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Updated catches of Atlantic sharpnose and bonnethead sharks

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ABSTRACT

This document presents updated commercial landings, recreational catches, and discard estimates of Atlantic sharpnose and bonnethead sharks up to 2011. Information on the geographical distribution of both commercial landings and recreational catches is presented along with gear-specific information of commercial landings. Length-frequency information and trends in average size of the catches from several commercial and recreational sources are also presented.

KEYWORDS

Catch, Landings, Discards, Commercial fishing, Long lining, Shark fisheries, Bycatch, Observer programs, Atlantic sharpnose shark, Bonnethead shark

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1. Background

The Catch Statistics Working Group (WG) of SEDAR 13 provided summary reports and tables of Atlantic sharpnose and bonnethead shark catches. The purpose of the present document is to build upon that information to update the baseline scenario catch tables for these two species to facilitate input into the SEDAR 34 stock assessments. Information on geographical distribution of commercial landings and recreational catches as well as gear-specific information of commercial landings from several sources is updated. Size (length compositions and trends in average length and weight) information from several commercial and recreational sources is also updated.

2. Catch histories

2.1. Commercial landings

U.S. commercial landings in weight for both species in 1995-2011 were compiled based on Northeast regional general canvass landings data, Southeast Accumulated Landings System (ALS) data, and SEFSC Pelagic Dealer Compliance (PDC) data based on southeastern region permitted shark dealer reports. The larger of the two values reported in the southeast ALS and PDC was taken as the value of shark landings for the southeast. The landings from the northeast general canvass data were then added to the southeast landings to produce total U.S. estimates.

As in SEDAR 13, commercial landings were split into three groups according to the predominant gear types: longlines, nets (including drift gillnets and all gillnet types), and lines (including troll lines, hook and line, and bandit gear). These three gear types accounted for the vast majority of the volume of reported commercial landings (typically 97-100% in any given year for 1997-2011). Commercial landings for each of these three main gear categories (longlines, nets, and lines) for 1995-2011 were computed by multiplying total landings by the proportion that each of these three gear types make up of all gears (in the northeast canvass and ALS data). Commercial landings in numbers were then calculated by dividing landings in weight for each of the three gears by the average weight from the Bottom Longline Observer Program (BLLOP; longlines and lines) or the Gillnet Observer Program (GNOP; nets).

All weights from the BLLOP and GNOP were predicted from fork length measurements taken by observers in the directed shark bottom longline fishery and gillnet fishery, respectively, using the corresponding length-weight regression. Average weights were available for 1995-2011 from the BLLOP, and for 2002-2011 from the GNOP.

Landings prior to 1995 were taken from SEDAR 13, where they were re-constructed assuming: an exponential increase from 1980 to 1995 (longlines); a linear increase from 1980 to 1995 (nets); and a linear increase from 1950 to 1995 (lines). See “Catch histories” in SEDAR 13 SCS DW Report for more details.

2.2 Recreational catches

Recreational catches of blacktip sharks correspond to estimates from three data collection programs: the Marine Recreational Information Program (MRIP), the NMFS Headboat Survey (HBOAT) operated by the SEFSC Beaufort Laboratory, and the Texas Parks and Wildlife Department Recreational Fishing Survey (TXPWD). The MRIP has effectively replaced MRFSS (Marine Recreational Fishery Statistics Survey), but new estimates for a suite of fish species, including sharks, are only available for the period 2004-2011. For 1980-2003, we used MRFSS estimates; however, MRFSS estimates will be adjusted to MRIP using ratio estimators (see SEDAR 34-WP-xx by V. Matter). Total, annual recreational catch estimates of blacktip sharks in the Gulf of Mexico were computed as the sum of the MRIP (or MRFSS) (A+B1=fished landed or killed), HBOAT (fish landed), and TXPWD (fish landed) survey estimates.

Catches prior to 1981 were taken from SEDAR 13, where they were back-calculated based on trends in population growth in coastal states form the US Census Bureau). See "Catch histories" in SEDAR 13 SCS DW Report for more details.

We also accounted for live post-release mortality (the proportion of sharks released alive that die) by multiplying B2s in MRFSS (1981-2003) and MRIP (2004-2011) by an estimated hook-and-line post-release mortality rate of 10% for both Atlantic sharpnose and bonnethead (see SEDAR 34-WP-08 by D. Courtney).

2.3 Bottom longline dead discards and live post-release mortality

Dead discard estimates in bottom longlines for 1995-2005 were calculated by multiplying the average dead discard rate observed for 1994-2005 (77.6% for Atlantic sharpnose; 58.7% for bonnethead) by the annual catch (in numbers) in longlines (from section 2.1). To compute dead discard estimates for 2006-2011, we used the average dead discard rate observed for the period 2006-2011 (51.8% for Atlantic sharpnose; 52.3% for bonnethead). We used average discard rates for these two periods because single, annual estimates show large interannual variation. These data will be replaced by dead discard estimates obtained from the Coastal Fishery Logbook program and the BLLOP for 2005-2011 (see SEDAR 34-WP-21 by J. Carlson).

Dead discards prior to 1995 were taken from SEDAR 13, where they were re-constructed by multiplying the average discard rate for 1994-2005 by the back-calculated annual longline landings for 1981-1994. See "Catch histories" in SEDAR 13 SCS DW Report for more details.

We also accounted for live post-release mortality (the proportion of sharks released alive that die) by multiplying landings from longlines, nets, and lines by the percentage released alive in each of these gears (from observer programs) and the post-release mortality rate estimated for each of these gears. For Atlantic sharpnose, percent released alive was 0.24 (mean of 2005-2011 from the BLLOP) for longline, 0.098 (mean of 1998-2011 from the GNOP) for

nets, and 0.24 (the same value as for longlines) for lines. For bonnethead, percent released alive was 0.024 (mean of 2005-2011 from the BLLOP) for longline, 0.053 (mean of 1998-2011 from the GNOP) for nets, and 0.024 (the same value as for longlines) for lines. The estimated post-release mortality rate for Atlantic sharpnose was 35% in longlines and gillnets, and 10% in lines; for bonnethead it was 40% in longlines and gillnets, and 10% in lines (see SEDAR 34-WP-08 by D. Courtney).

2.4 Shrimp trawl fishery discards

Dead discard estimates from the shrimp trawl fishery in the Gulf of Mexico for 1972-2005 were taken from SEDAR 13. Values for 2006-2011 were assumed equal to the mean of 2003-2005 values. These estimates will be updated with values provided by Zhang et al. (see SEDAR34-WP-18) using the same methodology as Nichols (2007) using WinBUGS (SEDAR 13-DW-32). Estimates for the Atlantic were not produced (see "Catch histories" in SEDAR 13 SCS DW Report for more details, but the Atlantic estimates were rejected because of extreme interannual variability and very low sample sizes in some years). Thus, as in SEDAR 13, estimates for the GOM were considered more reliable and those for the ATL were obtained by scaling the GOM estimates by the ratio of the observed days in the SA (2.2 days on average) to the observed days in the GOM (17.5 days on average) or 12.6%. For 1981, which had a very large estimate, the geometric mean of the 3 preceding and 3 ensuing years was used instead.

For the historic landings (1950-1971), bycatch estimates were obtained by applying the mean ratio of shrimp to sharks caught by year for the period 1972-2005. See "Catch histories" in SEDAR 13 SCS DW Report for more details, but essentially the annual shrimp landings in pounds (heads off) for the period 1950-1971 were divided by this ratio to produce annual estimates.

Tables 1 and 2 summarize the updated catch history for Atlantic sharpnose and bonnethead sharks showing each of the sources described above. Figures 1 and 2 show the different catch streams ("fleets") that can be used for the stock assessment.

2.5 Commercial landings by region and gear

Commercial landing information by region and gear was extracted from the ALS (southeast and northeast) data. Averaged over the period 1993-2011, 87% of Atlantic sharpnose sharks and 96% of bonnethead sharks were landed in the South Atlantic (Florida to North Carolina), with very little contribution from the Gulf of Mexico (GOM) region (9% and 4%, respectively) and almost negligible or inexistent for the Mid Atlantic (MA; Virginia to New Jersey) region (3% and 0%, respectively; Tables 3 and 4). For Atlantic sharpnose, drift nets (52%) and gillnets (14%) together accounted for 2/3 of landings in the SA, with longlines averaging 17% and "other gear" (a category that includes the designation "combined gears" from the ALS) 14% during 1993-2011 (Table 5, Fig. 3). For bonnethead, drift nets (76%) and

gillnets (2%) together accounted for over 3/4 of landings in the SA, with longlines averaging 9% and "other gear" 12% during 1993-2011 (Table 6, Fig. 4).

2.6 Landings by state

2.6.1 Commercial landings by state

Commercial landing information by state was extracted from the PDC (covering southeast states only) and the ALS (covering both SE and NE states). For Atlantic sharpnose, data from both the PDC and ALS indicated that in the GOM they were landed mostly in Alabama (Fig. 5), whereas in the SA both sources indicated that Florida's east coast was the main state of landing (Fig. 6). For bonnethead, data from the PDC indicated that in the GOM they were landed mostly in Florida's west coast, with more landings recorded in Alabama especially in 2006 and 2011, but the ALS only showed landings in Florida's west coast (Fig. 7). In the SA both sources indicated that Florida's east coast was the main state of landing (Fig. 8).

2.6.2 Recreational landings by state

Combined data from the MRFSS, HBOAT, and TXPWD surveys indicated that Atlantic sharpnose sharks were caught in very similar proportions in the GOM and SA regions during 1981-2011 (Fig. 9), whereas bonnethead sharks were caught predominantly in the GOM (about 2/3 in the GOM vs. 1/3 in the SA; Fig. 10). Data from MRFSS reveal that South Carolina, both coasts of Florida, and Mississippi accounted for a large proportion of all catches of Atlantic sharpnose sharks (Fig. 9), whereas bonnetheads were predominantly caught in both coasts of Florida (Fig. 10). Data from the HBOAT survey showed Texas and Florida's east coast as the two most important states where Atlantic sharpnose and bonnethead sharks were caught by headboats (Figs. 9 and 10).

2.7 Average size (length and weight) and length compositions

The predicted average weight and observed fork length of Atlantic sharpnose shark from the BLLOP showed a slightly decreasing trend from 1994 to 2011 (Fig. 11) while the decreasing trends for bonnethead shark were a little more accentuated (but sample sizes were very low; Fig. 12). Average weight and fork length from the GNOP also showed a slightly decreasing trend from 2002 to 2011 for Atlantic sharpnose shark (Fig. 13) whereas there was no trend for bonnethead shark (Fig. 14). In contrast, both series for both species from the MRFSS showed a slightly upward trend (Figs. 15 and 16) whereas the HBOAT survey showed a more accentuated decline for Atlantic sharpnose (Fig. 17) and no trend for bonnethead shark (Fig. 18; but sample sizes were very low). The TXPWD survey showed a slightly increasing trend for Atlantic sharpnose (Fig. 19) and a much more accentuated upward trend for bonnethead shark (Fig. 20).

