Length Frequency Analysis and Calculated Catch at Age Estimations for Commercially Landed Gray Triggerfish (*Balistes capriscus*) From the Gulf of Mexico

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SEDAR 9-DW-11

Preliminary Draft

National Marine Fisheries Service
Sustainable Fisheries Division
Contribution Number SFD-2005-20

Introduction

The distribution of length and age within a given population is critical information often used in the assessment of that population. The Trip Interview Program (TIP), developed and facilitated by the National Marine Fisheries Service Southeast Fisheries Science Center collects size frequency and age at length data. Port agents in the southeastern United States visit docks and fish houses where they interview the fisherman and take length and weight measurements of the catch. Port agents are either stationed at the location where the fish are unloaded and are able to measure each fish as it is landed, or if the fish have already been unloaded, the port agents then measure a sample of the catch from the storage containers within the fish house. Whenever possible, a captain or crewmember are interviewed to obtain information about the fishing trip, including area fished, gear, etc. Hard part and tissue samples are sometimes obtained from species and sent to the lab for age based or genetic analysis. Commercially sampled gray triggerfish length and weight information gathered by the TIP program were analyzed to ascertain length frequency and estimated catch at calculated age across various strata. No genetic or hard part samples are available through the TIP program for gray triggerfish (SEFSC Website 2005).

Methods

Data for the gray triggerfish species from the Gulf of Mexico demersal fishery was extracted from the TIP database. Database statisticians preliminary removed obvious outliers before the data was distributed for analysis (Chih, Personal Communication, 2005). A clean set of length and corresponding weight values were obtained through cleaning the data and eliminating outliers. The first step in this process was to remove any records located outside of the Gulf of Mexico management area. Area within the data was either defined using the NMFS shrimp codes or the four digit NMFS lat-long codes. In order to discern which areas are located within the management area, records with the NMFS shrimp code were retained and those records with the four-digit NMFS lat-long code were edited. NMFS lat-long codes located within the Gulf of Mexico management area were converted to their corresponding NMFS shrimp code, while those area codes located within the Atlantic or outside of the United States exclusive economic zone (EEZ) were removed. Table 1 shows the different area codes that were found within the data and whether they were removed, or the value to which they were converted.

Calculation of Weight-Length Relationship

Once the data was constrained to the Gulf of Mexico management area, the length and weight values had to be converted such that they are all in the same units, inches and pounds respectively. Those data where weight equaled zero were removed. In addition, the length units were in both total or fork length, and the weight units were in both whole or gutted weight. Consequently, the following conversion factors from Goodyear and Thompson (1993) had to be applied to obtain total length (TL), where length is in inches:

$$TL = 1.214FL - 0.754$$
$$FL = 0.621 + 0.824TL$$

Whole weight (WW) was obtained by applying the conversion factor for gray triggerfish used by the Fisheries Logbook System (FLS), where once weight is in pounds:

$$WW = 1.04GW$$

$$GW = WW/1.04$$

Once the length and weight data was in a uniform unit of measurement, the data was plotted and a nonlinear regression was used to perform an initial fit of the weight length relationship:

$$WW = aTL^b$$

with total length in inches and whole weight in pounds. Residuals were calculated for this initial fit and the frequency distribution of the residuals was calculated. The upper and lower 0.5 percentile of the residuals was removed and a nonlinear regression using the weight to length relationship was calculated with the remaining data yielding parameters for the relationship.

Length Frequency Analysis

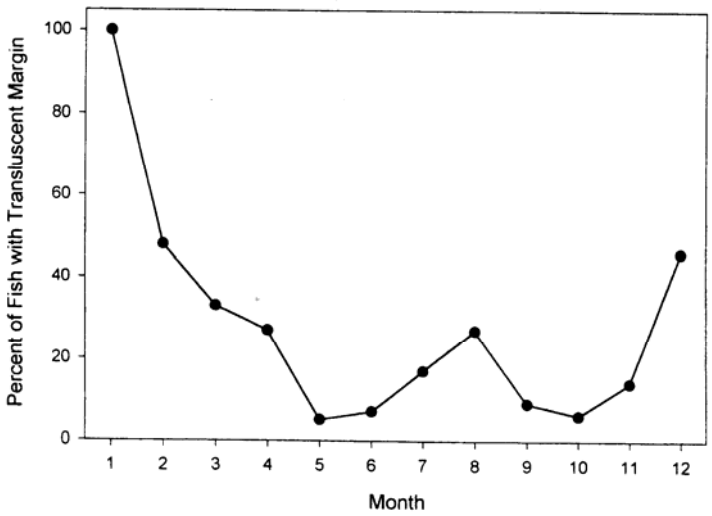
An analysis of length frequency across various strata was performed to ascertain whether differences in length are present. Since weight is not needed in this analysis, the records where weight equals zero but length is present were included. Records determined as outliers in the above calculations were not used in the length frequency analysis. Length frequency was calculated across the following strata: year, state, gear, region, and shrimp code area, as well as the interactions between year and gear, year and region, and year and state. The mean, 95 and 50 percent confidence intervals, and standard deviation were calculated for each stratum and the interactions. Results are displayed in box plots and in the diagrams in Appendix C.

Catch at Calculated Age

The length values used in the length frequency analysis were used to back calculate estimated age using the von Bertalanffy relationship provided by Ingram (2001) for Gulf of Mexico gray triggerfish, combined sexes:

$$L_t = 583(1-e^{(-0.1830(t + 1.5786))})$$

The marginal increment analysis performed on the spines used to derive the above von Bertalanffy relationship suggested that a spine "annulus is formed from December through February and a spawning check or false annulus is formed in August" (Ingram 2001).



Monthly percent frequency of a translucent margin in the first dorsal spine of gray triggerfish (Ingram 2001)

Given the range of time during which a ring may be formed, and based on the above figure illustrating the percent frequency of fish with annuli each month, it was decided that by the middle of February, most fish could be said to have formed an annulus. With this information, the von Bertalanffy growth equation was off set such that fish change from one age to another the middle of February. To accomplish this, the parameter t_0 in the growth equation had to be changed using the following formula:

$$t_{new} = t_0 - \frac{\text{marking month}}{12}$$

where the marking month is equal to the middle of February, or the value 2.5. The von Bertalanffy growth equation that resulted was the following:

$$L_t = 583(1\text{-}e^{(-0.1830(t + 1.78693))})$$

Age was calculated for each length value using the altered von Bertalanffy equation, and the resulting decimal was truncated to yield an integer representing the age of the animal (for example 5.768 → 5 year old). The percentage of each age group was calculated across various strata including year, month, quarter, gear, region, state and NMFS shrimp area code. To perform all calculations, the software JMP IN (Copyright 2004 SAS Institute, version 5.1.2) and Microsoft Office (Copyright 2000 Microsoft Corporation) were used.

Results and Discussion

In the TIP database for the Gulf of Mexico, gray triggerfish are the fifth most frequently sampled species by the number of individuals sampled (Figure 2). For members of the triggerfish family in the TIP database, the majority of the records are defined at the species level, the majority of which are gray triggerfish (Table 1). During the analysis, only those records listed specifically as gray triggerfish were used. The specific gear code classification for those gears that captured gray triggerfish in the TIP database was designated as either hook and line, traps or other for purposes of analysis (Table 6). The number of gray triggerfish captured using each of these gear designations

indicates that hook and line is the prominent means of capturing this species (Figure 3). Spatially, the data suggests that the other two gear designations, traps and other, are found only in the Eastern Gulf of Mexico; those individuals captured in the Western Gulf of Mexico appear to be captured exclusively by hook and line (Figure 4).

Calculation of Weigh Length Relationship and Parameters

Initial nonlinear regression fit of the weight length relationship for those data containing a positive length and weight value greater than zero reveals the outliers within the data (Figure 5). The frequency of the resulting residuals is illustrated in Figure 6. The upper and lower 0.5 percentile of the residuals were eliminated resulting in the removal of 69 records (or 0.99% of the data) out of 6,954 total records, the remaining data after the records where weight equals zero is removed. Nonlinear regression of the resulting data resulted in the calculation of a growth curve (Figure 7) and parameters (Table 5).

Length Frequency Analysis

Length frequency analysis across the years in the time series reveals only slight variations in mean size (Figure 8). Month and season show slight variation with mean size in fall being slightly smaller (Figures 9 through 14). Regionally, the east appears to capture smaller individuals than in the west, with the exception of the early years when sample size was smaller (Figures 15 through 17). Stratified by state, Florida has been sampled more frequently than the other states and trends across a particular state could be driven by sample size in some cases (Figure 18 through 23). As illustrated in Figure 4, the data suggests that there may be a stratification of gear used to capture gray triggerfish by region, where the Eastern Gulf of Mexico catches gray triggerfish with more diverse gear than in the Western Gulf where it is predominantly hook and line. The partition of length data by gear reveals that larger individuals tend to be captured by those gear codes designated as other (see Table 6), while smaller individuals tend to be captured in traps (Figures 24 through 27). Finally, stratification of the length data by NMFS shrimp code reveals specific differences in size by each area, particularly in the eastern half of the Gulf (codes 1 through 12, see Figure 1) where there is great variability from one shrimp grid to the next (Figure 28).

Catch at Calculated Age

Since the catch at calculated age is a function of the length, similar patterns to those illustrated in the length frequency analysis will be present. Across year, month and quarter, there is little difference in the catch at calculated age (Figures 29 though 31). For gear, it is apparent that hook and line captures older individuals than traps, while those gears classified as other (see Table 6) capture a distribution of ages (Figure 32). Across region there is only little difference in the catch at calculated age (Figure 33), while across state there is some variability (Figure 34). Catch at calculated age across the NMFS shrimp codes varies greatly, as was observed when analyzing length frequency across this stratum (Figure 35).

It is important to note that according to a study by Ingram (2001) on gray triggerfish stock structure in the Gulf of Mexico, differences in von Bertalanffy growth parameters exist from one area to another. This disparity is hypothesized to be due to

differences in estimated mortality rates due to different levels of exploitation as calculated in the Ingram study, and other gray triggerfish studies done elsewhere in the Gulf of Mexico (Johnson and Saloman 1984; Hood and Johnson 1997). Such differences in growth, mortality and exploitation requires that the catch at calculated age values presented in this paper be considered with caution, and perhaps recalculated on a more area specific (rather than Gulf-wide) basis using area-specific growth parameters (Ingram 2001).

Literature Cited

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Appendix A: Tables

Area Code Found	New Defined Area	Area Code Found	New Defined Area
0	removed	2683	4
1	1	2684	4
2	2	2696	21
3	3	2733	removed
4	4	2782	5
5	5	2783	5
6	6	2784	5
7	7	2785	5
8	8	2786	5
9	9	2789	13
10	10	2790	14
11	11	2791	15
12	12	2793	17
13	13	2794	18
14	14	2795	20
15	15	2832	removed
16	16	2883	6
17	17	2884	6
21	21	2885	6
22	22	2888	11
90	removed	2889	13
744	removed	2890	14
748	removed	2891	15
2382	removed	2892	16
2384	removed	2893	17
2389	removed	2894	18
2481	removed	2985	8
2482	2	2986	9
2483	2	2987	10
2582	3	2988	11
2583	3	2989	13
2584	3	2990	14
2586	3	2991	15
2682	4	3086	9
		3087	10

Table 1: Areas removed or converted to NMFS Gulf of Mexico shrimp codes.

YEAR	Total Trigger (# fish)	Trigger sp. (# of fish)	Gray Trigger (# of fish)	Queen Trigger (# of fish)	Ocean Trigger (# of fish)	% spec. specific	of sp defined % gray	of sp defined % queen	of sp defined % ocean
1984	18	0	18	0	0	100%	100%	0%	0%
1985	1	0	1	0	0	100%	100%	0%	0%
1986	4	4	0	0	0	0%	0%	0%	0%
1988	28	28	0	0	0	0%	0%	0%	0%
1989	41	0	6	0	35	100%	15%	0%	85%
1990	474	15	438	9	12	97%	95%	2%	3%
1991	1103	145	946	10	2	87%	99%	1%	0%
1992	1792	86	1633	7	66	95%	96%	0%	4%
1993	1559	141	1381	14	23	91%	97%	1%	2%
1994	2283	146	2104	12	21	94%	98%	1%	1%
1995	1482	10	1452	16	4	99%	99%	1%	0%
1996	1244	5	1227	8	4	100%	99%	1%	0%
1997	1060	8	1022	20	10	99%	97%	2%	1%
1998	1066	181	865	7	13	83%	98%	1%	1%
1999	1451	708	710	14	19	51%	96%	2%	3%
2000	894	455	430	9	0	49%	98%	2%	0%
2001	1050	5	1029	15	1	100%	98%	1%	0%
2002	770	0	761	8	1	100%	99%	1%	0%
2003	605	0	584	21	0	100%	97%	3%	0%
					AVG 1989-	88%	91%	1%	8%
					AVG 1990-	87%	98%	1%	1%

Table 2: Partition of the number and percent of fish in the TIP Gulf of Mexico data labeled as belonging to the Triggerfish family, and of those individuals, the number and percentage of fish that were further defined on the species level as either gray, queen or ocean triggerfish.

Parameter	Preliminary Estimate	Low	High
a	0.002002	0.00111168	0.00289231
b	2.54088256	2.39166131	2.69010381

Table 3: Initial parameter estimates for a weight to length relationship fit by nonlinear regression to all data containing a length and a weight value greater than zero (n = 6,954 fish).

Quanties			Moments	
100.00%	maximum	25.6141185	Mean	-0.0201645
99.50%		2.3219937	Std Dev	1.30456423
97.50%		1.00819022	Std Err Mean	0.01564401
90.00%		0.3749319	upper 95% Mean	0.01050257
75.00%	quartile	0.05702121	lower 95% Mean	-0.0508315
50.00%	median	-0.1349932	N	6954
25.00%	quartile	-0.2829367		
10.00%		-0.4401335		
2.50%		-0.7984931		
0.50%		-1.7516762		
0.00%	minimum	-14.982264		

Table 4: Distribution of the residuals resulting from calculated length weight relationship prior to removal of outliers.

Parameter	Final Estimate	Low	High
a	0.00104723	0.00090241	0.00119205
b	2.75709575	2.71072622	2.80346528

Table 5: Final parameter estimates for a length weight relationship fit by nonlinear regression to data from which residuals in the upper and lower 0.5 percentile were removed (n = 6,885 fish).

TIP Code	Gear Description	# of Gray Trigger	Designated As
0	Unknown	36	Other
215	Otter Trawl Bottom, Shrimp	2	Other
300	Pots and Traps Cmb.	9	Traps
330	Pots and Traps, Crab, Blue	12	Traps
333	Pots and Traps, Crab, Other	22	Traps
345	Pots and Traps, Fish	1310	Traps
600	Troll and Hand Lines, Cmb.	28	Other
610	Lines Hand	643	Hook and Line
611	Rod and Reel	2346	Hook and Line
612	Mannual Reel	4370	Hook and Line
613	Electric or Hydraulic Reel	4155	Hook and Line
616	Electric Rod and Reel	608	Hook and Line
660	Lines, Troll	3	Other
665	Lines, Troll Mackerel	7	Other
675	Lines Long Set with Hooks To	3	Other
676	Lines, Long Bottom, Reef Fish	466	Other
943	Diving Outfits, Other	24	Other

Table 6: Gear code classification used for those gears that captured gray triggerfish in the TIP database. For purposes of analysis, each gear code was designated as hook and line, traps or other.

YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13
1990	0.00%	6.00%	28.87%	23.79%	12.93%	8.55%	4.39%	4.85%	2.54%	1.39%	1.15%	1.85%	0.69%	0.69%
1991	0.12%	9.76%	31.41%	28.35%	13.29%	7.06%	2.35%	1.29%	1.53%	0.12%	0.59%	0.59%	0.94%	0.82%
1992	0.25%	7.70%	36.48%	29.88%	14.54%	6.35%	1.73%	0.74%	0.74%	0.37%	0.12%	0.37%	0.12%	0.25%
1993	0.58%	7.71%	27.80%	31.37%	15.65%	7.21%	2.62%	1.82%	1.09%	0.73%	0.80%	0.36%	0.51%	0.36%
1994	0.58%	12.33%	26.79%	24.03%	16.10%	8.66%	5.13%	1.89%	1.45%	0.92%	0.68%	0.48%	0.05%	0.48%
1995	0.14%	15.50%	33.08%	23.67%	13.49%	6.57%	2.63%	2.15%	0.97%	0.76%	0.28%	0.28%	0.21%	0.00%
1996	0.98%	15.14%	30.20%	26.10%	14.73%	5.81%	2.45%	1.55%	1.06%	0.57%	0.57%	0.16%	0.08%	0.33%
1997	1.58%	15.53%	31.16%	24.04%	14.74%	7.02%	3.26%	1.09%	0.40%	0.49%	0.10%	0.00%	0.20%	0.10%
1998	1.08%	21.70%	37.53%	18.35%	9.35%	4.32%	1.44%	1.32%	0.72%	0.96%	0.24%	0.48%	0.36%	0.48%
1999	0.72%	12.23%	34.39%	24.17%	12.52%	4.89%	1.73%	2.01%	1.01%	1.29%	0.72%	0.58%	0.43%	0.72%
2000	0.24%	10.24%	37.86%	24.76%	11.67%	5.71%	1.19%	1.67%	1.67%	1.19%	0.71%	0.00%	0.00%	0.24%
2001	1.00%	14.69%	34.17%	28.47%	10.49%	4.40%	2.30%	1.50%	0.70%	0.60%	0.20%	0.30%	0.10%	0.50%
2002	0.41%	16.32%	35.53%	23.18%	11.25%	5.49%	1.92%	0.69%	1.23%	0.96%	0.27%	0.27%	0.69%	0.41%
2003	1.38%	13.15%	27.51%	24.91%	14.53%	7.09%	2.60%	1.73%	1.38%	1.04%	0.69%	0.69%	0.87%	0.17%
2004	0.00%	9.29%	32.71%	23.42%	10.41%	9.29%	5.58%	1.86%	2.60%	0.74%	0.74%	0.74%	0.37%	0.74%
YEAR	14	15	16	17	18	19	20	21	22	23	24	27	29	39
1990	0.00%	0.69%	0.00%	0.00%	0.00%	1.15%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%
1991	0.00%	0.71%	0.00%	0.00%	0.00%	0.94%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1992	0.06%	0.06%	0.00%	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%	0.06%	0.00%
1993	0.22%	0.29%	0.15%	0.00%	0.29%	0.00%	0.22%	0.00%	0.00%	0.15%	0.00%	0.00%	0.00%	0.07%
1994	0.15%	0.10%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.05%	0.05%	0.00%	0.00%	0.00%	0.00%
1995	0.00%	0.14%	0.00%	0.00%	0.00%	0.00%	0.07%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1996	0.00%	0.08%	0.08%	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1997	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%
1998	0.36%	0.24%	0.48%	0.12%	0.00%	0.12%	0.00%	0.00%	0.00%	0.12%	0.00%	0.12%	0.00%	0.12%
1999	0.29%	0.29%	0.14%	0.43%	0.14%	0.29%	0.00%	0.43%	0.00%	0.43%	0.00%	0.00%	0.00%	0.14%
2000	0.24%	0.48%	0.24%	0.00%	0.48%	0.24%	0.24%	0.24%	0.00%	0.24%	0.00%	0.48%	0.00%	0.00%
2001	0.00%	0.30%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.10%	0.10%	0.00%	0.00%	0.00%
2002	0.14%	0.55%	0.00%	0.00%	0.14%	0.41%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
2003	0.17%	0.17%	0.17%	0.00%	0.69%	0.00%	0.52%	0.00%	0.00%	0.35%	0.00%	0.00%	0.00%	0.17%
2004	0.00%	0.00%	0.00%	0.74%	0.00%	0.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.37%	0.00%

Table 7: Annual catch at age for gray triggerfish sampled by TIP.

