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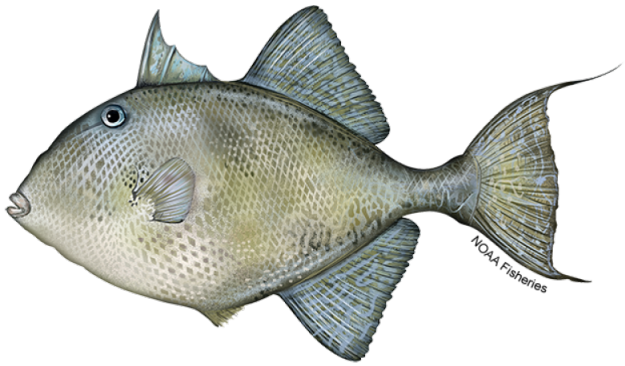

Gulf of America Gray Triggerfish (*Balistes capriscus*) Preliminary Length and Age Compositions for the Commercial Handline and Longline Fisheries

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Introduction

This document outlines the data and methodologies used to estimate nominal length and age compositions of the commercial handline and longline fisheries for the SEDAR 100 Gulf of America (formerly Gulf of Mexico, hereafter referred to as "Gulf") Gray Triggerfish Assessment. These compositions were estimated using data sources approved in SEDAR 43. Preliminary annual nominal length and age compositions are presented here, and the final weighted compositions will be added as an appendix after discussion and approval at the data workshop.

Data Description

SEDAR 100 assesses all Gulf Gray Triggerfish in federal waters from the Florida Keys west to the Texas-Mexico border. For this assessment, three fleets are investigated, Commercial Handline East, Handline West, and Longline East. There were insufficient samples from the western region to construct a Longline West fleet. The east and west subregions are defined using statistical zones with the east comprising zones 744, 748, and 1 – 12, and the west comprising zones 13 – 21 and are shown in Figure 1. Additionally, compositions are provided as Commercial Handline and Commercial Longline fleets with no spatial stratification for consideration. For the landings, landings from other gears are combined into the Handline fleet. However, for length and age compositions only handline samples are used and samples from other gears are excluded. This is to avoid bias in the compositions due to the majority of the landings data coming from handline gears. The commercial data source utilized to generate the length and age compositions for the commercial fleets consists of length samples from the Trip Interview Program (Beggerly *et al.* 2022), and age samples collected by federal and state sampling programs.

Commercial Length Compositions of Landings

Length Samples

Length samples of commercial landings were obtained from the TIP database maintained by the NMFS Southeast Fisheries Science Center (SEFSC) and were filtered to remove biases that include samples from pooled trips. Samples from the handline fishery were available from 1989 onward, samples from the longline fishery were available from 1990 onward.

These data were compiled using length bins of 2 centimeters (cm) with the floor of the bin being labeled. Natural total length ($NatTL$), maximum total length (MaxTL), and standard length (SL) were converted to fork length (FL) using the following conversion equations:

$$FL = 2.436 + 0.807 * NatTL$$

$$FL = 2.1282 + 0.791 * MaxTL$$

$$FL = 1.0311 + 1.153 * SL$$

A minimum length bin of 2 cm was used, and a maximum length bin of 78 cm was used, with fish falling outside of this range being pooled in the smallest or largest bin. Any fish lengths greater than 90 cm FL were deleted and assumed to be errors.

Length Compositions

Nominal length compositions for the commercial handline fleet (HL) and commercial longline fleet (LL) were estimated for Gray Triggerfish landings from the GMFMC/SAFMC boundary to the TX/Mexico border for the East and West subregions. Annual nominal length compositions were estimated using length bins of 2 cm, where for each year i, subregion r, and length bin j,

$$LC_{i,\mathrm{r},j} = \frac{n_{i,\mathrm{r},j}}{n_{i,r}}$$

where $n_{i,r,j}$ is the number of samples in year i, subregion r and length bin j; $n_{i,r}$ is the number of samples in year i and subregion r (i.e., summed across length bins); and $LC_{i,\mathrm{r},j}$ is the proportion of the total number of sampled fish in each year i and subregion r within each length bin j.

Annual length compositions by subregion are shown in Figures 2 and 3 for handline and longline, respectively. Annual gulf-wide length compositions are shown in Figure 4. Annual sample sizes of commercial lengths and trips are shown in Tables 1 and 2 for commercial handline and longline, respectively. Years with fewer than 30 length samples or fewer than 10 trips are recommended to be dropped from further analyses. All data are presented in Table 1, regardless of the recommendation to drop.

Commercial Age Compositions of Landings

Age Samples

The majority of the commercial age samples were a subset of the length samples, although some non-TIP (i.e. state collected) are included as well. Age data compiled by the SEFSC Panama City Laboratory were filtered to remove duplicated and biased data. Gray Triggerfish maximum age will be discussed at the data workshop and the use of an age plus group will be determined at that time. For the preliminary age compositions, no plus group is used.

Age Compositions

Nominal age compositions were estimated for the commercial handline fleet (HL) and longline fleet (LL) in each year and subregion. Any strata with fewer than 10 age samples were recommended to be dropped. Nominal age compositions of landings were estimated using the following equation within each year i, subregion r, and age bin k,

$$AC_{i,r,k} = \frac{a_{i,r,k}}{a_{i,r}}$$

where $a_{i,r,k}$ is the number of age samples in year i, subregion r, and age bin k; $a_{i,r}$ is the number of age samples in year i and subregion r; and $AC_{i,r,k}$ is the proportion of the total number of sampled fish in each year i and subregion r within each age bin k. A minimum sample size

threshold was recommended annually within each year stratum, AC_{ir}, where these were recommended to be dropped and excluded from further analyses if $a_{ir} < 10$.

