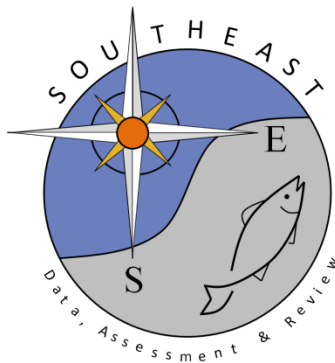South Atlantic Red Grouper (Epinephelus morio) length and age
compositions from the recreational fishery.

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SEDAR86-WP06

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South Atlantic Red Grouper (*Epinephelus morio*) length and age compositions from the recreational fishery.

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Introduction

This document outlines the data and methodologies used to estimate length and age compositions of recreational landings for the SEDAR 86 Red Grouper (*Epinephelus morio*) assessment. These compositions were developed using two data sources approved in SEDAR 53 (MRIP, SRHS) and one additional data source (FWRI) that was not available in SEDAR 53.

Data Description

SEDAR 86 assesses all South Atlantic Red Grouper in federal waters extending from North Carolina south to the east coast of Florida (including Monroe County). Recreational length and age compositions were calculated at two different spatial scales. First, compositions were calculated where all states in the South Atlantic (NC, SC, GA, and FL) were treated as a single region. Next, the South Atlantic was split into two regions: NCSC and GAFL and recreational length and age compositions were then calculated for each region.

Marine Recreational Information Program (MRIP) Biological Sampling

MRIP (formally known as the Marine Recreational Fishing Statistics Survey, MRFSS) began in March 1981. 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 South Atlantic, APAIS samples recreational fishers from private, shore, and charterboat modes. APAIS sampling was temporarily suspending 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.

Southeast Regional Headboat Survey (SRHS) Biological Sampling

The SRHS program began in North Carolina and South Carolina in 1972. Only North Carolina and South Carolina were sampled from 1972-1975. In 1976, the survey expanded southward to include Georgia and northeast Florida (Nassau-Indian River counties). In 1978, the survey was further expanded to include southeast Florida (St. Lucie-Monroe

counties; Fitzpatrick et al. 2017). Biological samples (e.g. length, weight, and otoltihs) 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 safety measures were approved (Cheshire et al. 2023).

Florida Fish and Wildlife Research Institute (FWRI)

A small number of length samples (n=157) were provided from three FWRI sampling programs: At-Sea Observer (FWRI-OBS), MARFIN, and State Reef Fish Survey (SRFS). The FWRI-OBS program began in 2015 and fishery observers collect biological information on catch and regulatory discards from headboat and charterboat modes. MARFIN is a randomized survey used to collect biological data from private and charterboat fishing modes from 2015-2017. SRFS began in July 2020 on the east coast of Florida. Biological data from reef fish species harvested from private recreational anglers are collected as part of the dockside intercept component of the SRHS program (Cermak, pers comm 2023). The majority of samples from FWRI are from the headboat mode (n=120).

Fleet Structure

Two recreational fishing fleets, headboat (HB) and general recreational (GR) were defined. The HB fleet only contains fish from the headboat mode. The GR fleet combines fish sampled from both private and charterboat modes. As done in SEDAR 53, fish sampled from the shore mode were excluded from these analyses. From the shore mode, very few Red Grouper were sampled for length (n=22) and none were sampled for age.

Length Compositions of Recreational Landings

Nominal length compositions were calculated for each fleet and for the different region classifications (South Atlantic and two-region: NCSC, and GAFL). Weighted length compositions were only calculated for the South Atlantic Region. Weighted length compositions were not calculated for the two-region spatial classification for the Gen Rec fleet, because only FL had enough samples for weighting. For the Headboat fleet, landings for GA and north FL are combined because of confidentiality reasons. Length compositions could not be weighted by state (GA, FL) since the landings are combined and not available at the state-level.

Fish were assigned to 3 cm bins with bins ranging from 16 cm - 118 cm. The label represents the midpoint value of the bin. Fishery-dependent sampling is typically opportunistic and sampled lengths may not be representative of the true landings composition of recreational Red Grouper in the South Atlantic. Possible sampling bias in the collection of length samples are typically removed by weighting the length compositions with the associated landings on the finest spatial and temporal scales available without losing data. For the South Atlantic compositions, NC and SC were combined into a subregion while GA and FL were combined into a separate subregion for weighting. Proportions of annual landings from each subregion were used to weight the subregional length compositions which were then summed and normalized.

Nominal length compositions are only presented if there were a minimum of 30 fish per year were sampled for length. For weighted length compositions, only sub-regions with a minimum of 30 fish per year were retained.

For the entire South Atlantic region, the length distributions of fish sampled from the GR and HB fleets were similar most years (Fig. 1). Weighting had little impact on the length compositions and the nominal and weighted length compositions for both GR (Fig. 2) and HB (Fig. 3) were similar.

For most years, the South Atlantic and two-region (NCSC and GAFL) nominal length compositions were similar for the GR fleet. (Fig. 4) There were multiple years for the HB fleet where the nominal length compositions for GAFL had smaller modes than for NCSC (Fig. 5).

Age Compositions of Recreational Landings

For all spatial regions (South Atlantic, NCSC, and GAFL) nominal and weighted age compositions were calculated for each fleet. 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, length bin j, and subregion r and corrects the composition of the age data to more closely represent the final length composition of landings. The reweighting factor $RW_{i,j,r}$ is calculated as

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

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

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

where all length bins j within age class k were summed and then rescaled to sum to 1 across each year. The weighting procedure differed slightly for the South Atlantic versus NCSC and GAFL weighted age compositions. For the South Atlantic weighted age compositions, $LC_{i,j,r}$ is the weighted length composition and for NCSC and GAFL it is the nominal length composition.

Nominal age compositions are only presented if there were a minimum of 10 fish per year sampled for age. For weighted age compositions, only subregions with a minimum of 10 fish per year were retained.

The method to calculate final ages differs in this SEDAR versus the approached using in SEDAR 53. In SEDAR 53 ages were based on increment counts, while final ages in SEDAR 86 were based on calendar age (Potts, pers comm 2023).

For the GR fleet, the length distribution from the size-only and age data are very similar from 2011-2015. Starting in 2016, more differences in the length distributions from the two data sets become more apparent and for several years, fish sampled for ages were smaller and had a narrower length distribution than fish sampled only for size (Fig. 6). For the HB fleet, there were several years where the length distributions are comparable between fish sampled only for size and fish sampled for ages. However, when there are differences, the fish sampled for ages typically have a much narrower length distribution than fish sampled only for sizes (Fig. 7). Sampled fish ranged in age from 1-27 years and the majority of fish from both fleets were less than 6 years old (Fig. 8). For the HB fleet, the mode age of fish in NCSC was generally older than fish sampled in GAFL (Fig. 9). Similar to the length compositions, weighting did not have much of an affect on the age compositions and the nominal and weighted age compositions are similar for both fleets when the data was aggregated at the South Atlantic regional level (Figs. 10&11) and as separate NCSC and GAFL regions (Fig. 12&13).

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Tables

Table 1: Number of fish (f) and trips (t) with length samples collected from the Gen Rec (g; combined private and charterboat modes) and Headboat (h) fleets. f.g = the total number of measured fish from GR, t.g = the total number of trips where a fish was measured from GR, f.h = the total number of measured fish from HB, and t.h = the total number of trips where a fish was measured from HB.

Year	f.NCg	t.NCg	f.SCg	t.SCg	f.GAg	t.GAg	f.FLg	t.FLg	f.g	t.g	f.NCh	t.NCh	f.SCh	t.SCh	f.GAh	t.GAh	f.FLh	t.FLh	f.h	t.h
1972	0	0	0	0	0	0	0	0	0	0	7	6	5	5	0	0	0	0	12	11
1973	0	0	0	0	0	0	0	0	0	0	9	8	1	1	0	0	0	0	10	9
1974	0	0	0	0	0	0	0	0	0	0	12	7	2	2	0	0	0	0	14	9
1975	0	0	0	0	0	0	0	0	0	0	21	17	6	2	0	0	0	0	27	19
1976	0	0	0	0	0	0	0	0	0	0	20	17	6	5	0	0	37	18	63	40
1977	0	0	0	0	0	0	0	0	0	0	21	15	0	0	0	0	90	53	111	68
1978	0	0	0	0	0	0	0	0	0	0	11	9	1	1	0	0	79	45	91	55
1979	0	0	0	0	0	0	0	0	0	0	20	11	0	0	0	0	137	77	157	88
1980	0	0	0	0	0	0	0	0	0	0	27	19	1	1	0	0	147	89	175	109
1981	0	0	0	0	0	0	0	0	19	13	19	11	0	0	0	0	204	130	223	141
1982	0	0	0	0	0	0	0	0	27	12	30	19	0	0	0	0	241	139	271	158
1983	0	0	0	0	0	0	0	0	20	8	24	14	1	1	0	0	351	205	376	220
1984	0	0	0	0	0	0	0	0	19	13	15	12	1	1	0	0	562	273	578	286
1985	0	0	0	0	0	0	0	0	8	6	11	9	0	0	0	0	559	238	570	247
1986	0	0	0	0	0	0	0	0	29	16	10	10	0	0	0	0	367	188	377	198

