South Atlantic Red Snapper (*Lutjanus campechanus*) Preliminary Length and Age Compositions for the Commercial Handline Fishery

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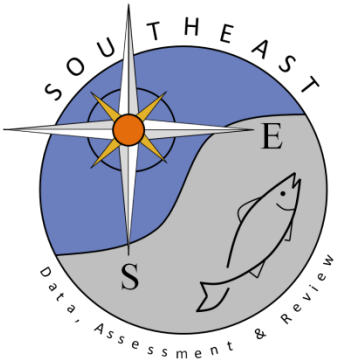

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South Atlantic Red Snapper (*Lutjanus campechanus*) Preliminary Length and Age Compositions for the Commercial Handline Fishery

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Introduction

This document outlines the data and methodologies used to estimate nominal length and age compositions of the commercial handline fishery for the SEDAR 90 South Atlantic Red Snapper Assessment. These compositions were estimated using data sources approved in SEDAR 73. 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 90 assesses all Atlantic Red Snapper in federal waters along the east coast of the United States from the East Coast of Florida northward to the North Carolina/Virginia border. For this assessment, a single commercial Handline fleet is defined. 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 vast majority of the landings data coming from handline gears. The commercial data source utilized to generate the length and age compositions for the commercial handline fleet 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 handline fishery were available from 1984 onward.

These data were compiled using length bins of 3 centimeters (cm) with the midpoint of the bin being labeled to match SEDAR 73. Natural total length ($NatTL$), fork length (FL), and standard length (SL) were converted to maximum total length ($MaxTL$) using the following conversion equations:

$$MaxTL = 0.462 + 1.02 * NatTL$$

$$MaxTL = 0.222 + 1.07 * FL$$

$$MaxTL = 2.209 + 1.22 * SL$$

Following SEDAR 73, a minimum length bin of 21 cm was used, and a maximum length bin of 99 cm was used, with fish falling outside of this range being pooled in the smallest or largest bin. Any fish lengths greater than 1500 mm $MaxTL$ were deleted and assumed to be errors.

Length Compositions

Nominal length compositions for the commercial handline fleet (HL) were estimated for Red Snapper landings from the GMFMC/SAFMC boundary to the NC/VA border. Annual nominal length compositions were estimated using length bins of 3 cm, where for each year i, and length bin j,

$$LC_{i,j} = \frac{n_{i,j}}{n_i}$$

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

Annual length compositions are shown in Figure 1. Annual sample sizes of commercial lengths and trips are shown in Table 1. 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 Beaufort Laboratory were filtered to remove duplicated and biased data. Red Snapper maximum age was estimated to be 51 years, with a plus group for age 13 plus used in modeling.

Age Compositions

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

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

where $a_{i,k}$ is the number of age samples in year i and age bin k; a_i is the number of age samples in year i; and $AC_{i,k}$ is the proportion of the total number of sampled fish in each year i within each age bin k. A minimum sample size threshold was recommended annually within each year stratum, AC_i, where these were recommended to be dropped and excluded from further analyses if $a_i < 10$.

The annual nominal age compositions are shown in Figure 2. Annual sample sizes of commercial ages and trips are shown in Table 2.

Discussion for data workshop

- **Weighting scheme** – previously weighting has been done first at the subregional level, before combining to a single composition for the age data. Using the coastwide weighted length composition to weight the ages would allow for more ages to be retained, and therefore more robust compositions. Length sample and trip sizes by subregion are shown in Tables 3 and 4 respectively. Age sample and trip sizes by subregion are shown in Tables 5 and 6 respectively. Annual length and age distributions by subregion are shown in figures 3 and 4 respectively.

