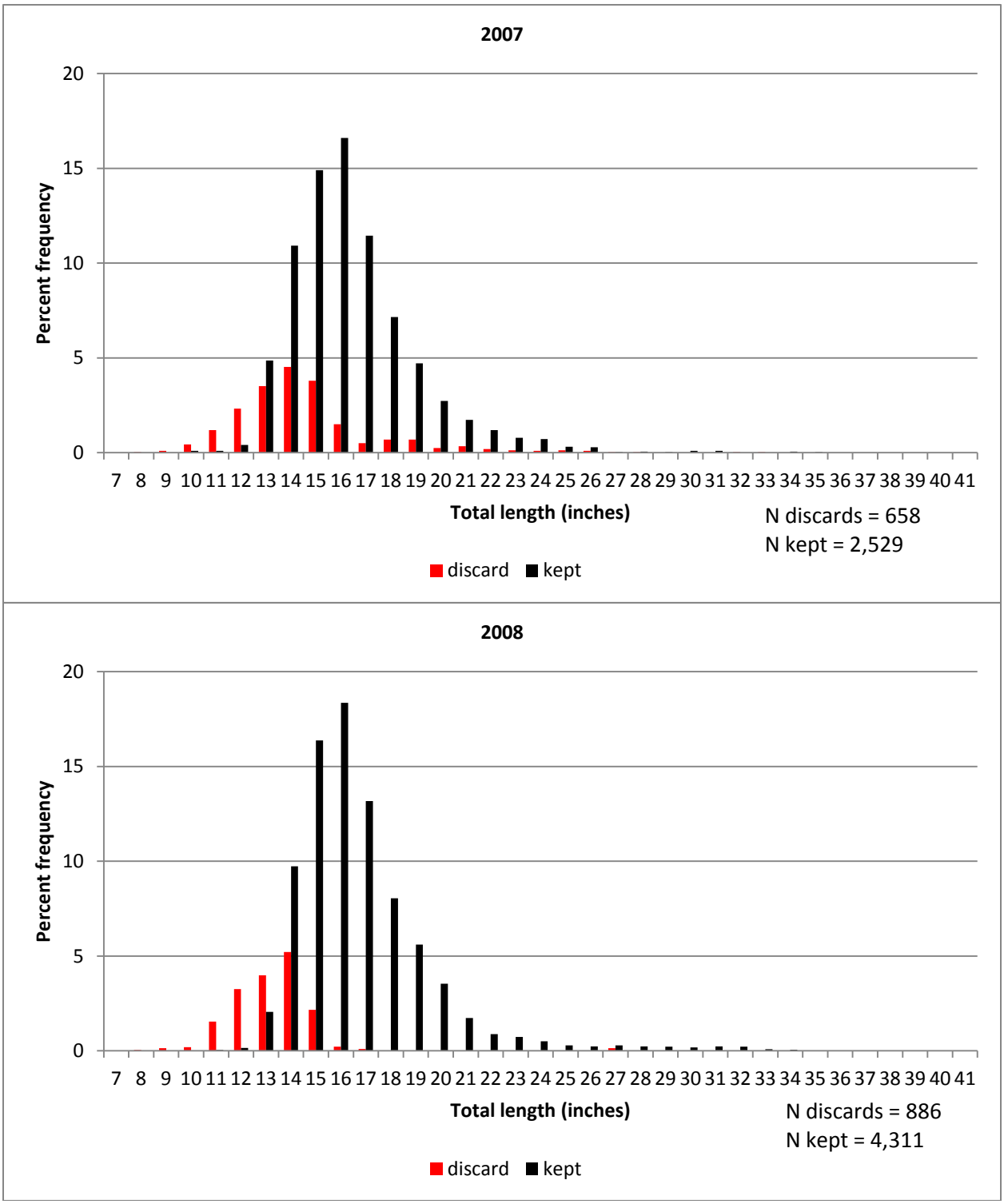

Figure 11. Commercial vertical line western Gulf of Mexico observed red snapper size composition by year, continued.

