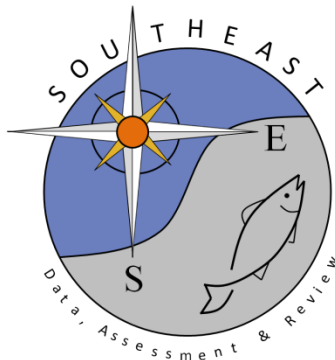


Length frequency distributions for gray triggerfish collected in the Gulf
of Mexico from 1986 to 2013

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SEDAR43-WP-04

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Length frequency distributions for gray triggerfish collected in the Gulf of Mexico from 1986 to 2013

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Introduction

This report documents changes in the length frequency distributions (LFDs) of gray triggerfish samples collected from the Gulf of Mexico from 1986 to 2013. The 2011 gray triggerfish update for SEDAR 9 separated length frequency distributions (LFDs) and age frequency distributions (AFDs) for gray triggerfish into east and west Gulf regions. In this document, LFDs for both the total Gulf of Mexico region and for the separate east/west regions were estimated. LFDs for age and length samples were also compared to examine the randomness of age samples and to determine whether the direct AFDs or the age length keys (ALKs) should be used in the Stock Synthesis model.

Materials and Methods

Length samples from commercial fisheries were obtained from the TIP database housed at the Southeast Fisheries Science Center and the Gulf FIN database. Commercial samples were divided into east and west regions (Table 1). Fishing areas were used to define the east ($1 \leq \text{grid} \leq 12$) and west ($\text{grid} > 12$) regions. When fishing area information was not available, landing areas were used to define the east (Florida, Alabama, and Mississippi) and west (Louisiana and Texas) regions. Length samples for recreational fisheries (Table 2) were obtained from the Marine Recreational Fisheries Statistics Survey (i.e., the Marine Recreational Information Program, MRIP), the Head Boat Survey, the Texas Parks and Wildlife Department database, the Gulf FIN database, and the TIP database. Landing areas were used to define the east (Florida, Alabama, and Mississippi) and west (Louisiana and Texas) regions for recreational samples. Age samples

(spine) were subsamples of length samples. Age samples were processed by the Panama City Lab. In this study, only age samples from four fishing modes were used for analyses (commercial, head boat, charter boat and private boat). All lengths were fork lengths in centimeters. Conversion equations for different length types were developed and provided by the Panama City Lab.

Results and Discussion

The variability of the estimated LFDs estimated from commercial samples increased noticeably after 2005 (Fig 1). These changes could be due to small total sample sizes (Table 1) as well as to an increase in the percentage of trips with small trip sample sizes (Table 4) for those years. Although LFDs were separated into east and west regions for the 2011 gray triggerfish SEDAR update, LFDs estimated from current samples did not show consistent and significant differences between the LFDs estimated from the east and west regions (Fig 3 & 4). Which region had larger fish appeared to vary randomly from year to year and sometimes showed no discernible difference. The sample sizes for some region/year were also too small for estimation of LFDs (Table 1 & 3).

Comparisons of LFDs estimated from length and age samples showed that age samples may not have been randomly subsampled from the length samples, especially for age samples taken before 2008 (Fig 5 & 6). As a result, these age samples cannot be used to construct AFDs directly. For the 2011 gray triggerfish SEDAR update, a combined age length key from all years was used for estimation of AFDs for individual years. For the stock synthesis model, age length keys for individual years can be estimated from current data.

Table 1. Sample sizes for commercial length samples collected from the Gulf of Mexico between 1990 and 2013.

YEAR	East	West	total
1990	110	327	437
1991	60	818	878
1992	131	1531	1662
1993	864	861	1725
1994	1612	1122	2734
1995	1583	657	2240
1996	1539	331	1870
1997	1182	345	1527
1998	937	242	1179
1999	913	89	1002
2000	476	56	532
2001	1170	186	1356
2002	758	184	942
2003	540	213	753
2004	256	81	337
2005	432	148	580
2006	366	14	380
2007	161	142	303
2008	150	68	218
2009	169	64	233
2010	195	12	207
2011	325	31	356
2012	136	285	421
2013	237	555	792

Table 2. Number of trips and percent of trips with trip sample sizes less than five for commercial samples collected from the TIP sampling program.

Year	No. of trips	No. of trips with n<5	Percent trips with n < 5
1990	76	42	0.55
1991	133	65	0.49
1992	216	95	0.44
1993	177	89	0.50
1994	221	95	0.43
1995	148	52	0.35
1996	145	56	0.39
1997	143	69	0.48
1998	146	81	0.55
1999	121	71	0.59
2000	111	72	0.65
2001	134	63	0.47
2002	133	82	0.62
2003	116	77	0.66
2004	63	38	0.60
2005	117	77	0.66
2006	87	69	0.79
2007	63	51	0.81
2008	64	59	0.92
2009	58	46	0.79
2010	50	38	0.76
2011	82	57	0.70
2012	88	60	0.68
2013	167	107	0.64

Table 3. Sample sizes for recreational length samples collected from the Gulf of Mexico between 1990 and 2013.

YEAR	East	West	total
1981	68	11	79
1982	174	14	188
1983	127	48	175
1984	35	72	107
1985	30	109	139
1986	349	361	710
1987	728	372	1100
1988	816	376	1192
1989	1240	494	1734
1990	1889	650	2539
1991	1980	507	2487
1992	2472	1422	3894
1993	1075	793	1868
1994	1260	1410	2670
1995	1160	1101	2261
1996	883	989	1872
1997	1359	488	1847
1998	2463	591	3054
1999	2711	289	3000
2000	2707	202	2909
2001	3451	325	3776
2002	3416	277	3693
2003	3021	292	3313
2004	3299	292	3591
2005	2433	257	2690
2006	1334	316	1650
2007	1289	455	1744
2008	1203	398	1601
2009	791	227	1018
2010	803	34	837
2011	1286	139	1425
2012	484	130	614
2013	825	123	948

Table 4. Sample sizes for commercial and recreational age samples (spine) collected from the east and west regions of the Gulf of Mexico between 2003 and 2013.

Year	commercial		commercial Total	recreational		recreational Total	Total
	East	West		East	West		
2003	84		84	50		50	134
2004	40		40	103		103	143
2005	126	1	127	61		61	188
2006	69		69	78		78	147
2007	69	46	115	100	163	263	378
2008	80	29	109	239	89	328	437
2009	37	28	65	264	112	376	441
2010	30	2	32	180	4	184	216
2011	178	28	206	236	37	273	479
2012	76	234	310	257	46	303	613
2013	168	338	506	497	34	531	1037
Total	957	706	1663	2065	485	2550	4213

Fig 1(a) Length frequency distributions for commercial length samples collected from the Gulf of Mexico between 1990 and 1994.

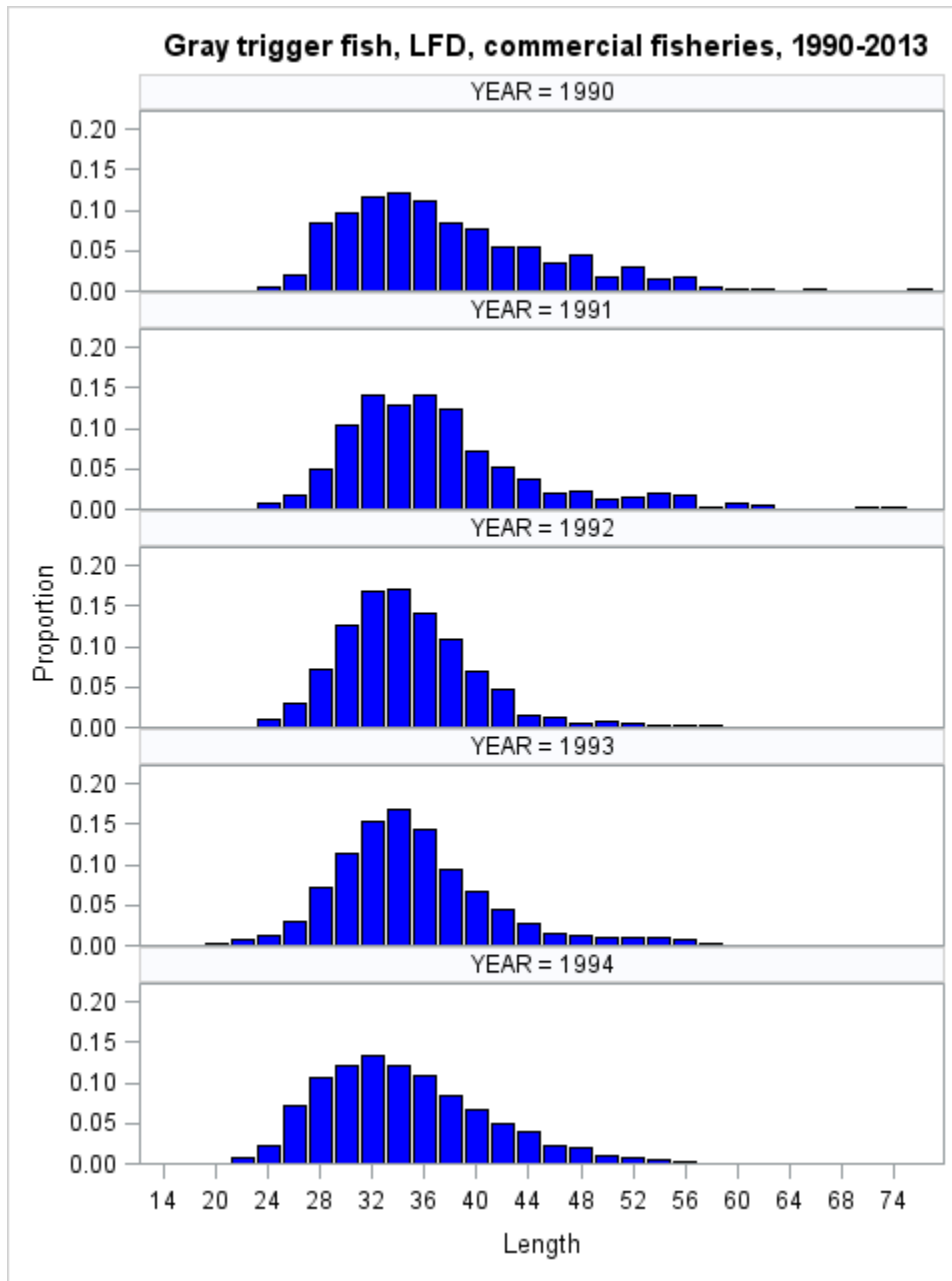


Fig 1(b) Length frequency distributions for commercial length samples collected from the Gulf of Mexico between 1995 and 1999.