References

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

Tables

Table 1. *Annual number of South Atlantic Red Snapper commercial handline (HL) length samples and associated trips. Years not meeting the recommended 30 fish or 10 trip minimum filter are highlighted in red.*

Year	Number of Fish	Number of Trips
1984	1739	126
1985	1527	144
1986	706	97
1987	565	90
1988	447	86
1989	692	88
1990	501	64
1991	464	110
1992	336	86
1993	622	122
1994	598	107
1995	787	132
1996	739	161
1997	407	109
1998	443	129
1999	803	175
2000	781	157
2001	1328	201
2002	779	144
2003	1069	155
2004	752	139

Table. 1 *continued.*

2005	551	133
2006	441	134
2007	561	185
2008	640	171
2009	2683	265
2010	67	3
2011	1	1
2012	133	38
2013	530	99
2014	566	85
2016	1	1
2017	1054	120
2018	1720	187
2019	910	119
2020	1356	159
2021	1588	139
2022	1298	116
2023	1663	175

Table 2. *Annual number of South Atlantic Red Snapper commercial handline (HL) age samples and associated trips. Years not meeting the recommended 10 fish or 10 trip minimum filter are highlighted in red.*

Year	Number of Fish	Number of Trips
1992	15	3
1993	7	1
1994	1	1
1995	13	1
1996	120	16
1997	57	12
1998	54	16
1999	12	4
2000	45	8
2001	144	21
2002	35	6
2003	55	10
2004	99	28
2005	148	56
2006	192	80
2007	291	138
2008	416	156
2009	2602	269
2010	67	3
2011	1	1
2012	160	42

Table 2. *continued.*

2013	723	108
2014	721	102
2015	1	1
2017	950	106
2018	1707	185
2019	903	122
2020	1412	163
2021	1616	165
2022	1332	171
2023	1483	203
2024	1116	113

Table 3. *Annual number of South Atlantic Red Snapper commercial handline (HL) length samples by subregion (FL – GA, NC – SC). Year and subregion strata not meeting the recommended 30 fish minimum filter are highlighted in red.*

Year	FL – GA	NC – SC
1984	44	1695
1985	903	624
1986	225	481
1987	277	288
1988	194	253
1989	191	501
1990	112	389
1991	250	214
1992	259	77
1993	397	225
1994	222	376
1995	672	115
1996	441	298
1997	241	166
1998	219	224
1999	301	502
2000	446	335
2001	791	537
2002	311	468
2003	475	594
2004	296	456
2005	130	421
2006	233	208

Table 3. *continued.*

2007	296	265
2008	207	433
2009	2060	623
2010	66	1
2011	0	1
2012	92	41
2013	412	118
2014	308	258
2016	0	1
2017	886	168
2018	1406	314
2019	724	186
2020	1167	189
2021	1448	140
2022	981	317
2023	1182	481

Table 4. Annual number of South Atlantic Red Snapper commercial handline (HL) trips associated with length samples by subregion (FL – GA, NC – SC). Year and subregion strata not meeting the recommended 10 trip minimum filter are highlighted in red.

Year	FL – GA	NC – SC
1984	4	122
1985	47	97
1986	25	72
1987	32	58
1988	24	62
1989	14	74
1990	10	54
1991	50	60
1992	56	30
1993	71	51
1994	39	68
1995	83	49
1996	72	89
1997	49	60
1998	52	77
1999	62	113
2000	64	93
2001	67	134
2002	28	116
2003	46	109
2004	28	111
2005	14	119
2006	44	90

2007	48	137
2008	17	154
2009	103	162
2010	2	1
2011	0	1
2012	20	18
2013	64	35
2014	38	47
2016	0	1
2017	83	37
2018	118	69
2019	69	50
2020	117	42
2021	105	34
2022	70	46
2023	111	64

Table 5. *Annual number of South Atlantic Red Snapper commercial handline (HL) age samples by subregion (FL – GA, NC – SC). Year and subregion strata not meeting the recommended 10 fish minimum filter are highlighted in red.*

Year	FL – GA	NC – SC
1992	15	0
1993	7	0
1994	1	0
1995	13	0
1996	120	0
1997	57	0
1998	54	0
1999	12	0
2000	45	0
2001	144	0
2002	35	0
2003	53	2
2004	67	32
2005	46	102
2006	53	139
2007	85	206
2008	58	358
2009	2197	405
2010	66	1
2011	0	1
2012	116	44

Table 5. *continued.*

2013	609	114
2014	551	170
2015	0	1
2017	783	167
2018	1421	286
2019	731	172
2020	1225	187
2021	1477	139
2022	1014	318
2023	994	489
2024	982	134

Table 6. Annual number of South Atlantic Red Snapper commercial handline (HL) trips associated with age samples by subregion (FL – GA, NC – SC). Year and subregion strata not meeting the recommended 10 trip minimum filter are highlighted in red.