The annual nominal age compositions by subregion are shown in Figures 5 and 6 for the commercial handline and longline fisheries, respectively. Annual gulf-wide age compositions are shown in Figure 7. Bubble plots showing the annual age compositions are shown in Figures 8 and 9 for handline and longline, respectively. Annual sample sizes of commercial ages and trips are shown in Tables 3 and 4 for handline and longline, respectively.

Discussion for data workshop

- **SEDAR 43 split the commercial fleet into East and West; SEDAR 62 retained this structure but treated commercial longline as its own fleet (primarily from the East)** – we will examine sample sizes for handline and longline fleets by subregion (East/West) and as whole gulf fleets, and determine whether it is appropriate to stratify compositions spatially and by gear, or whether a single commercial fleet will be used. Differences in compositions will be explored between regions and gears to help justify whether to split commercial fleets by East or West or combine them into a Gulf-wide fleet.

References

Beggerly, S., M. Stevens, H. Baertlein. 2022. Trip Interview Program Metadata. SEDAR74-DW14. 12pp.

Tables

Table 1. *Annual number of Gulf Gray Triggerfish commercial handline (HL) length samples and associated trips by subregion. Years not meeting the recommended 30 fish or 10 trip minimum filter are highlighted in red.*

	East		West	
YEAR	N fish	N trips	N fish	N trips
1989	1	1	5	1
1990	63	10	276	43
1991	55	8	653	82
1992	105	12	1228	142
1993	449	35	757	115
1994	921	81	718	61
1995	871	80	170	10
1996	787	80	48	4
1997	583	68	301	55
1998	431	64	215	39
1999	437	63	81	11
2000	185	40	56	15
2001	512	55	186	29
2002	230	43	174	33
2003	196	30	211	37
2004	176	23	82	15
2005	255	31	141	43
2006	109	26	14	9
2007	38	16	64	14
2008	74	19	9	3
2009	139	40	8	2
2010	141	30	6	3
2011	266	54	18	1
2012	113	32	278	44
2013	169	51	555	93
2014	130	48	339	56
2015	475	96	549	87
2016	603	109	492	72
2017	562	102	412	64
2018	684	101	188	45
2019	1200	166	149	37
2020	597	140	145	26
2021	386	78	30	14
2022	572	128	172	35
2023	869	189	181	55
2024	566	127	108	31

Table 2. *Annual number of Gulf Gray Triggerfish commercial longline (LL) length samples and associated trips by subregion. Years not meeting the recommended 30 fish or 10 trip minimum filter are highlighted in red. Years with no data have been left blank.*

	East		West	
YEAR	N fish	N trips	N fish	N trips
1990	52	14		
1991	44	15	7	2
1992	23	11	2	2
1993	40	13	2	1
1994	28	16		
1995	5	4		
1996	31	10		
1997	22	6		
1998	52	23		
1999	43	27		
2000	29	25		
2001	32	16		
2002	51	27		
2003	48	34		
2004	24	18		
2005	67	31		
2006	60	35		
2007	49	27		
2008	74	41		
2009	25	16		
2010	28	15		
2011	54	26		
2012	17	11		
2013	33	16		
2014	47	17		
2015	89	24		
2016	77	33		
2017	116	46		
2018	42	24		
2019	123	32	1	1
2020	12	10		
2021	9	3		
2022	47	20	8	3
2023	34	23		
2024	33	16		

Table 3. *Annual number of Gulf Gray Triggerfish commercial handline (HL) age samples and associated trips. Years not meeting the recommended 10 fish or 10 trip minimum filter are highlighted in red.*

	East		West	
YEAR	N fish	N trips	N fish	N trips
2003	41	6		
2004	22	6		
2005	73	11	1	1
2006	20	10		
2007	21	10	5	1
2008	10	6	3	1
2009	17	10	14	3
2010	11	6	2	1
2011	126	30	28	3
2012	56	19	233	39
2013	117	37	337	69
2014	77	31	289	51
2015	178	44	513	85
2016	173	41	418	65
2017	127	29	376	61
2018	217	53	172	43
2019	283	50	129	36
2020	103	36	121	24
2021	37	12	28	16
2022	133	30	122	27
2023	186	42	113	35
2024	132	36	68	19

Table 4. *Annual number of Gulf Gray Triggerfish commercial longline (LL) age samples and associated trips. Years not meeting the recommended 10 fish or 10 trip minimum filter are highlighted in red.*

	East		West	
YEAR	N fish	N trips	N fish	N trips
2003	43	30		
2004	16	15		
2005	53	25		
2006	44	26		
2007	46	25		
2008	63	35		
2009	17	12		
2010	19	9		
2011	52	26		
2012	18	13		
2013	30	15		
2014	41	15		
2015	83	24		
2016	67	28		
2017	85	31		
2018	37	21		
2019	106	26	1	1
2020	6	4		
2022	33	12	5	2
2023	14	7		
2024	21	7		