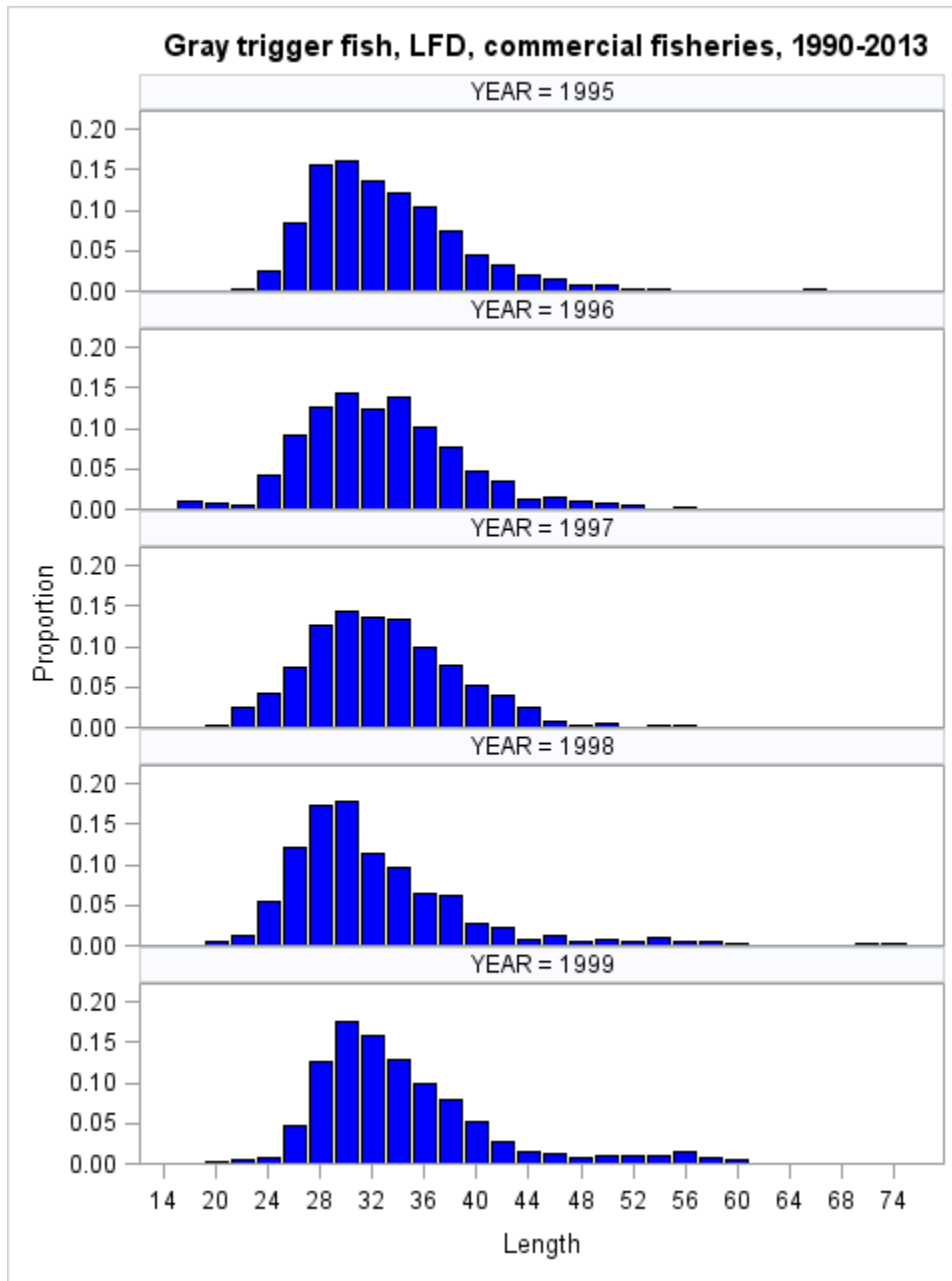


Fig 1(c) Length frequency distributions for commercial length samples collected from the Gulf of Mexico between 2000 and 2004.

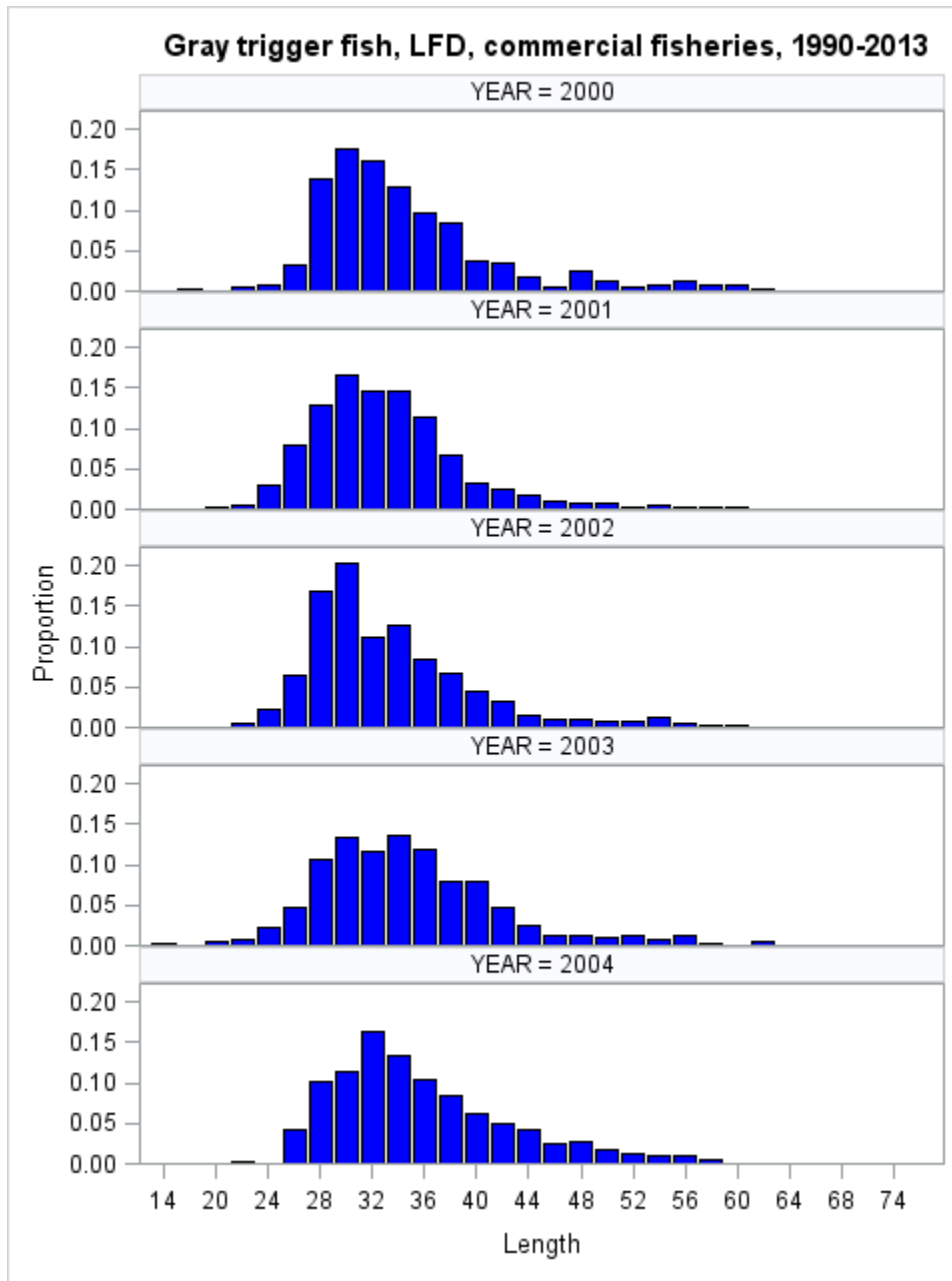


Fig 1(d) Length frequency distributions for commercial length samples collected from the Gulf of Mexico between 2005 and 2009.

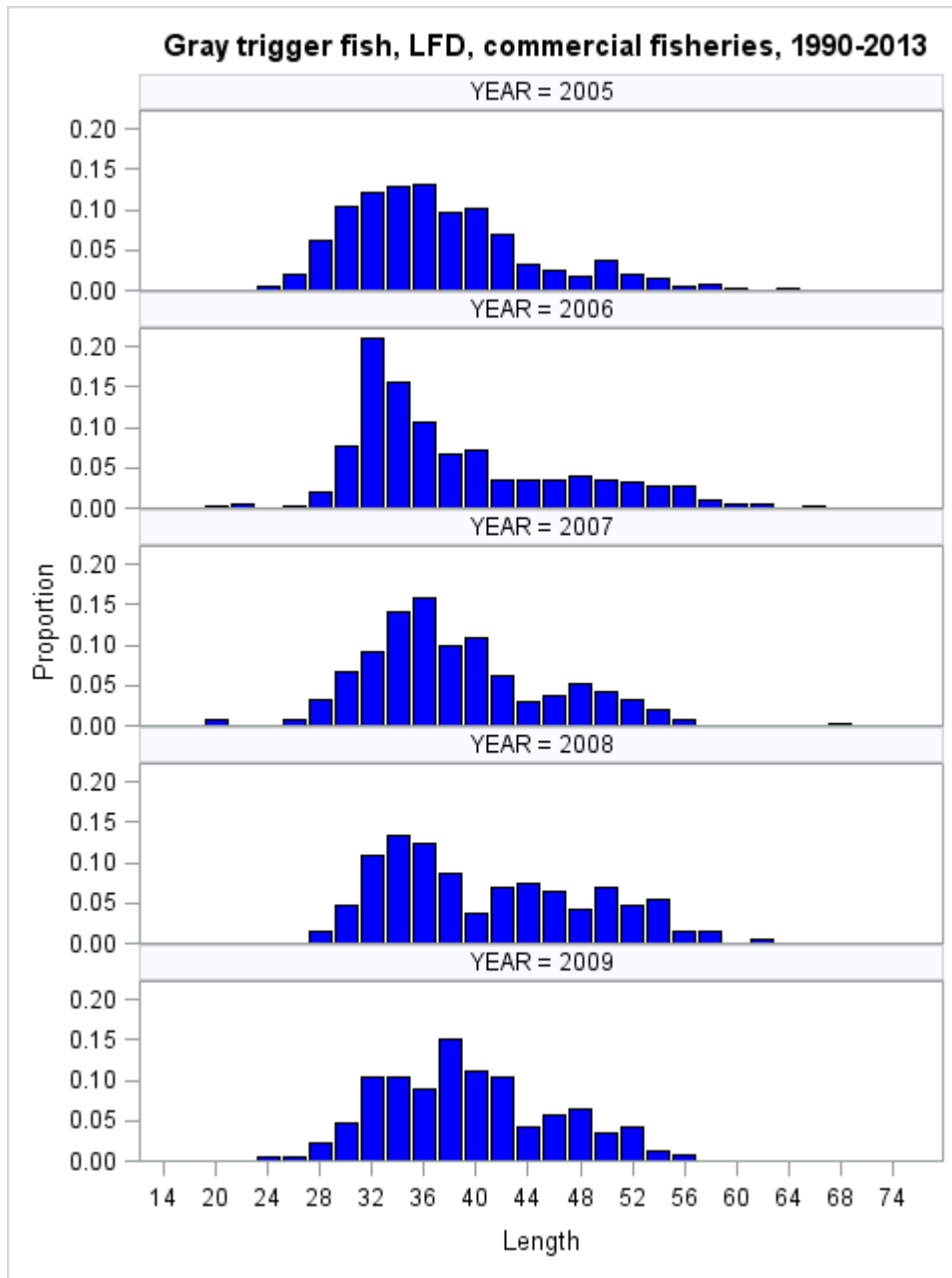


Fig 1(e) Length frequency distributions for commercial length samples collected from the Gulf of Mexico between 2010 and 2013.