Month	0	1	2	3	4	5	6	7	8	9	10	11	12	13
1	0.49%	13.39%	33.91%	28.01%	11.55%	4.55%	1.60%	1.84%	0.86%	0.61%	0.25%	0.49%	0.37%	0.37%
2	0.39%	7.64%	31.26%	29.13%	15.47%	8.03%	2.98%	1.49%	1.17%	0.39%	0.45%	0.58%	0.39%	0.39%
3	0.37%	7.75%	26.42%	29.96%	17.64%	8.63%	4.28%	1.85%	0.66%	0.59%	0.22%	0.15%	0.15%	0.37%
4	0.46%	10.60%	30.57%	26.80%	14.13%	6.61%	3.38%	1.77%	1.61%	0.77%	0.84%	0.38%	0.38%	0.38%
5	0.90%	10.17%	30.74%	27.39%	14.83%	7.83%	2.81%	1.44%	1.26%	0.54%	0.30%	0.18%	0.24%	0.36%
6	0.72%	15.50%	27.57%	23.06%	14.77%	5.68%	4.14%	1.53%	1.17%	1.53%	0.90%	0.81%	0.45%	0.81%
7	0.99%	16.89%	37.17%	20.50%	10.96%	4.82%	2.19%	1.10%	1.54%	0.99%	0.66%	0.55%	0.44%	0.22%
8	0.35%	17.85%	36.82%	21.86%	10.19%	6.47%	1.90%	1.19%	0.98%	0.63%	0.21%	0.28%	0.21%	0.28%
9	0.76%	13.27%	36.11%	25.65%	11.49%	6.05%	1.72%	1.44%	0.89%	0.48%	0.55%	0.14%	0.28%	0.28%
10	1.34%	18.28%	32.69%	21.32%	12.04%	4.75%	2.45%	2.08%	1.11%	0.97%	0.45%	0.52%	0.22%	0.30%
11	0.00%	11.42%	29.23%	25.85%	16.06%	6.65%	3.51%	1.88%	1.63%	0.88%	0.88%	0.88%	0.38%	0.13%
12	0.49%	10.58%	29.81%	28.71%	14.60%	7.30%	2.31%	2.19%	0.61%	0.97%	0.12%	0.24%	0.36%	0.73%
Month	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**27**	**29**	**39**
1	0.12%	0.37%	0.00%	0.12%	0.12%	0.49%	0.25%	0.12%	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%
2	0.06%	0.00%	0.00%	0.06%	0.00%	0.06%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3	0.15%	0.30%	0.07%	0.07%	0.15%	0.07%	0.00%	0.07%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%
4	0.15%	0.23%	0.23%	0.00%	0.08%	0.23%	0.23%	0.00%	0.00%	0.08%	0.00%	0.00%	0.08%	0.00%
5	0.18%	0.24%	0.12%	0.00%	0.06%	0.06%	0.12%	0.00%	0.00%	0.12%	0.00%	0.06%	0.00%	0.06%
6	0.00%	0.36%	0.00%	0.09%	0.09%	0.45%	0.09%	0.09%	0.09%	0.00%	0.00%	0.09%	0.00%	0.00%
7	0.22%	0.22%	0.00%	0.00%	0.22%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.11%
8	0.00%	0.21%	0.07%	0.00%	0.00%	0.14%	0.07%	0.00%	0.00%	0.14%	0.00%	0.07%	0.00%	0.07%
9	0.07%	0.21%	0.07%	0.00%	0.14%	0.14%	0.14%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%	0.07%
10	0.22%	0.22%	0.15%	0.07%	0.15%	0.22%	0.07%	0.07%	0.00%	0.07%	0.00%	0.15%	0.00%	0.07%
11	0.00%	0.25%	0.00%	0.13%	0.00%	0.00%	0.00%	0.00%	0.00%	0.13%	0.00%	0.00%	0.13%	0.00%
12	0.00%	0.36%	0.00%	0.00%	0.00%	0.12%	0.00%	0.12%	0.00%	0.36%	0.00%	0.00%	0.00%	0.00%

Table 8: Catch at age for gray triggerfish sampled by TIP by month.

Quarter	0	1	2	3	4	5	6	7	8	9	10	11	12	13
1	0.40%	8.94%	30.08%	29.19%	15.40%	7.49%	3.15%	1.70%	0.92%	0.51%	0.32%	0.40%	0.30%	0.38%
2	0.71%	11.75%	29.82%	26.03%	14.59%	6.86%	3.35%	1.57%	1.35%	0.88%	0.64%	0.42%	0.34%	0.49%
3	0.66%	15.86%	36.63%	22.99%	10.87%	5.91%	1.90%	1.27%	1.08%	0.66%	0.45%	0.29%	0.29%	0.26%
4	0.74%	14.30%	30.96%	24.59%	13.83%	5.97%	2.70%	2.06%	1.11%	0.94%	0.47%	0.54%	0.30%	0.37%
Quarter	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**27**	**29**	**39**
1	0.11%	0.19%	0.03%	0.08%	0.08%	0.16%	0.05%	0.08%	0.00%	0.03%	0.03%	0.00%	0.00%	0.00%
2	0.12%	0.27%	0.12%	0.02%	0.07%	0.22%	0.15%	0.02%	0.02%	0.07%	0.00%	0.05%	0.02%	0.02%
3	0.08%	0.21%	0.05%	0.00%	0.11%	0.13%	0.08%	0.00%	0.00%	0.08%	0.00%	0.05%	0.00%	0.08%
4	0.10%	0.27%	0.07%	0.07%	0.07%	0.13%	0.03%	0.07%	0.00%	0.17%	0.00%	0.07%	0.03%	0.03%

Table 9: Catch at age for gray triggerfish sampled by TIP by quarter where quarter one is January through March, quarter two April through June, quarter three July through September, and quarter four October through December.

Gear	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Hook and Line	0.38%	10.94%	31.41%	27.83%	15.06%	7.15%	2.88%	1.56%	0.92%	0.57%	0.32%	0.21%	0.17%	0.20%
Trap	2.78%	29.51%	44.62%	14.68%	4.56%	1.85%	0.71%	0.50%	0.14%	0.07%	0.21%	0.07%	0.00%	0.07%
Other	0.71%	8.19%	11.03%	6.76%	5.34%	5.87%	5.87%	5.87%	8.01%	6.23%	4.63%	5.52%	4.27%	5.16%
Gear	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**27**	**29**	**39**
Hook and Line	0.04%	0.10%	0.03%	0.02%	0.03%	0.06%	0.04%	0.02%	0.01%	0.01%	0.00%	0.02%	0.01%	0.00%
Trap	0.07%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%
Other	1.60%	3.74%	0.89%	0.53%	1.42%	2.85%	1.25%	0.53%	0.00%	1.96%	0.18%	0.71%	0.00%	0.89%

Table 10: Catch at age for gray triggerfish sampled by TIP by gear, where each gear designation corresponds to the gear codes explicated by Table 6.

Region	0	1	2	3	4	5	6	7	8	9	10	11	12	13
West	0.12%	6.83%	29.47%	30.59%	17.09%	8.29%	3.47%	1.60%	0.90%	0.52%	0.34%	0.25%	0.16%	0.15%
East	1.10%	17.87%	34.36%	21.47%	10.57%	4.95%	2.14%	1.58%	1.20%	0.87%	0.60%	0.55%	0.44%	0.59%
Region	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**27**	**29**	**39**
West	0.03%	0.06%	0.00%	0.00%	0.00%	0.07%	0.01%	0.01%	0.01%	0.00%	0.00%	0.00%	0.01%	0.00%
East	0.16%	0.39%	0.13%	0.08%	0.16%	0.25%	0.15%	0.07%	0.00%	0.15%	0.01%	0.08%	0.01%	0.07%

Table 11: Catch at age for gray triggerfish sampled by TIP by region (assuming the existence of two stocks), where the east represents NMFS Gulf of Mexico shrimp codes 1 through 12 and the west represents NMFS Gulf of Mexico shrimp codes 13 through 21.

State	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Alabama	0.00%	12.12%	27.27%	27.27%	15.15%	9.09%	6.06%	0.00%	3.03%	0.00%	0.00%	0.00%	0.00%	0.00%
Florida	1.06%	17.50%	33.66%	21.60%	10.84%	5.21%	2.31%	1.69%	1.29%	0.98%	0.61%	0.56%	0.43%	0.57%
Louisiana	0.08%	6.18%	28.14%	30.89%	17.82%	8.82%	3.70%	1.64%	0.99%	0.52%	0.34%	0.27%	0.21%	0.15%
Mississippi	0.19%	8.87%	42.26%	32.64%	10.00%	3.77%	0.94%	0.57%	0.19%	0.38%	0.19%	0.00%	0.00%	0.00%
Texas	0.33%	9.88%	32.41%	27.86%	16.32%	7.21%	2.66%	1.55%	0.89%	0.22%	0.22%	0.11%	0.00%	0.22%
State	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**27**	**29**	**39**
Alabama	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Florida	0.17%	0.40%	0.13%	0.08%	0.15%	0.24%	0.14%	0.06%	0.00%	0.15%	0.01%	0.08%	0.01%	0.06%
Louisiana	0.02%	0.06%	0.00%	0.00%	0.00%	0.10%	0.02%	0.02%	0.02%	0.00%	0.00%	0.00%	0.02%	0.00%
Mississippi	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Texas	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 12: Catch at age for gray triggerfish sampled by TIP by state.

Shrimp Area	0	1	2	3	4	5	6	7	8	9	10	11	12
1	6.38%	31.91%	31.91%	10.64%	6.38%	4.26%	6.38%	0.00%	2.13%	0.00%	0.00%	0.00%	0.00%
2	1.20%	3.61%	2.41%	13.25%	8.43%	3.61%	3.61%	10.84%	7.23%	4.82%	3.61%	2.41%	6.02%
3	0.68%	8.11%	18.92%	10.14%	3.38%	3.38%	4.73%	6.08%	6.76%	5.41%	2.70%	4.73%	2.03%
4	2.33%	14.42%	15.35%	9.30%	5.12%	8.84%	5.58%	5.58%	5.12%	3.26%	4.65%	4.19%	3.26%
5	0.21%	7.77%	17.65%	12.39%	10.50%	7.77%	5.67%	5.46%	6.93%	4.20%	3.36%	3.15%	2.10%
6	1.08%	17.76%	40.26%	22.50%	7.55%	4.39%	1.44%	1.37%	0.50%	0.79%	0.50%	0.36%	0.36%
7	2.24%	27.55%	44.35%	15.48%	5.80%	2.24%	0.70%	0.46%	0.39%	0.23%	0.23%	0.08%	0.00%
8	2.30%	16.09%	40.23%	32.18%	6.90%	2.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
9	0.67%	19.46%	33.05%	25.00%	13.59%	4.87%	1.68%	1.01%	0.00%	0.50%	0.00%	0.00%	0.00%
10	0.85%	18.91%	34.51%	24.63%	12.88%	4.94%	1.70%	0.65%	0.41%	0.20%	0.04%	0.08%	0.04%
11	0.00%	5.82%	28.48%	28.64%	19.14%	9.19%	4.13%	2.30%	1.07%	0.61%	0.15%	0.00%	0.31%
12	0.00%	0.00%	21.05%	52.63%	21.05%	5.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
13	0.00%	4.61%	31.03%	29.35%	14.88%	10.69%	4.82%	2.31%	0.21%	0.21%	0.63%	0.21%	0.00%
14	0.05%	5.24%	29.29%	30.75%	18.35%	9.62%	3.25%	1.37%	0.80%	0.33%	0.28%	0.24%	0.14%
15	0.07%	6.80%	27.63%	30.84%	17.63%	7.17%	4.48%	1.72%	1.19%	0.75%	0.75%	0.30%	0.22%
16	0.00%	4.62%	26.59%	33.96%	17.20%	8.67%	4.05%	2.31%	1.01%	0.72%	0.00%	0.29%	0.14%
17	0.20%	9.79%	28.76%	30.68%	16.55%	7.16%	2.93%	1.31%	0.91%	0.81%	0.20%	0.40%	0.10%
18	0.42%	7.98%	38.24%	30.25%	11.76%	5.88%	0.84%	0.84%	1.68%	0.84%	0.00%	0.00%	1.26%
20	0.00%	7.14%	28.57%	35.71%	21.43%	7.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
21	0.38%	10.17%	34.05%	28.59%	15.12%	6.48%	2.41%	1.14%	0.76%	0.25%	0.13%	0.13%	0.00%
22	0.00%	8.33%	21.30%	22.22%	25.00%	12.04%	4.63%	4.63%	0.93%	0.00%	0.93%	0.00%	0.00%
Shrimp Area	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**27**	**29**
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	2.41%	2.41%	1.20%	0.00%	4.82%	1.20%	2.41%	0.00%	0.00%	3.61%	0.00%	1.20%	1.20%
3	2.70%	2.03%	2.03%	0.00%	1.35%	2.70%	2.03%	0.68%	0.00%	1.35%	0.00%	1.35%	0.00%
4	0.93%	2.79%	0.47%	0.47%	0.00%	1.40%	0.93%	0.47%	0.00%	0.47%	0.00%	0.47%	0.00%
5	0.42%	2.94%	0.63%	0.63%	0.84%	1.26%	0.84%	0.42%	0.00%	1.05%	0.21%	0.21%	0.00%
6	0.07%	0.22%	0.00%	0.14%	0.07%	0.36%	0.00%	0.07%	0.00%	0.00%	0.00%	0.07%	0.00%
7	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
9	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10	0.00%	0.04%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
11	0.15%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
13	0.00%	0.42%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%
14	0.05%	0.05%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15	0.00%	0.07%	0.00%	0.00%	0.00%	0.07%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%
16	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%	0.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
17	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%
18	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
20	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
21	0.13%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
22	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 13: Catch at age for gray triggerfish sampled by TIP by area, where the area corresponds to the NMFS shrimp code in the Gulf of Mexico (see Figure 1).

Appendix B: Graphs and Charts

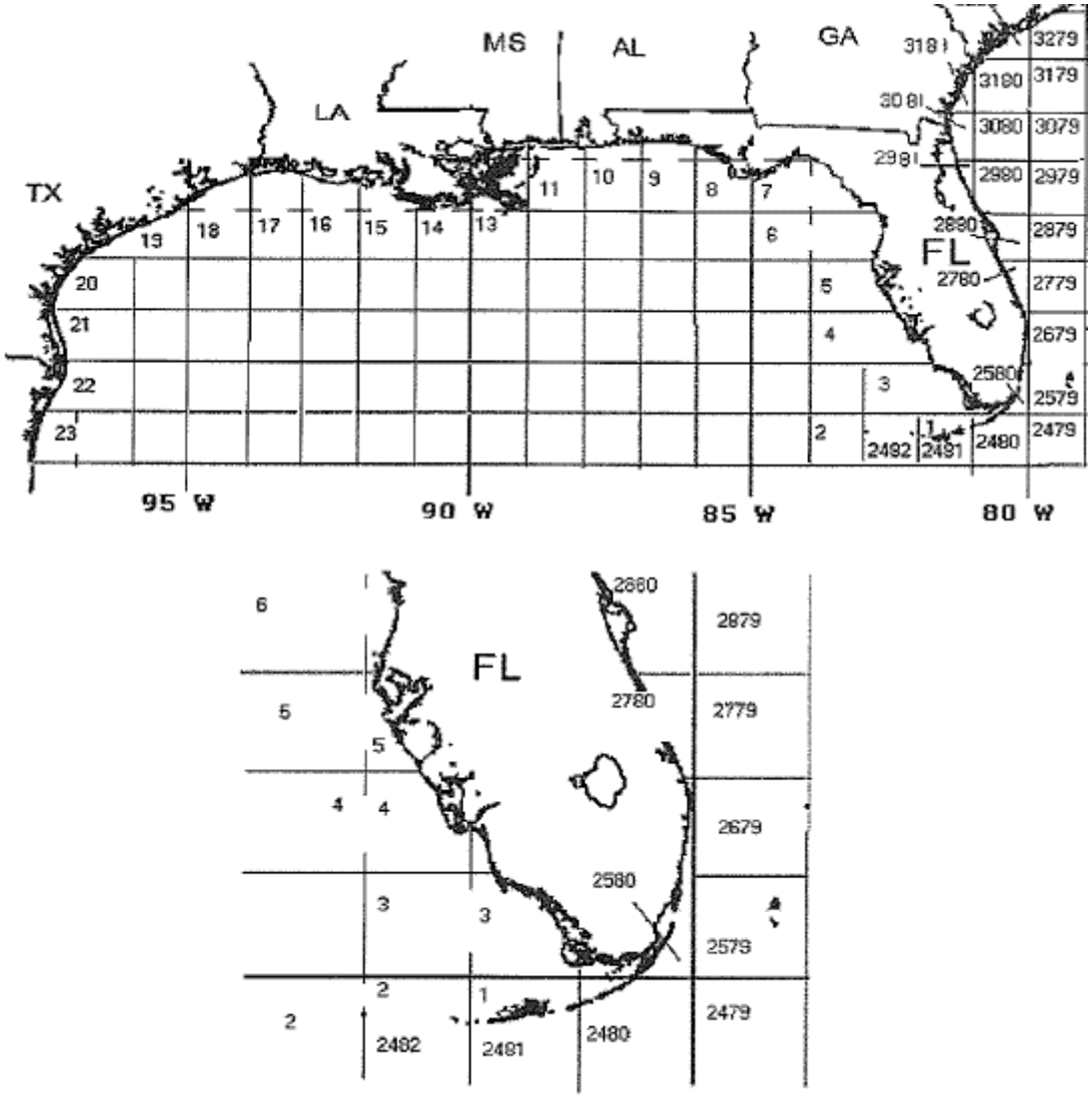


Figure 1: NMFS statistical shrimp fishing areas for the Gulf of Mexico, where the Gulf of Mexico is defined as Areas 1 through 22, and area 2482.

