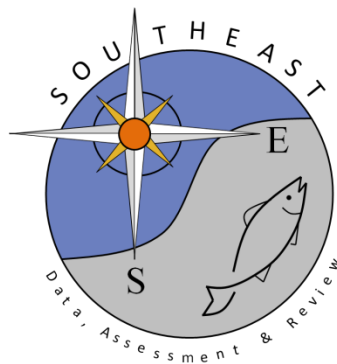


Gulf of America Gag Grouper (*Mycteroperca microlepis*) length and age compositions from the U.S. recreational fishery

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SEDAR105-WP-08

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Introduction

This document provides nominal and weighted length and age compositions, conditional age-at-length (CAAL), and mean length-at-age (MLAA) of recreational landings, in U.S. waters, for the SEDAR 105 Gulf of America Gag (*Mycteroperca microlepis*) assessment.

Data Description

Compositions in this document only include biological samples collected from Gag harvested in U.S. waters from the Texas/Mexico border and eastward to the west coast of Florida including the waters north of US 1 in Monroe County. A total of 43,112 lengths from 16 sampling programs (Tables 1 and 2) were included in the nominal and weighted length compositions and 10,883 ages from 15 programs (Table 1 and 3) were included in the nominal and weighted age compositions, CAAL, and MLAA analyses.

The sampling programs contributing the largest numbers of length and/or age samples are described below.

Marine Recreational Information Program (MRIP)

MRIP (formally known as the Marine Recreational Fishing Statistics Survey, MRFSS) began in March 1981. In the Gulf of America, the MRIP survey is conducted in FL, AL, and MS. MRIP was also conducted in LA from 1981-2013. The access point angler survey (APAIS) component of MRIP collects information on recreational catch and fishing trip characteristics, including fish lengths and weights, from anglers at public marine fishing access sites. In the Gulf of America, APAIS samples recreational fishers from private, shore, and charterboat modes. APAIS sampling was temporarily suspended during Wave 2 in 2020 because of the COVID pandemic. APAIS sampling resumed in all states by August 2020 (Wave 4), however, sampling of fish lengths and weights were reduced due to social distancing guidelines and field officer safety protocols (NMFS OST 2023). For intercepted angler trips where both fish length and weight are missing, MRIP uses hot and cold-deck imputation to impute lengths (NMFS OST 2023). Imputed lengths were excluded from length composition analyses. MRIP provided 24,051 Gag lengths. MRIP dockside samplers do not collect age structures from intercepted fish. Historically, FWC

biologists collected age samples while conducting MRIP dockside interviews to support auxiliary studies and would label these samples would be labeled as ‘MRFSS’.

Southeast Region Headboat Survey (SRHS)

The SRHS program estimates landings and effort for headboat vessels. In the Gulf of America, the SRHS program began in 1986 and extends from Monroe County, FL to South Padre Island, TX (Cheshire et al. 2023). Biological samples (e.g. length, weight, and age structures) are collected as part of the SRHS dockside intercept sampling program (DISP) component of the SRHS program (Fitzpatrick et al. 2017). DISP sampling was temporarily suspended in March 2020 due to the COVID pandemic and no biological samples were collected. DISP biological sampling resumed in July 2021 once NMFS/SEFSC approved safety measures were approved (Cheshire et al. 2023). SRHS sampled 8,569 Gag for length and of those fish, 1,372 were also sampled for age.

FIN-BIOSTAT

FIN-BIOSTAT sampling began in 2001 and the program is administered by the Gulf State Marine Fisheries Commission (GSMFC) through GulfFIN. All recreational fishing modes are sampled through FIN-BIOSTAT (Bray, pers com 2024). FIN-BIOSTAT is conducted in every Gulf state, however, in FL it is called RECFIN from 2001-2018 and RepBio from 2018-2024 (Bray and Cermak, pers com 2023). From TX-AL, 139 Gag were sampled for length and of those 42 were also sampled for age. From RECFIN, 2,957 Gag were sampled for length and of those 2,842 were also sampled for age. RECFIN sampling assignments were not conducted using a randomized methodology in an effort to maximize the number of biological samples collected, however, fish were not sampled in a biased fashion once at the selected site. A pilot phase for RepBio was initiated in 2018 and was fully implemented in 2019. Fishing access points identified from the MRIP Site Register are assigned weekly, by subregion, using a randomized draw process (Cermak, pers com 2023). RepBio provided 875 samples for length and 825 samples for age compositions.

Trip Interview Program (TIP)

The Trip Interview Program (TIP) is part of the State-Federal Cooperative Statistic Program and began in the 1980s. The primary focus of TIP is to collect detailed biological information from commercial fisheries. TIP samplers collect biological samples (e.g. otoliths, gonads) dockside while the catch is being offloaded or at a dealer site. TIP samples are collected randomly from stratified areas (Beggerly et al. 2025). While TIP is designed to sample commercial fisheries, during the 1990s and early 2000s, TIP samplers would collect samples from recreational charter and headboat vessels when commercial vessels were not available. (Barnett, pers comm). TIP sampled 2,065 Gag for length and 1,891 for age from recreational vessels.

Stock and Fleet Structure

Three recreational fleets, Charter (CB), Headboat (HB), and Private/Shore (PRSH) are defined for SEDAR 105.

Changes from SEDAR 72

Improvements in data provision, facilitated by the Life History Template, allowed unique records (n=6,075) in the age data to be added to the length-only data and included in the length compositions. These additional samples were not included in the length compositions for SEDAR 72.

A different weighting stratification for length compositions was requested for SEDAR 105 than what was used for SEDAR 72. In SEDAR 72 for the Charter and Private/Shore fleets, the Gulf was separated into three subregions (1) West (TX-LA), (2) Northeast (MS-NFL), and (3) Southeast (SFL) and for the Headboat fleet the Gulf was separated into West (TX-LA) and East (MS-FL) subregions for weighting (SEDAR72-DW-17). For SEDAR 105, the lead analysts requested the Gulf be divided into three subregions for all fleets: (1) West (TX-MS), (2) North (AL-NFL), and (3) South (SFL) for weighting. Detailed descriptions of the spatial ranges for each weighting subregion are provided in the 'Nominal and Weighted Length Composition' section below.

In the 1980s, there was an issue with Gag being misidentified as Black Grouper (*Mycteroperca bonaci*) in the MRIP survey. Almost 100% of Black Grouper MRIP catch estimates from the 1980s are reclassified as Gag (SEDAR105-WP-02). For SEDAR 105, Black Grouper lengths collected from MRIP in the 1980s are assumed to be misidentified GAG and these lengths were included in length composition analyses. These samples were not included in SEDAR 72. When comparing the length distributions of Gag and misidentified Black Grouper, the length distribution of the misidentified Black Grouper generally skews smaller than the length distribution of Gag (Figure 1).

Morphometric equations were updated for SEDAR 105 (see below) and the equations used for SEDAR 105 (SEDAR105-DW-14) differ from the equations used in SEDAR 72 (SEDAR72-DW-17).

Morphometric Conversions

Natural total length (NTL), maximum total length (MTL), and standard length (SL) were converted to fork length (FL) using the following conversion equations (in mm):

Natural Total Length (NTL) to Fork Length:

$$FL = 13.17 + 0.96 * NTL$$

Maximum Total Length (MTL) to Fork Length:

$$FL = 1.15 + 0.97 * MTL$$

Standard Length (SL) to Fork Length:

$$FL = 26.18 + 1.11 * SL$$

Nominal and Weighted Length Compositions

Nominal and weighted length compositions were developed for SEDAR 105. Fish were assigned to 2 cm bins with bins ranging from 20 - 158 cm with the 158 cm bin representing a plus group. The label represents the floor of the bin. For nominal length compositions, it is not recommended to use a length composition where there are not a minimum of 30 fish from at least 10 trips per stratum. Fishery-dependent sampling is typically opportunistic and sampled lengths may not be representative of the true landings composition of recreational Gag in the Gulf. Possible sampling bias in the collection of length samples are typically removed by weighting the length compositions with the associated landings at the finest spatial and temporal scale available without losing data. The weighting subregions were defined as West (TX-MS), North (AL west to the Dixie/Levy County border in FL), and South (Levy - Monroe County, FL). For weighted length compositions, it is not recommended to use a composition that does not have a minimum of 30 fish from at least 10 trips per weighting substratum (e.g. North, South). There were 65 samples from Florida that lacked the additional spatial information needed to assign the samples to either the North or South weighting substratum. These samples were retained for nominal length compositions and excluded from weighted length compositions. Sample sizes per weighting substratum, for each fleet, are provided in Table 4.

For most years, nominal length compositions were similar for all three fleets (Figure 2). In the 1980s to early 1990s the distribution of fish sampled from the PRSH fleet did skew slightly smaller than the CB and HB fleets.

There are differences in the length distribution of fish sampled in the three weighting subregions that are observed for all three recreational fleets (Figures 3-5). Sample sizes in the West subregion are fairly low, so it is hard to infer if these are reflective of true differences in length or if the sample sizes are too low to be representative. For many years, the length distribution of fish in the South subregion skews smaller than the length distribution of fish sampled in the North. Caution does need to be used when evaluating these trends, especially for the HB fleet where sample sizes in the North are more limited and do not always meet the minimum sample threshold of 30 fish from 10 trips (Table 4; Figure 4).

Weighting had minimal impacts on the length compositions and the nominal and weighted length distributions are similar to one another (Figures 6-8). The weighted length compositions showed similar patterns to the nominal length compositions. In the earlier part of the time series, the weighted length distribution of the PRSH skewed slightly smaller than the CB and HB fleets, while the weighted length distributions were more similar in the later years (Figure 9).

The nominal (Figures 10-12) and weighted (Figures 13-15) length compositions are generally similar between SEDAR 72 and SEDAR 105. However, for the length compositions there are some differences for the years where there were more samples available for SEDAR 105.

Comparison of Length and Age Data

The distribution of length samples, included in the length compositions (length-only) and samples with both length and ages included in the age compositions are shown in Figures 16-18. While there is good agreement between the length distributions of data used in the length and age

compositions for several years, there are also several years where there are differences and the length distribution of the age data skews larger than the length distribution of the length-only data.

Nominal and Weighted Age Compositions

Gag ages ranged from 1-30 years old, with 88% of fish being between 0-5 years old. Nominal and weighted age composition analyses were conducted using age bins ranging from 1-20, with 20 being a plus group. Separate age compositions were provided for each fleet. For age compositions, it is recommended to exclude strata where there are not a minimum of 10 fish sampled from 10 trips.

Nominal and weighted age compositions were provided for SEDAR 105. The age compositions are weighted to account for potential sampling biases associated with fishery-dependent data. The weighting method is adapted from Chih (2009) and a reweighting factor (RW) was estimated within year i and length bin j and corrects the composition of the age data to more closely represent the final length composition of landings. For each fleet the reweighting factor $RW_{i,j}$ is calculated as

$$RW_{i,j} = \frac{LC_{i,j}}{a_{i,j}/a_i}$$

where $LC_{i,j}$ is the length composition from the length-only data, $a_{i,j}$ is the number of age samples in year i and length bin j , and a_i are the total number of age samples in year i . With this method, if there were age samples in $a_{i,j}$ not represented in $LC_{i,j}$ they are down-weighted to zero and effectively dropped from further analysis. The final weighted age compositions, for each fleet, were estimated as

$$AC_{i,k} = \sum_j \left(RW_{i,j} * \frac{a_{i,j,k}}{a_i} \right)$$

where all length bins j within age class k were summed and then rescaled to sum to 1 across each year.

Comparisons of nominal age distributions by fleet are shown in Figure 19 and fleet-specific nominal age bubble plots are shown in Figures 20-22. Generally, Gag from the PRSH fleet skew slightly younger than fish from the CB and HB fleets.

For all fleets, weighting generally had little impact on the nominal age distributions. For years where weighting had a larger impact, the weighted age distributions were shifted towards younger fish compared to the nominal age distributions (Figures 23-25).

Comparisons of weighted age distributions by fleet are shown in Figure 26 and fleet-specific weighted age bubble plots are shown in Figures 27-29. Similar to the nominal age compositions, Gag from the PRSH fleet generally skew slightly younger than fish from the CB and HB fleets.

Nominal (Figures 30-32) and weighted (Figures 33-35) age compositions from SEDAR 72 and SEDAR 105 are similar for most years.

Conditional Age-at-Length

Conditional age-at-length (CAAL) is the proportion of fish at age in a given length bin. When data are sufficient (i.e. wide spread of ages and lengths represented), CAAL is considered to be more informative than length and age compositions because it can be used to directly estimate the length-at-age process and the variability in length-at-age (Taylor and Methot 2013; Piner et al. 2016; Lee et al. 2019). Another benefit of CAAL is that it avoids double use of fish for both age and length compositions, especially when age compositions are weighted by the length compositions.

CAAL is calculated as

$$CAAL_{i,j,k} = \frac{a_{i,j,k}}{a_{i,j}}$$

where $a_{i,j,k}$ is the number of age samples in year i , length bin j , and age class k and $a_{i,j}$ is the number of age samples in year i and length bin j .

Fleet specific CAAL is shown in Figures 36-38. For all fleets, there is not a wide spread of ages and lengths represented.

Mean Length-at-Age

Mean length-at-age (MLAA) is the average length for each age and is calculated as

$$MLAA_{i,k} = \frac{\sum L_{i,k}}{a_{i,k}}$$

where L are lengths, a is the number of associated sample sizes, i is year, and k is age class. MLAA are provided to aide in model diagnostics and is presented in Figures 39-41.

Data Adequacy and Availability

Tables 5-7 summarize the adequacy of data available for composition analyses for the CB, HB, and PRSH fleets, respectively. For each data product (e.g. nominal length compositions, weighted age compositions) the fishing year is color-coded either gray, red, yellow, or green. Gray indicates that data are not available for that year. Years in red indicate that the sample sizes were not sufficient for that data product. For weighted age compositions, year is also shaded as red if the corresponding weighted length composition did not have sufficient sample sizes. For weighted length and age compositions, yellow was used if sample sizes were sufficient for the North and South weighting subregions, but sample sizes were insufficient in West. Yellow was also used for CAAL to indicate that sample sizes were sufficient and CAAL should be considered in the model, if the spread is sufficient. For all analytical products, green was used to indicate minimum sample size thresholds were met.

The proportions of landings, length samples, and age samples from West, North, and South weighting subregions was compared to evaluate how representative the biological sampling was of the landings (Figures 42-44). All fleets in the West have years where the proportion of length and age samples is larger than the proportion of landings but this is especially true for the HB fleet. For many years though, there is generally good agreement in the proportions of landings, lengths, and age samples across the weighting subregions. Weighting the length and age compositions helps mitigate any issues where the biological sampling is not reflective of the landings.

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Tables

Table 1: Number of fish (nfish) and trips (ntrip) sampled for length and age by each data source.

*Age samples labeled MRFSS are from auxiliary studies.

Sampling_Program	Length		Age	
	nfish	ntrip	nfish	ntrip
ALMR	1	1	1	1
FIN-BIOSTAT	139	97	42	30
FIN-OBS	20	15	0	0
FWRI	27	10	27	10
FWRI-MERR	751	54	738	53
FWRI-OBS	1,377	590	769	396
GHC - IFQ	0	0	5	4
HB	567	263	255	128
MRFSS*	0	0	880	309
MRIP	24,051	8,751	0	0
PCLAB	589	265	553	259
RECFIN	2,957	1,176	2,842	1,142
REDSNAPPER	0	0	2	1
REPPIO	875	265	825	234
SRFS	945	578	681	403
SRHS	8,569	3,574	1,372	813
TIP	2,065	514	1,891	482
TPWD	179	145	0	0

Table 2: Annual number of fish sampled for **length** by each data source.

Year	ALMR	FIN- BIOSTAT	FIN- OBS	FWRI	FWRI- MERR	FWRI- OBS	HB	MRIP	PCLAB	RECFIN	REPBIO	SRFS	SRHS	TIP	TPWD
1981	0	0	0	0	0	0	0	131	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	161	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	181	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	129	0	0	0	0	0	0	2
1985	0	0	0	0	0	0	0	199	0	0	0	0	0	0	2
1986	0	0	0	0	0	0	0	310	0	0	0	0	665	0	0
1987	0	0	0	0	0	0	0	346	0	0	0	0	651	0	4
1988	0	0	0	0	0	0	0	250	0	0	0	0	380	0	0
1989	0	0	0	0	0	0	0	127	0	0	0	0	450	0	1
1990	0	0	0	0	0	0	0	103	0	0	0	0	361	0	5
1991	0	0	0	0	0	0	0	111	0	0	0	0	156	144	5
1992	0	0	0	0	0	0	0	303	0	0	0	0	143	283	0
1993	0	0	0	0	0	0	0	286	0	0	0	0	130	316	0
1994	0	0	0	0	0	0	0	225	0	0	0	0	219	231	2
1995	0	0	0	0	0	0	0	248	0	0	0	0	191	232	0
1996	0	0	0	0	0	0	0	236	0	0	0	0	268	486	7
1997	0	0	0	9	0	0	0	597	0	0	0	0	310	160	0
1998	0	0	0	7	0	0	0	1,345	0	0	0	0	519	84	9
1999	0	0	0	0	0	0	0	2,260	43	0	0	0	488	13	12
2000	0	0	0	0	0	0	0	1,955	20	0	0	0	339	19	17
2001	0	0	0	0	0	0	0	1,278	5	0	0	0	263	8	17
2002	0	20	0	0	0	0	0	1,387	20	48	0	0	300	19	8
2003	0	5	0	0	0	0	0	1,618	8	0	0	0	383	31	8

Year	ALMR	FIN- BIOSTAT	FIN- OBS	FWRI	FWRI- MERR	FWRI- OBS	HB	MRIP	PCLAB	RECFIN	REPBIO	SRFS	SRHS	TIP	TPWD
2004	1	12	0	4	0	0	0	2,374	6	61	0	0	233	11	8
2005	0	28	19	0	0	0	0	1,754	1	132	0	0	221	2	4
2006	0	16	0	0	0	0	0	781	6	28	0	0	169	7	11
2007	0	11	1	0	0	0	0	512	5	37	0	0	161	1	6
2008	0	0	0	0	0	0	0	747	0	190	0	0	213	0	6
2009	0	6	0	0	0	141	0	441	0	337	0	0	118	8	9
2010	0	6	0	0	0	262	0	605	0	757	0	0	137	8	5
2011	0	1	0	0	0	16	0	177	11	305	0	0	42	0	3
2012	0	15	0	0	0	25	0	551	43	251	0	0	96	0	5
2013	0	0	0	7	0	32	0	268	4	206	0	0	109	0	1
2014	0	2	0	0	0	104	307	370	11	446	0	0	153	0	2
2015	0	0	0	0	0	30	260	197	7	85	0	81	87	0	3
2016	0	2	0	0	0	88	0	165	11	39	0	96	31	1	3
2017	0	0	0	0	0	104	0	143	23	4	0	131	56	1	3
2018	0	0	0	0	0	185	0	130	32	31	11	131	86	0	4
2019	0	4	0	0	8	136	0	183	100	0	141	187	76	0	2
2020	0	4	0	0	65	7	0	118	29	0	191	108	0	0	1
2021	0	5	0	0	14	102	0	436	95	0	345	108	114	0	1
2022	0	2	0	0	23	127	0	161	65	0	183	48	128	0	2
2023	0	0	0	0	639	16	0	81	21	0	0	39	99	0	1
2024	0	0	0	0	2	2	0	71	23	0	4	16	24	0	0

Table 3: Annual number of fish sampled for **age** by each data source. *Age samples labeled MRFSS are from auxiliary studies.

Year	SRHS	TIP	FWRI	MRFSS*	PCLAB	RECFIN	ALMR	FIN- BIOSTAT	GHC - IFQ	REDSNAPPER	FWRI- OBS	HB	SRFS	REPBIO	FWRI- MERR
1986	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	36	84	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	107	266	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	74	307	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	84	210	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	83	219	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	129	451	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	60	158	9	0	0	0	0	0	0	0	0	0	0	0	0
1998	40	70	7	2	0	0	0	0	0	0	0	0	0	0	0
1999	11	12	0	44	43	0	0	0	0	0	0	0	0	0	0
2000	21	18	0	0	20	0	0	0	0	0	0	0	0	0	0
2001	33	8	0	117	5	0	0	0	0	0	0	0	0	0	0
2002	12	19	0	261	20	48	0	0	0	0	0	0	0	0	0
2003	76	31	0	220	8	0	0	0	0	0	0	0	0	0	0
2004	38	11	4	18	6	61	1	0	0	0	0	0	0	0	0
2005	88	2	0	27	1	131	0	0	0	0	0	0	0	0	0
2006	54	7	0	5	6	28	0	0	0	0	0	0	0	0	0
2007	16	1	0	23	5	36	0	10	0	0	0	0	0	0	0
2008	17	0	0	60	0	189	0	0	0	0	0	0	0	0	0

Year	SRHS	TIP	FWRI	MRFSS*	PCLAB	RECFIN	ALMR	FIN- BIOSTAT	GHC - IFQ	REDSNAPPER	FWRI- OBS	HB	SRFS	REPBIO	FWRI- MERR
2009	10	8	0	27	0	332	0	3	0	0	0	0	0	0	0
2010	18	8	0	45	0	721	0	2	0	0	0	0	0	0	0
2011	9	0	0	19	11	300	0	1	0	0	0	0	0	0	0
2012	4	0	0	12	43	213	0	12	0	0	0	0	0	0	0
2013	24	0	7	0	4	200	0	0	0	0	0	0	0	0	0
2014	15	0	0	0	11	424	0	2	5	2	0	0	0	0	0
2015	71	0	0	0	7	85	0	0	0	0	30	255	43	0	0
2016	12	0	0	0	11	39	0	2	0	0	81	0	55	0	0
2017	8	1	0	0	22	4	0	0	0	0	104	0	100	0	0
2018	59	0	0	0	31	31	0	0	0	0	183	0	96	11	0
2019	53	0	0	0	91	0	0	4	0	0	124	0	135	119	8
2020	0	0	0	0	29	0	0	2	0	0	7	0	100	183	65
2021	14	0	0	0	94	0	0	4	0	0	98	0	67	332	13
2022	33	0	0	0	65	0	0	0	0	0	124	0	42	176	21
2023	4	0	0	0	20	0	0	0	0	0	16	0	32	0	629
2024	0	0	0	0	0	0	0	0	0	0	2	0	11	4	2

Table 4: Number of fish and trips sampled for **length**, by fleet, from the West (W; TX, LA, and MS), North (N; AL-NFL), and South (S; SFL) weighting subregions. Values in **red** do not meet the minimum recommended sample size of 30 fish or 10 trips per strata.