Length-frequency distributions of Atlantic sharpnose sharks observed in the BLLOP show that most animals caught were under 90 cm FL, but the majority were mature (ca. $\geq$ 66 cm

FL for sexes and areas combined; Fig. 21). Few bonnetheads were observed in the BLLOP, but the vast majority were mature (ca. ≥ 65 cm FL for sexes and areas combined; Fig. 22). Most Atlantic sharpnose and bonnethead sharks observed in the GNOP were mature (Figs. 23 and 24). The recreational fisheries sampled by MRFSS caught all sizes of Atlantic sharpnose and bonnethead sharks, both immature and mature (Figs. 25 and 26), whereas a larger proportion of mature individuals was caught by headboats (Figs. 27 and 28). Similar proportions of immature and mature Atlantic sharpnose sharks were caught in the TXPWD survey (Fig. 29), but proportionally more immature bonnetheads were caught (Fig. 30).

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Table 1. Catch history for Atlantic sharpnose sharks (thousands of fish).

BASELINE SCENARIO
CATCHES OF ATLANTIC SHARPNOSE SHARKS (in numbers)

Year	Commercial				Total commercial removals			Recreational catches	Total recreational removals	Bottom longline discards	Shrimp bycatch (GOM)	Shrimp bycatch (SA)	Total shrimp	Total
	Total	Longline	Nets	Lines	Longline	Nets	Lines							
1950		0	0	0	0	0	0	12,114	12,114	0	175,722	23,435	199,157	211,271
1951		0	0	0	0	0	0	13,314	13,314	0	224,238	31,603	255,841	269,155
1952		0	0	1	0	0	1	14,514	14,514	0	229,584	29,353	258,937	273,451
1953		0	0	1	0	0	1	15,714	15,714	0	259,963	37,803	297,766	313,481
1954		0	0	2	0	0	2	16,914	16,914	0	274,611	32,881	307,492	324,407
1955		0	0	2	0	0	2	18,114	18,114	0	245,951	32,746	278,697	296,813
1956		0	0	2	0	0	2	19,314	19,314	0	224,199	29,140	253,339	272,656
1957		0	0	3	0	0	3	20,514	20,514	0	195,061	32,719	227,780	248,297
1958		0	0	3	0	0	3	21,714	21,714	0	200,735	25,481	226,216	247,933
1959		0	0	4	0	0	4	22,914	22,914	0	224,067	29,703	253,769	276,687
1960		0	0	4	0	0	4	24,114	24,114	0	236,305	35,544	271,849	295,967
1961		0	0	4	0	0	4	24,815	24,815	0	113,758	22,669	136,426	161,246
1962		0	0	5	0	0	5	25,517	25,517	0	148,927	29,933	178,861	204,382
1963		0	0	5	0	0	5	26,218	26,218	0	245,978	23,155	269,133	295,356
1964		0	0	6	0	0	6	26,920	26,920	0	215,420	25,337	240,757	267,682
1965		0	0	6	0	0	6	27,621	27,621	0	221,774	37,102	258,877	286,504
1966		0	0	6	0	0	6	28,322	28,322	0	213,372	30,904	244,276	272,605
1967		0	0	7	0	0	7	29,024	29,024	0	270,109	29,785	299,894	328,924
1968		0	0	7	0	0	7	29,725	29,725	0	239,327	34,251	273,578	303,310
1969		0	0	8	0	0	8	30,427	30,427	0	248,037	38,364	286,401	316,835
1970		0	0	8	0	0	8	31,128	31,128	0	285,899	29,517	315,416	346,552
1971		0	0	8	0	0	8	34,310	34,310	0	281,092	42,122	323,214	357,532
1972		0	0	9	0	0	9	34,613	34,613	0	485,780	61,069	546,849	581,470
1973		0	0	9	0	0	9	34,916	34,916	0	102,900	12,936	115,836	150,761
1974		0	0	9	0	0	9	35,220	35,220	0	185,074	23,266	208,340	243,569
1975		0	0	10	0	0	10	35,523	35,523	0	192,627	24,216	216,843	252,376
1976		0	0	10	0	0	10	35,827	35,827	0	141,282	17,761	159,043	194,880
1977		0	0	11	0	0	11	36,130	36,130	0	497,629	62,559	560,188	596,329
1978		0	0	11	0	0	11	36,434	36,434	0	578,336	72,705	651,041	687,486
1979		0	0	11	0	0	11	36,737	36,737	0	470,857	59,194	530,051	566,800
1980		50	0	12	89	0	12	41,970	41,970	39	757,373	95,213	852,586	894,656
1981		75	0	12	133	0	12	43,490	43,490	58	376,709	47,358	424,066	467,702
1982		112	0	13	199	0	1,021	40,656	41,665	87	208,879	26,259	235,138	278,023
1983		168	0	13	298	0	120	46,248	46,355	130	343,009	43,121	386,130	432,904
1984		250	0	13	444	0	6,408	36,562	42,957	194	193,399	24,313	217,712	267,521
1985		373	0	14	663	0	1,317	24,366	25,669	290	293,171	36,856	330,027	357,675
1986		556	0	14	988	0	1,090	36,595	37,671	432	202,706	25,483	228,189	267,937
1987		830	663	15	1,474	663	554	38,568	39,107	644	568,133	71,422	639,555	681,353
1988		1,238	1,326	15	2,199	1,326	5,683	81,032	86,700	961	322,388	40,529	362,917	458,825
1989		1,847	1,989	15	3,281	1,989	1,156	59,813	60,953	1,434	270,901	34,056	304,957	372,337
1990		2,755	2,652	16	4,894	2,652	541	51,417	51,942	2,139	303,917	38,207	342,124	402,153
1991		4,110	3,315	16	7,301	3,315	915	142,387	143,286	3,191	460,335	57,871	518,206	673,024
1992		6,132	3,978	17	10,893	3,978	2,693	87,641	90,317	4,761	860,192	108,138	968,330	1,076,211
1993		9,148	4,641	17	16,251	4,641	2,074	81,211	83,268	7,103	385,082	48,410	433,492	539,725
1994		13,647	5,305	17	24,243	5,305	9,482	106,625	116,089	10,596	230,386	28,963	259,349	414,467
1995	28,499	22,514	5,968	18	41,894	5,968	7,328	155,679	162,989	17,480	567,054	71,287	638,341	856,521
1996	62,488	59,551	2,923	14	110,811	2,923	6,969	81,276	88,231	46,236	446,999	56,194	503,193	712,126
1997	69,777	7,341	61,532	904	13,660	61,563	4,115	73,418	76,629	5,700	292,293	36,745	329,038	485,004
1998	63,021	6,402	54,606	2,012	11,913	54,675	7,809	75,870	81,667	4,971	455,072	57,209	512,281	668,345
1999	66,648	5,284	57,258	4,106	9,832	57,399	19,523	66,459	81,876	4,102	276,374	34,744	311,118	479,748
2000	38,415	3,949	33,312	1,154	7,349	33,352	27,556	127,257	153,659	3,066	478,883	60,202	539,085	761,000
2001	53,160	4,780	47,150	1,230	8,894	47,192	46,786	127,913	173,469	3,711	283,371	35,624	318,995	595,336
2002	53,485	9,872	42,712	901	18,369	42,743	27,687	85,870	112,656	7,665	567,679	71,365	639,044	840,499
2003	52,067	29,551	19,877	2,639	54,988	19,967	35,199	84,995	117,555	22,944	262,108	32,951	295,059	522,769
2004	59,336	24,488	34,156	691	45,568	34,180	26,789	74,801	100,899	19,013	153,970	19,356	173,326	380,762
2005	93,244	25,738	66,348	1,159	47,892	66,388	35,124	76,363	110,328	19,983	289,384	36,380	325,764	585,497
2006	129,065	38,728	88,215	2,122	62,064	88,288	65,179	76,645	139,702	20,069	235,154	36,380	271,534	626,767
2007	131,439	12,887	115,423	3,130	20,652	115,530	48,587	98,477	143,935	6,678	235,154	36,380	271,534	600,237
2008	66,607	10,425	54,863	1,319	16,707	54,908	31,062	72,412	102,155	5,402	235,154	36,380	271,534	476,365
2009	89,536	31,861	56,405	1,270	51,059	56,449	33,386	64,807	96,923	16,510	235,154	36,380	271,534	509,351
2010	59,281	16,852	37,507	4,922	27,006	37,676	91,020	70,716	156,814	8,733	235,154	36,380	271,534	584,049
2011	83,002	24,849	51,776	6,377	39,822	51,995	19,367	47,324	60,314	12,877	235,154	36,380	271,534	443,033

Table 2. Catch history for bonnethead sharks (thousands of fish).

BASELINE SCENARIO
CATCHES OF BONNETHEAD SHARKS (in numbers)