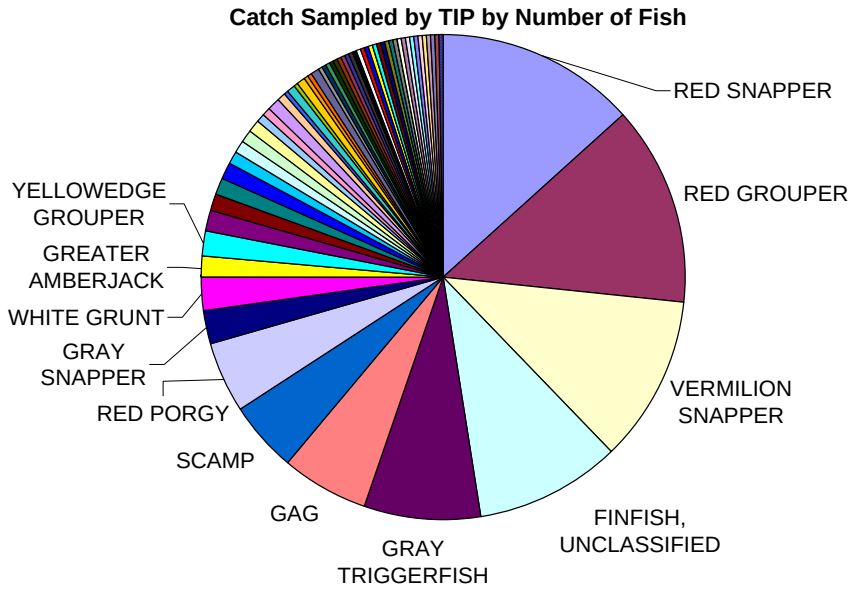


Figure 2: Trip Interview Program species composition by the number of individual fish sampled for the Gulf of Mexico demersal fisheries (n = 181,695 fish).

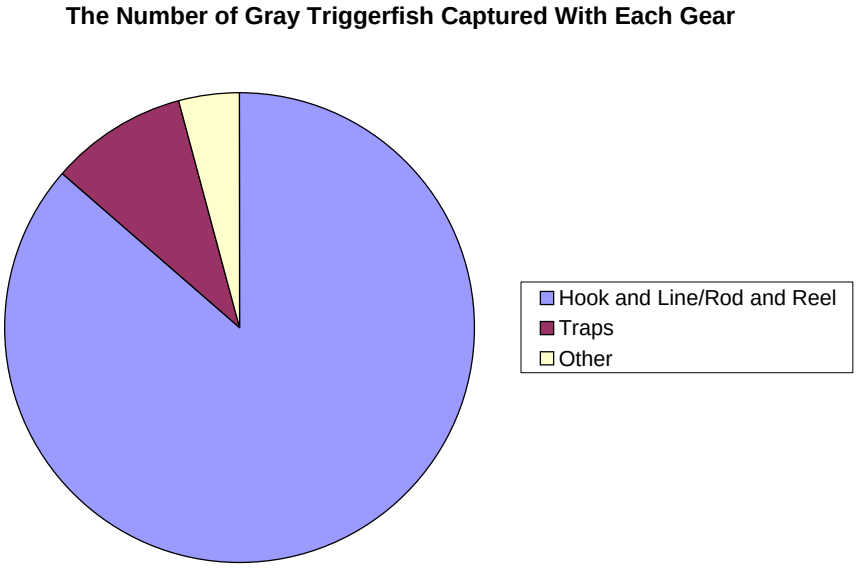


Figure 3: Gear designation for TIP gear codes as explicated in Table 6.

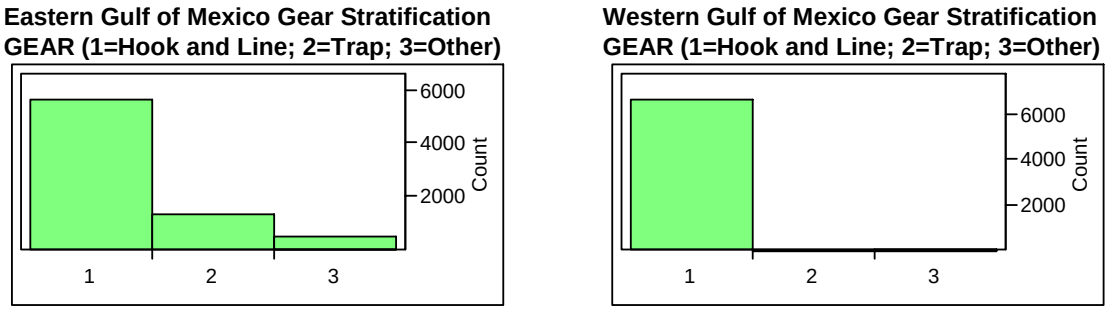


Figure 4: Regional stratification of gear type used in the Gulf of Mexico (assuming the existence of two stocks), where the east represents NMFS Gulf of Mexico shrimp codes 1 through 12 and the west represents NMFS Gulf of Mexico shrimp codes 13 through 21.

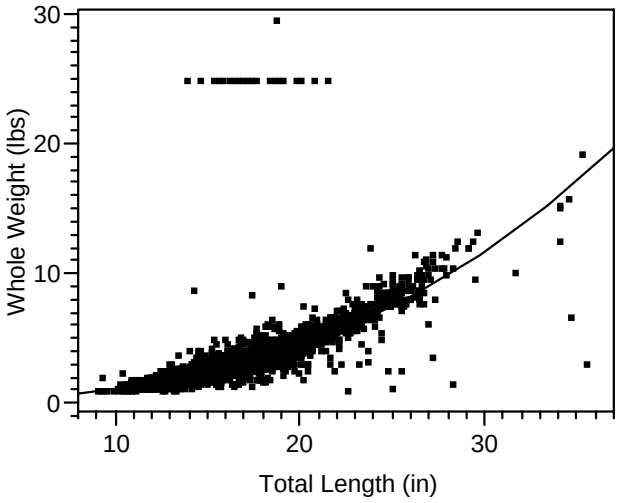


Figure 5: Initial nonlinear regression of weight length relationship to all data containing a length and weight value greater than zero (n = 6,954 fish).

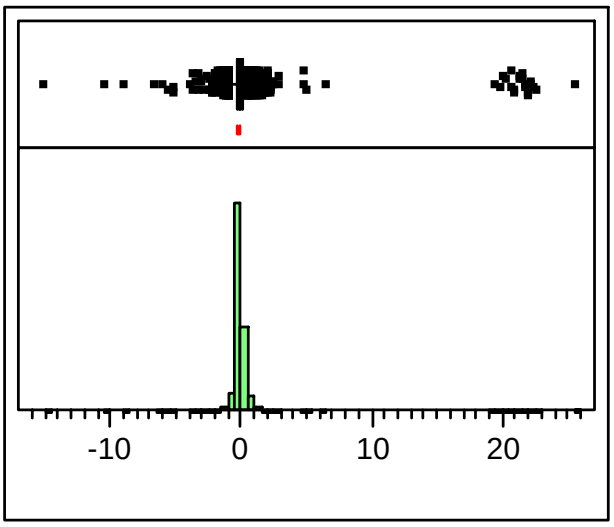


Figure 6: Frequency distribution of the residuals resulting from calculated length weight relationship.

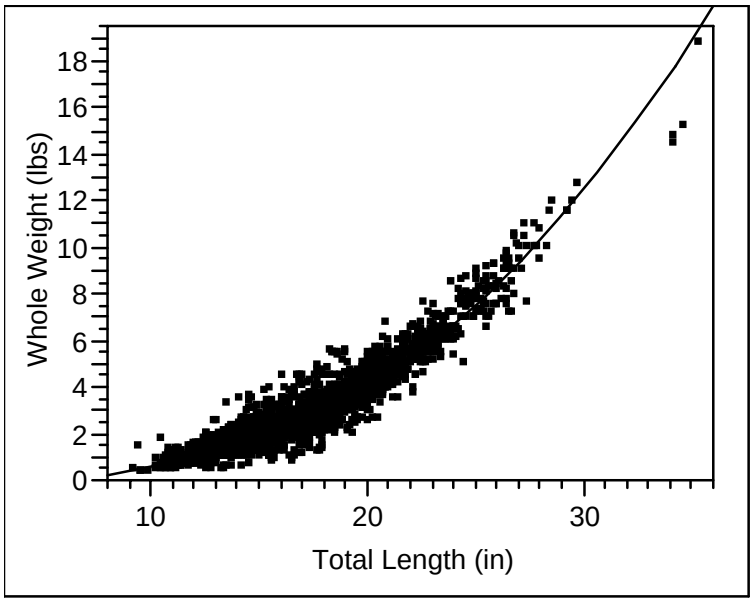


Figure 7: Final weight-length fit by nonlinear regression to data from which residuals in the upper and lower 0.5 percentile were removed (n = 6,885 fish).

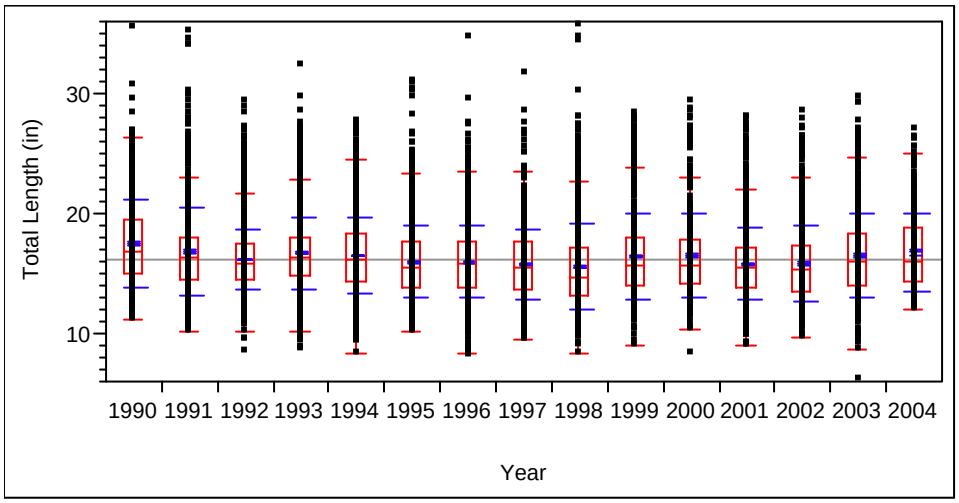


Figure 8: The significance of year on total length for all TIP gray triggerfish data (n = 14,558). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

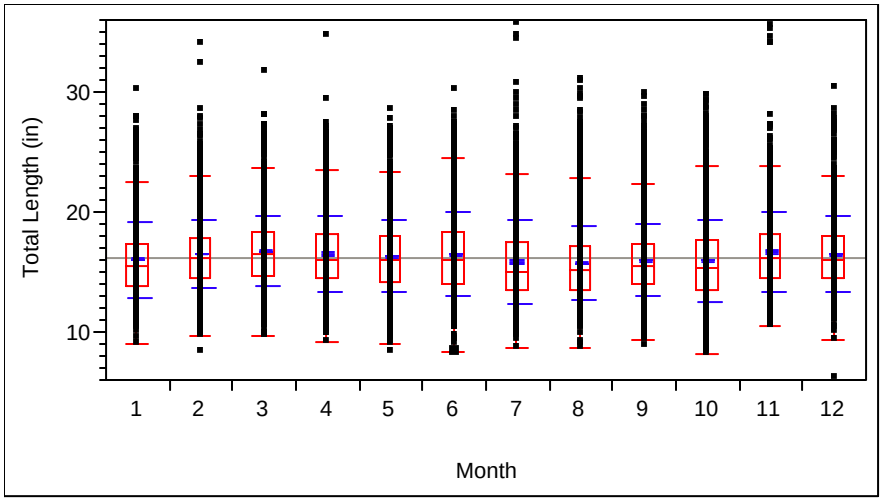


Figure 9: The significance of month on total length for all TIP gray triggerfish data (n = 14,558). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

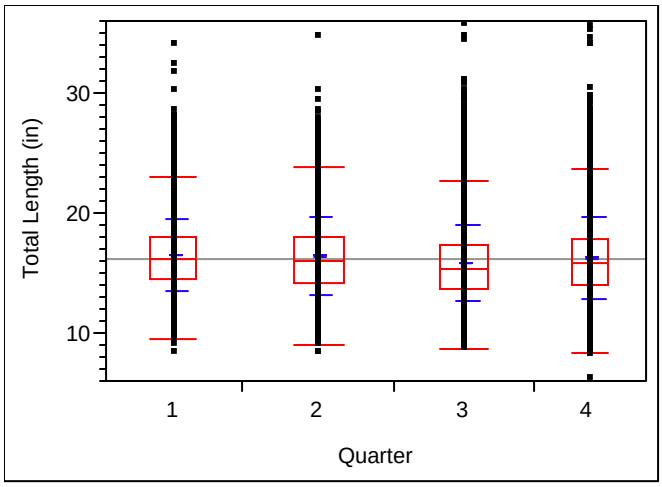


Figure 10: The significance of quarter on total length for all TIP gray triggerfish data (n = 14,558). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Quarter 1: Winter

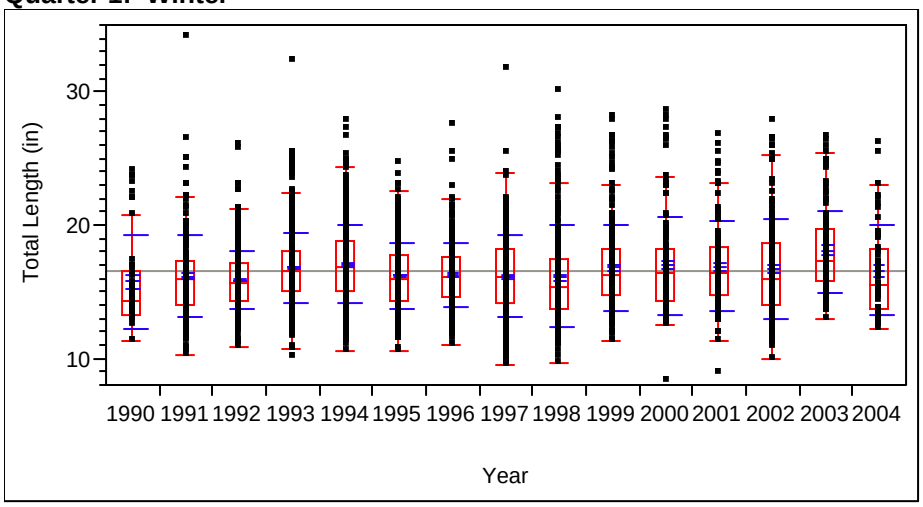


Figure 11: The interaction of winter and year on total length for all TIP gray triggerfish data (n = 3,732). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Quarter 2: Spring

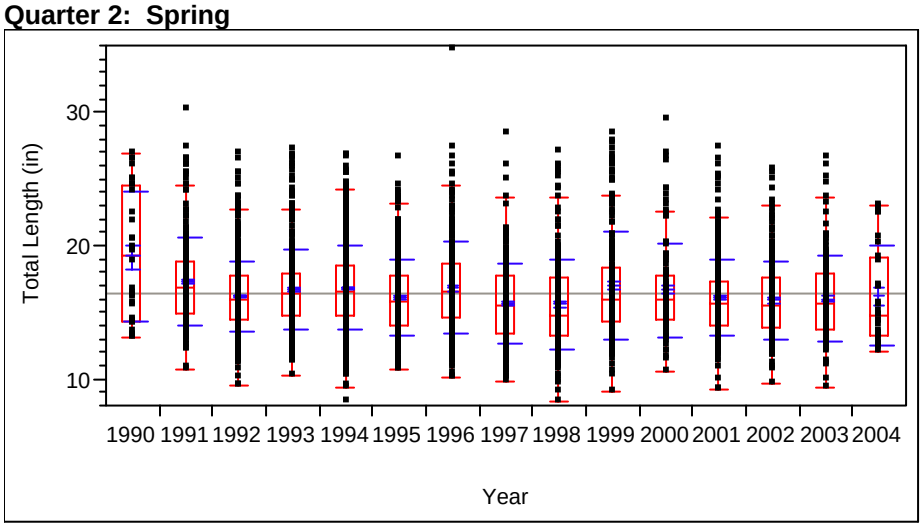


Figure 12: The interaction of spring and year on total length for all TIP gray triggerfish data (n =4,096). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Quarter 3: Summer

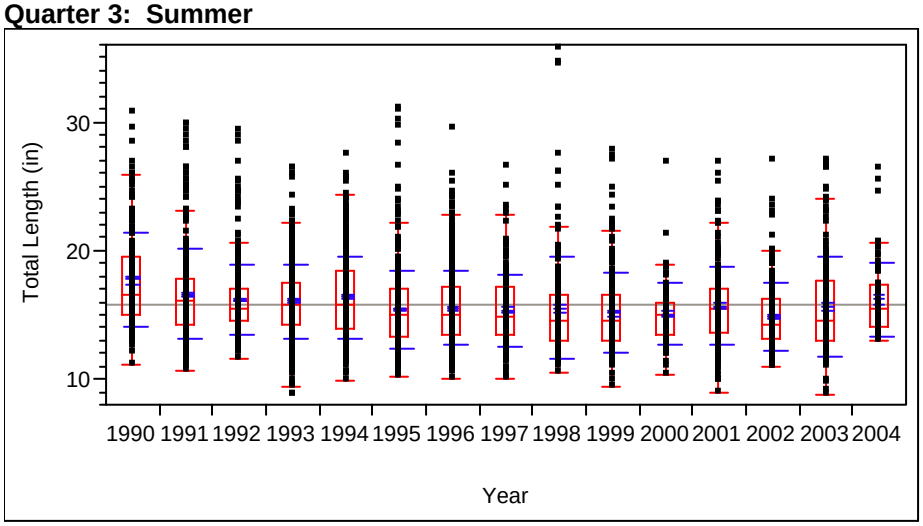


Figure 13: The interaction of summer and year on total length for all TIP gray triggerfish data (n =3,816). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Quarter 4: Fall

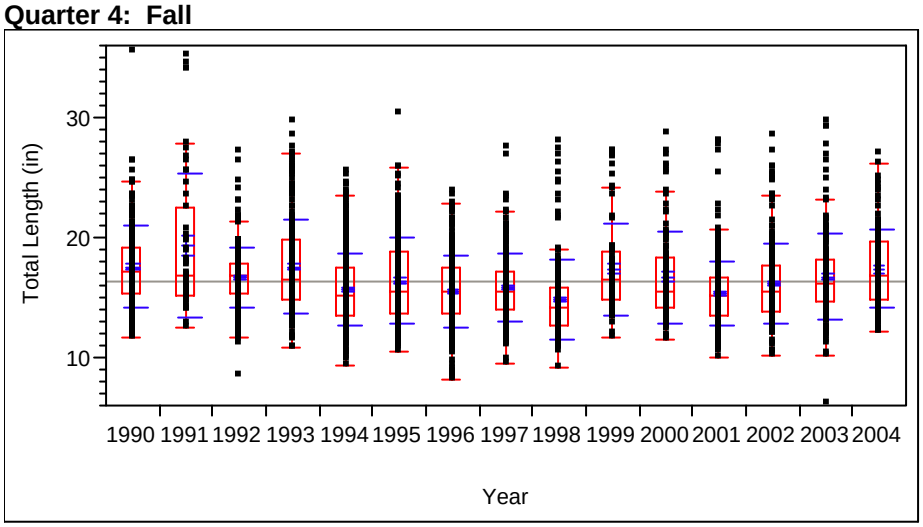


Figure 14: The interaction of fall and year on total length for all TIP gray triggerfish data (n =2,994). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