Year	FL – GA	NC – SC
1992	3	0
1993	1	0
1994	1	0
1995	1	0
1996	16	0
1997	12	0
1998	16	0
1999	4	0
2000	8	0
2001	21	0
2002	6	0
2003	9	1
2004	10	18
2005	7	49
2006	8	72
2007	13	125
2008	6	150
2009	110	159
2010	2	1
2011	0	1
2012	23	19

Table 6. *continued.*

2013	73	35
2014	63	39
2015	0	1
2017	69	37
2018	120	65
2019	71	51
2020	120	43
2021	124	41
2022	108	63
2023	125	78
2024	93	20

Figures

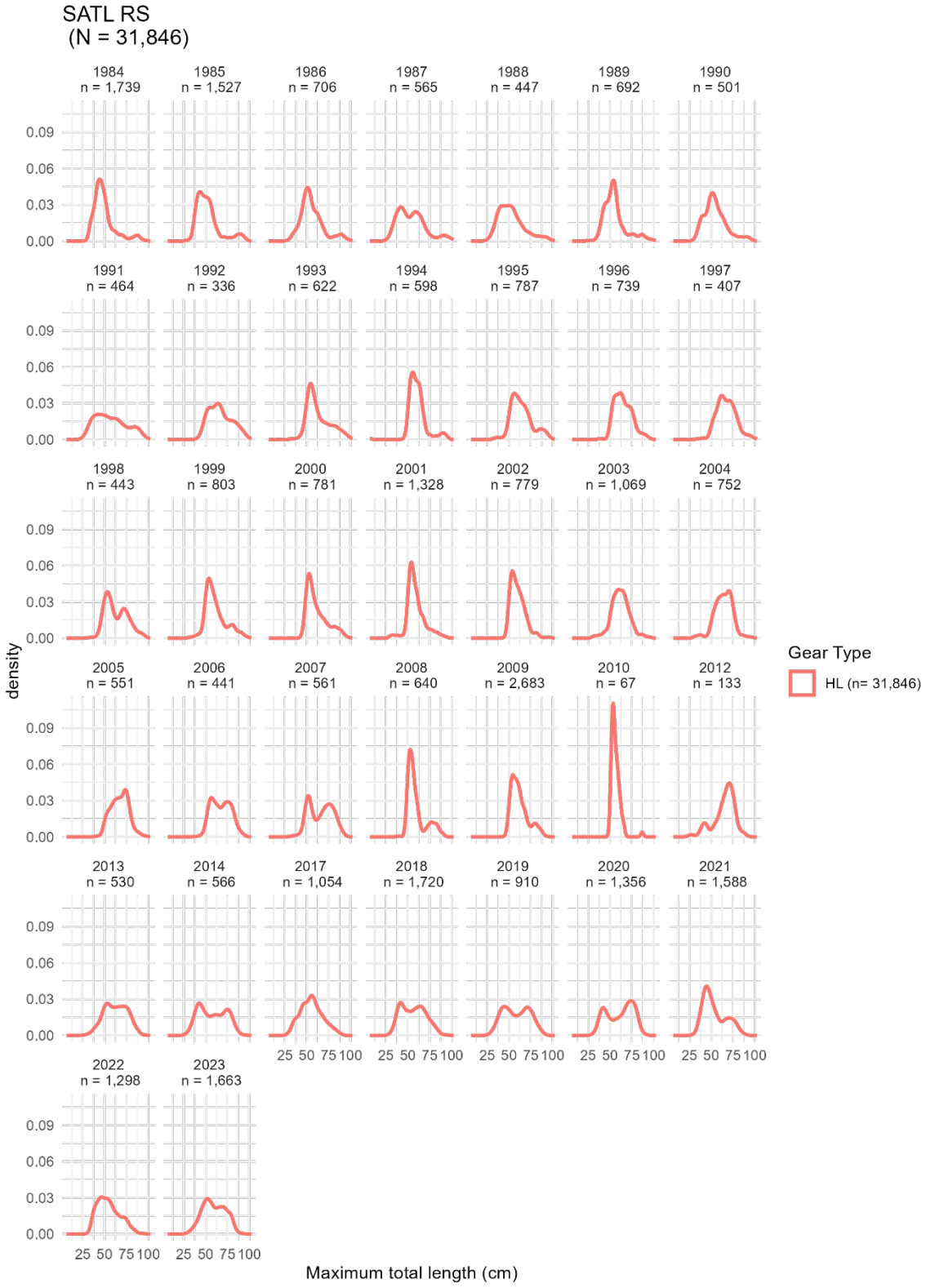

Figure 1. *Annual length distributions for the South Atlantic Red Snapper commercial handline fishery.*