Year	Commercial				Total commercial removals			Recreational catches	Total recreational removals	Bottom longline discards	Shrimp bycatch (GOM)	Shrimp bycatch (SA)	Total shrimp bycatch	Total
	Total	Longline	Nets	Lines	Longline	Nets	Lines							
1950		0	0	0	0	0	0	7,469	7,469	0	90,488	12,518	103,005	110,474
1951		0	0	0	0	0	0	13,314	13,314	0	115,471	16,880	132,351	145,665
1952		0	0	0	0	0	0	14,514	14,514	0	118,224	15,678	133,902	148,416
1953		0	0	0	0	0	0	15,714	15,714	0	133,867	20,192	154,059	169,773
1954		0	0	0	0	0	0	16,914	16,914	0	141,410	17,563	158,973	175,887
1955		0	0	0	0	0	0	18,114	18,114	0	126,652	17,491	144,143	162,257
1956		0	0	0	0	0	0	19,314	19,314	0	115,451	15,565	131,016	150,330
1957		0	0	0	0	0	0	20,514	20,514	0	100,446	17,477	117,923	138,437
1958		0	0	0	0	0	0	21,714	21,714	0	103,368	13,610	116,978	138,692
1959		0	0	0	0	0	0	22,914	22,914	0	115,383	15,865	131,248	154,162
1960		0	0	0	0	0	0	15,058	15,058	0	121,685	18,985	140,670	155,729
1961		0	0	0	0	0	0	15,760	15,760	0	58,579	12,108	70,687	86,447
1962		0	0	0	0	0	0	16,461	16,461	0	76,690	15,988	92,678	109,139
1963		0	0	0	0	0	0	17,162	17,162	0	126,666	12,368	139,034	156,196
1964		0	0	0	0	0	0	17,864	17,864	0	110,930	13,533	124,463	142,327
1965		0	0	0	0	0	0	18,565	18,565	0	114,202	19,818	134,020	152,585
1966		0	0	0	0	0	0	19,267	19,267	0	109,876	16,507	126,382	145,649
1967		0	0	0	0	0	0	19,968	19,968	0	139,092	15,909	155,001	174,969
1968		0	0	0	0	0	0	20,669	20,669	0	123,241	18,295	141,535	162,205
1969		0	0	0	0	0	0	21,371	21,371	0	127,726	20,491	148,218	169,588
1970		0	0	0	0	0	0	18,450	18,450	0	147,223	15,766	162,989	181,440
1971		0	0	0	0	0	0	21,632	21,632	0	144,748	22,499	167,247	188,879
1972		0	0	0	0	0	0	21,935	21,935	0	230,616	28,992	259,608	281,544
1973		0	0	0	0	0	0	22,239	22,239	0	168,133	21,137	189,270	211,509
1974		0	0	0	0	0	0	22,542	22,542	0	227,183	28,560	255,743	278,285
1975		0	0	0	0	0	0	22,846	22,846	0	337,902	42,479	380,381	403,227
1976		0	0	0	0	0	0	23,149	23,149	0	152,590	19,183	171,773	194,922
1977		0	0	0	0	0	0	23,453	23,453	0	295,526	37,152	332,678	356,130
1978		0	0	0	0	0	0	23,756	23,756	0	72,078	9,061	81,139	104,896
1979		0	0	0	0	0	0	24,060	24,060	0	282,239	35,482	317,721	341,781
1980		0	0	0	0	0	0	25,067	25,067	0	141,564	17,797	159,361	184,428
1981		0	0	0	0	0	0	39,269	39,771	0	97,393	12,244	109,637	149,408
1982		1	0	0	1	0	0	25,943	28,677	0	168,807	21,221	190,028	218,706
1983		1	0	0	2	0	0	24,288	26,080	1	81,431	10,237	91,668	117,750
1984		3	0	0	5	0	0	17,137	18,800	2	91,813	11,542	103,355	122,160
1985		6	0	0	9	0	0	24,295	27,226	4	89,457	11,246	100,703	127,939
1986		10	0	0	16	0	0	53,725	57,522	6	287,078	36,090	323,168	380,706
1987		16	8,770	0	26	8,770	0	29,839	32,356	10	181,772	22,851	204,623	245,776
1988		24	17,541	0	38	17,541	0	37,633	41,766	14	161,864	20,349	182,213	241,558
1989		40	26,311	0	64	26,311	0	41,049	46,830	24	106,352	13,370	119,722	192,927
1990		74	35,082	0	118	35,082	0	50,639	52,671	44	241,231	30,326	271,557	359,428
1991		113	43,852	0	180	43,852	0	13,840	18,782	66	92,551	11,635	104,186	166,999
1992		190	52,623	0	302	52,623	0	22,247	28,296	112	137,106	17,236	154,342	235,563
1993		349	61,393	0	554	61,393	0	21,210	30,402	205	126,692	15,927	142,619	234,968
1994		680	70,164	0	1,080	70,164	0	22,833	34,757	400	108,176	13,599	121,775	227,775
1995	78,934	0	78,934	0	0	80,610	0	34,643	54,089	0	215,025	27,032	242,057	376,757
1996	21,040	0	21,040	0	0	21,486	0	23,162	44,909	0	425,538	53,496	479,034	545,429
1997	19,796	379	19,115	301	605	19,521	308	16,711	36,914	223	370,649	46,596	417,245	474,593
1998	3,242	956	2,042	244	1,527	2,086	249	31,824	59,417	562	146,460	18,412	164,872	228,151
1999	14,742	557	13,213	971	890	13,494	992	38,937	66,107	327	241,472	30,357	271,829	353,312
2000	18,350	779	17,535	36	1,244	17,907	37	57,740	112,435	458	121,846	15,318	137,164	268,787
2001	16,923	419	16,451	53	669	16,800	54	60,094	136,315	246	234,102	29,430	263,532	417,370
2002	8,817	550	8,038	229	879	8,209	234	51,747	127,028	323	271,715	34,159	305,874	442,223
2003	9,423	3,756	5,558	109	5,999	5,676	111	41,172	84,304	2,207	192,434	24,192	216,626	312,717
2004	6,775	1,096	5,620	59	1,750	5,740	61	40,475	101,614	644	403,209	50,689	453,898	563,062
2005	8,989	2,109	6,657	224	3,368	6,798	229	22,790	79,922	1,239	99,659	12,529	112,188	202,505
2006	9,485	1,286	7,950	250	1,971	8,119	255	22,149	67,852	673	231,768	12,529	244,297	322,494
2007	23,517	416	23,046	55	638	23,535	56	49,366	116,101	218	244,879	12,529	257,408	397,738
2008	14,675	363	14,274	37	557	14,577	38	21,163	62,986	190	192,102	12,529	204,631	282,789
2009	17,863	3,903	13,930	30	5,984	14,226	30	22,196	74,683	2,043	222,916	12,529	235,445	330,368
2010	3,036	90	2,929	17	138	2,991	18	16,156	65,029	47	219,965	12,529	232,494	300,670
2011	12,709	897	11,660	152	1,375	11,907	155	60,314	103,638	469	211,661	12,529	224,190	341,266

Table 3. Percentage of Atlantic sharpnose shark commercial landings by region and year for all gear combined.

	Region		
Year	**Gulf of Mexico**	**Mid Atlantic**	**South Atlantic**
1993	0.0	5.8	94.2
1994	0.0	0.0	100.0
1995	3.7	0.0	96.3
1996	0.0	0.0	100.0
1997	0.2	0.0	99.8
1998	0.9	0.0	99.1
1999	0.9	0.2	98.9
2000	2.0	0.1	97.9
2001	0.1	0.0	99.9
2002	9.0	0.0	91.0
2003	24.7	0.0	75.3
2004	21.2	0.0	78.8
2005	22.2	0.0	77.8
2006	42.5	0.2	57.3
2007	11.2	16.2	72.6
2008	13.0	34.5	52.4
2009	6.2	0.0	93.8
2010	4.3	2.9	92.9
2011	16.2	1.3	82.4

Table 4. Percentage of bonnethead shark commercial landings by region and year for all gear combined.

	Region	
Year	**Gulf of Mexico**	**South Atlantic**
1995	22.9	77.1
1996	24.1	75.9
1997	0.1	99.9
1998	1.1	98.9
1999	8.6	91.4
2000	0.1	99.9
2001	0.4	99.6
2002	0.0	100.0
2003	1.0	99.0
2004	4.4	95.6
2005	0.0	100.0
2006	3.9	96.1
2007	0.0	100.0
2008	0.0	100.0
2009	0.0	100.0
2010	0.0	100.0
2011	8.2	91.8

Table 5. Percentage of Atlantic sharpnose shark commercial landings by region and gear for all years combined. (Years listed under each region indicate those used in the summary calculation)

Gear	Gulf of Mexico (1993 - 2011)	Mid Atlantic (1993 - 2011)	South Atlantic (1993 - 2011)
Drift nets	2.1	27.9	51.7
Gillnets	31.3	51.5	14.3
Lines	1.1	0.0	2.5
Longlines	58.7	0.0	16.9
Other	6.3	0.0	14.1
Other nets	0.4	0.0	0.0
Other trawl	0.0	0.0	0.0
Otter trawl	0.0	0.0	0.3
Pots & traps	0.0	0.0	0.0
Purse seine	0.0	0.0	0.0
Unknown	0.0	20.6	0.2

Table 6. Percentage of bonnethead shark commercial landings by region and gear for all years combined. (Years listed under each region indicate those used in the summary calculation)

Gear	Gulf of Mexico (1995 - 2011)	South Atlantic (1993 - 2011)
Drift nets	4.8	75.6
Gillnets	0.0	1.9
Lines	40.2	1.3
Longlines	37.5	9.2
Other	8.3	11.9
Other nets	8.4	0.0
Other trawl	0.0	0.0
Otter trawl	0.0	0.1
Pots & traps	0.8	0.0
Purse seine	0.0	0.0
Unknown	0.0	0.0

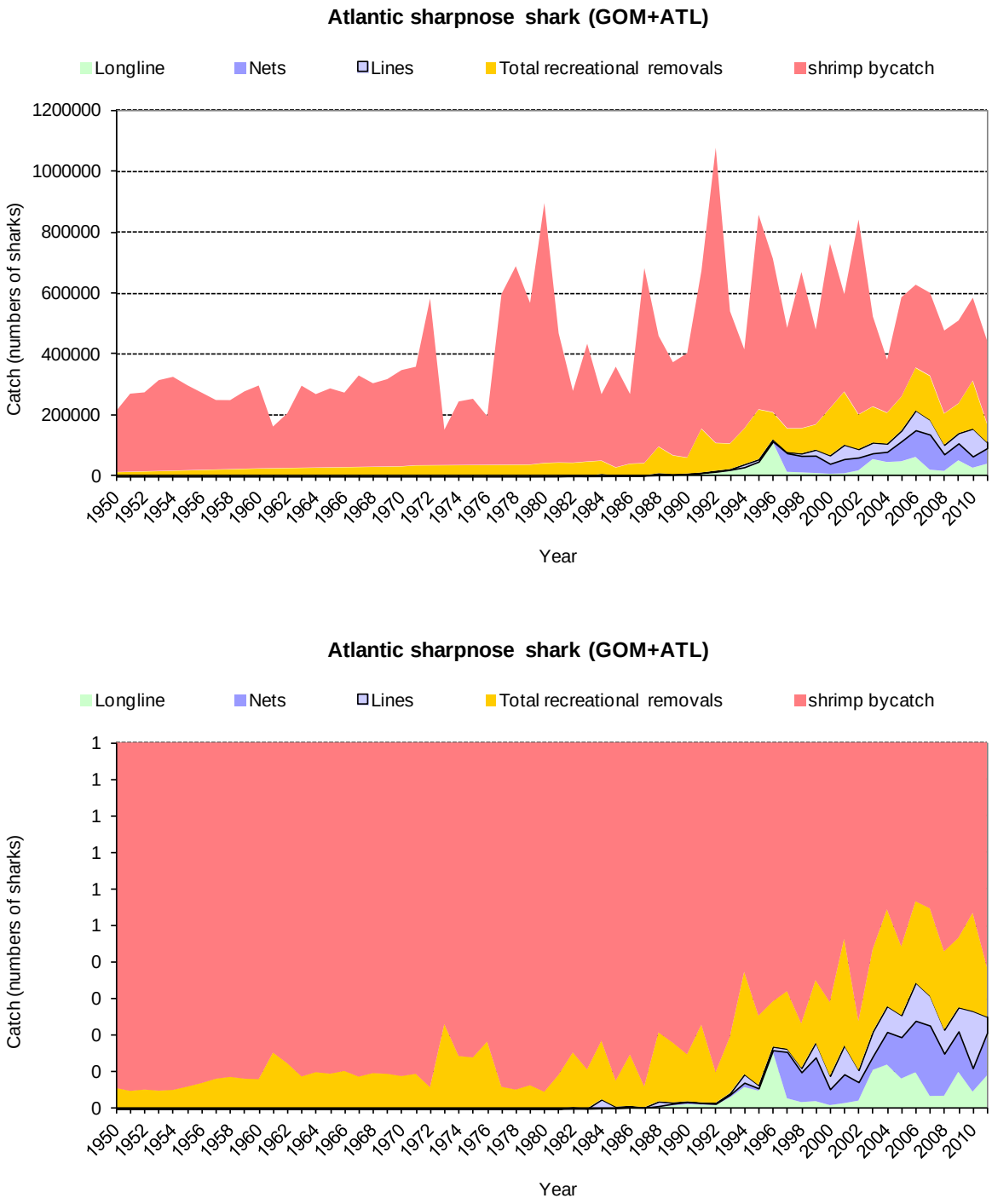


Figure 1. Total catches of Atlantic sharpnose sharks by sector. Top panel shows catches stacked; bottom panel shows them as proportions.