Year	f.NCg	t.NCg	f.SCg	t.SCg	f.GAg	t.GAg	f.FLg	t.FLg	f.g	t.g	f.NCh	t.NCh	f.SCh	t.SCh	f.GAh	t.GAh	f.FLh	t.FLh	f.h	t.h
1987	3	1	0	0	0	0	0	0	46	27	11	10	8	3	0	0	261	156	280	169
1988	9	3	0	0	0	0	0	0	22	14	24	22	10	4	0	0	177	115	211	141
1989	15	5	0	0	0	0	0	0	35	12	29	23	6	5	0	0	205	126	240	154
1990	4	4	0	0	0	0	0	0	4	4	19	15	1	1	0	0	131	86	151	102
1991	5	5	0	0	0	0	0	0	8	8	28	23	6	2	0	0	30	28	64	53
1992	9	8	0	0	0	0	0	0	25	23	44	33	1	1	0	0	35	24	80	58
1993	19	8	0	0	0	0	0	0	40	27	15	13	5	5	0	0	87	59	107	77
1994	16	7	0	0	0	0	0	0	40	26	27	22	9	5	0	0	96	69	132	96
1995	8	3	0	0	0	0	0	0	51	32	60	31	20	12	1	1	105	66	186	110
1996	8	4	0	0	0	0	0	0	43	33	35	26	62	24	0	0	166	107	263	157
1997	0	0	0	0	0	0	0	0	41	30	49	29	158	28	0	0	192	126	399	183
1998	2	2	1	1	2	1	0	0	58	45	118	55	56	31	2	2	279	180	455	268
1999	11	3	4	3	0	0	0	0	65	42	109	54	26	15	0	0	174	123	309	192
2000	1	1	0	0	0	0	0	0	37	26	61	35	6	5	0	0	131	88	198	128
2001	15	8	0	0	0	0	0	0	75	50	41	26	0	0	0	0	117	92	158	118
2002	35	12	0	0	0	0	0	0	106	64	18	8	2	2	0	0	166	131	186	141
2003	35	11	0	0	0	0	0	0	87	52	24	11	6	6	0	0	91	77	121	94
2004	46	15	2	2	0	0	0	0	81	35	71	31	3	3	0	0	80	65	154	99
2005	26	10	0	0	0	0	0	0	49	27	51	32	0	0	0	0	103	75	185	129

Year	f.NCg	t.NCg	f.SCg	t.SCg	f.GAg	t.GAg	f.FLg	t.FLg	f.g	t.g	f.NCh	t.NCh	f.SCh	t.SCh	f.GAh	t.GAh	f.FLh	t.FLh	f.h	t.h
2006	52	12	2	2	0	0	0	0	77	32	37	20	17	13	0	0	83	60	158	113
2007	133	19	1	1	0	0	0	0	160	38	37	13	29	21	1	1	59	50	151	97
2008	127	22	1	1	0	0	0	0	167	46	23	16	7	5	0	0	34	28	68	52
2009	41	12	1	1	0	0	0	0	57	23	10	8	0	0	0	0	22	19	35	28
2010	29	8	0	0	0	0	1	1	34	13	7	6	1	1	0	0	65	53	77	64
2011	15	7	0	0	0	0	0	0	30	13	6	6	0	0	0	0	87	58	98	69
2012	12	7	0	0	0	0	1	1	35	25	11	8	0	0	0	0	152	67	171	82
2013	9	5	0	0	0	0	4	4	43	35	8	6	1	1	0	0	120	66	129	73
2014	9	6	0	0	0	0	0	0	50	37	0	0	0	0	0	0	121	58	122	59
2015	1	1	0	0	0	0	4	2	41	23	4	3	0	0	0	0	88	48	97	55
2016	0	0	0	0	0	0	0	0	25	22	6	4	0	0	0	0	225	62	231	66
2017	0	0	0	0	0	0	1	1	24	20	1	1	0	0	0	0	188	45	198	53
2018	0	0	0	0	0	0	6	3	30	21	1	1	0	0	0	0	113	28	115	30
2019	2	1	0	0	0	0	2	2	21	14	0	0	1	1	0	0	41	22	44	24
2020	2	1	0	0	0	0	3	3	31	18	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	6	3	17	13	0	0	0	0	0	0	0	0	1	1
2022	1	1	0	0	0	0	8	8	29	23	0	0	0	0	0	0	71	39	71	39

Table 2: Number of fish (f) and trips (t) with age samples collected from the Gen Rec (g; combined private and charterboat modes) and Headboat (h) fleets. f.g = the total number of measured fish from GR, t.g = the total number of trips where a fish was measured from GR, f.h = the total number of measured fish from HB, and t.h = the total number of trips where a fish was measured from HB.

Year	f.NCg	t.NCg	f.SCg	t.SCg	f.GAg	t.GAg	f.FLg	t.FLg	f.g	t.g	f.NCh	t.NCh	f.SCh	t.SCh	f.GAh	t.GAh	f.FLh	t.FLh	f.h	t.h
1977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	7	6
1978	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	9	4	11	6
1979	0	0	0	0	0	0	0	0	0	0	14	7	0	0	1	1	23	21	38	29
1980	0	0	0	0	0	0	0	0	0	0	25	14	0	0	0	0	93	59	118	73
1981	0	0	0	0	0	0	0	0	0	0	25	14	0	0	0	0	144	97	169	111
1982	0	0	0	0	0	0	0	0	0	0	11	9	0	0	0	0	62	42	73	51
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	35	38	35
1984	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	43	41	44	42
1985	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	23	19	24	20
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	12	14	12
1987	0	0	0	0	0	0	0	0	0	0	10	5	0	0	0	0	3	3	13	8
1988	0	0	0	0	0	0	0	0	0	0	15	8	3	2	0	0	3	3	21	13
1989	0	0	0	0	0	0	0	0	0	0	3	3	2	1	0	0	0	0	5	4
1990	0	0	0	0	0	0	0	0	0	0	9	8	0	0	0	0	2	2	11	10
1991	0	0	0	0	0	0	0	0	0	0	14	11	0	0	0	0	2	2	16	13
1992	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	4	3
1993	0	0	0	0	0	0	0	0	0	0	1	1	3	3	0	0	0	0	4	4

Year	f.NCg	t.NCg	f.SCg	t.SCg	f.GAg	t.GAg	f.FLg	t.FLg	f.g	t.g	f.NCh	t.NCh	f.SCh	t.SCh	f.GAh	t.GAh	f.FLh	t.FLh	f.h	t.h
1994	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	3	2	5	4
1996	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	3	3
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2
1998	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	2	3	3
2001	0	0	0	0	0	0	14	10	14	10	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	37	26	37	26	0	0	1	1	0	0	1	1	2	2
2003	0	0	0	0	0	0	29	24	29	24	1	1	0	0	0	0	5	5	6	6
2004	0	0	7	1	0	0	17	15	24	16	11	10	0	0	0	0	22	19	33	29
2005	0	0	0	0	0	0	35	26	35	26	20	20	0	0	0	0	58	42	78	62
2006	0	0	0	0	0	0	19	12	19	12	7	6	5	5	0	0	47	41	59	52
2007	0	0	0	0	0	0	6	3	6	3	14	12	12	12	1	1	23	20	50	45
2008	0	0	0	0	0	0	1	1	1	1	4	2	5	5	0	0	19	12	28	19
2009	0	0	0	0	0	0	47	9	47	9	2	2	0	0	0	0	13	9	15	11
2010	0	0	2	1	0	0	12	7	14	8	5	4	0	0	0	0	21	19	26	23
2011	0	0	1	1	0	0	0	0	1	1	7	1	0	0	0	0	54	33	61	34
2012	0	0	9	3	0	0	1	1	10	4	4	3	0	0	0	0	126	53	130	56
2013	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	99	53	102	56
2014	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	112	52	112	52
2015	0	0	0	0	0	0	2	2	2	2	5	4	0	0	0	0	75	43	80	47

Year	f.NCg	t.NCg	f.SCg	t.SCg	f.GAg	t.GAg	f.FLg	t.FLg	f.g	t.g	f.NCh	t.NCh	f.SCh	t.SCh	f.GAh	t.GAh	f.FLh	t.FLh	f.h	t.h
2016	0	0	0	0	0	0	3	3	3	3	6	4	0	0	0	0	193	54	199	58
2017	0	0	1	1	0	0	32	21	33	22	1	1	0	0	0	0	148	39	149	40
2018	0	0	3	2	0	0	91	18	94	20	1	1	1	1	0	0	76	27	78	29
2019	0	0	2	1	0	0	2	2	4	3	0	0	1	1	0	0	39	21	40	22
2021	0	0	0	0	0	0	6	5	6	5	0	0	0	0	0	0	3	3	3	3

Table 3: Number of fish (f) and trips (t) with age samples retained in the weighted age compositions, for the entire South Atlantic region, from the Gen Rec (g; combined private and charterboat modes) and Headboat (h) fleets.

