Age and length composition weighting for U.S. gray triggerfish (*Balistes Capriscus*)

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1 Introductction

The SEDAR 32 data workshop developed raw length and age compositions for each of the fisheries where sufficient data were available. The fishery-dependent data collection for lengths and ages may be biased due to sampling protocols, state-specific sampling effort, or other non-random methods. The selection of fish from which to collect ageing structures may be biased, typically towards larger fish, because the selection process is rarely formally randomized. One technique to overcome bias in the length sampling is to weight samples by the associated landings at a spatial and temporal scale at which the bias is expected. Usually this is unknown and samples are weighted at the finest scale available without losing data (e.g. length samples with no associated landings). In this document we describe how the length data were weighted and how these weightings are extended to the age data. Similar methods have been used in previous SEDAR assessments and completed between the data and assessment workshops.

2 Data Description

2.1 Lengths

Commercial

Biological sample data were obtained from the NMFS/SEFSC Trip Interview Program (SEFSC-TIP). Data were filtered to eliminate records: 1) that included a size or effort bias, 2) where lengths were collected using a non-random method, 3) that were not from commercial trips, 4) which were selected by quota sampling, or 5) where the data was not collected shore-side. These data were further limited to those that could be assigned a year, gear, and state. Length samples were assigned a state based on landing location or sample location if there was no landing location assigned.

The number of fish sampled had a high of 3,385 for handline gear in (Table 1). The number of lengths sampled was consistently greater than 100 for handline gear for 1984-2011.

All gray triggerfish lengths were converted to FL in mm using the formula provided by the SEDAR 32 Life History Group and binned into one centimeter intervals (e.g. 25cm interval = 24.5cm to 25.4cm).

Recreational

MRFSS/MRIP Biological Sampling

The MRFSS/MRIP angler intercept survey includes the sampling of fish lengths from the harvested (landed, whole condition) catch. Up to 15 of each species landed per angler interviewed are measured to the nearest millimeter (mm) along a center line (defined as tip of snout to center of tail along a straight line, not curved over body). In those fish with a forked tail, this measure would typically be referred to as a fork length, and in those fish that do not have a forked tail it would typically be referred to as a total length with the exception of some fishes that have a single, or few, caudal fin rays that extend further. Weights are typically collected for the same fish measured. When time is constrained a weight may be collected without a length measurement.

Headboat Survey Biological Sampling

Lengths were collected from 1972 to 2011 by headboat dockside samplers. From 1972 to 1975, only North Carolina and South Carolina were sampled whereas Georgia and northeast Florida were sampled beginning in 1976. The Southeast Region Headboat Survey conducted dockside sampling for the entire range of Atlantic waters along the southeast portion of the US from the NC-VA border through the Florida Keys beginning in 1978. For gray triggerfish fork lengths are routinely collected. Weights are typically collected for the same fish measured during dockside sampling.

SCDNR State Finfish Survey (SFS)

Gray triggerfish lengths were collected through the SCDNR State Finfish Survey (SFS) from 1988 to 2011. The SFS collects finfish intercept data in South Carolina through a non-random intercept survey at public boat landings along the SC coast. The survey focuses on known productive sample sites, targets primarily private boat mode, and is conducted year-round (January- December) using a questionnaire and interview procedure similar to the intercept portion of the MRFSS. From 1988 through March 2009 mid-line lengths were measured and from April 2009 to 2011 total lengths were measured. From 1988 to 2011 220 gray triggerfish lengths were collected by SFS personnel. The Recreational

Fisheries Working Group recommended the SCDNR SFS length data for all modes be used to supplement the MRFSS/MRIP length data for length compositions.

Any existing weight measurements without an associated fork length measurement were converted to fork length using the following equation derived for the combined South Atlantic stock by the Life History Working Group at the SEDAR 32 data workshop:

FL (mm)= 350.7*Wgt (kg)^0.33

Any existing total length measurements without an associated fork length measurement were converted to fork length using the following equation derived for the combined South Atlantic stock by the Life History Working Group at the SEDAR 32 data workshop:

FL (mm)= 24.92+0.80*TL (mm)

Annual numbers of gray triggerfish measured for length and the percentage of estimated catch (number) that was sampled from the recreational fishery are reported by state in Table 2. Due to SRHS vessel confidentiality requirements Georgia and east Florida are grouped (GA/EFL). All states north of North Carolina are grouped (VA North) due to low sample sizes and minimal landings in these areas.

2.2 Ages

Commercial

Ages were determined for 1,242 fish collected from 6,366 trips from 1992 to 2011. Samples were only collected for four years in the 1990's, but nine years of sampling was done after 2000. The lowest number of samples collected was from 2002 with just eight fish. The highest period of sampling was performed from 2007 onward, with over 690 fish collected annually, peaking in 2011 at 1,271 fish. The number of fish sampled annually can be found by year, gear, and state in Table 3.

Recreational

Aging structures and other biological samples are not collected during MRFSS/MRIP assignments because of concerns over the introduction of bias to survey data collection. Biological samples (scales, otoliths, spines, stomachs

and gonads) are collected by the SRHS and processed for aging, diet studies, and maturity studies. Aging structures provided from the charter boat and private boat modes were collected ad hoc by MRFSS/MRIP state subcontractors and SRHS port agents.

Annual numbers of gray triggerfish sampled for age and the percentage of estimated catch (number) that was sampled from the recreational fishery are reported by state in Table 4.

3 Weighting methods

3.1 Lengths

Commercial

The commercial landings estimates for SEDAR 32 were developed at the year and state level. Therefore, the finest scale to weight the SEFSC-TIP length data was by year and state for each of the gear groupings (handline and other). For each year, the state-specific length composition was multiplied by the proportion of landings from that state. The weighted state-specific length compositions were then combined and scaled to sum to one.

Recreational

The recreational landings estimates for SEDAR 32 were developed at the year and state level in order to consolidate the MRFSS/MRIP and SRHS landings estimates. Therefore, the finest scale to weight the length data was year and state data was by year and state for each of the gear groupings (handline and other). For each year, the state-specific length composition was multiplied by the proportion of landings from that state. The weighted state-specific length compositions were then combined and scaled to sum to one.

3.2 Ages (Commercial and Recreational)

The fishery-dependent age composition estimates were weighted to correct biases in age composition due to non-representative sampling. This weighting method was adapted from a technique to reduce bias associated with non-representative age sampling to produce unbiased growth curves (Chih, 2009) and has been previously used in SEDAR assessments. Lengths are recorded for each fish sampled for age. A reweighting value (RW) associated with the year (j) and length interval (i) of the age sample was assigned to each age sample by fishery as in the formula:

$$RW_{ij} = \frac{LC_{ij}}{OL_{ij}/TO_j}$$

where LC_{ij} is the weighted length composition value associated with the year j and length interval i for each aged fish, OL_{ij} is the number of aged samples in length interval i and year j , and $TO_j$is the total number of aged samples in year j. This weighting corrects for a potential sampling bias of age samples relative to length samples (Chih, 2009). The numerator in this method differs slightly from the method used by Chih (2009) in that the length composition is weighted by the landings.

4 Results

4.1 Lengths

Commercial

The commercial handline length compositions were very similar when compared across regions (Figure 1). Therefore the weighting of the length composition for the handline fishery had almost no influence (Figure 2). The commercial "other" lengths were excluded as data input because of poor sample size over most years and minimal landings.

Recreational

The recreational length compositions showed slightly smaller fish sampled in GA/FLE and VA north (Figure 3) than those sampled in NC and SC. However, weighting had limited influence on the length composition (Figure 4).

4.2 Ages

Commercial

One way to investigate sampling bias related to the collection of age samples is to compare the length composition of the aged fish to the length composition. For gray triggerfish, the length composition of the aged fish agree well with the length composition for years good sampling (Figure 2). The weighted age compositions are very similar to the nominal age compositions (Figure 5).

Recreational

The length composition of the aged fish was compared to the nominal length composition to investigate sampling bias. For gray triggerfish, the length composition of the aged fish agrees with the nominal length composition for years in which the number of age samples is greater than approximately 10

(Figure 6). The weighted age compositions are very similar to the nominal age compositions (Figure 7).

5 Discussion

There is minimal influence when weighting the recreational and commercial length or age compositions for gray triggerfish. However, the weighted compositions are recommended for use as a matter of protocol and to remove whatever minimal bias may be present.

Some of the lengths are at the tails of the overall distribution. For this reason it is recommended that the lengths less than 20cm be pooled into the 20cm bin. Lengths greater than 70cm should be pooled to the 70cm bin. The commercial handline weighted length composition for input into the model is given in Table 5. The recreational weighted length composition for input into the model is given in Table 6. For the recreational combined composition sample size the number of trips provided is a combination of vessel and angler trips.

The age data extends to 15 years. Several factors where considered in determining the maximum age for the model including the growth, maturity, and fecundity. Based on these analyses a plus group is recommended at 8 years of age. The weighted age composition for commercial handline is shown in Table 7. The weighted age composition for the recreational fishery is shown in Table 8.

Tables

Table 1. Number of fish sampled for lengths for gray triggerfish and the percent of the estimated catch in numbers that was sampled by state for the commercial handline gear.

	Lengths Handline				Percent of fish sampled for lengths			
Year	NC	SC	GA	FL	NC	SC	GA	FL
1983	8				0.1			
1984	272		34		4.4		1.6	
1985	523			115	8.9			2.2
1986	199		2	6	2.5		0.1	0.1
1987	401				4.1			
1988	201				2.0			
1989	328				3.5			
1990	644				3.0			
1991	561				1.6			
1992	431			61	1.1			0.2
1993	789			268	1.5			1.4
1994	1271			159	1.6			0.9
1995	2120		261	604	2.2		3.3	2.5
1996	945		144	649	1.0		1.8	2.9
1997	338		272	49	0.4		2.1	0.2
1998	872		13	145	0.9		0.2	1.1
1999	1092		206	412	2.3		2.2	4.8
2000	1671		279	496	5.8		3.8	7.4
2001	1455		244	223	4.8		3.3	3.0
2002	823		348	193	2.6		4.4	1.8
2003	1444		425	326	3.4		10.6	6.1
2004	2613		756	16	5.5		12.6	0.1
2005	2352	62	291	27	4.8	0.3	3.5	0.2
2006	1892	449		292	4.6	1.9		3.6
2007	1093	630		353	2.5	2.1		2.2
2008	1107	531		52	1.8	2.2		0.6
2009	972	673		66	1.4	2.6		0.3
2010	1100	369			1.7	0.9		
2011	1206	263		31	1.9	0.6		0.1

Table 2. Number of gray triggerfish sampled for lengths and percentage of the estimated catch in numbers that was sampled by state for the recreational fishery.

	Lengths (N)				Percentage of fish sampled for length			
Year	GA/EFL	SC	NC	VANorth	GA/EFL	SC	NC	VANorth
1974	-	224	94		-	1.356	0.889	-
1975	-	184	211		-	1.760	1.753	-
1976	83	192	157		0.518	2.247	1.926	-
1977	76	300	81		0.459	2.526	1.387	-
1978	250	148	215		1.089	2.514	2.634	-
1979	147	32	171		0.783	0.727	1.860	-
1980	198	94	136		1.914	1.262	3.453	-
1981	411	39	38	-	0.638	1.147	1.042	-
1982	345	100	121	1	0.573	0.730	2.587	0.134
1983	663	104	228	2	1.040	2.069	4.601	0.012
1984	543	185	144	1	0.719	2.092	1.510	0.021
1985	590	95	302	3	0.615	0.773	2.116	0.048
1986	363	85	292	16	0.851	1.621	3.781	0.104
1987	318	77	178	19	0.522	1.499	2.346	0.071
1988	278	79	107	2	0.324	1.209	2.226	0.070
1989	581	60	132	36	0.306	0.700	2.472	0.078
1990	567	33	236	26	0.365	0.679	1.287	0.138
1991	474	72	175	39	0.266	0.523	0.644	0.066
1992	304	286	228	24	0.278	1.154	0.377	0.147
1993	240	316	374	48	0.280	0.954	0.365	0.082
1994	284	505	532	23	0.460	1.867	0.523	0.111
1995	236	333	420	18	0.408	1.362	0.485	0.067
1996	115	532	724	31	0.253	1.797	0.556	0.051
1997	342	650	712	42	0.500	1.345	0.670	0.033
1998	428	325	291	6	1.077	1.165	0.661	0.052
1999	379	251	262	10	0.846	0.856	0.753	0.256
2000	238	94	144	6	0.731	0.557	0.437	0.040
2001	400	39	188	21	1.184	0.245	0.485	0.111
2002	424	212	191	63	0.595	1.589	0.340	0.155
2003	764	195	234	17	0.978	1.171	0.509	0.126
2004	1,201	167	289	47	1.025	0.729	0.604	0.059
2005	864	14	228	57	0.980	0.215	0.484	0.146
2006	714	99	103	16	0.681	1.021	0.292	0.421
2007	878	143	142	140	0.646	0.535	0.128	0.275
2008	497	123	218	47	0.505	0.221	0.242	0.498
2009	716	121	240	213	0.540	0.738	0.223	0.324
2010	1,083	130	670	38	1.150	0.724	0.703	0.144
2011	946	85	462	25	1.139	0.649	0.842	0.304

Table 3. Number of fish sampled for age for gray triggerfish and the percent of the estimated catch in numbers that was sampled by state for the commercial handline gear.

	Ages Handline				Percent of fish sampled for ages			
Year	NC	SC	GA	FL	NC	SC	GA	FL
1992		142				0.9		
1993		60				0.3		
1994								
1995								
1996		224				1.0		
1997	101	323			0.1	0.7		
1998								
1999								
2000								
2001								
2002				8				0.1
2003								
2004	188	2		3	0.4	0.0		0.0
2005	386				0.8			
2006	327	136			0.8	0.6		
2007	478	203			1.1	0.7		
2008	652	83			1.1	0.3		
2009	616	70			0.9	0.3		
2010	668	297			1.0	0.7		
2011	1022	215			1.6	0.5		

Table 4. Number of gray triggerfish sampled for age and percentage of the estimated catch in numbers that was sampled by state for the recreational fishery.

	Ages (N)			Percentage fish sampled for age		
Year	GA/EFL	SC	NC	GA/EFL	SC	NC
1990	18	0	0	0.0116	0.0000	0.0000
1991	5	4	33	0.0028	0.0291	0.1215
1994	1	0	0	0.0016	0.0000	0.0000
1997	2	0	0	0.0029	0.0000	0.0000
2001	2	0	0	0.0059	0.0000	0.0000
2002	5	0	0	0.0070	0.0000	0.0000
2003	43	0	0	0.0551	0.0000	0.0000
2004	60	0	0	0.0512	0.0000	0.0000
2005	156	0	1	0.1770	0.0000	0.0021
2006	91	13	7	0.0868	0.1341	0.0198
2007	17	26	36	0.0125	0.0973	0.0323
2008	6	5	13	0.0061	0.0090	0.0144
2009	5	21	6	0.0038	0.1280	0.0056
2010	1	28	69	0.0011	0.1559	0.0724
2011	3	23	36	0.0036	0.1756	0.0656

Table 5. Weighted length composition (FL in cm) for commercial handline gray triggerfish.

