

3. COMMERCIAL FISHERY STATISTICS

For this data workshop, there was not a Commercial Fisheries Statistics workgroup. The commercial data products discussed at the workshop were shrimp bycatch and shrimp effort (used to derive an index of fleet effort), which were discussed in a combined Indices and Bycatch workgroup, and commercial length and age compositions discussed in the Life History workgroup. For documentation purposes, commercial landings, discards, length and age compositions, and indices are summarized below.

3.1 DATA NOT DISCUSSED AT THE DATA WORKSHOP

Commercial landings and discards were provided for this assessment following decisions adopted during SEDAR 43, SEDAR 62, or through SEDAR best practices. Working papers were provided for these products to thoroughly document the methods and any differences compared to SEDAR 62.

SEDAR100-DW-05: Commercial Landings of Gulf of America Gray Triggerfish (*Balistes capricus*) from 1949-2024.

SEDAR100-DW-06: CPUE Expansion Estimation for Commercial Discards of Gulf of America Gray Triggerfish.

3.1.1 Commercial Landings

Commercial landings of Gulf Gray Triggerfish were compiled from the Accumulated Landings System (ALS) and state trip ticket programs (STT) following methodology used in SEDAR 43 and SEDAR 62. Landings were provided in whole weight pounds from 1949-2024 by subregion, gear, and year, with subregions being East (Florida - Mississippi) and West (Texas - Louisiana) as shown in Figure 3.10.1. Commercial landings were largely consistent with what was provided in SEDAR 62. Some minor differences were observed between the landings provided in SEDAR 62 and those provided for the current assessment (SEDAR 100), particularly in more recent years, however the landings provided here were consistent with those used for ACL monitoring and therefore considered to be the best available data. Final landings by year, gear, and subregion are summarized in Table 3.9.1, and landings by year and subregion are shown graphically in Figure 3.10.2. Further details regarding the commercial landings are available in the commercial landings working paper, along with recommendations for uncertainty estimates (SEDAR100-DW-05).

3.1.2 Commercial Discards

Commercial discards are estimated for vertical line gear using two different data sources and methods that correspond to differences in management and discard behavior. In 2007, an Individual Fishing Quota (IFQ) was implemented for Red Snapper and this is the same year the SEFSC implemented the Reef Fish Observer Program. For this reason, observer-discard rates were not used to estimate discards prior to IFQ considering this change in management had a significant impact on discard behavior of Red Snapper and other reef fishes caught in the reef fish fishery, such as Gray Triggerfish. Discard estimation from 2007-2024 using observer data followed standard methods presented in SEDAR 62, the previous data/assessment workshop for this species.

Since the SEFSC no longer recommends the use of discard logbook data for estimating discards for SEDAR (Alhale et al. 2024), a hindcast procedure was used to estimate the discards previous to observer coverage using discard rates in the earliest time then applied to logbook-derived effort. The observer method is more reliable because there is a verification step to use observer kept data to re-estimate the landings of Gray Triggerfish. For this assessment, discards were limited to 2000 and after as that was the first year of a size limit in this fishery. Discards were estimated for three overall regions following the TORs of this assessment; East, West, and Gulf-wide (Table 3.9.2). The commercial discard working paper (SEDAR100-DW-06) documents in three sections the observer method with associated discard length compositions, the discard logbook method, a calibration of discard logbook-derived estimates, as well as comparisons to SEDAR 62. Discards were limited to vertical line gears only with longline being excluded due to near 0 observed catches for this species.

3.2 ISSUES DISCUSSED AT THE DATA WORKSHOP IN THE INDICES AND BYCATCH GROUP

Commercial data issues discussed in the Indices and Bycatch workgroup at the data workshop were limited to shrimp bycatch and included:

- Shrimp effort data
- Shrimp bycatch estimation using SEAMAP data
- Overall estimated shrimp bycatch

3.2.1 Review of Working and Reference Documents

The workgroup considered data and analyses presented from the following documents:

SEDAR100-DW-22: Estimation of Gray Triggerfish Bycatch from Gulf of America Shrimp Trawls

3.2.2 Workgroup Participants

Below are the Indices & Bycatch workgroup participants and their affiliations:

Sarina Atkinson	NMFS
Matthew Campbell	NMFS
Heather Christiansen	FWC
Kyle Dettloff	NMFS
David Hanisko	NMFS
Frank Hernandez	NMFS
Matthew Nuttall	NMFS
Katherine Overly	NMFS
Cheston Peterson	University of Miami/CIMAS (Group Co-lead)
Adam Pollack	NMFS (Group Co-lead)
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Kevin Thompson	NMFS
Glenn Zapfe	NMFS

3.3 SHRIMP EFFORT & BYCATCH

3.3.1 Shrimp Effort

Gulf penaeid shrimp effort has non-universal coverage of the fleet. Therefore, trawling effort must be estimated from a sample of the fleet and scaled up to total effort using the landings. There are two sources of data for estimating Gulf penaeid offshore trawling effort. Port agent interviews were used from 1984-2006 and electronic logbook (ELB) positional data were used from 2007-2023. Fleet effort for the observer time period (2007-2023) was estimated using shrimp catch and effort data for a subset of vessels equipped with GPS tracklog (ELB) devices (Smith et al. 2025, Dettloff 2024). Fleet catch of non-target species (discarded as bycatch) was estimated in the second expansion using onboard observer catch and effort data for a subset of vessel trips and the estimated fleet effort (Atkinson et al. 2024 and 2025, Smith et al. 2025). GLM analysis of stratification variables confirmed that season, area, and depth were important variables for partitioning mean and variance of penaeid shrimp and non-target species catch rates. An overview of the data of each source as well as the overall methods are summarized in Atkinson et al. 2025 (SEDAR98-DW-23). Shrimp trawl effort estimates are provided in Table 3.9.3.

3.3.2 Shrimp Bycatch

Because Gray Triggerfish are not mandatorily recorded in the Shrimp Observer program, the bycatch estimation methods used for Red Snapper in SEDAR 98 (Smith et al. 2025) could not be applied directly. Instead, bycatch estimation was applied to proxy species for Gray Triggerfish based on a co-occurrence analysis of SEAMAP data, which were filtered to reflect commercial shrimping grounds and habitat as accurately as possible. Bycatch estimates were then calculated using the same methodology applied to Red Snapper in SEDAR 98 and calibrated based on catch-per-unit-effort (CPUE) ratios of Gray Triggerfish and the proxy species in the filtered SEAMAP dataset. Estimation of Gray Triggerfish shrimp trawl bycatch therefore consisted of three phases: **1)** filtering the SEAMAP data to best represent shrimp habitat; **2)** conducting a stratified co-occurrence analysis of Gray Triggerfish and species tracked by the shrimp observer program to determine proxy species using the filtered SEAMAP data; and **3)** estimation of shrimp bycatch of proxy species using the methods in Smith et al. (2025) and calibration to Gray Triggerfish based on CPUE ratios from the filtered SEAMAP data.