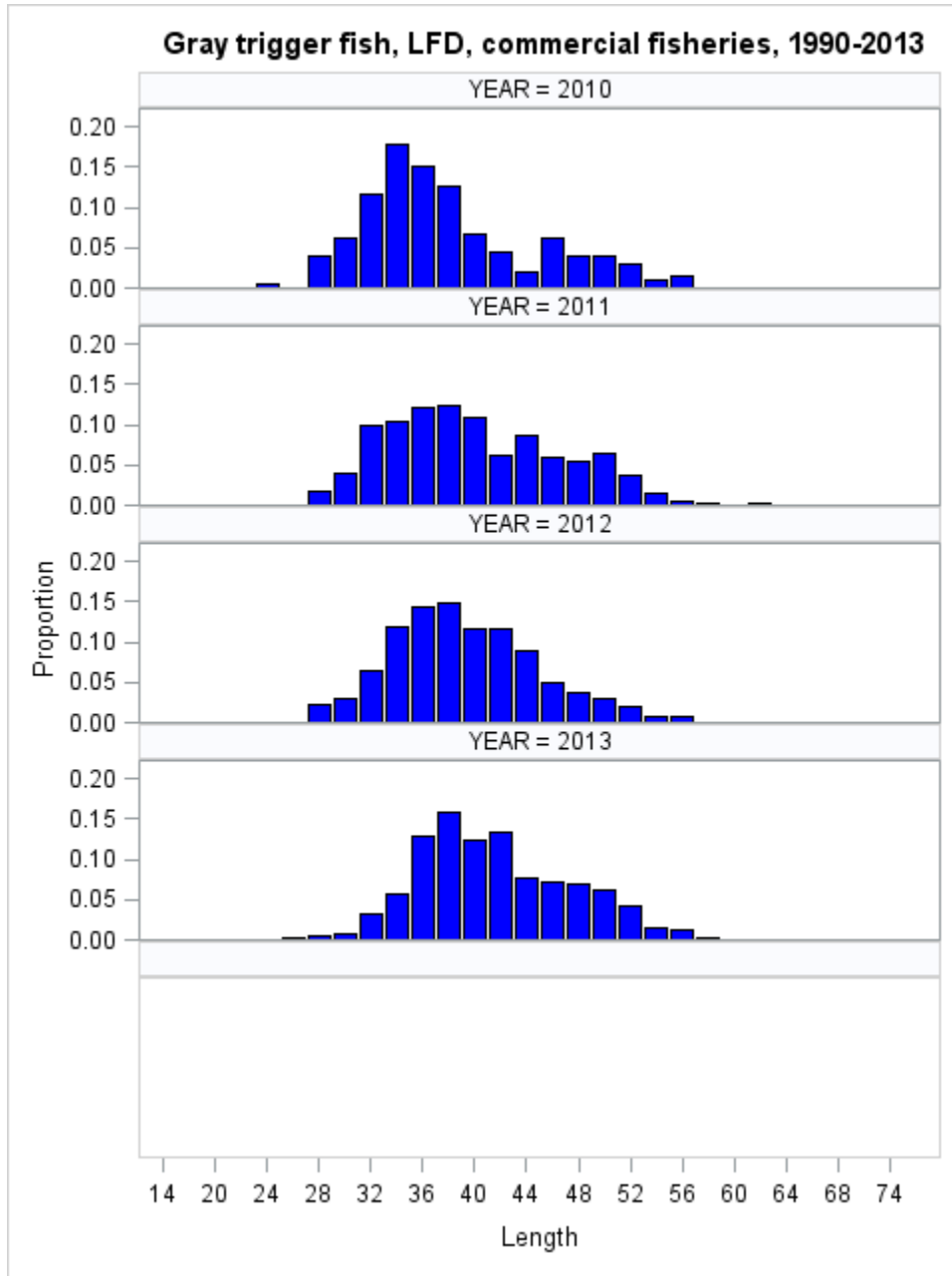


Fig 2(a) Length frequency distributions for recreational length samples collected from the Gulf of Mexico between 1986 and 1990.

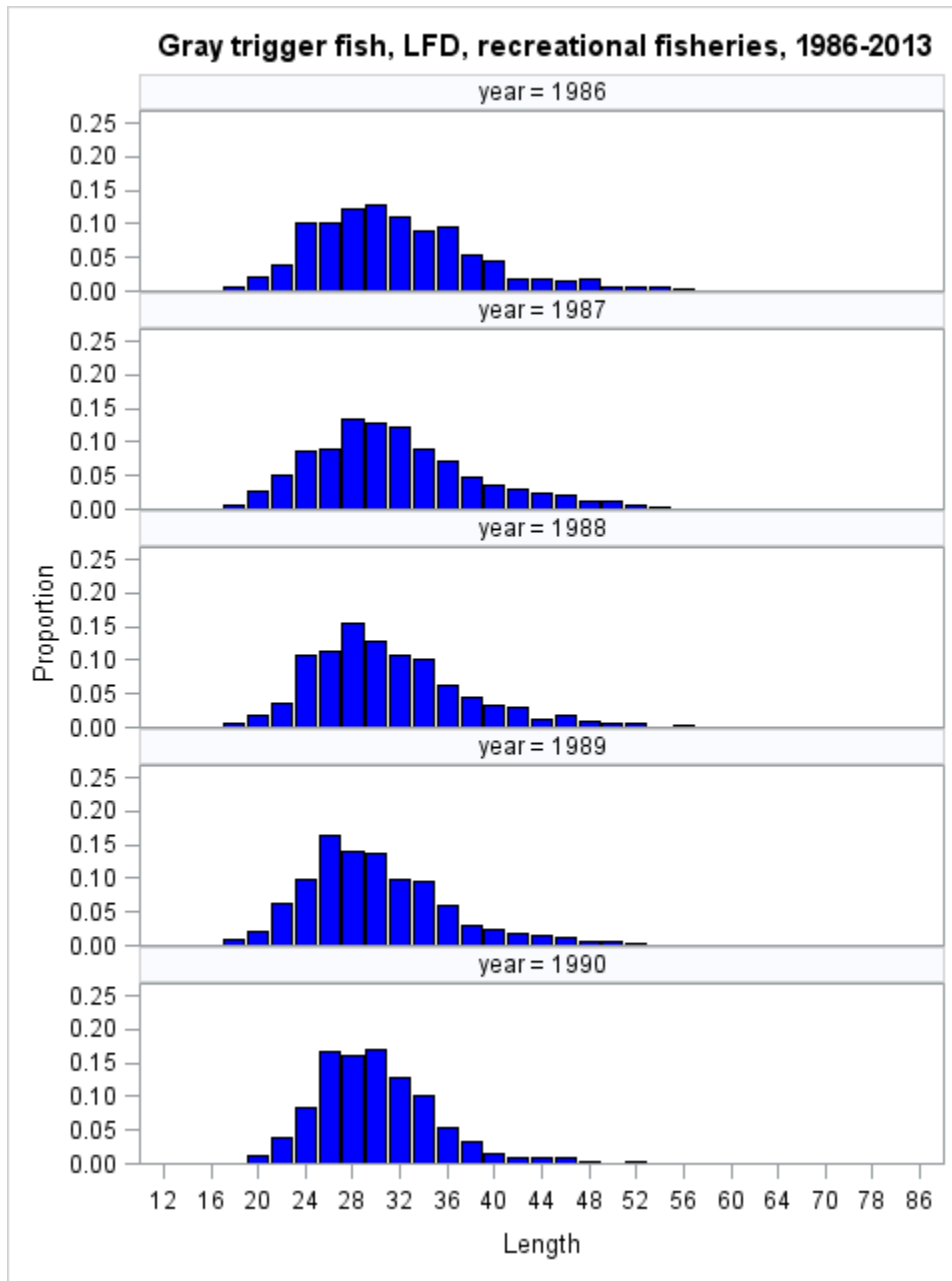


Fig 2(b) Length frequency distributions for recreational length samples collected from the Gulf of Mexico between 1991 and 1995.

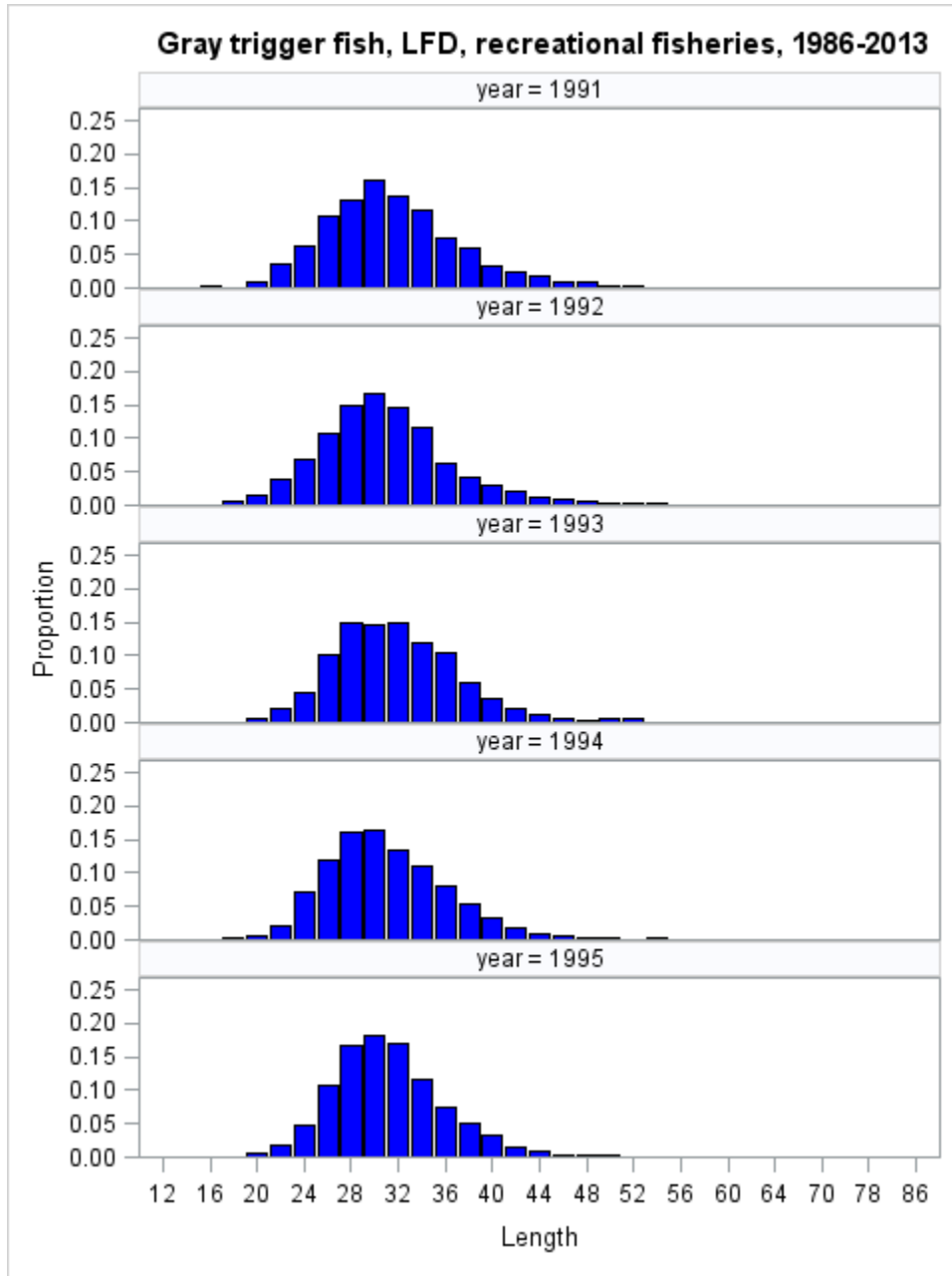


Fig 2(c) Length frequency distributions for recreational length samples collected from the Gulf of Mexico between 1996 and 2000.

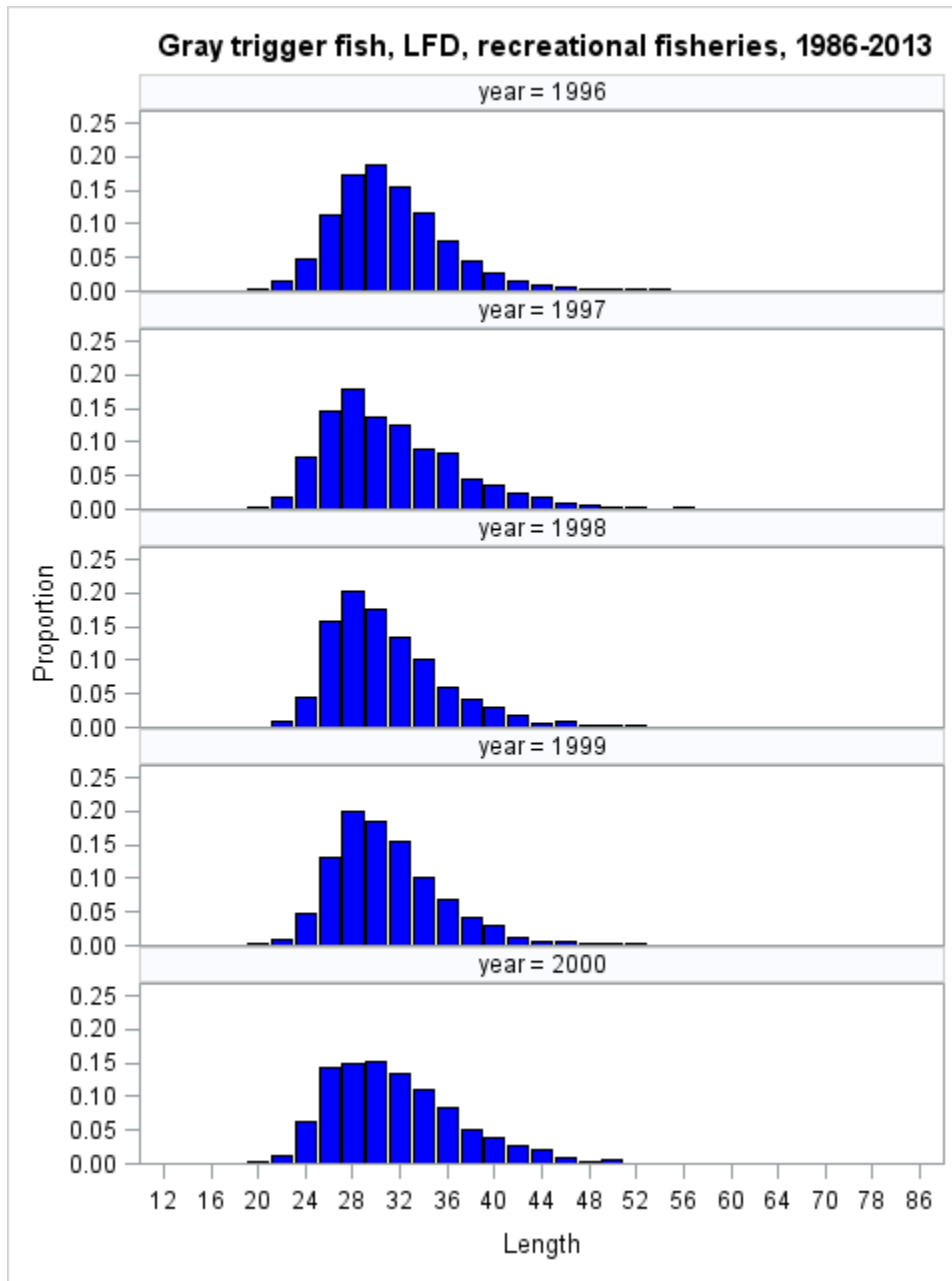


Fig 2(d) Length frequency distributions for recreational length samples collected from the Gulf of Mexico between 2001 and 2005.