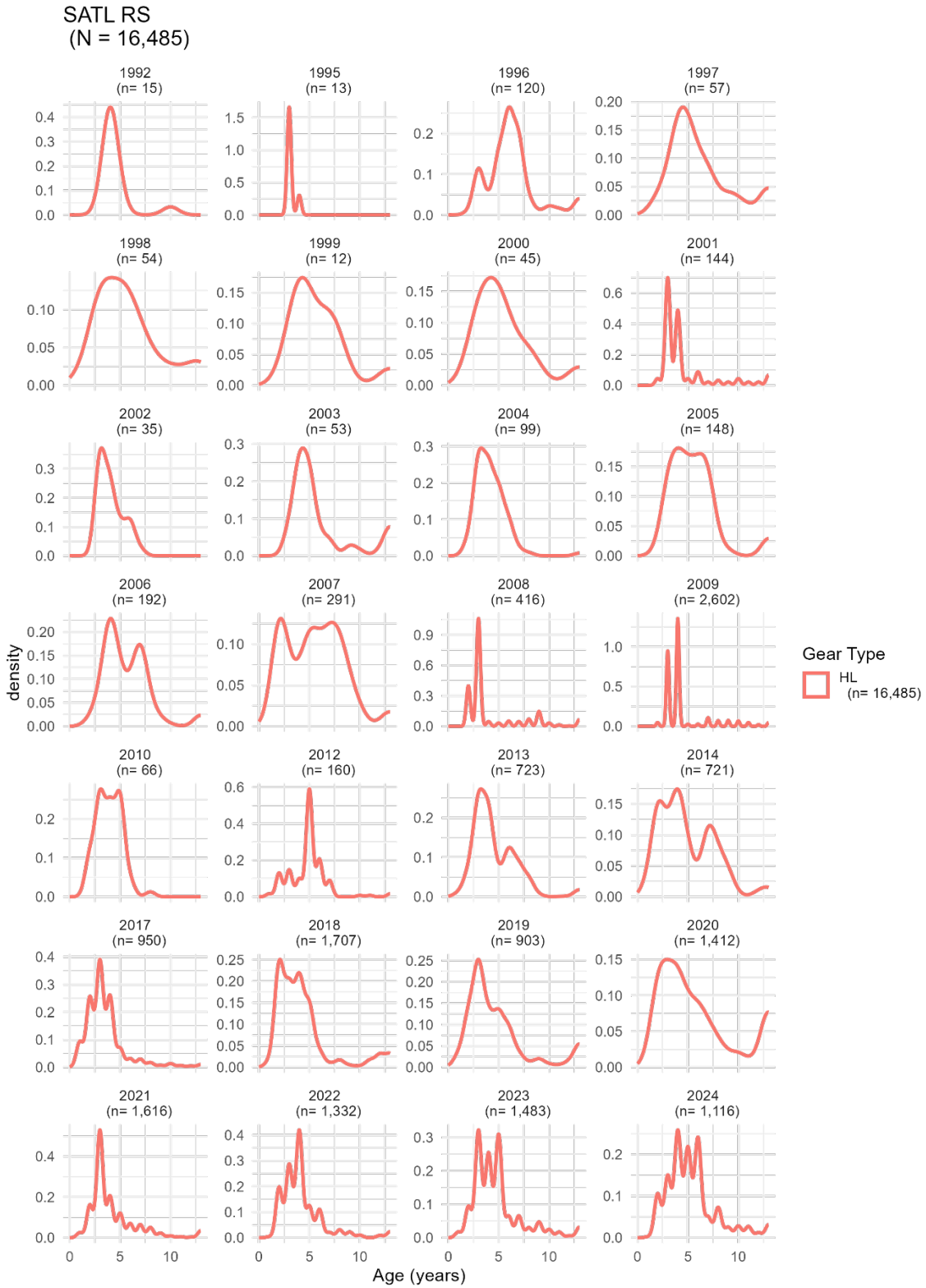

Figure 2. *Annual nominal age distributions for the South Atlantic Red Snapper commercial handline fishery.*