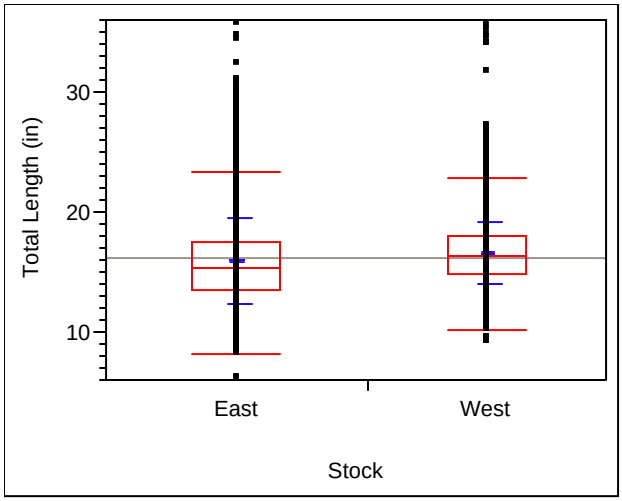


Figure 15: The significance of region on gray triggerfish total length (assuming the existence of two stocks), where the east represents NMFS Gulf of Mexico shrimp codes 1 through 12 and the west represents NMFS Gulf of Mexico shrimp codes 13 through 21 (n = 14,327). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Western Region

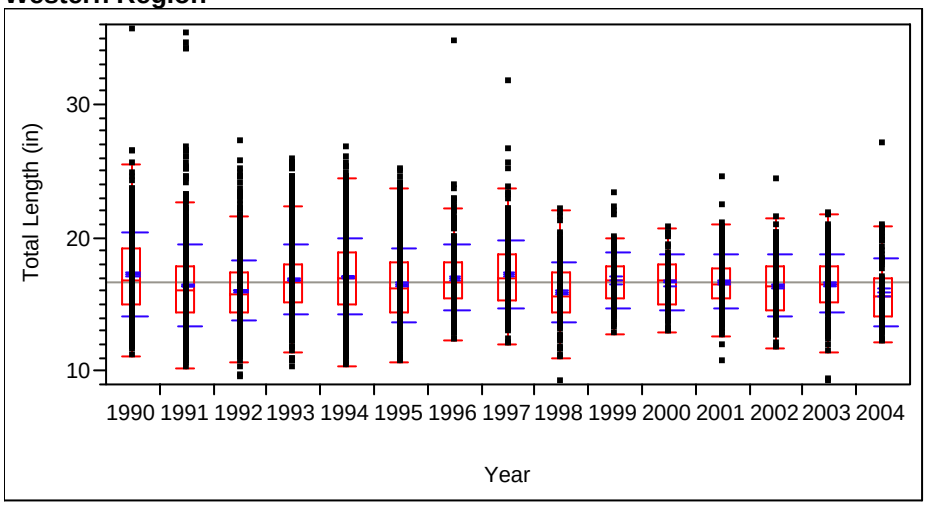


Figure 16: The interaction of the western region of the Gulf and year on gray triggerfish length where the west represents NMFS Gulf of Mexico shrimp codes 13 through 21 assuming the existence of two stocks (n = 6,667). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Eastern Region

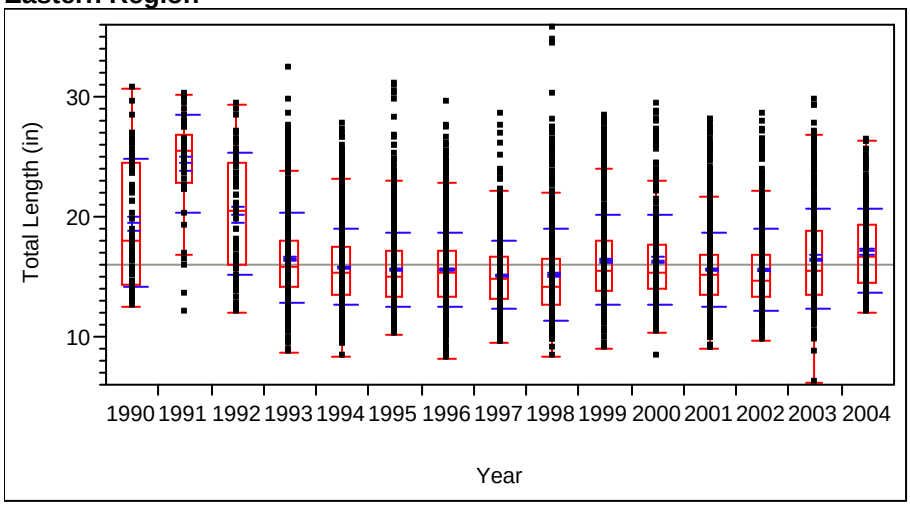


Figure 17: The interaction of the eastern region of the Gulf and year on gray triggerfish length where the west represents NMFS Gulf of Mexico shrimp codes 1 through 12 assuming the existence of two stocks (n = 7,532). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

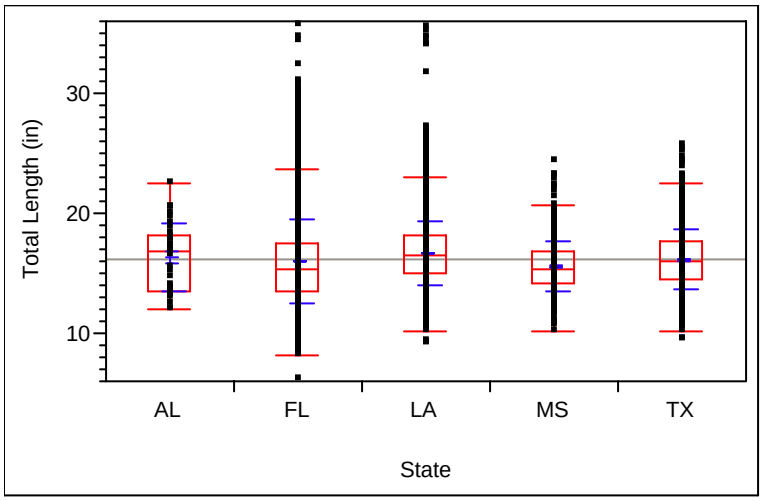


Figure 18: The significance of state on total length for all TIP gray triggerfish data (n = 14,558). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Alabama

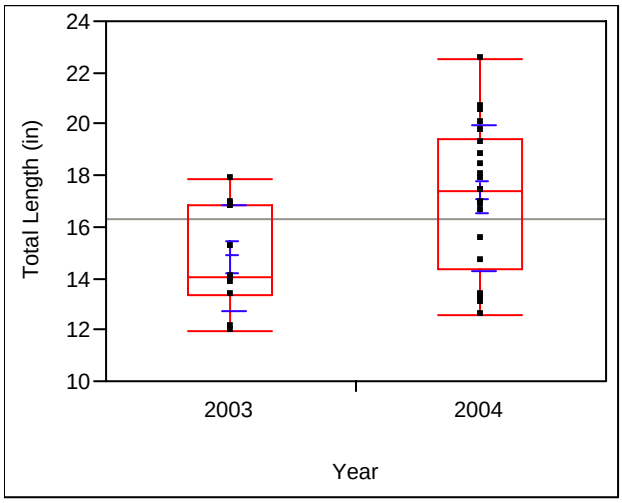


Figure 19: The interaction of Alabama and year on total length for all TIP gray triggerfish data (n = 33). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Florida

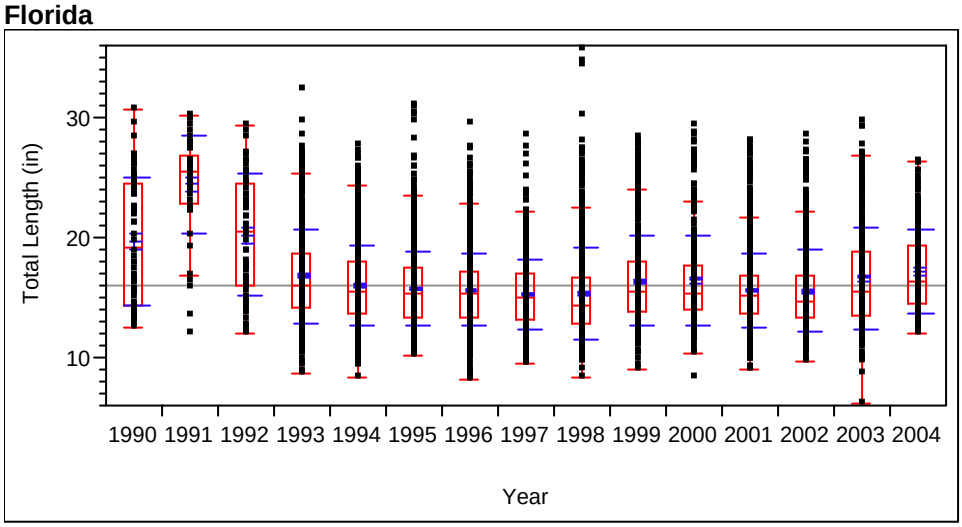


Figure 20: The interaction of Florida and year on total length for all TIP gray triggerfish data (n = 7,924). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Louisiana

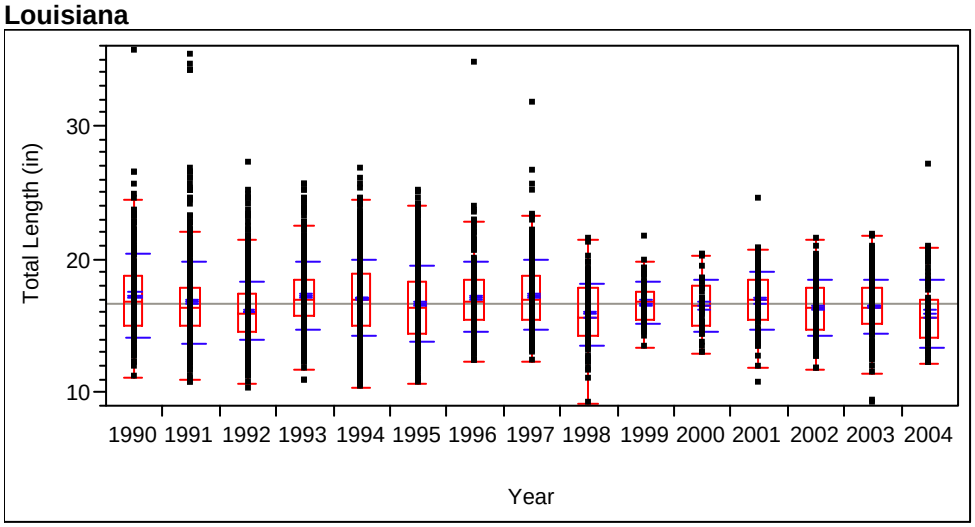


Figure 21: The interaction of Louisiana and year on total length for all TIP gray triggerfish data (n = 5,256). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Mississippi

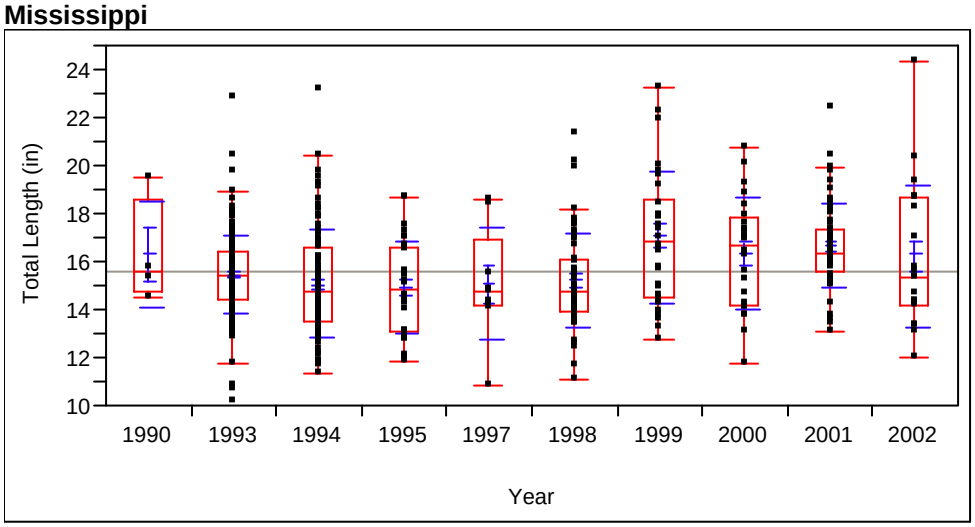


Figure 22: The interaction of Mississippi and year on total length for all TIP gray triggerfish data (n = 530). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Texas

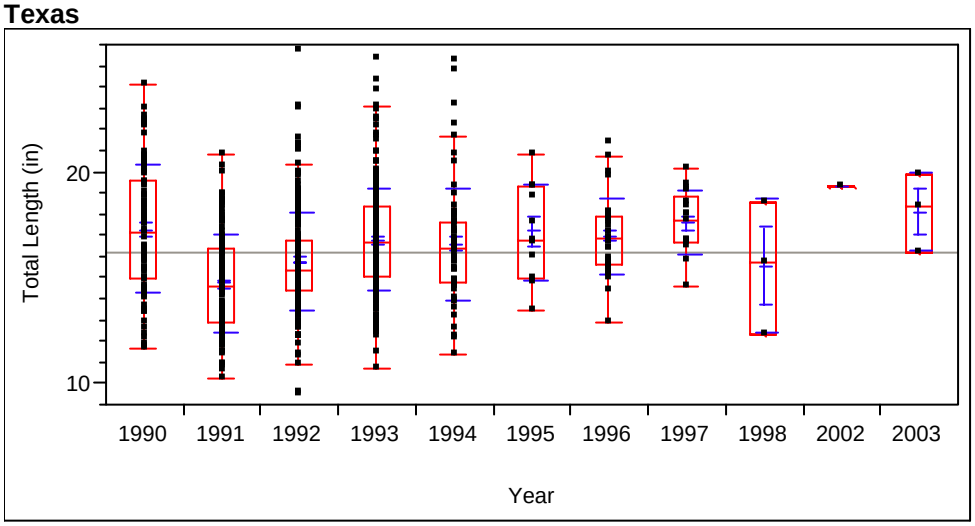


Figure 23: The interaction of Texas and year on total length for all TIP gray triggerfish data (n = 901). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

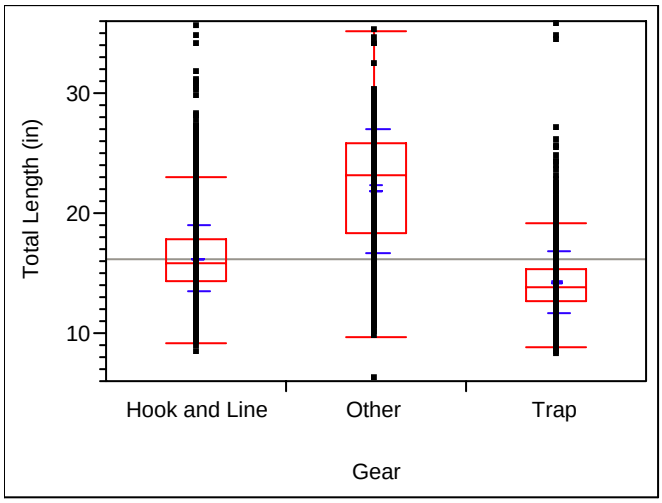


Figure 24: The significance of gear (see Table 6) on total length for all TIP gray triggerfish data (n = 14,558). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Gear: Hook and Line

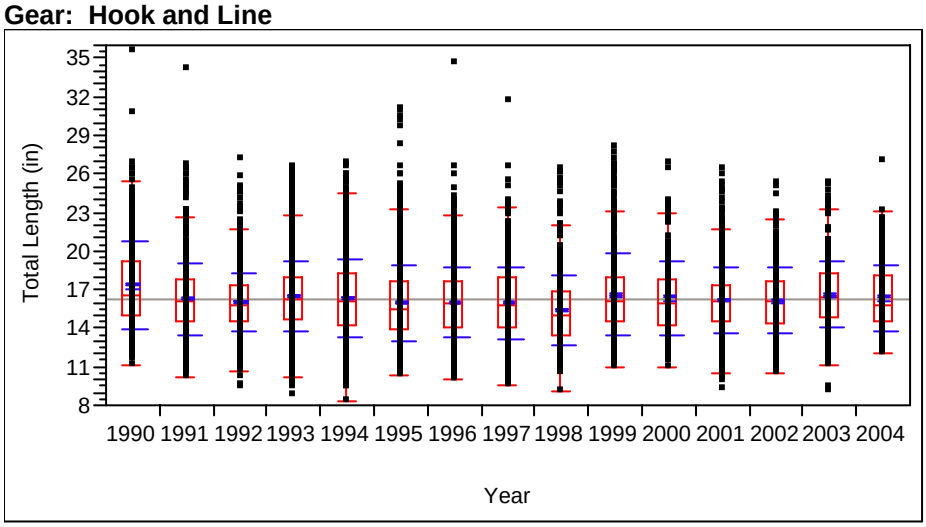


Figure 25: The significance of those gear codes classified as hook and line gear (see Table 6) on gray triggerfish total length (n=12,593). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Gear: Traps

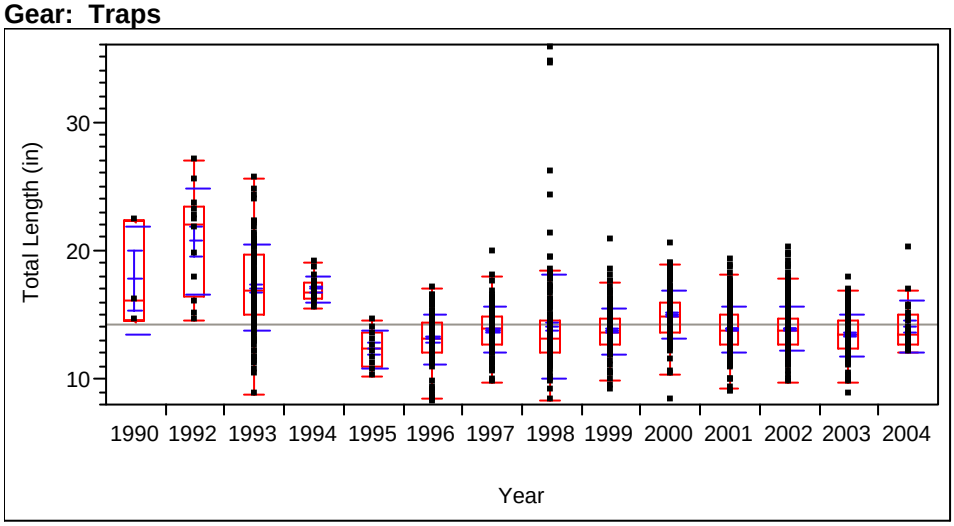


Figure 26: The significance of those gear codes classified as fish traps (see Table 6) on gray triggerfish total length (n=1,403). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