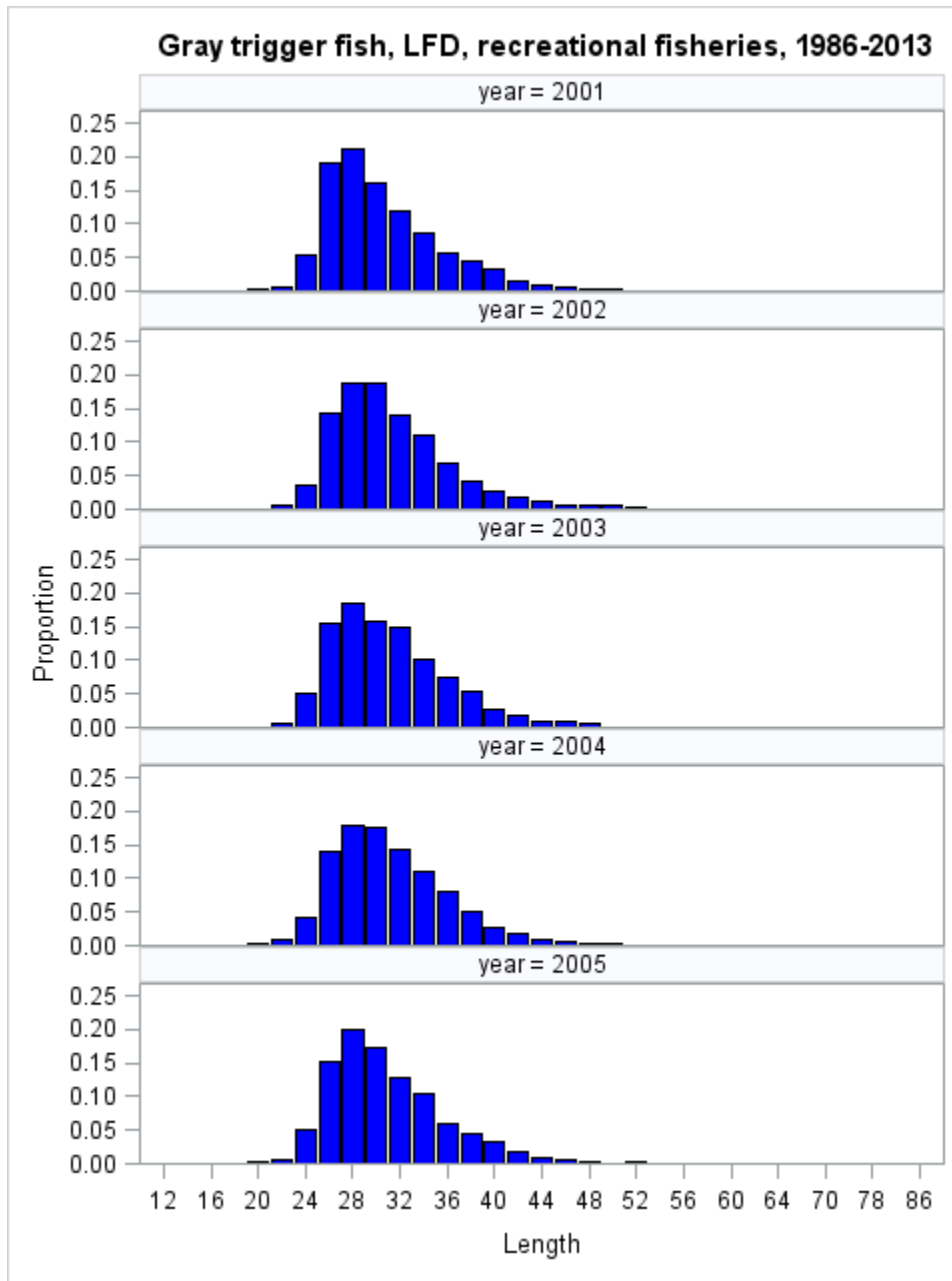


Fig 2(e) Length frequency distributions for recreational length samples collected from the Gulf of Mexico between 2006 and 2010.

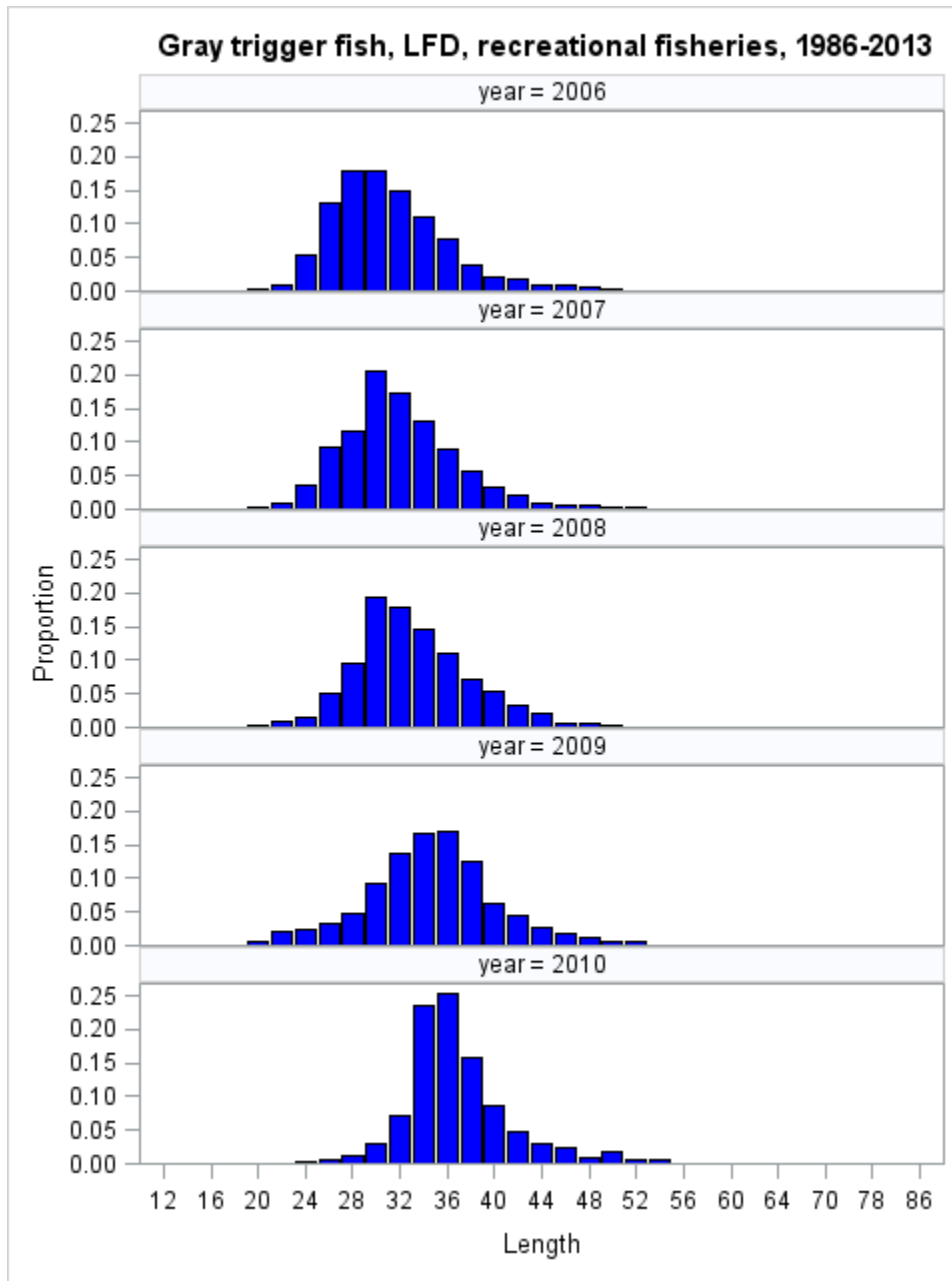


Fig 2(f) Length frequency distributions for recreational length samples collected from the Gulf of Mexico between 2011 and 2013.

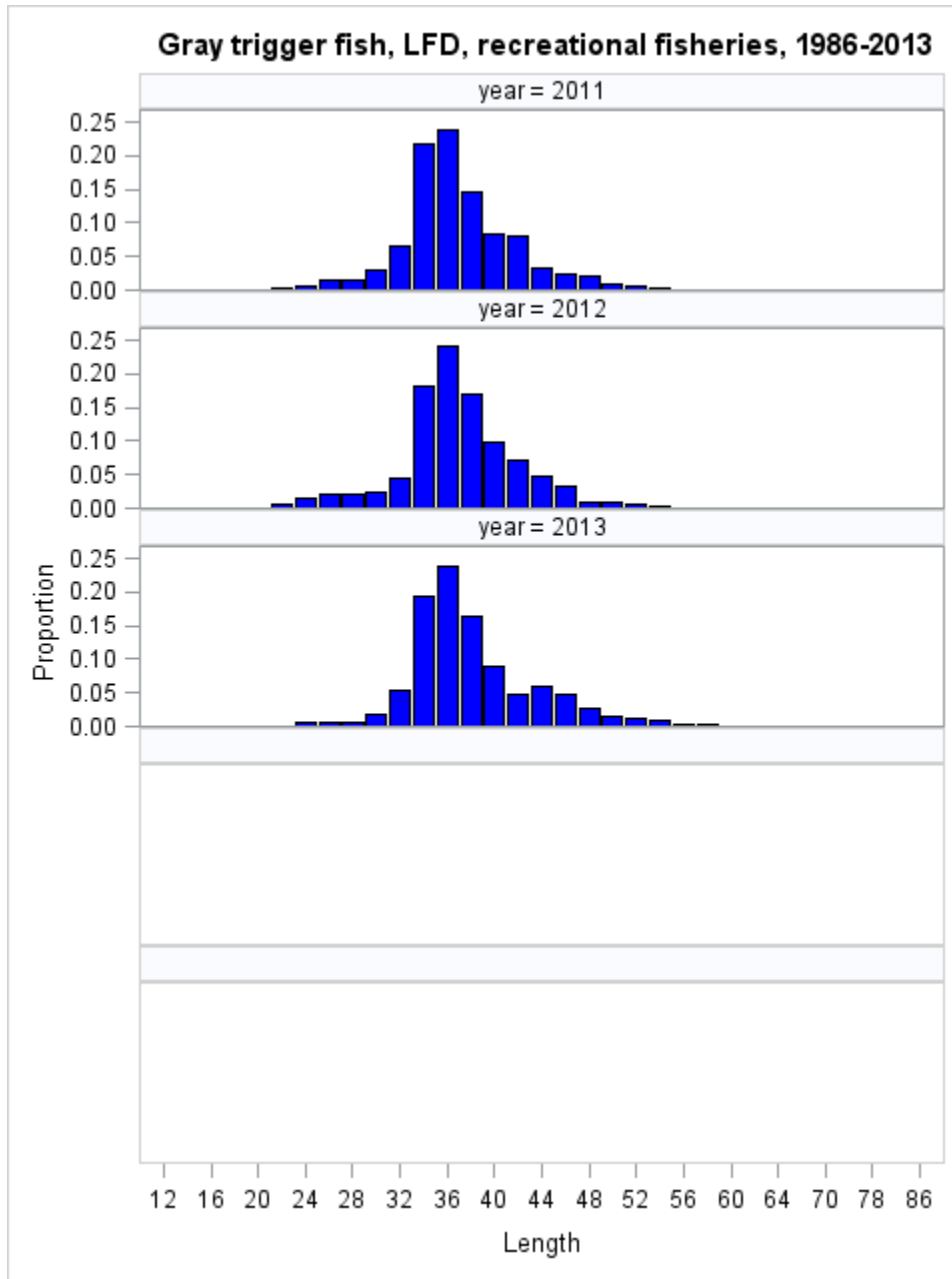


Fig 3(a) Comparisons of length frequency distributions for commercial length samples collected from the east and west regions of the Gulf of Mexico between 1991 and 1996.