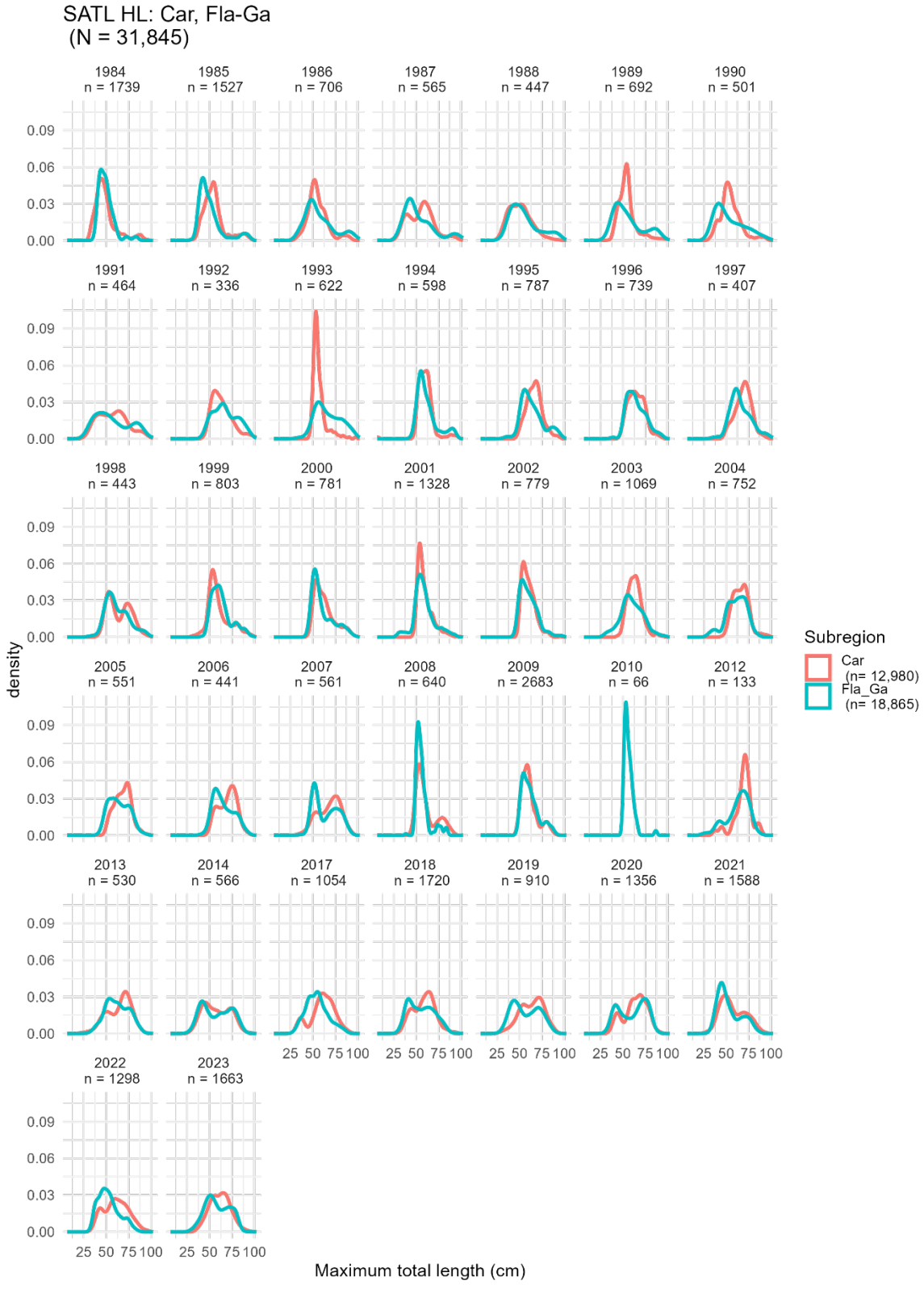

Figure 3. *Annual length distributions by subregion (Fla_Ga: Florida & Georgia, Car: North Carolina & South Carolina) for the South Atlantic Red Snapper commercial handline fishery.*