Figures

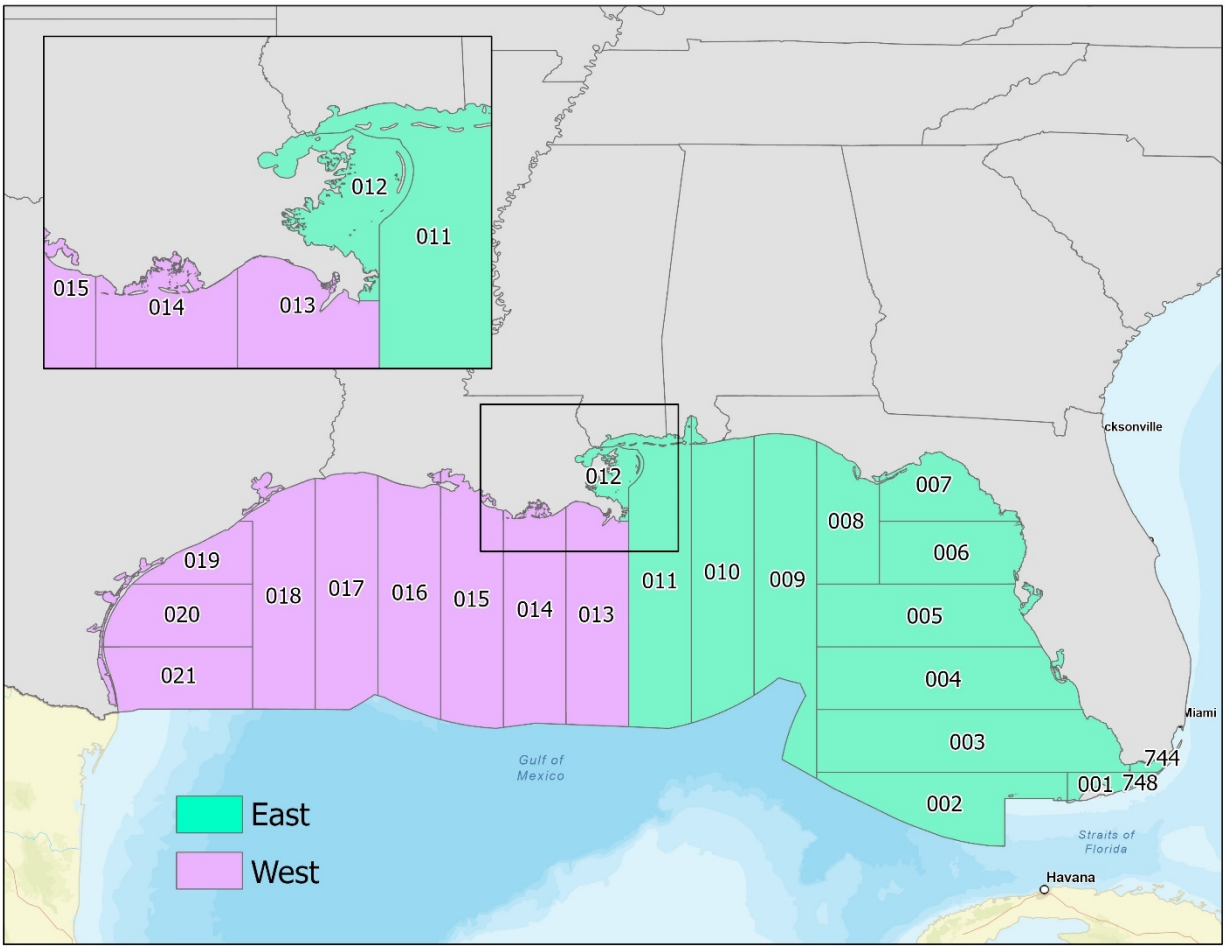

Figure 1. Gulf Gray Triggerfish commercial fisheries subregions as defined by NMFS statistical zones.