Gear: Other

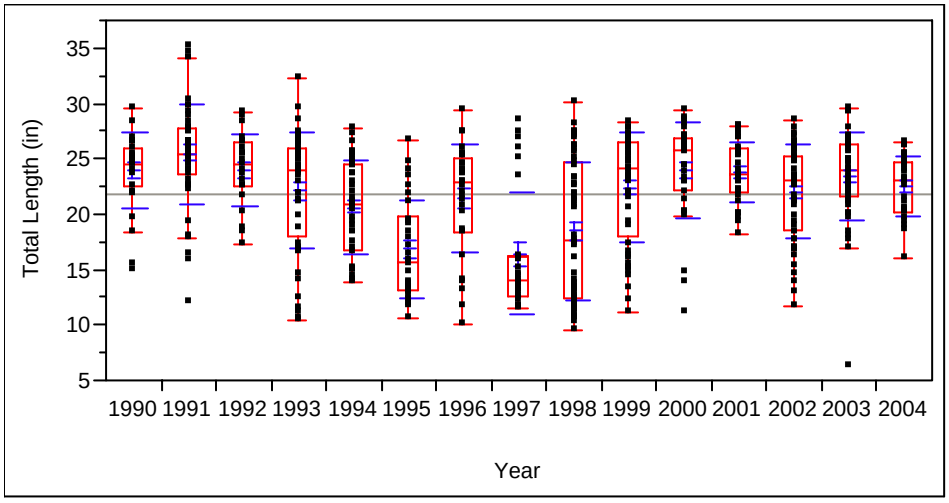


Figure 27: The significance of those gear codes classified as other (see Table 6) on gray triggerfish total length (n=562). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

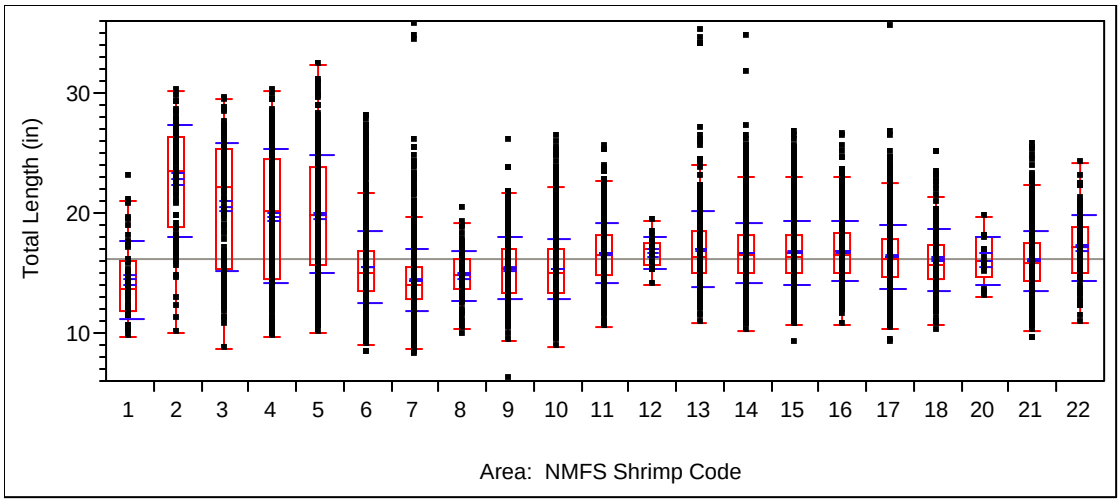


Figure 28: The significance of shrimp code area on gray triggerfish total length as per the NMFS Gulf area shrimp codes (see Figure 1) (n=14,199). The continuous horizontal line represents the mean across the strata while the red boxes constraining the data represent 95% confidence intervals. The smaller blue lines represent standard deviation, and larger red lines furthest from the mean represent 50% confidence intervals.

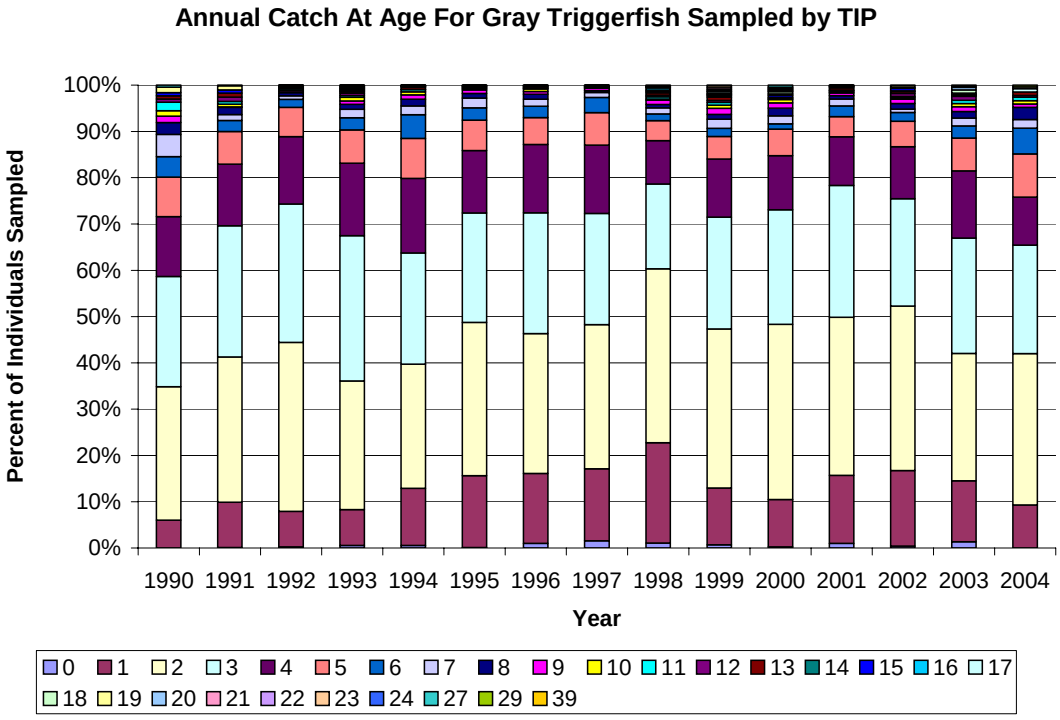


Figure 29: Annual catch at age for gray triggerfish sampled by TIP.

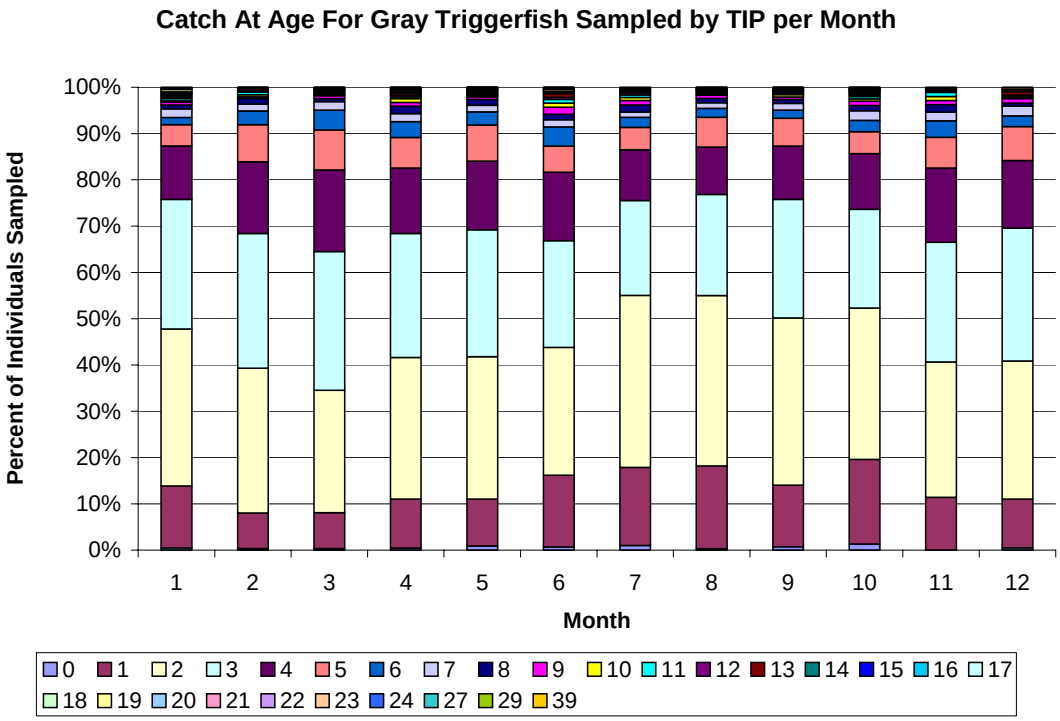


Figure 30: Catch at age for gray triggerfish sampled by TIP by month.

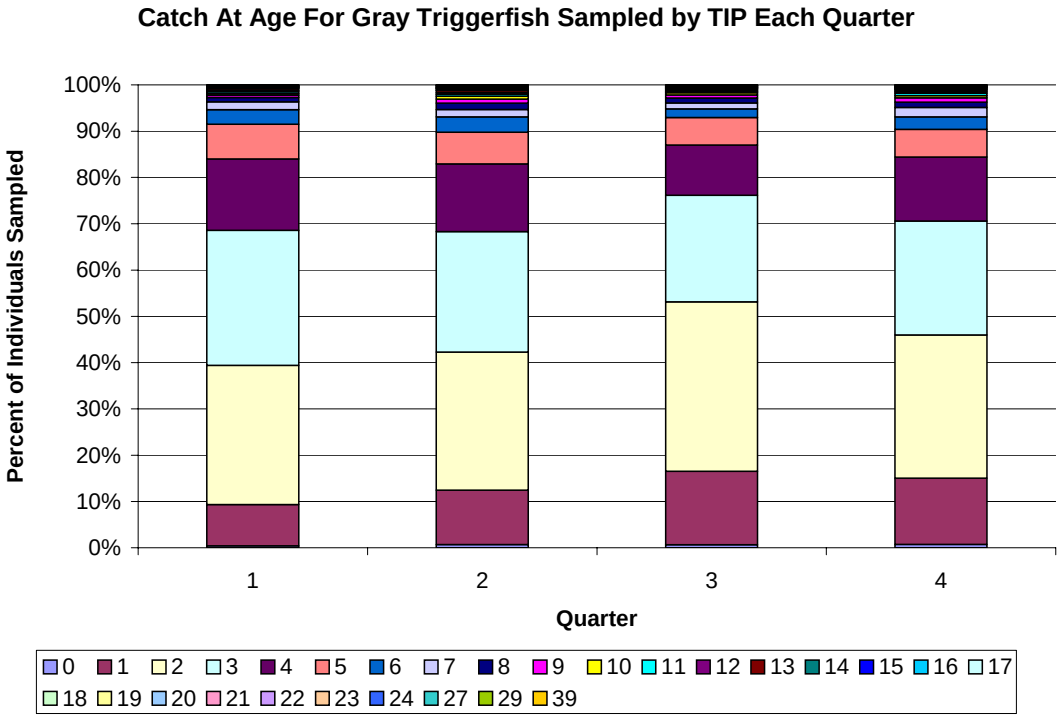


Figure 31: Catch at age for gray triggerfish sampled by TIP by quarter where quarter one is January through March, quarter two April through June, quarter three July through September, and quarter four October through December.

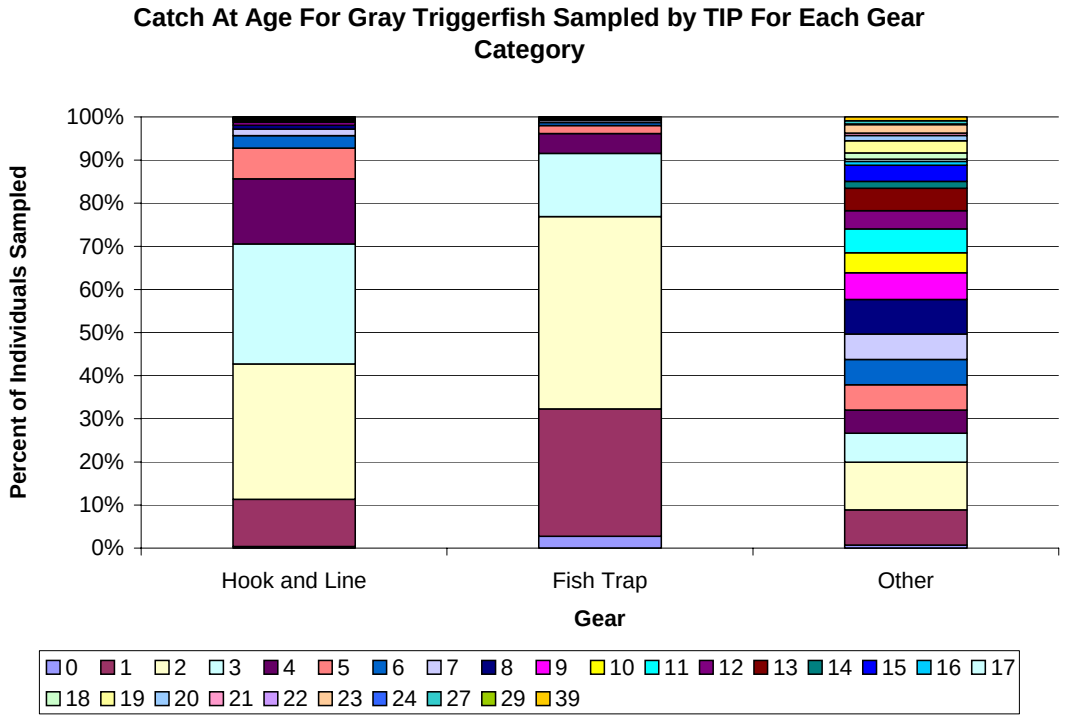


Figure 32: Catch at age for gray triggerfish sampled by TIP by gear, where each gear designation corresponds to the gear codes explicated by Table 6.

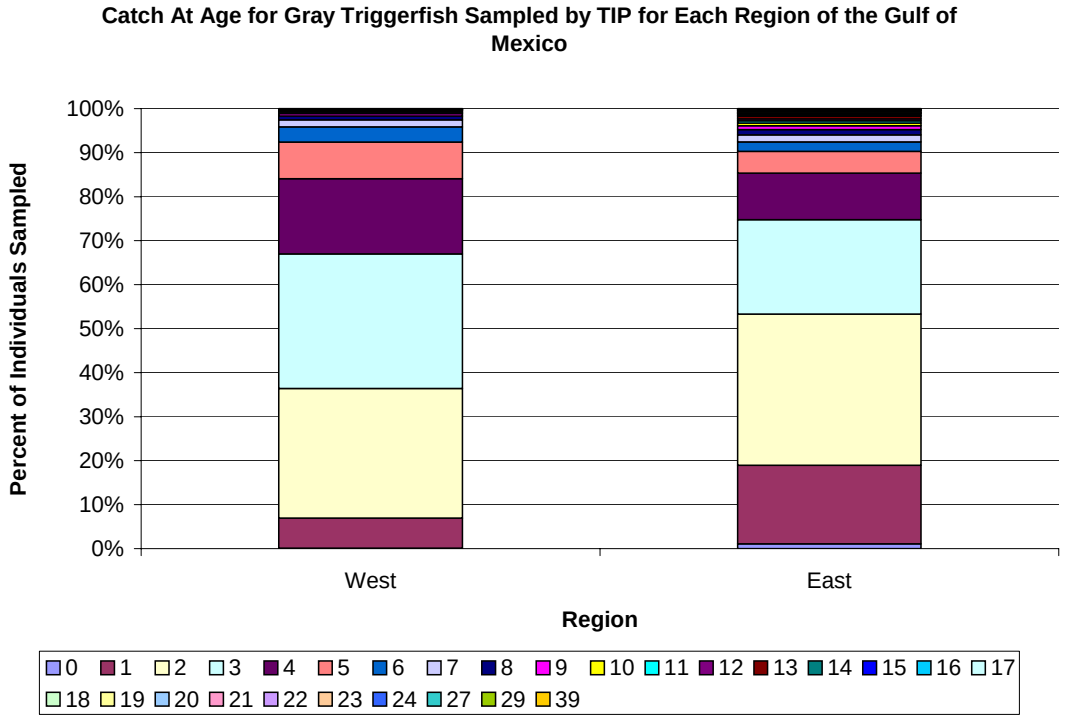


Figure 33: Catch at age for gray triggerfish sampled by TIP by region (assuming the existence of two stocks), where the east represents NMFS Gulf of Mexico shrimp codes 1 through 12 and the west represents NMFS Gulf of Mexico shrimp codes 13 through 21.

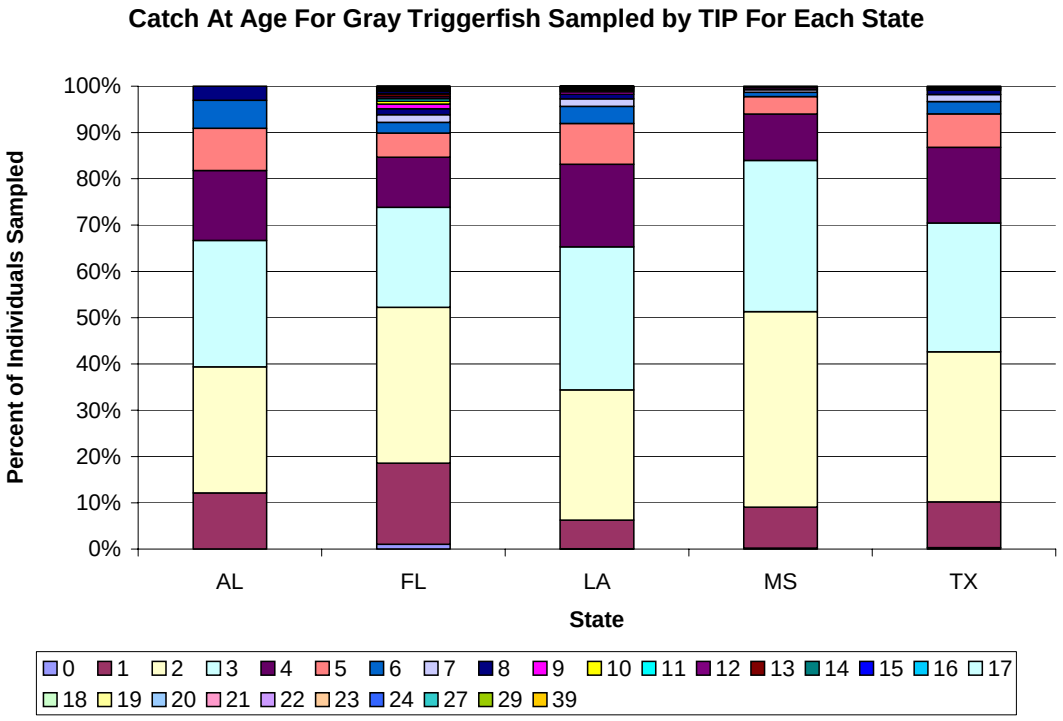


Figure 34: Catch at age for gray triggerfish sampled by TIP by state.