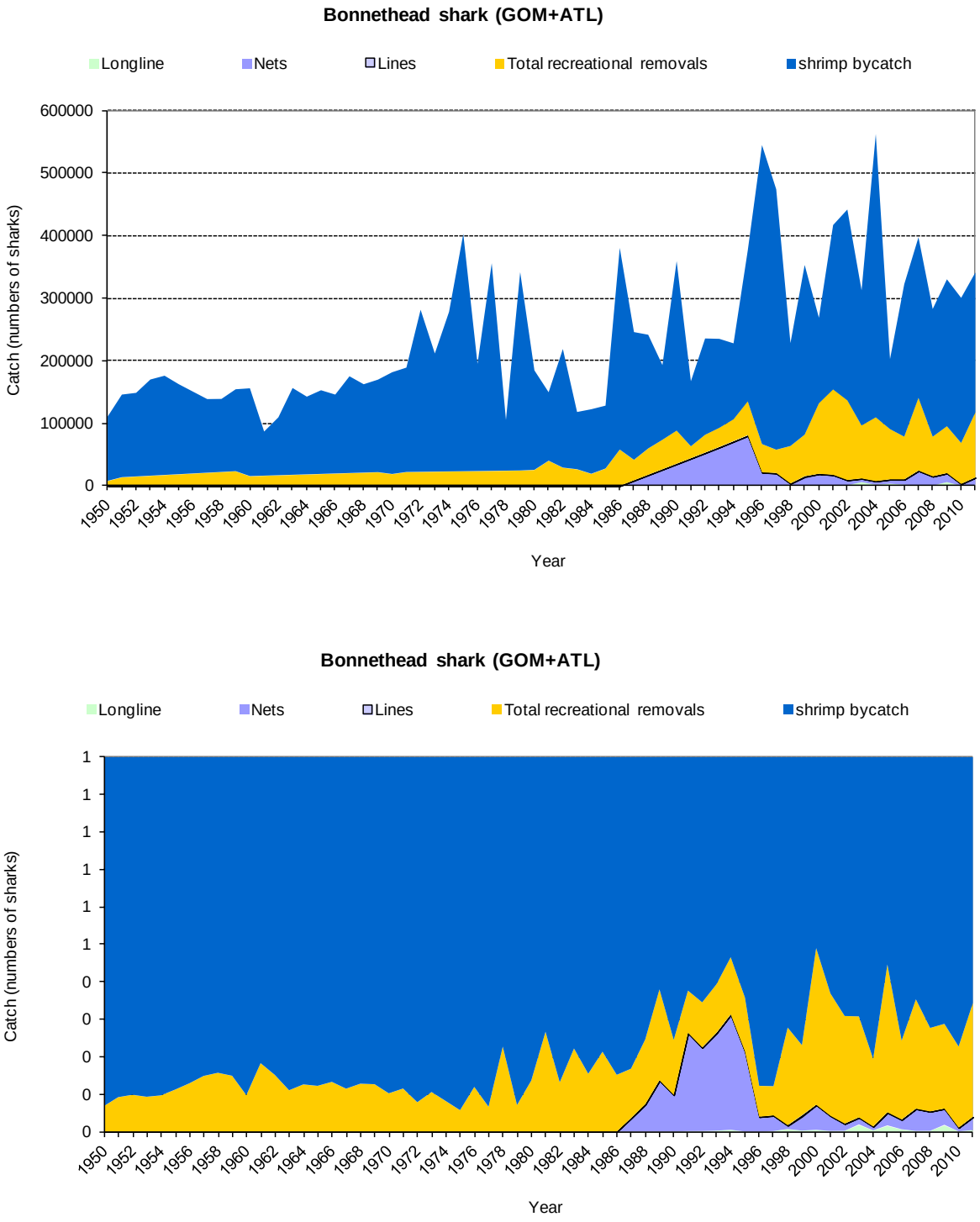
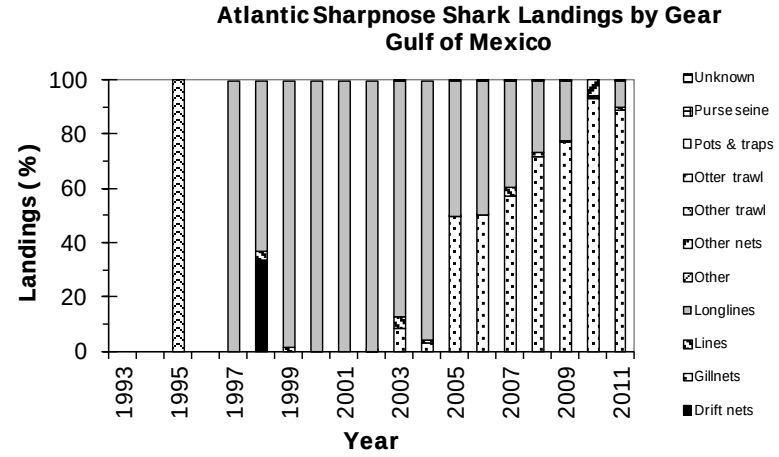
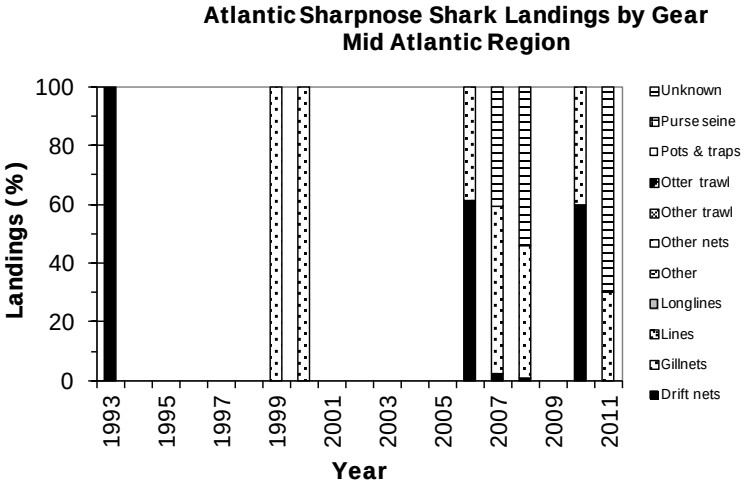


Figure 2. Total catches of bonnethead sharks by sector. Top panel shows catches stacked; bottom panel shows them as proportions.





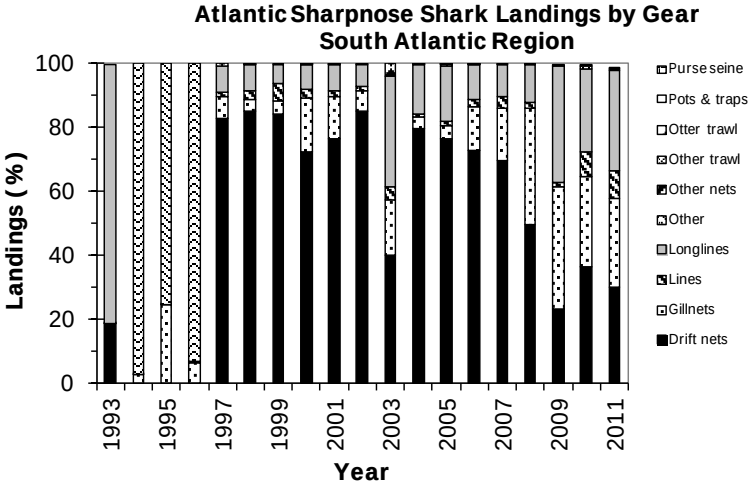


Figure 3. Commercial landings of Atlantic sharpnose sharks by region and gear type. Data are from the ALS (SE + NE).

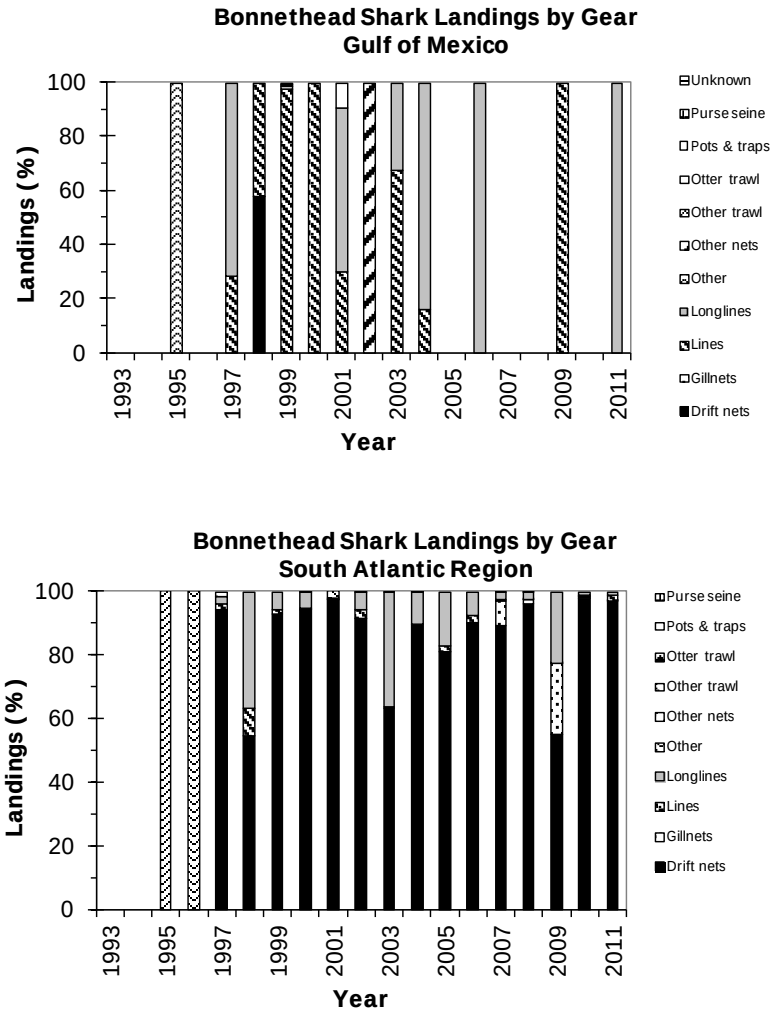


Figure 4. Commercial landings of bonnethead sharks by region and gear type. Data are from the ALS (SE + NE).