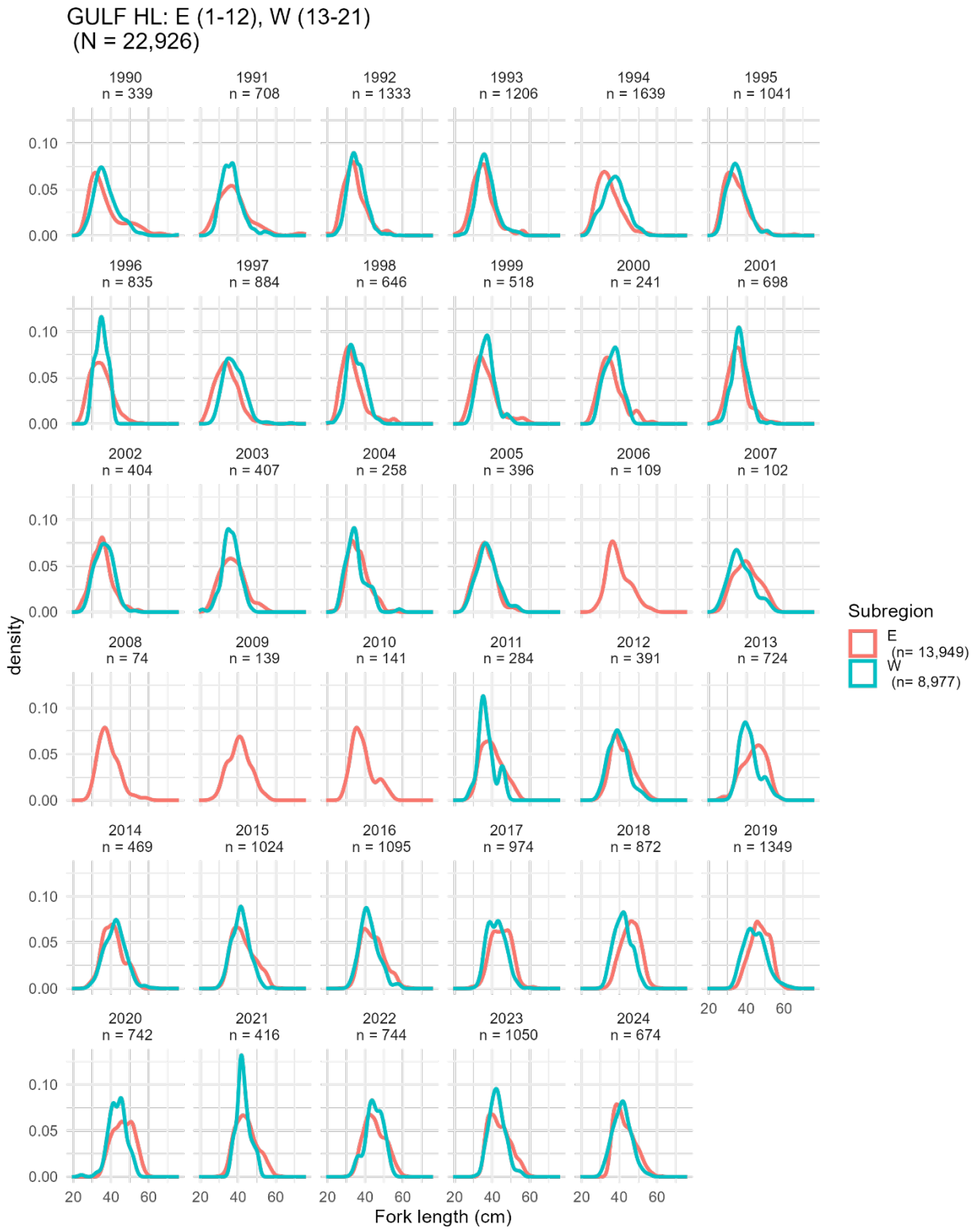

Figure 2. Annual length distributions for the Gulf Gray Triggerfish commercial handline east and handline west fisheries.

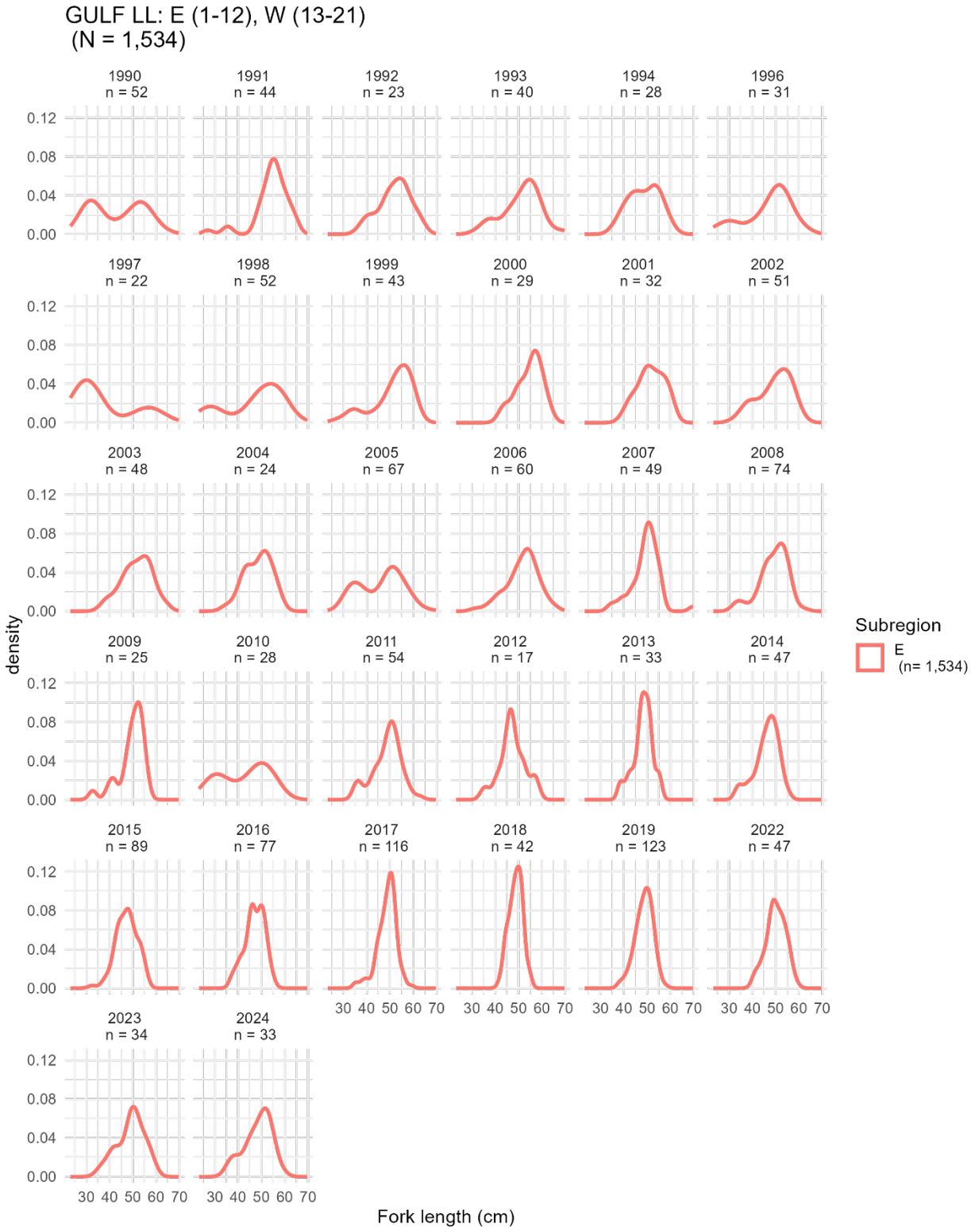

Figure 3. Annual length distributions for the Gulf Gray Triggerfish commercial longline east fishery.