Year	N(fish)	N(trips)	20	21	22	23	24	25	26	27	28	29	30	31	32
1983	8	6	-	-	-	-	-	-	-	-	-	-	-	0.1250	-
1984	306	45	-	-	-	-	-	-	0.0031	-	-	0.0031	0.0063	0.0138	0.0044
1985	638	60	-	-	-	-	-	0.0072	-	-	0.0036	0.0036	0.0107	0.0058	0.0058
1986	207	34	-	-	-	-	-	-	-	-	-	-	0.0408	-	0.0033
1987	401	45	-	-	-	-	-	-	0.0025	0.0050	0.0025	-	-	0.0050	0.0050
1988	201	30	-	-	0.0050	-	-	0.0050	-	-	0.0149	0.0199	-	0.0050	0.0149
1989	328	36	-	-	-	-	-	-	-	-	0.0030	0.0091	0.0091	0.0030	0.0274
1990	644	37	-	-	-	-	0.0016	-	-	-	0.0031	0.0016	0.0031	0.0093	0.0109
1991	561	36	-	-	-	-	0.0018	0.0018	-	0.0018	0.0053	0.0089	0.0125	0.0232	0.0357
1992	492	36	0.0029	-	-	-	-	-	-	-	0.0075	0.0119	0.0147	0.0205	0.0460
1993	1057	73	0.0027	-	-	-	-	-	0.0011	0.0027	-	0.0029	0.0091	0.0243	0.0269
1994	1430	67	-	-	-	-	-	-	0.0014	0.0012	0.0025	0.0049	0.0117	0.0221	0.0373
1995	2985	135	-	-	-	-	0.0006	0.0010	0.0042	0.0085	0.0108	0.0234	0.0307	0.0248	0.0312
1996	1738	74	-	-	0.0003	0.0006	0.0006	0.0024	0.0034	0.0054	0.0149	0.0214	0.0361	0.0443	0.0728
1997	659	38	-	-	0.0007	0.0075	0.0025	0.0075	0.0087	0.0060	0.0043	0.0177	0.0283	0.0450	0.0404
1998	1030	55	-	-	0.0008	0.0008	0.0033	0.0049	0.0095	0.0151	0.0109	0.0095	0.0358	0.0341	0.0571
1999	1710	97	-	-	-	-	-	0.0007	0.0013	0.0032	0.0116	0.0138	0.0232	0.0294	0.0443
2000	2446	149	0.0003	0.0011	0.0017	0.0028	0.0020	0.0042	0.0081	0.0072	0.0126	0.0219	0.0253	0.0422	0.0387
2001	1922	134	-	-	0.0012	0.0025	0.0017	0.0030	0.0048	0.0131	0.0153	0.0160	0.0310	0.0462	0.0584
2002	1364	98	-	-	-	0.0015	0.0039	0.0030	0.0115	0.0203	0.0220	0.0275	0.0300	0.0410	0.0464
2003	2195	79	0.0003	-	0.0015	0.0003	0.0008	0.0021	0.0027	0.0031	0.0108	0.0140	0.0265	0.0381	0.0647
2004	3385	135	-	-	-	-	-	0.0118	0.0225	0.0127	0.0166	0.0115	0.0310	0.0535	0.0431
2005	2732	132	-	-	-	-	-	0.0007	0.0002	0.0065	0.0093	0.0060	0.0137	0.0422	0.0357
2006	2633	212	0.0010	-	-	0.0007	0.0003	0.0012	0.0014	0.0024	0.0055	0.0105	0.0168	0.0355	0.0386
2007	2076	280	0.0022	-	-	-	-	0.0009	0.0018	0.0018	0.0073	0.0071	0.0155	0.0248	0.0316
2008	1690	286	0.0005	-	-	-	-	0.0006	-	0.0029	0.0033	0.0028	0.0112	0.0189	0.0382
2009	1711	235	0.0006	-	-	0.0006	-	0.0026	0.0058	0.0104	0.0093	0.0198	0.0282	0.0360	0.0566
2010	1469	230	-	-	-	-	-	-	0.0006	0.0028	0.0060	0.0050	0.0230	0.0220	0.0251
2011	1500	227	-	-	-	-	0.0004	-	0.0007	0.0022	0.0037	0.0034	0.0086	0.0160	0.0310

Table 5 (Continued).

Year	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
1983	-	-	-	-	-	-	-	-	-	-	0.1250	-	-	-	-
1984	0.0283	0.0169	0.0320	0.0395	0.0553	0.0513	0.0463	0.0482	0.0438	0.0888	0.0463	0.0625	0.0563	0.0482	0.0375
1985	0.0213	0.0201	0.0235	0.0435	0.0384	0.0598	0.0334	0.0532	0.0481	0.0716	0.0633	0.0674	0.0710	0.0834	0.0499
1986	-	0.0475	0.0033	0.0167	0.0100	0.0201	0.0234	0.0743	0.0810	0.0710	0.0402	0.1279	0.0502	0.0402	0.1219
1987	0.0050	0.0050	0.0075	0.0150	0.0125	0.0274	0.0299	0.0449	0.0673	0.0873	0.0873	0.0549	0.0524	0.0673	0.0648
1988	0.0050	0.0149	0.0299	0.0398	0.0398	0.0448	0.0547	0.0597	0.0647	0.0498	0.0896	0.0448	0.0597	0.0597	0.0398
1989	0.0183	0.0213	0.0305	0.0335	0.0518	0.0457	0.0701	0.0671	0.0945	0.0732	0.0335	0.0732	0.0671	0.0579	0.0457
1990	0.0202	0.0217	0.0528	0.0745	0.0590	0.0776	0.0839	0.0916	0.0792	0.0652	0.0575	0.0652	0.0512	0.0388	0.0280
1991	0.0357	0.0392	0.0624	0.0677	0.0660	0.0784	0.0731	0.0588	0.0784	0.0927	0.0481	0.0535	0.0535	0.0232	0.0196
1992	0.0773	0.0851	0.0727	0.0727	0.0636	0.0877	0.0548	0.0756	0.0579	0.0535	0.0430	0.0191	0.0337	0.0236	0.0207
1993	0.0514	0.0579	0.0738	0.0755	0.0823	0.0789	0.0639	0.0809	0.0564	0.0638	0.0469	0.0422	0.0378	0.0287	0.0158
1994	0.0406	0.0878	0.0895	0.0681	0.0927	0.0777	0.0703	0.0668	0.0663	0.0616	0.0450	0.0355	0.0245	0.0157	0.0179
1995	0.0493	0.0700	0.0655	0.0801	0.0751	0.0752	0.0788	0.0734	0.0620	0.0523	0.0427	0.0357	0.0276	0.0209	0.0136
1996	0.0819	0.0851	0.0936	0.1003	0.0753	0.0797	0.0542	0.0468	0.0376	0.0336	0.0264	0.0212	0.0170	0.0098	0.0082
1997	0.0836	0.0919	0.1079	0.1042	0.0880	0.0746	0.0557	0.0500	0.0323	0.0438	0.0208	0.0210	0.0087	0.0081	0.0102
1998	0.0760	0.1080	0.0949	0.0972	0.0716	0.0795	0.0763	0.0556	0.0491	0.0335	0.0196	0.0180	0.0118	0.0134	0.0065
1999	0.0529	0.0786	0.0767	0.0994	0.0771	0.0698	0.0606	0.0661	0.0641	0.0505	0.0437	0.0371	0.0324	0.0196	0.0129
2000	0.0564	0.0656	0.0747	0.0740	0.0803	0.0751	0.0722	0.0657	0.0493	0.0467	0.0404	0.0359	0.0278	0.0218	0.0143
2001	0.0739	0.0755	0.0968	0.0744	0.0684	0.0778	0.0702	0.0605	0.0480	0.0445	0.0245	0.0233	0.0232	0.0126	0.0104
2002	0.0728	0.0678	0.0772	0.0674	0.0726	0.0651	0.0659	0.0725	0.0471	0.0470	0.0407	0.0278	0.0232	0.0101	0.0088
2003	0.0685	0.0722	0.1116	0.0793	0.0746	0.0920	0.0663	0.0752	0.0430	0.0381	0.0289	0.0262	0.0187	0.0086	0.0113
2004	0.0645	0.0600	0.1120	0.0907	0.0863	0.0807	0.0762	0.0657	0.0359	0.0336	0.0175	0.0162	0.0252	0.0168	0.0051
2005	0.0614	0.0782	0.1113	0.0935	0.1025	0.0857	0.0828	0.0799	0.0563	0.0291	0.0308	0.0273	0.0150	0.0114	0.0096
2006	0.0478	0.0566	0.0718	0.0820	0.0805	0.0878	0.0736	0.0794	0.0730	0.0603	0.0438	0.0349	0.0324	0.0226	0.0143
2007	0.0404	0.0508	0.0737	0.0709	0.0823	0.0865	0.0774	0.0703	0.0670	0.0645	0.0455	0.0430	0.0359	0.0307	0.0213
2008	0.0409	0.0551	0.0704	0.0840	0.0823	0.1001	0.0916	0.0718	0.0611	0.0599	0.0472	0.0322	0.0323	0.0216	0.0239
2009	0.0560	0.0842	0.0766	0.0764	0.0743	0.0700	0.0628	0.0680	0.0530	0.0432	0.0365	0.0339	0.0265	0.0218	0.0112
2010	0.0558	0.0494	0.0769	0.0638	0.0941	0.0922	0.0638	0.0804	0.0620	0.0628	0.0388	0.0366	0.0337	0.0315	0.0178
2011	0.0508	0.0695	0.0838	0.0616	0.1006	0.0717	0.0905	0.0909	0.0724	0.0708	0.0309	0.0314	0.0253	0.0209	0.0138

Table 5 (Continued).

Year	48	49	50	51	52	53	54	55	56	57	58	59	60
1983	-	-	0.2500	0.1250	-	-	-	0.1250	-	0.1250	-	-	0.1250
1984	0.0276	0.0281	0.0219	0.0219	0.0375	0.0375	0.0281	0.0250	0.0188	0.0031	0.0063	0.0094	0.0031
1985	0.0371	0.0432	0.0299	0.0247	0.0126	0.0173	0.0115	0.0128	0.0090	0.0070	0.0036	0.0058	0.0011
1986	0.0268	0.0603	0.0335	0.0301	0.0134	0.0134	0.0201	0.0067	0.0067	0.0100	0.0033	-	0.0033
1987	0.0399	0.0773	0.0599	0.0399	0.0324	0.0424	0.0200	0.0125	0.0175	0.0050	0.0050	-	-
1988	0.0249	0.0299	0.0398	0.0149	0.0299	0.0149	0.0299	0.0249	0.0149	-	0.0100	-	0.0050
1989	0.0366	0.0457	0.0244	0.0091	0.0061	0.0091	0.0122	0.0122	0.0030	0.0030	-	0.0030	-
1990	0.0171	0.0202	0.0109	0.0155	0.0124	0.0078	0.0062	0.0031	0.0047	0.0016	0.0047	-	-
1991	0.0214	0.0143	0.0053	0.0125	0.0018	-	-	-	0.0018	0.0018	-	-	-
1992	0.0132	0.0176	0.0073	0.0073	0.0029	0.0029	0.0015	-	-	0.0015	-	0.0015	-
1993	0.0255	0.0113	0.0091	0.0091	0.0065	0.0029	0.0058	0.0020	0.0011	-	-	-	0.0009
1994	0.0185	0.0146	0.0051	0.0078	0.0046	0.0020	0.0020	0.0020	0.0012	0.0012	-	-	-
1995	0.0111	0.0088	0.0051	0.0046	0.0046	0.0025	0.0014	0.0025	0.0018	-	-	-	-
1996	0.0050	0.0108	0.0033	0.0019	0.0011	0.0025	0.0003	-	0.0006	0.0006	-	0.0008	-
1997	0.0118	0.0043	0.0059	-	0.0043	0.0043	-	-	-	-	-	-	-
1998	-	0.0017	-	0.0019	0.0017	-	0.0010	-	-	0.0010	-	-	-
1999	0.0083	0.0107	0.0040	0.0007	0.0024	0.0030	0.0003	0.0003	0.0003	0.0006	0.0003	-	-
2000	0.0109	0.0074	0.0039	0.0041	0.0020	0.0013	0.0017	-	0.0003	-	-	-	-
2001	0.0049	0.0059	0.0036	0.0042	0.0011	0.0015	0.0010	-	-	0.0006	-	-	-
2002	0.0086	0.0066	0.0038	0.0026	0.0012	-	0.0019	0.0011	-	-	-	0.0011	-
2003	0.0057	0.0070	0.0034	0.0029	0.0008	0.0002	0.0002	-	0.0003	0.0003	-	-	-
2004	0.0030	0.0020	0.0021	0.0017	0.0009	0.0006	0.0004	0.0003	-	-	-	-	-
2005	0.0036	0.0023	0.0013	0.0021	0.0007	0.0007	-	-	0.0004	-	-	-	-
2006	0.0115	0.0050	0.0048	0.0020	0.0009	0.0004	0.0004	0.0003	-	-	-	-	-
2007	0.0169	0.0128	0.0060	0.0034	0.0024	0.0025	0.0014	0.0004	0.0004	-	-	0.0005	-
2008	0.0153	0.0105	0.0093	0.0084	0.0012	0.0016	0.0006	0.0005	-	-	-	-	-
2009	0.0107	0.0057	0.0104	0.0040	0.0029	0.0006	-	0.0010	-	-	0.0004	-	-
2010	0.0198	0.0122	0.0067	0.0067	0.0061	0.0028	0.0011	-	0.0006	-	-	-	-
2011	0.0153	0.0127	0.0078	0.0063	0.0045	0.0011	0.0011	0.0004	-	-	-	-	-

Table 6. Weighted length composition (FL in cm) for recreational gray triggerfish (SRHS, MRFSS/MRIP, and SFS).