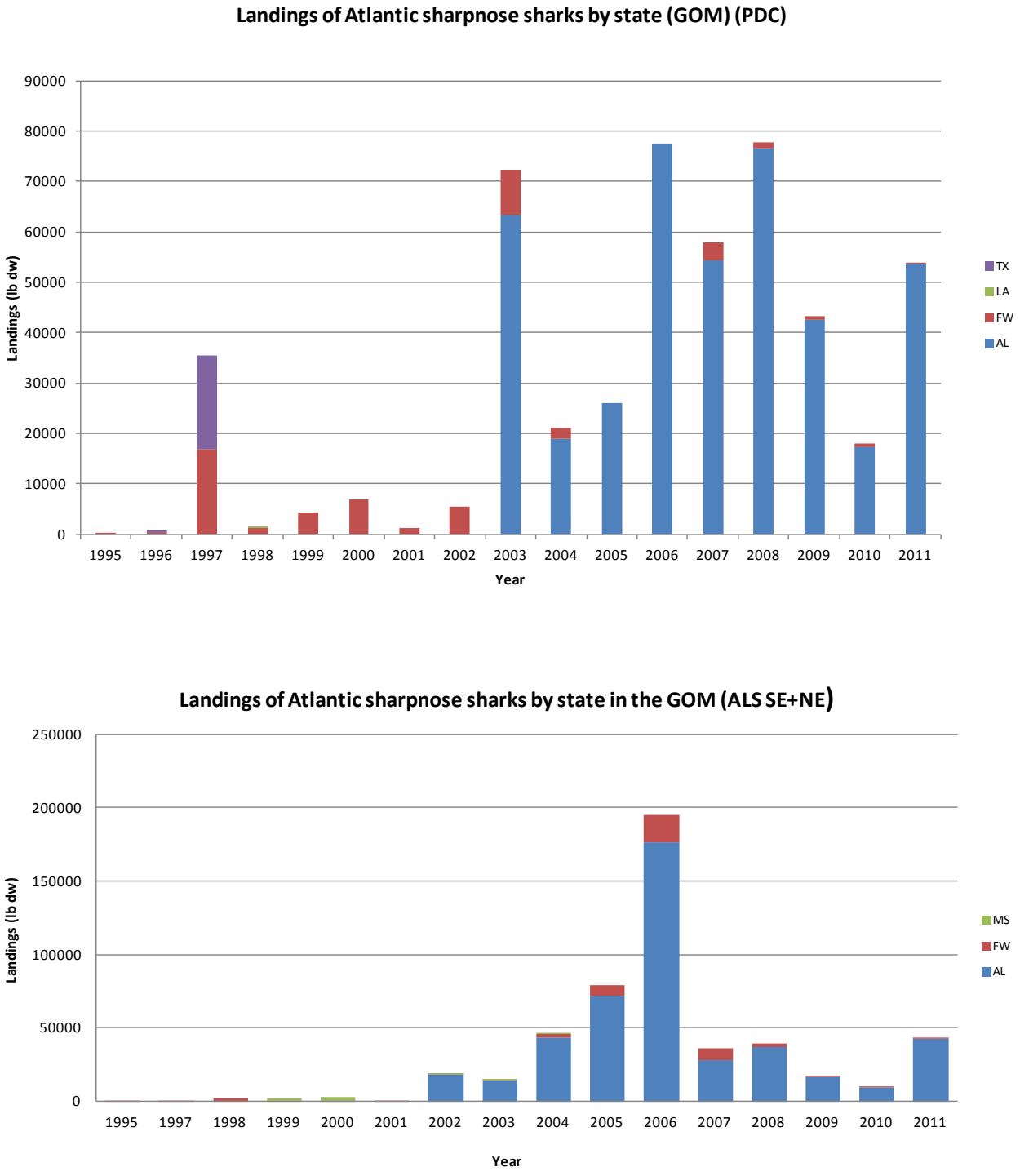
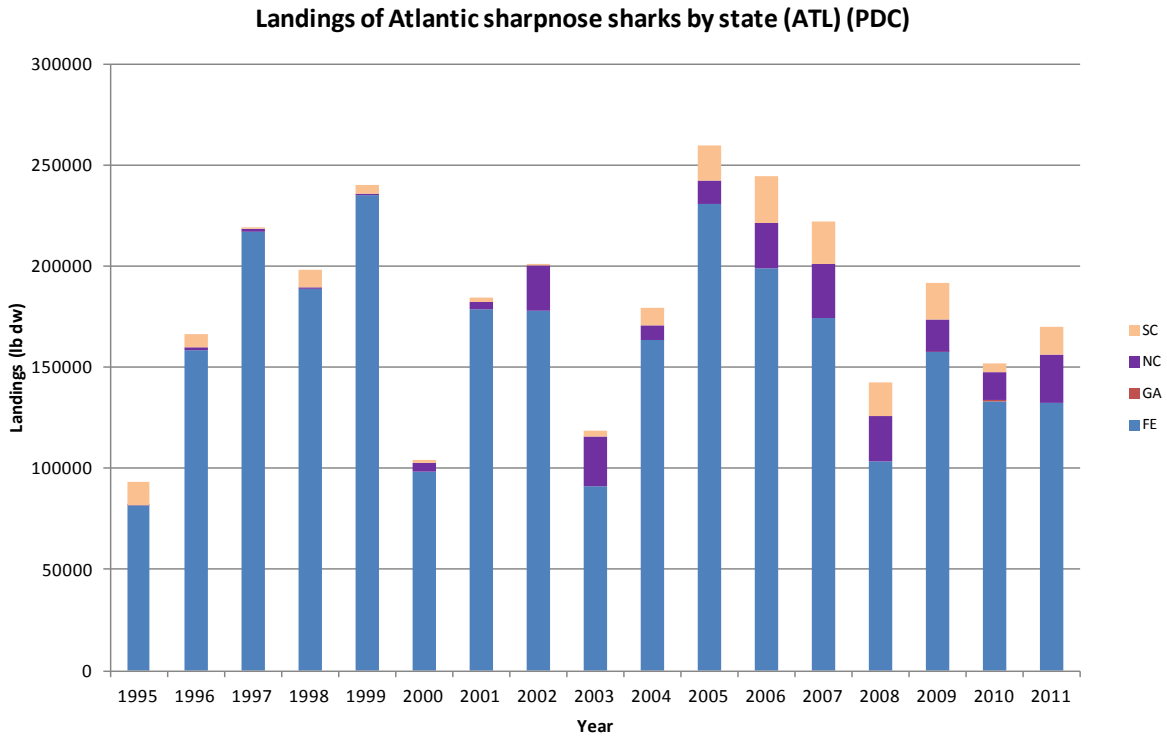


Figure 5. Commercial landings of Atlantic sharpnose sharks by state in the GOM from two data sources (PDC and ALS).



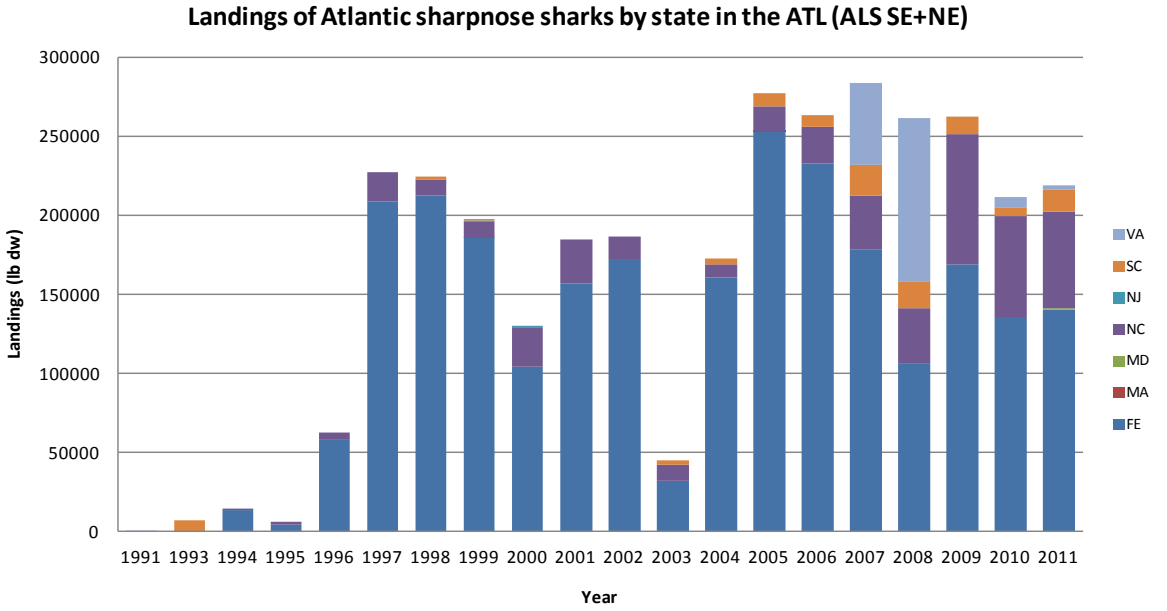


Figure 6. Commercial landings of Atlantic sharpnose sharks by state in the ATL from two data sources (PDC and ALS).

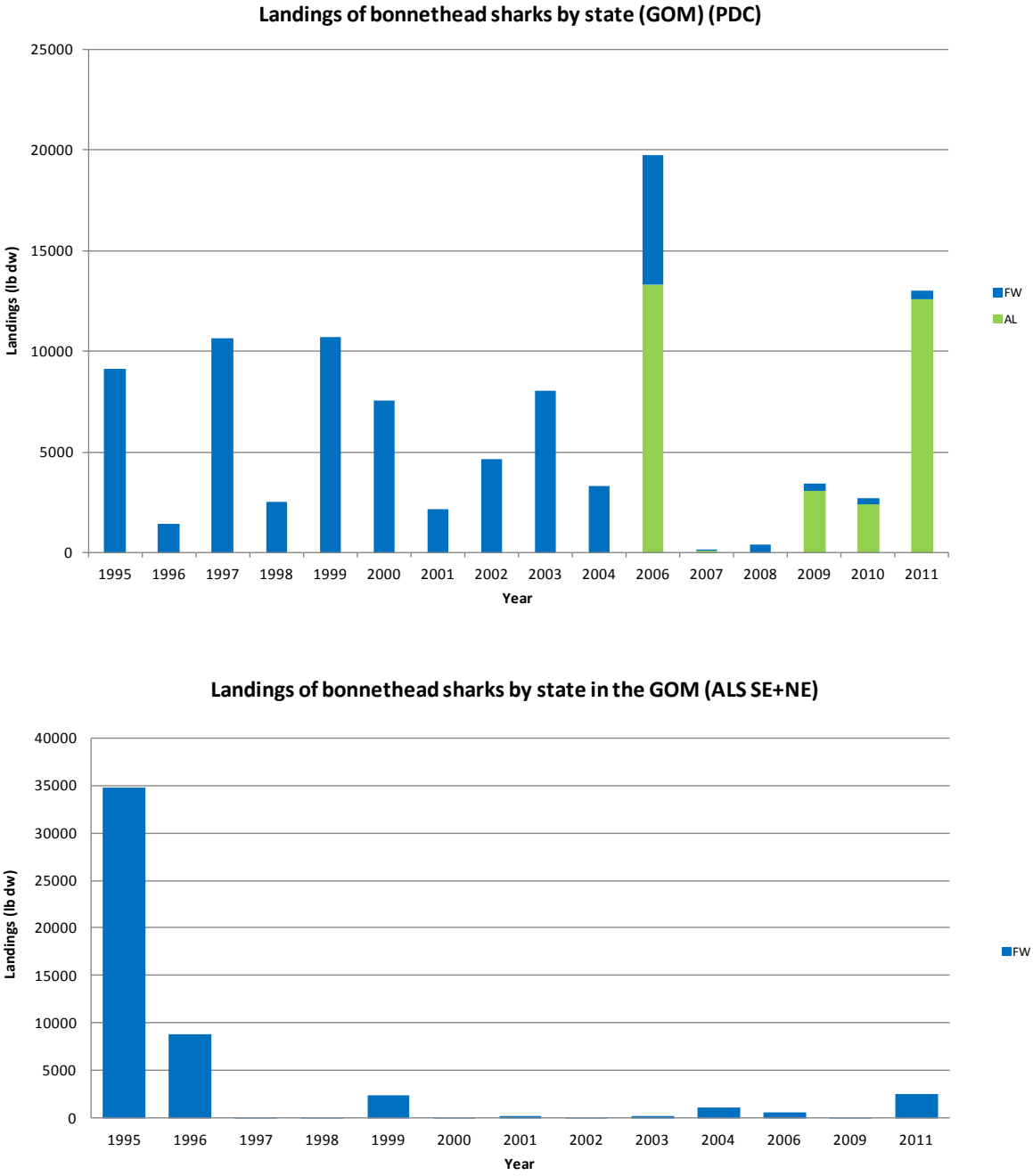


Figure 7. Commercial landings of bonnethead sharks by state in the GOM from two data sources (PDC and ALS).