Year	f_g	t_g	f_h	t_h
1976	0	0	0	0
1977	0	0	0	0
1978	0	0	0	0
1979	0	0	24	22
1980	0	0	93	59
1981	0	0	144	97
1982	0	0	67	46
1983	0	0	38	35
1984	0	0	43	41
1985	0	0	23	19
1986	0	0	14	12
1987	0	0	0	0
1988	0	0	18	10
1989	0	0	0	0
1990	0	0	0	0
1991	0	0	14	11
1992	0	0	0	0
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0

Year	f_g	t_g	f_h	t_h
2001	14	10	0	0
2002	36	25	0	0
2003	28	24	0	0
2004	16	14	33	29
2005	0	0	78	62
2006	0	0	59	52
2007	0	0	50	45
2008	0	0	19	12
2009	0	0	0	0
2010	0	0	21	19
2011	0	0	54	33
2012	0	0	126	53
2013	0	0	99	53
2014	0	0	112	52
2015	0	0	75	43
2016	0	0	193	54
2017	0	0	148	39
2018	89	18	76	27
2019	0	0	39	21
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0

Table 4: Number of fish (f) and trips (t) with age samples retained in the weighted age compositions, for NCSC, from the Headboat (h) fleet.

Year	f_h	t_h
1981	0	0
1982	5	4
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0
1999	0	0
2000	0	0
2001	0	0
2002	0	0
2003	0	0
2004	11	10
2005	20	20

Year	f_h	t_h
2006	0	0
2007	12	10
2008	0	0
2009	0	0
2010	0	0
2011	0	0
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	0	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0
2022	0	0

Table 5: Number of fish (f) and trips (t) with age samples retained in the weighted age compositions, for GAFL, from the Gen Rec (g; combined private and charterboat modes) and Headboat (h) fleets.

Year	f_g	t_g	f_h	t_h
1976	0	0	0	0
1977	0	0	0	0
1978	0	0	0	0
1979	0	0	23	21
1980	0	0	93	59
1981	0	0	144	97
1982	0	0	62	42
1983	0	0	38	35
1984	0	0	43	41
1985	0	0	23	19
1986	0	0	14	12
1987	0	0	0	0
1988	0	0	0	0
1989	0	0	0	0
1990	0	0	0	0
1991	0	0	0	0
1992	0	0	0	0
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0

Year	f_g	t_g	f_h	t_h
2001	14	10	0	0
2002	36	25	0	0
2003	28	24	0	0
2004	16	14	22	19
2005	0	0	58	42
2006	0	0	47	41
2007	0	0	23	20
2008	0	0	19	12
2009	0	0	0	0
2010	0	0	21	19
2011	0	0	54	33
2012	0	0	126	53
2013	0	0	99	53
2014	0	0	112	52
2015	0	0	75	43
2016	0	0	193	54
2017	0	0	148	39
2018	89	18	76	27
2019	0	0	39	21
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0