Year	n.fish	n.trips	20	21	22	23	24	25	26	27	28	29
1974	318	118	-	-	-	-	-	-	-	-	-	-
1975	395	151	0.0049	-	-	-	-	-	-	-	0.0024	-
1976	435	182	-	-	-	-	-	-	0.0084	0.0042	-	-
1977	457	179	-	-	0.0013	-	-	0.0026	0.0013	0.0046	-	0.0079
1978	613	228	-	-	-	0.0019	0.0051	0.0038	0.0108	0.0169	0.0296	0.0301
1979	350	141	-	-	-	0.0028	0.0057	0.0085	0.0198	0.0085	0.0226	0.0367
1980	428	181	0.0016	0.0016	-	0.0031	0.0016	-	0.0016	0.0047	0.0078	0.0078
1981	488	239	-	-	-	0.0663	0.0006	0.0023	0.0040	0.0092	0.0749	0.0155
1982	566	249	0.0336	-	0.0007	0.0020	0.0033	0.0093	0.0415	0.0112	0.0099	0.0402
1983	996	426	0.0009	0.0843	0.0460	0.0077	0.0534	0.0184	0.1058	0.0189	0.1012	0.1023
1984	873	429	0.0856	0.0302	0.0010	0.0621	0.0329	0.0326	0.0336	0.0065	0.0631	0.0634
1985	987	447	0.0305	0.0023	0.0044	0.0352	0.0370	0.0099	0.1488	0.3175	0.0792	0.0120
1986	754	361	-	0.0006	0.0031	0.0068	0.0086	0.0135	0.0898	0.0354	0.0142	0.0366
1987	590	307	0.0006	0.0012	0.0024	0.0084	0.0060	0.0489	0.0393	0.0947	0.0464	0.0564
1988	466	252	0.1259	0.0266	0.0517	0.0018	0.0054	0.0359	0.0585	0.1215	0.0345	0.0250
1989	795	311	0.0008	0.0008	0.0012	0.0031	0.0287	0.0053	0.0860	0.1385	0.0334	0.0090
1990	861	290	0.0003	0.0150	0.0549	0.0694	0.0043	0.0154	0.0657	0.0636	0.0159	0.0250
1991	749	275	0.0297	0.0015	0.0010	0.0103	0.0035	0.0048	0.0099	0.0398	0.0711	0.0330
1992	840	301	0.0003	0.0013	0.0272	0.0022	0.0509	0.0060	0.0112	0.0163	0.0237	0.0269
1993	973	328	-	0.0002	0.0002	0.0123	0.0279	0.0182	0.0290	0.0128	0.0222	0.0387
1994	1,339	322	0.0150	-	0.0016	0.0014	0.0089	0.0199	0.0072	0.0173	0.0293	0.0290
1995	1,004	299	0.0231	0.0017	0.0020	0.0133	0.0149	0.0156	0.0203	0.0175	0.0425	0.0423
1996	1,399	275	-	-	0.0318	0.0016	0.0079	0.0017	0.0124	0.0211	0.0430	0.0319
1997	1,732	360	-	0.0044	-	0.0005	0.0073	0.0058	0.0029	0.0145	0.0195	0.0273
1998	1,050	389	0.0005	0.0004	0.0001	0.0003	0.0009	0.0063	0.0132	0.0076	0.0435	0.0551
1999	895	342	-	-	0.0032	0.0058	0.0075	0.0056	0.0220	0.0153	0.0303	0.0376
2000	480	220	-	0.0054	-	0.0068	0.0130	0.0094	0.0127	0.0138	0.0362	0.0723
2001	641	275	-	-	0.0002	0.0013	0.0019	0.0042	0.0111	0.0085	0.0577	0.0240
2002	849	356	-	0.0004	0.0009	0.0050	0.0060	0.0069	0.0198	0.0325	0.0411	0.0618
2003	1,202	408	-	-	-	0.0003	0.0096	0.0086	0.0206	0.0289	0.0428	0.0890
2004	1,680	483	-	-	0.0010	0.0012	0.0013	0.0045	0.0112	0.0159	0.0385	0.0743
2005	1,155	340	0.0069	-	-	0.0001	0.0002	0.0025	0.0082	0.0433	0.0965	0.0673
2006	920	358	-	-	-	-	0.0023	0.0094	0.0115	0.0696	0.0185	0.0586
2007	1,213	449	-	-	-	-	0.0017	0.0067	0.0084	0.0219	0.0163	0.0323
2008	867	297	-	-	-	-	-	0.0022	0.0094	0.2055	0.0211	0.0263
2009	1,197	441	-	-	0.0015	0.0053	0.0033	0.0134	0.0146	0.0166	0.0167	0.0389
2010	1,910	478	0.0017	-	-	0.0005	0.0003	0.0040	0.0032	0.0170	0.0215	0.0339
2011	1,499	403	0.0002	-	-	-	0.0007	0.0058	0.0096	0.0068	0.0116	0.0168

Table 6 (continued). Weighted length composition (FL in cm) for recreational gray triggerfish (SRHS, MRFSS/MRIP, and SFS).

Year	30	31	32	33	34	35	36	37	38	39	40	41
1974	-	-	-	-	-	-	-	-	0.0025	-	0.0050	0.0169
1975	-	-	0.0077	0.0026	-	0.0026	0.0052	0.0101	0.0052	0.0105	0.0206	0.0155
1976	0.0100	0.0058	0.0084	0.0084	0.0126	0.0184	0.0326	0.0268	0.0185	0.0148	0.0586	0.0777
1977	0.0092	0.0184	0.0013	0.0373	0.0118	0.0333	0.0161	0.0501	0.0573	0.0676	0.0388	0.0572
1978	0.0320	0.0202	0.0390	0.0403	0.0277	0.0374	0.0350	0.0341	0.0313	0.0349	0.0387	0.0350
1979	0.0226	0.0226	0.0254	0.0339	0.0113	0.0135	0.0285	0.0235	0.0322	0.0460	0.0342	0.0421
1980	0.0094	0.0159	0.0078	0.0125	0.0110	0.0189	0.0318	0.0236	0.0110	0.0351	0.0418	0.0781
1981	0.0230	0.0225	0.0184	0.0235	0.0189	0.0840	0.0138	0.0103	0.0778	0.0224	0.0139	0.0129
1982	0.0126	0.0106	0.0797	0.0488	0.0159	0.0441	0.0243	0.0559	0.0186	0.0257	0.0271	0.0328
1983	0.1856	0.0639	0.0114	0.0166	0.0172	0.0223	0.0254	0.0206	0.0132	0.0181	0.0110	0.0095
1984	0.0133	0.0116	0.0485	0.0443	0.0484	0.0448	0.0284	0.0561	0.0163	0.0697	0.0192	0.0175
1985	0.0115	0.0124	0.0411	0.0098	0.0128	0.0139	0.0149	0.0158	0.0152	0.0198	0.0132	0.0179
1986	0.0433	0.0542	0.0169	0.0454	0.0127	0.0790	0.0945	0.0448	0.0225	0.0335	0.0467	0.0222
1987	0.0381	0.0165	0.0289	0.0519	0.1059	0.0711	0.0115	0.0404	0.0693	0.0230	0.0555	0.0096
1988	0.0270	0.0124	0.0212	0.0123	0.1603	0.0488	0.0310	0.0121	0.0105	0.0172	0.0099	0.0058
1989	0.0398	0.0234	0.0063	0.0474	0.1886	0.0465	0.0232	0.0157	0.0137	0.0427	0.0311	0.0238
1990	0.0228	0.0171	0.0197	0.0281	0.0709	0.0234	0.0267	0.0276	0.0790	0.0244	0.0134	0.0133
1991	0.0389	0.0414	0.0246	0.0533	0.1482	0.0567	0.0525	0.0408	0.0403	0.0448	0.0167	0.0663
1992	0.0686	0.0558	0.0711	0.0881	0.0730	0.0742	0.0611	0.0531	0.0269	0.0859	0.0124	0.0141
1993	0.1005	0.1297	0.1047	0.0756	0.0497	0.0724	0.0555	0.0672	0.0409	0.0256	0.0126	0.0253
1994	0.0344	0.0316	0.0606	0.0699	0.1103	0.1213	0.0520	0.0642	0.0491	0.0622	0.0560	0.0415
1995	0.1064	0.0688	0.0736	0.0889	0.0628	0.0644	0.0757	0.0811	0.0527	0.0345	0.0237	0.0156
1996	0.0955	0.0743	0.0744	0.0847	0.0821	0.0837	0.0882	0.0559	0.0451	0.0405	0.0319	0.0231
1997	0.0709	0.1453	0.1086	0.1029	0.1823	0.0644	0.0377	0.0607	0.0569	0.0349	0.0093	0.0242
1998	0.0519	0.0570	0.0398	0.1043	0.1065	0.1204	0.0808	0.0396	0.0548	0.0320	0.0437	0.0345
1999	0.0605	0.0716	0.0802	0.0769	0.0800	0.0707	0.0516	0.0471	0.0590	0.0599	0.0313	0.0567
2000	0.0421	0.0791	0.0351	0.1227	0.0460	0.0836	0.0700	0.1036	0.0102	0.0590	0.0211	0.0105
2001	0.0409	0.0648	0.1388	0.1337	0.1101	0.1197	0.0396	0.0774	0.0361	0.0118	0.0301	0.0204
2002	0.0592	0.1118	0.0982	0.1084	0.0958	0.0548	0.0647	0.0659	0.0302	0.0309	0.0163	0.0230
2003	0.0712	0.0892	0.1033	0.1056	0.1038	0.0552	0.0459	0.0509	0.0212	0.0329	0.0232	0.0092
2004	0.1075	0.0841	0.0849	0.1125	0.0836	0.0873	0.0681	0.0711	0.0359	0.0156	0.0279	0.0261
2005	0.0714	0.0619	0.0756	0.0568	0.0872	0.0818	0.0652	0.0581	0.0594	0.0528	0.0355	0.0241
2006	0.0916	0.0838	0.0625	0.0725	0.0699	0.0525	0.0738	0.0791	0.0401	0.0495	0.0531	0.0321
2007	0.0521	0.0874	0.0919	0.0993	0.0902	0.1249	0.0899	0.0861	0.0435	0.0271	0.0284	0.0214
2008	0.0721	0.0675	0.0457	0.0673	0.0694	0.0613	0.0505	0.0497	0.0481	0.0612	0.0364	0.0199
2009	0.0790	0.0878	0.0713	0.1182	0.0976	0.1069	0.0838	0.0542	0.0494	0.0294	0.0234	0.0256
2010	0.0650	0.0890	0.1109	0.1101	0.0760	0.1006	0.0855	0.0615	0.0557	0.0376	0.0322	0.0207
2011	0.0665	0.0503	0.0825	0.0927	0.0986	0.1077	0.0927	0.0915	0.0879	0.0511	0.0257	0.0270

Table 6 (continued). Weighted length composition (FL in cm) for recreational gray triggerfish (SRHS, MRFSS/MRIP, and SFS).

Year	42	43	44	45	46	47	48	49	50	51	52	53
1974	0.0125	0.0194	0.0337	0.0487	0.0490	0.0296	0.0365	0.0587	0.0628	0.0615	0.0581	0.0509
1975	0.0204	0.0226	0.0200	0.0202	0.0226	0.0326	0.0408	0.0380	0.0658	0.0406	0.0408	0.0376
1976	0.0472	0.0304	0.0254	0.0165	0.0197	0.0490	0.0334	0.0255	0.0213	0.0300	0.0318	0.0246
1977	0.0892	0.0461	0.0650	0.0475	0.0462	0.0559	0.0415	0.0448	0.0331	0.0286	0.0169	0.0352
1978	0.0337	0.0476	0.0405	0.0372	0.0488	0.0393	0.0466	0.0504	0.0346	0.0354	0.0147	0.0257
1979	0.0593	0.0411	0.0559	0.0422	0.0470	0.0690	0.0445	0.0445	0.0450	0.0262	0.0269	0.0194
1980	0.0739	0.0775	0.0499	0.0407	0.0470	0.0669	0.0497	0.0628	0.0407	0.0254	0.0414	0.0131
1981	0.0145	0.0096	0.0703	0.1410	0.0770	0.0141	0.0146	0.0157	0.0720	0.0118	0.0141	0.0114
1982	0.1976	0.0849	0.0267	0.0148	0.0443	0.0148	0.0126	0.0129	0.0038	0.0068	0.0129	0.0058
1983	0.0107	0.0123	0.0078	0.0032	0.0033	0.0025	0.0021	0.0004	0.0032	-	0.0004	-
1984	0.0215	0.0115	0.0095	0.0089	0.0049	0.0081	0.0049	0.0077	0.0672	0.0046	0.0036	0.0036
1985	0.0127	0.0155	0.0098	0.0137	0.0173	0.0078	0.0090	0.0079	0.0076	0.0051	0.0029	0.0040
1986	0.0223	0.0868	0.0310	0.0156	0.0140	0.0157	0.0269	0.0149	0.0285	0.0035	0.0023	0.0034
1987	0.0124	0.0540	0.0116	0.0084	0.0032	0.0070	0.0318	0.0205	0.0047	0.0017	0.0061	0.0043
1988	0.0183	0.0644	0.0301	0.0046	0.0034	0.0082	0.0031	0.0024	0.0003	0.0034	0.0017	0.0012
1989	0.0730	0.0776	0.0026	0.0006	0.0019	0.0013	0.0005	0.0022	0.0008	0.0045	0.0230	0.0010
1990	0.1180	0.0019	0.0050	0.0057	0.0025	0.0032	0.0040	0.0535	0.0009	0.0557	0.0535	0.0003
1991	0.0366	0.0364	0.0067	0.0364	0.0040	0.0060	0.0014	0.0024	0.0017	0.0038	0.0014	0.0014
1992	0.0571	0.0365	0.0055	0.0275	0.0042	0.0042	0.0010	0.0003	0.0013	0.0013	0.0038	0.0038
1993	0.0320	0.0081	0.0069	0.0056	0.0016	0.0025	0.0046	0.0009	0.0022	0.0018	0.0002	0.0099
1994	0.0283	0.0157	0.0155	0.0101	0.0064	0.0193	0.0019	-	0.0011	0.0158	0.0004	-
1995	0.0234	0.0087	0.0104	0.0067	0.0028	0.0018	0.0024	0.0012	-	0.0002	-	0.0009
1996	0.0098	0.0278	0.0088	0.0120	0.0024	0.0055	0.0005	0.0002	0.0006	-	0.0004	0.0004
1997	0.0032	0.0031	0.0029	0.0019	0.0001	0.0006	0.0049	-	0.0003	0.0003	0.0004	0.0001
1998	0.0402	0.0132	0.0080	0.0203	0.0003	0.0012	0.0001	-	-	0.0203	0.0001	-
1999	0.0463	0.0044	0.0165	0.0162	0.0129	0.0046	0.0033	0.0033	0.0014	0.0002	0.0065	0.0058
2000	0.0214	0.0136	0.0133	0.0621	0.0125	-	0.0003	0.0003	0.0119	-	-	-
2001	0.0160	0.0117	0.0084	-	0.0142	0.0002	-	0.0056	0.0056	-	-	-
2002	0.0067	0.0156	0.0053	0.0052	0.0035	0.0080	0.0023	0.0074	-	-	-	0.0035
2003	0.0201	0.0207	0.0178	0.0089	0.0070	0.0047	0.0046	0.0040	0.0001	0.0004	-	-
2004	0.0101	0.0098	0.0024	0.0162	-	0.0040	0.0017	-	-	0.0017	-	0.0017
2005	0.0116	0.0145	0.0099	0.0065	0.0012	0.0001	-	0.0010	0.0001	-	-	0.0001
2006	0.0041	0.0229	0.0138	0.0050	0.0074	0.0012	0.0100	0.0006	0.0022	0.0011	0.0001	0.0011
2007	0.0166	0.0181	0.0166	0.0067	0.0001	0.0030	0.0079	-	-	-	0.0001	-
2008	0.0204	0.0141	0.0097	0.0135	0.0135	0.0107	0.0001	0.0001	-	0.0044	-	-
2009	0.0229	0.0046	0.0089	0.0110	0.0070	0.0040	0.0040	0.0003	-	0.0002	-	-
2010	0.0172	0.0170	0.0091	0.0088	0.0023	0.0052	0.0069	0.0047	0.0012	0.0009	-	-
2011	0.0126	0.0108	0.0171	0.0014	0.0060	0.0077	0.0124	0.0056	-	0.0002	0.0002	0.0002

Table 6 (continued). Weighted length composition (FL in cm) for recreational gray triggerfish (SRHS, MRFSS/MRIP, and SFS).