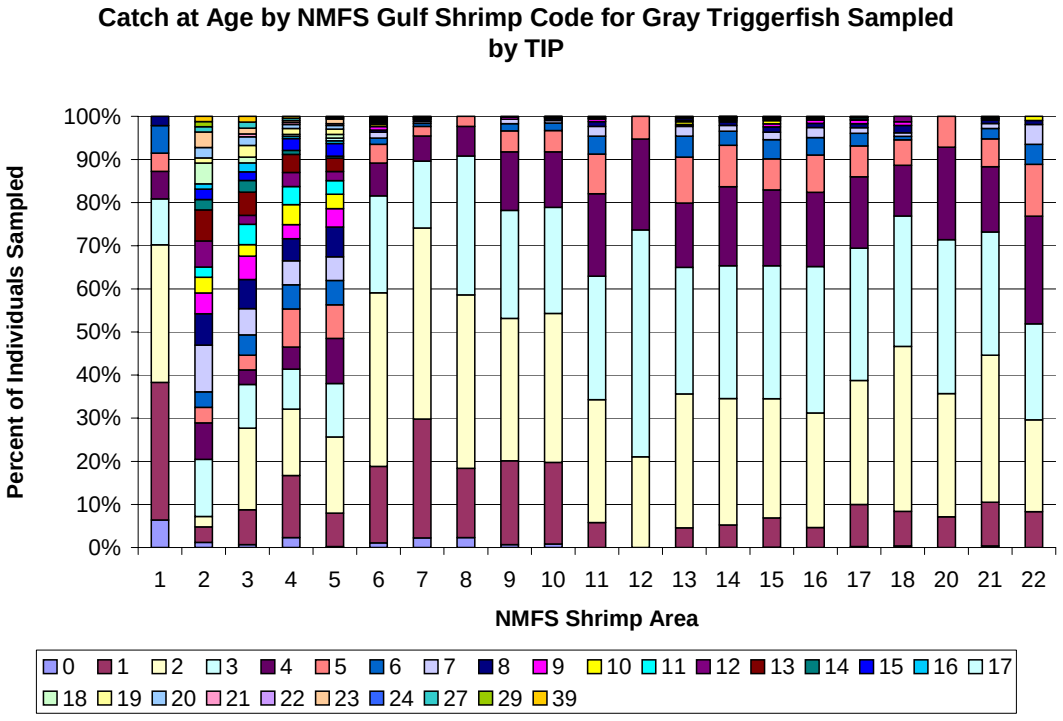
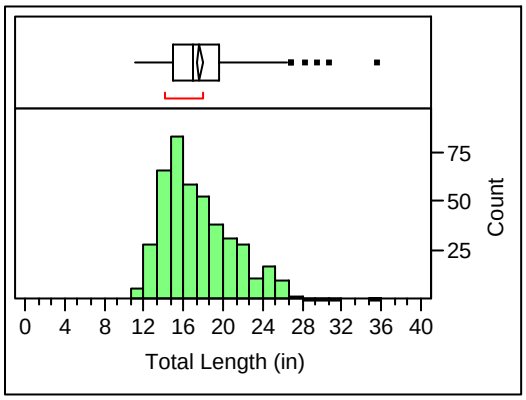


Figure 35: Catch at age for gray triggerfish sampled by TIP by area, where the area corresponds to the NMFS shrimp code in the Gulf of Mexico (see Figure 1).

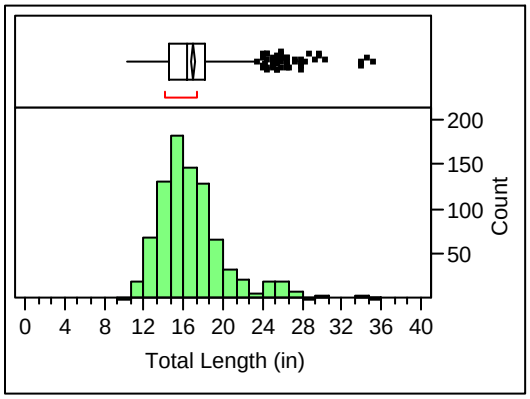
Appendix C: Length Frequency Distributions

1990



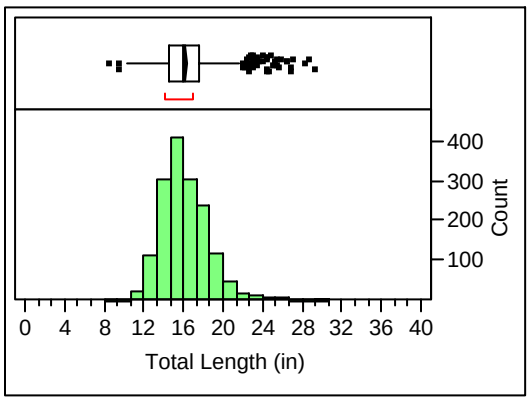
Mean	17.62144
Std Dev	3.7018576
Std Err Mean	0.1770839
upper 95% Mean	17.969485
lower 95% Mean	17.273396
N	437

1991



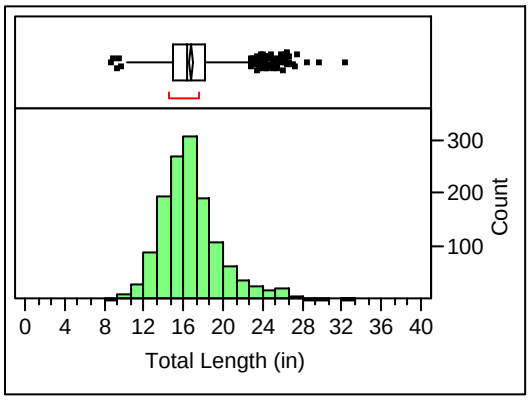
Mean	16.921144
Std Dev	3.6319336
Std Err Mean	0.1233469
upper 95% Mean	17.163238
lower 95% Mean	16.67905
N	867

1992



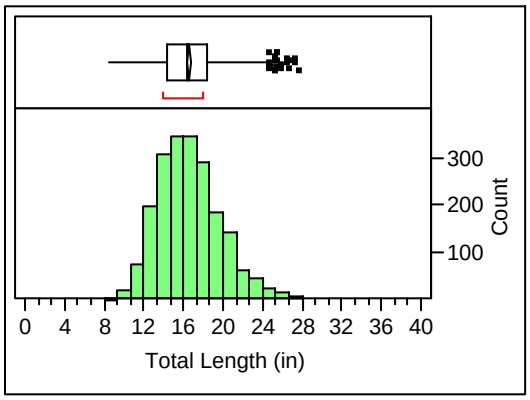
Mean	16.244254
Std Dev	2.521958
Std Err Mean	0.0625236
upper 95% Mean	16.36689
lower 95% Mean	16.121619
N	1627

1993



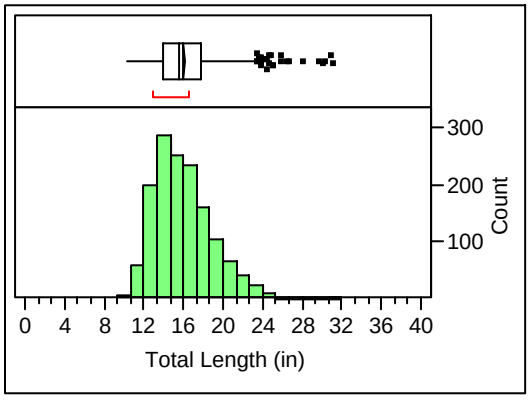
Mean	16.762091
Std Dev	3.0389759
Std Err Mean	0.0818361
upper 95% Mean	16.922628
lower 95% Mean	16.601554
N	1379

1994



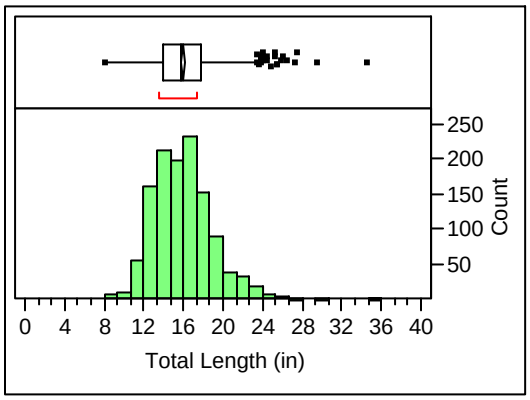
Mean	16.593023
Std Dev	3.0963833
Std Err Mean	0.0680401
upper 95% Mean	16.726457
lower 95% Mean	16.459589
N	2071

1995



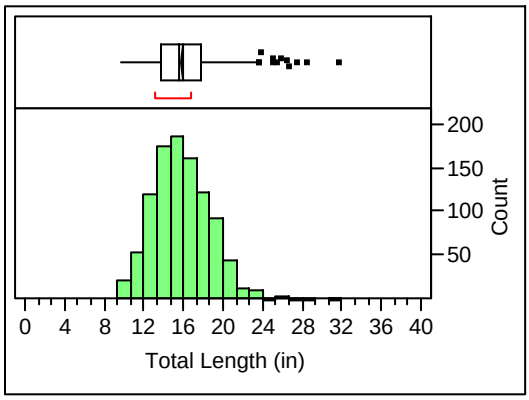
Mean	16.041401
Std Dev	2.9861478
Std Err Mean	0.0783931
upper 95% Mean	16.195177
lower 95% Mean	15.887625
N	1451

1996



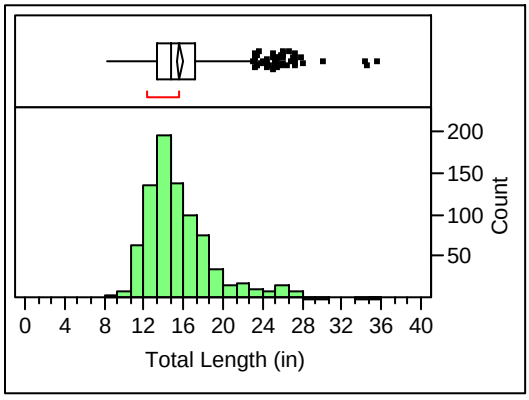
Mean	16.011189
Std Dev	2.9903256
Std Err Mean	0.085403
upper 95% Mean	16.178741
lower 95% Mean	15.843636
N	1226

1997



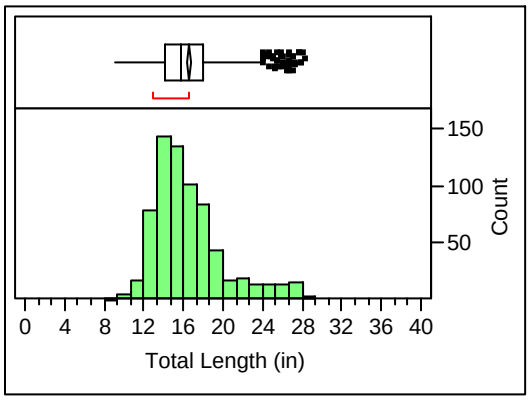
Mean	15.879969
Std Dev	2.9280151
Std Err Mean	0.0919506
upper 95% Mean	16.060405
lower 95% Mean	15.699534
N	1014

1998



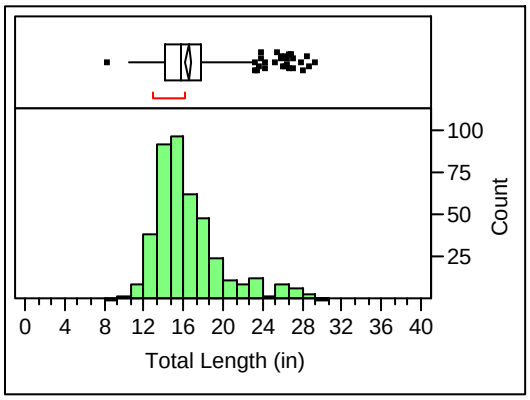
Mean	15.644631
Std Dev	3.6314728
Std Err Mean	0.1249265
upper 95% Mean	15.889834
lower 95% Mean	15.399428
N	845

1999



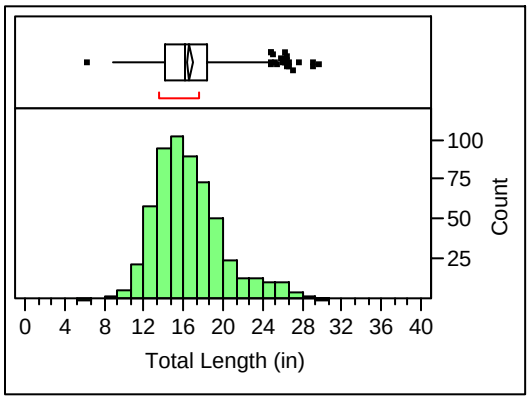
Mean	16.528975
Std Dev	3.5966568
Std Err Mean	0.1354579
upper 95% Mean	16.794925
lower 95% Mean	16.263025
N	705

2000



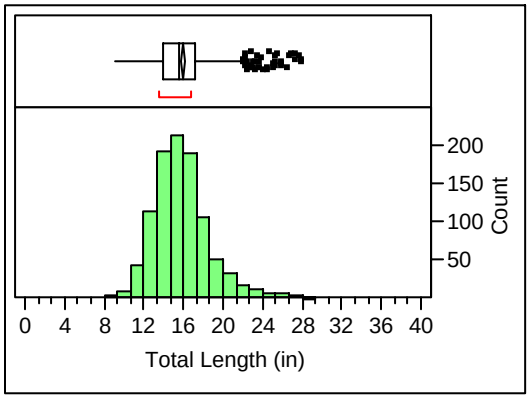
Mean	16.530356
Std Dev	3.5146404
Std Err Mean	0.1700854
upper 95% Mean	16.864667
lower 95% Mean	16.196045
N	427

2003



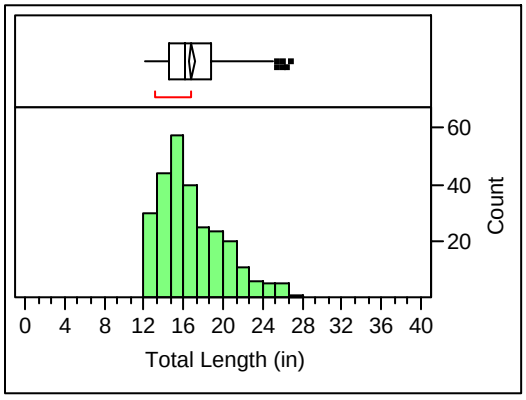
Mean	16.600284
Std Dev	3.5574901
Std Err Mean	0.1474627
upper 95% Mean	16.889909
lower 95% Mean	16.310659
N	582

2001



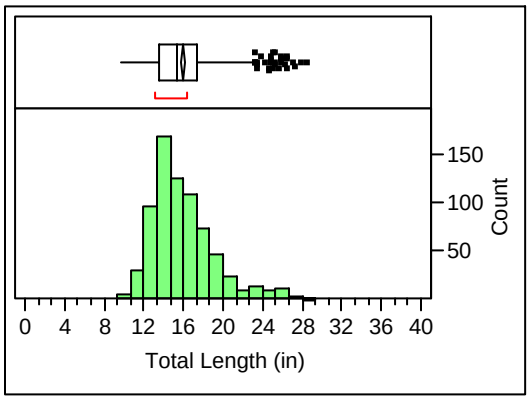
Mean	15.901921
Std Dev	2.9418038
Std Err Mean	0.0927502
upper 95% Mean	16.083928
lower 95% Mean	15.719915
N	1006

2004



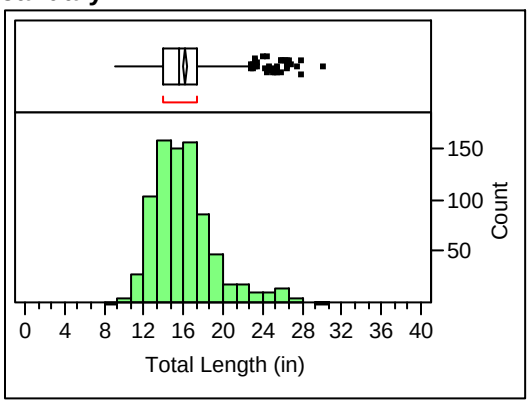
Mean	16.861974
Std Dev	3.2580128
Std Err Mean	0.1986445
upper 95% Mean	17.253076
lower 95% Mean	16.470872
N	269

2002



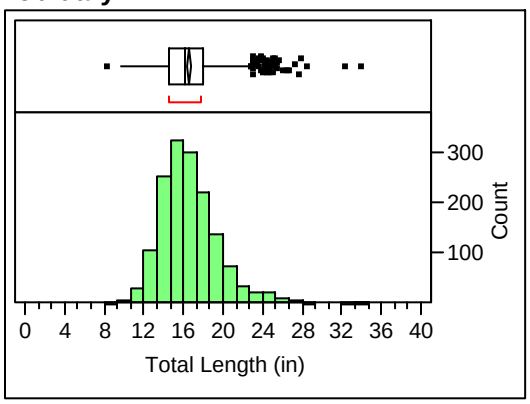
Mean	15.929718
Std Dev	3.1999071
Std Err Mean	0.118272
upper 95% Mean	16.161911
lower 95% Mean	15.697525
N	732

January



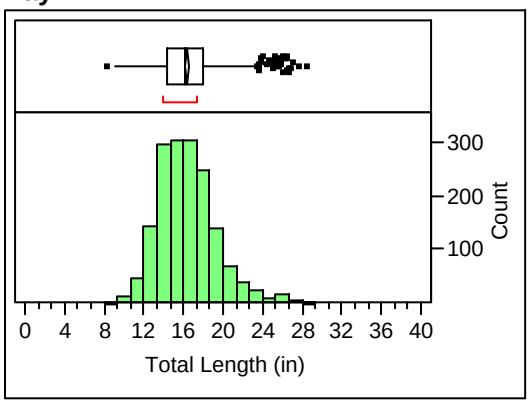
Mean	16.131986
Std Dev	3.1397212
Std Err Mean	0.1097778
upper 95% Mean	16.347466
lower 95% Mean	15.916507
N	818

February



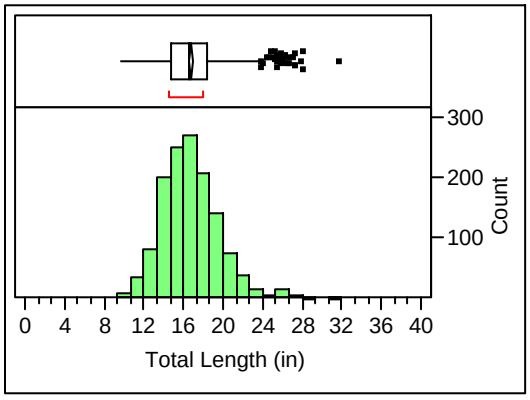
Mean	16.582771
Std Dev	2.8582646
Std Err Mean	0.0725766
upper 95% Mean	16.72513
lower 95% Mean	16.440413
N	1551

May



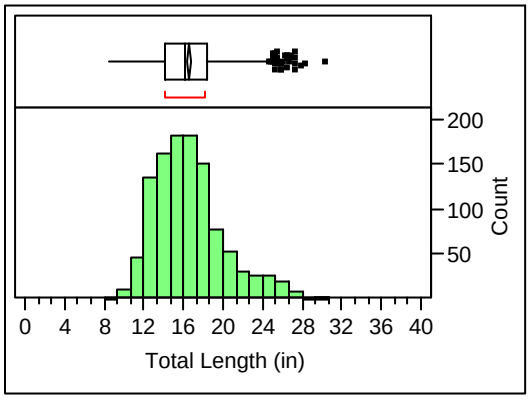
Mean	16.402829
Std Dev	2.9420028
Std Err Mean	0.071906
upper 95% Mean	16.543864
lower 95% Mean	16.261794
N	1674