	Charter						Headboat						Private/Shore					
	Number of Fish			Number of Trips			Number of Fish			Number of Trips			Number of Fish			Number of Trips		
Year	W	N	S	W	N	S	W	N	S	W	N	S	W	N	S	W	N	S
1981	0	12	10	0	9	3	0	1	31	0	1	22	0	43	34	0	15	16
1982	2	0	6	1	0	2	0	13	15	0	10	10	3	42	80	2	18	32
1983	3	2	2	2	2	1	0	9	73	0	8	50	0	28	64	0	6	20
1984	1	0	19	1	0	3	1	1	57	1	1	37	2	0	50	2	0	19
1985	0	20	0	0	9	0	0	1	118	0	1	65	8	18	36	3	8	15
1986	27	65	158	15	21	35	43	92	530	35	49	178	3	32	25	3	15	13
1987	6	129	66	3	46	17	49	147	455	38	82	180	3	65	81	3	35	34
1988	5	45	34	1	17	13	45	77	258	34	58	110	3	65	98	1	21	38
1989	7	26	54	3	16	12	27	110	313	22	63	108	5	4	32	4	4	17
1990	0	9	59	0	6	11	32	41	288	22	26	86	5	17	18	3	7	14
1991	10	140	10	6	37	3	14	51	96	13	30	38	4	10	81	2	5	39
1992	6	277	123	4	91	19	19	69	78	17	49	27	4	24	129	3	17	81
1993	7	313	85	5	63	15	50	75	22	39	46	10	5	63	112	3	29	52
1994	2	209	69	2	54	9	45	88	106	27	31	38	6	54	98	5	27	52
1995	3	229	88	3	51	25	40	70	100	28	38	37	0	14	127	0	8	62
1996	9	565	5	5	93	3	35	158	88	26	74	26	13	55	69	8	26	50
1997	3	339	215	2	121	59	29	99	192	24	60	51	0	20	179	0	9	87
1998	5	718	362	4	226	109	166	180	202	89	89	61	18	36	277	13	16	141
1999	7	1,259	519	5	395	132	133	94	262	65	63	67	18	116	408	13	37	199
2000	14	1,133	434	8	393	109	56	92	193	32	51	51	14	170	244	10	74	100
2001	3	726	260	3	247	77	29	37	197	22	26	51	19	84	216	12	45	115

Year	Charter						Headboat						Private/Shore					
	Number of Fish			Number of Trips			Number of Fish			Number of Trips			Number of Fish			Number of Trips		
	W	N	S	W	N	S	W	N	S	W	N	S	W	N	S	W	N	S
2002	9	687	464	5	259	118	17	50	238	11	26	59	13	132	192	11	67	102
2003	11	966	389	9	268	109	15	70	300	13	46	78	7	95	200	7	53	107
2004	4	1,649	536	4	369	148	5	38	191	5	22	64	8	85	194	7	41	95
2005	19	1,411	239	9	401	94	17	48	188	12	26	81	5	87	143	3	49	81
2006	16	579	91	11	197	33	19	22	131	9	16	44	10	82	63	9	41	40
2007	8	270	121	8	141	31	1	11	158	1	9	62	7	85	73	7	48	46
2008	4	321	285	4	129	72	3	20	200	3	18	67	5	111	207	4	54	89
2009	7	150	313	1	82	82	2	15	335	2	11	114	13	53	170	11	29	78
2010	3	239	727	2	112	189	2	13	450	2	9	130	5	30	306	4	20	146
2011	1	136	207	1	78	37	1	14	55	1	6	19	2	20	119	2	15	67
2012	1	510	290	1	177	76	6	31	76	5	20	26	4	20	48	4	13	22
2013	0	149	131	0	85	48	6	16	127	5	10	45	3	14	181	2	11	82
2014	0	80	247	0	41	65	6	37	838	5	24	338	2	22	163	2	17	76
2015	2	64	117	1	50	35	4	23	338	4	20	157	1	51	150	1	34	88
2016	1	60	140	1	42	69	2	5	52	2	5	37	2	44	130	2	31	75
2017	0	36	120	0	21	47	2	3	85	2	3	38	3	41	175	3	28	118
2018	0	78	202	0	41	82	2	23	126	1	17	56	4	66	109	3	51	61
2019	0	172	242	0	85	104	4	17	127	4	15	59	2	99	174	2	60	90
2020	1	58	203	1	43	56	0	0	0	0	0	0	0	31	190	0	29	94
2021	0	141	641	0	74	157	1	7	163	1	7	63	1	70	195	1	52	88
2022	1	106	284	1	50	90	1	7	198	1	6	66	1	54	87	1	42	44
2023	0	20	662	0	8	32	0	8	107	0	4	20	1	34	56	1	21	31
2024	0	25	40	0	6	12	0	0	26	0	0	10	0	12	39	0	9	25

Table 5. Number of fish and trips sampled for **age** by fleet. Values in **red** do not meet the recommended minimum size threshold of 10 fish sampled from 10 trips.

Year	Number of Fish			Number of Trips		
	Charter	Headboat	Private/Shore	Charter	Headboat	Private/Shore
1986	0	1	0	0	1	0
1987	0	5	0	0	4	0
1988	0	27	0	0	24	0
1989	0	14	0	0	7	0
1990	0	12	0	0	11	0
1991	77	38	5	25	25	2
1992	230	130	13	73	80	8
1993	281	89	11	49	62	4
1994	182	104	8	45	66	5
1995	199	101	2	35	66	2
1996	438	141	1	60	82	1
1997	155	70	2	28	50	2
1998	51	66	2	11	35	2
1999	84	11	15	31	10	9
2000	36	23	0	17	16	0
2001	127	31	5	57	17	3
2002	312	17	31	89	7	14
2003	180	76	79	61	24	54
2004	75	39	25	41	17	12
2005	119	127	3	41	59	3
2006	26	57	17	15	27	10
2007	45	25	21	18	16	9
2008	160	27	79	54	18	27
2009	151	147	82	63	59	20
2010	401	219	174	143	76	79
2011	244	24	72	68	10	41
2012	266	16	2	81	9	2
2013	156	45	34	81	23	11
2014	93	346	20	38	168	13
2015	75	344	72	48	170	50
2016	90	36	74	50	29	51
2017	92	42	105	42	24	71

Year	Number of Fish			Number of Trips		
	Charter	Headboat	Private/Shore	Charter	Headboat	Private/Shore
2018	200	123	88	92	67	51
2019	293	120	121	135	64	62
2020	208	0	178	63	0	77
2021	419	68	135	129	40	71
2022	276	111	74	88	49	52
2023	623	20	58	26	6	47
2024	6	2	11	3	2	10

Table 6. Data suitability for the **Charter** fleet. Years in **green** have sufficient sample sizes. Years in **red** do not meet minimum sample size thresholds. For weighted length (Wgt Len) and weighted age (Wgt Age) years in **yellow** indicate that there were sufficient samples for North and South weighting subregions but sample sizes were insufficient for West. For CAAL, years in **yellow** indicate that sample sizes are sufficient. Years in **gray** do not have any samples.

Year	Nom Len	Wgt Len	Nom Age	Wgt Age	CAAL
1981	red	red	gray	gray	gray
1982	red	red	gray	gray	gray
1983	red	red	gray	gray	gray
1984	red	red	gray	gray	gray
1985	red	red	gray	gray	gray
1986	green	yellow	gray	gray	gray
1987	green	yellow	gray	gray	gray
1988	green	yellow	gray	gray	gray
1989	green	red	gray	gray	gray
1990	green	red	gray	gray	gray
1991	green	red	green	red	yellow
1992	green	yellow	green	yellow	yellow
1993	green	yellow	green	yellow	yellow
1994	green	red	green	red	yellow
1995	green	yellow	green	yellow	yellow
1996	green	red	green	red	yellow
1997	green	yellow	green	yellow	yellow
1998	green	yellow	green	yellow	yellow
1999	green	yellow	green	yellow	yellow
2000	green	yellow	green	yellow	yellow
2001	green	yellow	green	yellow	yellow
2002	green	yellow	green	yellow	yellow
2003	green	yellow	green	yellow	yellow
2004	green	yellow	green	yellow	yellow

Year	Nom Len	Wgt Len	Nom Age	Wgt Age	CAAL
2005					
2006					
2007					
2008					
2009					
2010					
2011					
2012					
2013					
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					

Table 7: Data Suitability for the **Headboat** fleet. Years in **green** have sufficient sample sizes. Years in **red** do not meet minimum sample size thresholds. For weighted length (Wgt Len) and weighted age (Wgt Age) years in **yellow** indicate that there were sufficient samples for North and South weighting subregions but sample sizes were insufficient for West. For CAAL, years in **yellow** indicate that sample sizes are sufficient. Years in **gray** do not have any samples.

Year	Nom Len	Wgt Len	Nom Age	Wgt Age	CAAL
1981	green	red	gray	gray	gray
1982	red	red	gray	gray	gray
1983	green	red	gray	gray	gray
1984	green	red	gray	gray	gray
1985	green	red	gray	gray	gray
1986	green	green	red	red	red
1987	green	green	red	red	red
1988	green	green	green	green	red
1989	green	yellow	red	red	red
1990	green	green	green	green	red
1991	green	yellow	green	yellow	yellow
1992	green	yellow	green	yellow	yellow
1993	green	red	green	red	yellow
1994	green	green	green	green	yellow
1995	green	green	green	green	yellow
1996	green	green	green	green	yellow
1997	green	yellow	green	yellow	yellow
1998	green	green	green	green	yellow
1999	green	green	green	green	red
2000	green	green	green	green	red
2001	green	yellow	green	yellow	yellow
2002	green	yellow	red	red	red
2003	green	yellow	green	yellow	yellow
2004	green	yellow	green	yellow	yellow
2005	green	yellow	green	yellow	yellow
2006	green	red	green	red	yellow

Year	Nom Len	Wgt Len	Nom Age	Wgt Age	CAAL
2007					
2008					
2009					
2010					
2011					
2012					
2013					
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					

Table 8. Data suitability for the **Private/Shore** fleet. Years in **green** have sufficient sample sizes. Years in **red** do not meet minimum sample size thresholds. For weighted length (Wgt Len) and weighted age (Wgt Age) years in **yellow** indicate that there were sufficient samples for North and South weighting subregions but sample sizes were insufficient for West. For CAAL, years in **yellow** indicate that sample sizes are sufficient. Years in **gray** do not have any samples.

Year	Nom Len	Wgt Len	Nom Age	Wgt Age	CAAL
1981	green	yellow	gray	gray	gray
1982	green	yellow	gray	gray	gray
1983	green	red	gray	gray	gray
1984	green	red	gray	gray	gray
1985	green	red	gray	gray	gray
1986	green	red	gray	gray	gray
1987	green	yellow	gray	gray	gray
1988	green	yellow	gray	gray	gray
1989	green	red	gray	gray	gray
1990	green	red	gray	gray	gray
1991	green	red	red	red	red
1992	green	red	red	red	red
1993	green	yellow	red	red	red
1994	green	yellow	red	red	red
1995	green	red	red	red	red
1996	green	yellow	red	red	red
1997	green	red	red	red	red
1998	green	yellow	red	red	red
1999	green	yellow	red	red	red
2000	green	yellow	gray	gray	gray
2001	green	yellow	red	red	red
2002	green	yellow	green	yellow	yellow
2003	green	yellow	green	yellow	yellow
2004	green	yellow	green	yellow	red
2005	green	yellow	red	red	red
2006	green	yellow	green	yellow	red
2007	green	yellow	red	red	red

Year	Nom Len	Wgt Len	Nom Age	Wgt Age	CAAL
2008					
2009					
2010					
2011					
2012					
2013					
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					

Figures

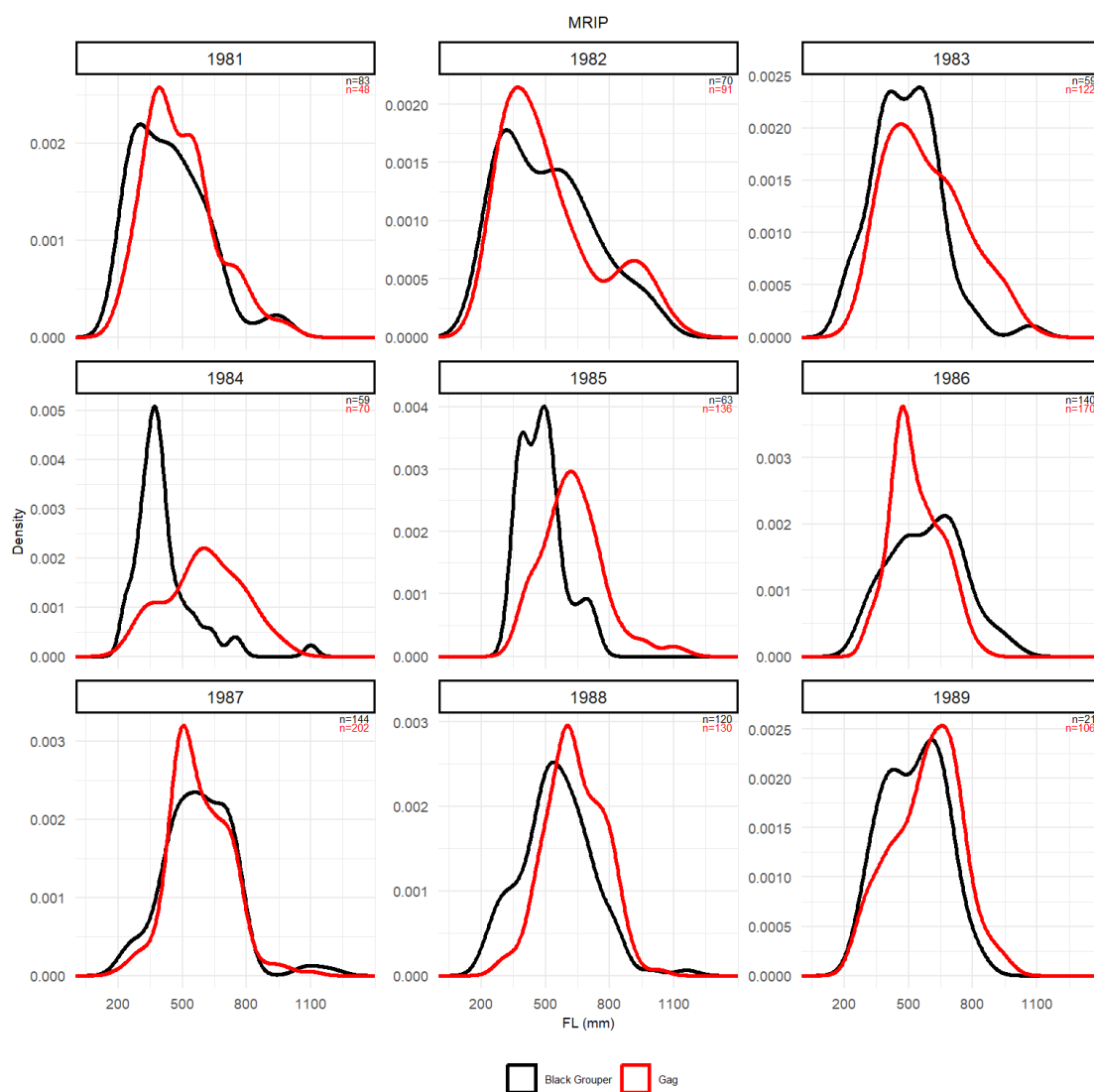


Figure 1. Nominal length distribution of Gag Grouper and misidentified Black Grouper from MRIP 1981-1989.

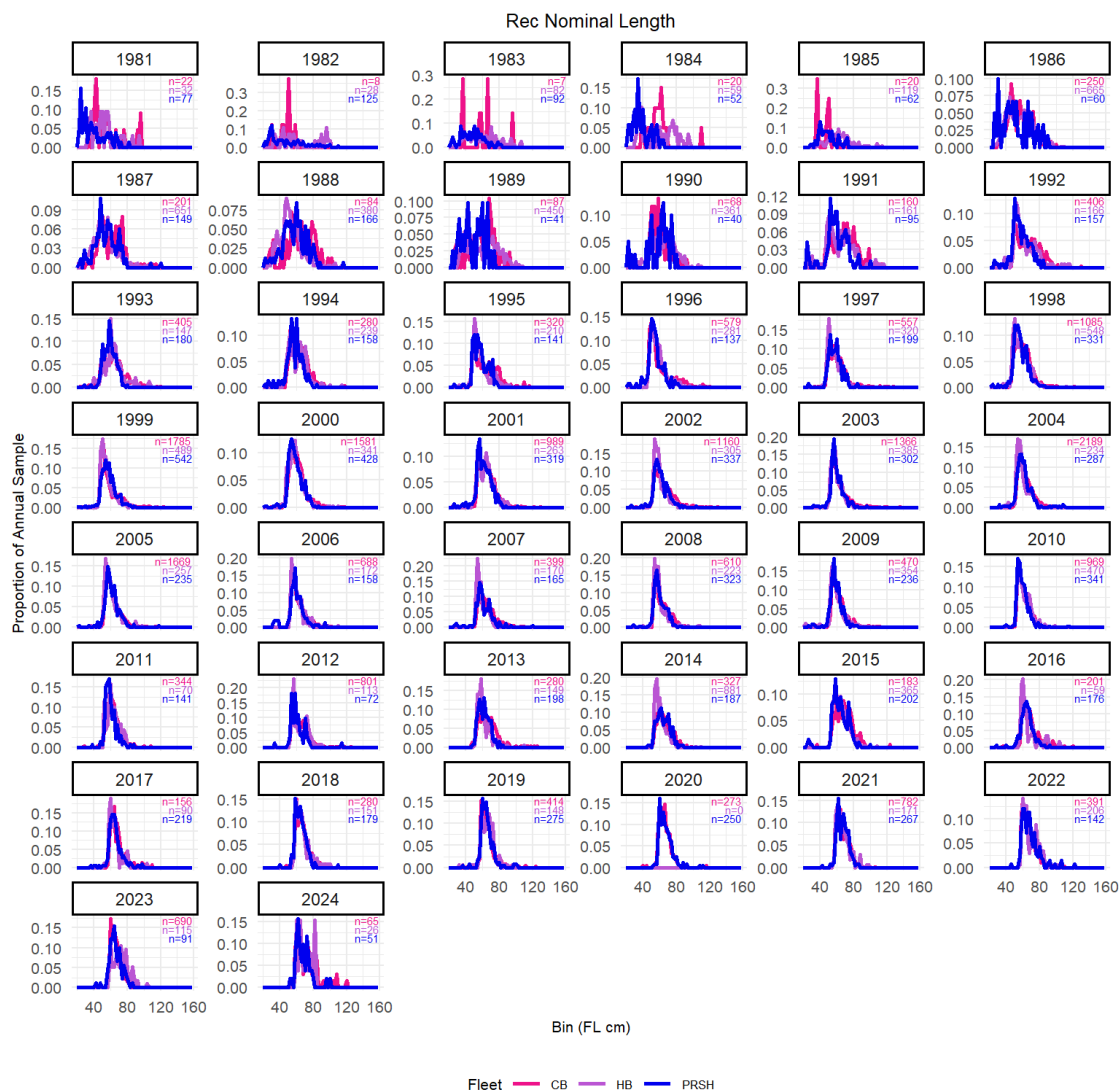


Figure 2. Nominal length distribution of Gag sampled from the Charter (CB), Headboat (HB), and Private/Shore (PRSH) fleets.

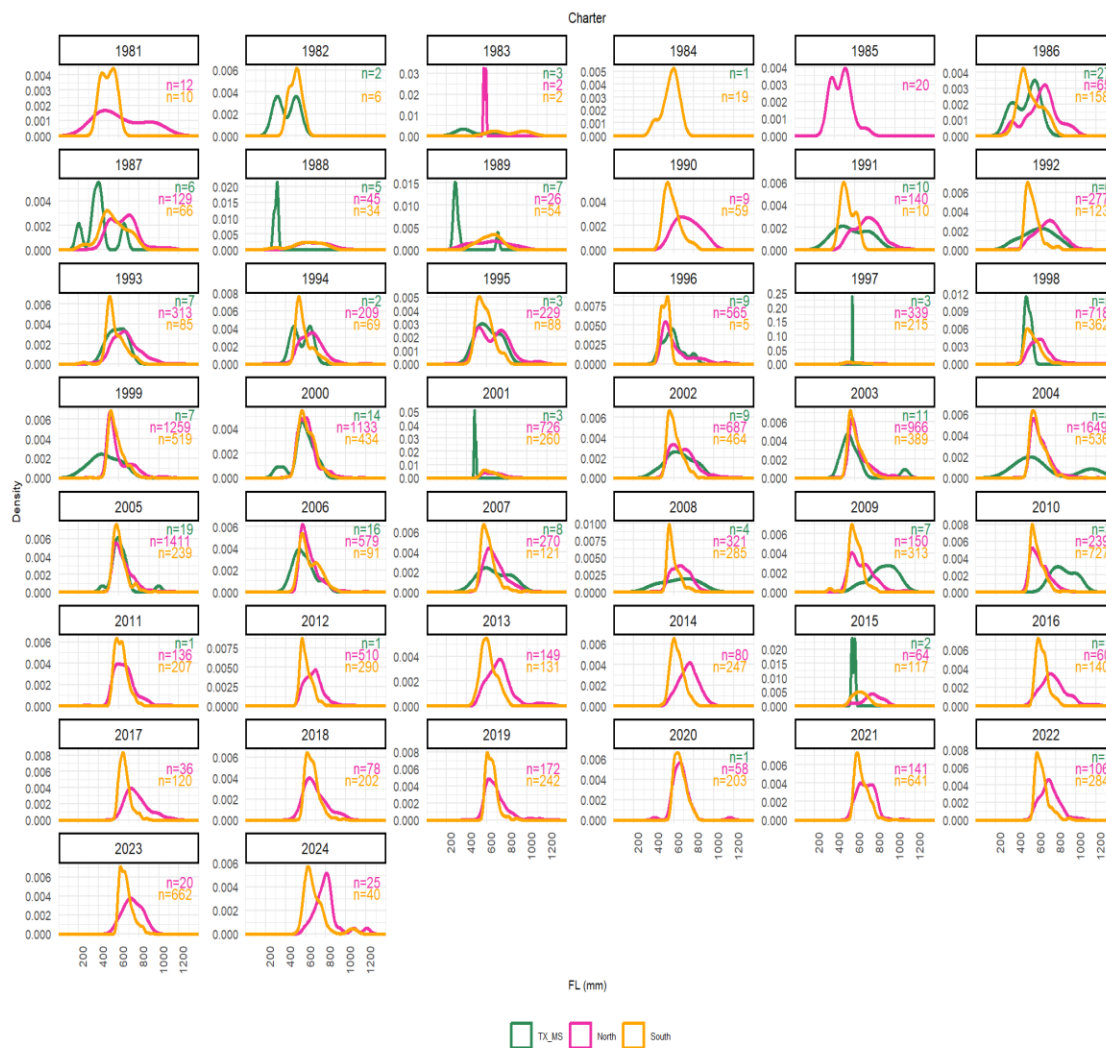


Table 3. Nominal length distribution of Gag sampled from the **Charter** fleet from the TX_MS (West), North, and South weighting subregions.

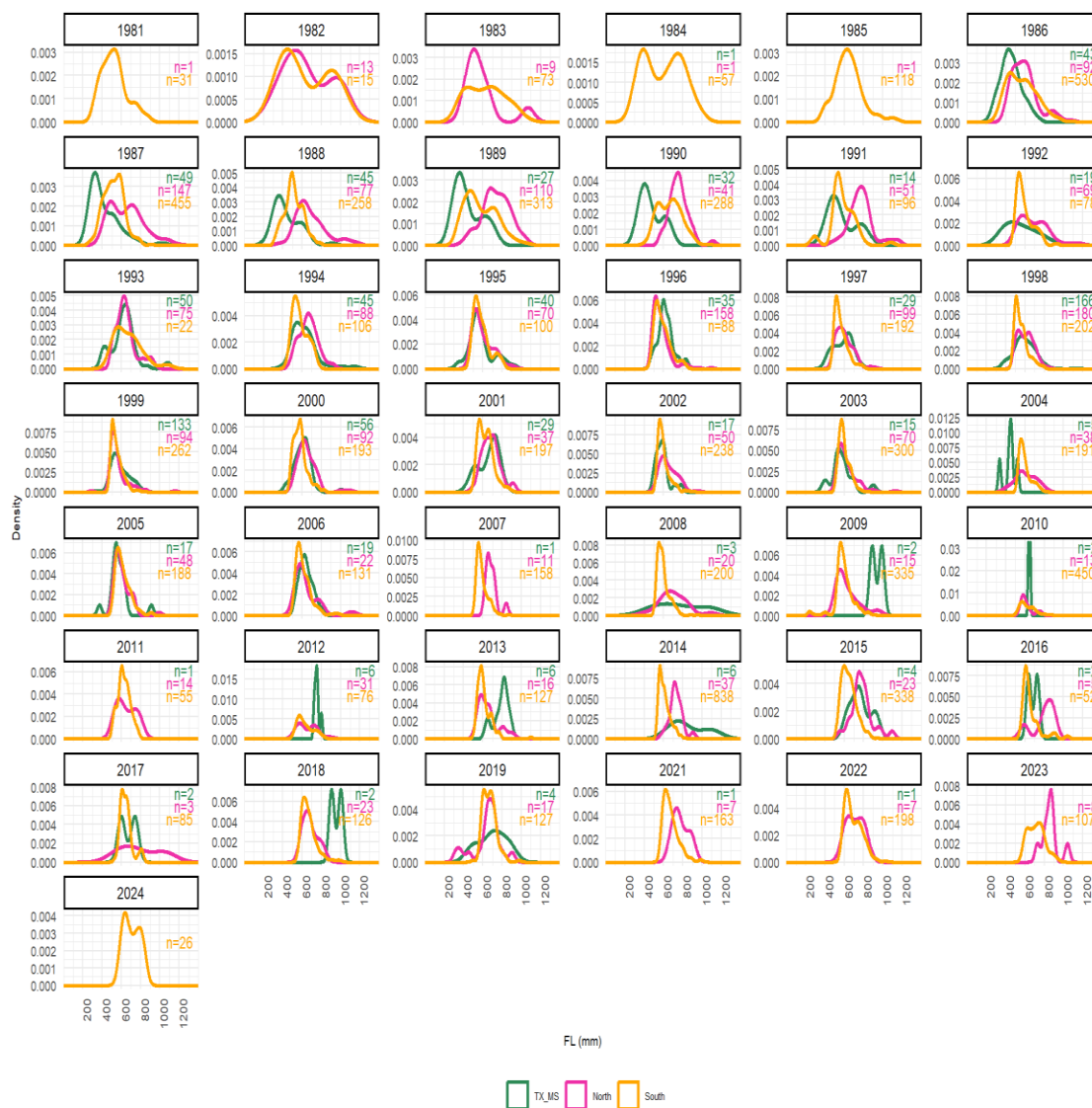


Figure 4. Nominal length distribution of Gag sampled from the **Headboat** fleet from the TX_MS (West), North, and South weighting subregions.