Year	54	55	56	57	58	59	60	61	62	63
1974	0.0559	0.0512	0.0412	0.0362	0.0634	0.0290	0.0578	0.0122	0.0141	0.0194
1975	0.0529	0.0505	0.0619	0.0580	0.0658	0.0509	0.0556	0.0303	0.0305	0.0206
1976	0.0347	0.0455	0.0417	0.0391	0.0282	0.0225	0.0207	0.0229	0.0162	0.0243
1977	0.0157	0.0013	0.0078	-	0.0079	-	-	0.0013	-	-
1978	0.0128	0.0119	0.0044	0.0031	0.0015	0.0031	-	-	0.0015	-
1979	0.0175	0.0044	0.0028	0.0087	0.0028	0.0022	-	-	-	-
1980	0.0164	0.0115	0.0142	0.0126	0.0081	-	0.0047	0.0067	0.0018	0.0018
1981	0.0108	0.0033	0.0023	-	-	-	-	-	-	-
1982	0.0074	0.0029	0.0020	0.0010	0.0013	-	-	-	-	-
1983	0.0004	-	-	-	-	-	-	-	-	-
1984	0.0025	0.0057	0.0010	0.0028	0.0022	-	0.0003	-	-	-
1985	0.0042	0.0020	0.0012	0.0008	0.0026	-	0.0003	-	-	-
1986	0.0033	0.0013	0.0011	0.0043	0.0006	-	-	-	0.0006	-
1987	0.0006	0.0009	0.0011	0.0044	0.0011	-	-	-	-	-
1988	0.0018	0.0017	-	-	-	-	-	-	-	-
1989	0.0004	-	0.0000	-	-	0.0004	0.0004	-	0.0004	-
1990	-	-	-	-	-	-	-	-	-	-
1991	-	0.0007	-	0.0303	0.0007	-	-	-	-	-
1992	-	-	-	-	-	0.0029	-	-	-	-
1993	-	0.0009	0.0013	-	-	-	-	-	-	-
1994	0.0014	0.0011	-	-	-	0.0002	-	-	-	-
1995	-	-	0.0002	-	-	-	-	-	-	-
1996	-	0.0004	-	0.0005	-	-	-	-	-	-
1997	0.0003	0.0016	-	-	-	-	-	-	-	-
1998	0.0016	-	0.0012	-	-	-	-	-	-	-
1999	0.0058	-	-	-	-	-	-	-	-	-
2000	0.0119	-	-	-	-	-	-	-	-	-
2001	0.0056	-	-	-	-	-	-	-	-	-
2002	0.0035	-	-	-	-	-	-	-	0.0035	-
2003	-	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-	-
2005	-	-	0.0001	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	0.0014
2008	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-

Table 6 (continued). Weighted length composition (FL in cm) for recreational gray triggerfish (SRHS, MRFSS/MRIP, and SFS).

Year	64	65	66	67	68	69	70
1974	0.0332	0.0119	0.0213	-	-	0.0025	0.0050
1975	0.0024	0.0129	0.0052	0.0026	0.0052	0.0052	-
1976	0.0124	0.0168	0.0043	0.0043	-	0.0064	-
1977	-	-	-	-	-	-	-
1978	-	-	-	0.0019	-	-	0.0019
1979	-	-	-	-	-	-	-
1980	0.0016	0.0018	-	-	0.0016	-	0.0016
1981	0.0023	-	-	-	-	-	0.0012
1982	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	0.0003
1985	-	-	-	-	0.0003	-	0.0003
1986	-	-	-	-	-	-	-
1987	-	-	-	-	-	-	0.0003
1988	-	-	-	-	-	-	0.0003
1989	-	-	-	-	-	-	0.0002
1990	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	0.0007
1992	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-
1995	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-
1997	-	0.0003	-	-	-	-	-
1998	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	0.0002
2002	-	-	-	-	0.0011	0.0011	-
2003	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-
2005	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	0.0001
2011	-	-	-	-	-	-	-

Table 7. Weighted age composition for commercial handline gray triggerfish with ages 8-15 pooled to the 8-plus bin.

Year	N(fish)	N(trips)	1	2	3	4	5	6	7	8-plus
1992	142	5	-	0.0067	0.1095	0.2842	0.3204	0.1575	0.0561	0.0656
1993	60	3	-	-	0.0058	0.2657	0.296	0.1586	0.1783	0.0955
1996	224	3	-	-	0.0707	0.2559	0.4022	0.1686	0.0848	0.0177
1997	424	10	-	-	0.0235	0.1845	0.3868	0.2542	0.1157	0.0352
2002	8	2	-	0.3071	0.4744	0.2185	-	-	-	-
2004	193	27	-	0.002	0.1811	0.4504	0.2862	0.0653	0.0133	0.0017
2005	386	47	-	0.0679	0.2783	0.3312	0.2337	0.0683	0.0041	0.0166
2006	463	86	-	0.0279	0.1713	0.2884	0.2906	0.1428	0.0618	0.0171
2007	681	196	0.004	0.0688	0.2027	0.2929	0.2184	0.1317	0.0504	0.031
2008	735	205	0.0009	0.0175	0.1827	0.3103	0.2571	0.1454	0.0554	0.0307
2009	686	180	-	0.0192	0.1874	0.3487	0.2594	0.1267	0.0397	0.0189
2010	965	215	0.0026	0.0294	0.1242	0.2835	0.2581	0.171	0.0844	0.0468
2011	1237	211	-	0.0334	0.1929	0.3207	0.2542	0.1266	0.0445	0.0276

Table 8. Weighted age composition for recreational gray triggerfish with ages 8-15 pooled to the 8-plus bin.

Year	n.fish	n.trips	1	2	3	4	5	6	7	8-plus
1990	18	10	-	0.2122	0.4560	0.2837	0.0410	-	0.0072	-
1991	42	24	-	0.0029	0.2274	0.5690	0.0908	0.0478	0.0431	0.0191
1994	1	1	-	1.0000	-	-	-	-	-	-
1997	2	2	-	0.8300	0.1700	-	-	-	-	-
2001	2	1	-	-	1.0000	-	-	-	-	-
2002	5	4	-	-	0.3733	0.3895	0.2198	0.0174	-	-
2003	43	24	-	0.1389	0.4723	0.3079	0.0743	-	0.0065	-
2004	60	24	-	0.0316	0.1676	0.2729	0.3157	0.1824	0.0299	-
2005	157	54	-	0.1204	0.3372	0.2676	0.1716	0.0781	0.0223	0.0029
2006	111	39	0.0138	0.0811	0.3115	0.3214	0.1859	0.0688	0.0151	0.0024
2007	79	48	0.0027	0.0804	0.3475	0.3691	0.1377	0.0626	-	-
2008	24	15	-	0.1757	0.3180	0.2813	0.1828	0.0421	-	-
2009	32	31	-	0.1143	0.2399	0.4043	0.2254	0.0159	-	0.0001
2010	98	56	-	0.0733	0.3540	0.2725	0.2557	0.0445	-	-
2011	62	37	-	0.0443	0.1386	0.5167	0.2072	0.0641	0.0090	0.0200

*Number of trips is a combination of angler and vessel trips.

Figures

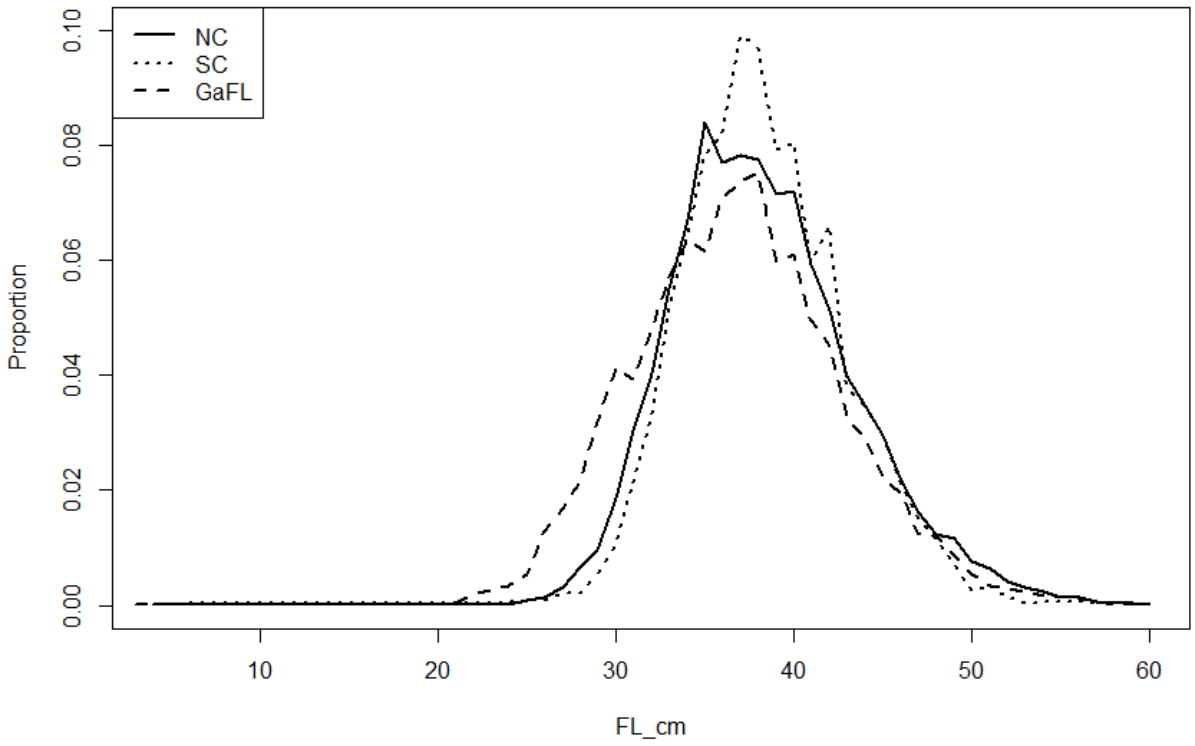

Figure 1. Length composition of gray triggerfish sampled for length in the commercial fishery by state/region for all years.

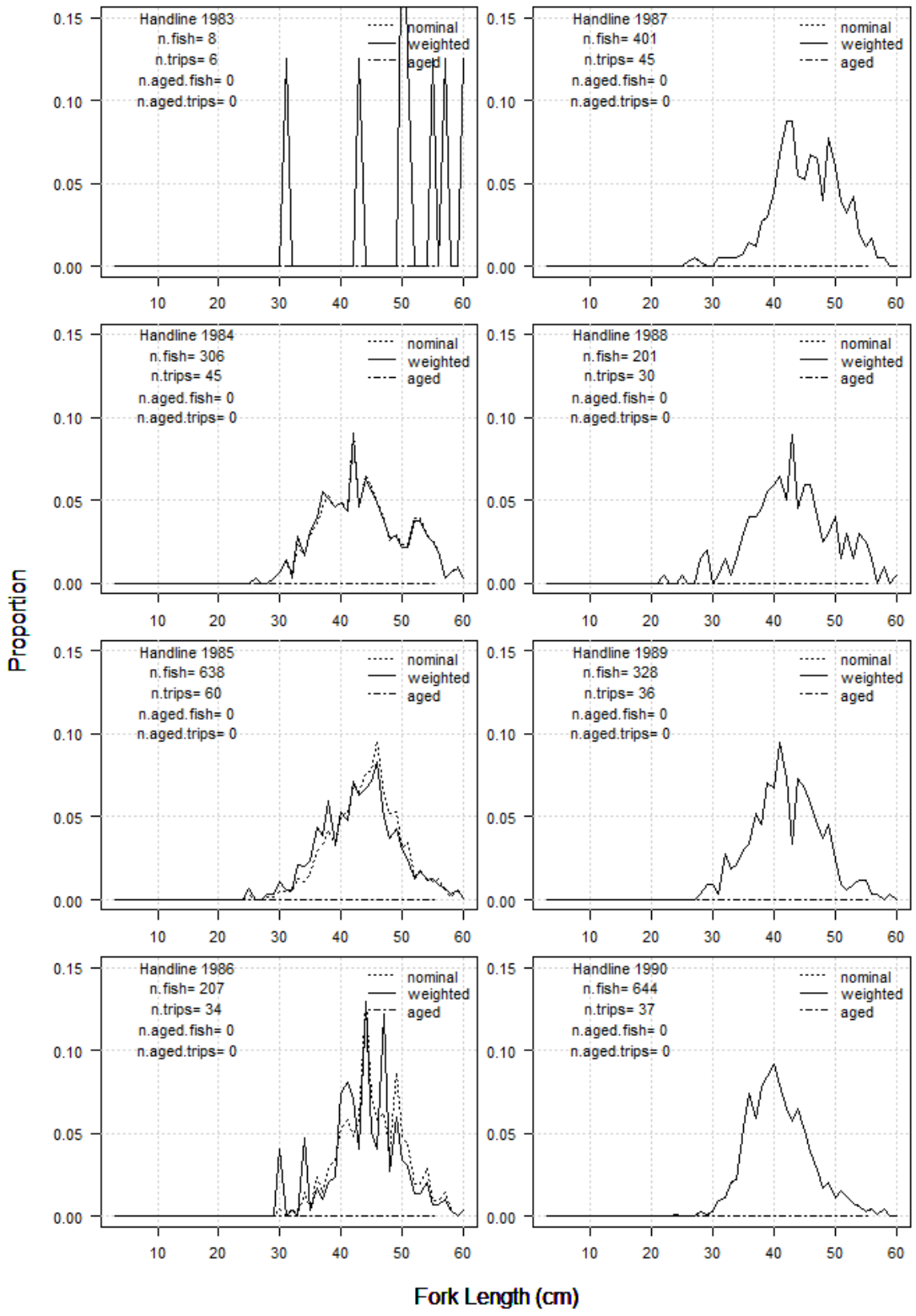

Figure 2. Weighted and un-weighted gray triggerfish length composition for commercial handline gear by year. The length composition of the aged fish is also plotted and fixed at 0 for years with no aged fish.