Figures
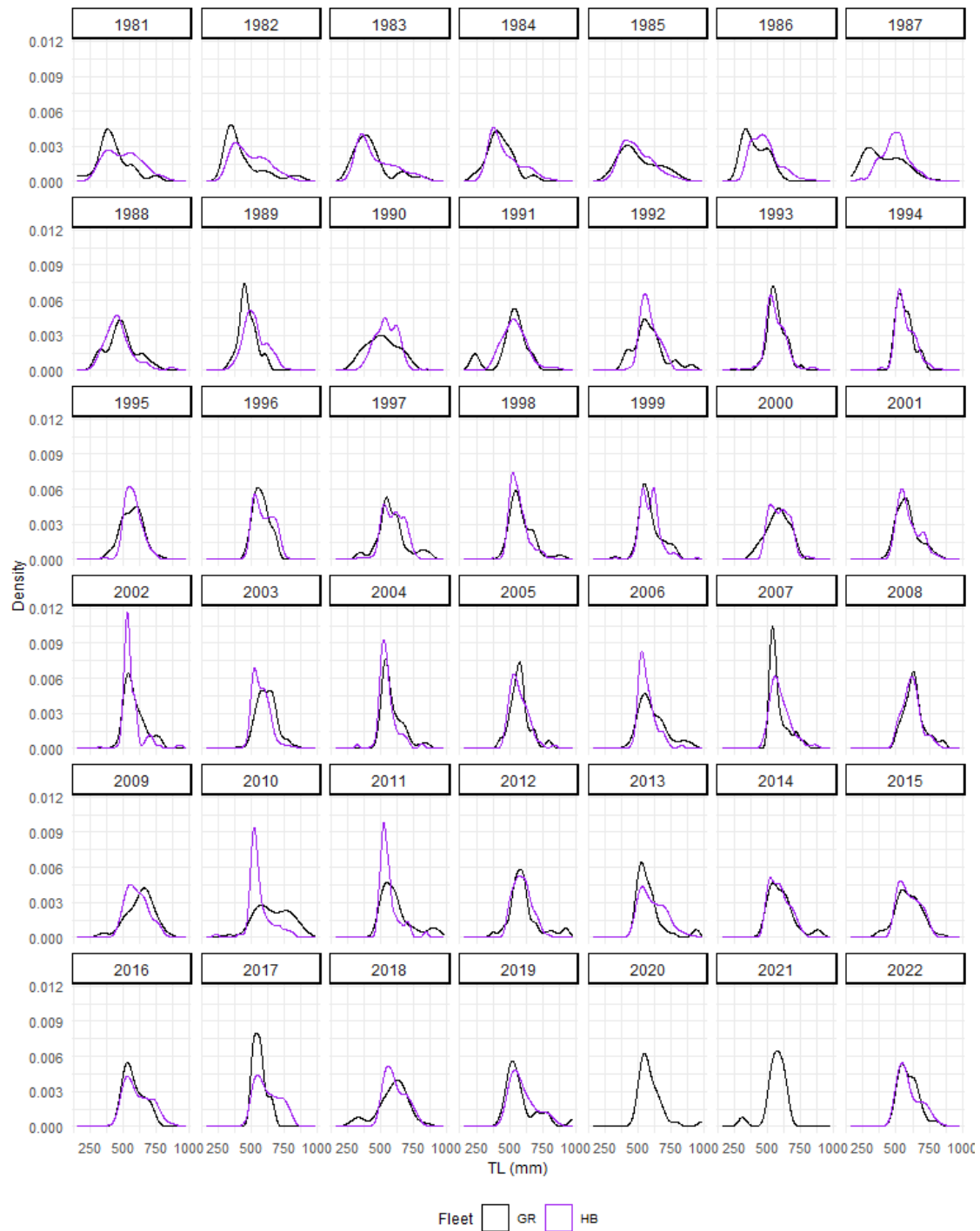
Figure 1. Length distributions of Red Grouper the from Gen Rec (GR) and Headboat (HB) recreational fishing fleets.
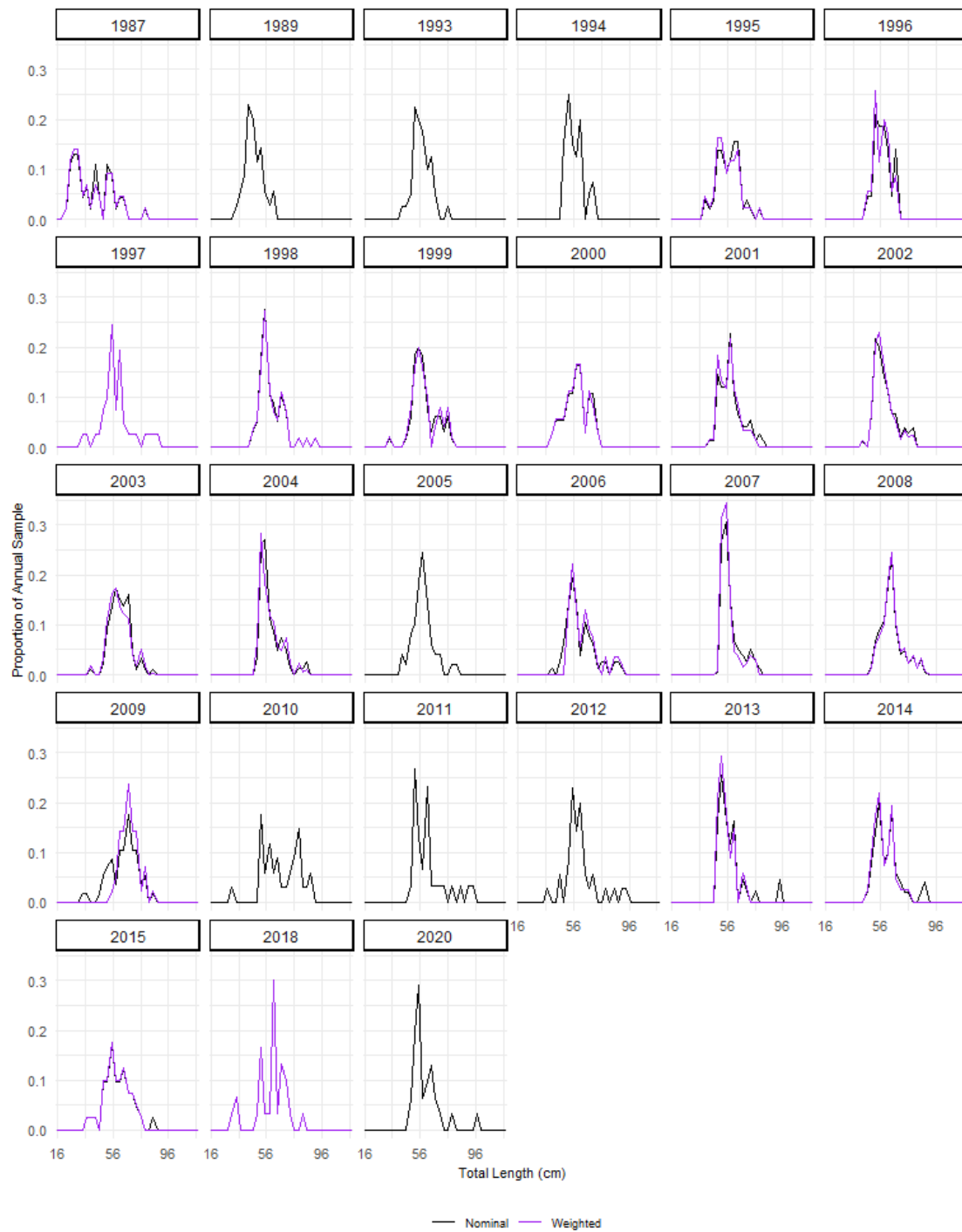
Figure 2. Nominal and weighed length compositions of Red Grouper from the Gen Rec (GR) recreational fishing fleet from the entire South Atlantic region.
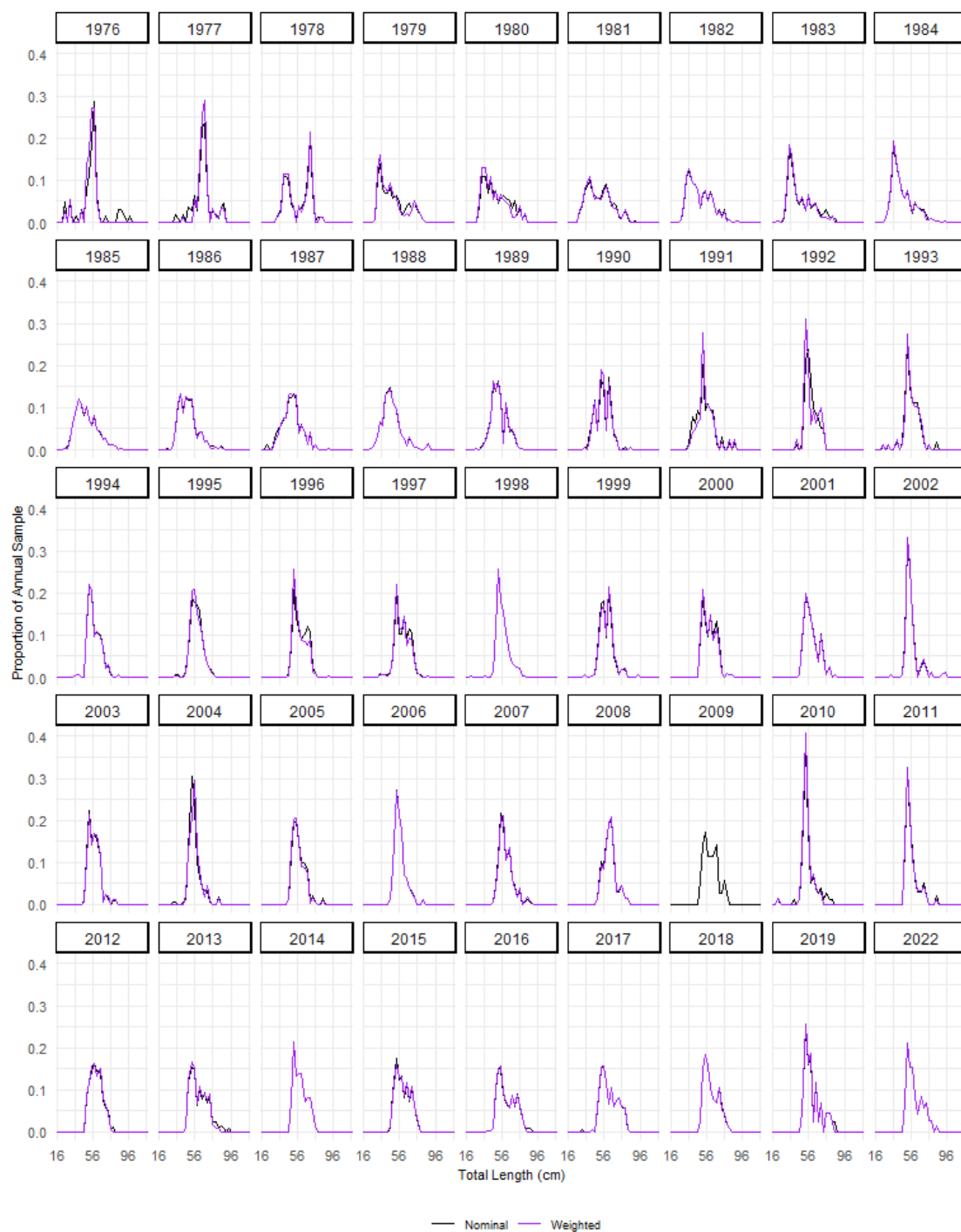
Figure 3. Nominal and weighed length compositions of Red Grouper from the Headboat (HB) recreational fishing fleet, from the entire South Atlantic region.