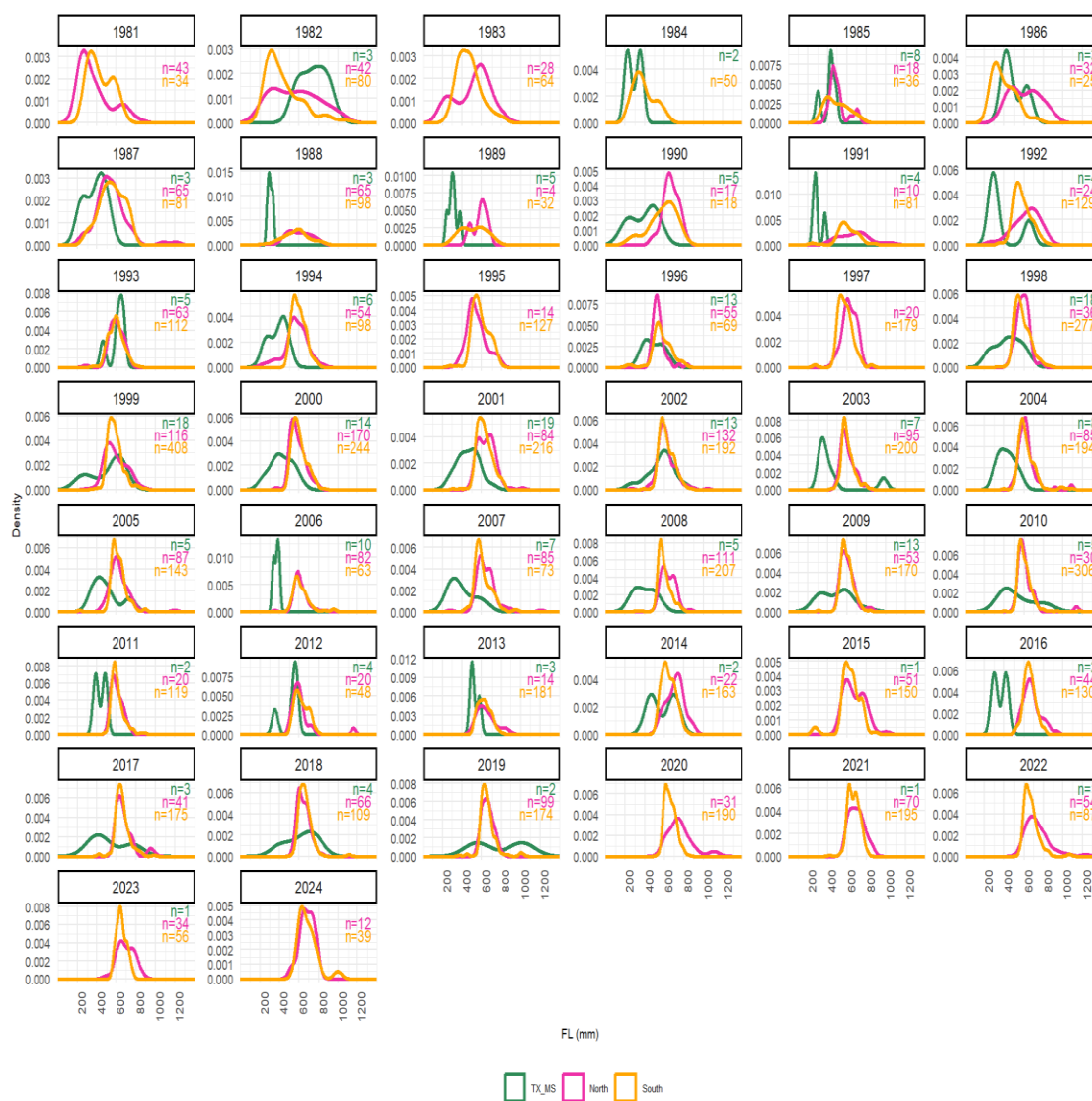


Figure 5. Nominal length distribution of Gag sampled from the **Private/Shore** fleet from the TX_MS (West), North, and South weighting subregions.

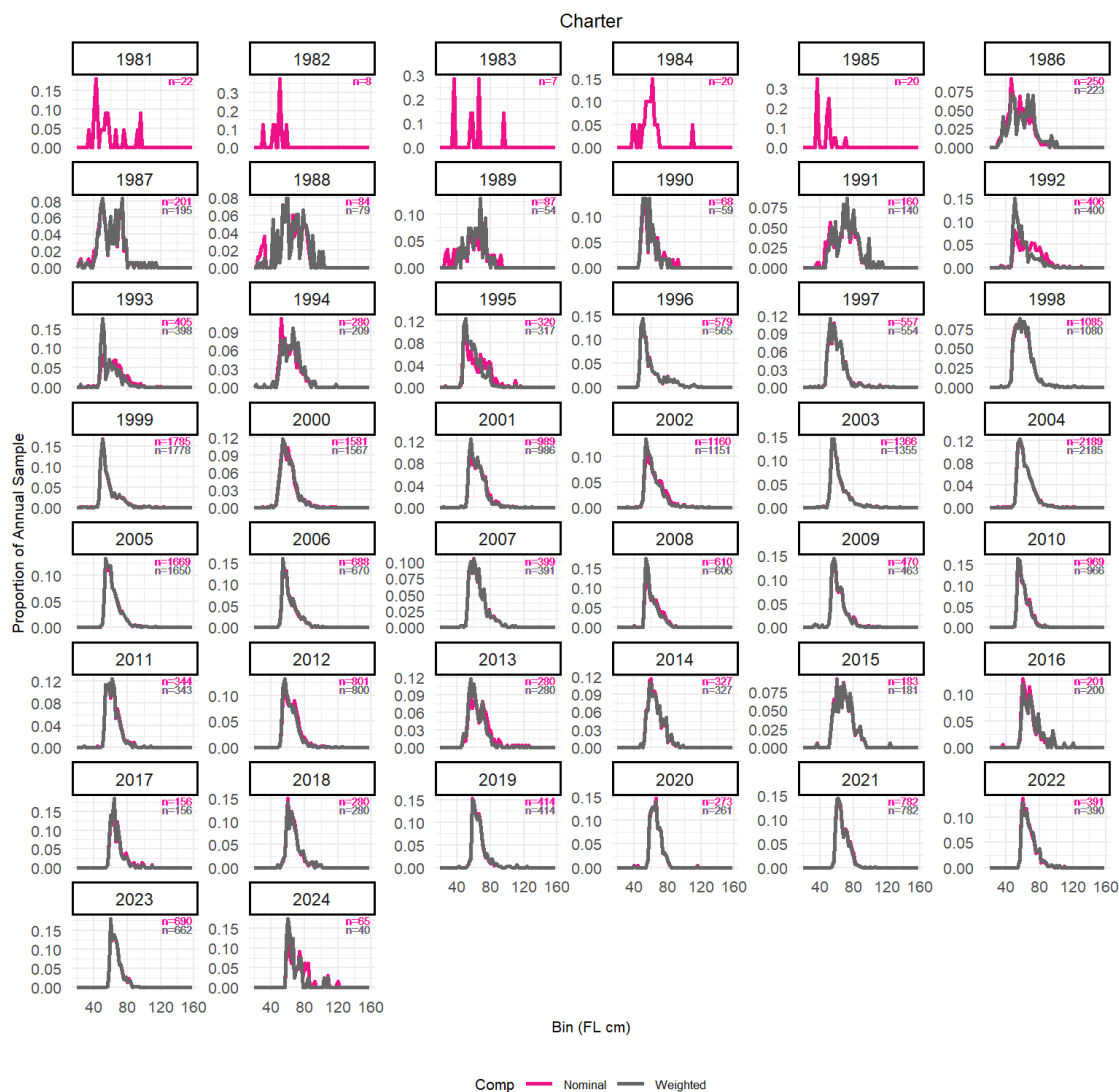


Figure 6. Nominal and weighted length compositions for Gag sampled from the **Charter** fleet.

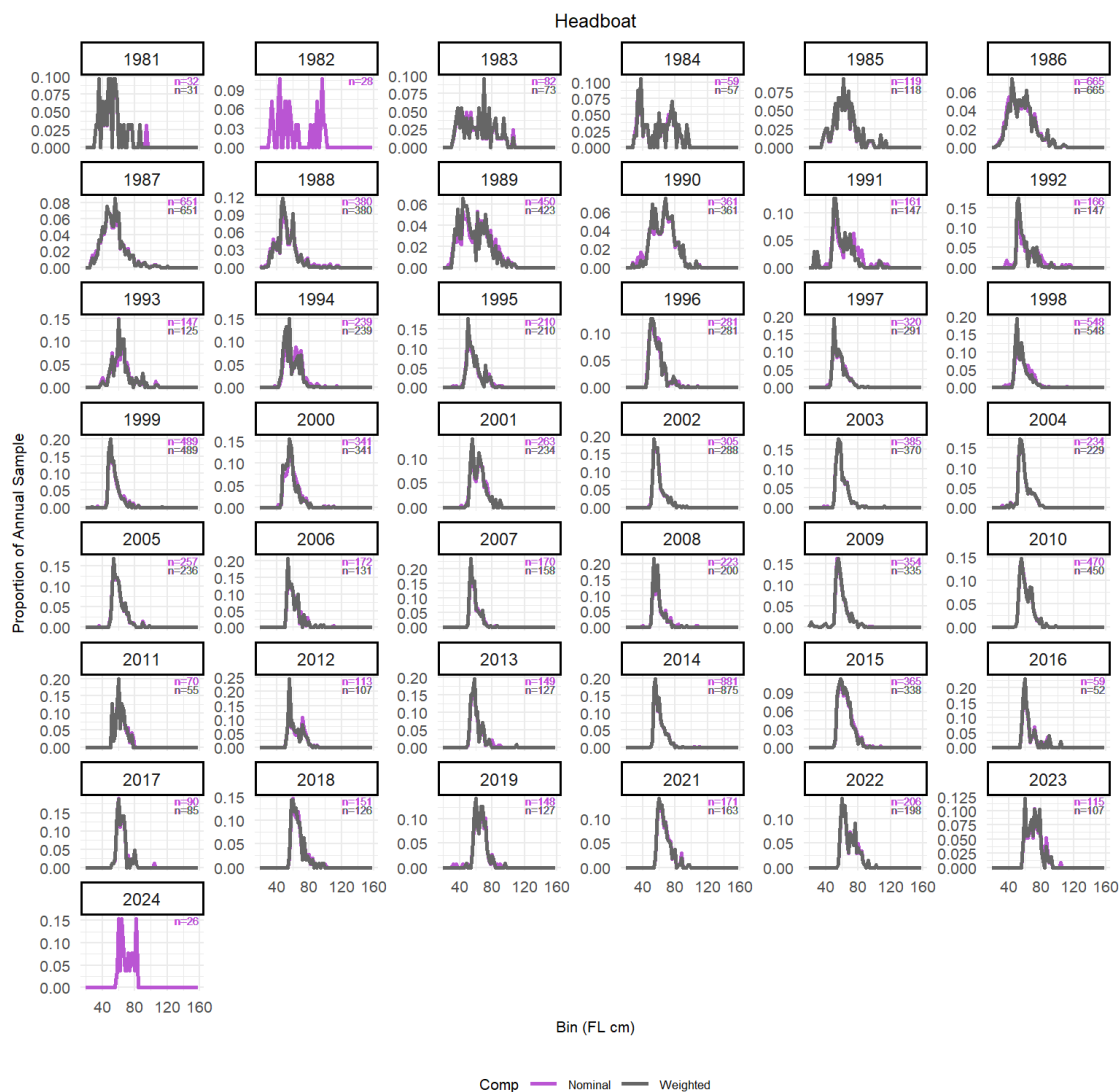


Figure 7. Nominal and weighted length compositions for Gag sampled from the **Headboat** fleet.

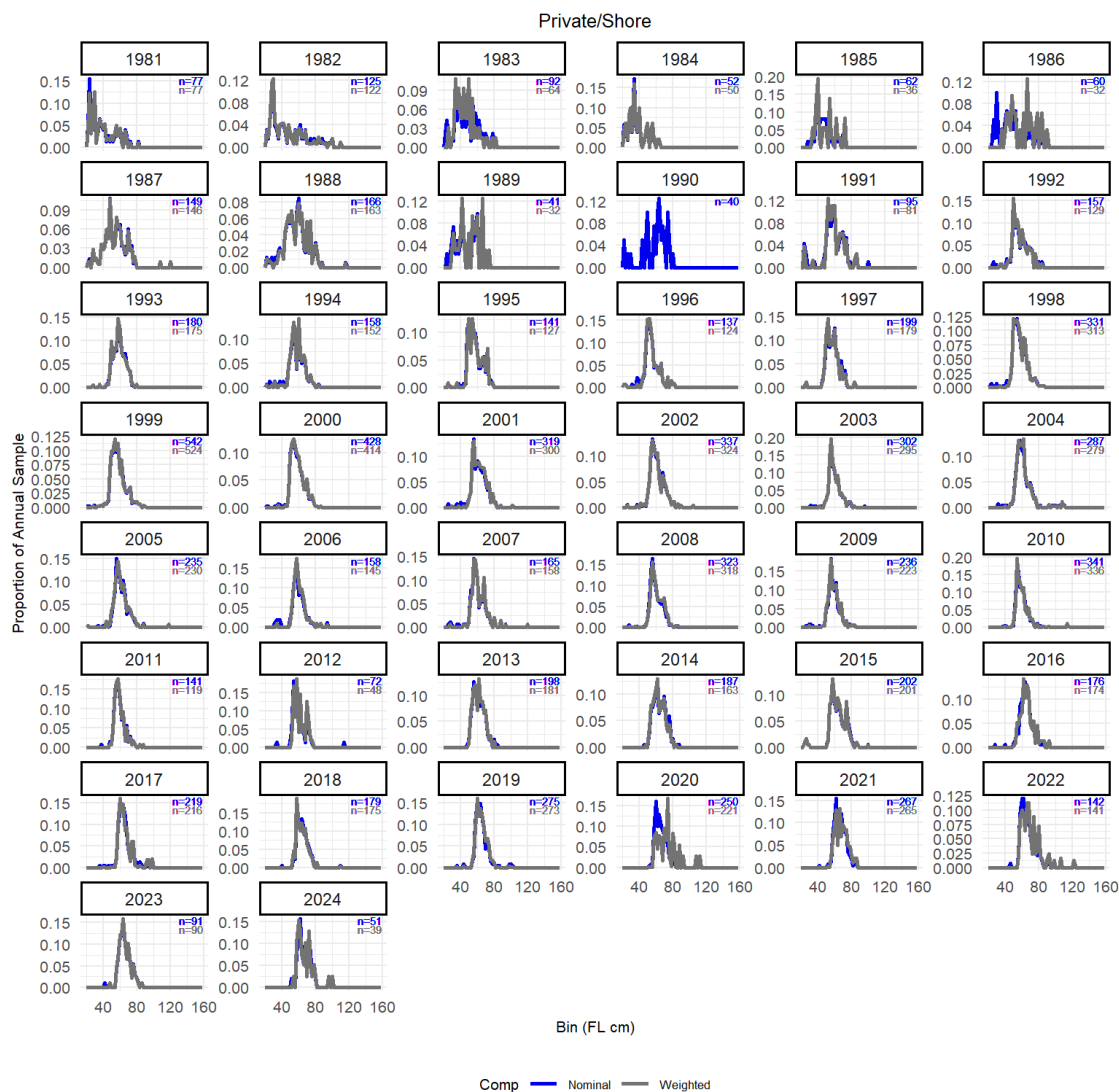


Figure 8. Nominal and weighted length compositions for Gag sampled from the *Private/Shore* fleet.

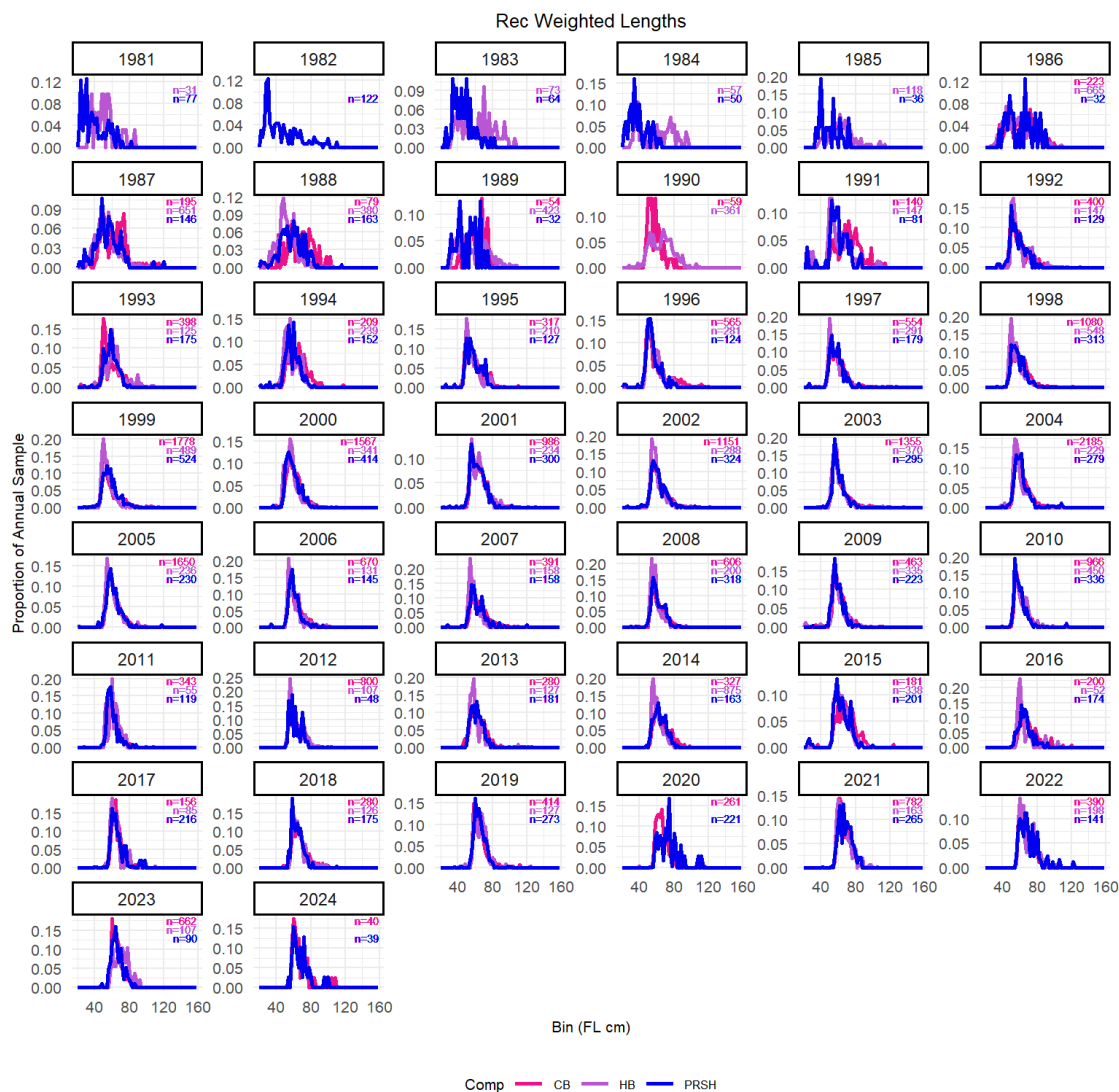


Figure 9. **Weighted length** distribution of Gag sampled from Charter (CB), Headboat (HB), and Private/Shore (PRSH) fleets.

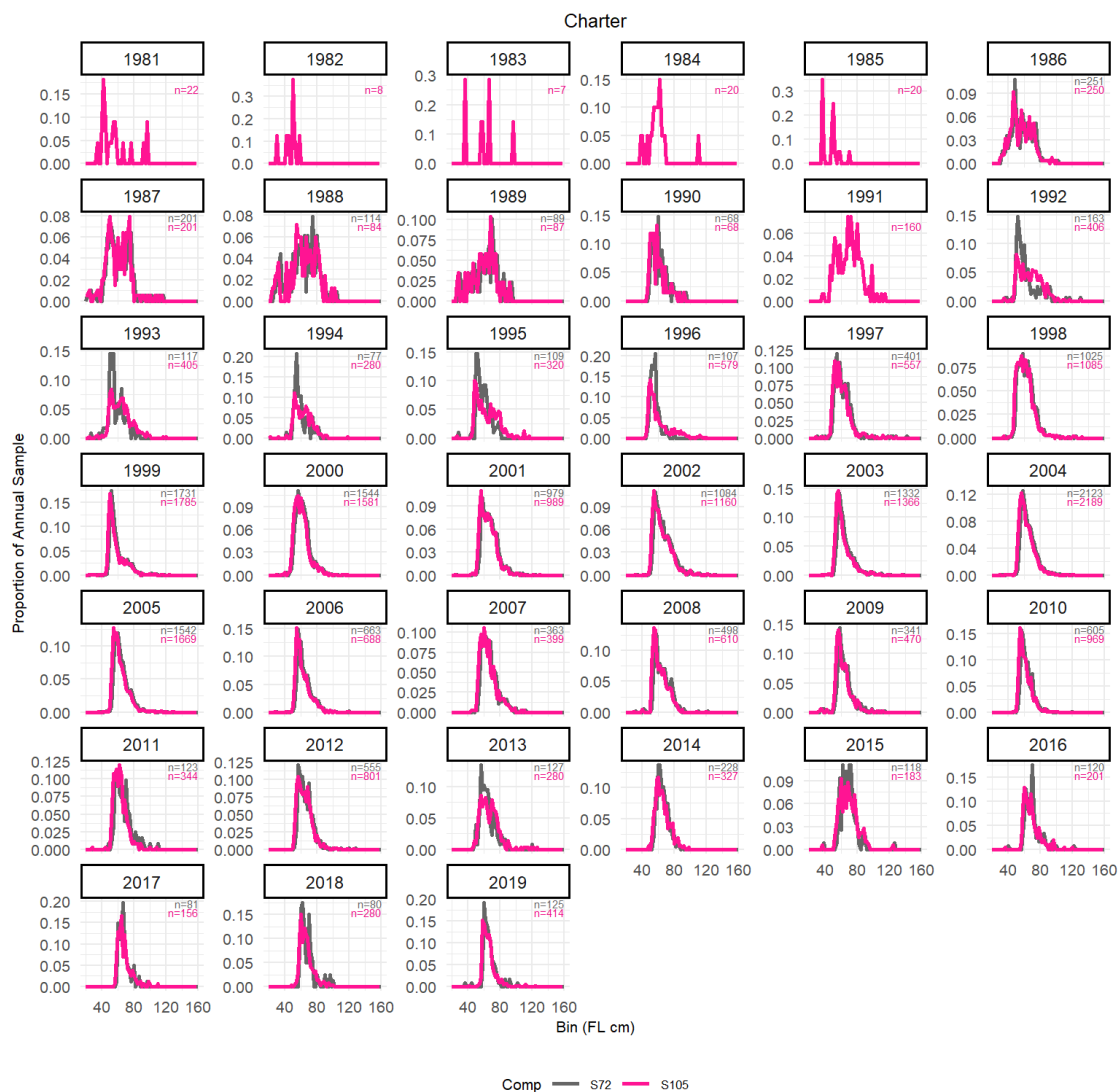


Figure 10. **Nominal length** distributions of Gag sampled from the **Charter** fleet for SEDAR 72 and SEDAR 105.