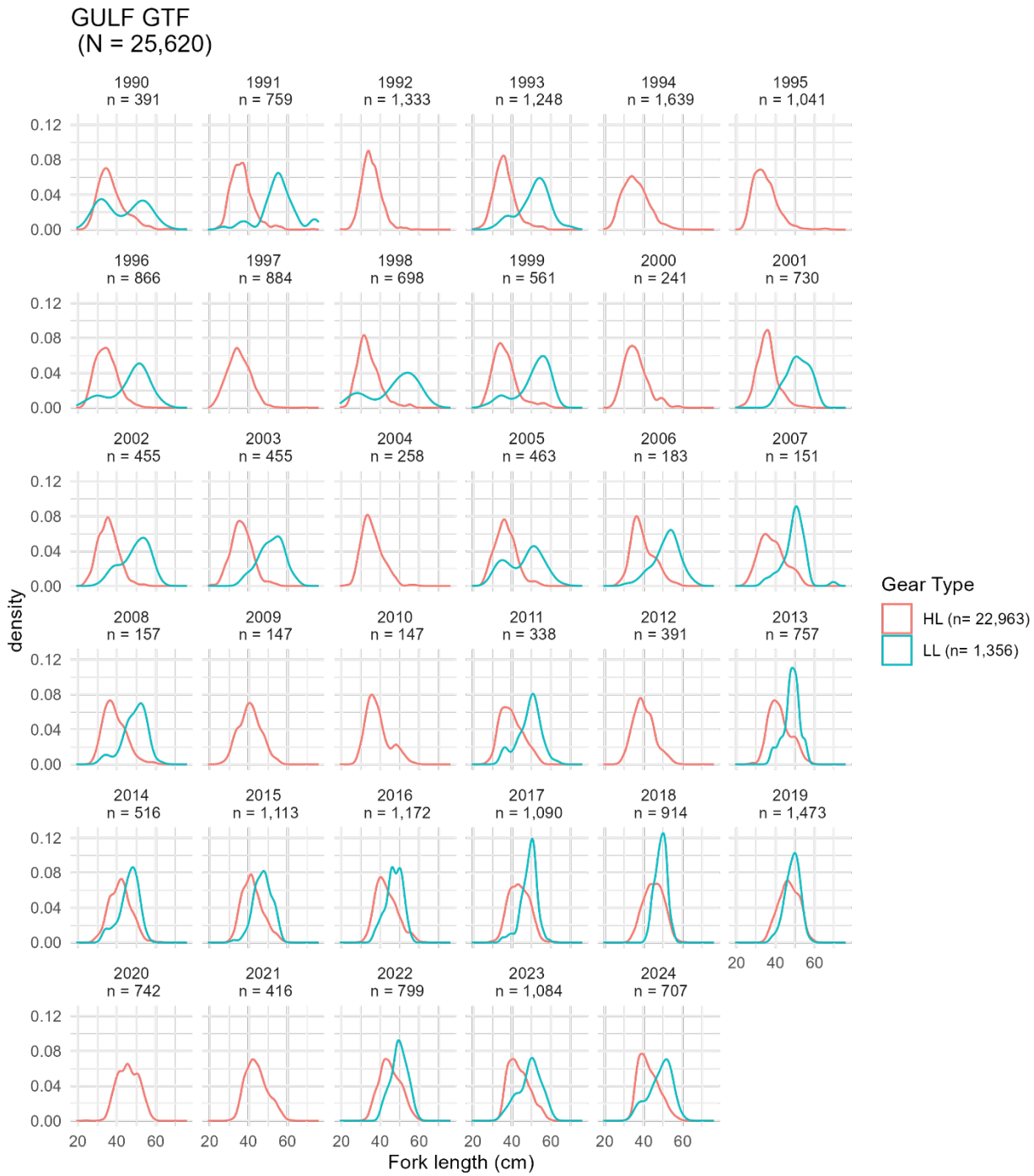

Figure 4. Annual nominal gulf-wide length compositions for the Gulf Gray Triggerfish commercial handline and longline fisheries.