SEAMAP data were subset using a series of filters, described in SEDAR100-DW-22, including intersection of known reef habitat, hard bottom indicator species (e.g. octocorals), overlap with known areas of commercial shrimp effort, and presence of penaeid shrimp catch. A blocked co-occurrence analysis (Mackenzie et al. 2006, Smith et al. 2021) using area-season-depth strata was applied to the filtered SEAMAP dataset to identify proxy species from the pool of species tracked by the shrimp observer program. The co-occurrence species interaction factor (SIF) was calculated to evaluate the association between Gray Triggerfish and other species in the SEAMAP catch that are also tracked by the shrimp observer program. The co-occurrence analysis used a stratification, or blocking, scheme to allow for spatio-temporal flexibility in species associations and therefore multiple proxy species if necessary. This stratification scheme followed previous work in the Gulf (Smith et al. 2025) by using an Area-Season-Depth stratification consisting of four areas, three seasons, and two depth zones (≤ 10 fathoms and > 10 fathoms). Lane Snapper (*Lutjanus synagris*) and Red Snapper (*L. campechanus*) were chosen as proxy species.

Bycatch estimation was conducted on proxy species following the methods of Smith et al. (2023; 2025). The general approach to estimating bycatch involves two catch rate expansions: one estimating total fleet effort and one estimating total fleet catch/bycatch. Fleet catch of non-target species (discarded as bycatch) was estimated in the second expansion using onboard observer catch and effort data for a subset of vessel trips and the estimated fleet effort (Atkinson et al. 2024, Smith et al. 2025). GLM analysis of stratification variables confirmed that season, area, and depth were important variables for partitioning mean and variance of penaeid shrimp and non-target species catch rates. A hindcasting procedure was developed for estimating bycatch for the pre-observer years 1984-2006 using observer data for 2007-2013 and the improved time series of shrimp landings and effort for 1984-2006. The key assumption was a stable relationship between strata-specific shrimp and proxy species catch rates. The resulting bycatch estimates for 1984-2006 generally tracked changes in shrimp fleet effort, and were less

volatile in terms of magnitude compared to the estimates produced for SEDAR 62, which relied on SEAMAP trawl data as a proxy for commercial shrimp trawls (Zhang 2020, SEDAR62-WP-20). To calibrate bycatch estimates of proxy species to Gray Triggerfish, conversion factors were calculated for each stratum based on catch rates of each species in the filtered SEAMAP dataset.

Estimates of Gray Triggerfish bycatch from commercial shrimp trawls for West and East Gulf regions for 1984-2023 are provided in Table 3.9.4 and Figure 3.10.3. Bycatch of Gray Triggerfish was higher in the West Gulf throughout the time series. The shrimp bycatch working paper (SEDAR100-DW-22) details the filtering process of the SEAMAP data, the co-occurrence analysis used to determine proxy species, and bycatch estimation methods.

Decision 1: The workgroup recommends the bycatch estimates from 1984-2023 following the improved methodology used for Red Snapper in SEDAR 98 with Lane Snapper and Red Snapper as proxy species for Gray Triggerfish in SEDAR 100. From workshop discussions with the analysts, the bycatch team suggested using a time-varying conversion factor for calibrating the estimates of bycatch from proxy species to Gray Triggerfish, which was completed and added to the final calculation.

3.3.3 Shrimp Bycatch Length Composition

Bycatch length compositions were also provided for this assessment. Due to the absence of Gray Triggerfish in the Shrimp Observer data, it was recommended that the filtered SEAMAP data be used as a proxy for discard length compositions. In order to justify this recommendation, Shrimp Observer and filtered SEAMAP Red Snapper length distributions were compared and found to be similar within area-depth-season strata. Therefore, it was assumed that filtered SEAMAP length frequencies for Gray Triggerfish were representative of bycatch length frequencies and calculated based on the estimates of bycatch for both the East/West Gulf regions and Gulf-wide. Length compositions showed that bycatch is focused on sublegal sizes of Gray Triggerfish. The length range was 1.5 to 52.0 cm fork length, with 99.5% of the observations below the minimum legal size of 35.6 cm. Annual length compositions of Gray Triggerfish bycatch were estimated for the entire Gulf region.

3.4 ISSUES DISCUSSED AT THE DATA WORKSHOP IN THE LIFE HISTORY WORKGROUP

Commercial data issues discussed at the data workshop in the life history workgroup include the following topics:

- All Gulf or 2 area model
- Single commercial fleet vs. separate handline and longline fleets
- Adequacy of data for providing nominal and weighted length and age compositions

3.4.1 Review of Working and Reference Documents

The workgroup considered data and analyses presented from the following documents:

SEDAR100-DW-07: Gulf of America Gray Triggerfish (*Balistes capriscus*) Preliminary Length and Age Compositions for the Commercial Handline and Longline Fisheries.

3.4.2 Workgroup Participants

Below are the Life History workgroup participants and their affiliations:

Lisa Ailloud	NMFS
Samantha Binion-Rock	NMFS
Bridget Cermak	FWC
Steven Garner	University of Miami/CIMAS
Ryan Nichols	NMFS
Ashley Pacicco	University of Miami/CIMAS (Group Lead)
William Patterson III	University of Florida, Gainesville, FL
Michaela Pawluk	NMFS

3.5 COMMERCIAL LENGTH AND AGE COMPOSITIONS

Commercial length and age compositions were discussed as part of the life history workgroup. Two main concerns regarding the commercial length and age compositions were 1) whether there was sufficient data to split out longline as its own fleet for modeling, and 2) whether there were sufficient samples for an East/West split in the model. In order to address these concerns, sample sizes for an East/West split, and an All Gulf model were considered for each gear (handline and longline).

Sample sizes were evaluated for adequacy in terms of providing both nominal and weighted compositions. Tables summarizing the data adequacy by year, and gear for an East/West model and an All Gulf model are provided in the Life History report section in Table 2.13.5. Based on the available data, the workgroup recommended that longline be kept a separate fleet from handline as there was a clear difference in size composition between the two gear groups (Figure 3.10.4). Regarding spatial stratification, the workgroup recommended proceeding with an All Gulf model due to extremely limited data in the Western subregion and a lack of evidence for

spatial differences in size composition within a given gear group (Figure 3.10.5 - only Handline is shown, as there were limited Longline samples from the Western subregion). Due to limited data for the longline fleet, only nominal age compositions were provided (Figure 3.10.6), while for handline weighted age compositions were provided where possible (Figure 3.10.7). Further details on the construction of the length and age compositions are available in the working paper (SEDAR100-DW-07).

3.6 COMMENTS ON ADEQUACY OF DATA FOR ASSESSMENT ANALYSES

Overall, the Indices and Bycatch workgroup determined the methods for estimating shrimp effort and bycatch from 1984-2023 were appropriate and recommended for use in the assessment model. There was discussion at the workshop of an alternate report detailing shrimp trawl bycatch (Scott-Denton et al. 2012; SEDAR100-RD-06) which included a misleading table which reported Balistidae bycatch to be 0.0%, despite bycatch by weight being non-zero. It was determined this was an error in the presentation of the table in the report, causing some confusion about the validity of these results. The workgroup felt the methods and data were appropriate despite this discussion at the workshop.