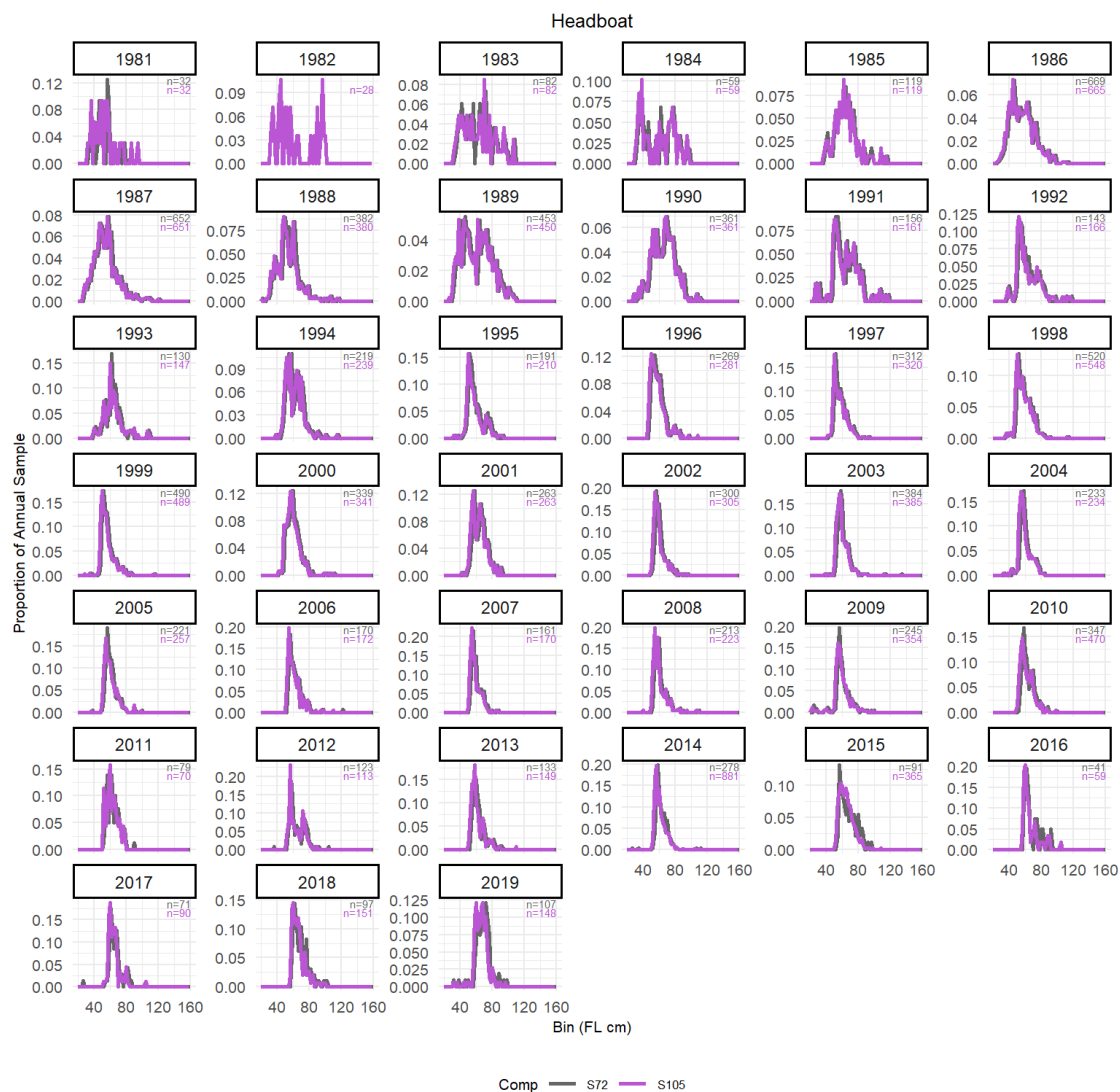


Figure 11. **Nominal length** distributions of Gag sampled from the **Headboat** fleet for SEDAR 72 and SEDAR 105.

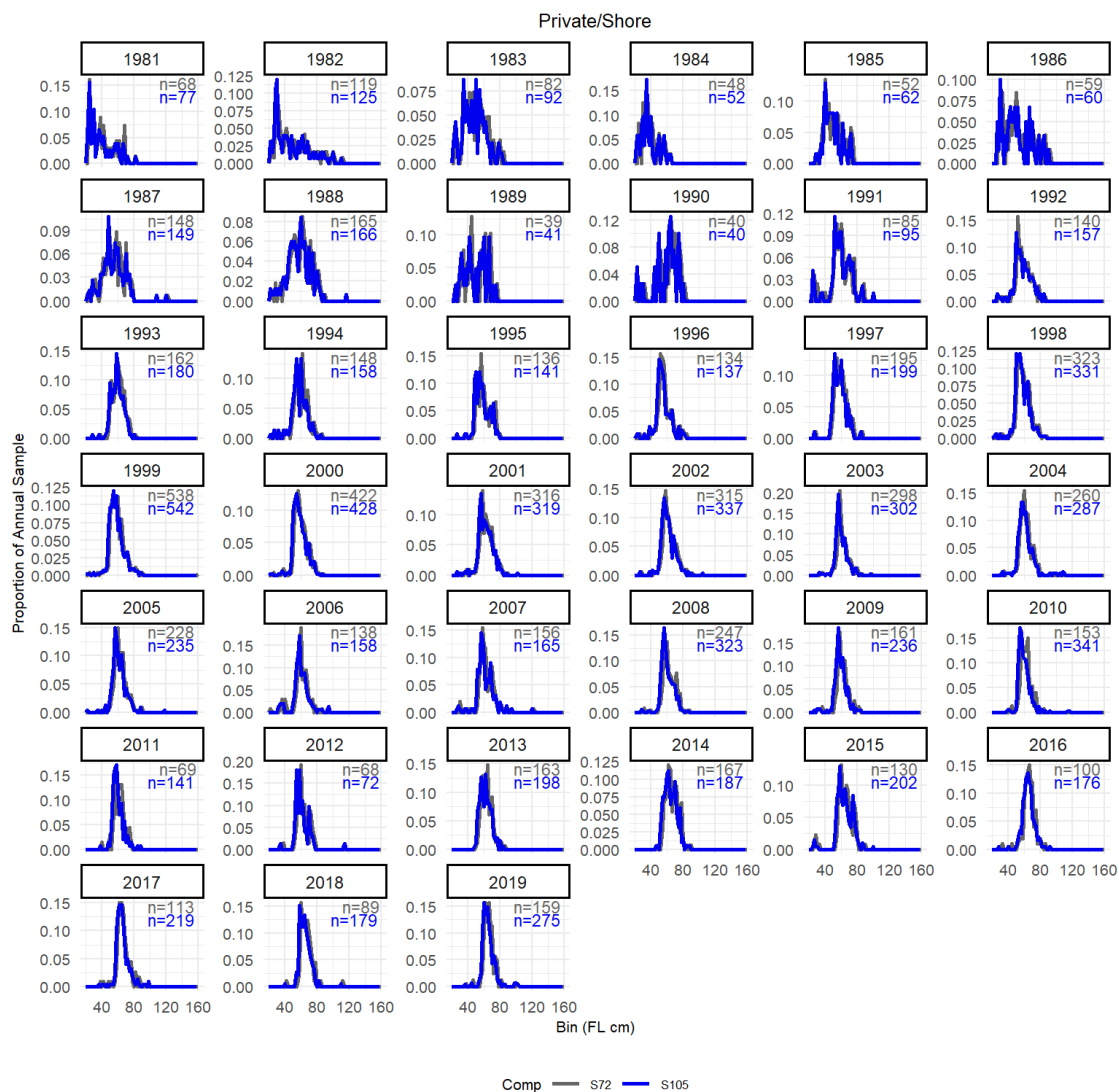


Figure 12. **Nominal length** distributions of Gag sampled from the **Private/Shore** fleet for SEDAR 72 and SEDAR 105.

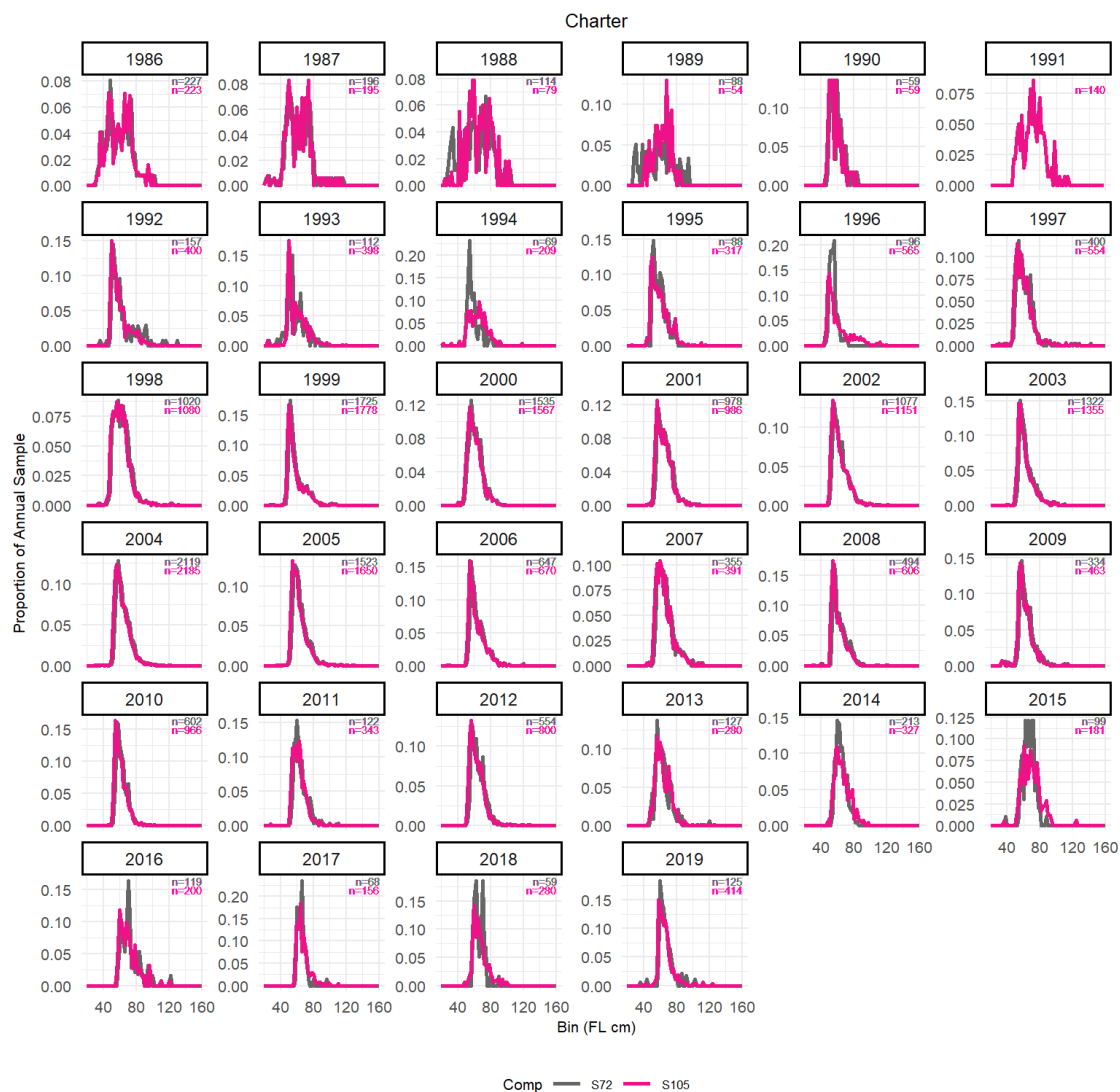


Figure 13. **Weighted length** distributions of *Gag* sampled from the *Charter* fleet for SEDAR 72 and SEDAR 105.

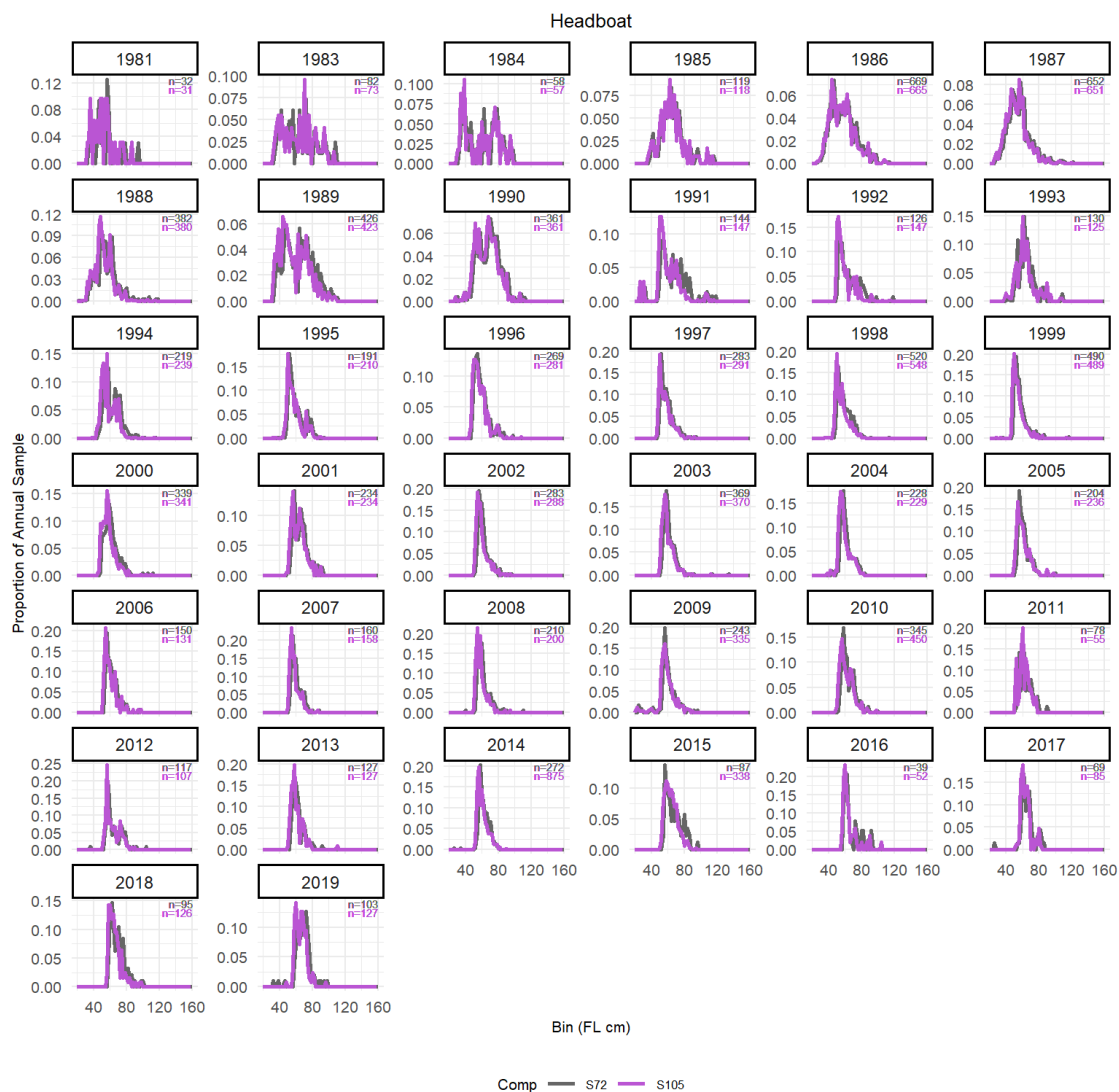


Figure 14. **Weighted length** distributions of Gag sampled from the **Headboat** fleet for SEDAR 72 and SEDAR 105.

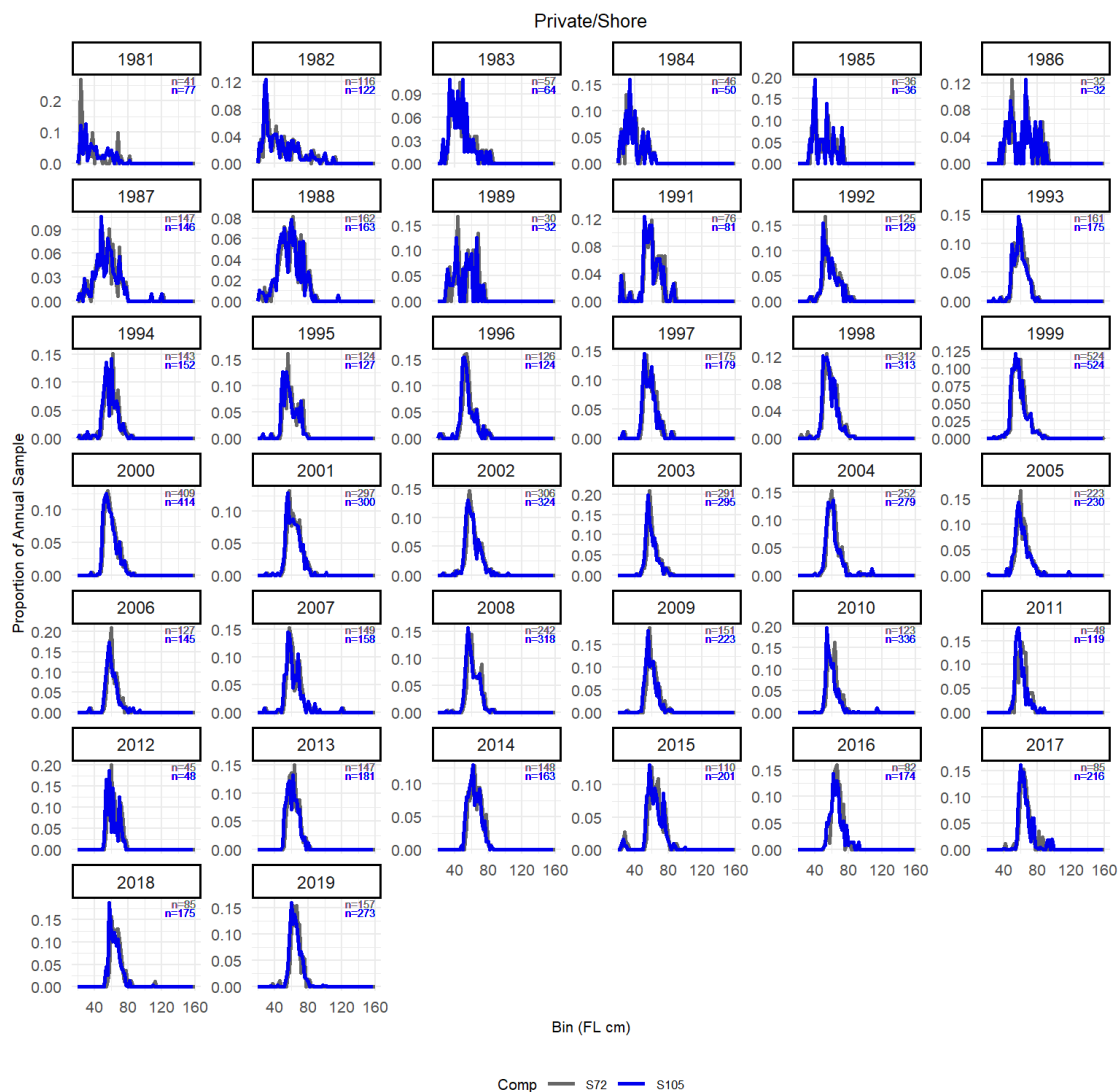


Figure 15. **Weighted length** distributions of Gag sampled from the **Private/Shore** fleet for SEDAR 72 and SEDAR 105.

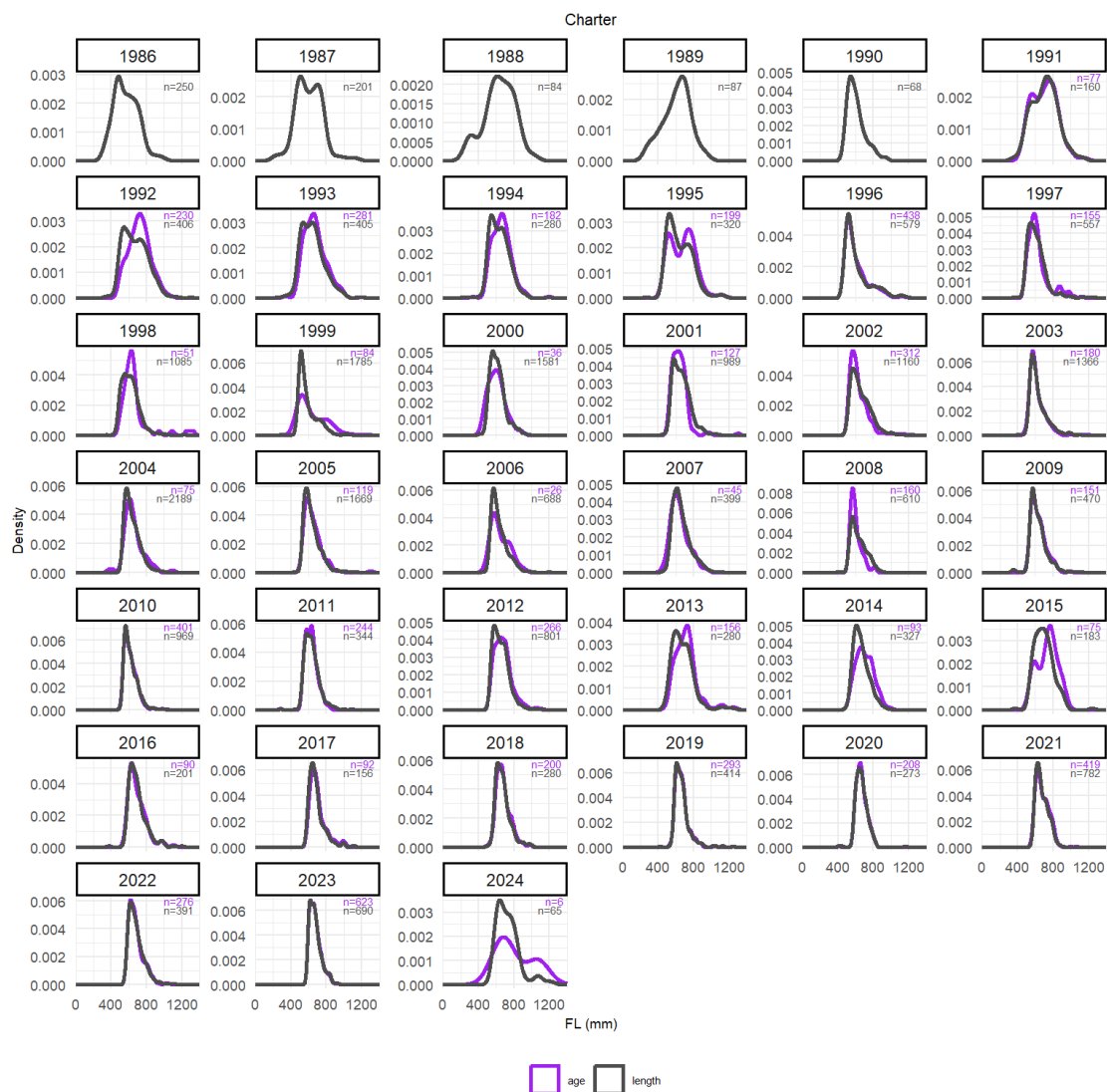


Figure 16. **Nominal length** distributions of Gag included in the length compositions and age compositions from the **Charter** fleet.