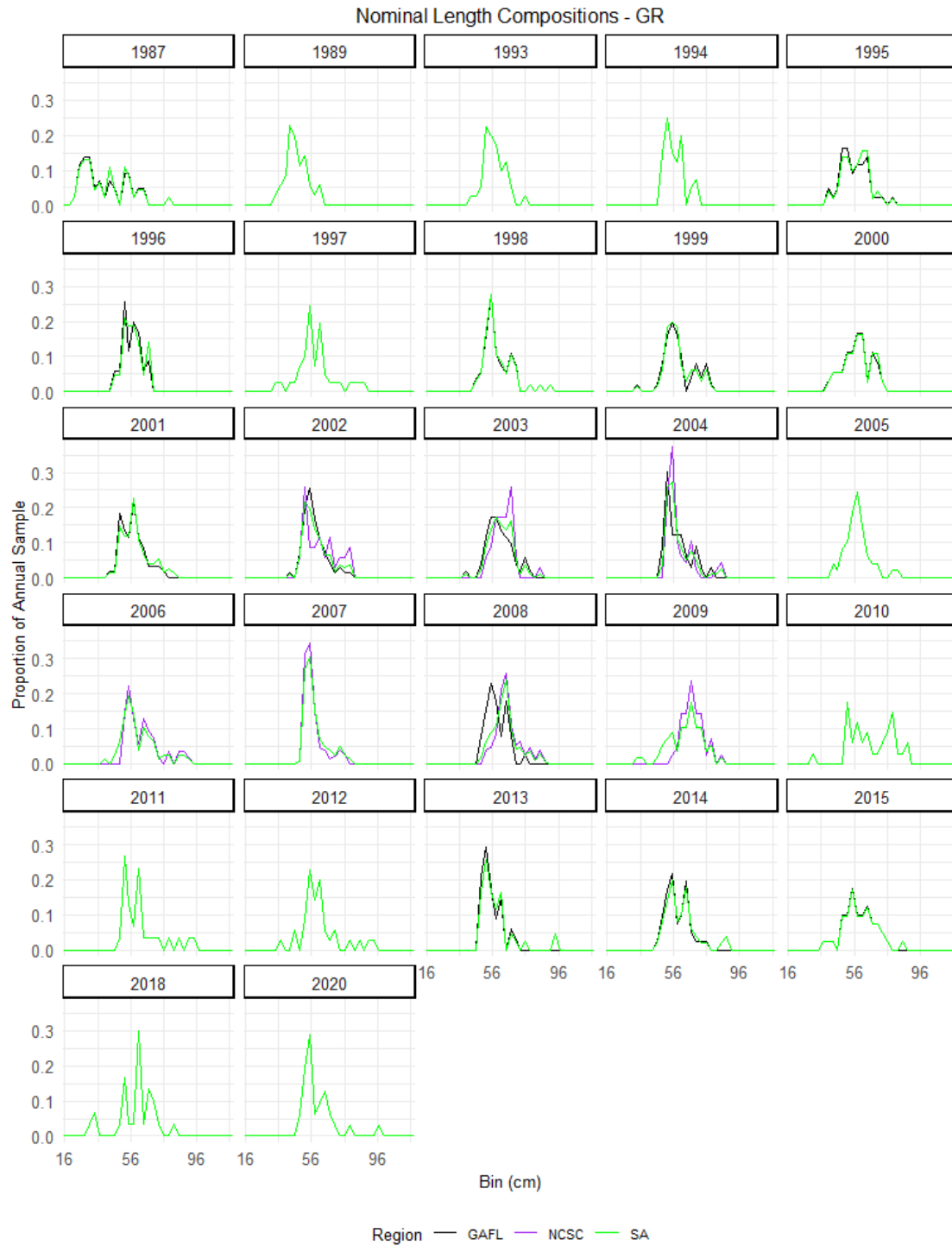
Figure 4. Comparison of nominal length compositions of Red Grouper from the Gen Rec (GR) recreational fishing fleet, from the South Atlantic, NCSC, and GAFL spatial regions.
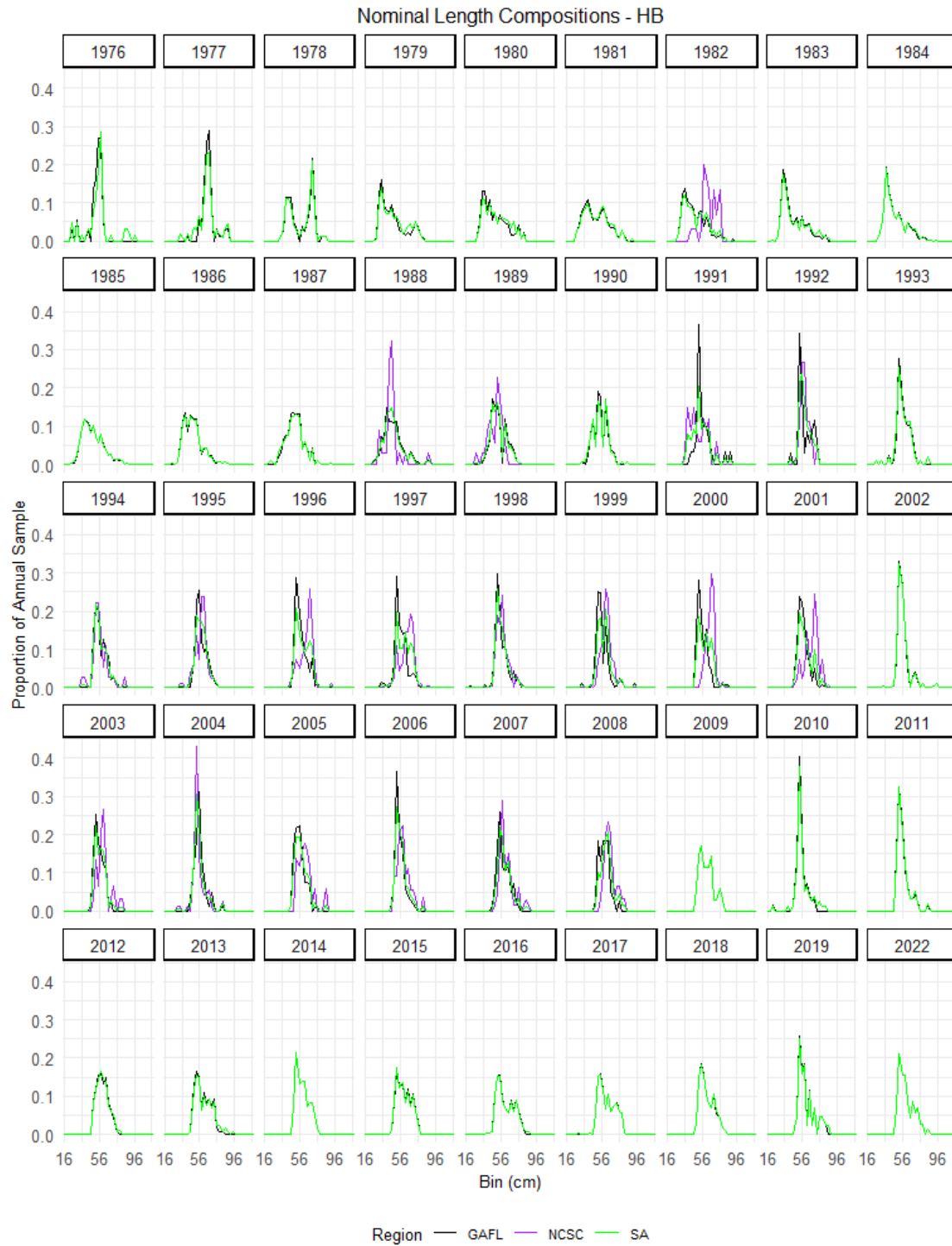
Figure 5. Comparison of nominal length compositions of Red Grouper from the Headboat (HB) recreational fishing fleet, from the South Atlantic, NCSC, and GAFL spatial regions.
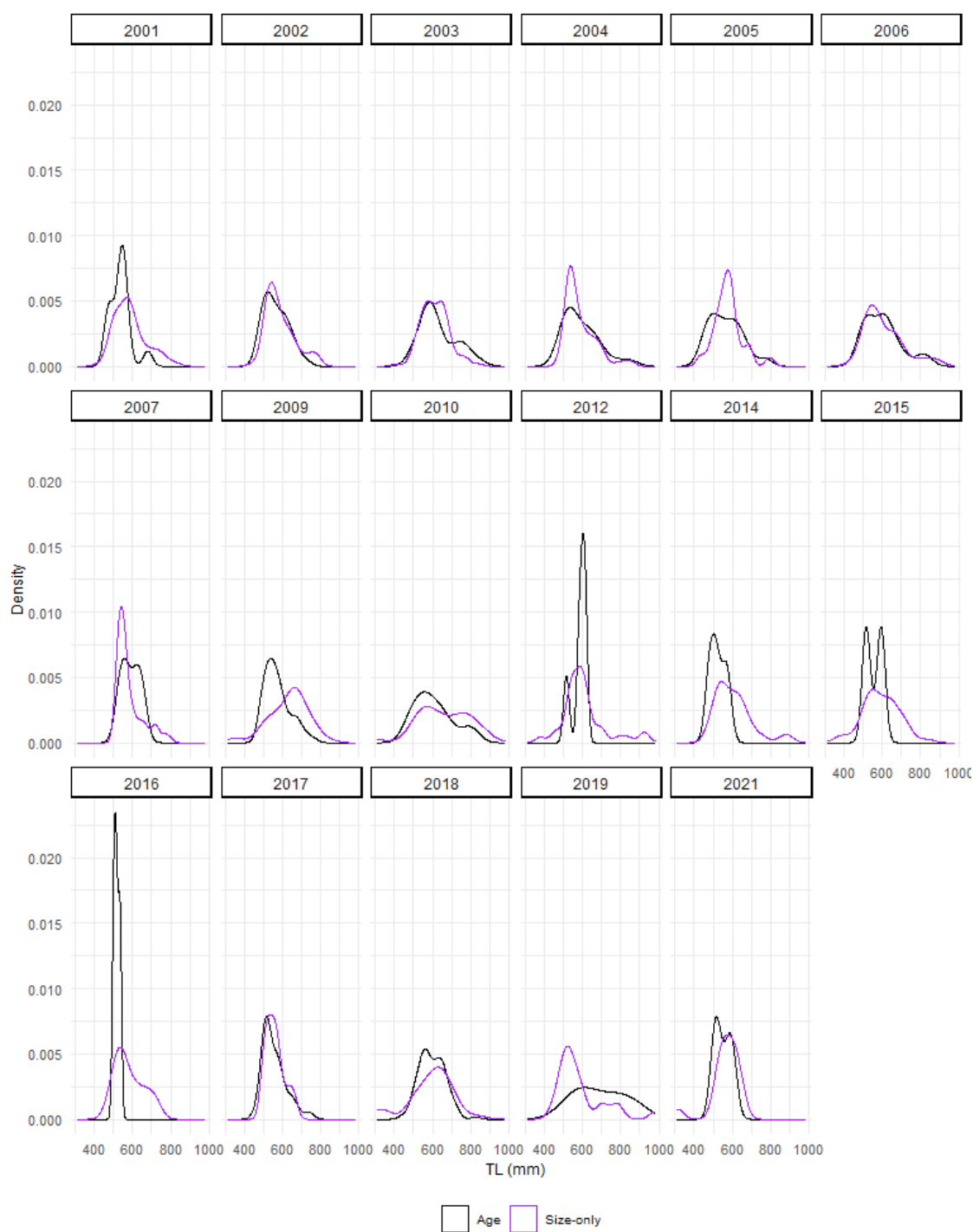