The Life History workgroup recommended that the available length and age data were adequate and appropriate for construction of commercial length and age compositions in most years. Two tables are provided in the Life History workgroup report summarizing data adequacy for both nominal and weighted compositions by year and gear (Tables 2.13.5 & 2.13.6). For years when data are insufficient for weighted compositions, nominal compositions are recommended to be used.

3.7 RESEARCH RECOMMENDATIONS

Although the Indices and Bycatch workgroup focused on understanding and evaluating Gray Triggerfish bycatch methods and estimates, the working paper SEDAR100-DW-22 outlines current efforts by SEFSC to improve bycatch estimation in the future. These include:

- Adding Gray Triggerfish to the list of species for which data are currently collected in the Shrimp Observer program.
- Outfitting the commercial shrimp fleet with modern, tamper-proof GPS tracklog devices;
- Applying electronic technologies to enable observers to collect size information on all fish species captured in fish trawls;
- Modifying the allocation of observer sampling effort to better incorporate net configuration and diurnal period;
- The potential for field experiments to improve calibrations of SEAMAP and commercial shrimp trawls.

3.8 LITERATURE CITED

Alhale, S., S. Atkinson, K. Thompson, G. Decossas, K. Dettloff. 2024. Reliability of the Discard Logbook for Use in Commercial Discard Estimates in the South Atlantic. SEDAR92-RD-05. 19 pp.

Atkinson, S., A. Lowther, K. Dettloff, S.G. Smith. 2024. Gulf of Mexico commercial brown, pink and white shrimp landings. SEDAR Working Paper SEDAR87-DW-06. SEDAR, North Charleston, SC. 38 pp.

Atkinson, S., K. Dettloff, C. Peterson, S.G. Smith. 2025. Estimation of Commercial Shrimp Effort in the Gulf of Mexico from 1984-2023. SEDAR98-DW-23. SEDAR, North Charleston, SC. 22 pp.

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Mackenzie, D.I., Nichols, J.D., Royle, J.A. Pollock, K.H., Bailey, L., Hines, J.E. 2006. Occupancy estimation and modeling: inferring patterns and dynamics of species occurrence. Academic Press.

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Smith, S.G., S. Sagarese, S. Martinez-Rivera, K.J. McCarthy 2021. Estimation of a Commercial Abundance Index for Gulf of Mexico Scamp & Yellowmouth Grouper Using Reef Fish Observer Data. SEDAR68-AW-04. SEDAR, North Charleston, SC. 33 pp.

Smith, S.G., S. Atkinson, C. Peterson, J. Williams, K. Dettloff, A. Lowther. 2023. Improving estimation of bycatch from shrimp trawls in the Gulf of Mexico. SEDAR Reference Document SEDAR98-RD-01. SEDAR, North Charleston, SC. 37 pp.

Smith, S.G., S. Atkinson, C. Peterson, and K. Dettloff. 2025. Estimation of red snapper bycatch from Gulf of America shrimp trawls. SEDAR98-DW-25. SEDAR, North Charleston, SC. 17 pp.

Zhang, X.. 2020. Shrimp Fishery Bycatch Estimates for Gulf of Mexico Grey Triggerfish, 1972-2017. SEDAR62-WP-20. SEDAR, North Charleston, SC. 29 pp.

3.9 TABLES

Table 3.9.1. Annual calculated Gulf of America Gray Triggerfish landings by gear groupings for each Subregion from 1949 to 2024. Confidential strata have been hidden with an asterisk (*).

Year	East			West		
	Handline+	Longline	Trap	Handline+	Longline	Trap
1949	14,300					
1950	14,700					
1951	28,000					
1952	72,400					
1953	43,600					
1954	39,600					
1955	46,600					
1956	22,800					
1957	17,400					
1958	15,200					
1959	10,300					
1960	11,900					
1961	6,500					
1962	5,600					
1963	3,100			4,200		
1964	15,700			4,300		
1965	17,350			4,300		
1966	8,600			5,200		
1967	12,200			5,200		
1968	8,600			3,900		
1969	14,600			7,700		
1970	15,851			8,200		
1971	30,500			9,900		
1972	47,400			15,200		
1973	40,000			13,200		
1974	40,452			13,100		
1975	62,000			16,000		
1976	69,700			14,800		
1977	50,096			9,290		
1978	48,518		108	10,197		
1979	65,670			31,814	3,919	
1980	64,069	1,406		28,707	2,294	

1981	61,465	3,033		20,636	4,726	
1982	55,317	7,642		26,316	7,398	
1983	40,486	9,102		19,350	4,481	
1984	29,058	8,348		29,396	3,335	*
1985	43,333	11,507		32,230	5,556	
1986	73,392			15,461	8,149	
1987	97,167			27,017	642	
1988	149,656			44,089	2,589	
1989	248,800			60,734	10,543	
1990	325,111	*		77,542	12,515	
1991	266,151	7,995	65,578	91,727	12,892	
1992	313,481	9,349	28,008	105,639	13,679	
1993	283,813	14,777	86,267	175,168	516	*
1994	203,379	18,940	29,645	152,829	484	
1995	179,632	6,442	18,924	130,001	523	
1996	108,475	6,447	21,887	124,244	375	
1997	77,995	10,028	15,807	75,791	993	
1998	86,837	5,531	13,301	70,510	*	
1999	100,374	10,055	14,025	102,446	222	
2000	48,291	5,486	9,320	94,881	284	
2001	87,249	5,991	14,593	67,531	52	
2002	128,461	3,019	17,633	85,800	*	
2003	145,116	7,269	14,034	85,336		
2004	115,943	14,230	12,550	72,801	*	
2005	91,920	6,402	6,627	41,711	*	
2006	49,654	7,539	3,675	31,359	*	
2007	42,162	8,250	*	44,767	*	
2008	34,268	15,331		26,941	*	
2009	52,256	8,636		16,994	*	
2010	43,778	2,749		8,586	*	
2011	89,850	979		13,243	*	
2012	63,497	756		7,784	*	
2013	57,368	1,035		4,638	*	
2014	33,536	4,446		2,703		
2015	38,034	6,751		2,711		
2016	44,509	11,450		3,157	*	
2017	53,232	6,985		2,422	*	
2018	54,210	8,417		2,071		
2019	51,676	9,243		1,571		
2020	47,456	3,857		1,467		
2021	36,445	7,569		940	*	

2022	35,966	8,117	1,197
2023	45,808	7,543	1,508
2024	41,875	8,264	1,465

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Table 3.9.2. Commercial discard estimates and standard errors (SE) for the vertical line fishery for the East, West and Gulf-wide in numbers (N) and pounds (lbs).