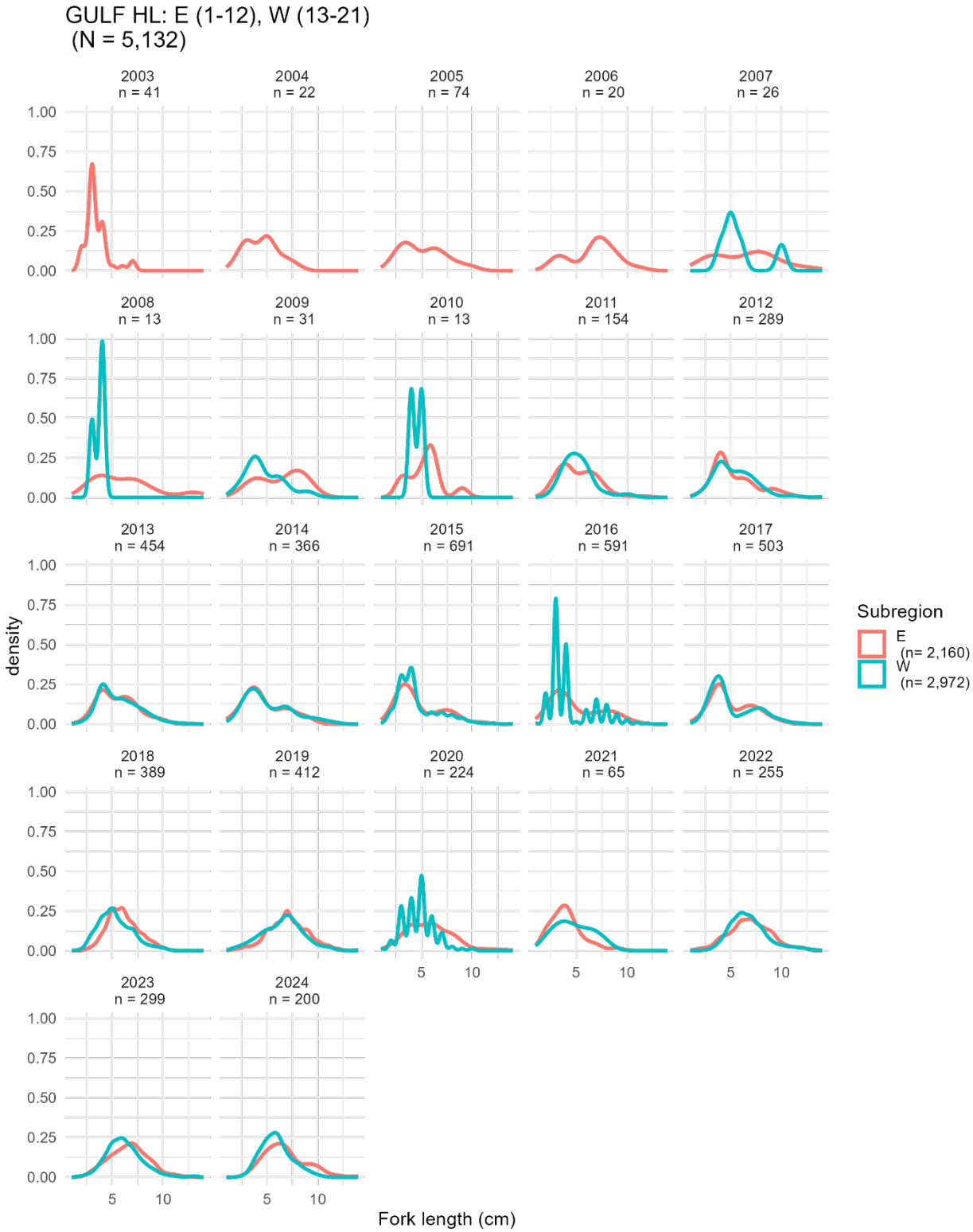

Figure 5. Annual nominal age distributions for the Gulf Gray Triggerfish commercial handline fishery by subregion.

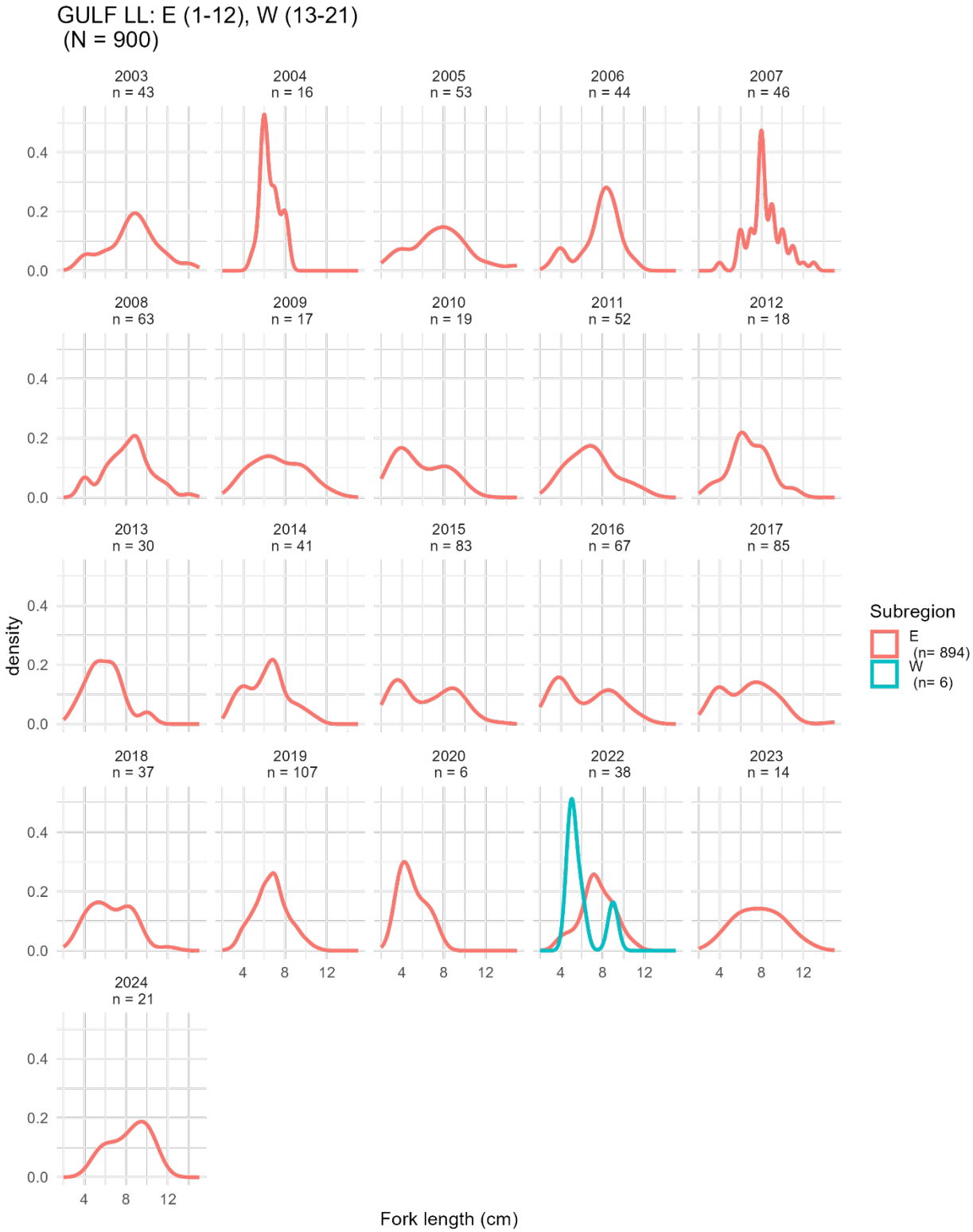

Figure 6. Annual nominal age distributions for the Gulf Gray Triggerfish commercial longline fishery by subregion.