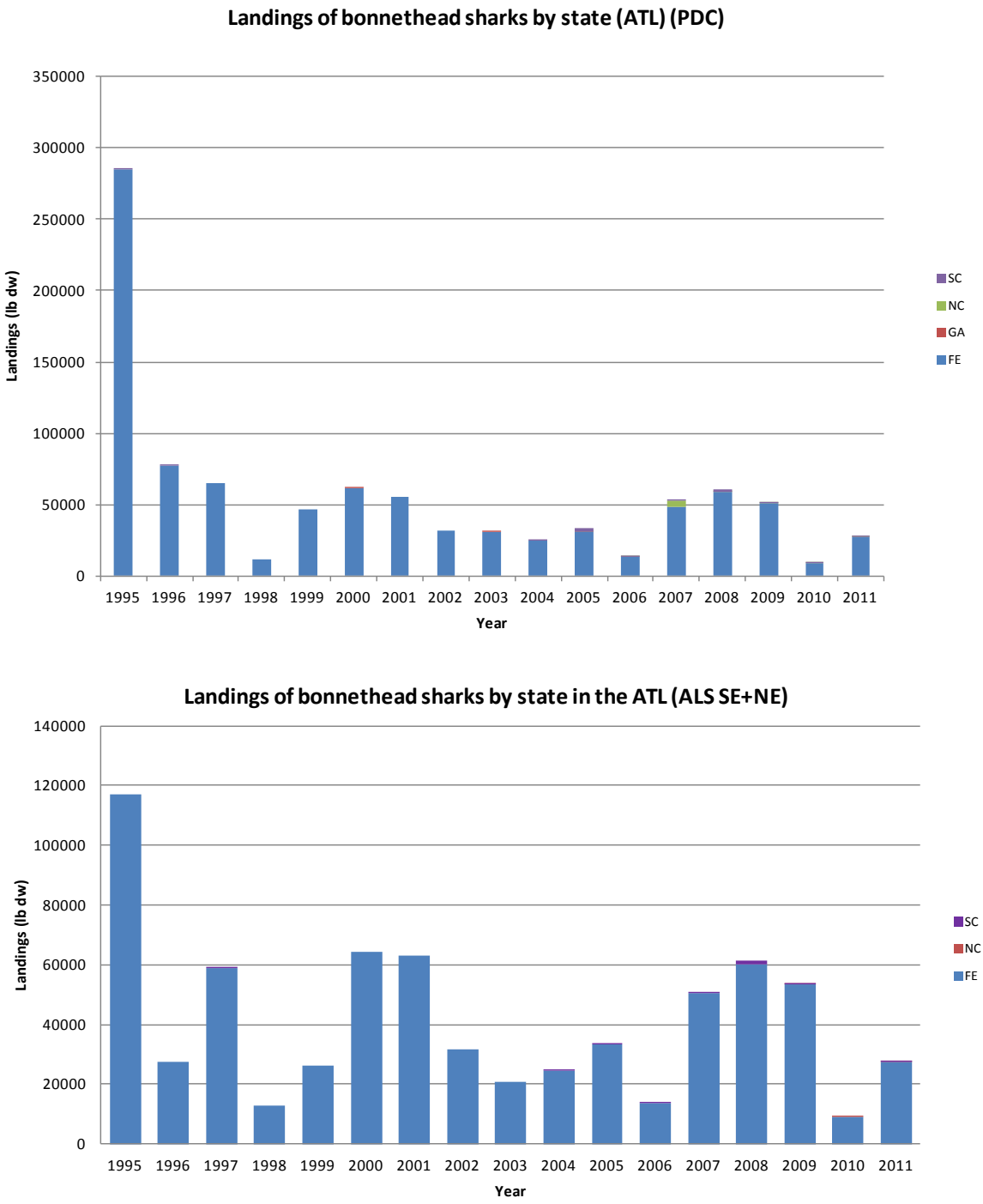


Figure 8. Commercial landings of bonnethead sharks by state in the ATL from two data sources (PDC and ALS).

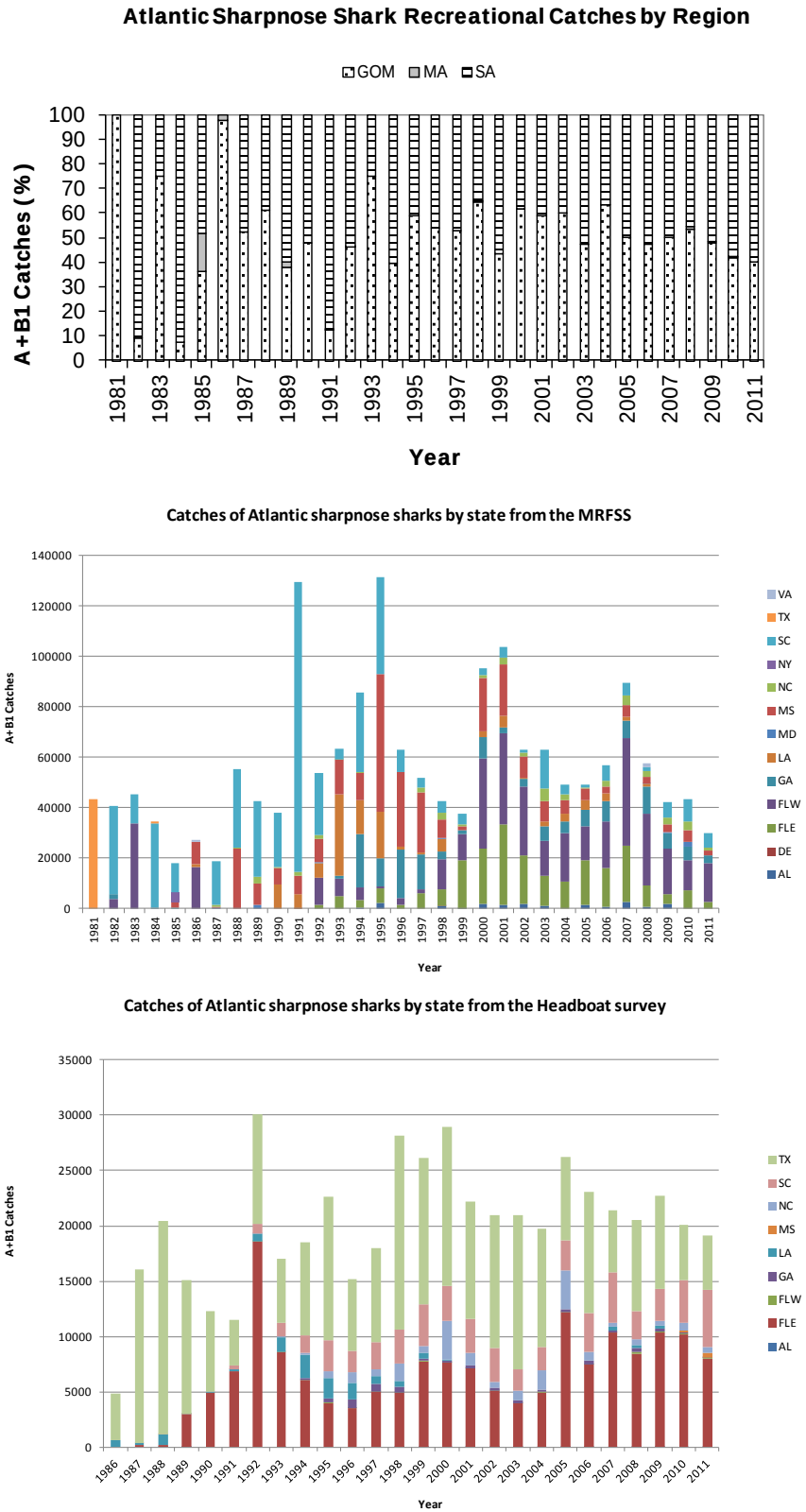


Figure 9. Recreational catches (A+B1) of Atlantic sharpnose sharks by region from MRFSS, HBOAT and TXPWD survey data combined (top), by state from MRFSS (middle), and by state from the HBOAT survey (bottom).