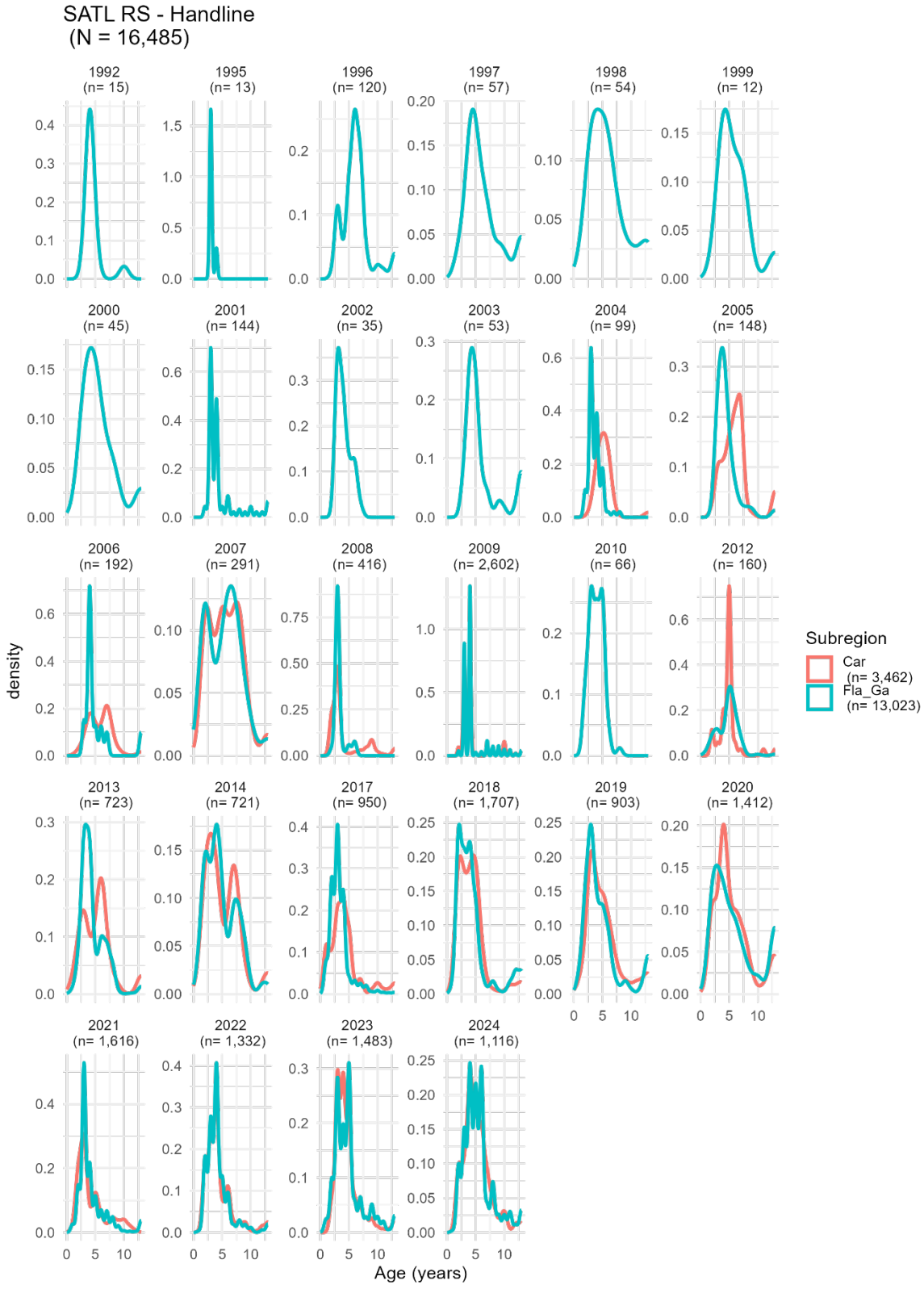

Figure 4. *Annual age distributions by subregion (Fla_Ga: Florida & Georgia, Car: North Carolina & South Carolina) for the South Atlantic Red Snapper commercial handline fishery.*