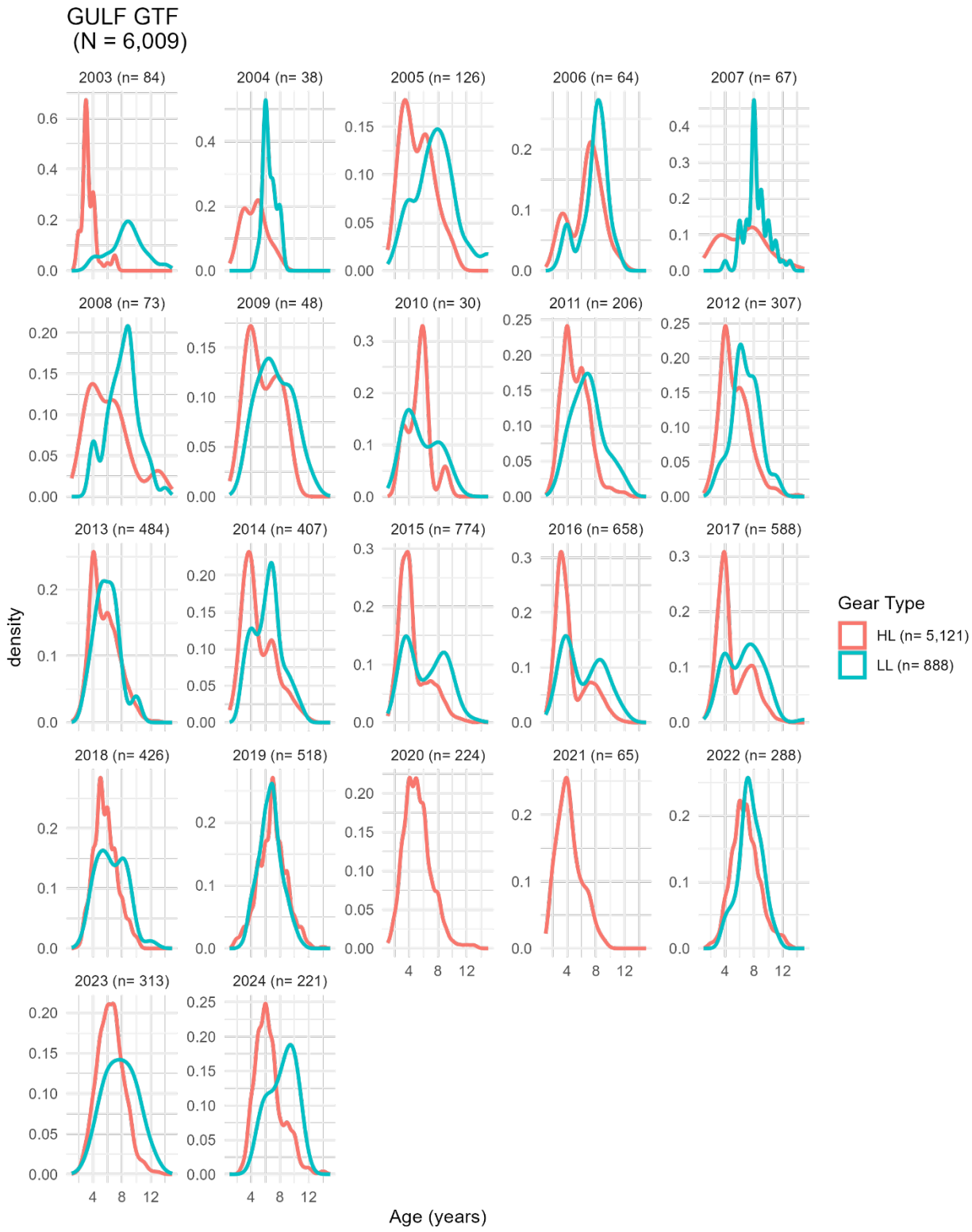

Figure 7. Annual nominal gulf-wide age compositions for the Gulf Gray Triggerfish commercial handline and longline fisheries.