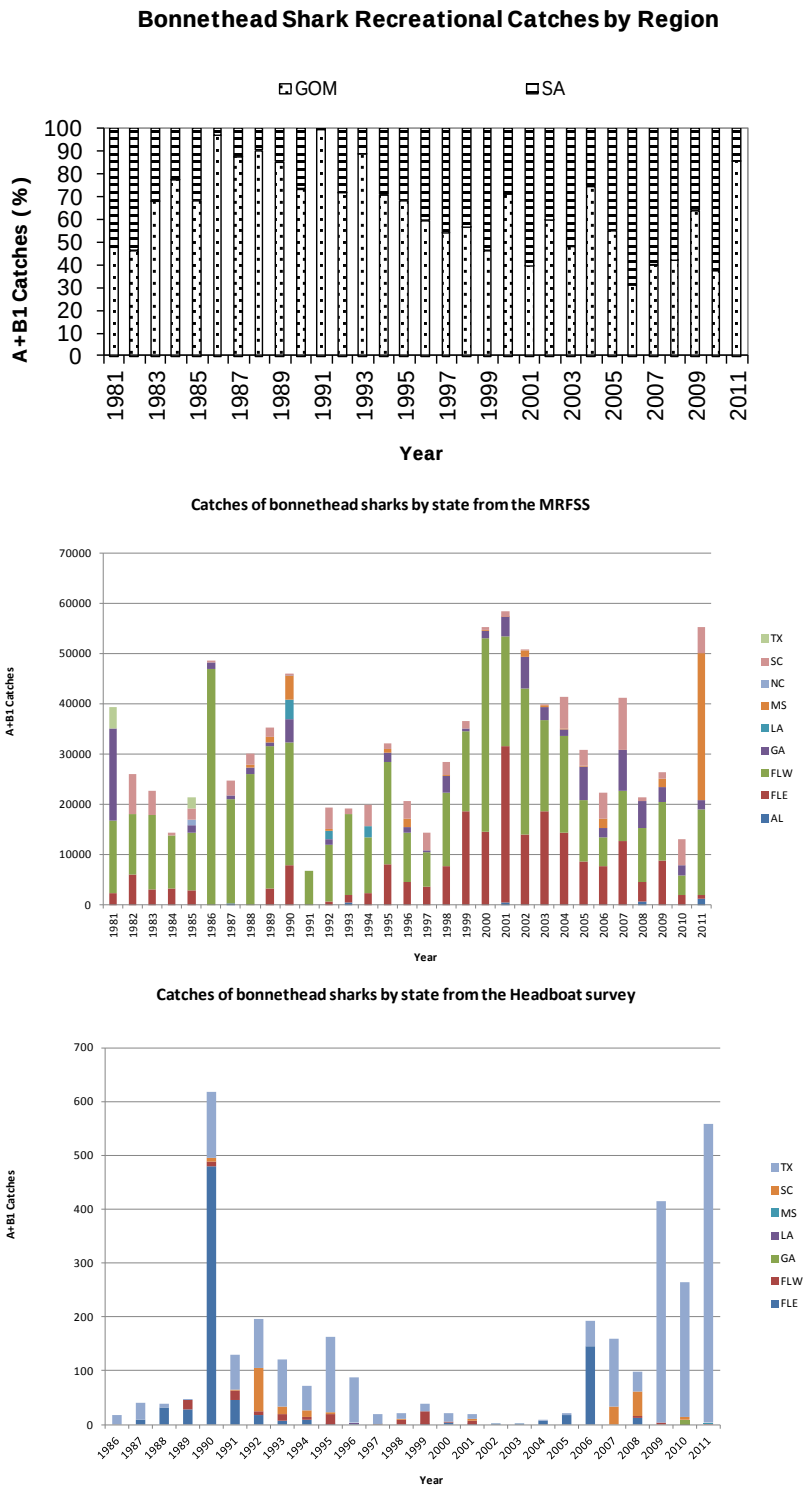


Figure 10. Recreational catches (A+B1) of bonnethead sharks by region from MRFSS, HBOAT and TXPWD survey data combined (top), by state from MRFSS (middle), and by state from the HBOAT survey (bottom).

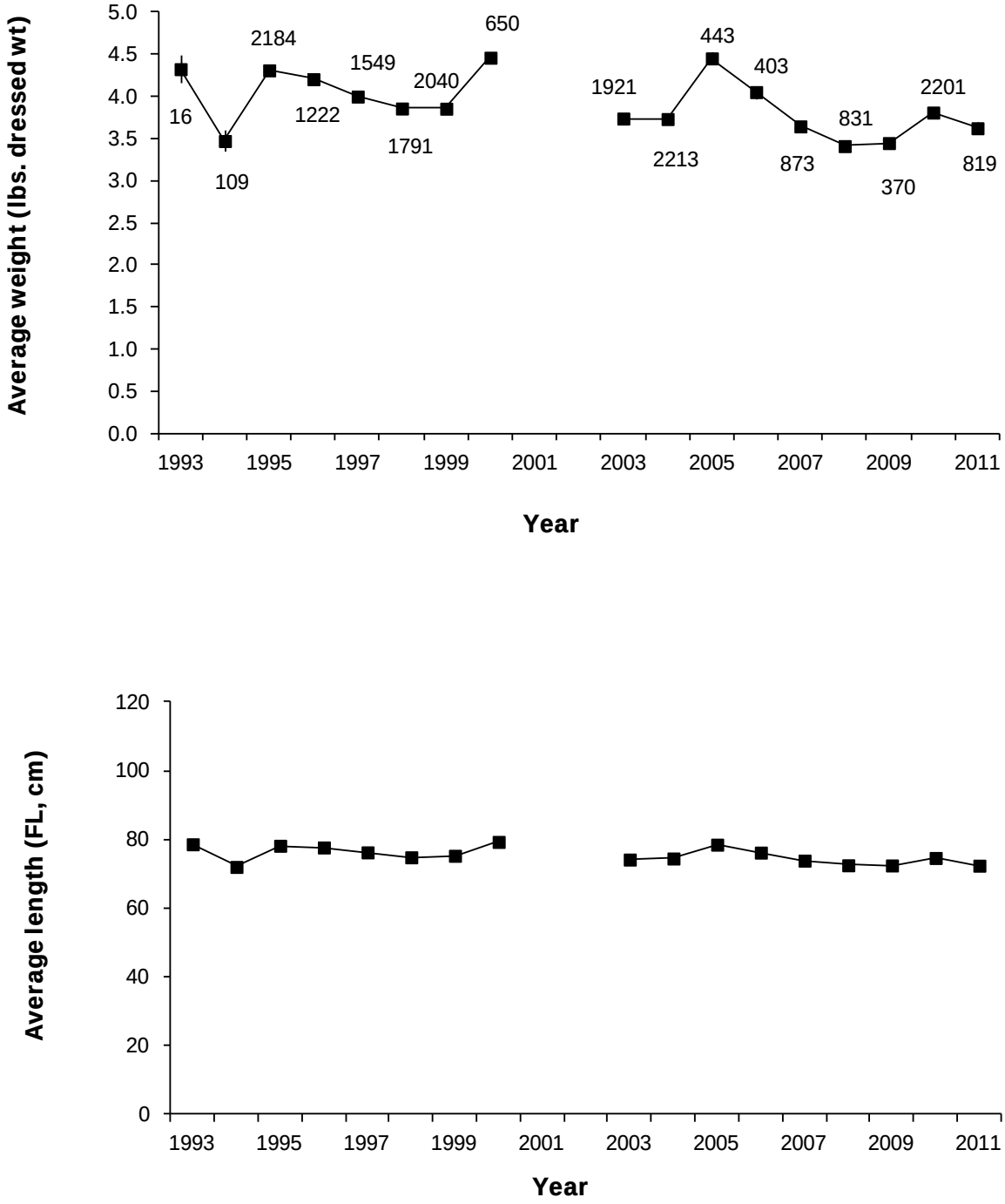
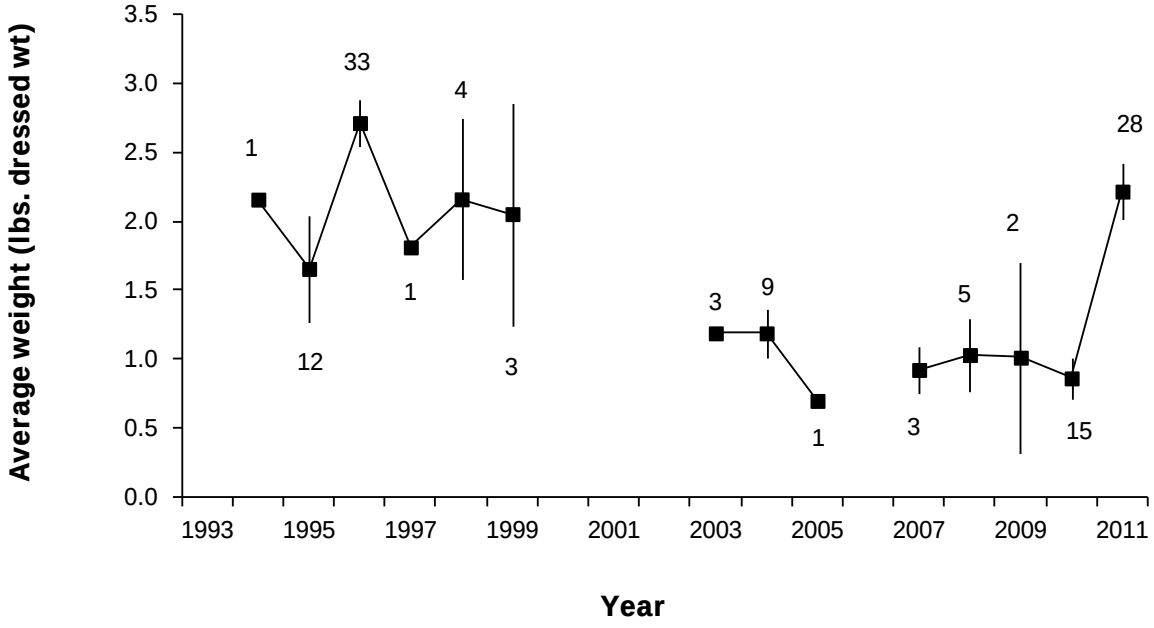


Figure 11. Average weight (top) and length (bottom) of Atlantic sharpnose sharks observed in the Shark Bottom Longline Observer Program. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.



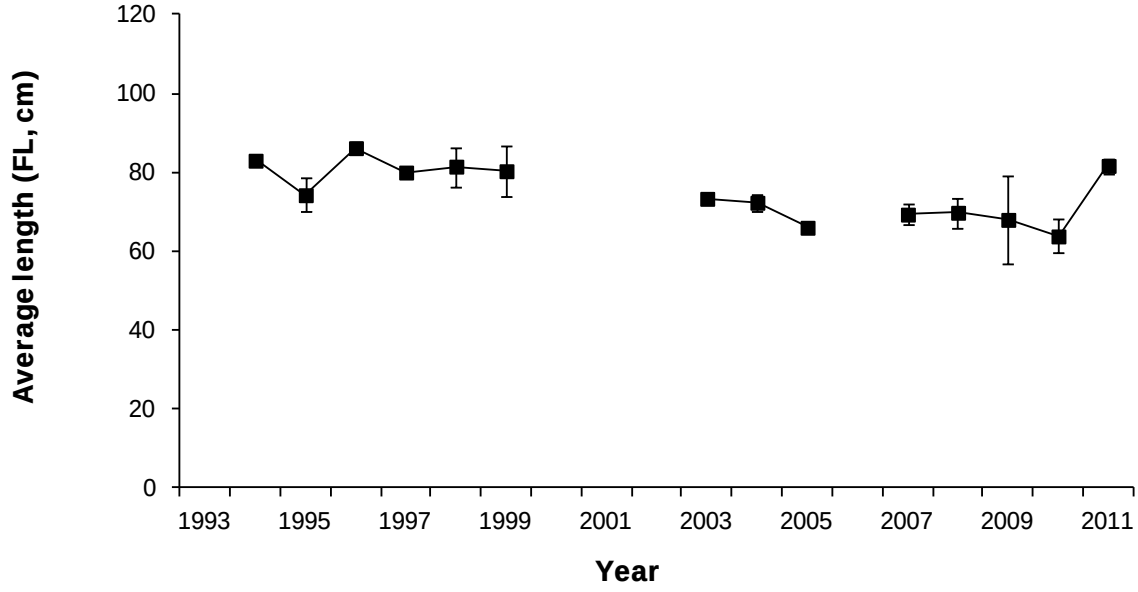


Figure 12. Average weight (top) and length (bottom) of bonnethead sharks observed in the Shark Bottom Longline Observer Program. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.