Year	Discards N			Discards lbs		
	East	West	Gulf-wide	East	West	Gulf-wide
2000	535	1,034	1,502	646	1,623	2,034
2001	725	950	1,632	875	1,491	2,210
2002	1,031	1,024	2,076	1,244	1,606	2,811
2003	1,138	1,166	2,264	1,374	1,830	3,065
2004	953	1,122	2,039	1,150	1,761	2,761
2005	837	808	1,565	1,010	1,268	2,119
2006	548	507	1,149	662	795	1,556
2007	489	1,002	1,078	590	1,572	1,460
2008	494	736	977	596	1,156	1,323
2009	12,838	2,015	15,977	20,896	3,904	26,692
2010	9,015	1,268	11,642	14,697	2,479	19,451
2011	15,566	1,390	14,944	25,555	2,721	24,966
2012	21,516	4,990	24,285	43,011	13,018	50,042
2013	10,641	1,228	13,827	24,778	3,272	33,180
2014	10,329	934	12,367	24,421	2,490	29,674
2015	9,279	1,049	12,920	21,837	2,795	30,735
2016	11,366	1,257	15,411	26,399	3,350	36,692
2017	10,095	861	13,869	23,185	2,295	33,128
2018	10,012	451	10,380	28,778	1,112	29,470
2019	11,542	381	11,735	33,175	977	33,318
2020	9,773	364	9,866	28,090	872	28,010
2021	9,684	349	9,729	27,834	830	27,621
2022	10,034	361	10,059	28,842	853	28,560
2023	11,316	507	11,630	32,524	1,219	33,019
2024	10,009	526	10,412	28,769	1,247	29,560

Table 3.9.2 continued

Year	SE N			SE lbs		
	East	West	Gulf-wide	East	West	Gulf-wide
2000	150	819	553	187	1,412	896
2001	204	752	601	253	1,298	974
2002	290	810	764	359	1,398	1,238
2003	320	923	834	397	1,592	1,351
2004	268	888	751	332	1,533	1,216
2005	235	639	576	292	1,103	934
2006	154	401	423	191	692	685
2007	137	793	397	170	1,368	643
2008	139	583	360	172	1,006	583
2009	3,888	1,499	4,619	6,213	2,892	7,501
2010	2,730	943	3,366	4,369	1,837	5,466
2011	4,714	1,034	4,320	7,598	2,016	7,016
2012	4,019	1,691	4,377	7,290	4,829	8,094
2013	1,490	311	1,668	3,803	863	3,940
2014	1,446	236	1,492	3,748	657	3,524
2015	1,299	265	1,558	3,352	737	3,650
2016	1,591	318	1,859	4,052	883	4,358
2017	1,413	218	1,673	3,559	605	3,934
2018	1,784	185	1,768	5,383	437	5,316
2019	2,056	156	1,999	6,205	384	6,010
2020	1,741	149	1,680	5,254	343	5,053
2021	1,725	143	1,657	5,206	326	4,983
2022	1,788	148	1,713	5,395	335	5,152
2023	2,016	208	1,981	6,084	479	5,956
2024	1,783	215	1,773	5,381	490	5,333

Table 3.9.3. Gulf of Mexico trawling effort (in days) by region (East/West) and total with associated CV. CVs were only available for 1984 onward.

Year	East	West	Total	CV
1960	32,332	78,901	111,233	
1961	24,082	55,345	79,427	
1962	28,260	68,219	96,479	
1963	26,846	83,157	110,002	
1964	34,923	84,068	118,991	
1965	31,237	73,990	105,228	
1966	28,562	71,148	99,710	
1967	24,917	91,692	116,609	
1968	32,370	87,436	119,806	
1969	37,798	102,062	139,860	
1970	27,371	90,876	118,247	
1971	27,006	95,168	122,175	
1972	28,737	116,644	145,381	
1973	31,039	104,073	135,111	
1974	33,820	101,592	135,412	
1975	30,509	88,353	118,862	
1976	30,674	112,193	142,867	
1977	33,586	120,224	153,810	
1978	38,657	148,165	186,822	
1979	46,772	148,831	195,603	

1980	26,652	106,763	133,416	
1981	34,121	129,325	163,446	
1982	38,884	121,942	160,826	
1983	47,101	111,336	158,437	
1984	52,691	116,137	168,827	1.4
1985	48,628	125,966	174,594	1.4
1986	54,518	147,191	201,708	1.5
1987	57,929	164,966	222,895	1.4
1988	46,990	144,962	191,953	1.5
1989	55,016	147,450	202,466	1.9
1990	63,417	140,942	204,359	2.3
1991	52,170	148,214	200,384	2.3
1992	52,695	146,284	198,979	2.6
1993	40,552	143,148	183,700	3.3
1994	39,796	105,250	145,046	4.4
1995	36,262	88,145	124,407	2.3
1996	45,704	96,463	142,167	2.3
1997	46,500	117,574	164,074	2.1
1998	63,512	131,623	195,135	2
1999	52,708	138,286	190,994	2.1
2000	39,719	129,580	169,299	1.9
2001	36,998	95,349	132,347	3.3
2002	36,568	112,875	149,444	2.6

2003	30,721	88,406	119,127	2.3
2004	24,279	75,277	99,557	2.3
2005	19,070	60,039	79,109	2.3
2006	16,099	56,197	72,296	2.7
2007	16,921	59,154	76,075	6.9
2008	11,606	50,566	62,172	2.6
2009	13,226	64,080	77,307	2
2010	5,912	44,400	50,312	2.4
2011	9,120	53,520	62,641	1.7
2012	9,232	53,423	62,655	2
2013	11,330	59,275	70,604	7.1
2014	14,087	62,201	76,287	1.3
2015	14,045	61,825	75,871	1.2
2016	12,825	61,443	74,268	1.1
2017	14,180	62,641	76,821	1.1
2018	16,076	55,443	71,519	1
2019	14,066	53,063	67,130	1
2020	18,474	52,164	70,638	1.3
2021	14,814	54,074	68,888	2
2022	12,324	33,293	45,618	2.5
2023	9,161	27,739	36,900	3.2
2024	8,449	27,013	35,462	3.8

Table 3.9.4. Time-series (1984-2023) of annual Gray Triggerfish bycatch estimates and associated standard error (SE) for the West/East subregions and Gulf-wide.