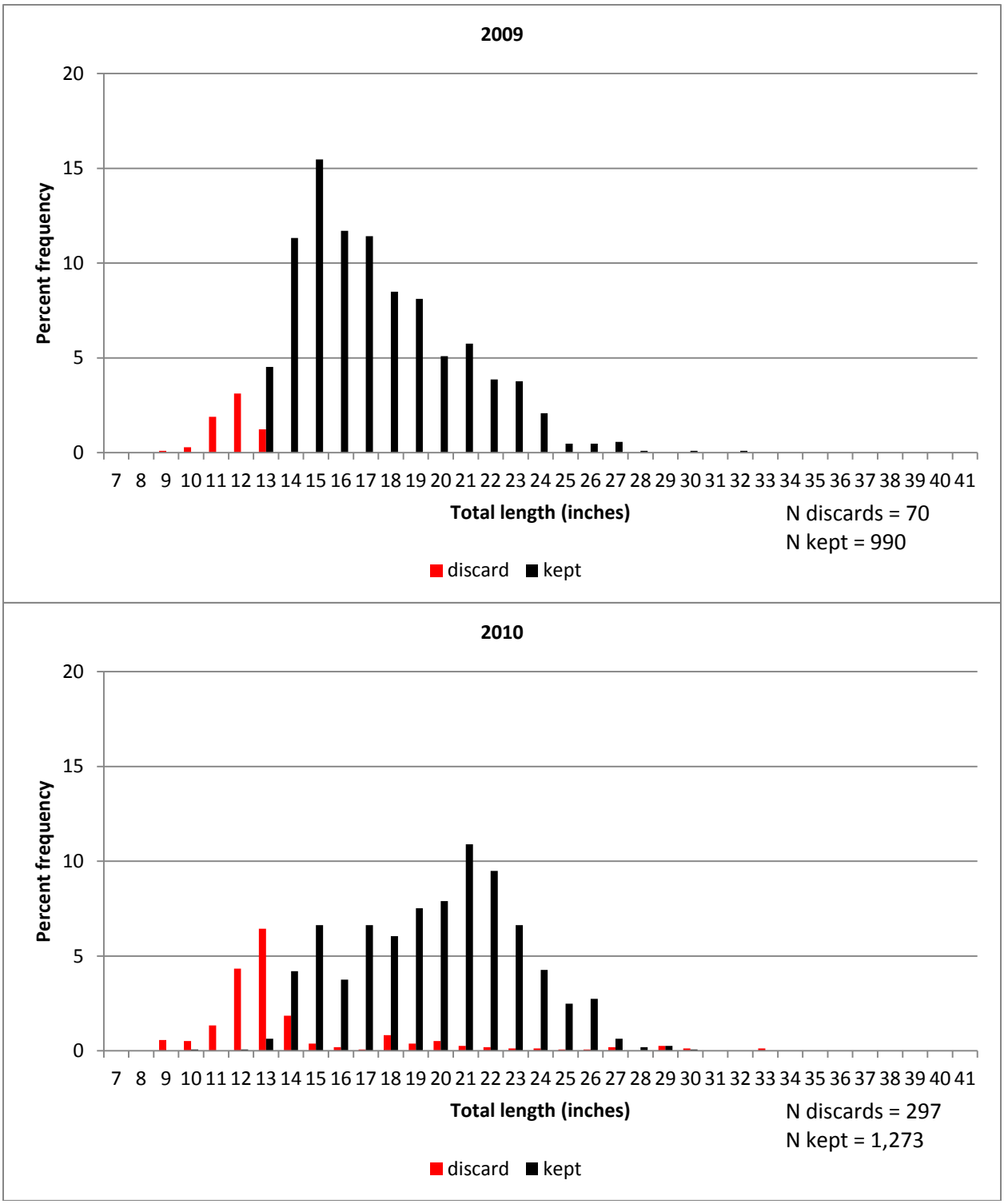

Figure 11. Commercial vertical line western Gulf of Mexico observed red snapper size composition by year, continued.