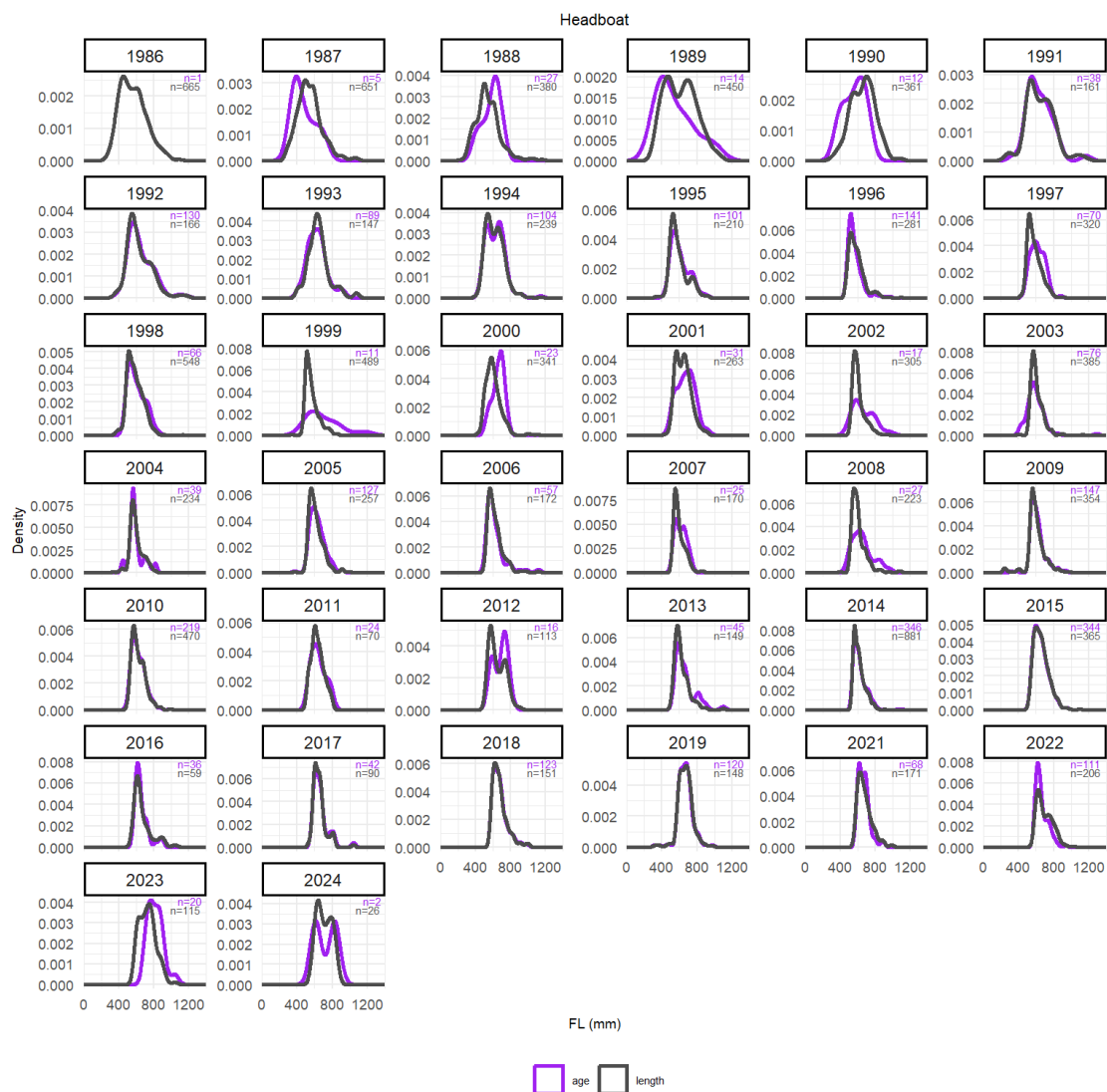


Figure 17. **Nominal length** distributions of Gag included in the length compositions and age compositions from the **Headboat** fleet.



Figure 18. **Nominal length** distributions of Gag included in the length compositions and age compositions from the **Private/Shore** fleet.

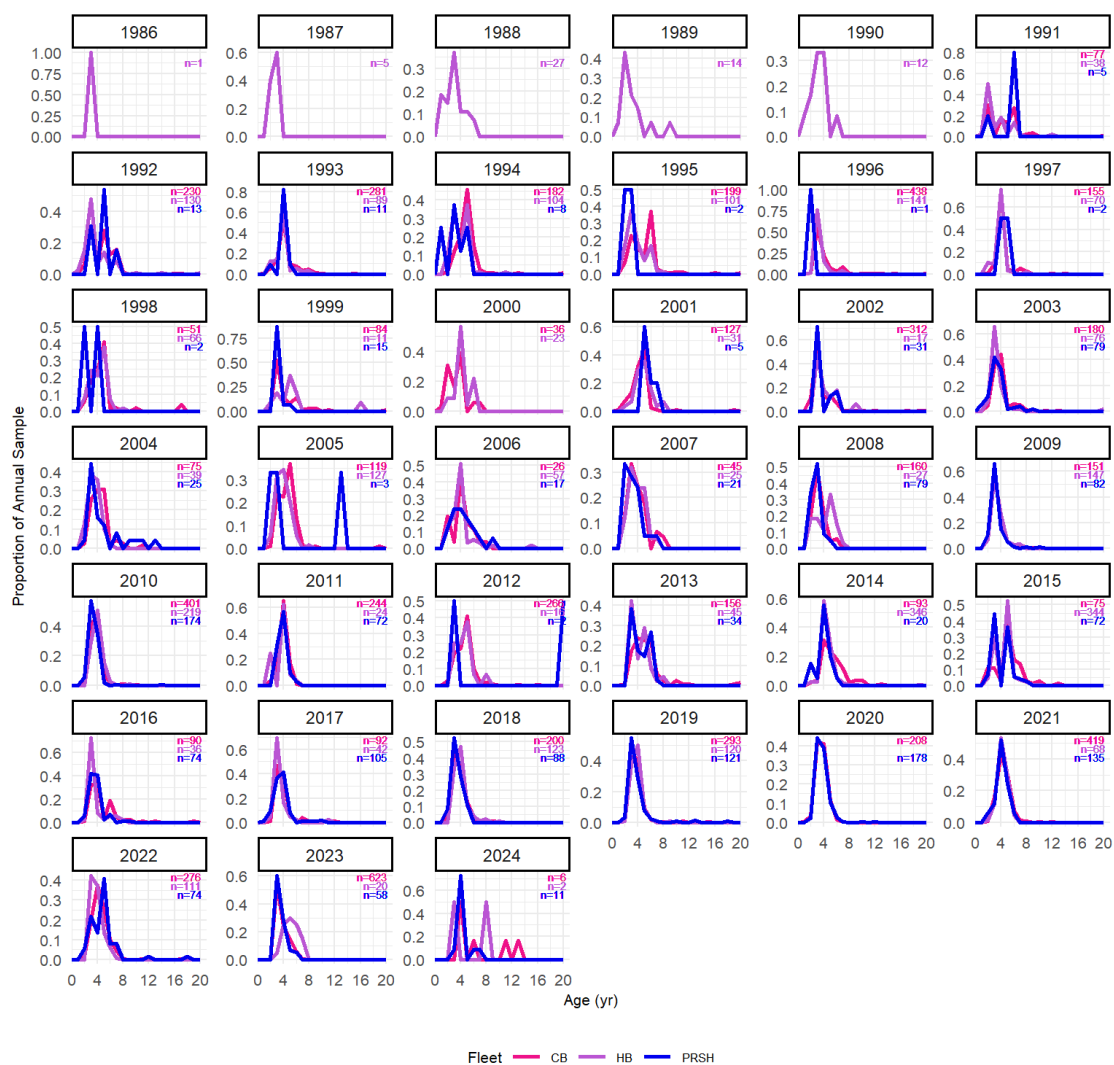


Figure 19. **Nominal age** distribution of Gag sampled from the Charter (CB), Headboat (HB), and Private/Shore (PRSH) fleets.

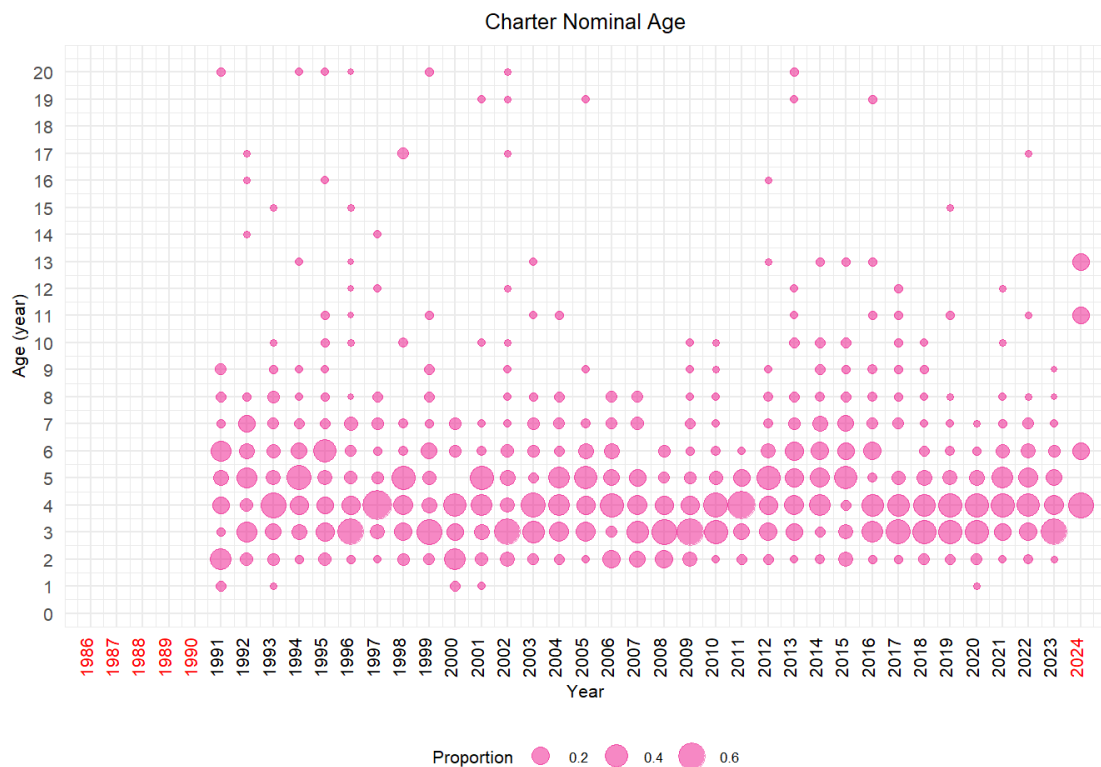
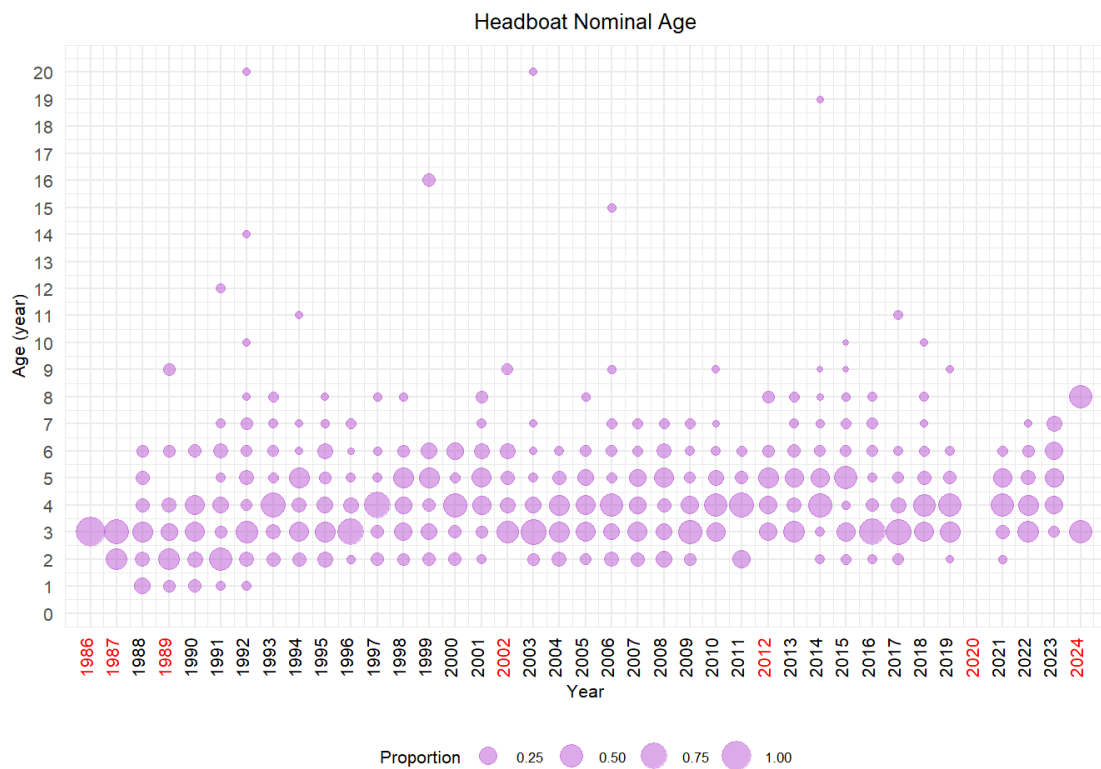


Figure 20. **Nominal age** bubble plot for Gag sampled from the **Charter** fleet. Years in **red** do not meet the minimum sample size threshold of 10 fish sampled from 10 trips.



*Figure 21. **Nominal age** bubble plot for Gag sampled from the **Headboat** fleet. Years in **red** do not meet the minimum sample size threshold of 10 fish sampled from 10 trips.*

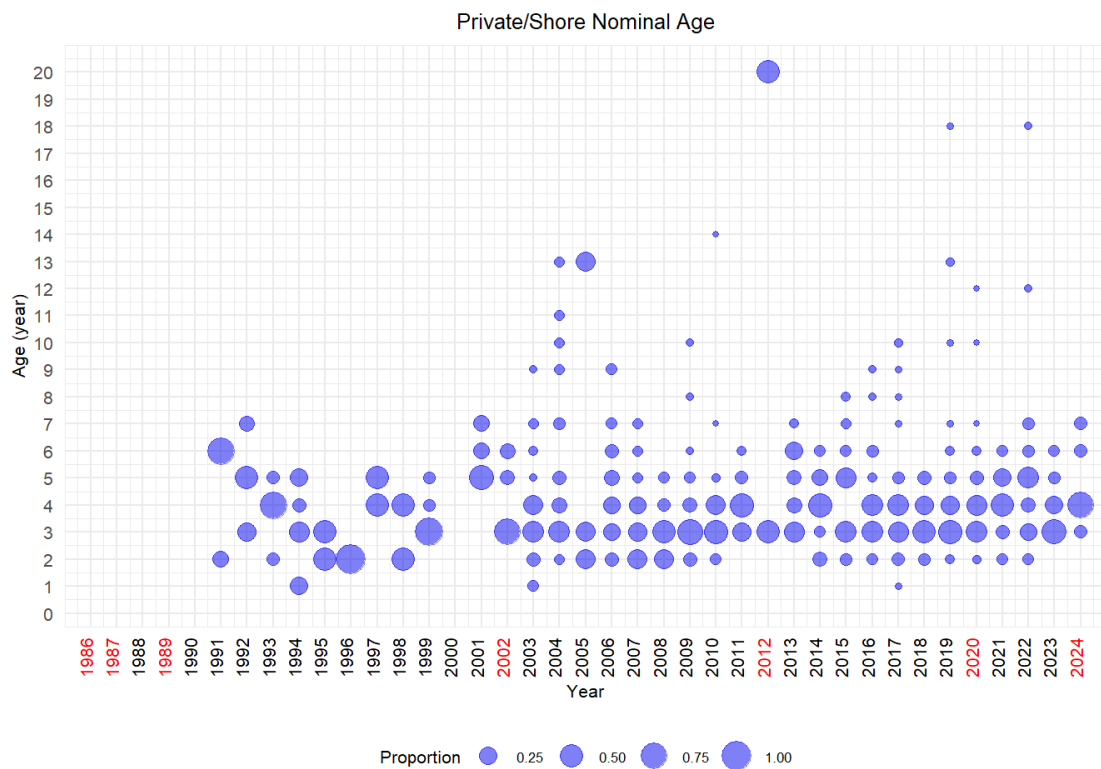


Figure 22. **Nominal age** bubble plot for Gag sampled from the **Private/Shore** fleet. Years in **red** do not meet the minimum sample size threshold of 10 fish sampled from 10 trips.



Figure 23. *Nominal and weighted age distributions of Gag sampled from the Charter fleet.*

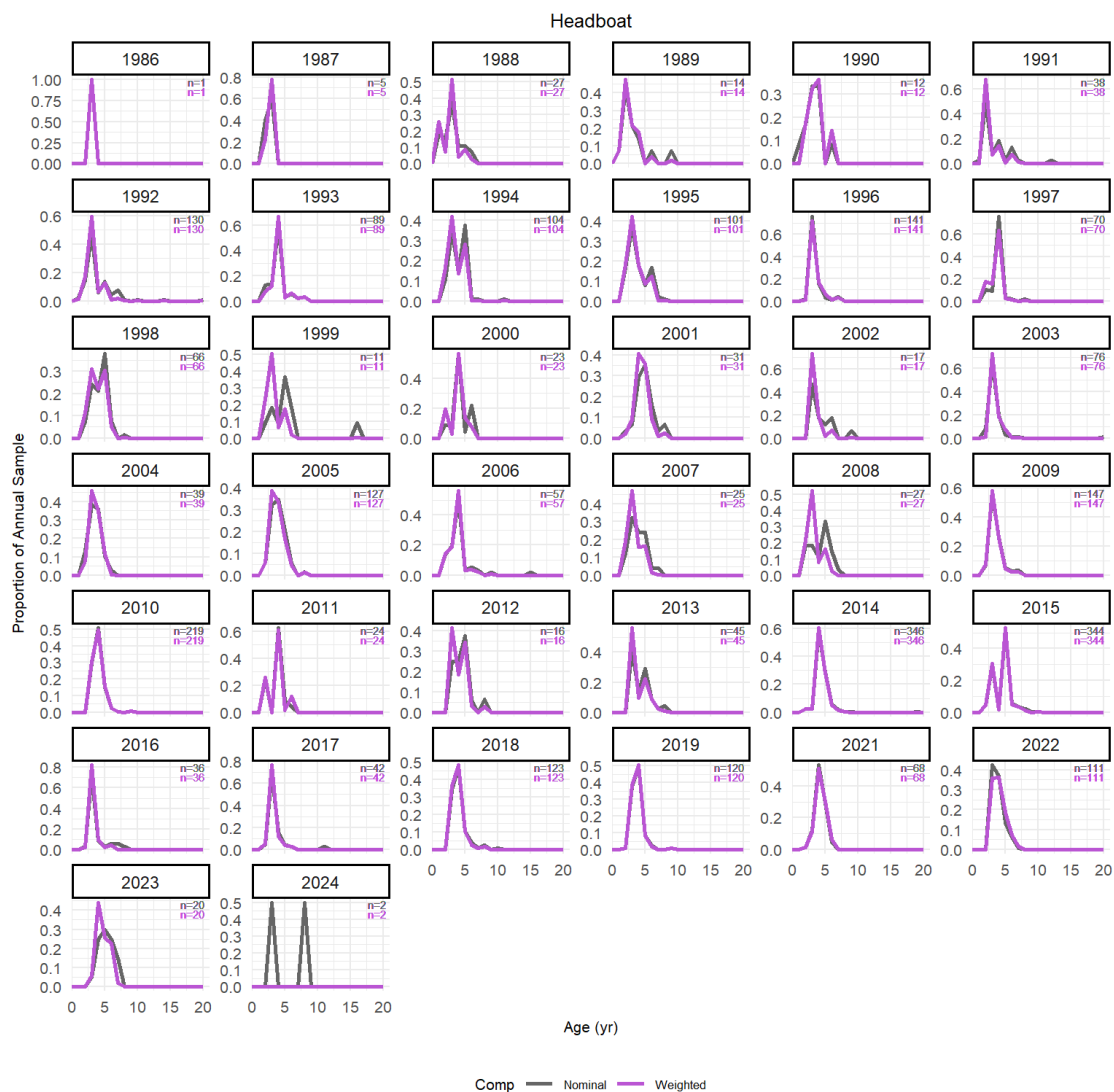


Figure 24. *Nominal and weighted age distributions of Gag sampled from the Headboat fleet.*

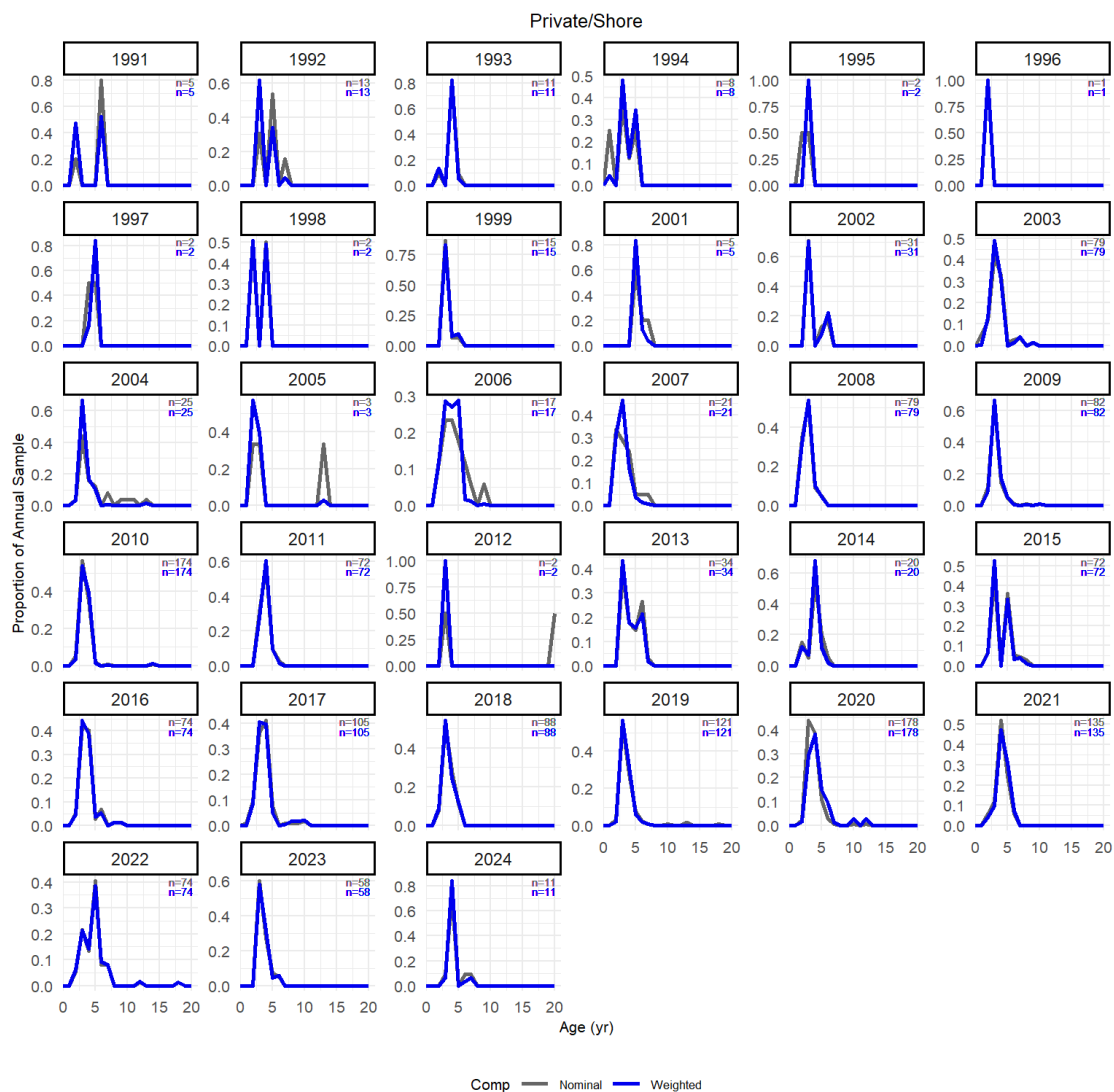


Figure 25. *Nominal and weighted age distributions of Gag sampled from the **Private/Shore** fleet.*