Year	East		West		Gulf	
	Bycatch	SE	Bycatch	SE	Bycatch	SE
1984	348,883	51,039	2,181,785	300,991	602,379	148,033
1985	390,068	54,298	2,397,973	329,808	670,997	178,256
1986	300,785	43,757	2,804,911	391,953	966,090	119,242
1987	430,966	65,524	3,206,838	459,509	540,201	50,701
1988	306,332	55,086	2,875,992	414,721	758,124	77,499
1989	298,776	51,267	2,751,088	385,031	704,027	94,371
1990	327,404	46,174	2,627,805	364,406	484,904	68,151
1991	267,675	42,356	2,714,367	392,295	660,309	55,952
1992	260,878	65,109	2,776,928	395,517	463,600	52,897
1993	275,399	41,411	2,694,047	391,001	437,446	51,893
1994	301,546	46,205	1,909,226	257,363	477,767	53,190
1995	456,167	77,144	1,589,749	223,185	424,302	40,706
1996	472,803	83,880	1,827,673	256,193	387,097	32,528
1997	445,693	93,359	2,218,890	321,520	368,221	31,366
1998	355,665	60,117	1,836,106	257,270	392,766	37,086
1999	249,506	38,249	1,891,162	278,825	257,934	19,562
2000	197,805	27,370	1,791,133	258,747	250,215	26,764
2001	201,124	28,334	1,411,184	219,230	2,530,668	307,430
2002	151,989	23,847	1,637,802	243,661	2,788,041	314,337
2003	139,340	26,969	1,237,157	186,654	3,105,696	349,112
2004	116,536	20,076	1,087,187	160,080	3,637,803	426,309
2005	83,861	14,885	854,585	121,871	3,182,324	427,100
2006	62,639	10,647	779,094	109,951	3,049,864	394,229
2007	140,290	39,430	462,089	114,883	2,955,209	317,663
2008	119,350	37,832	551,647	70,224	2,982,042	348,475
2009	102,596	16,604	863,494	110,293	3,037,806	579,787
2010	54,197	6,727	486,003	66,845	2,969,446	334,731
2011	69,321	9,912	688,803	82,488	2,210,772	274,235
2012	79,113	14,384	624,914	77,892	2,045,915	291,909
2013	35,973	7,615	448,932	67,211	2,300,476	349,643
2014	54,108	5,911	606,201	75,176	2,664,584	454,956
2015	34,799	2,926	428,801	172,639	2,191,771	296,618
2016	29,894	2,481	407,552	177,957	2,140,668	245,028
2017	33,993	2,629	443,774	218,757	1,988,938	202,757
2018	41,274	3,345	383,028	164,065	1,612,308	177,561
2019	36,419	2,818	350,678	126,095	1,789,791	202,955
2020	41,930	3,165	326,291	131,559	1,376,498	193,858
2021	36,414	2,996	356,352	142,460	1,203,723	150,714
2022	25,060	1,813	232,874	79,936	938,446	119,082
2023	22,525	1,907	227,690	102,109	841,732	101,584

3.10 FIGURES

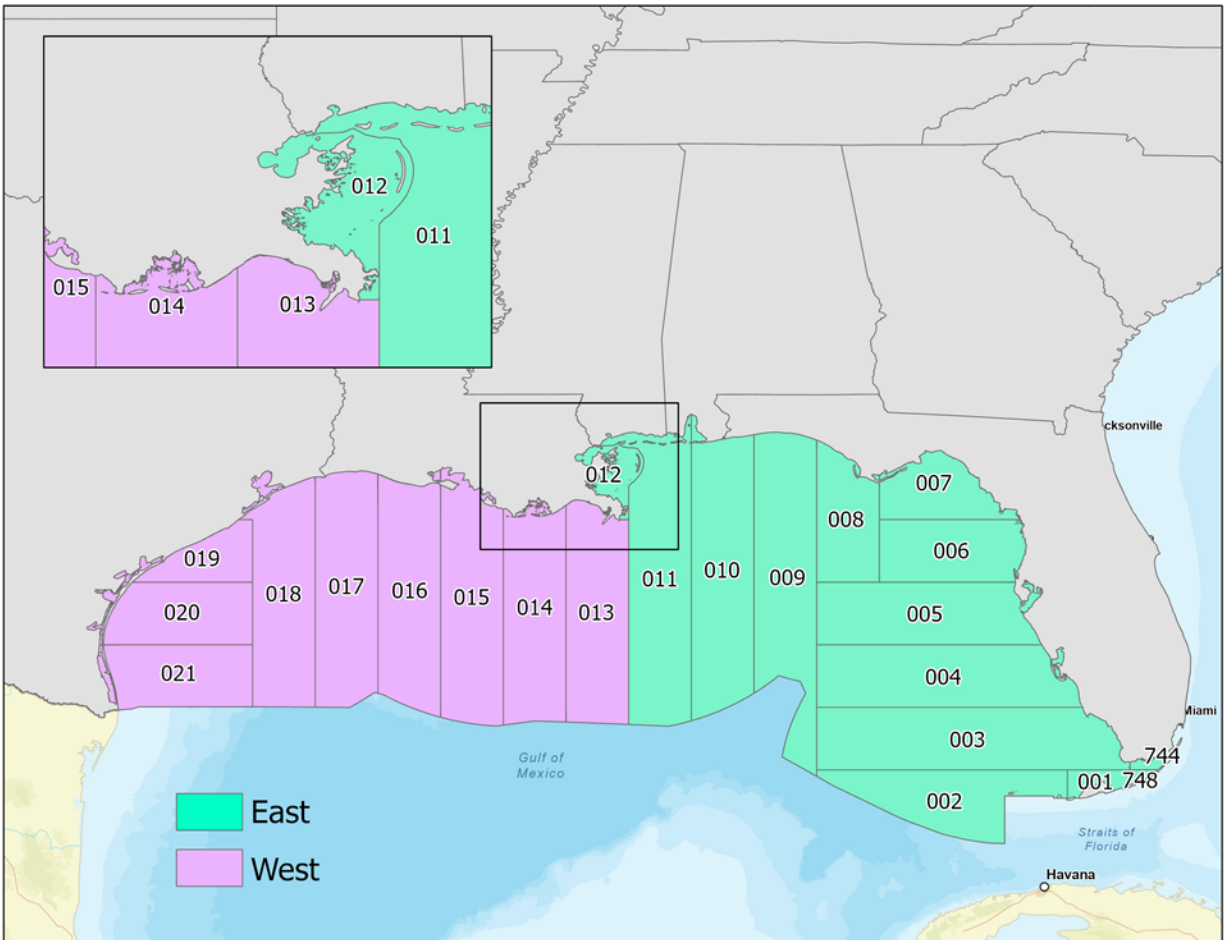


Figure 3.10.1. Gulf of America commercial fishing areas with subregions highlighted.