Figure 6. Comparison of Red Grouper lengths from size-only and age data sources sampled from the Gen Rec (GR) recreational fishing fleet, including all fish sampled in the South Atlantic region.
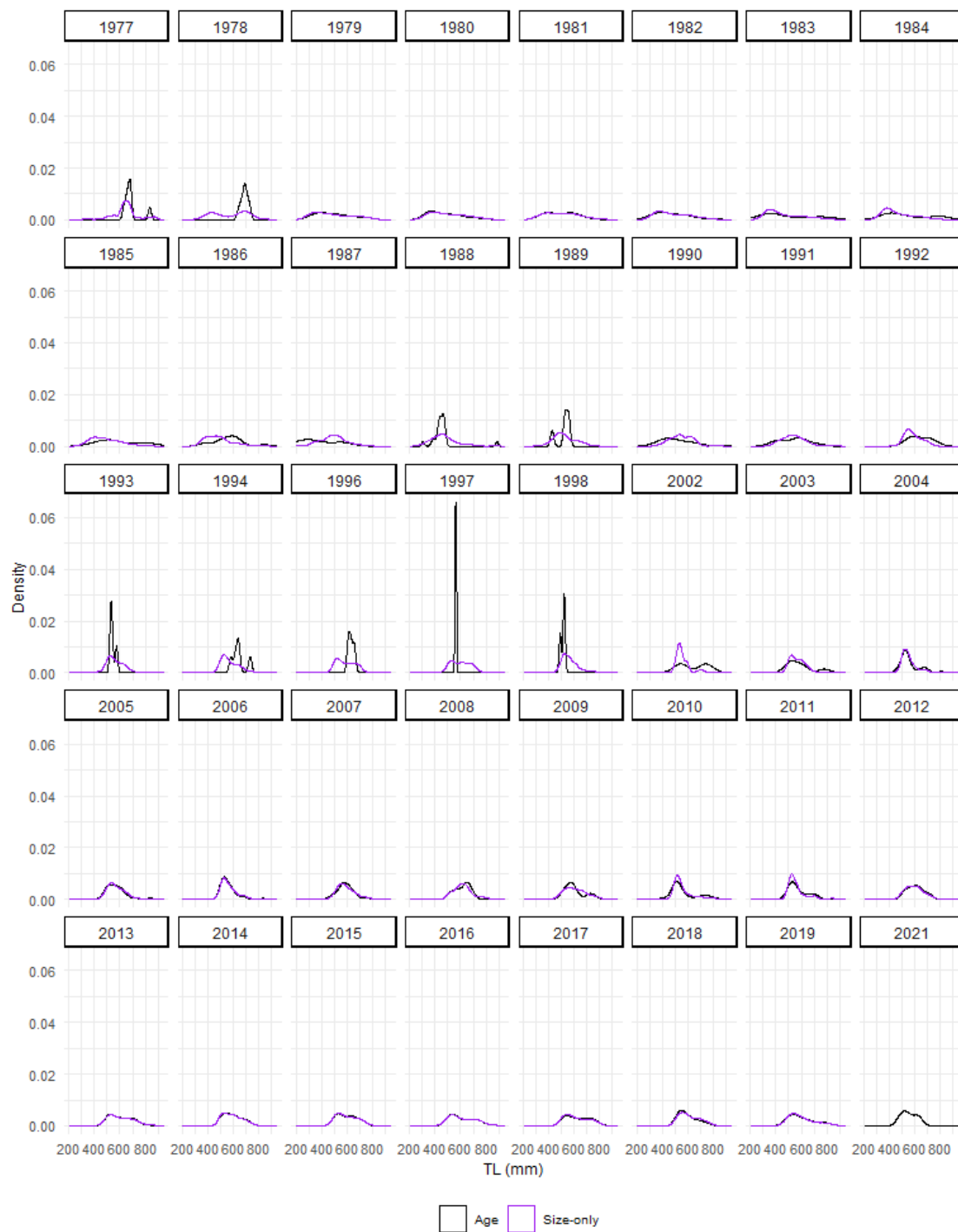
Figure 7. Comparison of Red Grouper lengths from size-only and age data sources sampled from the Headboat (HB) recreational fishing fleet for all fish sampled in the South Atlantic region.
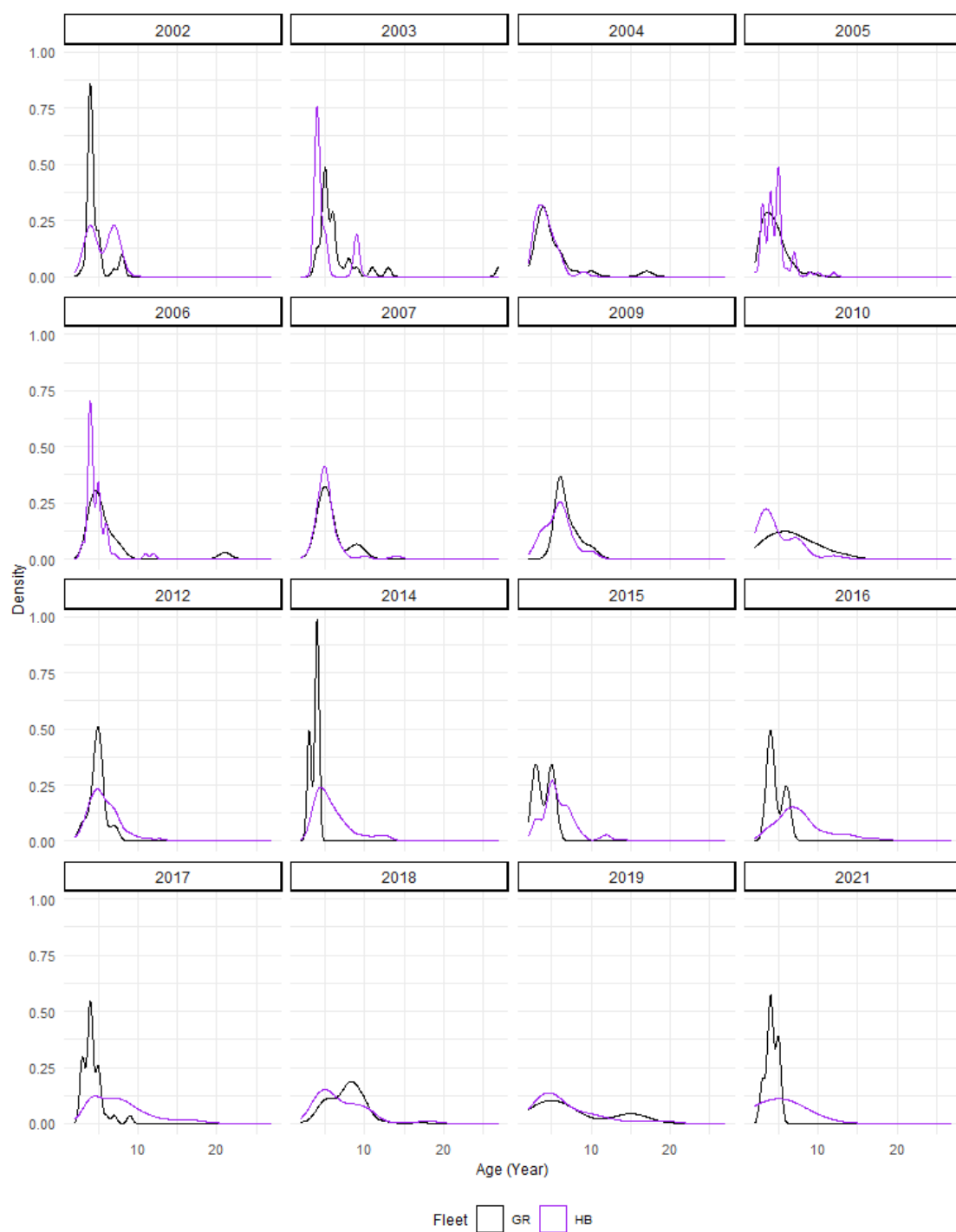
Figure 8. Comparison of age distibutions between samples collected from the Gen Rec (GR) and Headboat (HB) recreational fishing fleets in the South Atlantic region.