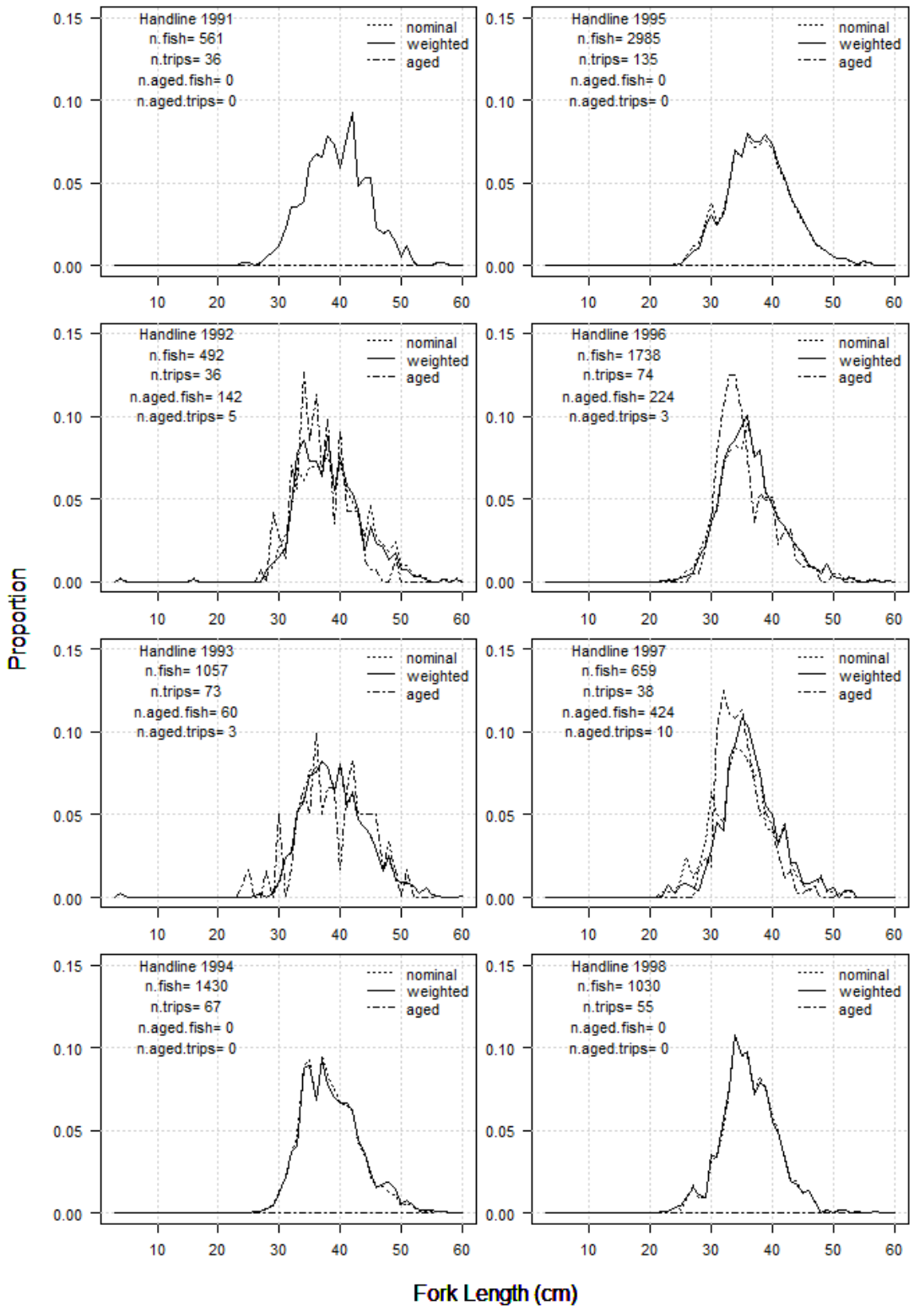

Figure 2 (continued).

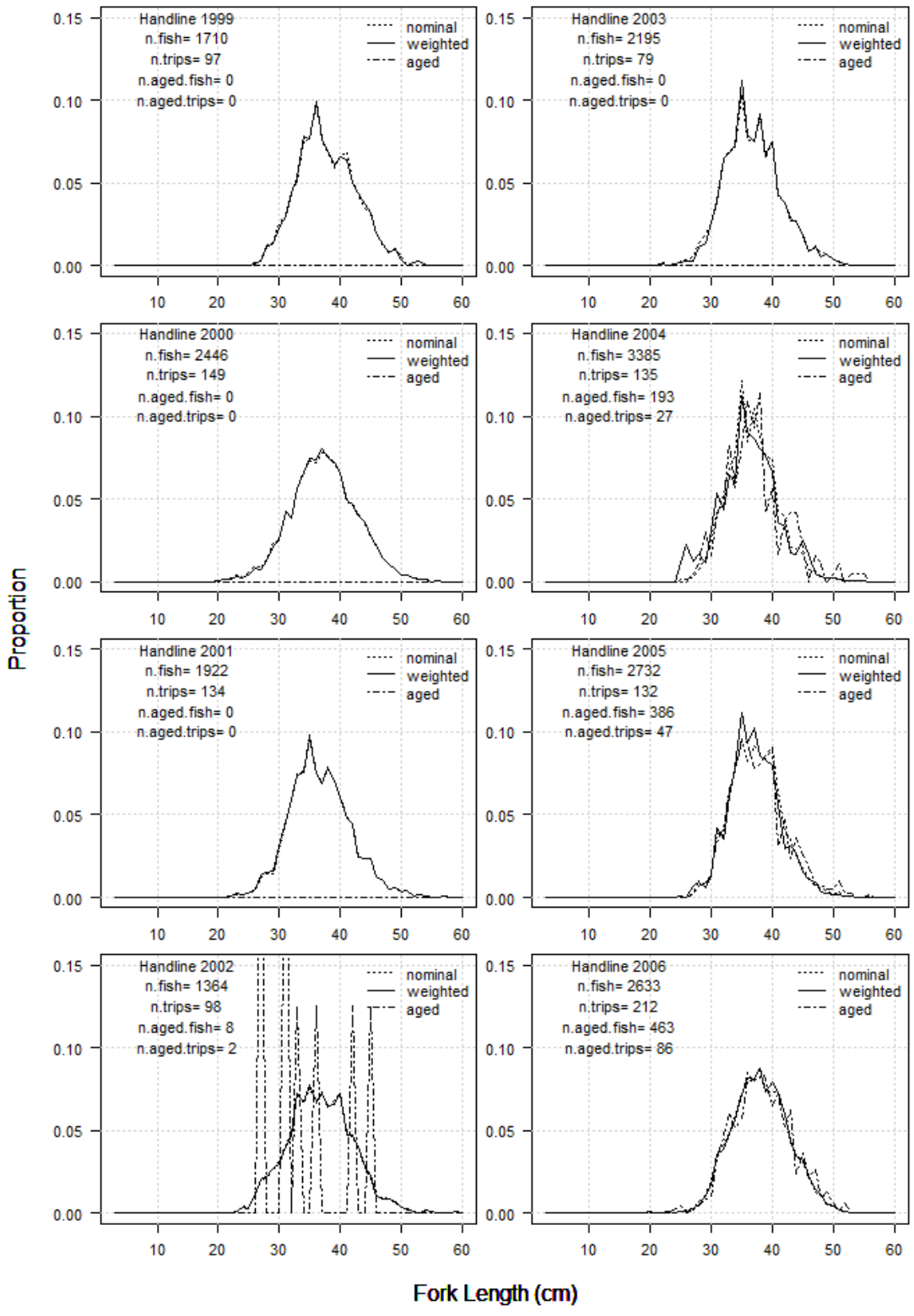

Figure 2 (continued).

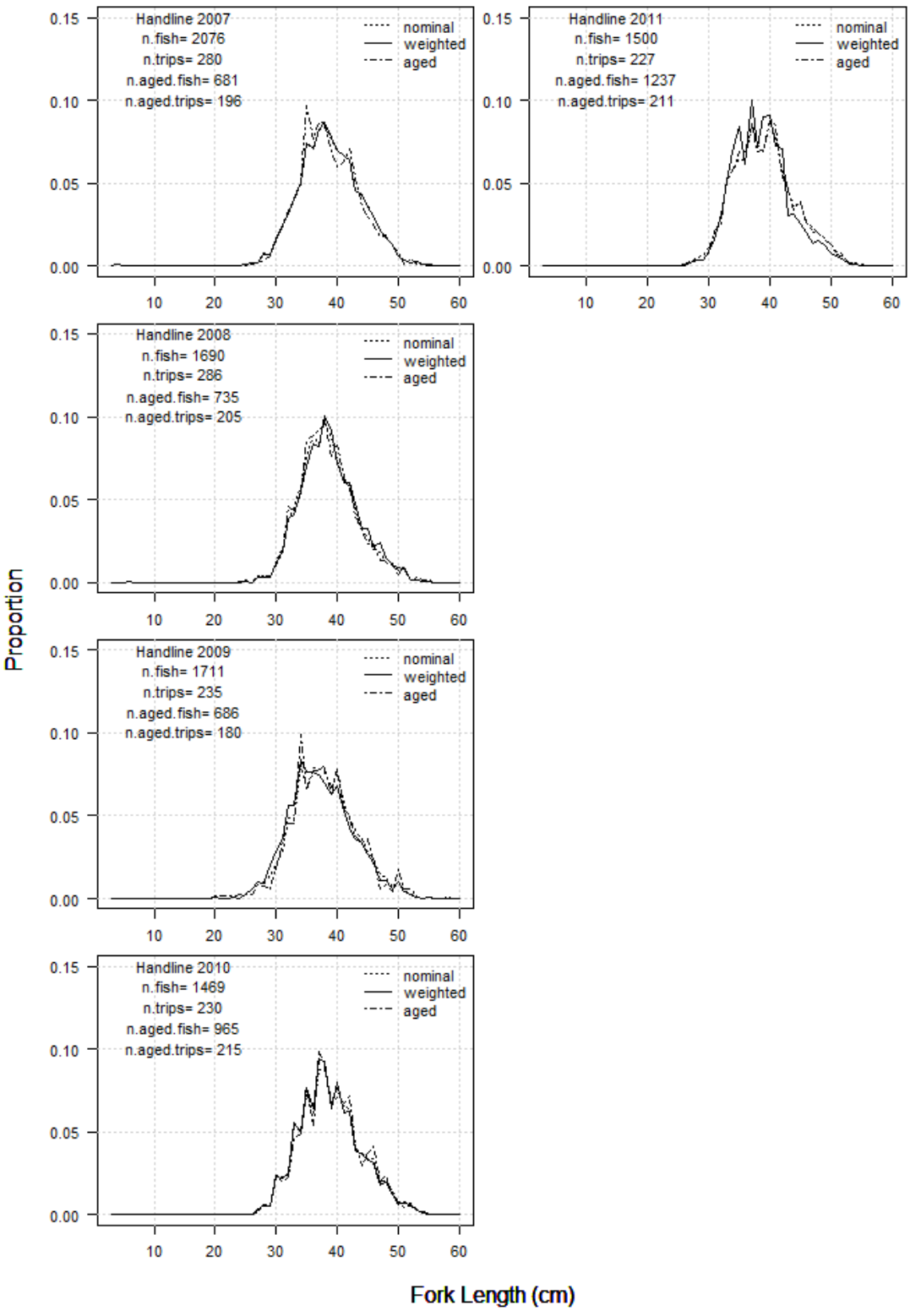

Figure 2 (continued).

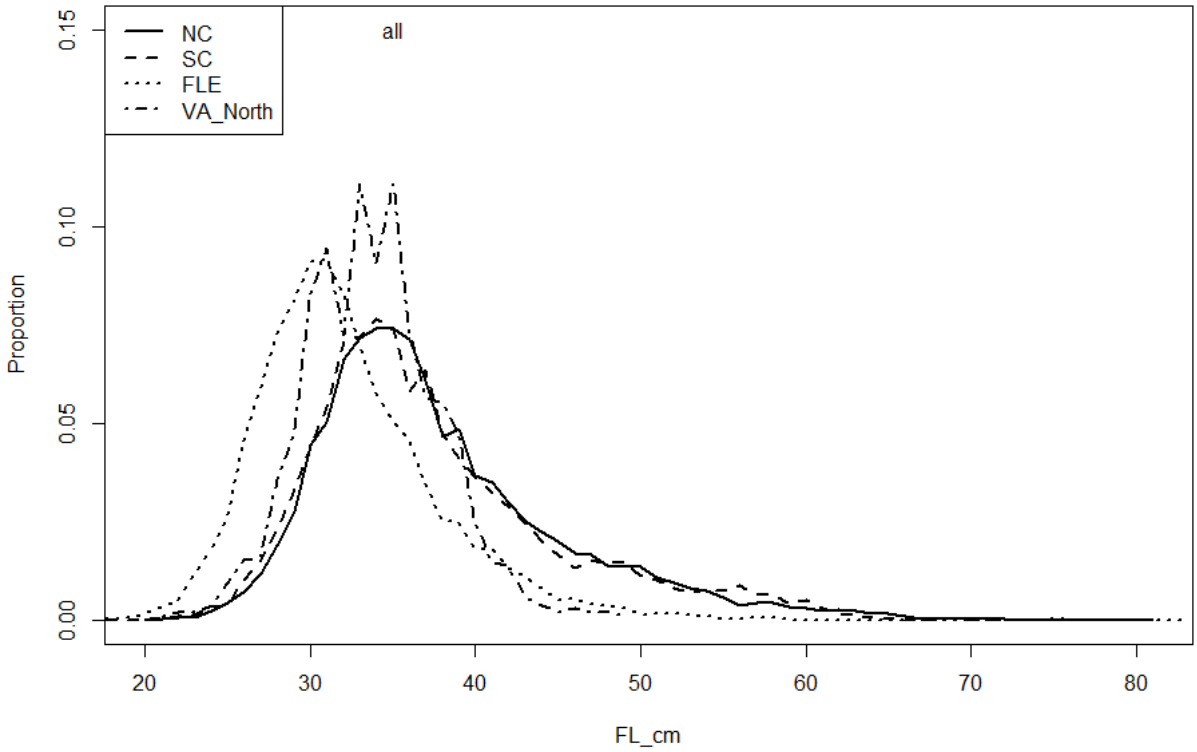

Figure 3. Length composition of gray triggerfish sampled for length in the recreational fishery by state/region for all years.