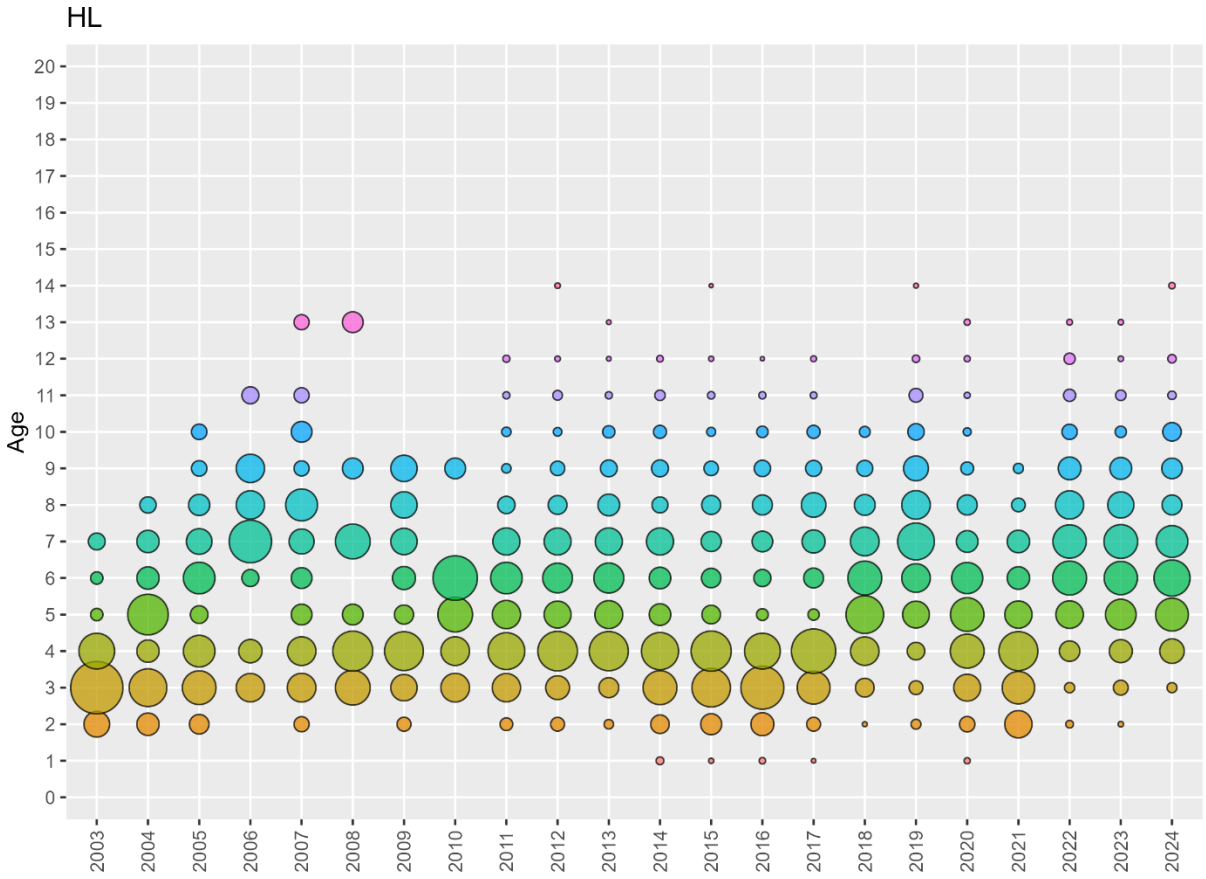

Figure 8. Annual nominal age compositions for the Gray Triggerfish commercial handline fishery. The size of the dots represents the relative proportion at age.

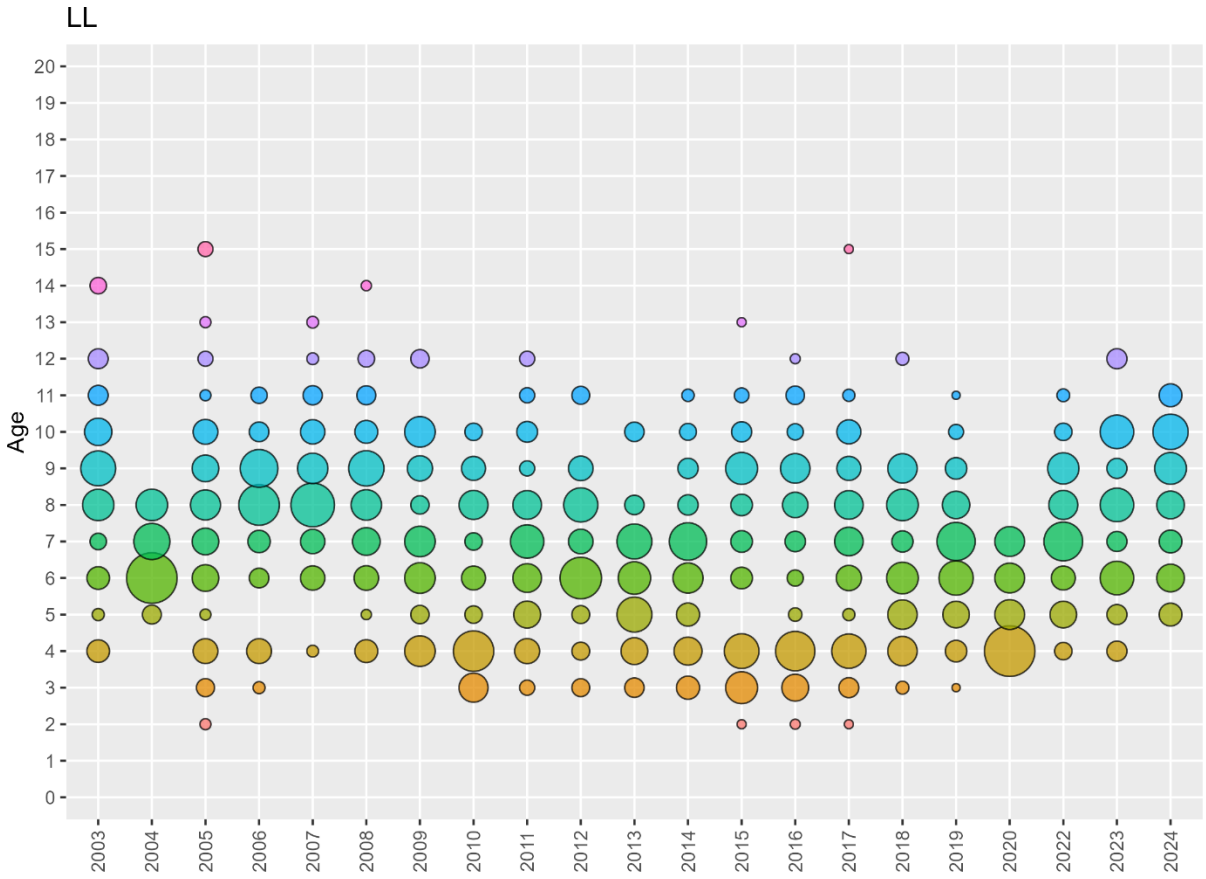

Figure 9. Annual nominal age compositions for the Gray Triggerfish commercial longline fishery. The size of the dots represents the relative proportion at age.