March



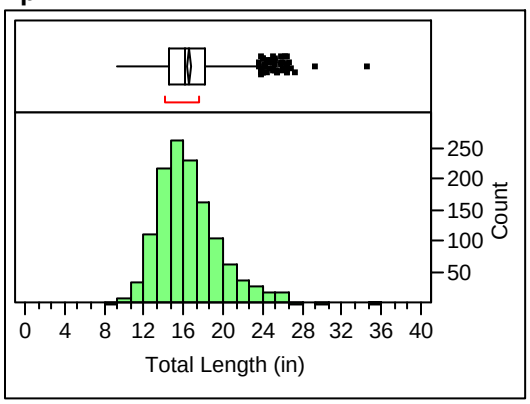
Mean	16.766732
Std Dev	2.9279873
Std Err Mean	0.0793088
upper 95% Mean	16.922313
lower 95% Mean	16.611152
N	1363

June



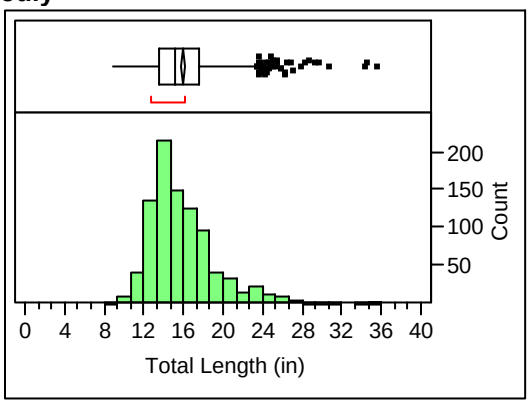
Mean	16.553936
Std Dev	3.4948805
Std Err Mean	0.1045697
upper 95% Mean	16.759112
lower 95% Mean	16.348761
N	1117

April



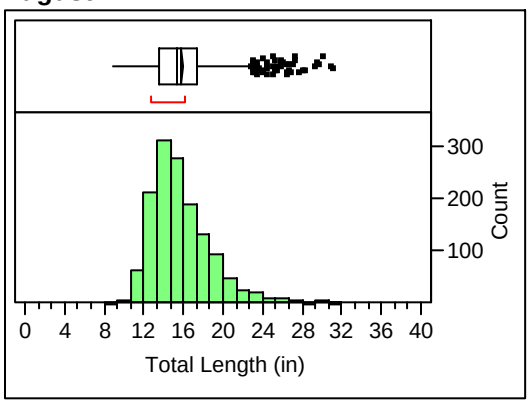
Mean	16.584559
Std Dev	3.155691
Std Err Mean	0.0873553
upper 95% Mean	16.755931
lower 95% Mean	16.413186
N	1305

July



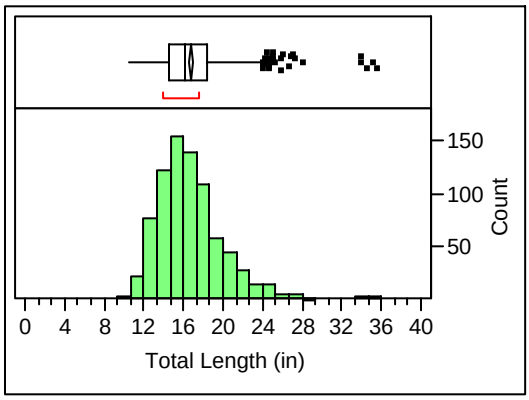
Mean	15.935662
Std Dev	3.4963004
Std Err Mean	0.115207
upper 95% Mean	16.161761
lower 95% Mean	15.709563
N	921

August



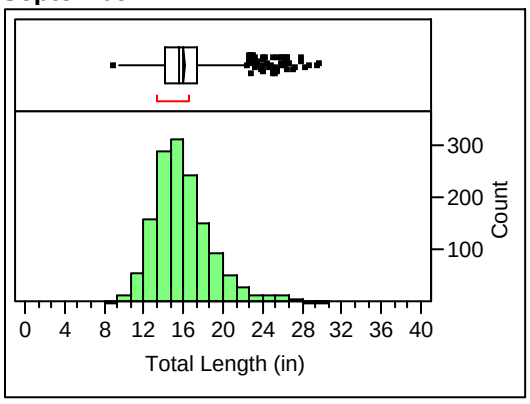
Mean	15.823905
Std Dev	3.1475392
Std Err Mean	0.0831183
upper 95% Mean	15.986951
lower 95% Mean	15.660858
N	1434

November



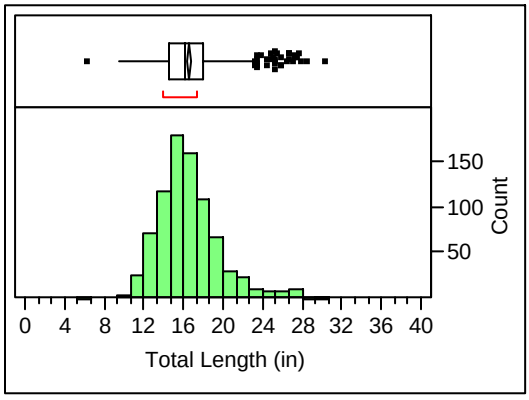
Mean	16.726815
Std Dev	3.3882797
Std Err Mean	0.1194212
upper 95% Mean	16.96123
lower 95% Mean	16.492401
N	805

September



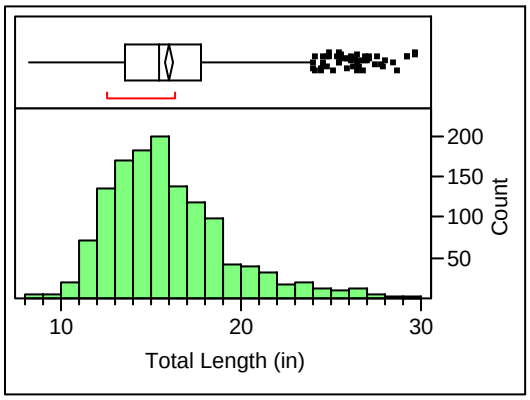
Mean	16.013814
Std Dev	2.9945051
Std Err Mean	0.078343
upper 95% Mean	16.167491
lower 95% Mean	15.860138
N	1461

December



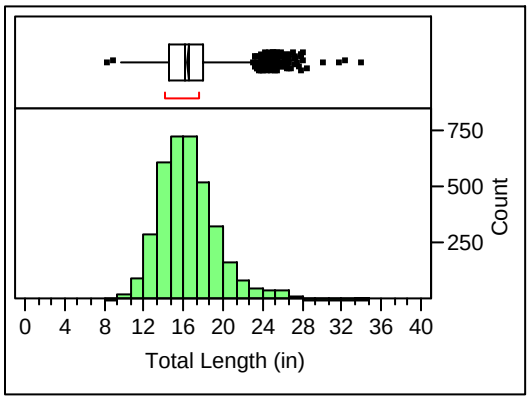
Mean	16.548771
Std Dev	3.13952
Std Err Mean	0.1089743
upper 95% Mean	16.762669
lower 95% Mean	16.334873
N	830

October



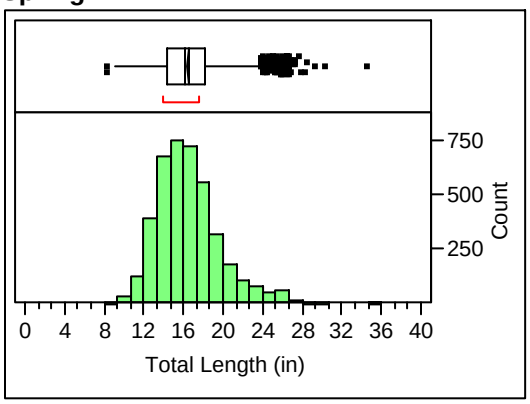
Mean	16.003073
Std Dev	3.4944338
Std Err Mean	0.094791
upper 95% Mean	16.189026
lower 95% Mean	15.817121
N	1359

Winter



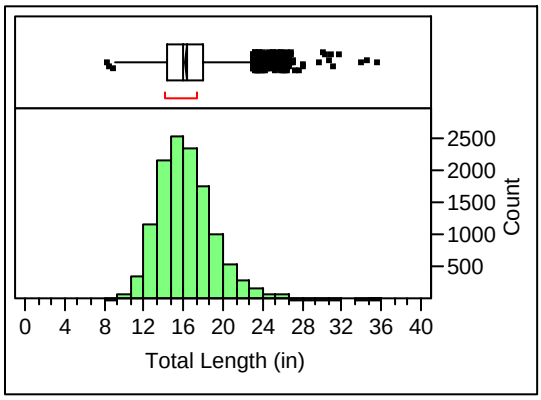
Mean	16.551152
Std Dev	2.956037
Std Err Mean	0.0483882
upper 95% Mean	16.646022
lower 95% Mean	16.456282
N	3732

Spring



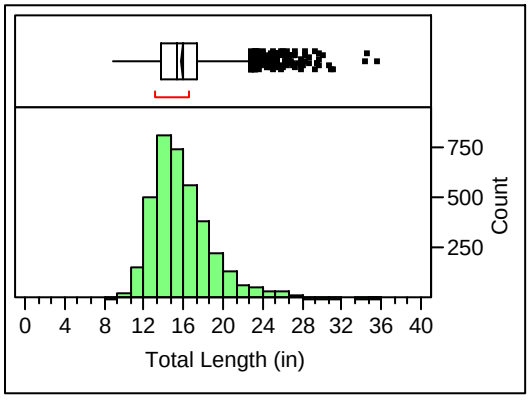
Mean	16.501936
Std Dev	3.1690503
Std Err Mean	0.0495164
upper 95% Mean	16.599016
lower 95% Mean	16.404857
N	4096

Hook and Line Gear



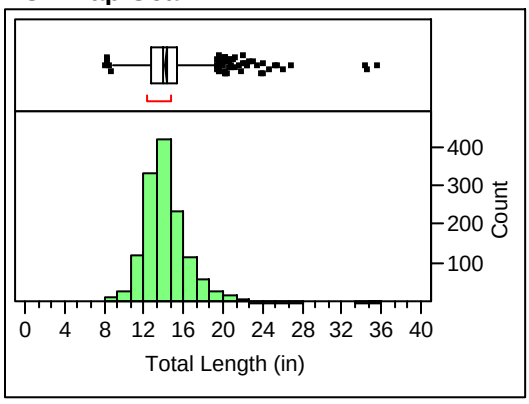
Mean	16.291121
Std Dev	2.7800552
Std Err Mean	0.0247638
upper 95% Mean	16.339662
lower 95% Mean	16.242581
N	12603

Summer



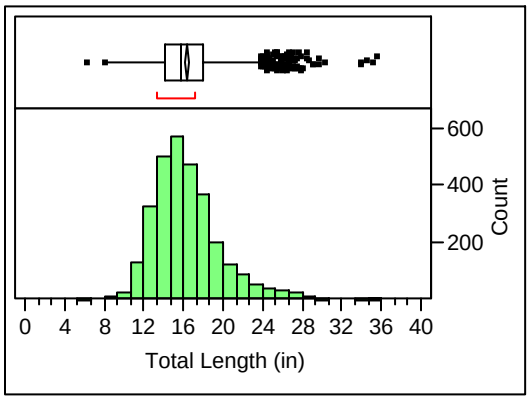
Mean	15.923587
Std Dev	3.1792705
Std Err Mean	0.0514663
upper 95% Mean	16.024491
lower 95% Mean	15.822683
N	3816

Fish Trap Gear



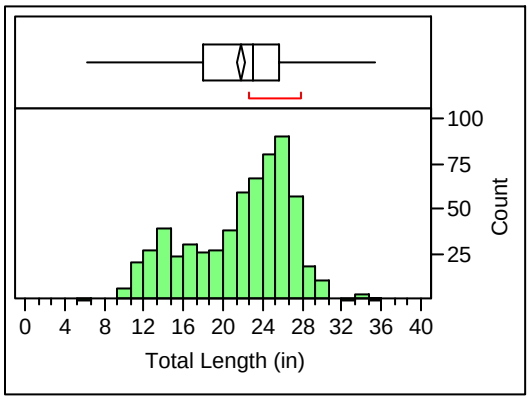
Mean	14.286488
Std Dev	2.5418705
Std Err Mean	0.0677892
upper 95% Mean	14.419467
lower 95% Mean	14.153509
N	1406

Fall



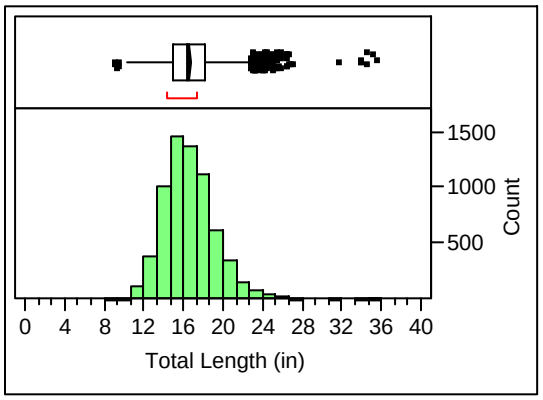
Mean	16.348946
Std Dev	3.3850101
Std Err Mean	0.0618634
upper 95% Mean	16.470245
lower 95% Mean	16.227646
N	2994

Other Gear



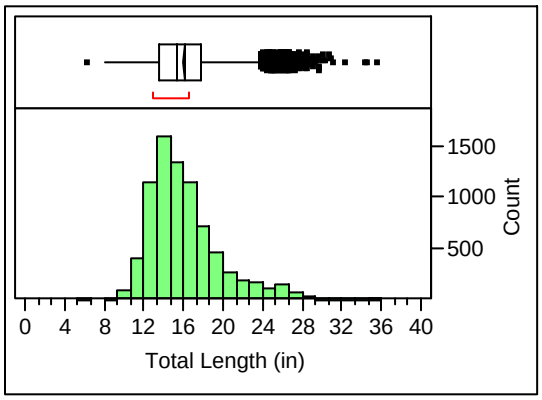
Mean	21.733189
Std Dev	5.1706031
Std Err Mean	0.2061654
upper 95% Mean	22.138046
lower 95% Mean	21.328332
N	629

Western Gulf of Mexico



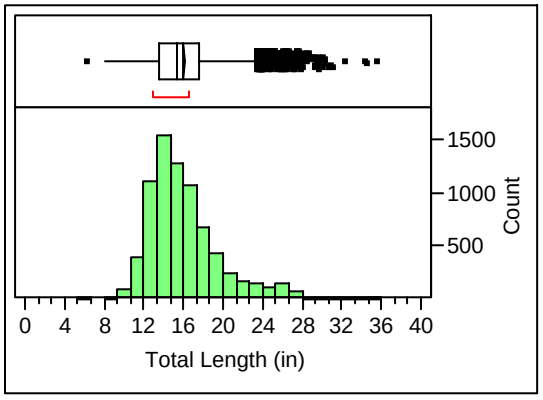
Mean	16.650236
Std Dev	2.6191764
Std Err Mean	0.0318207
upper 95% Mean	16.712615
lower 95% Mean	16.587858
N	6775

Florida



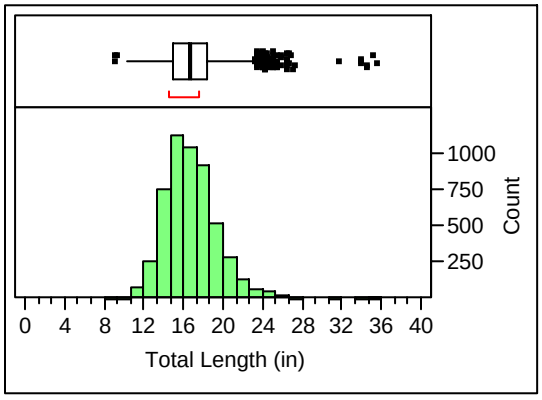
Mean	16.087688
Std Dev	3.5668988
Std Err Mean	0.0400725
upper 95% Mean	16.16624
lower 95% Mean	16.009135
N	7923

Eastern Gulf of Mexico



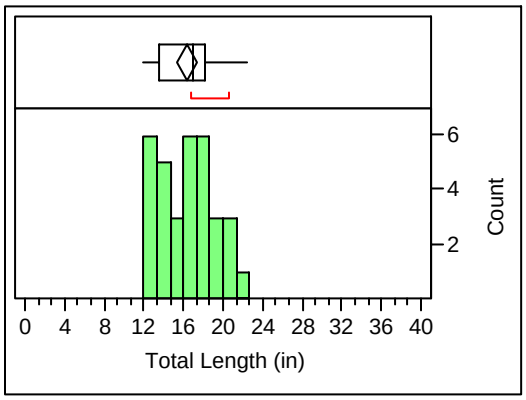
Mean	16.019011
Std Dev	3.5601323
Std Err Mean	0.0409725
upper 95% Mean	16.099329
lower 95% Mean	15.938694
N	7550

Louisiana



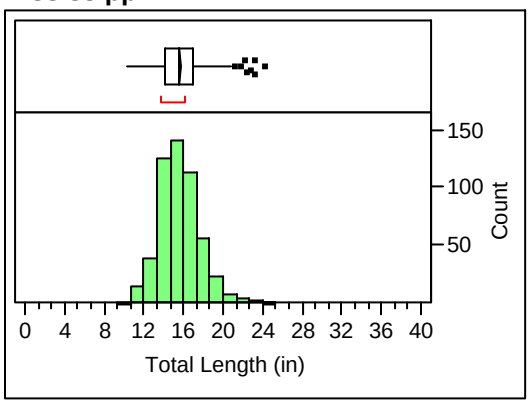
Mean	16.783511
Std Dev	2.6410155
Std Err Mean	0.036446
upper 95% Mean	16.854961
lower 95% Mean	16.712062
N	5251

Alabama



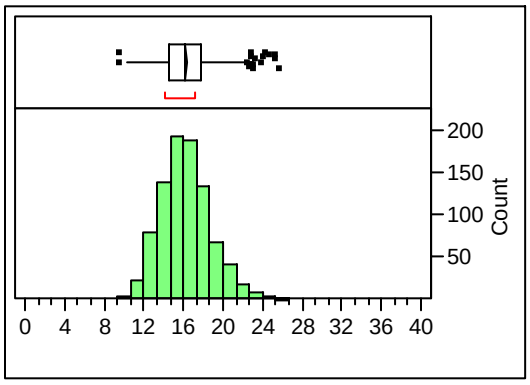
Mean	16.376985
Std Dev	2.7982448
Std Err Mean	0.4871119
upper 95% Mean	17.3692
lower 95% Mean	15.384771
N	33