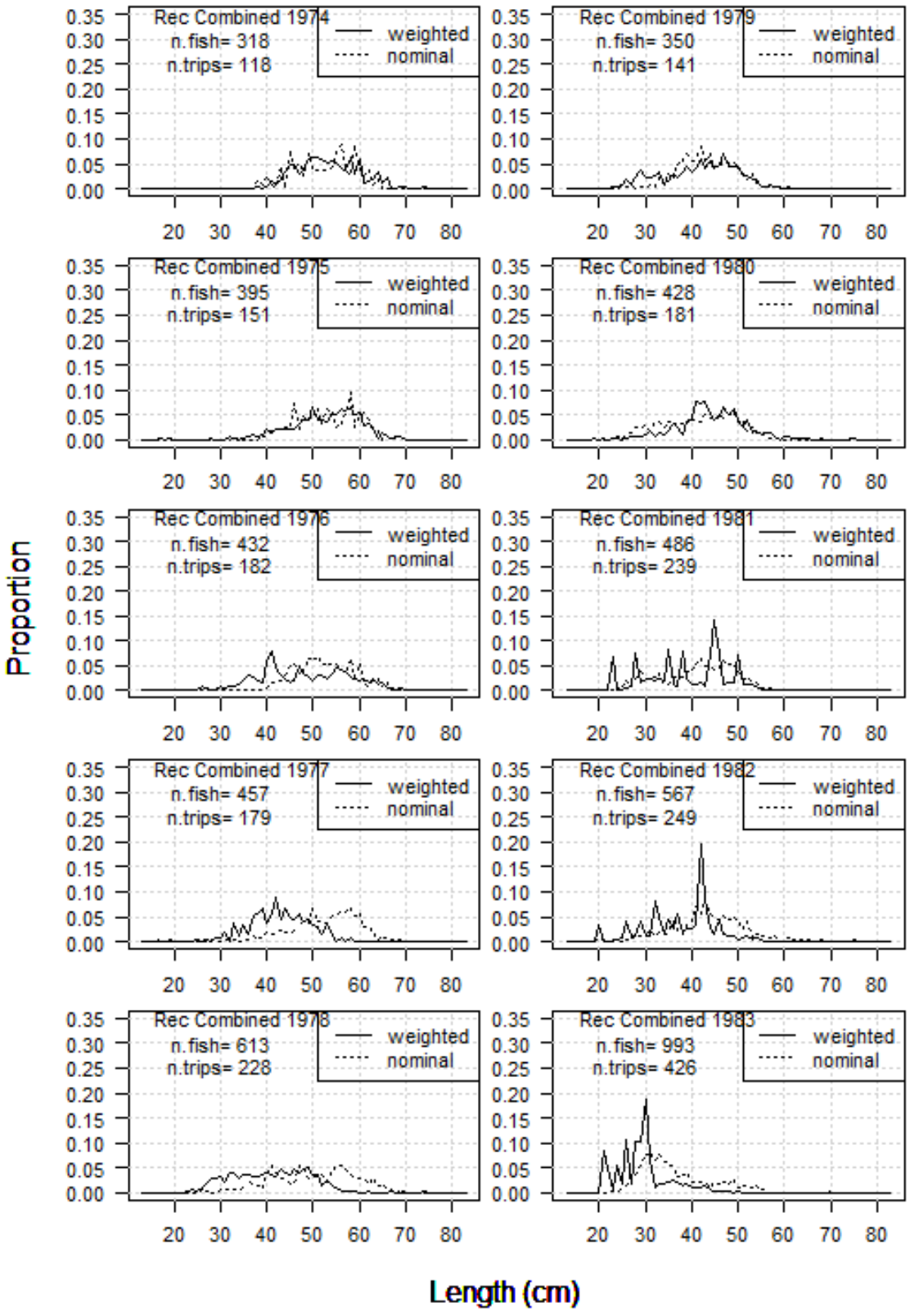

Figure 4. Weighted and nominal gray triggerfish length composition for the recreational fishery (SRHS, SFS, and MRFSS/MRIP) by year.

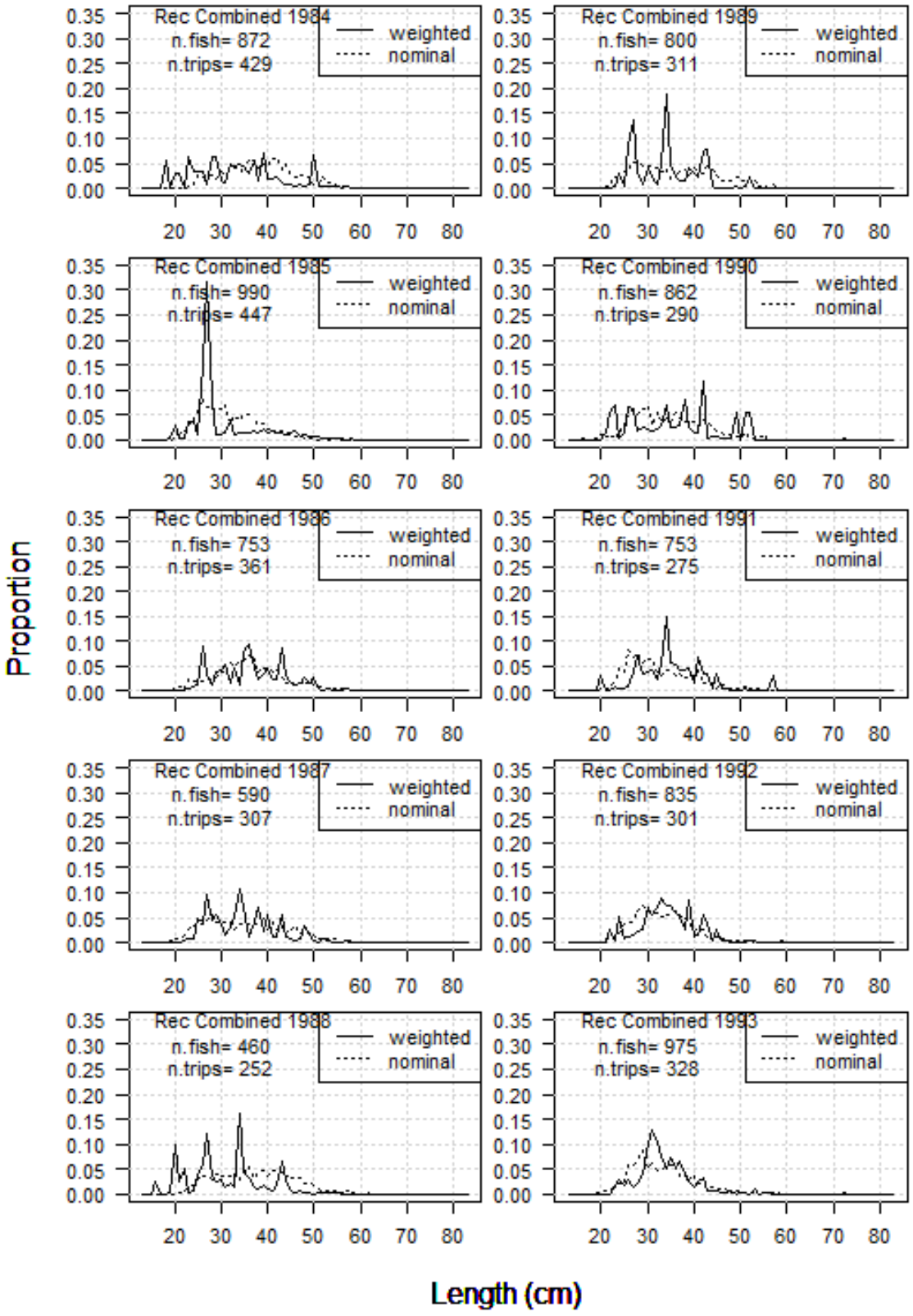

Figure 4 (continued). Weighted and nominal gray triggerfish length composition for the recreational fishery (SRHS, SFS, and MRFSS/MRIP) by year.

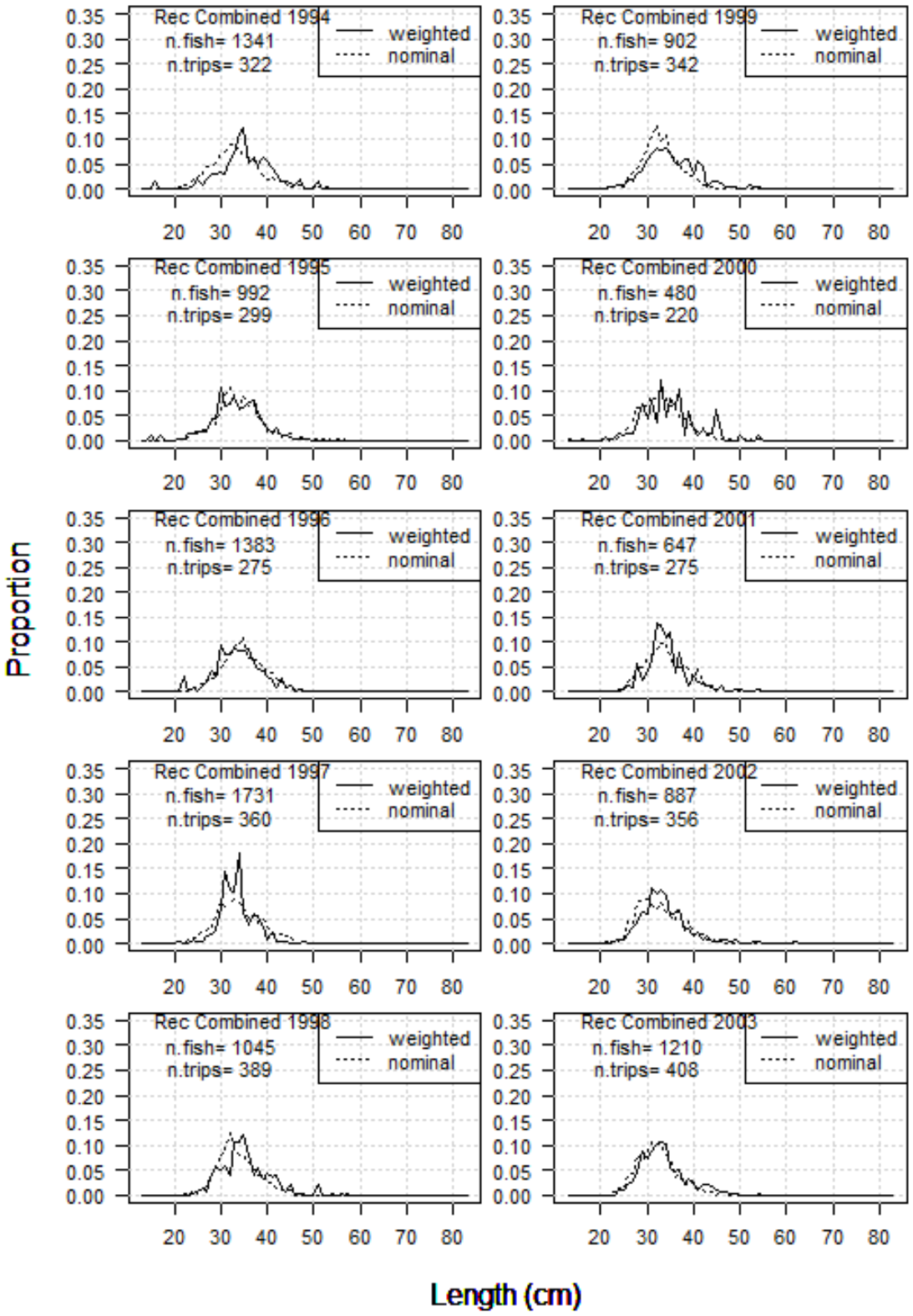

Figure 4 (continued). Weighted and nominal gray triggerfish length composition for the recreational fishery (SRHS, SFS, and MRFSS/MRIP) by year.

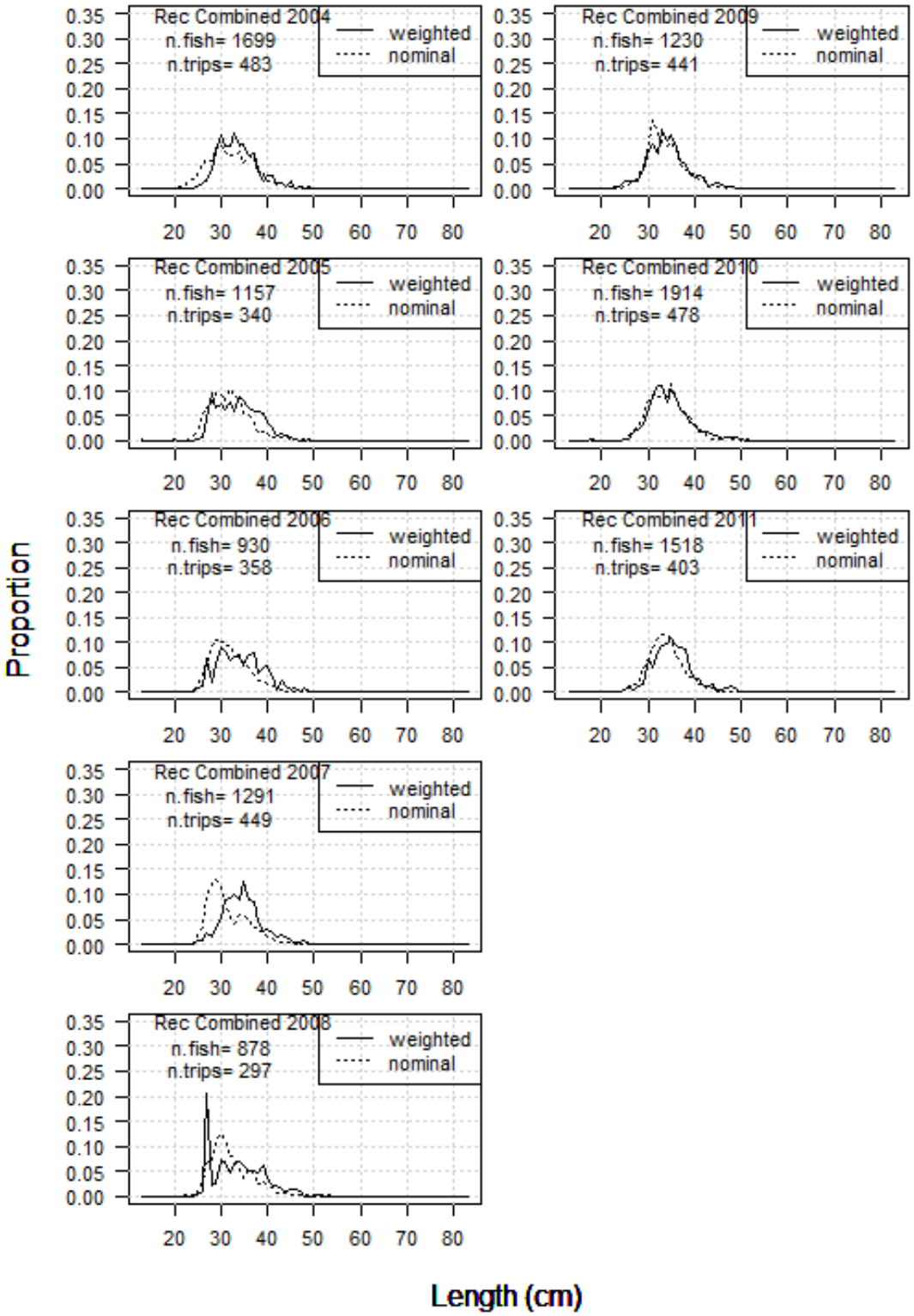

Figure 4 (continued). Weighted and nominal gray triggerfish length composition for the recreational fishery (SRHS, SFS, and MRFSS/MRIP) by year.