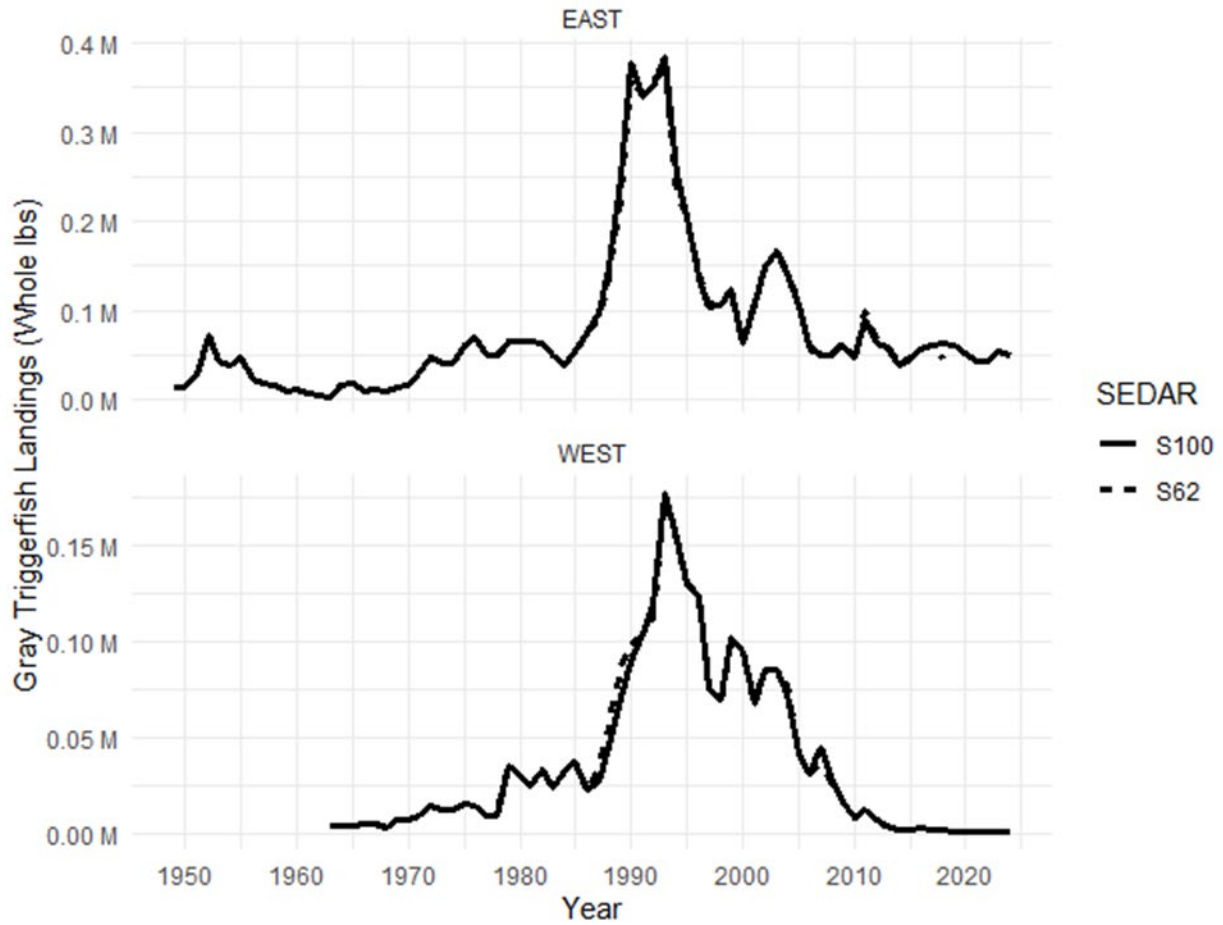


Figure 3.10.2. Annual calculated Gray Triggerfish commercial landings (in whole weight pounds) by subregion for the current SEDAR 100 compared to the previous assessment SEDAR 62 from 1949 - 2024. Confidential landings have been excluded.

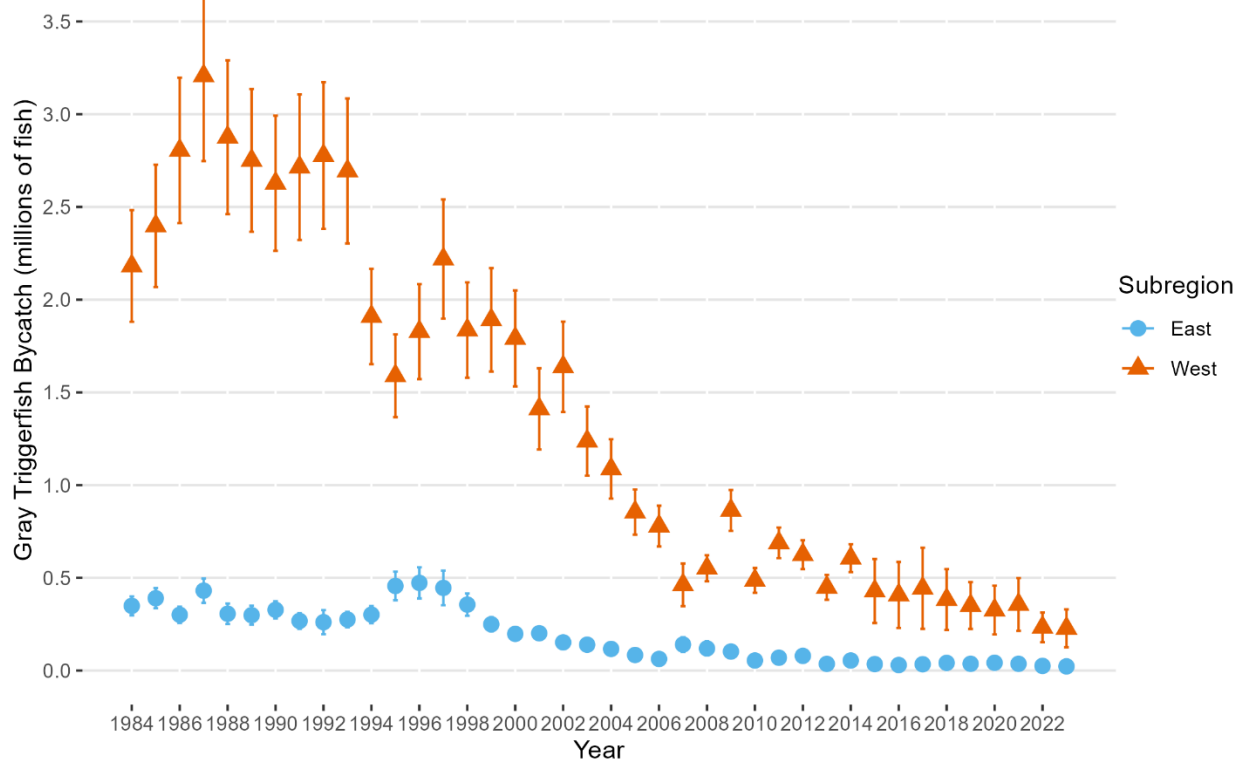


Figure 3.10.3. Gray Triggerfish bycatch time-series (1984-2023) and associated standard errors for West and East Gulf subregions.