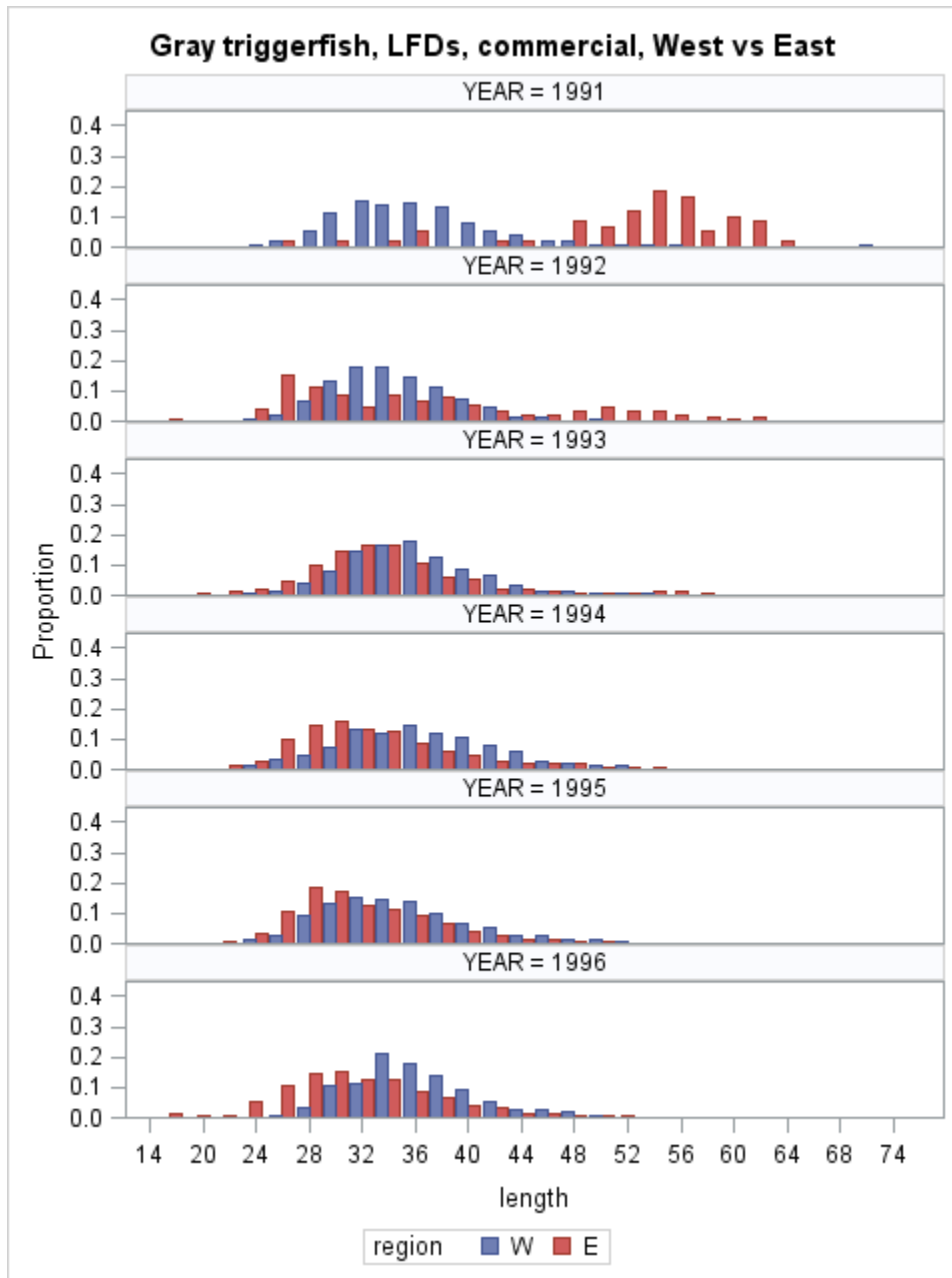


Fig 3(b) Comparisons of length frequency distributions for commercial length samples collected from the east and west regions of the Gulf of Mexico between 1997 and 2002.

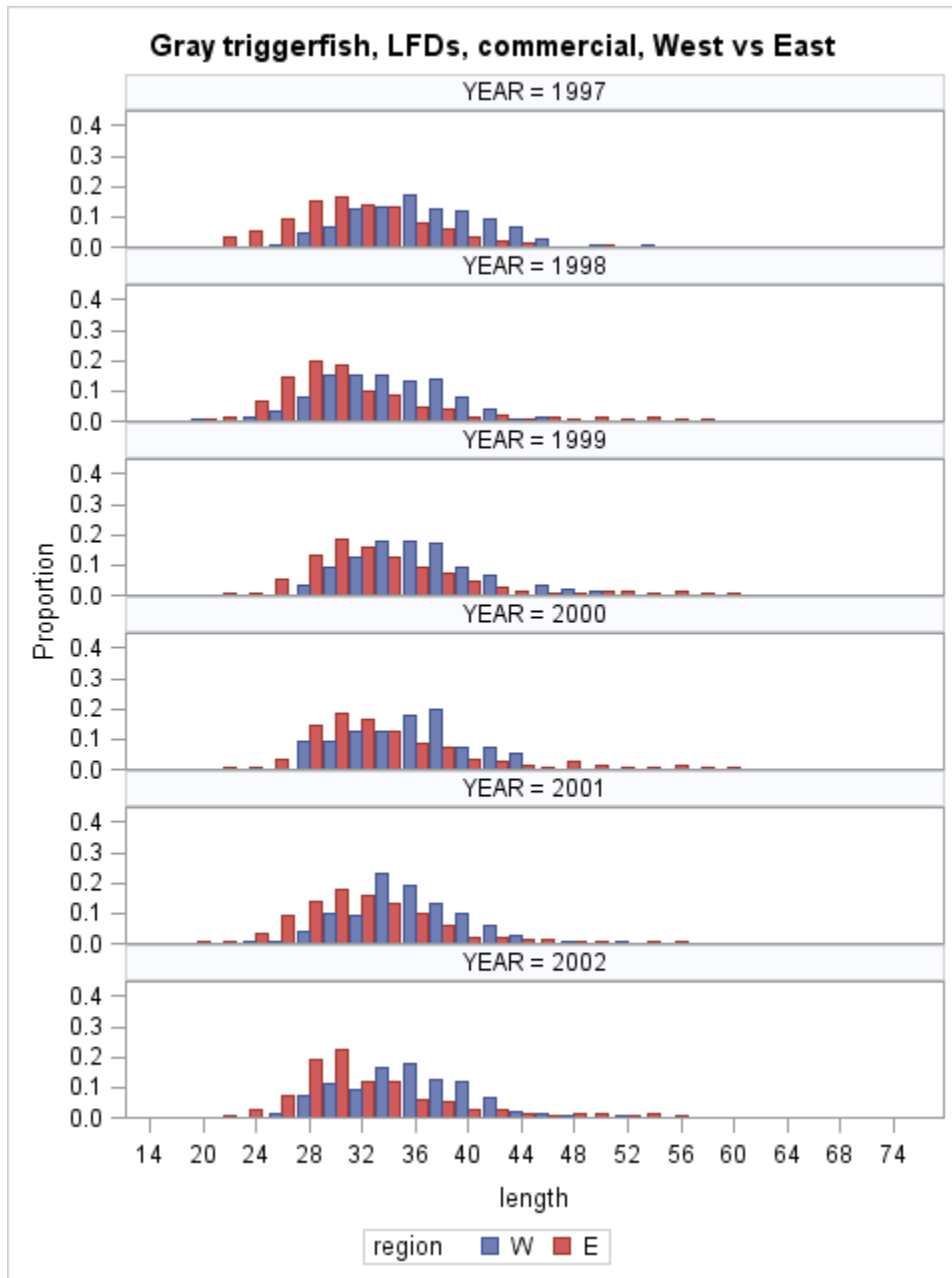


Fig 3(c) Comparisons of length frequency distributions for commercial length samples collected from the east and west regions of the Gulf of Mexico between 2003 and 2008.

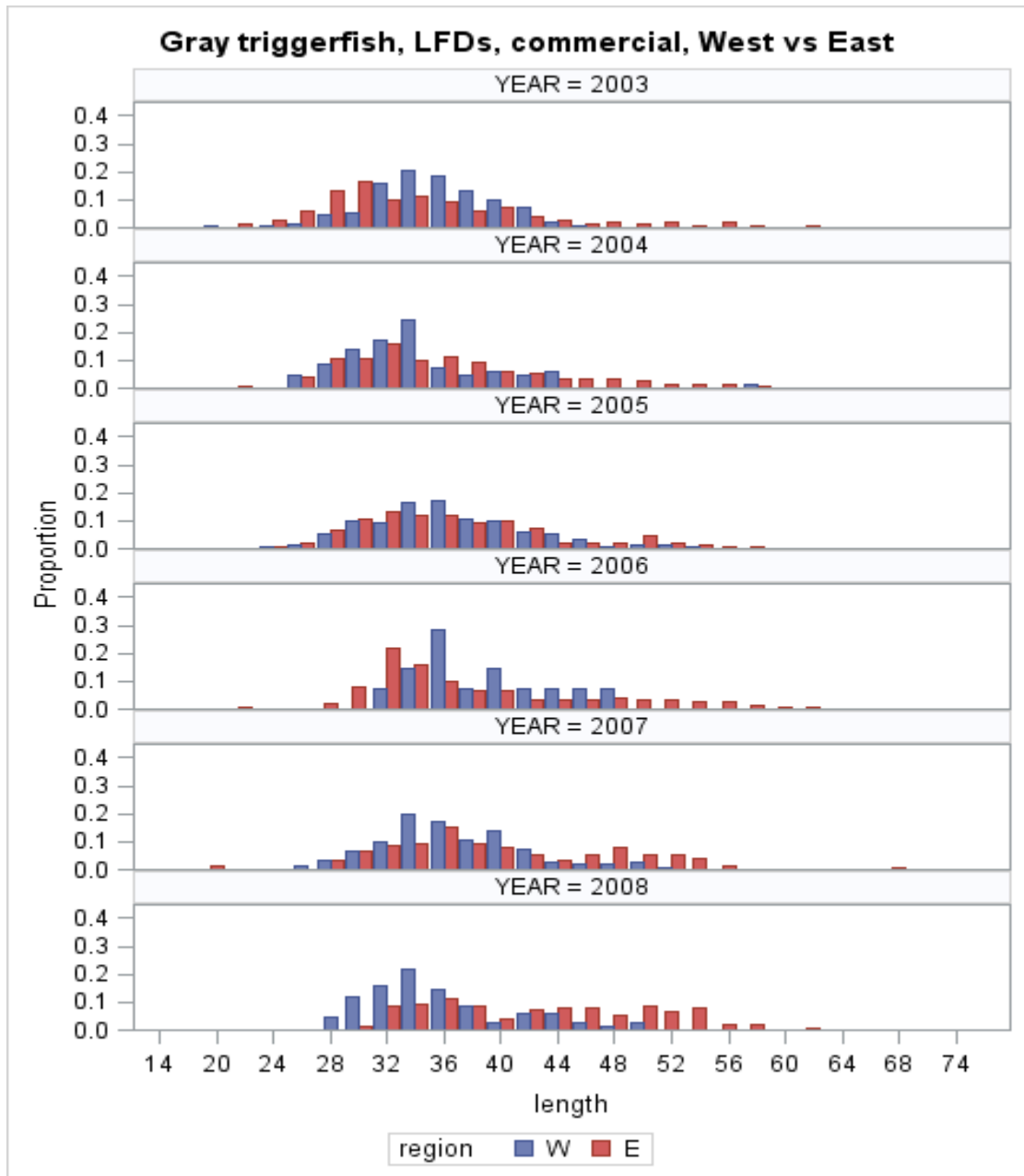


Fig 3 (d) Comparisons of length frequency distributions for commercial length samples collected from the east and west regions of the Gulf of Mexico between 2009 and 2013.