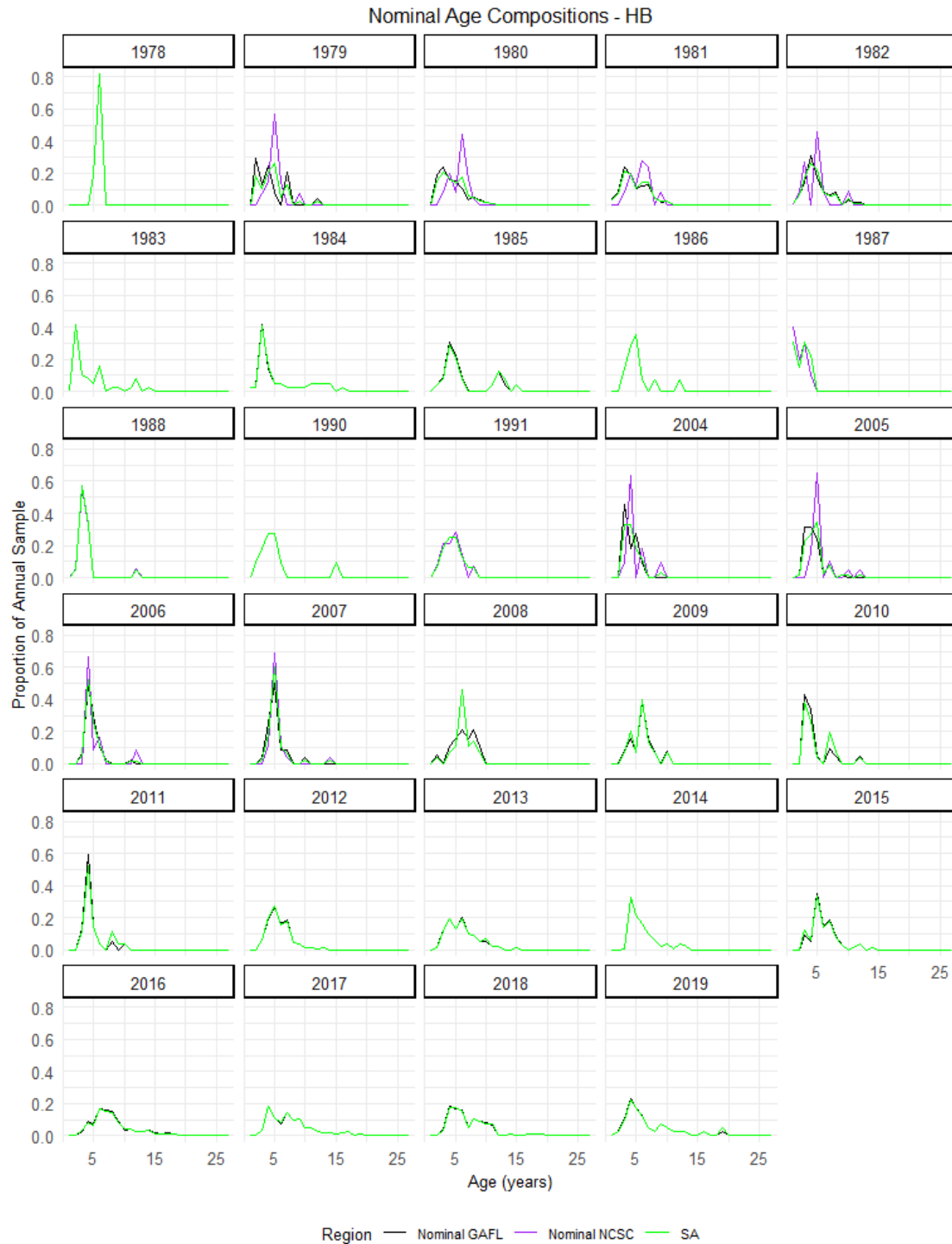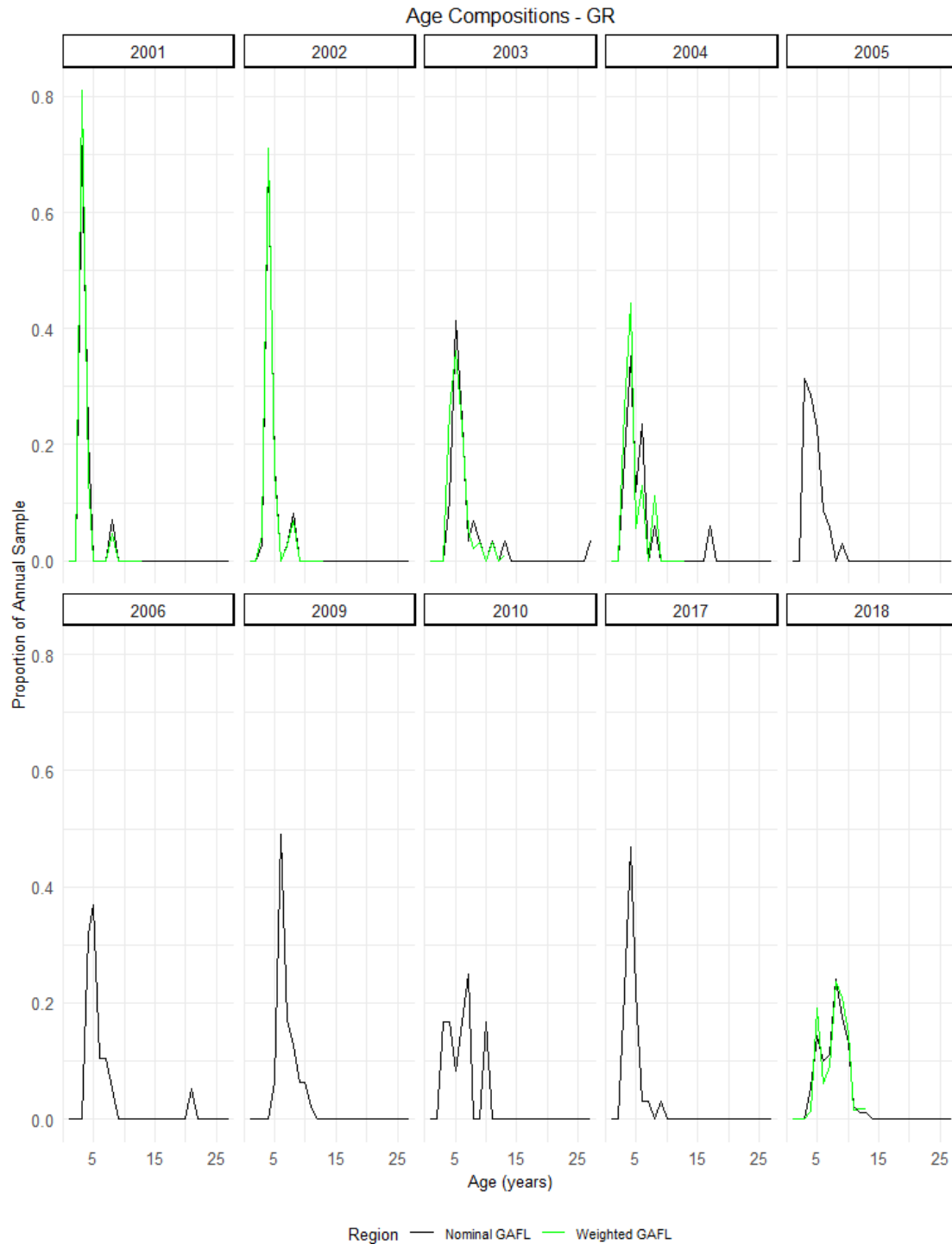
Figure 9. Comparison of nominal age compositions of Red Grouper from the Headboat (HB) recreational fishing fleets for the South Atlantic, NCSC, and GAFL spatial regions.
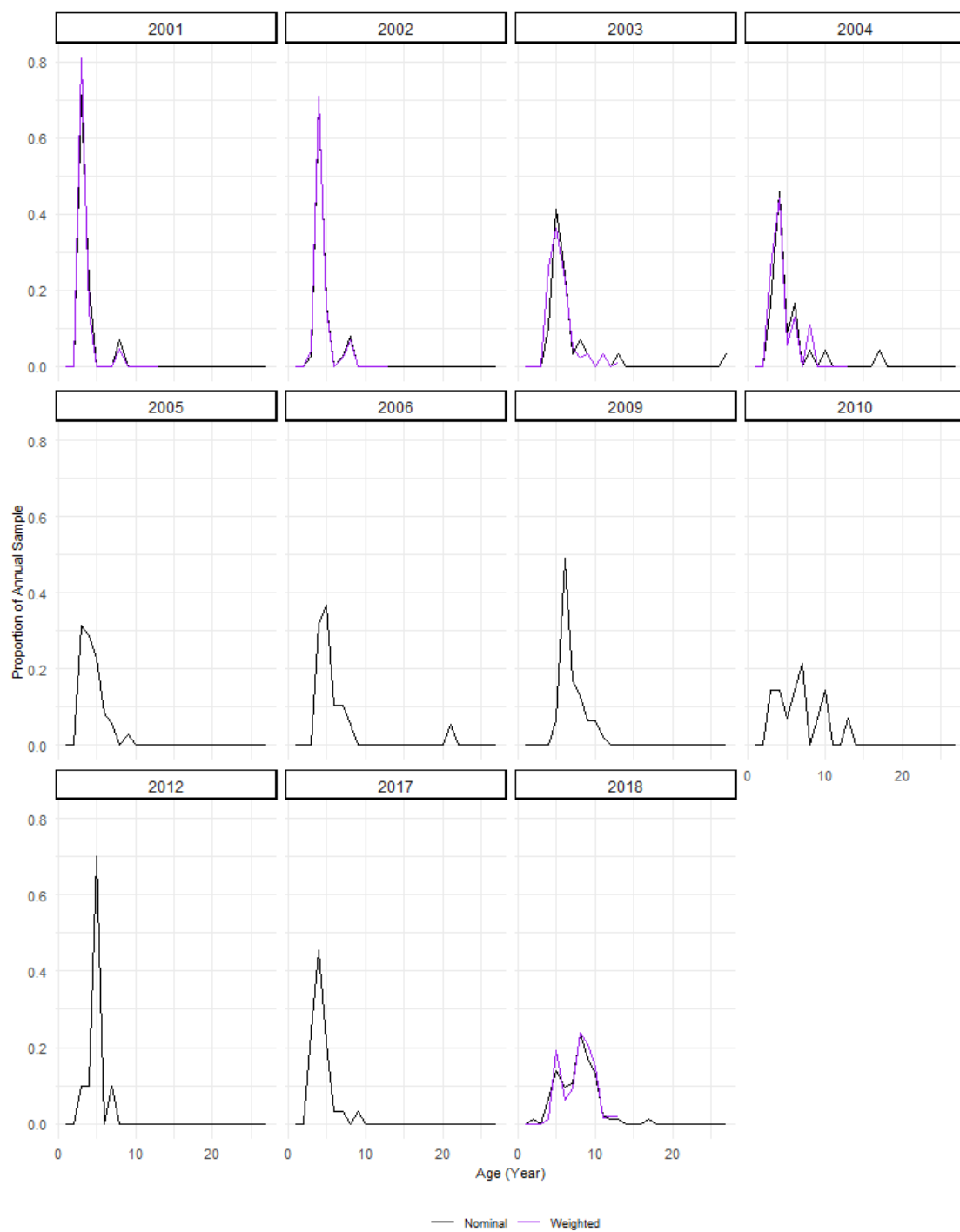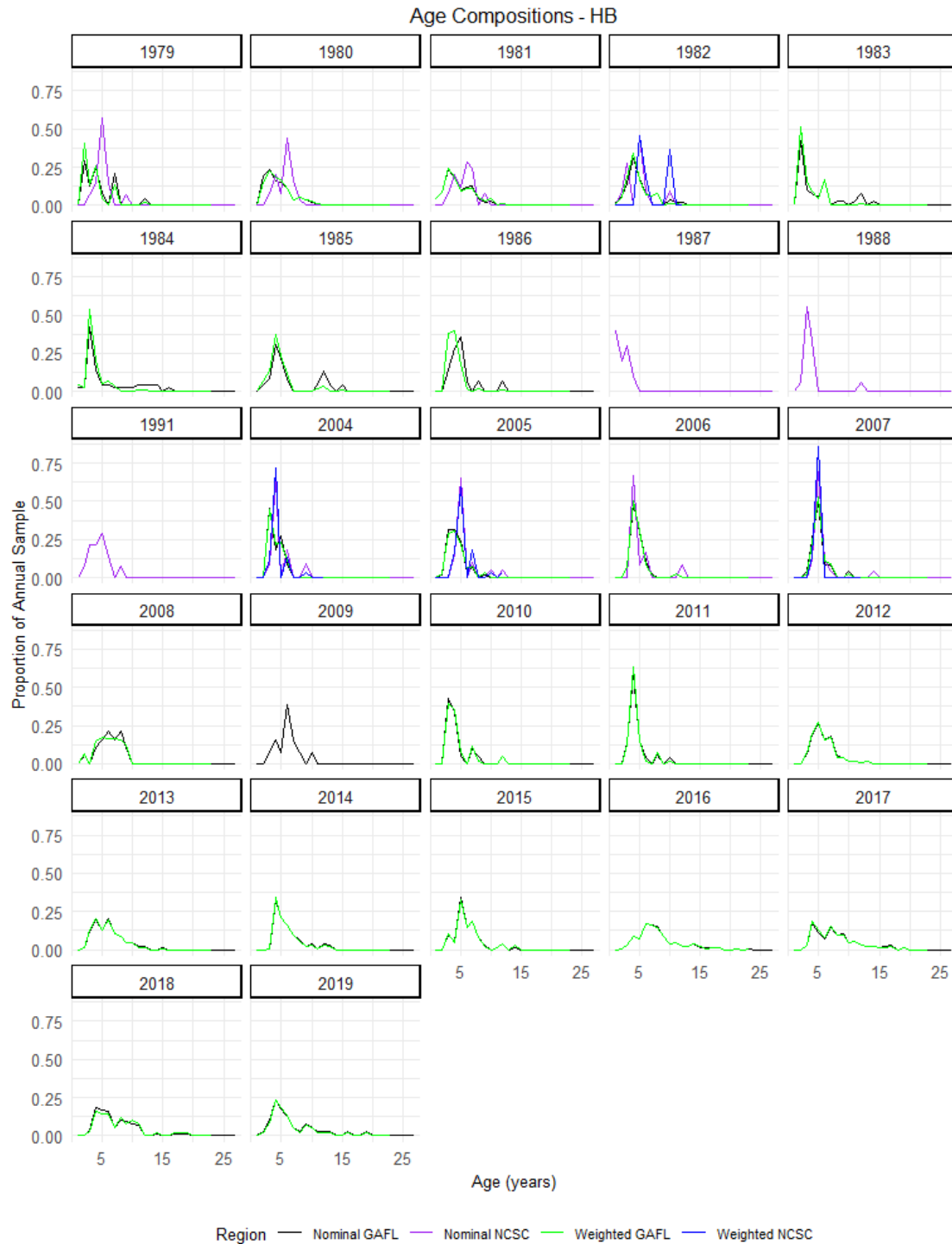
Figure 10. Nominal and weighed age compositions of Red Grouper from the Gen Rec (GR) recreational fishing fleet from the South Atlantic region.