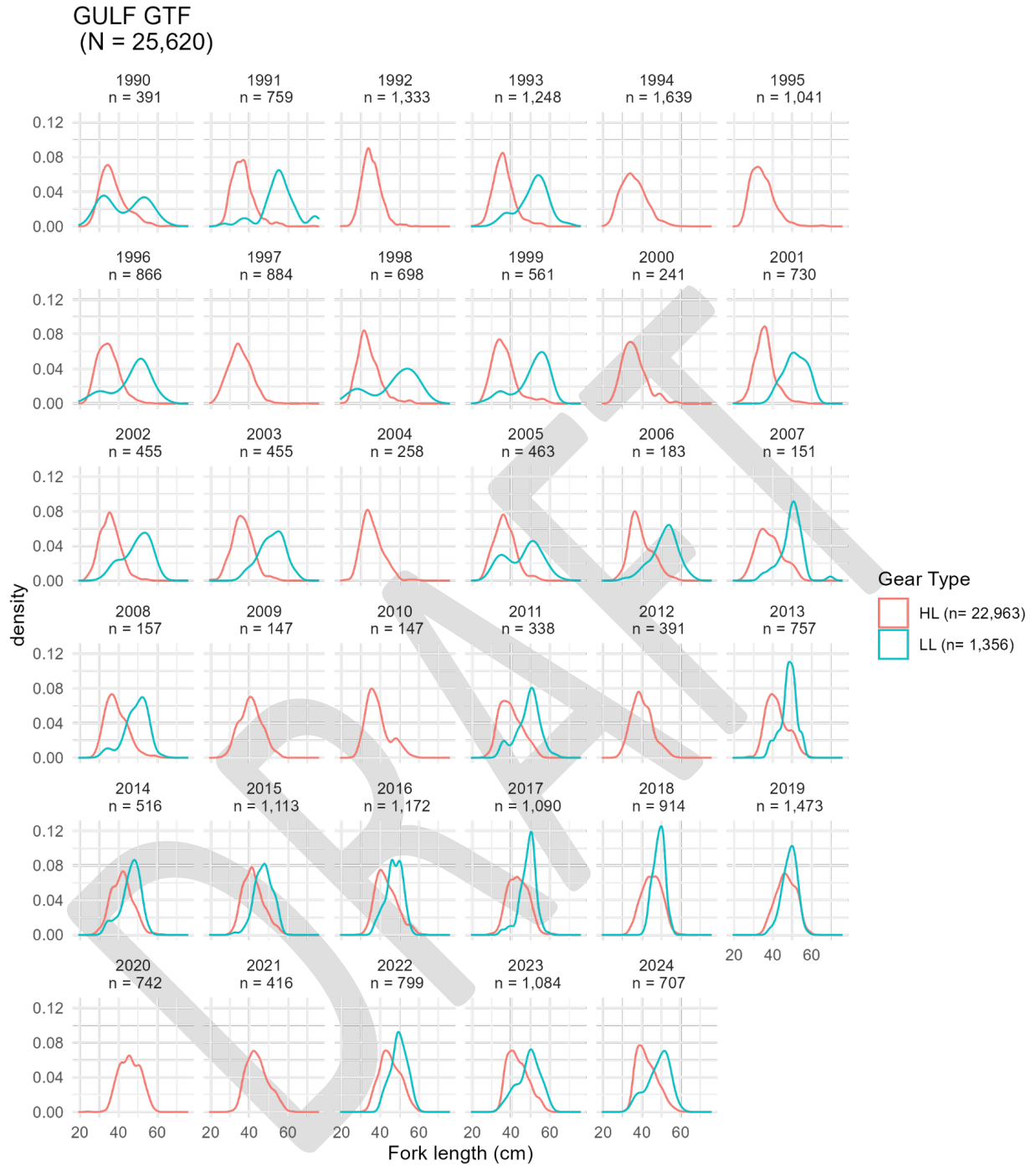


Figure 3.10.4. Annual nominal gulf-wide length compositions for the Gulf Gray Triggerfish commercial handline and longline fisheries.

GULF HL: E (1-12), W (13-21)
(N = 22,926)

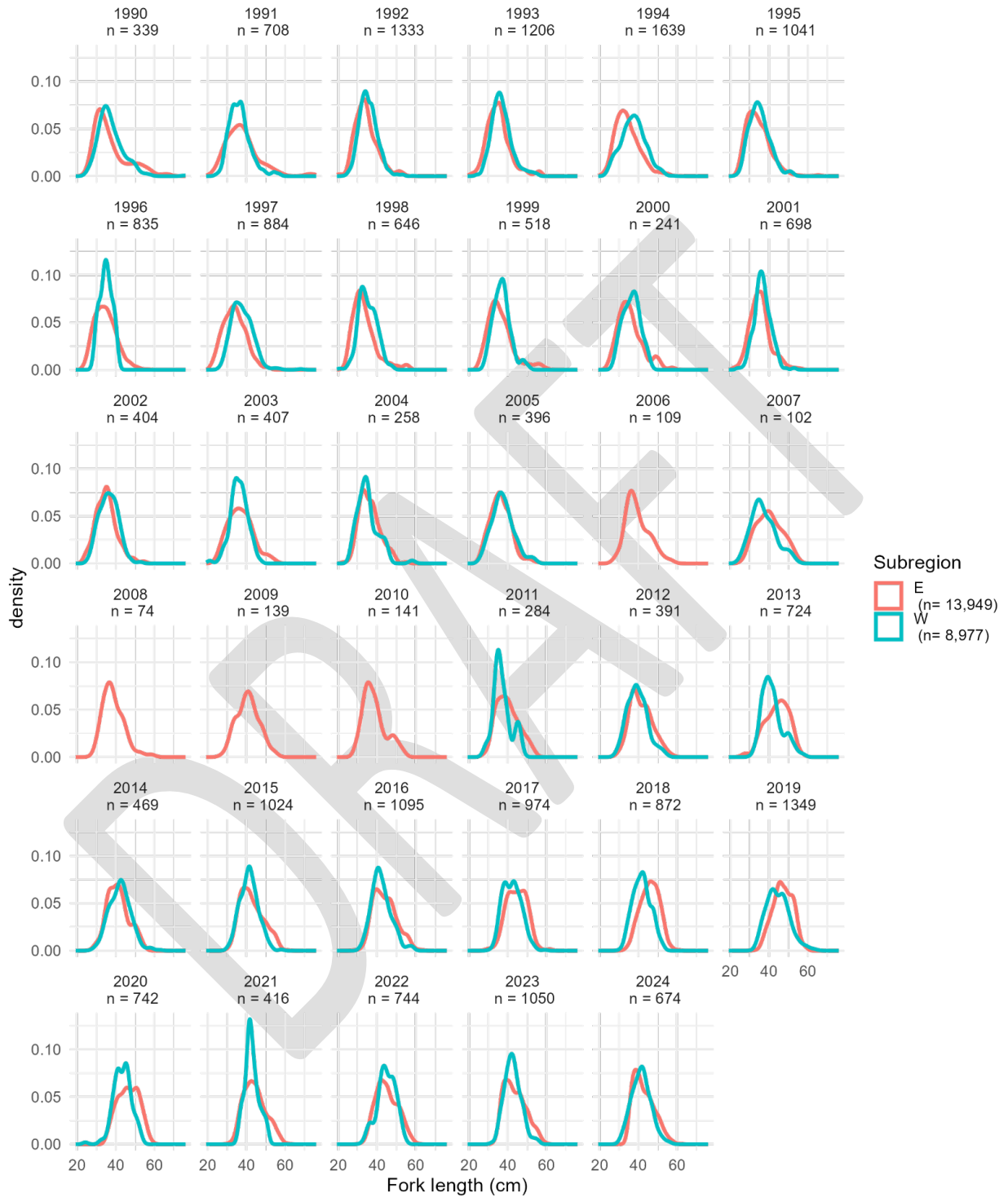


Figure 3.10.5. Annual nominal length compositions for the East and West subregions of the Gulf Gray Triggerfish commercial handline fishery.