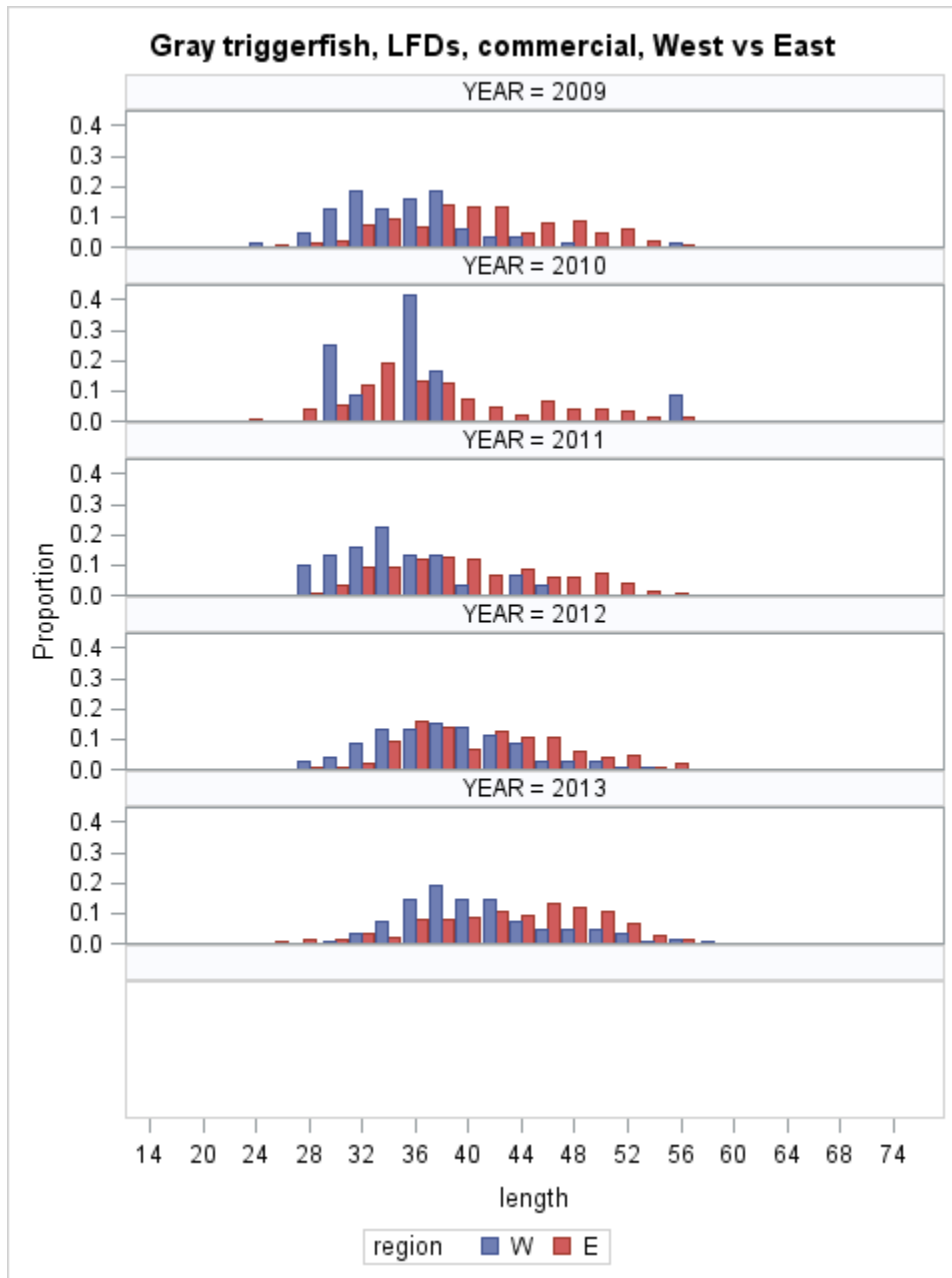


Fig 4(a) Comparisons of length frequency distributions for recreational length samples collected from the east and west regions of the Gulf of Mexico between 1986 and 1991.

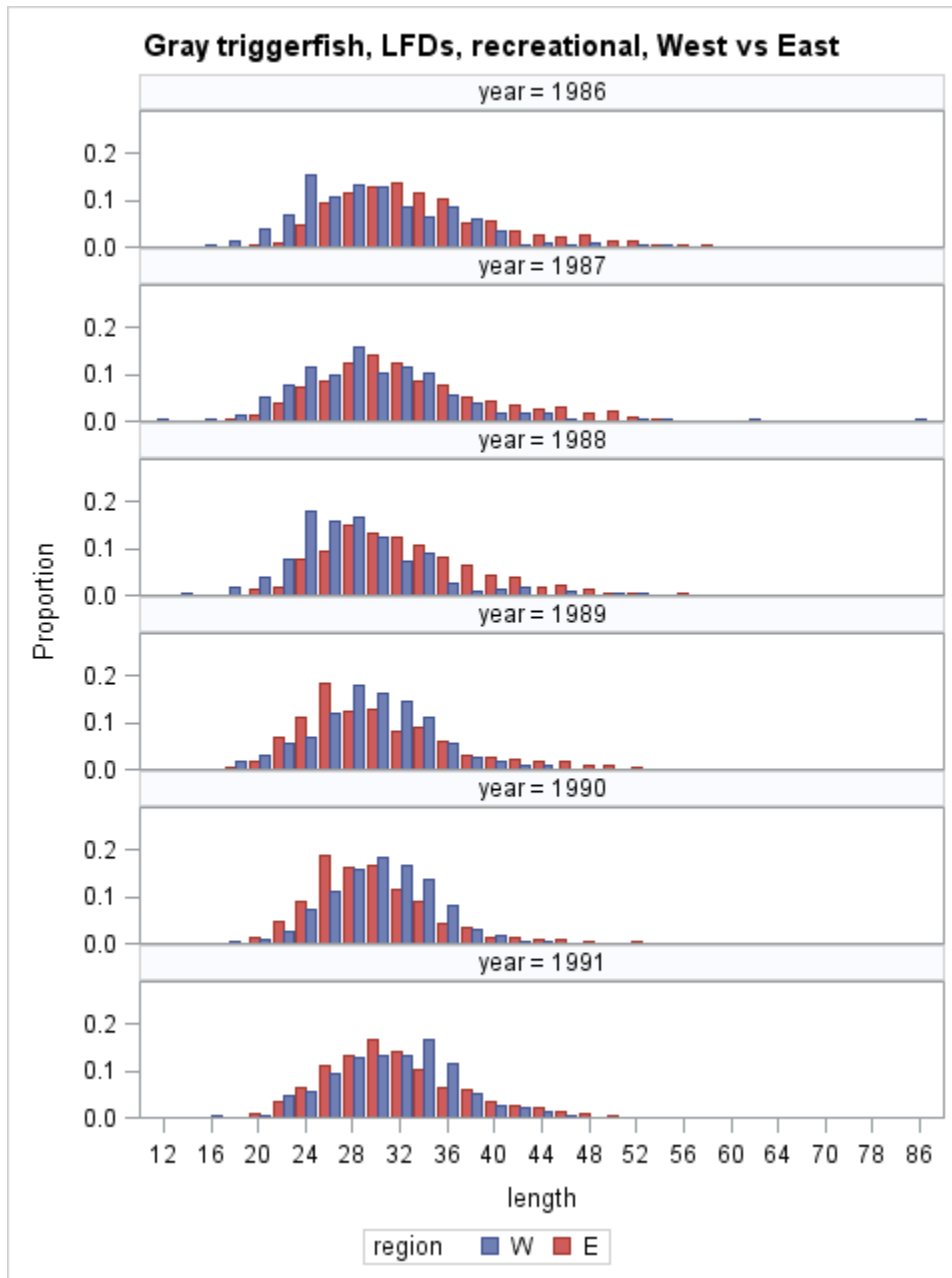


Fig 4(b) Comparisons of length frequency distributions for recreational length samples collected from the east and west regions of the Gulf of Mexico between 1992 and 1997.

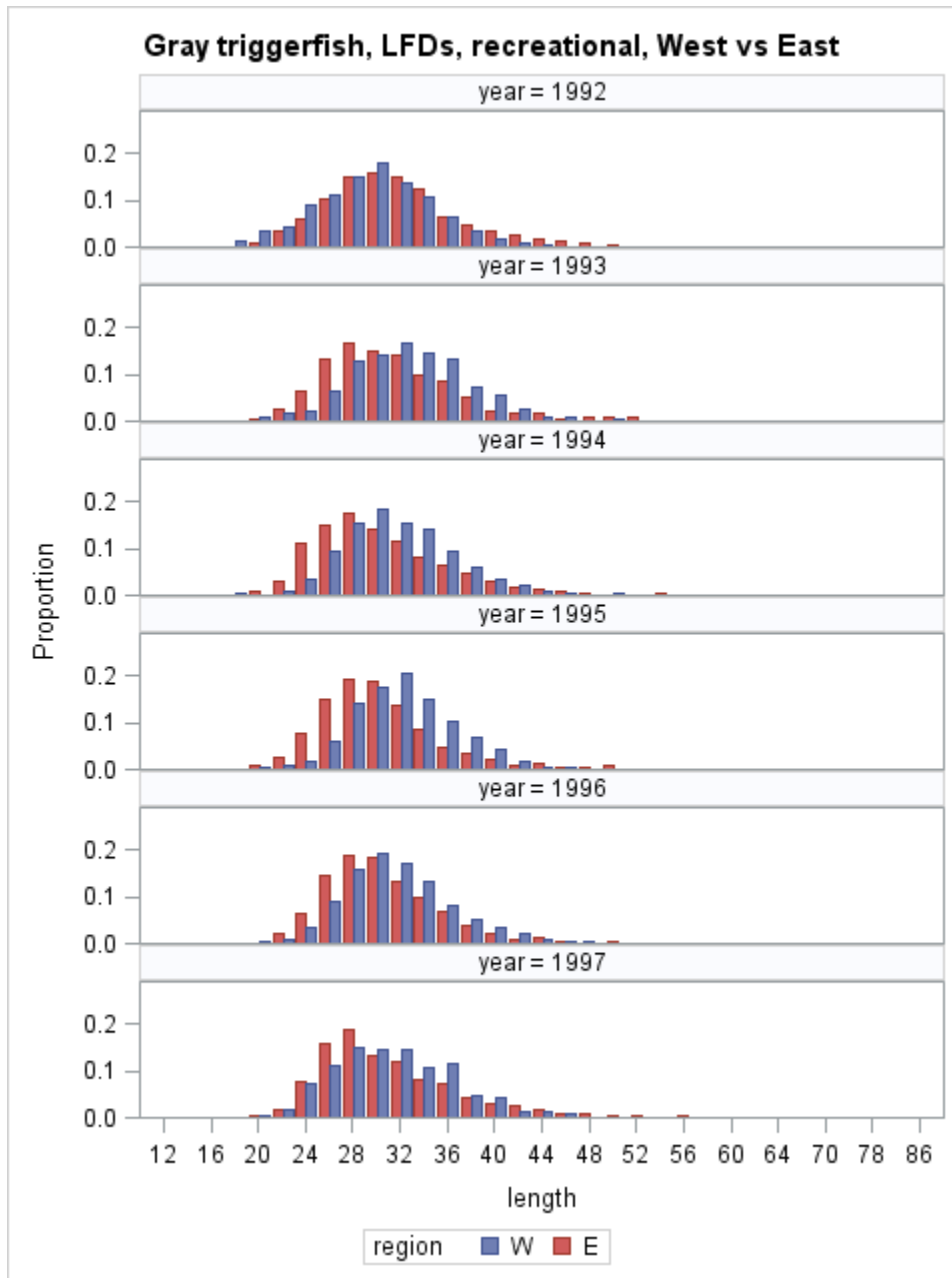


Fig 4(c) Comparisons of length frequency distributions for recreational length samples collected from the east and west regions of the Gulf of Mexico between 1998 and 2003.