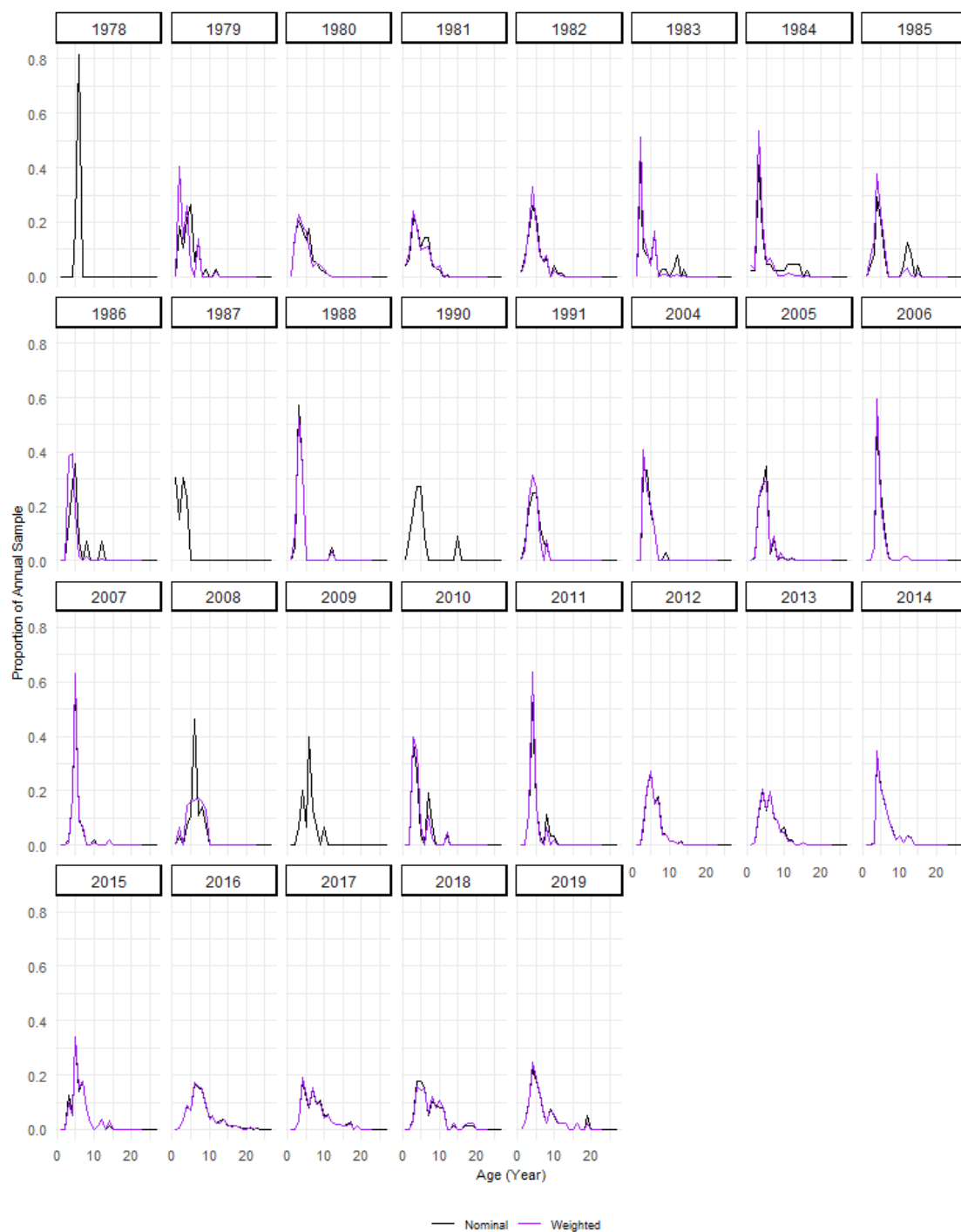
Figure 11. Nominal and weighed age compositions of Red Grouper from the Headboat (HB) recreational fishing fleet from the South Atlantic region.

Figure 12. Nominal and weighed age compositions of Red Grouper from the Gen Rec (GR) recreational fishing fleet from the GAFLspatial region. Note, there were not enough age samples for weighted NCSC age compositions.

Figure 13. Nominal and weighed age compositions of Red Grouper from the Headboat (HB) recreational fishing fleet from the NCSC and GAFL spatial regions.