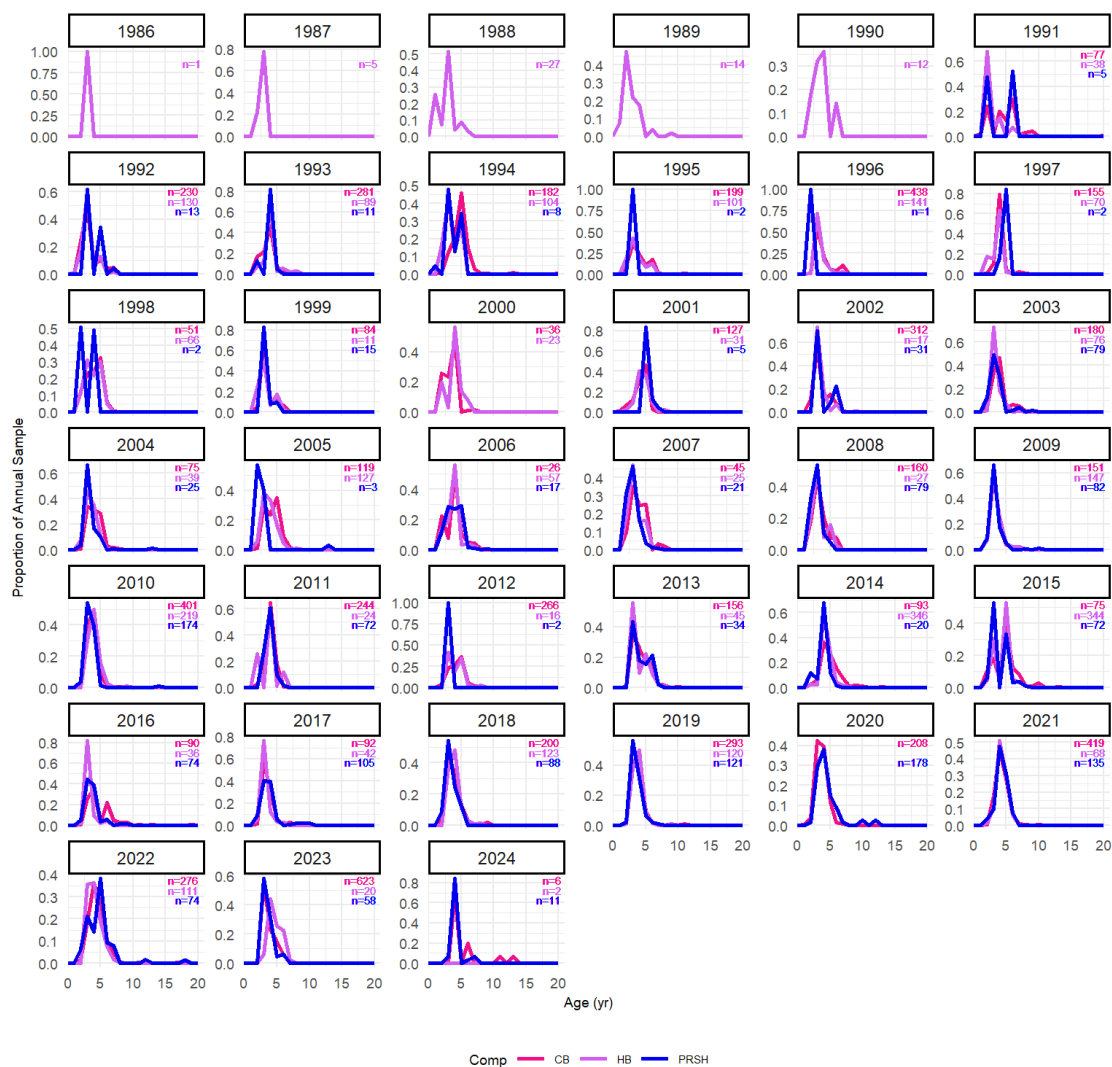


Figure 26. **Weighted age** distribution of Gag sampled from the Charter (CB), Headboat (HB), and Private/Shore (PRSH) fleets.

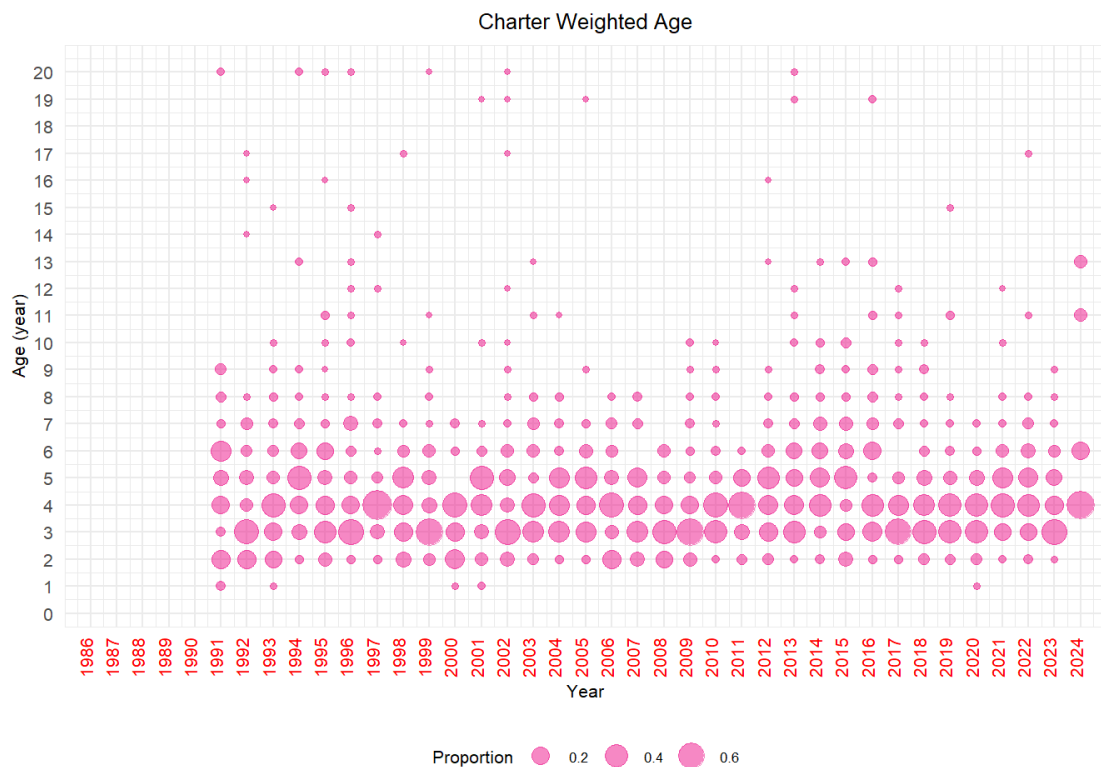


Figure 27. **Weighted age** bubble plot for Gag sampled from the **Charter** fleet. Years in **red** do not meet minimum sample size thresholds for their associated weighted length compositions and/or have an insufficient number of age samples.

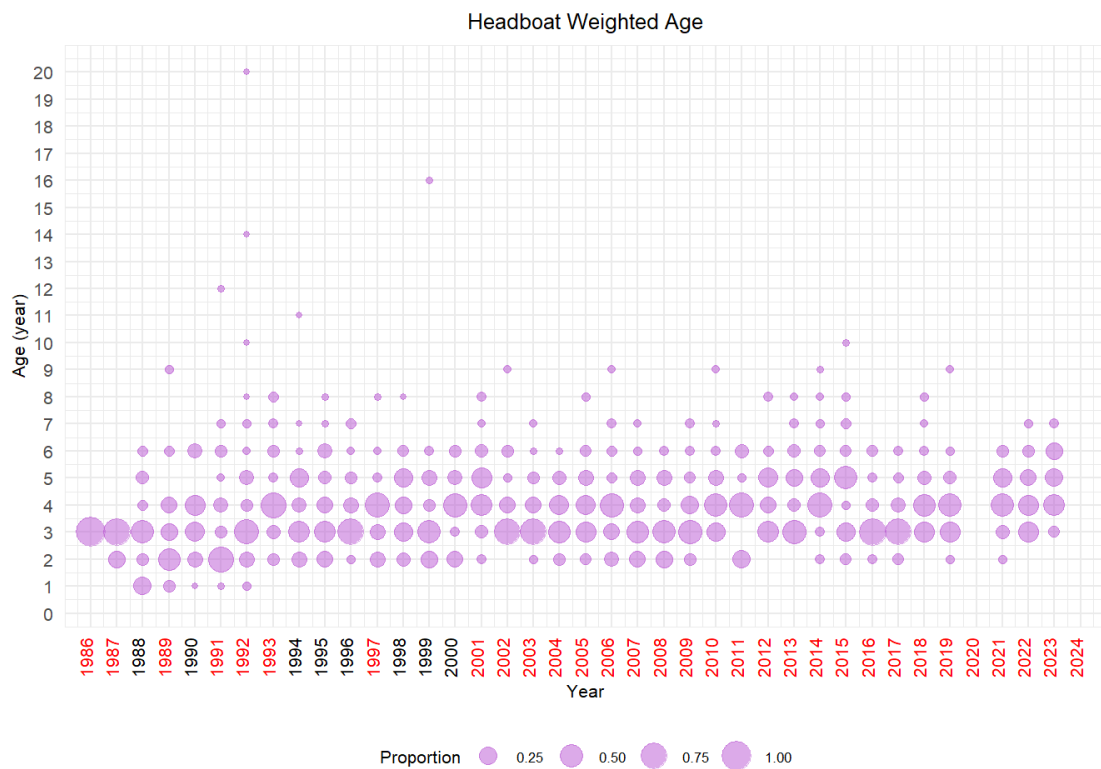


Figure 28. **Weighted age** bubble plot for Gag sampled from the **Headboat** fleet. Years in **red** do not meet minimum sample size thresholds for their associated weighted length compositions and/or have an insufficient number of age samples.

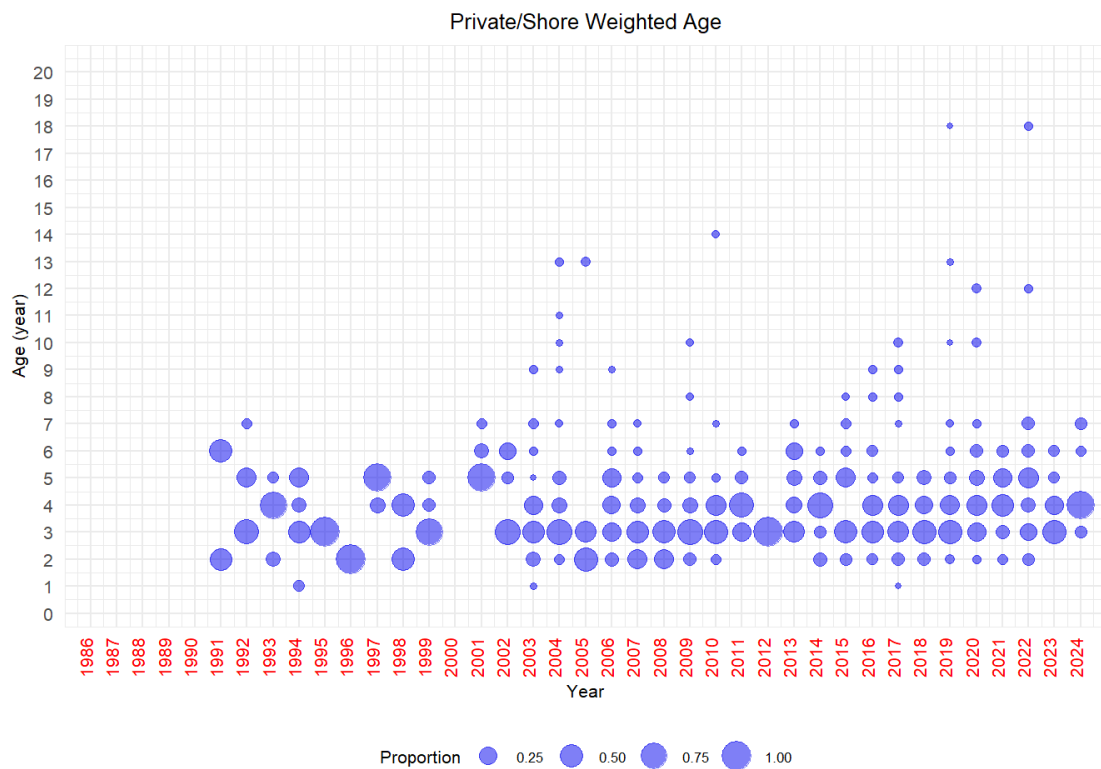


Figure 29. **Weighted age** bubble plot for Gag sampled from the **Private/Shore** fleet. Years in **red** do not meet minimum sample size thresholds for their associated weighted length compositions and/or have an insufficient number of age samples.

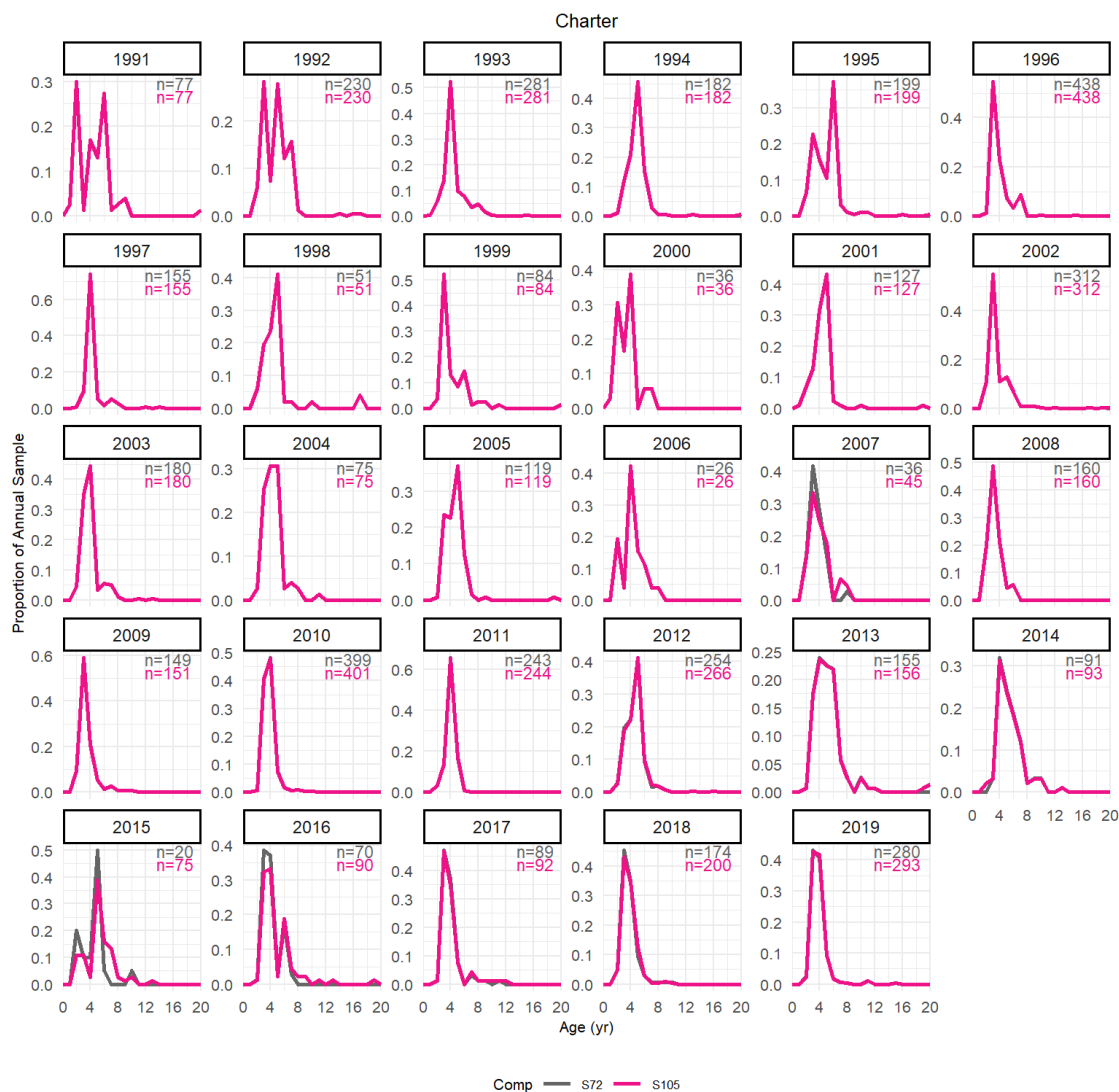


Figure 30. **Nominal age** distribution of Gag sampled from the **Charter** fleet for SEDAR 72 and SEDAR 105.

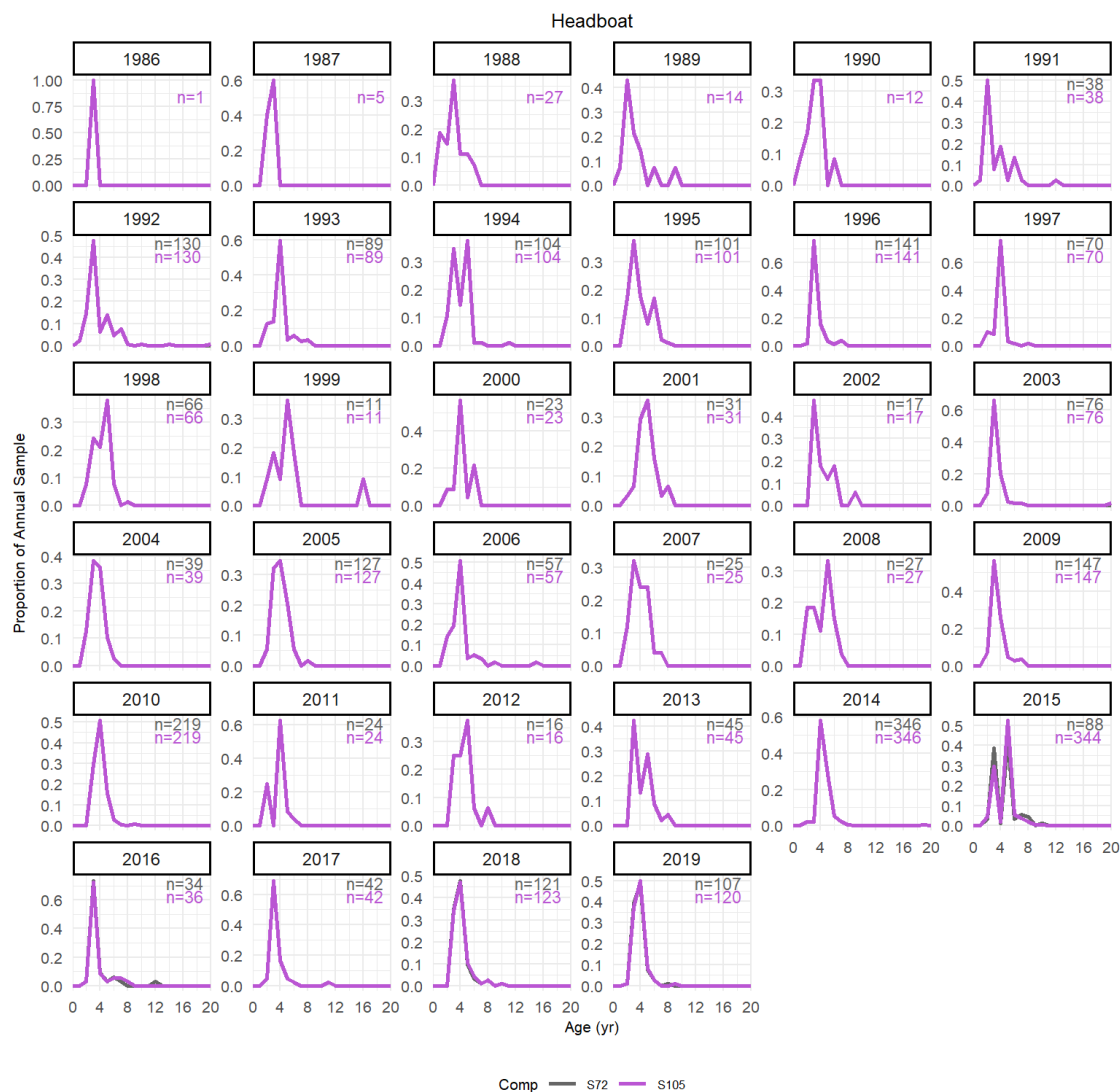


Figure 31. **Nominal age** distribution of Gag sampled from the **Headboat** fleet for SEDAR 72 and SEDAR 105.

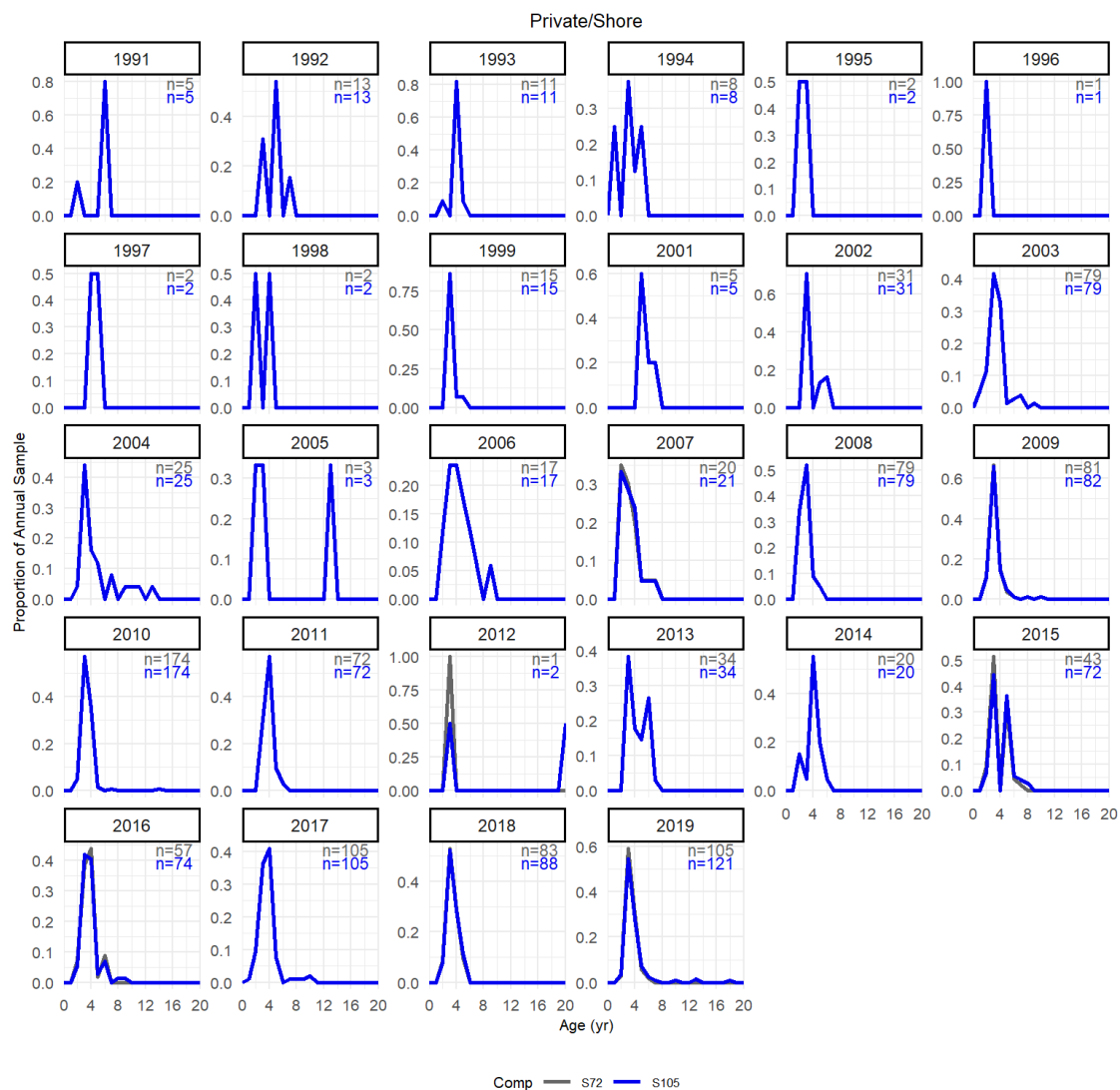


Figure 32. **Nominal age** distribution of Gag sampled from the **Private/Shore** fleet for SEDAR 72 and SEDAR 105.