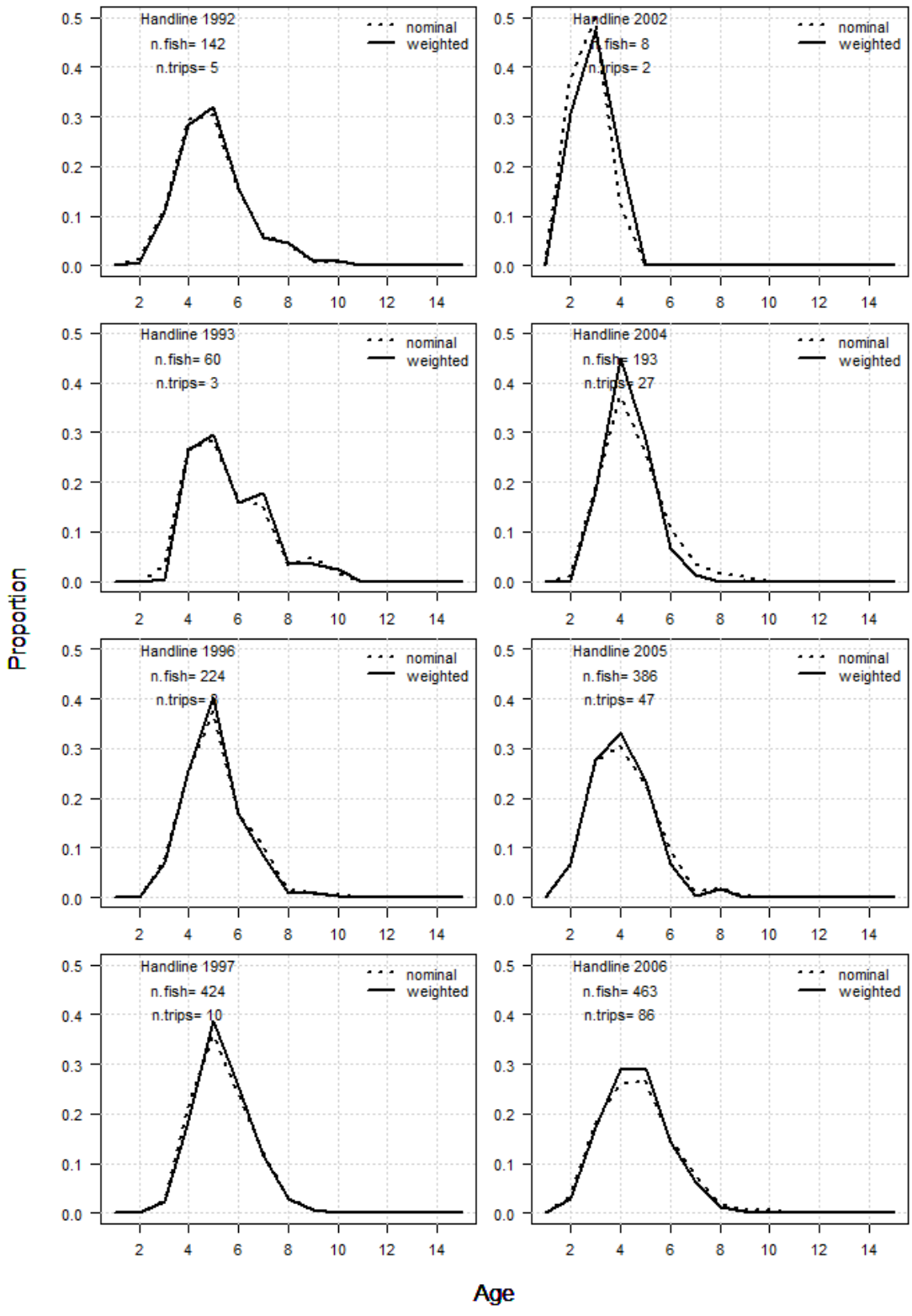

Figure 5. Weighted and un-weighted gray triggerfish age composition for the commercial handline gear.

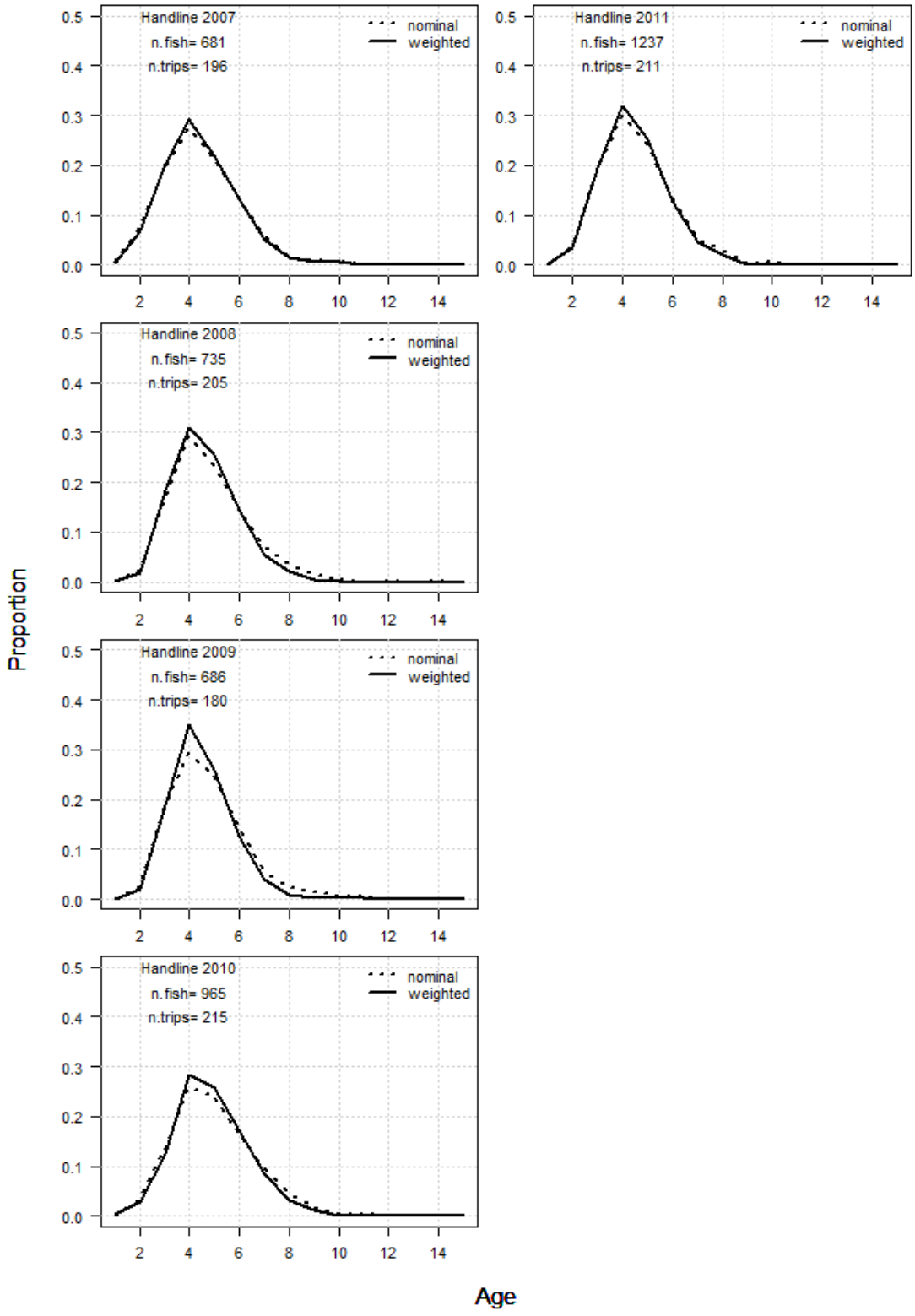

Figure 5 (continued).

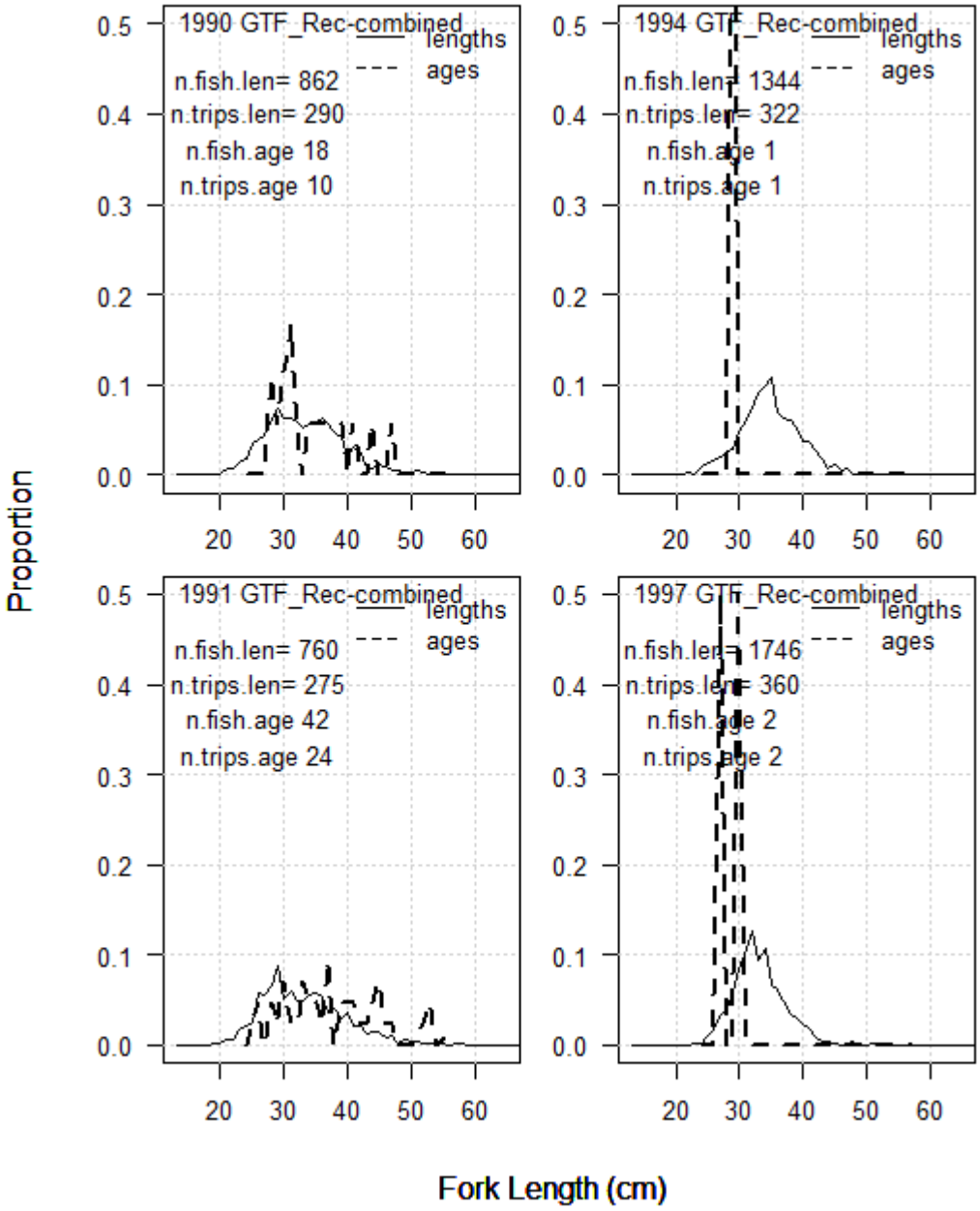

Figure 6. Length composition of aged gray triggerfish and all gray triggerfish sampled for length in the recreational fishery (SRHS, SFS, and MRFSS/MRIP).