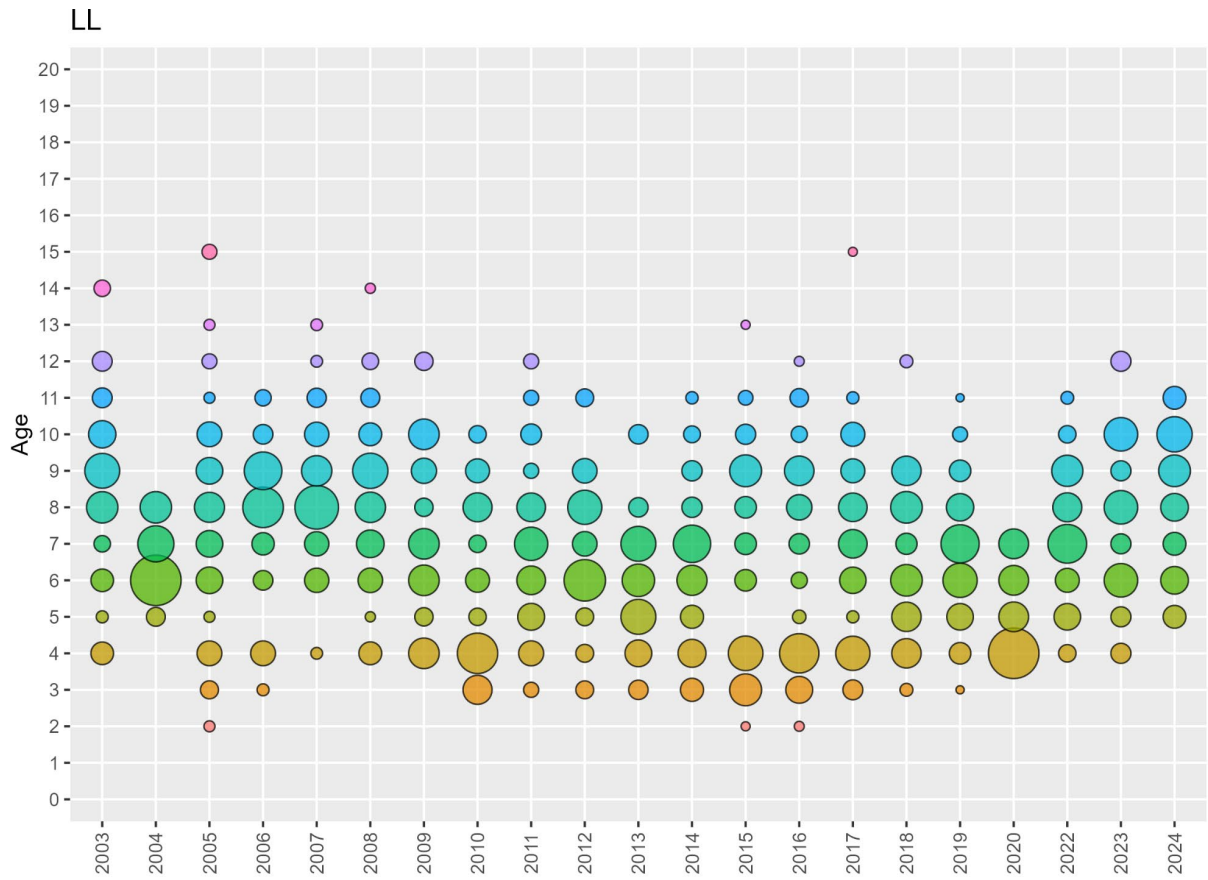


Figure 3.10.6. Final annual nominal age compositions for the Gulf Gray Triggerfish commercial longline fishery. The size of the dots represents the relative proportion at age. Refer to Table 2.13.6 for which years do not meet sample size criteria for inclusion.

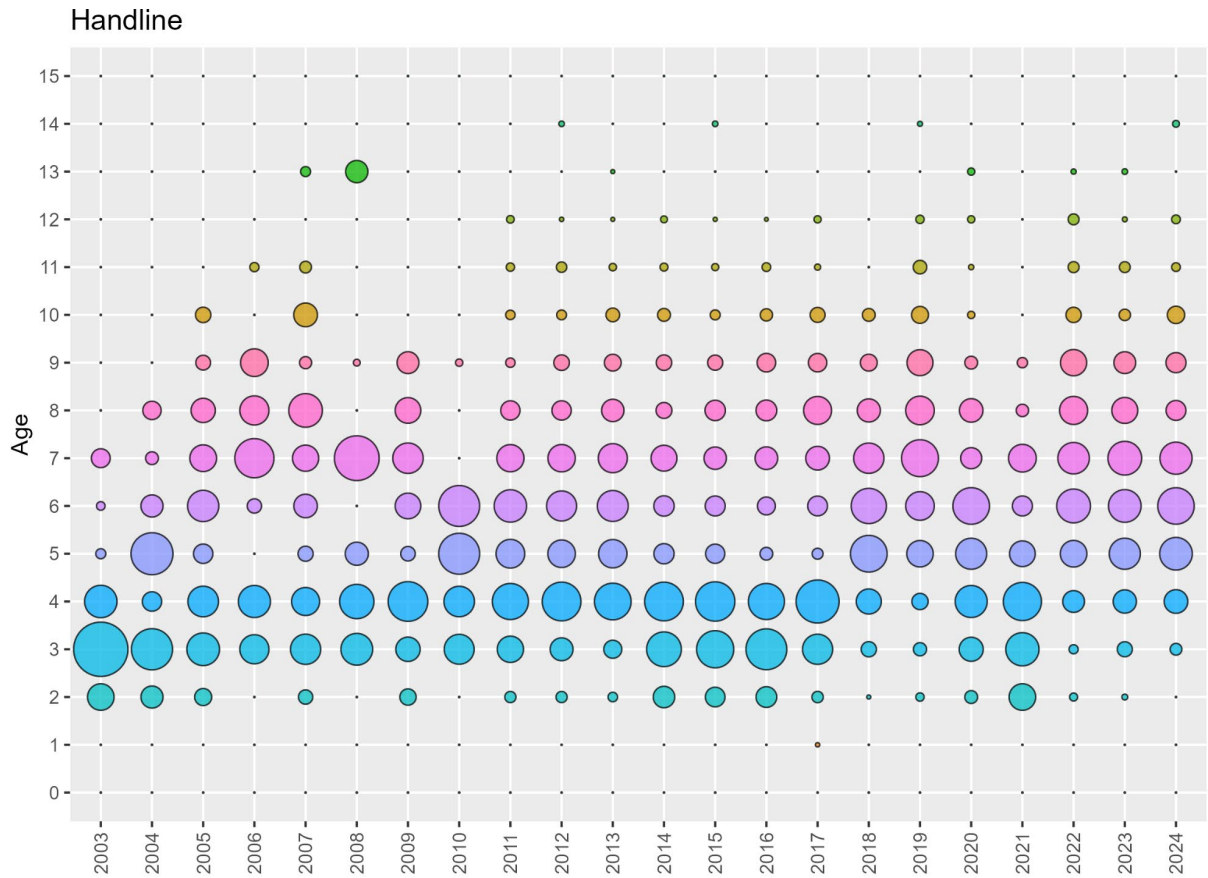


Figure 3.10.7. Final annual weighted age compositions for the Gulf Gray Triggerfish commercial handline fishery. The size of the dots represents the relative proportion at age. Refer to Table 2.13.6 for which years do not meet sample size criteria for inclusion.