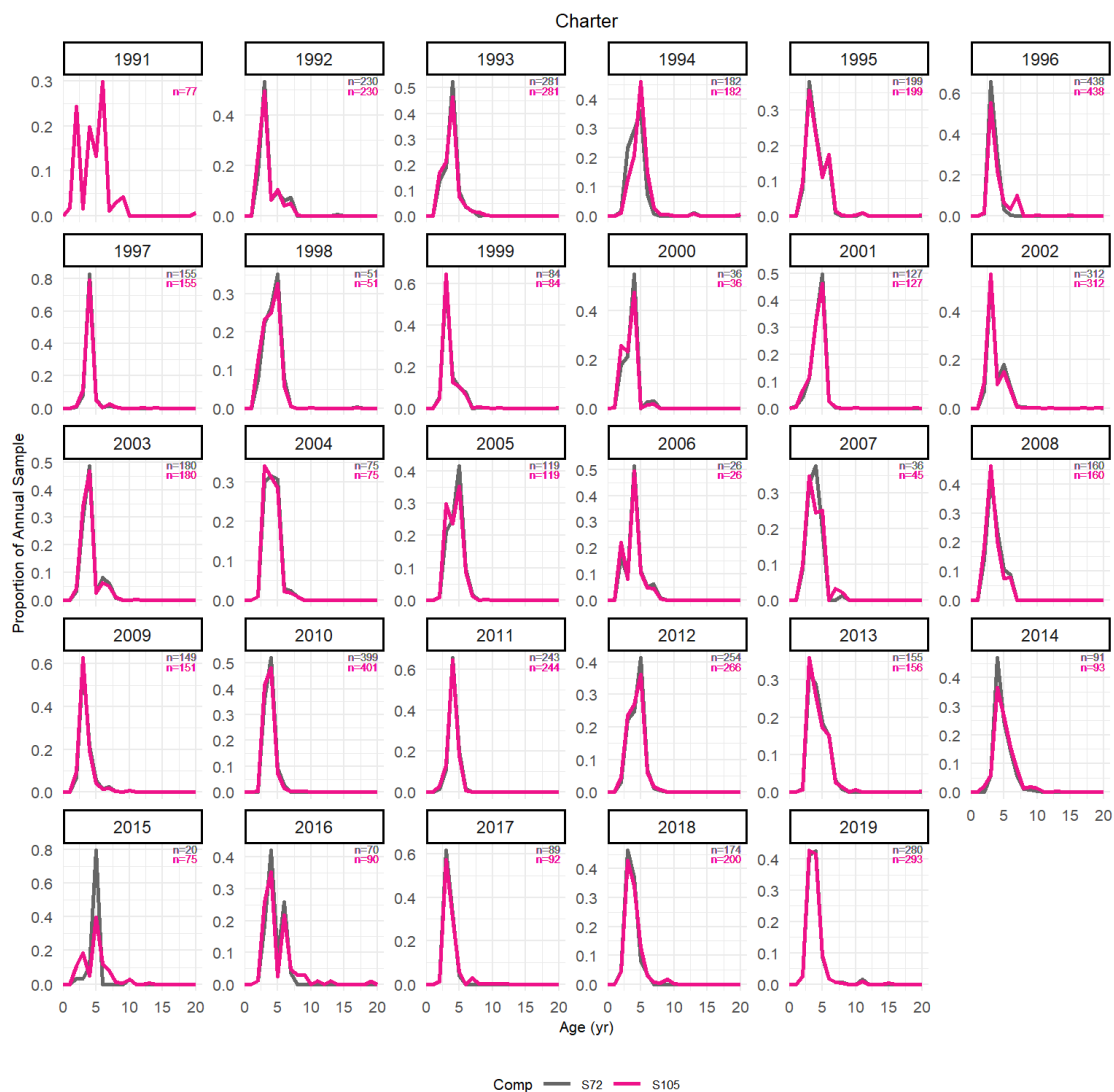


Figure 33. **Weighted age** distribution of Gag sampled from the **Charter** fleet for SEDAR 72 and SEDAR 105.

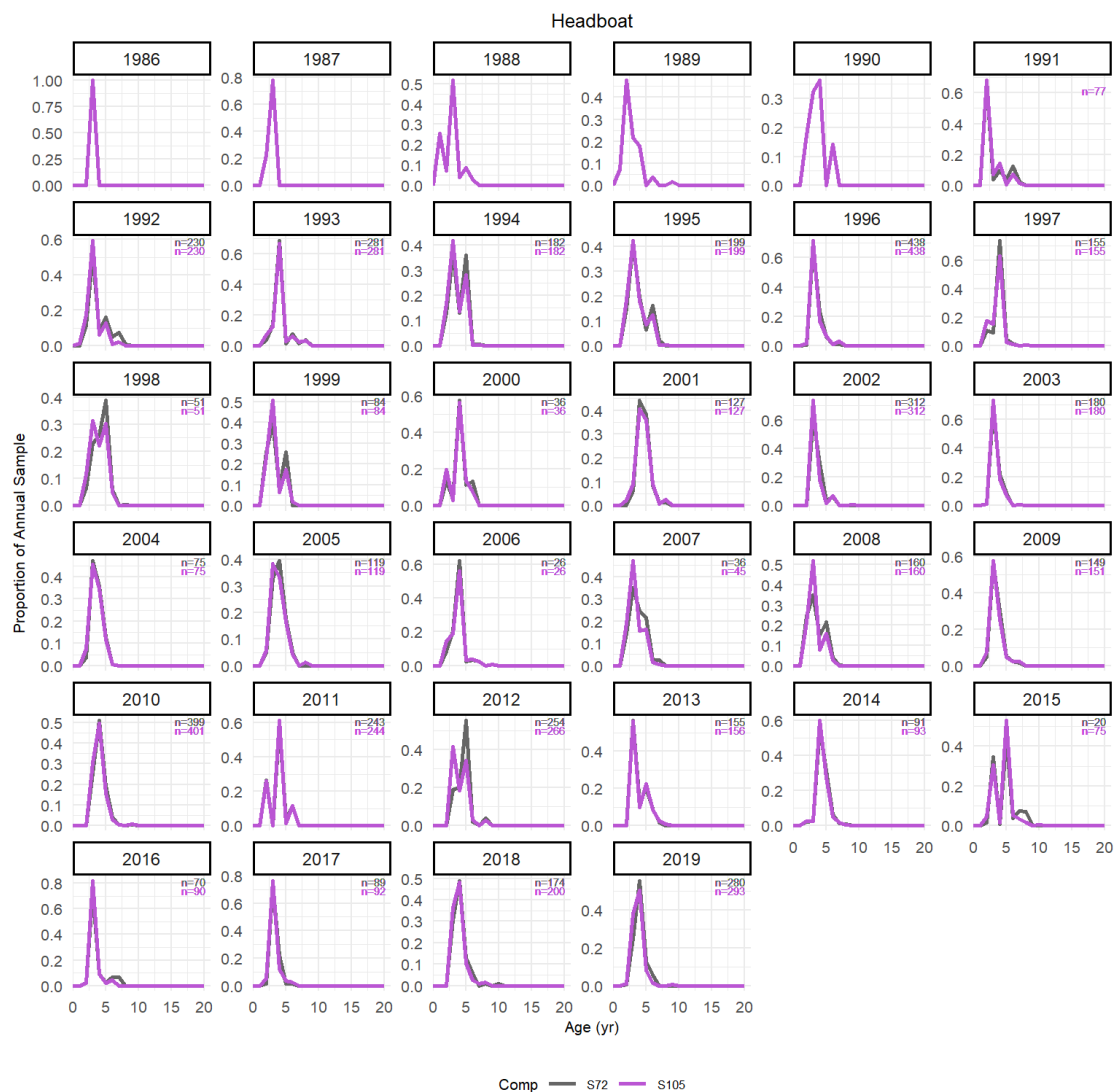


Figure 34. **Weighted age** distribution of Gag sampled from the **Headboat** fleet for SEDAR 72 and SEDAR 105.

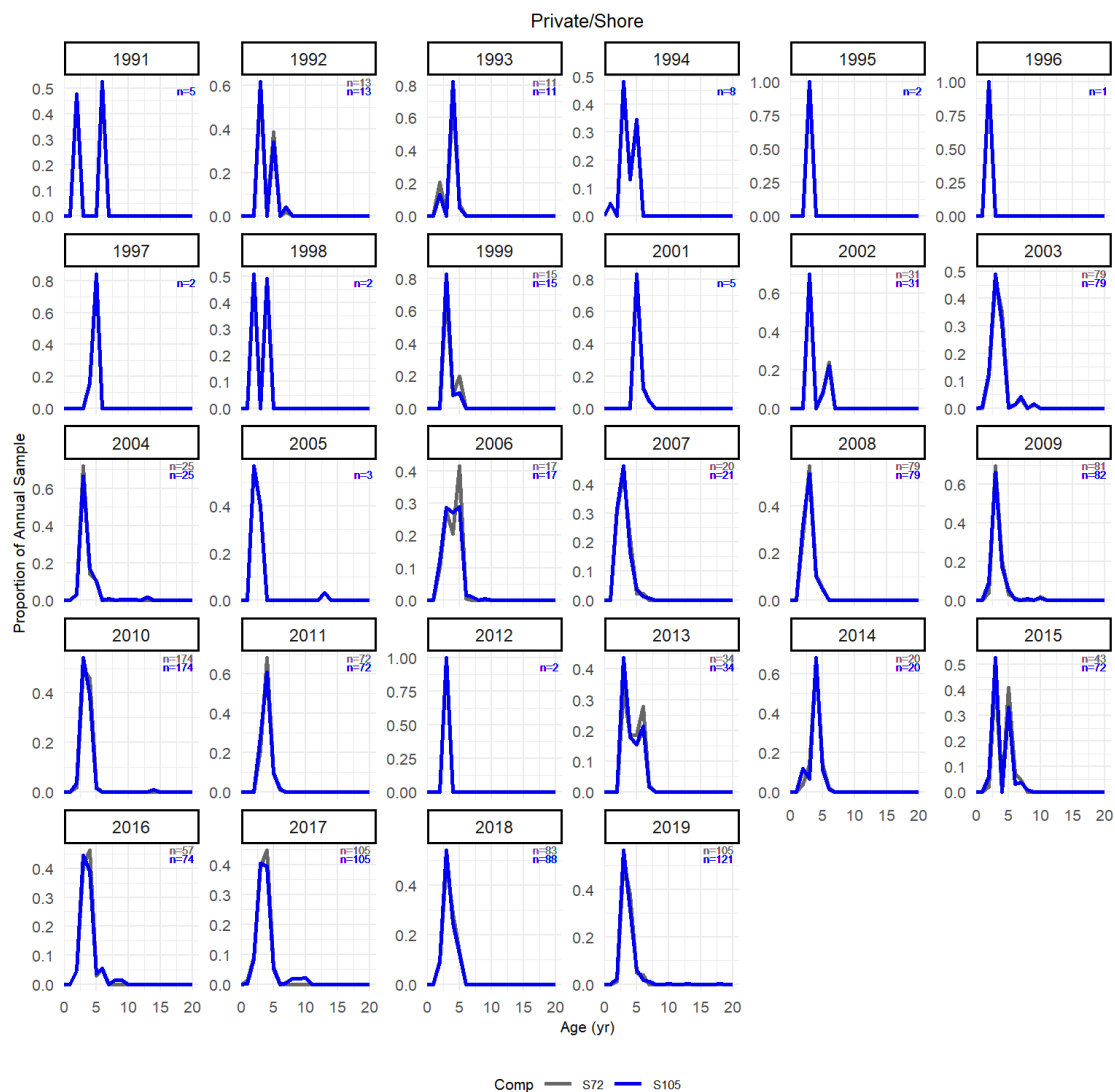


Figure 35. **Weighted age** distribution of Gag sampled from the **Private/Shore** fleet for SEDAR 72 and SEDAR 105.

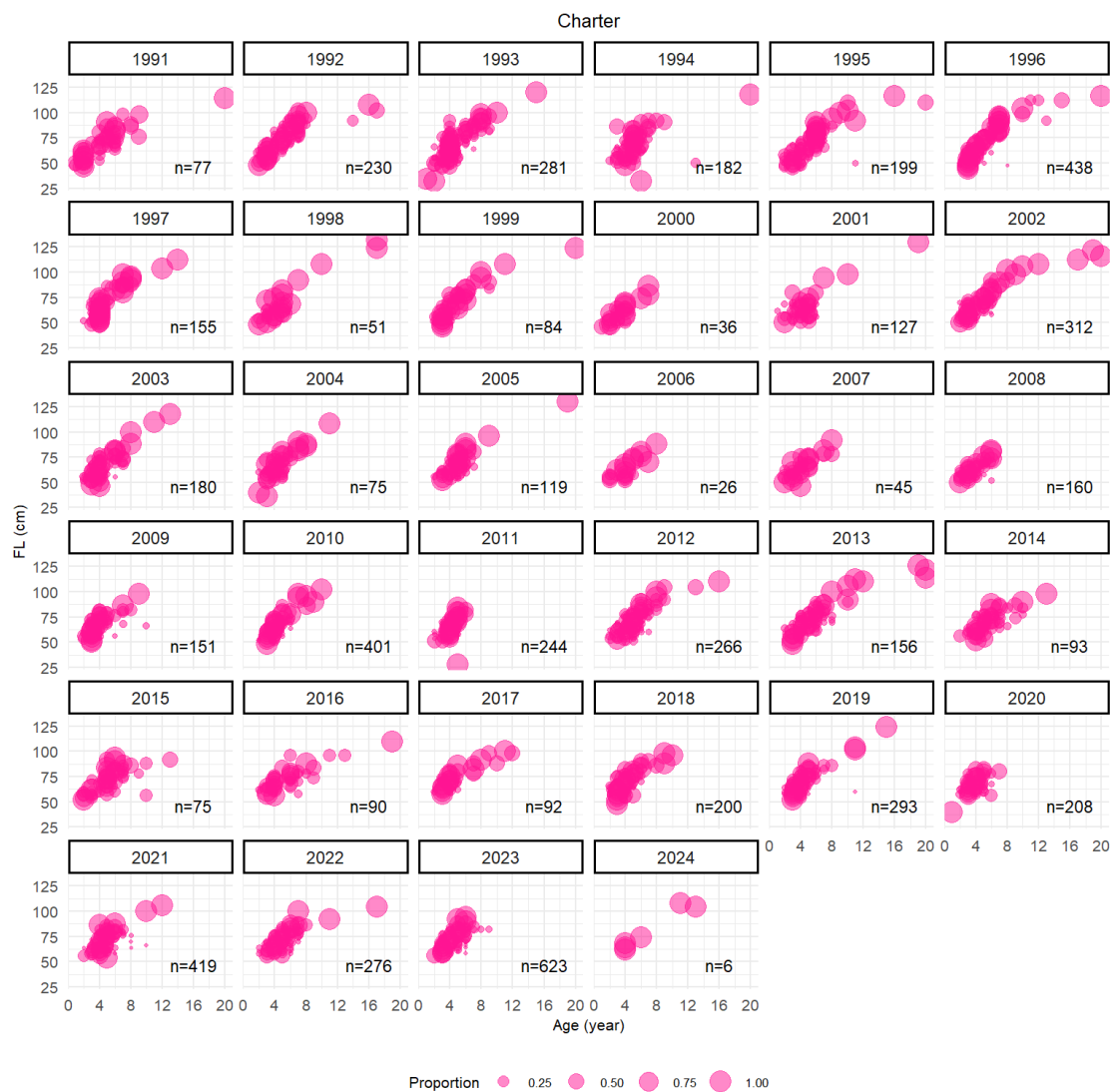


Figure 36. Conditional age-at-length (CAAL) for Gag sampled from the Charter fleet.

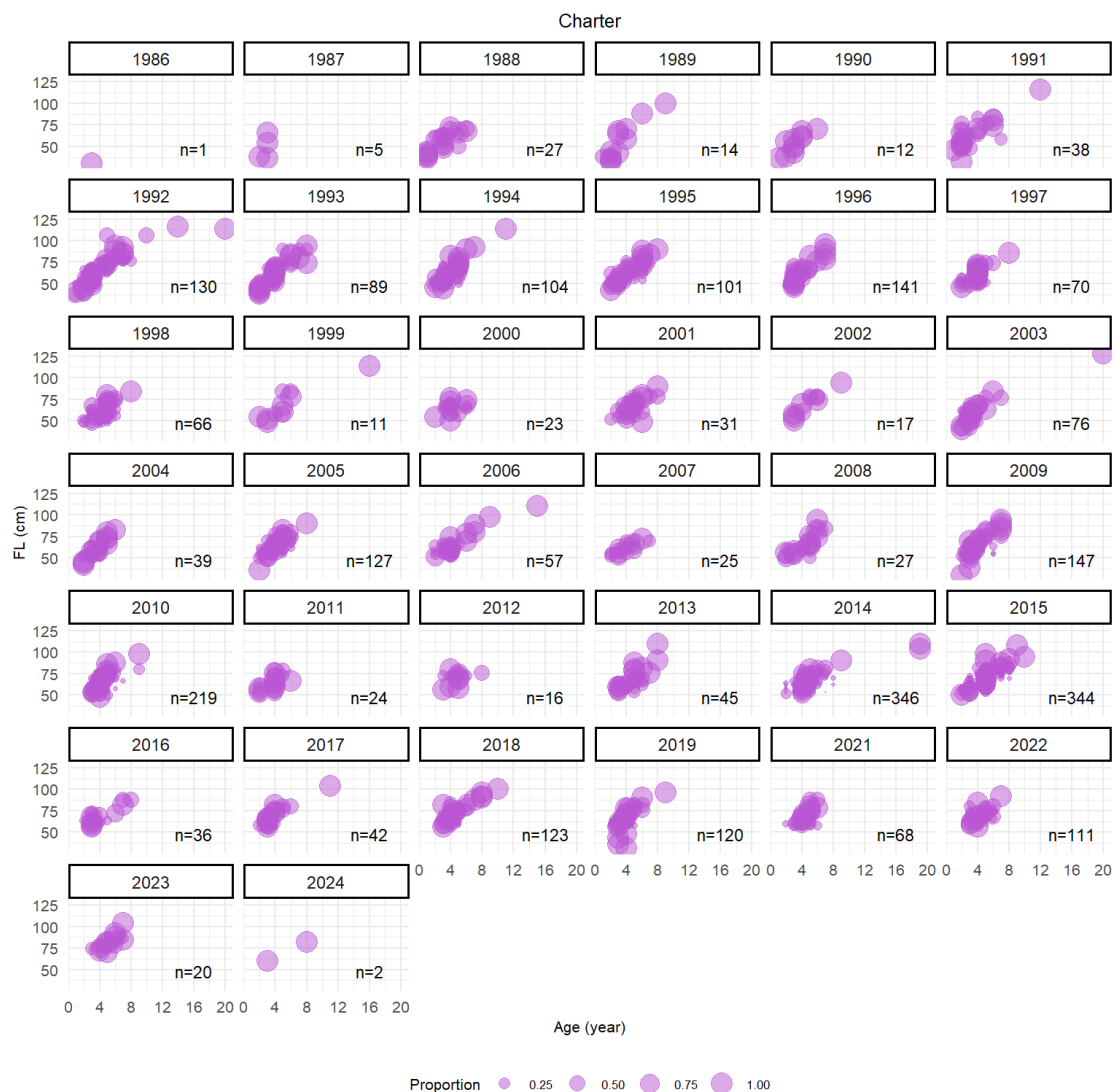
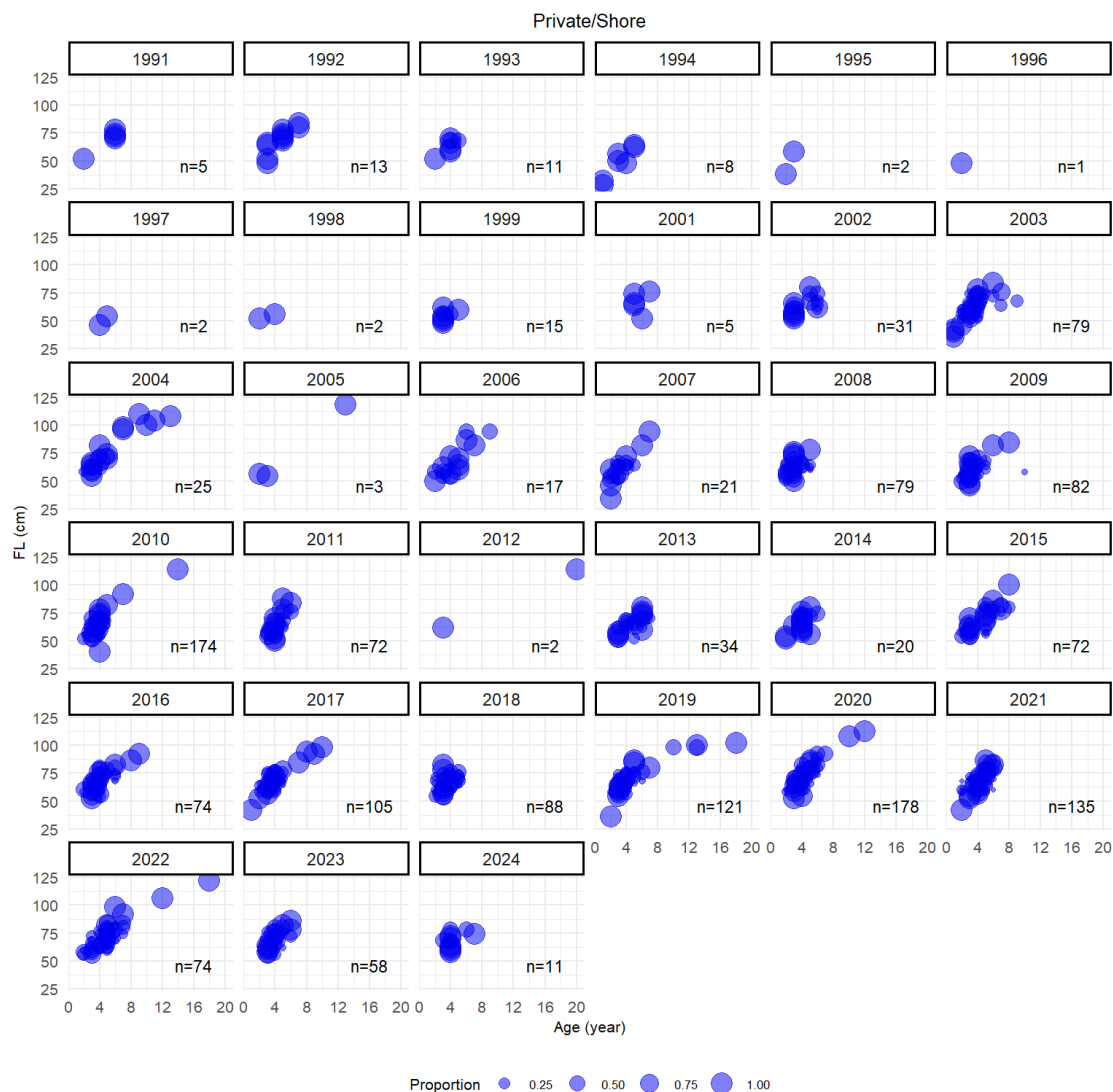