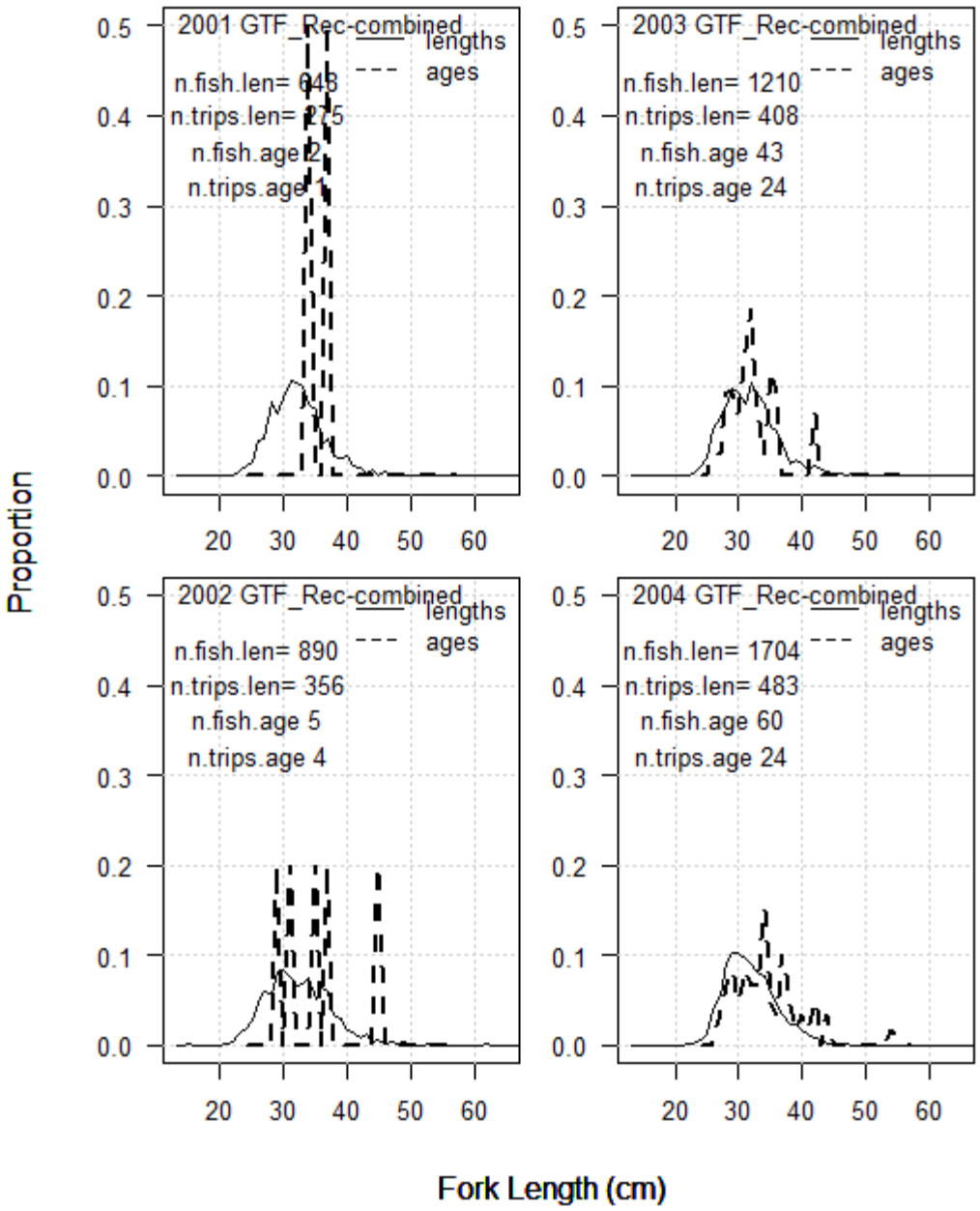

Figure 6 (continued). Length composition of aged gray triggerfish and all gray triggerfish sampled for length in the recreational fishery (SRHS, SFS, and MRFSS/MRIP).

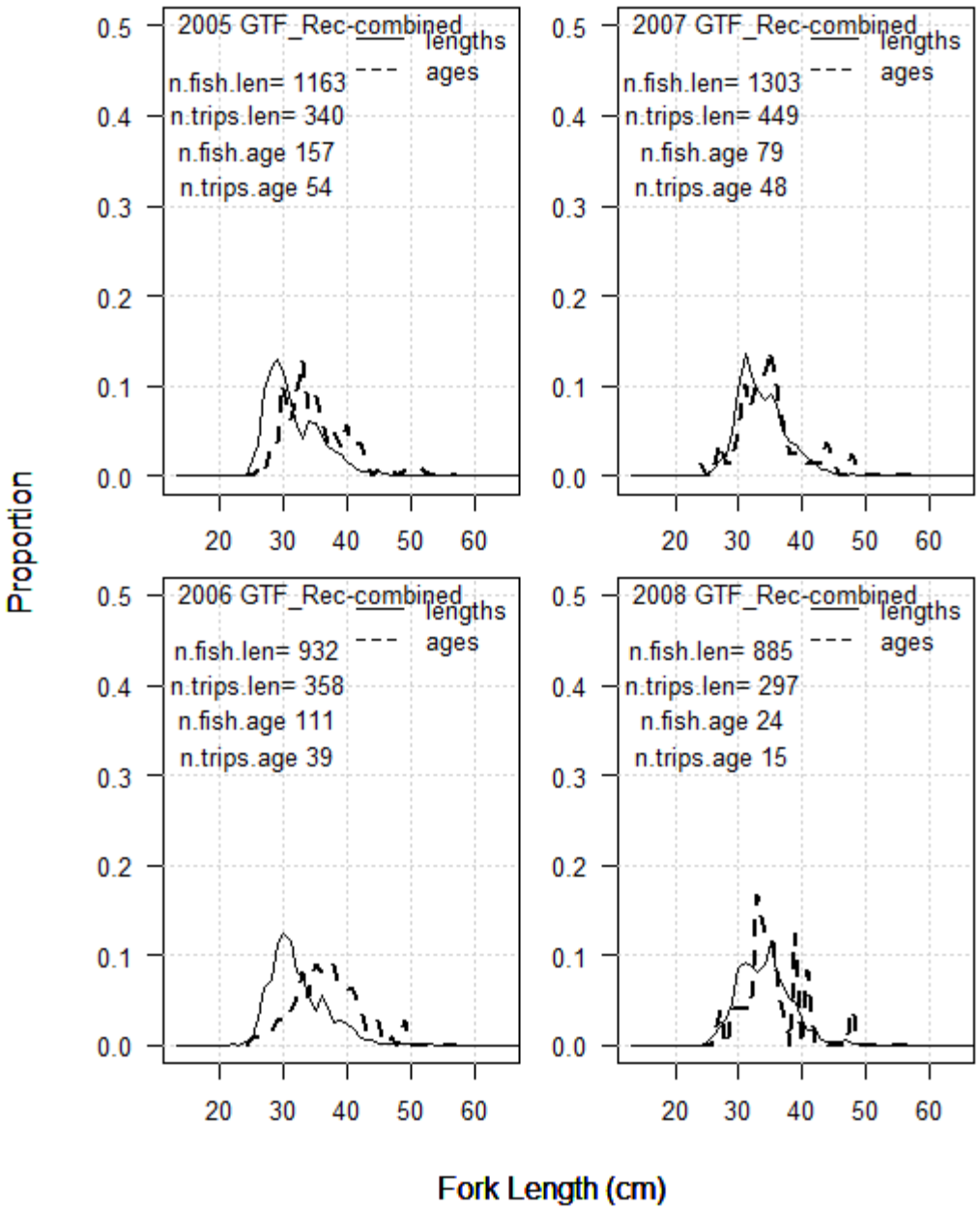

Figure 6 (continued). Length composition of aged gray triggerfish and all gray triggerfish sampled for length in the recreational fishery (SRHS, SFS, and MRFSS/MRIP).

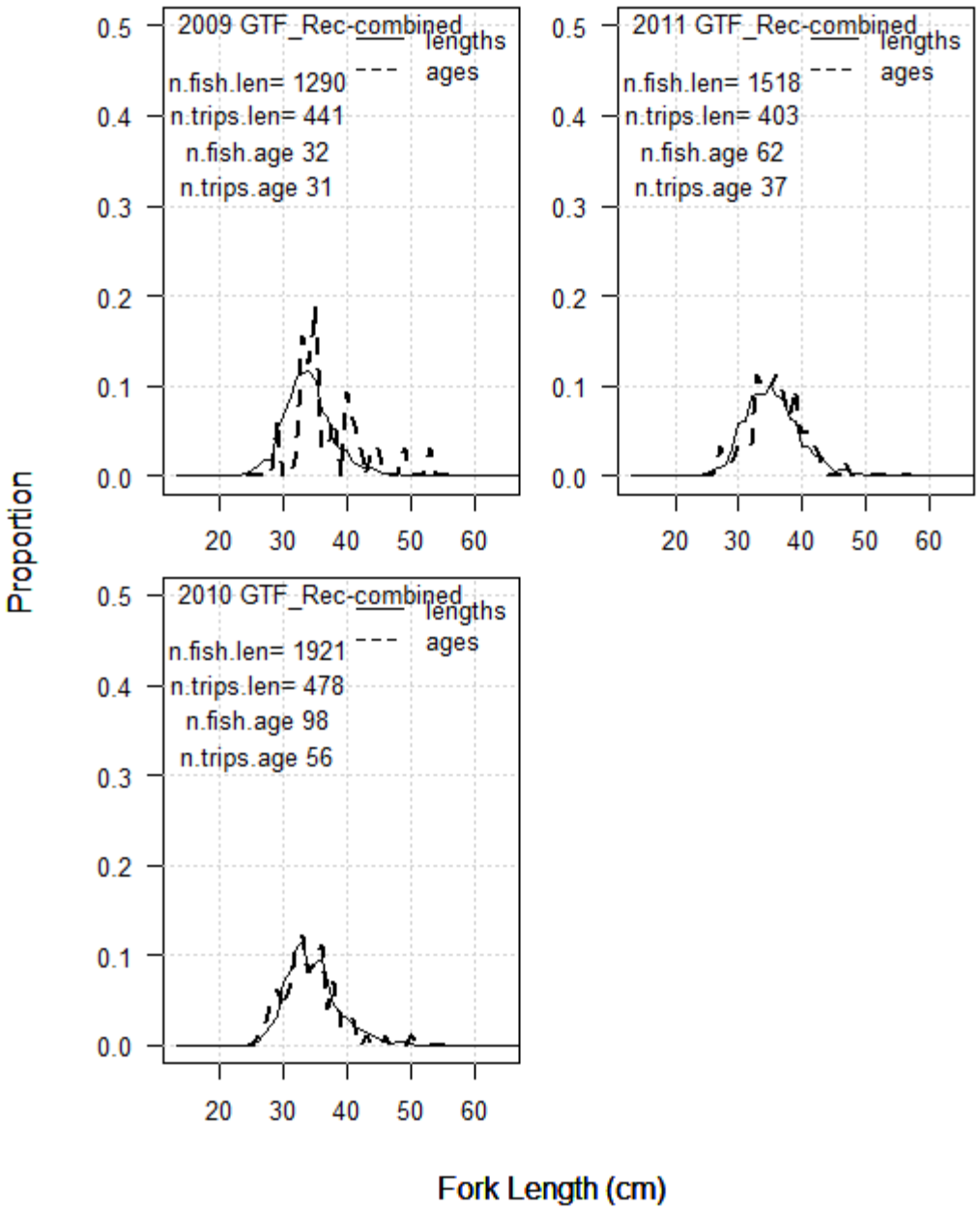

Figure 6 (continued). Length composition of aged gray triggerfish and all gray triggerfish sampled for length in the recreational fishery (SRHS, SFS, and MRFSS/MRIP).

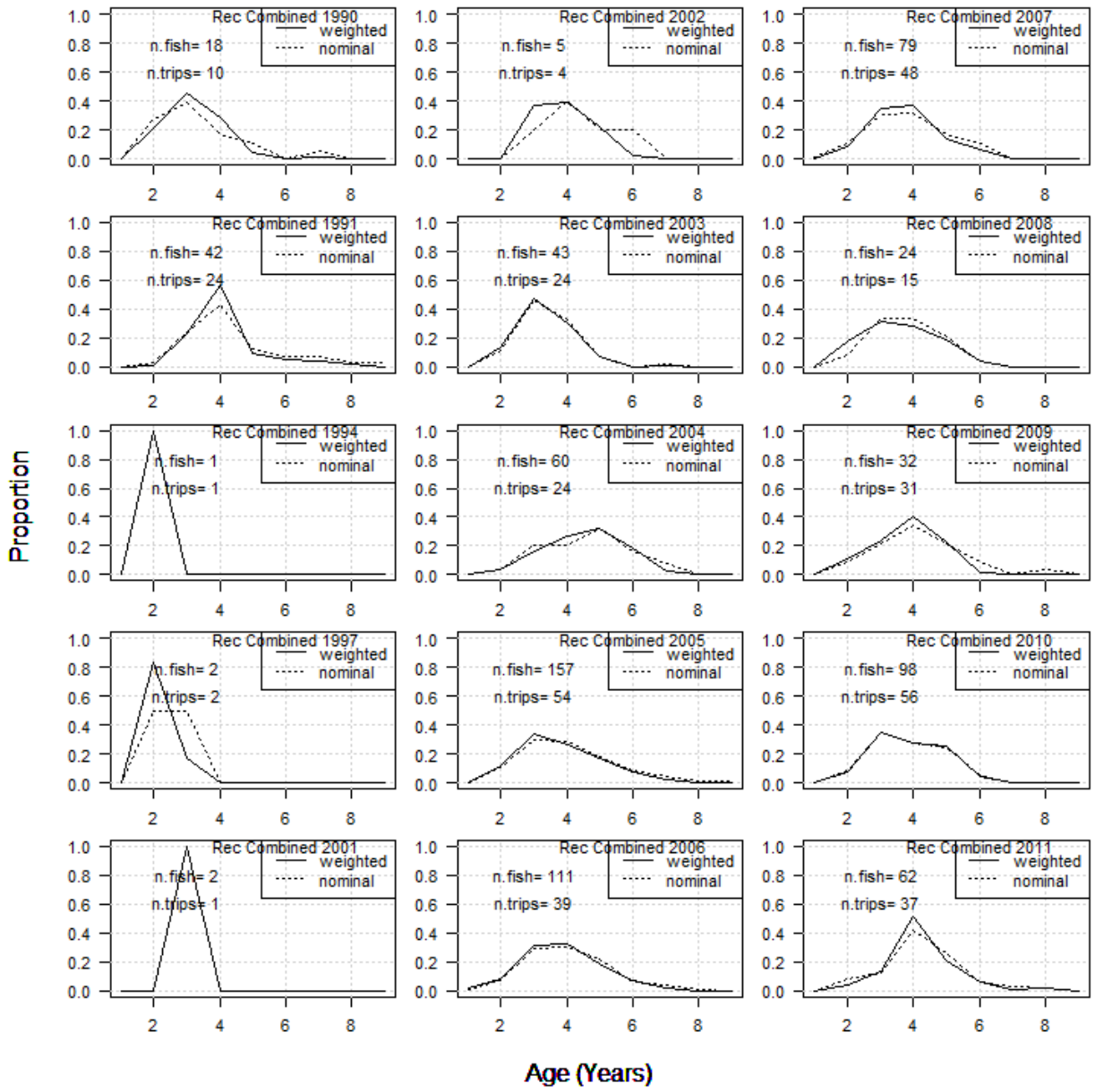

Figure 7. Weighted and un-weighted gray triggerfish age composition for the recreational fishery.