Mississippi



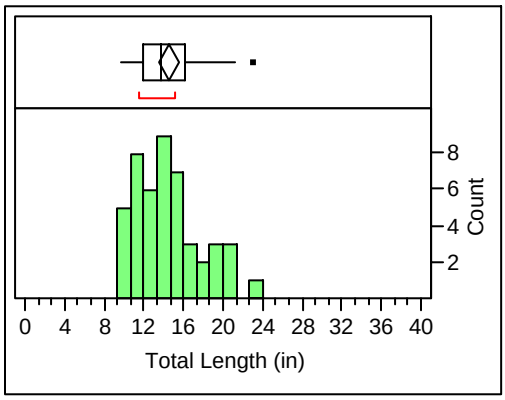
Mean	15.650898
Std Dev	2.0699097
Std Err Mean	0.0899111
upper 95% Mean	15.827525
lower 95% Mean	15.474271
N	530

Texas



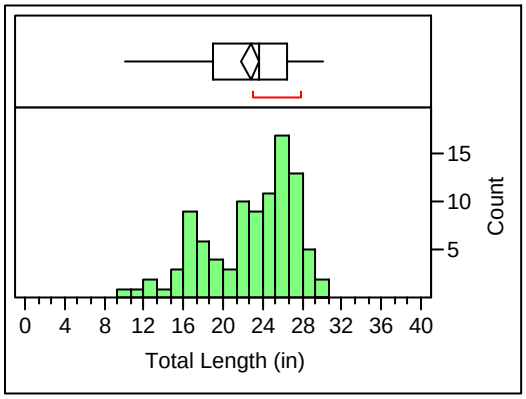
Mean	16.254825
Std Dev	2.5382059
Std Err Mean	0.0845599
upper 95% Mean	16.420782
lower 95% Mean	16.088867
N	901

AREA SHRIMP CODE=1



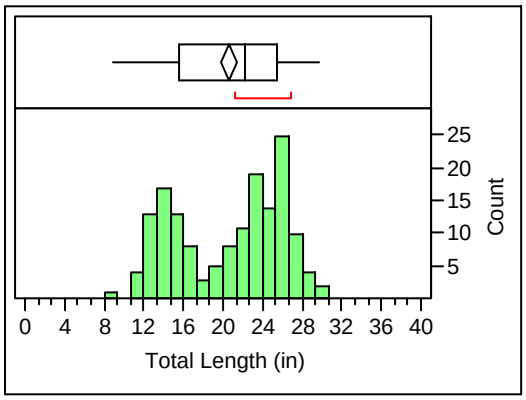
Mean	14.512688
Std Dev	3.2585143
Std Err Mean	0.4753032
upper 95% Mean	15.469424
lower 95% Mean	13.555952
N	47

AREA SHRIMP CODE=2



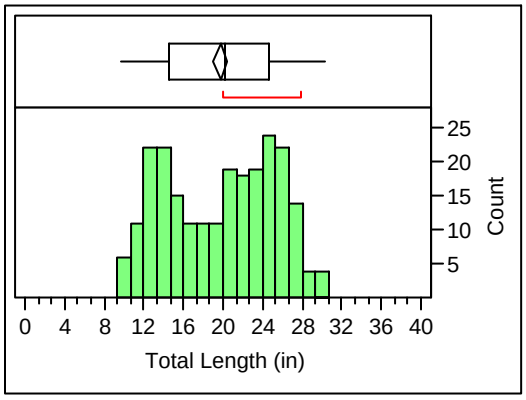
Mean	22.742799
Std Dev	4.6149969
Std Err Mean	0.4685819
upper 95% Mean	23.672927
lower 95% Mean	21.812671
N	97

AREA SHRIMP CODE=3



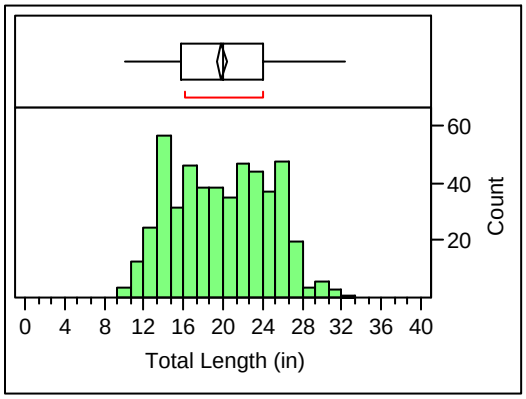
Mean	20.612622
Std Dev	5.3679859
Std Err Mean	0.4284119
upper 95% Mean	21.458858
lower 95% Mean	19.766385
N	157

AREA SHRIMP CODE=4



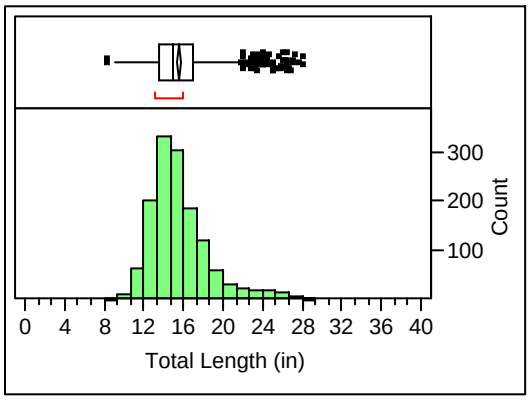
Mean	19.76896
Std Dev	5.4647731
Std Err Mean	0.3580092
upper 95% Mean	20.474324
lower 95% Mean	19.063595
N	233

AREA SHRIMP CODE=5



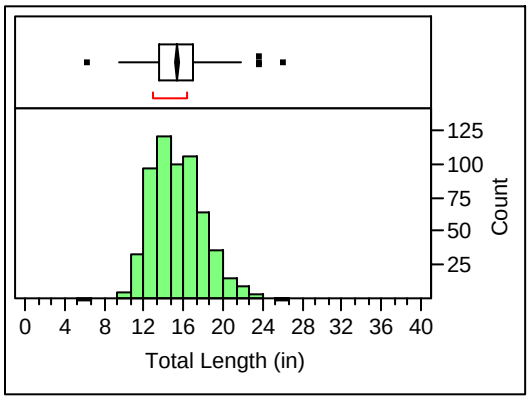
Mean	19.883779
Std Dev	4.8609816
Std Err Mean	0.2173897
upper 95% Mean	20.310891
lower 95% Mean	19.456668
N	500

AREA SHRIMP CODE=6



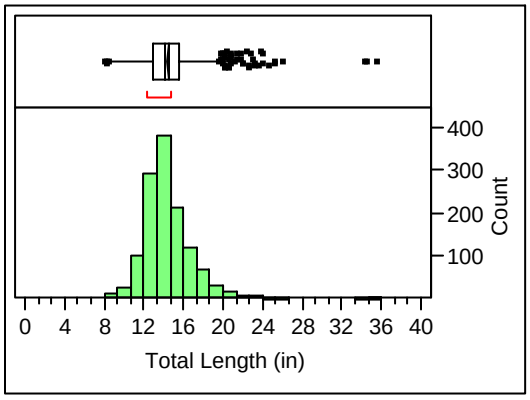
Mean	15.584834
Std Dev	3.0269366
Std Err Mean	0.0809851
upper 95% Mean	15.7437
lower 95% Mean	15.425969
N	1397

AREA SHRIMP CODE=9



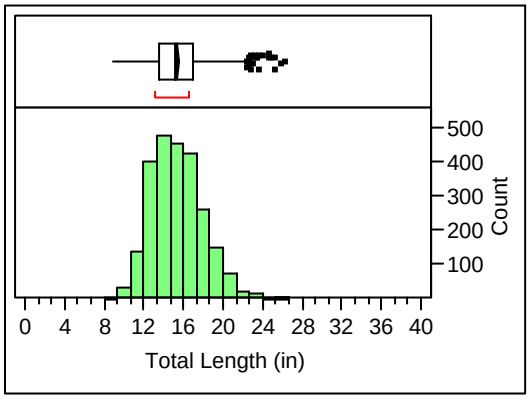
Mean	15.425062
Std Dev	2.5781201
Std Err Mean	0.1056039
upper 95% Mean	15.632463
lower 95% Mean	15.21766
N	596

AREA SHRIMP CODE=7



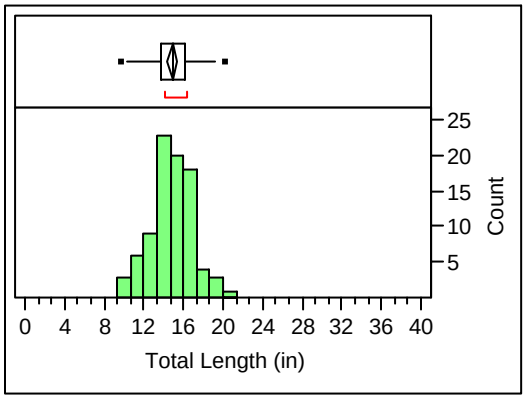
Mean	14.468871
Std Dev	2.6153818
Std Err Mean	0.0726775
upper 95% Mean	14.61145
lower 95% Mean	14.326293
N	1295

AREA SHRIMP CODE=10



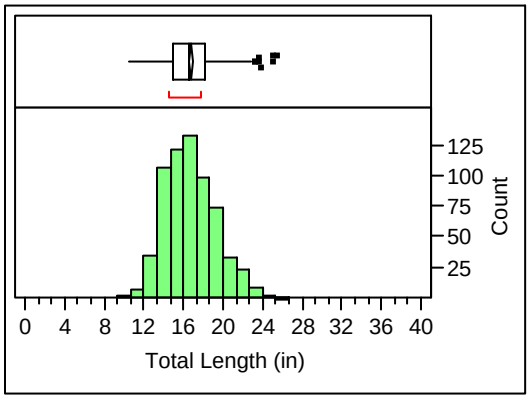
Mean	15.403882
Std Dev	2.5578967
Std Err Mean	0.0514781
upper 95% Mean	15.504827
lower 95% Mean	15.302937
N	2469

AREA SHRIMP CODE=8



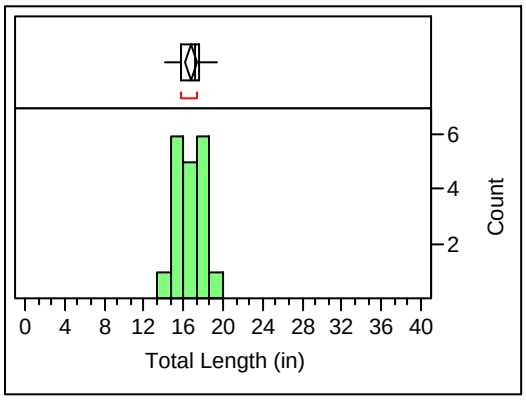
Mean	14.863518
Std Dev	2.0376213
Std Err Mean	0.2184559
upper 95% Mean	15.297794
lower 95% Mean	14.429242
N	87

AREA SHRIMP CODE=11



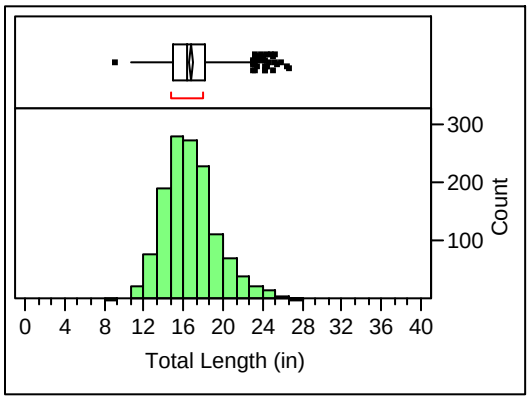
Mean	16.731161
Std Dev	2.5603748
Std Err Mean	0.1001952
upper 95% Mean	16.927905
lower 95% Mean	16.534417
N	653

AREA SHRIMP CODE=12



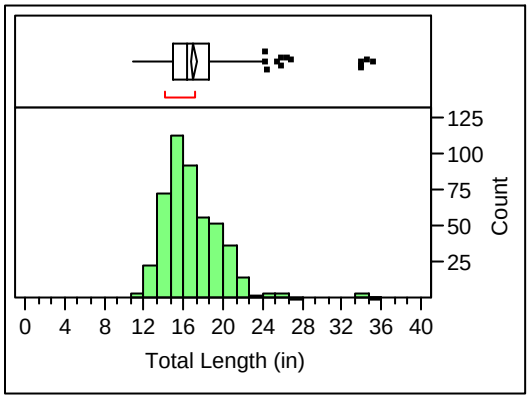
Mean	16.729009
Std Dev	1.3086928
Std Err Mean	0.3002347
upper 95% Mean	17.359778
lower 95% Mean	16.098239
N	19

AREA SHRIMP CODE=15



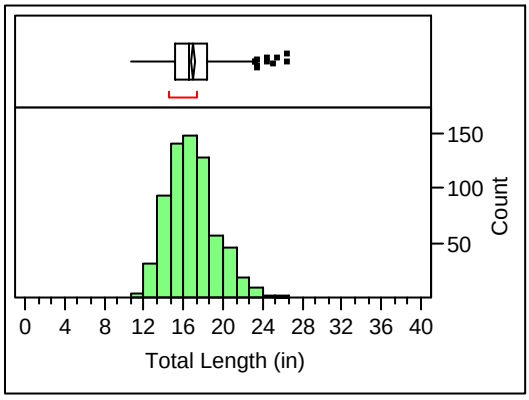
Mean	16.763379
Std Dev	2.6603223
Std Err Mean	0.0727016
upper 95% Mean	16.906001
lower 95% Mean	16.620757
N	1339

AREA SHRIMP CODE=13



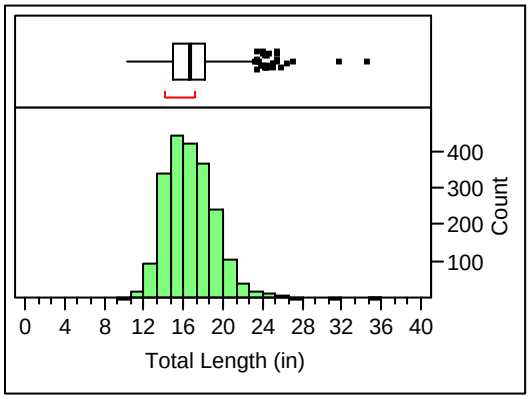
Mean	17.019695
Std Dev	3.1727036
Std Err Mean	0.1445127
upper 95% Mean	17.303649
lower 95% Mean	16.73574
N	482

AREA SHRIMP CODE=16



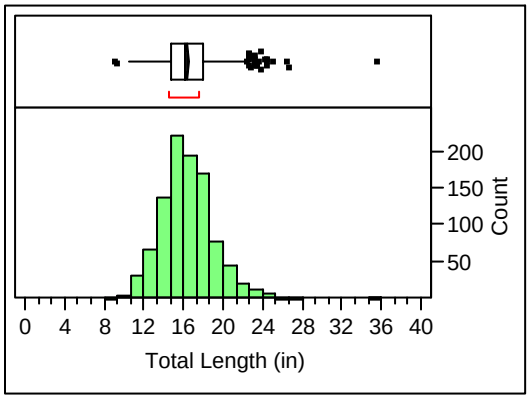
Mean	16.904066
Std Dev	2.4792382
Std Err Mean	0.0942465
upper 95% Mean	17.08911
lower 95% Mean	16.719022
N	692

AREA SHRIMP CODE=14



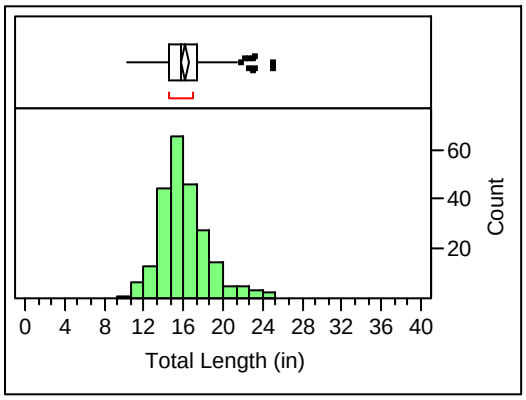
Mean	16.735507
Std Dev	2.4916217
Std Err Mean	0.0540763
upper 95% Mean	16.841555
lower 95% Mean	16.629459
N	2123

AREA SHRIMP CODE=17



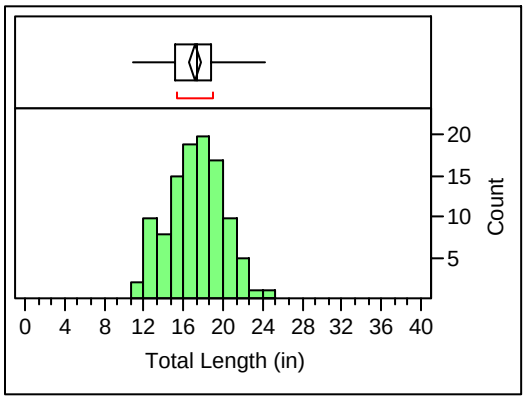
Mean	16.44854
Std Dev	2.6642173
Std Err Mean	0.084589
upper 95% Mean	16.614534
lower 95% Mean	16.282546
N	992

AREA SHRIMP CODE=18



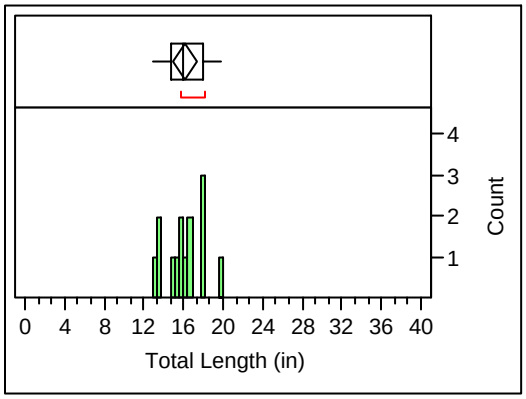
Mean	16.171697
Std Dev	2.5361557
Std Err Mean	0.1643946
upper 95% Mean	16.495558
lower 95% Mean	15.847836
N	238

AREA_SHRIMP CODE=22



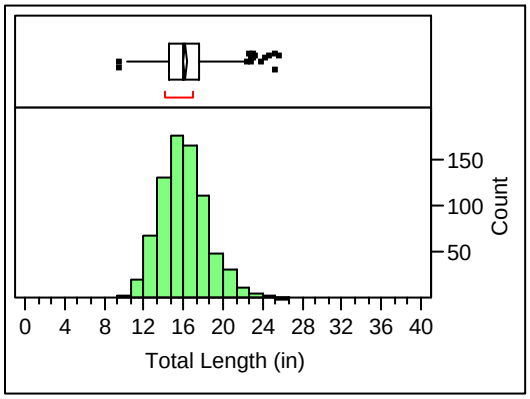
Mean	17.179119
Std Dev	2.7743984
Std Err Mean	0.2669666
upper 95% Mean	17.708349
lower 95% Mean	16.649889
N	108

AREA SHRIMP CODE=20



Mean	16.14163
Std Dev	1.9892651
Std Err Mean	0.5316535
upper 95% Mean	17.290197
lower 95% Mean	14.993062
N	14

AREA SHRIMP CODE=21



Mean	16.113664
Std Dev	2.4727704
Std Err Mean	0.0881447
upper 95% Mean	16.286691
lower 95% Mean	15.940637
N	787