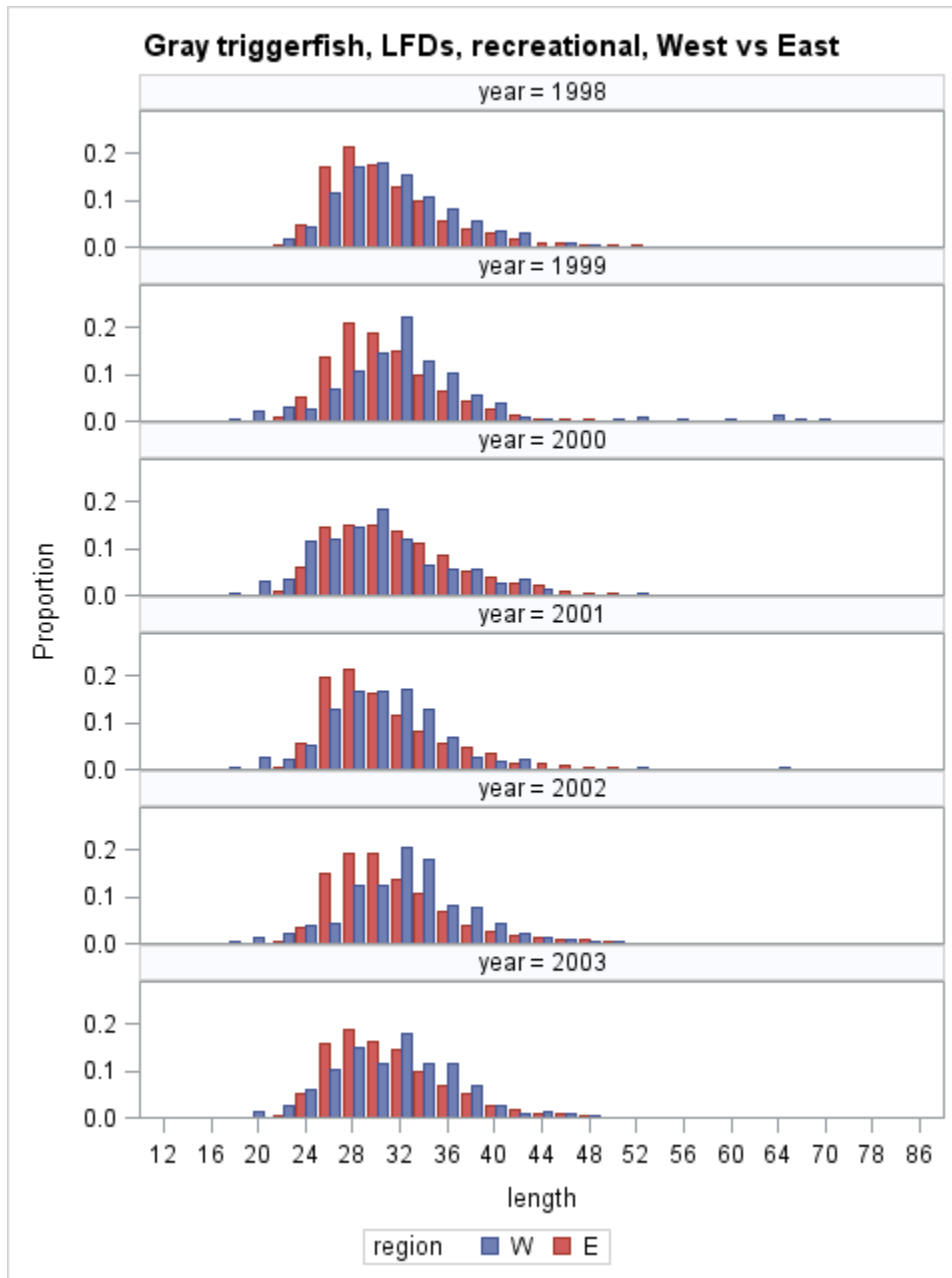


Fig 4(d) Comparisons of length frequency distributions for recreational length samples collected from the east and west regions of the Gulf of Mexico between 2004 and 2009.

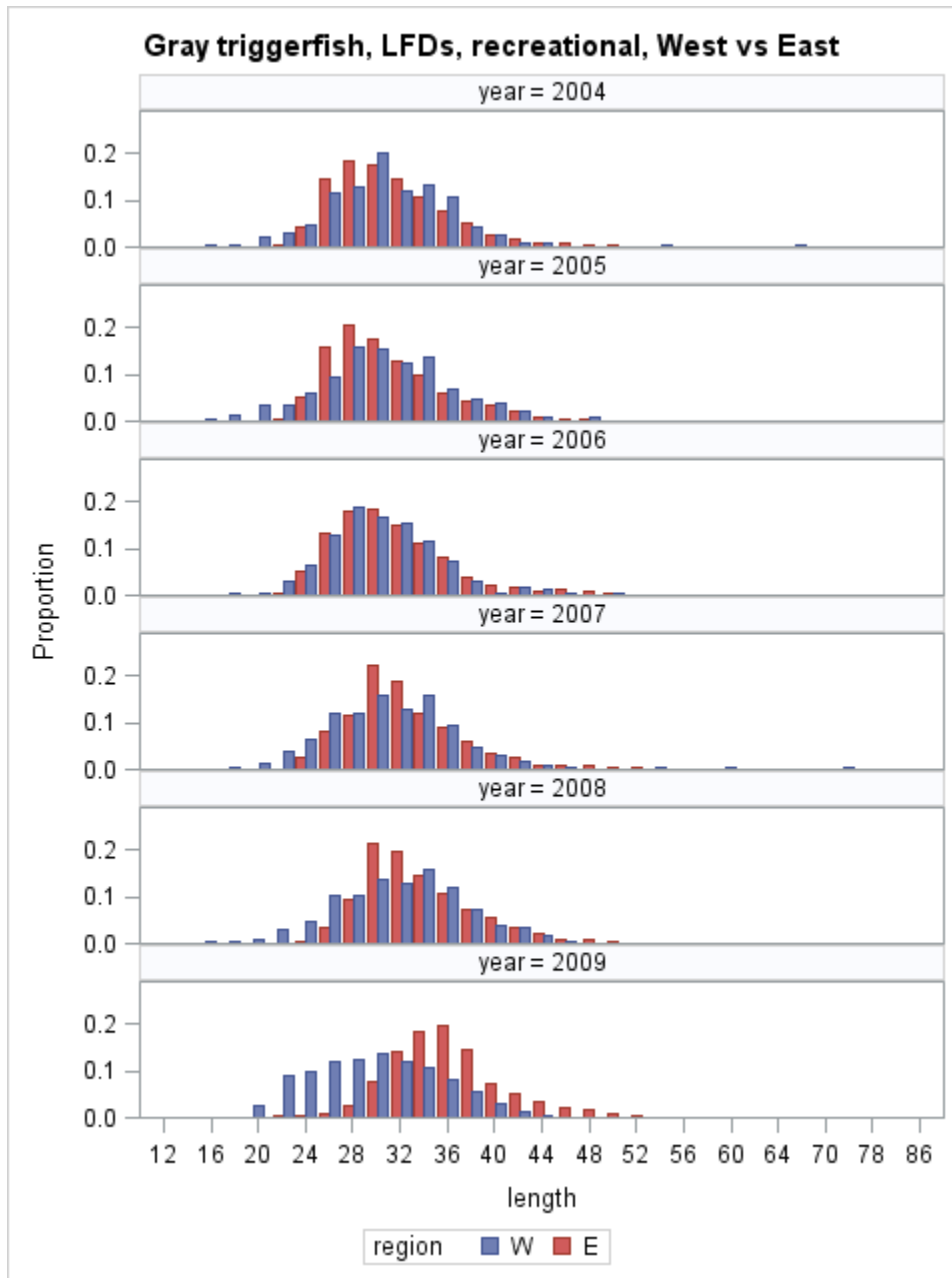


Fig 4(e) Comparisons of length frequency distributions for recreational length samples collected from the east and west regions of the Gulf of Mexico between 2010 and 2013.

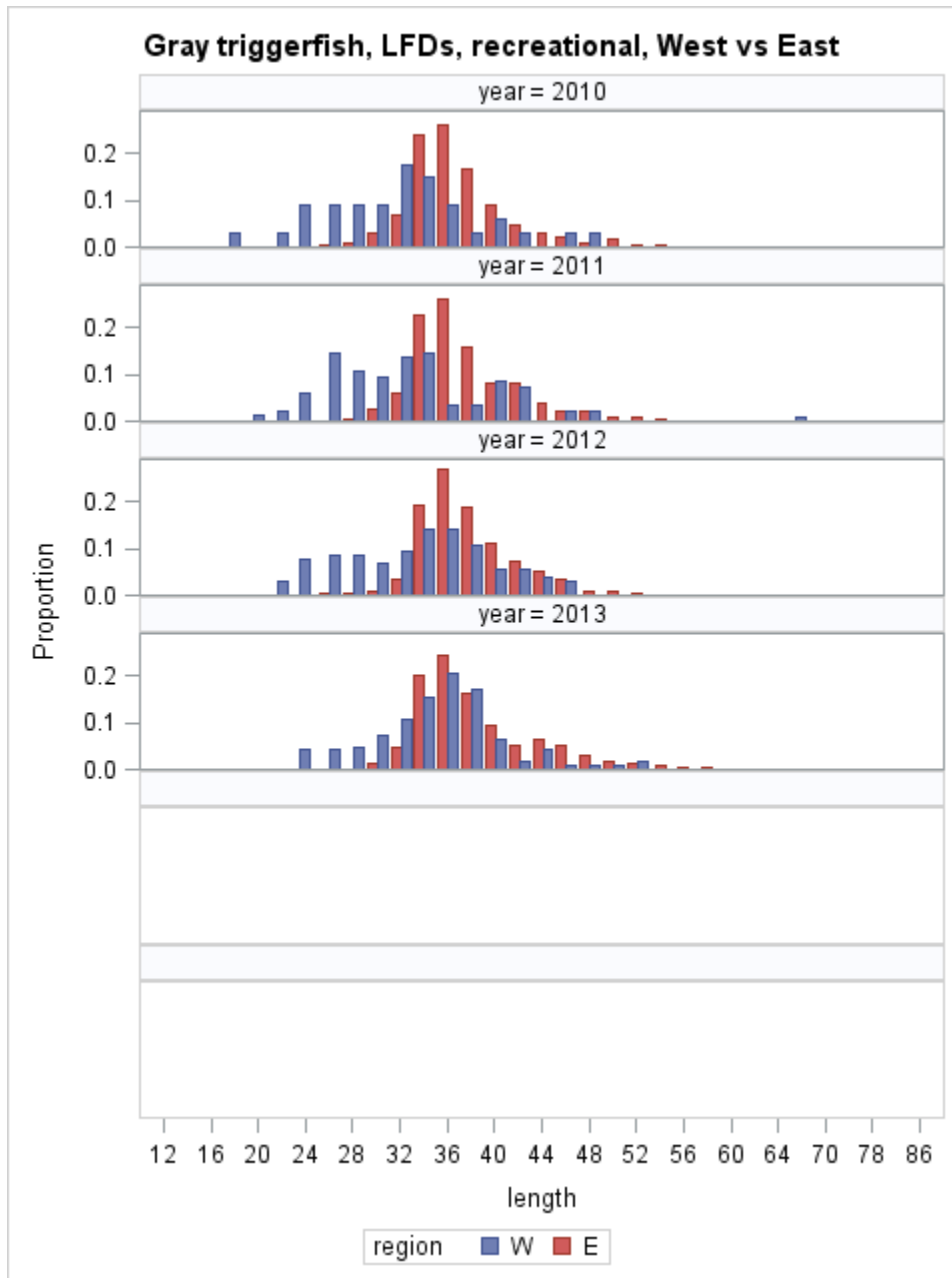


Fig 5(a) Comparisons of length frequency distributions for commercial length and age samples collected from the Gulf of Mexico between 2003 and 2008.