Figure 37. *Conditional age-at-length (CAAL) for Gag sampled from the Headboat fleet.*



*Figure 38. Conditional age-at-length (CAAL) for Gag sampled from the **Private/Shore** fleet.*

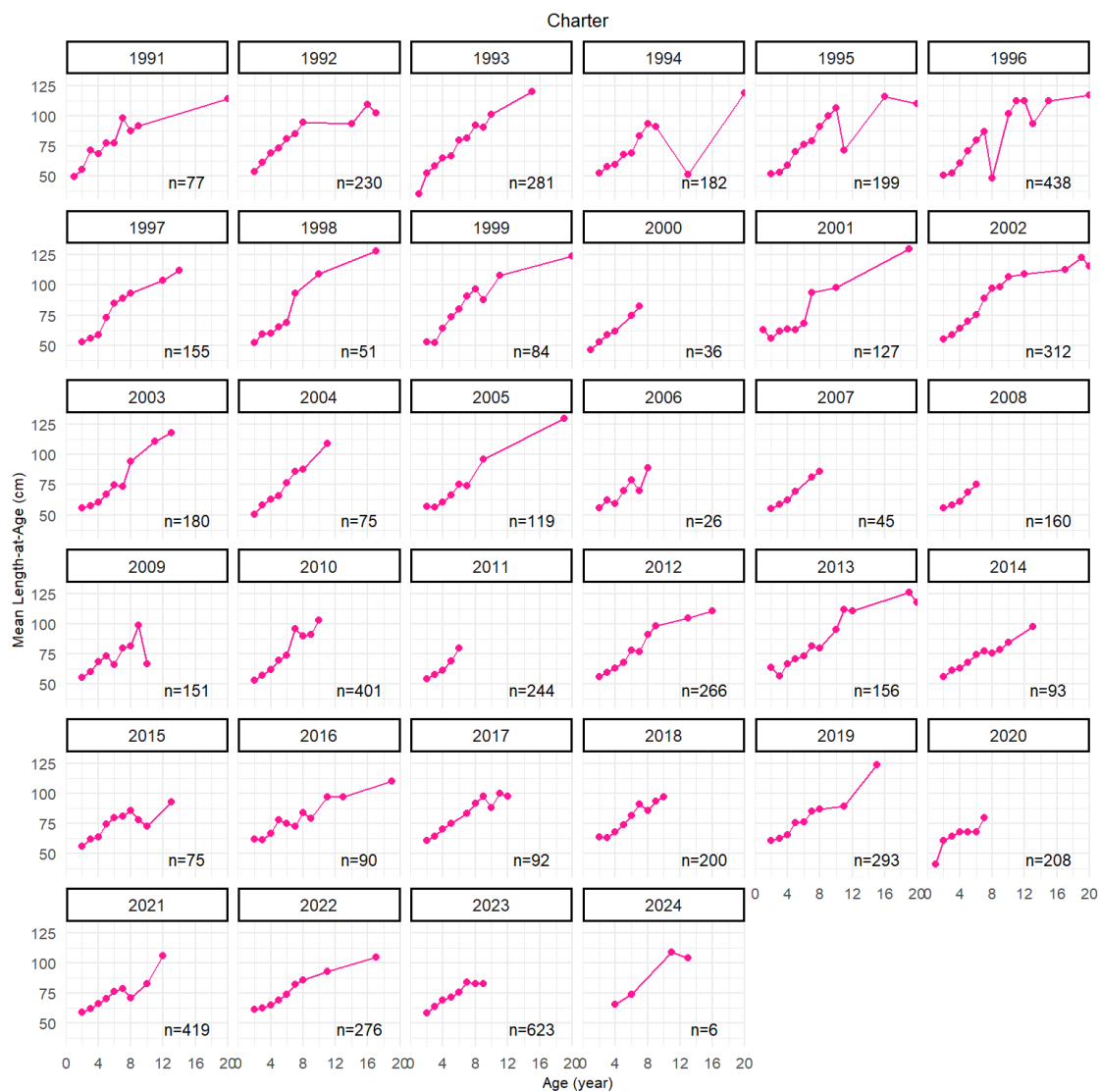


Figure 39. *Mean length-at-age (MLAA) of Gag sampled from the Charter fleet.*

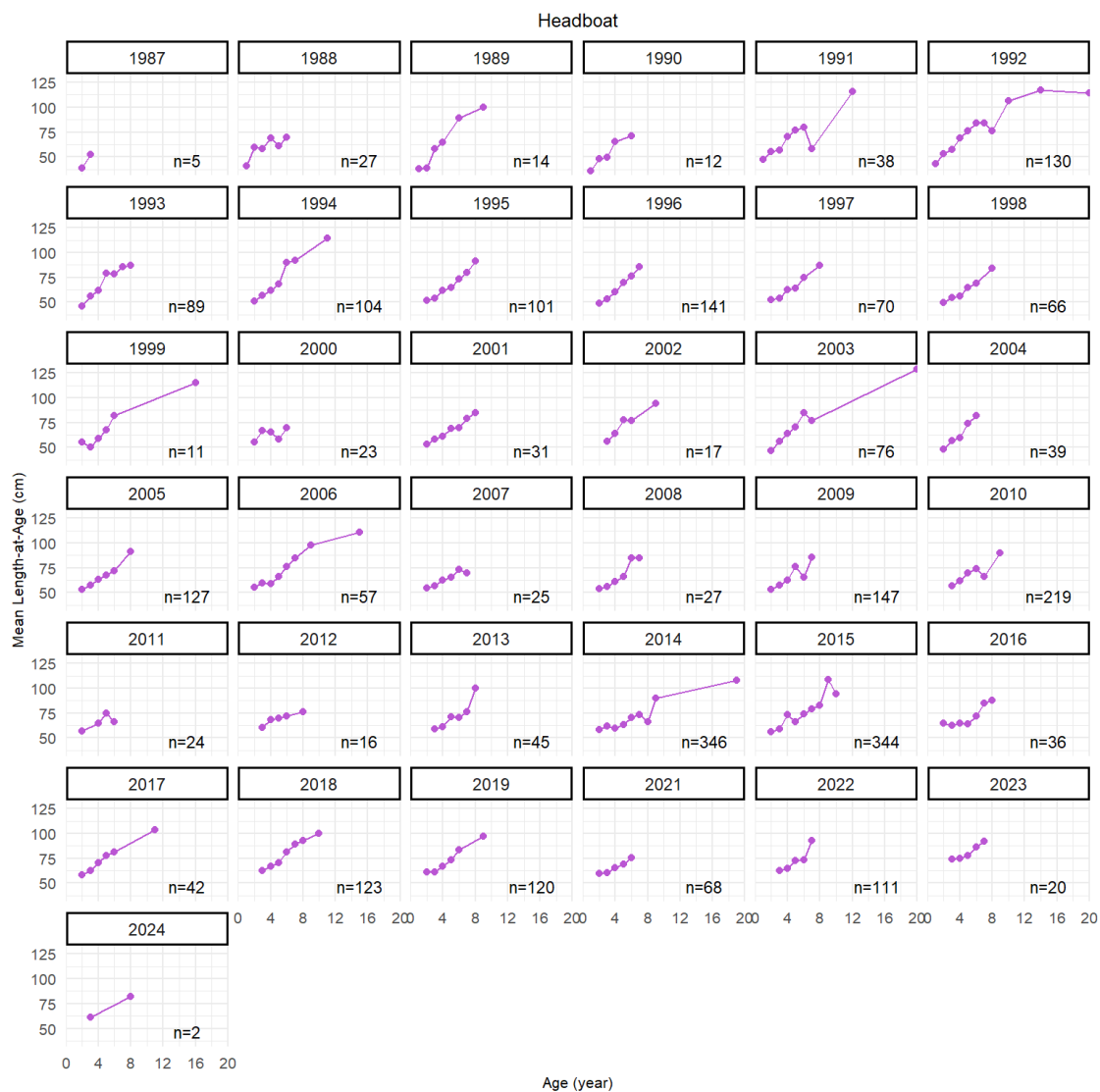


Figure 40. **Mean length-at-age (MLAA)** of Gag sampled from the **Headboat** fleet.

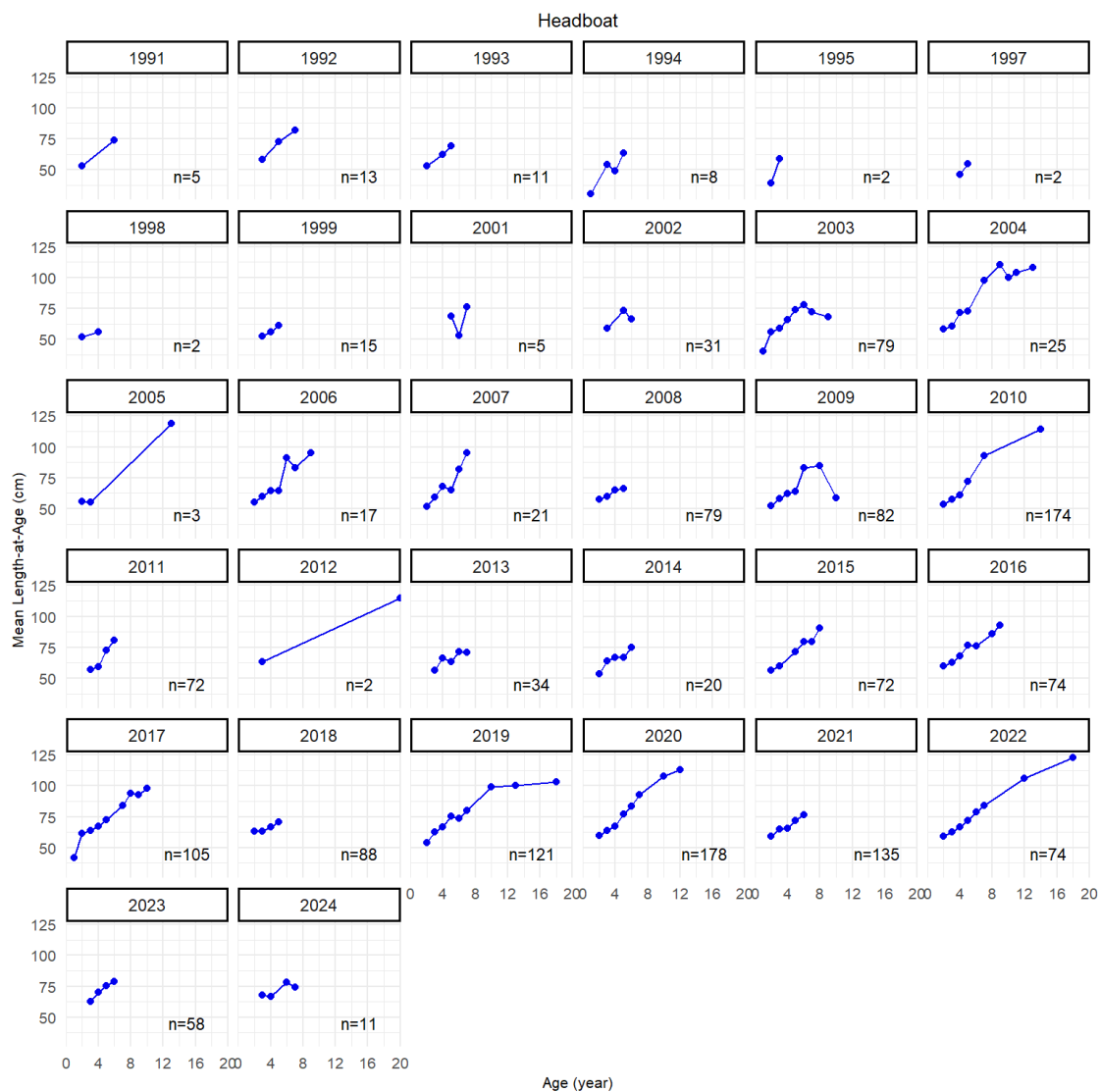


Figure 41. **Mean length-at-age (MLAA)** of Gag sampled from the **Headboat** fleet.

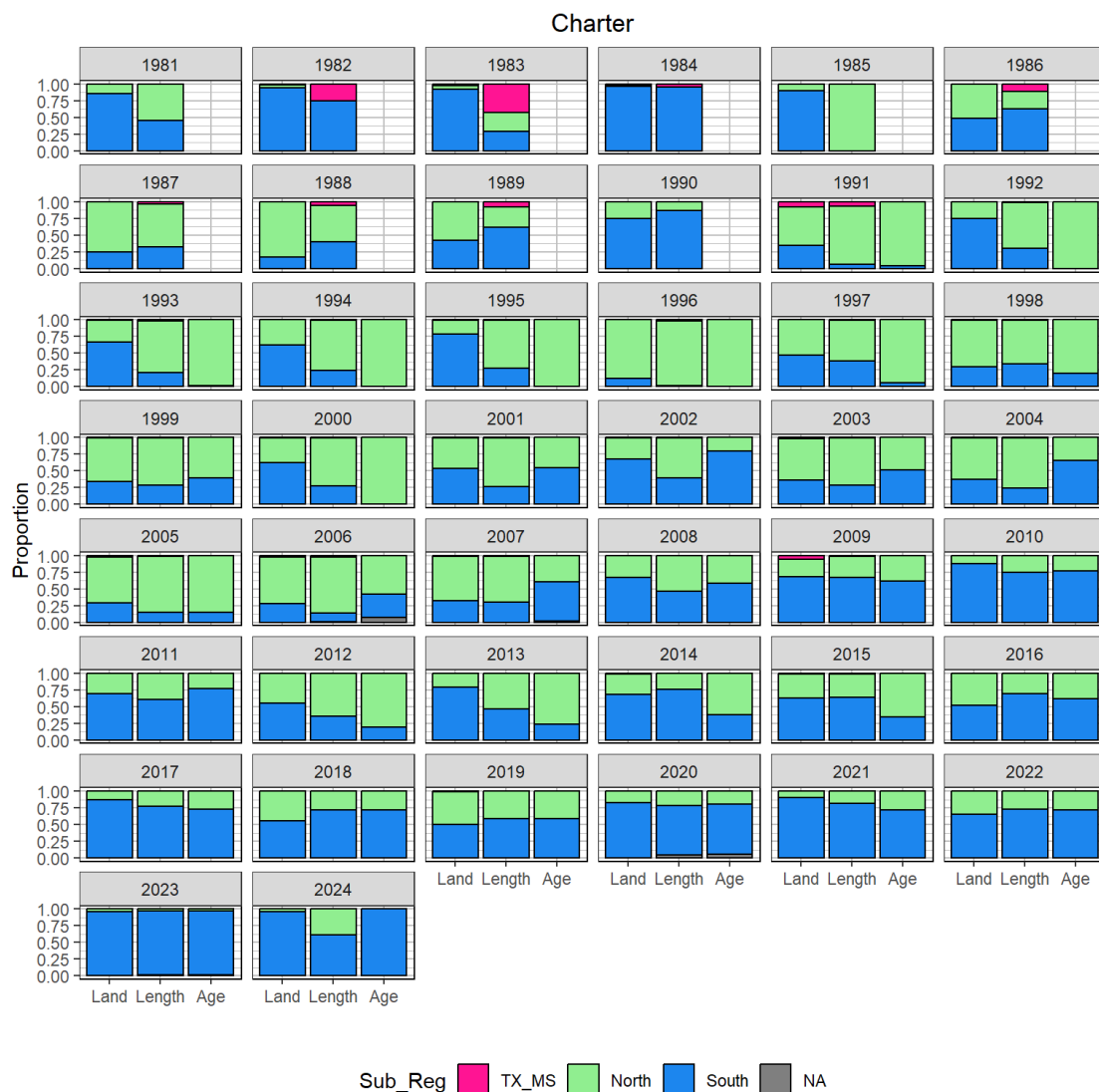


Figure 42. Proportions of landings, length samples, and age samples from the TX_MS (West), North, and South weighting subregions for Gag sampled from the **Charter** fleet. Samples labeled as NA are from Florida but did not contain any further spatial information that could be used to assign the sample to either North or South.

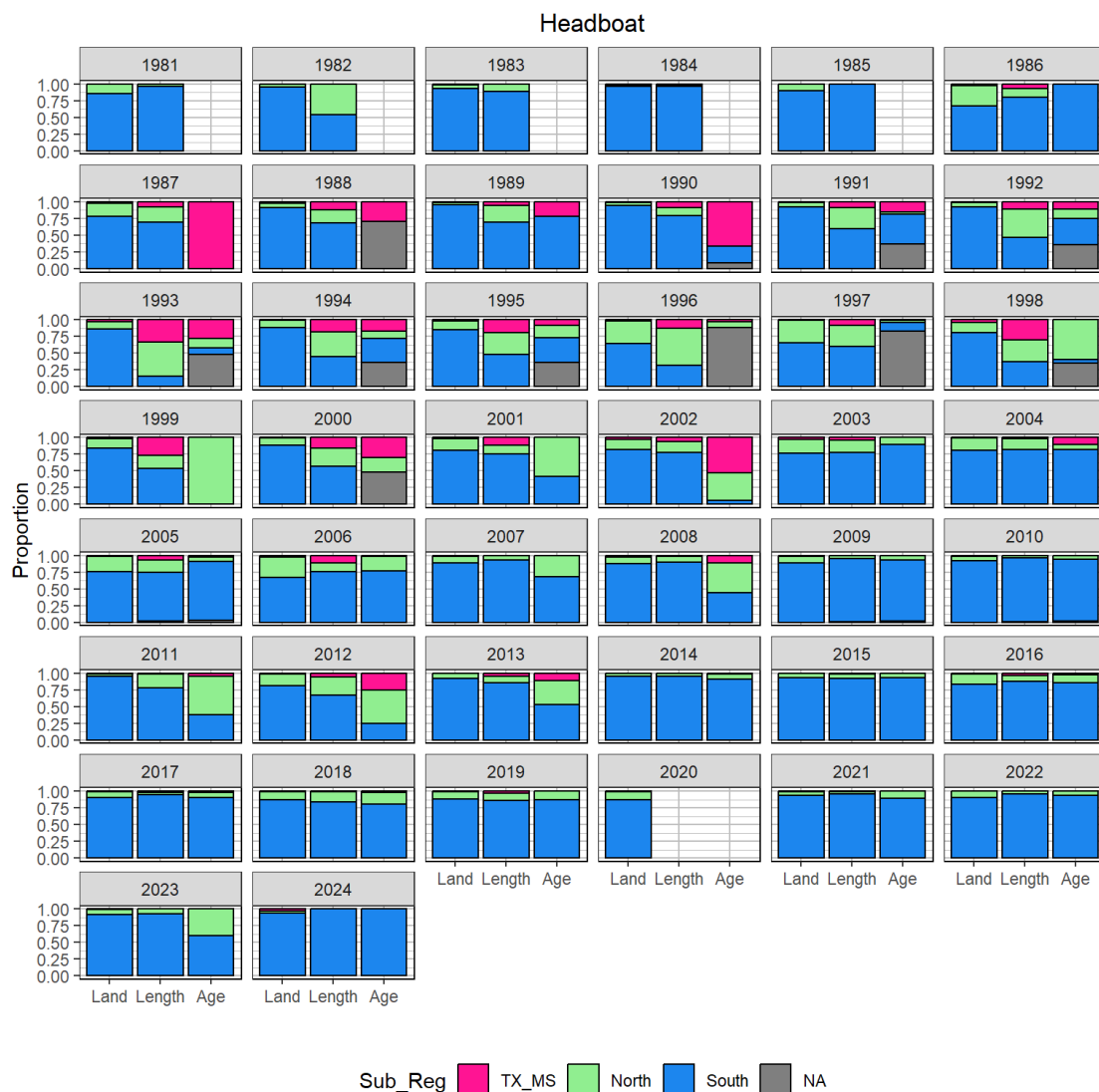
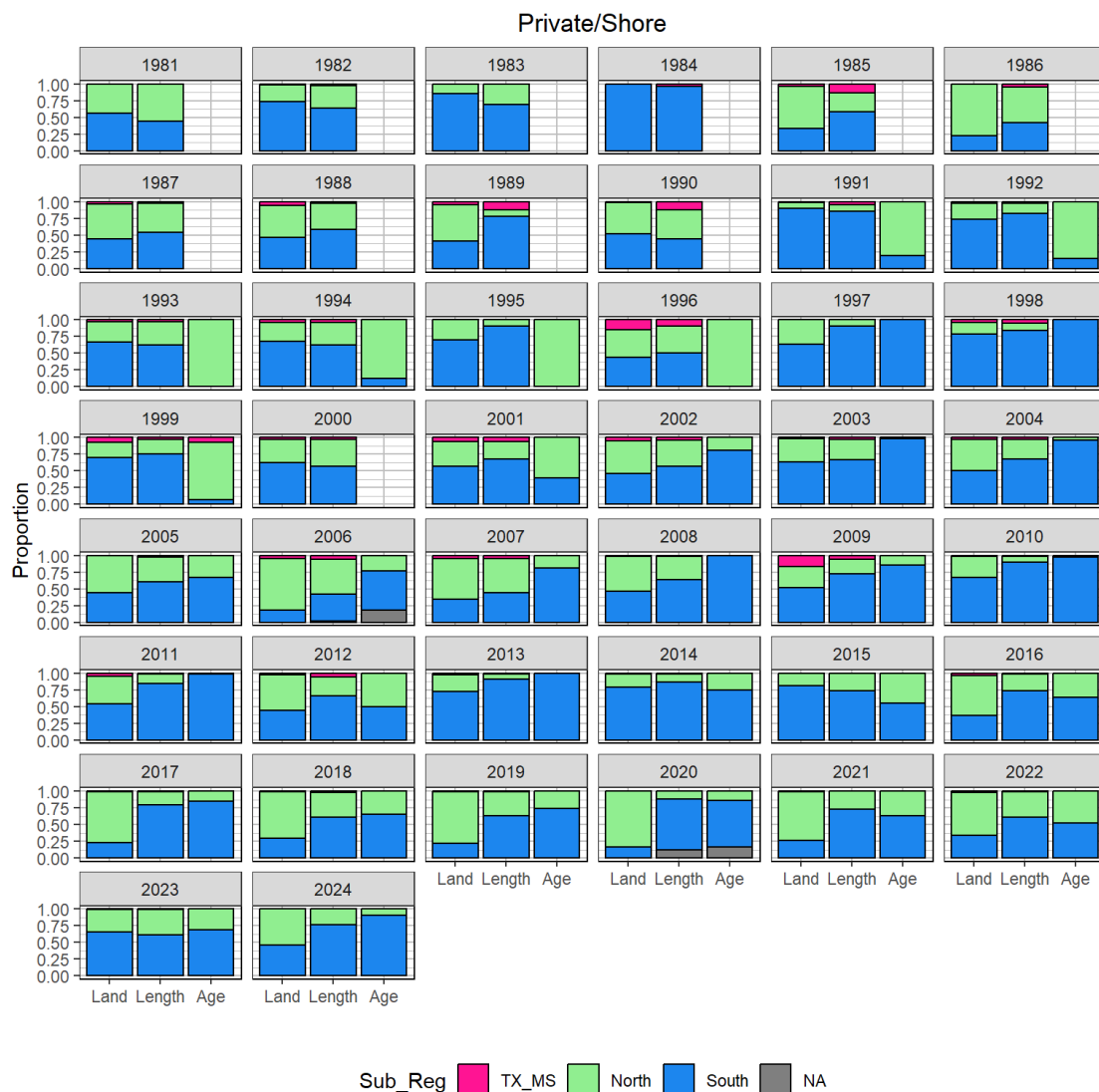


Figure 43. Proportions of landings, length samples, and age samples from the TX_MS (West), North, and South weighting subregions for Gag sampled from the **Headboat** fleet. Samples labeled as NA are from Florida but did not contain any further spatial information that could be used to assign the sample to either North or South.



*Figure 43. Proportions of landings, length samples, and age samples from the TX_MS (West), North, and South weighting subregions for Gag sampled from the **Private/Shore** fleet. Samples labeled as NA are from Florida but did not contain any further spatial information that could be used to assign the sample to either North or South.*