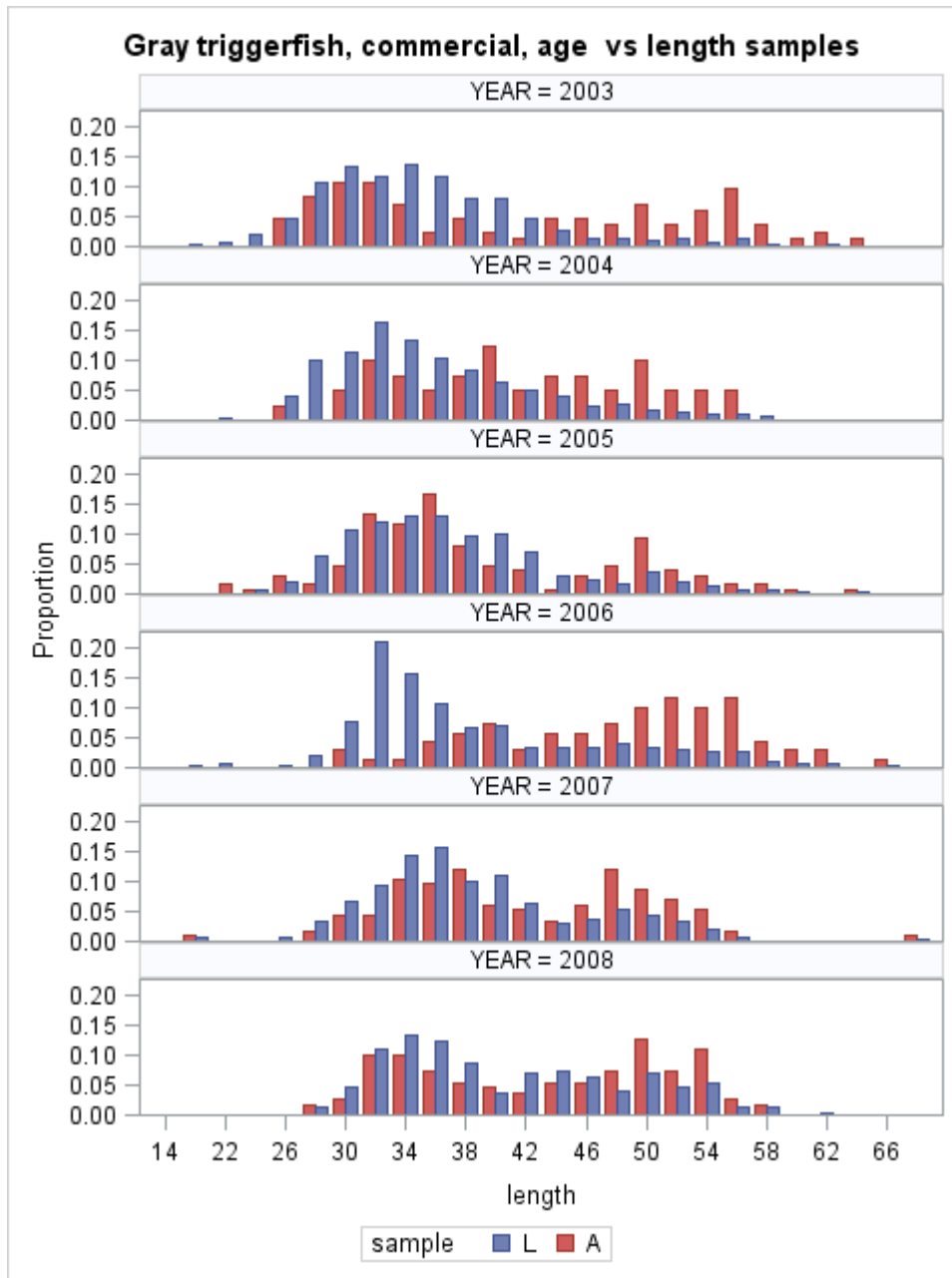


Fig 5(b) Comparisons of length frequency distributions for commercial length and age samples collected from the Gulf of Mexico between 2009 and 2013.

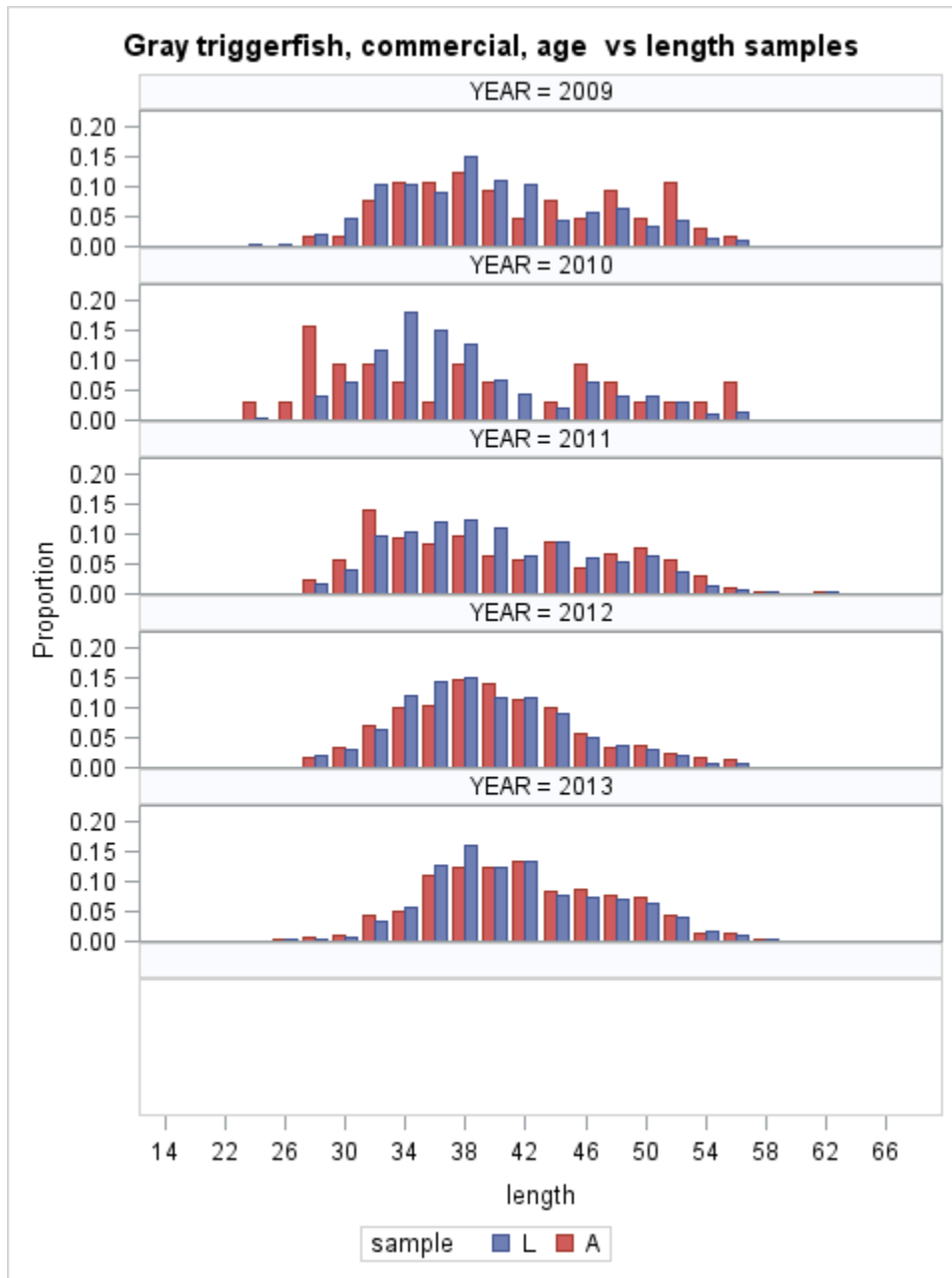


Fig 6(a) Comparisons of length frequency distributions for recreational length and age samples collected from the Gulf of Mexico between 2003 and 2008.

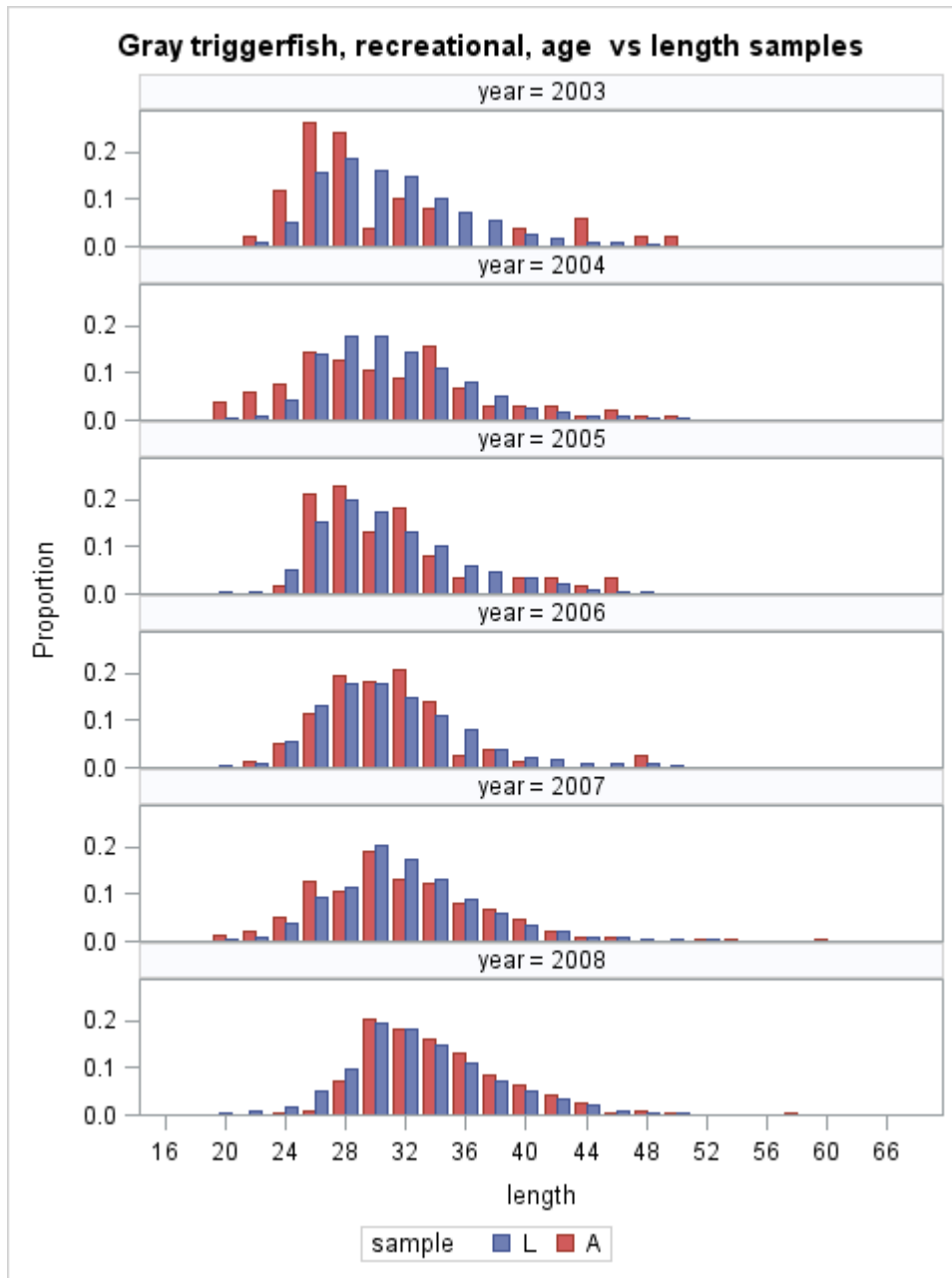


Fig 6(b) Comparisons of length frequency distributions for recreational length and age samples collected from the Gulf of Mexico between 2009 and 2013.