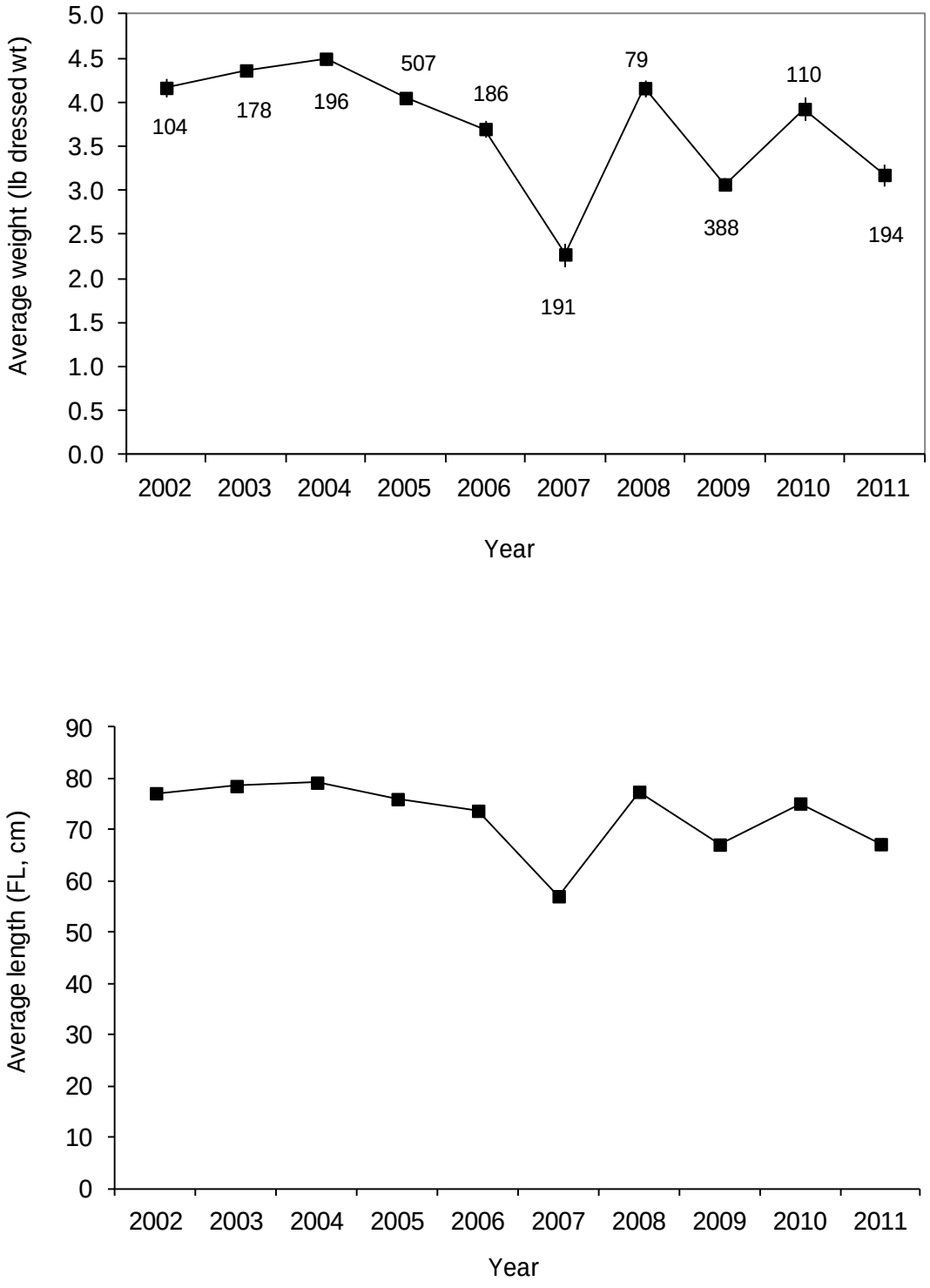


Figure 13. Average weight (top) and length (bottom) of Atlantic sharpnose sharks observed in the Gillnet Observer Program. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.

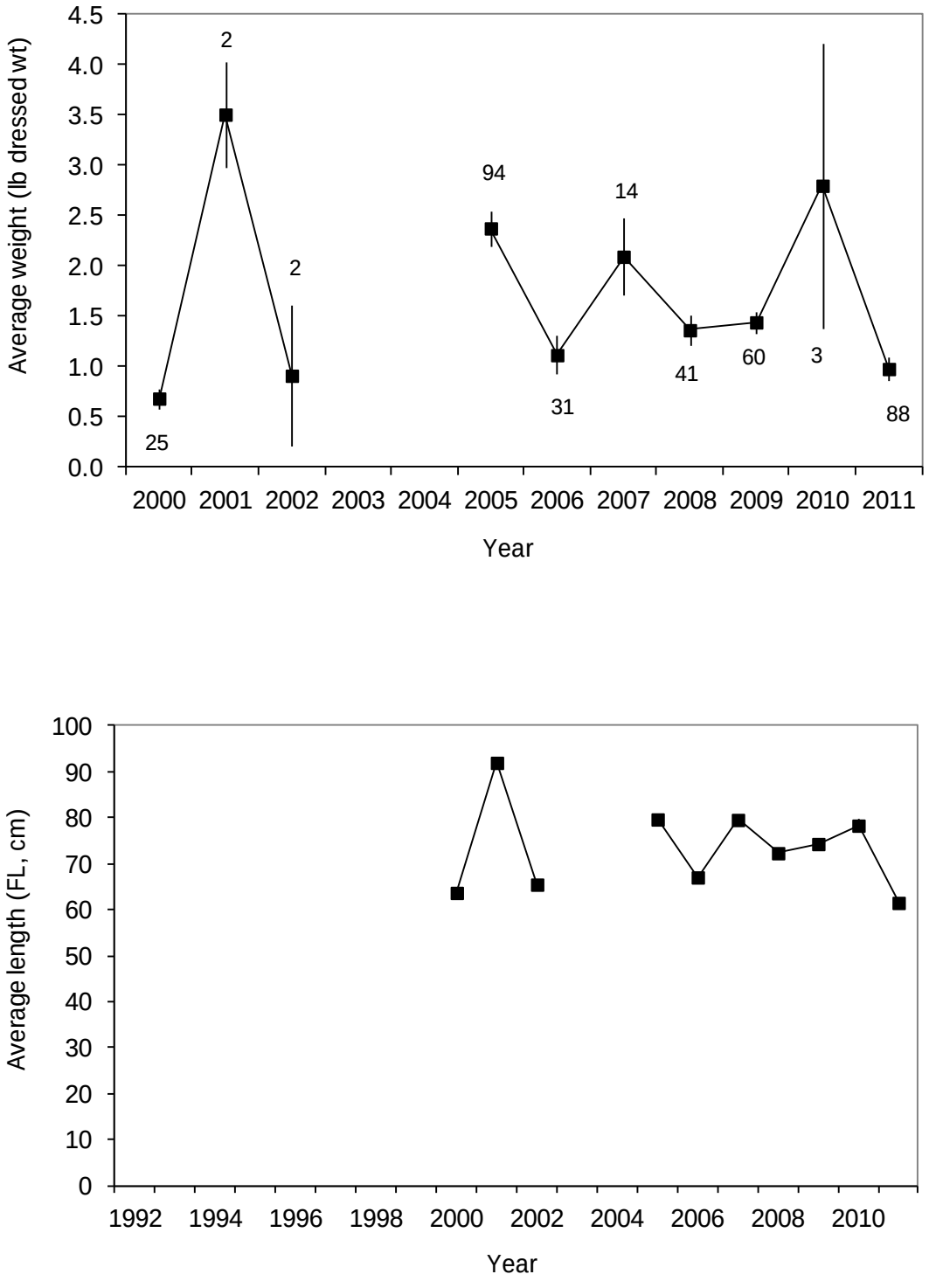


Figure 14. Average weight (top) and length (bottom) of bonnethead sharks observed in the Gillnet Observer Program. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.

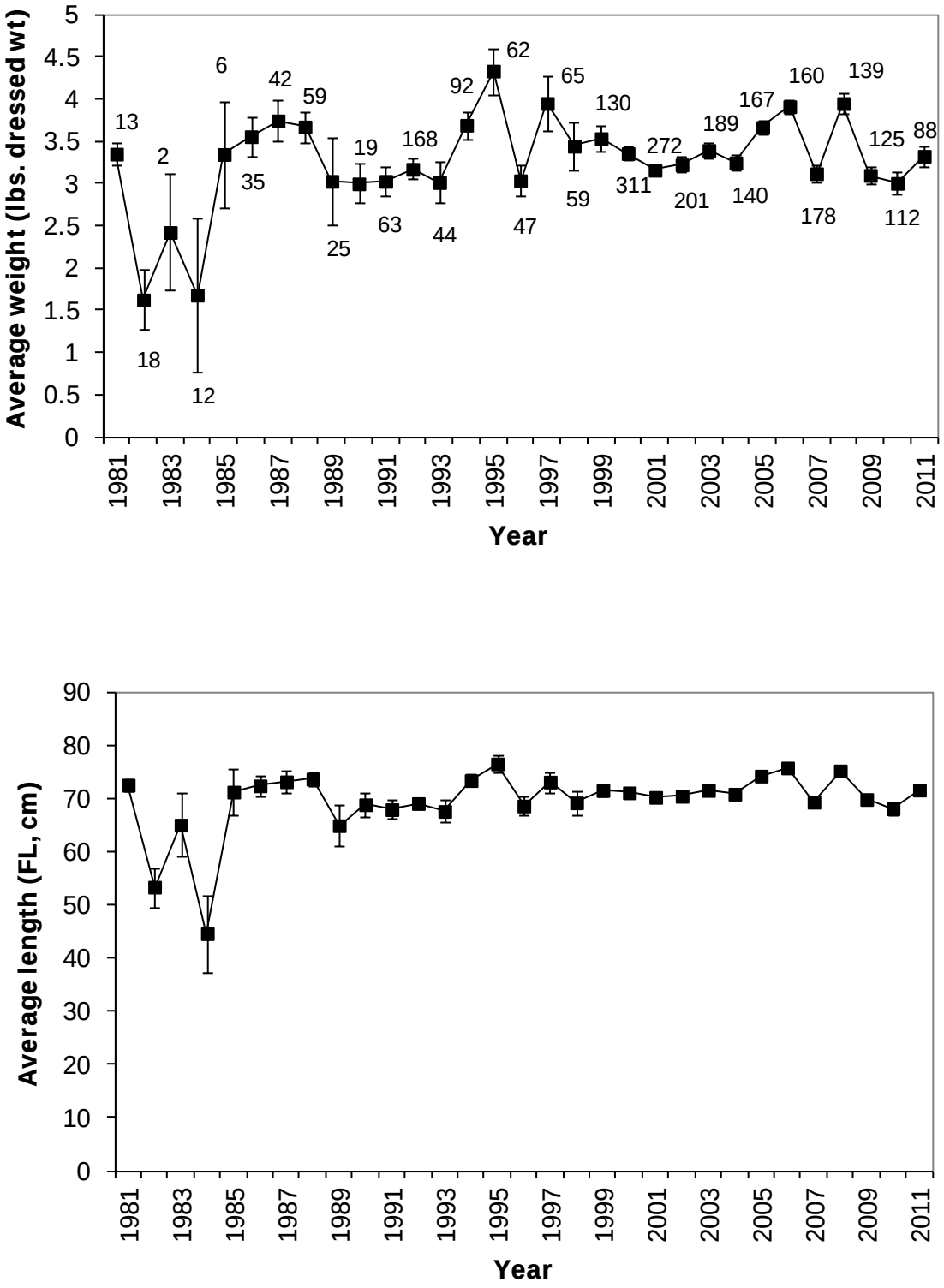


Figure 15. Average weight (top) and length (bottom) of Atlantic sharpnose sharks observed in the Marine Recreational Fishery Statistics Survey. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.

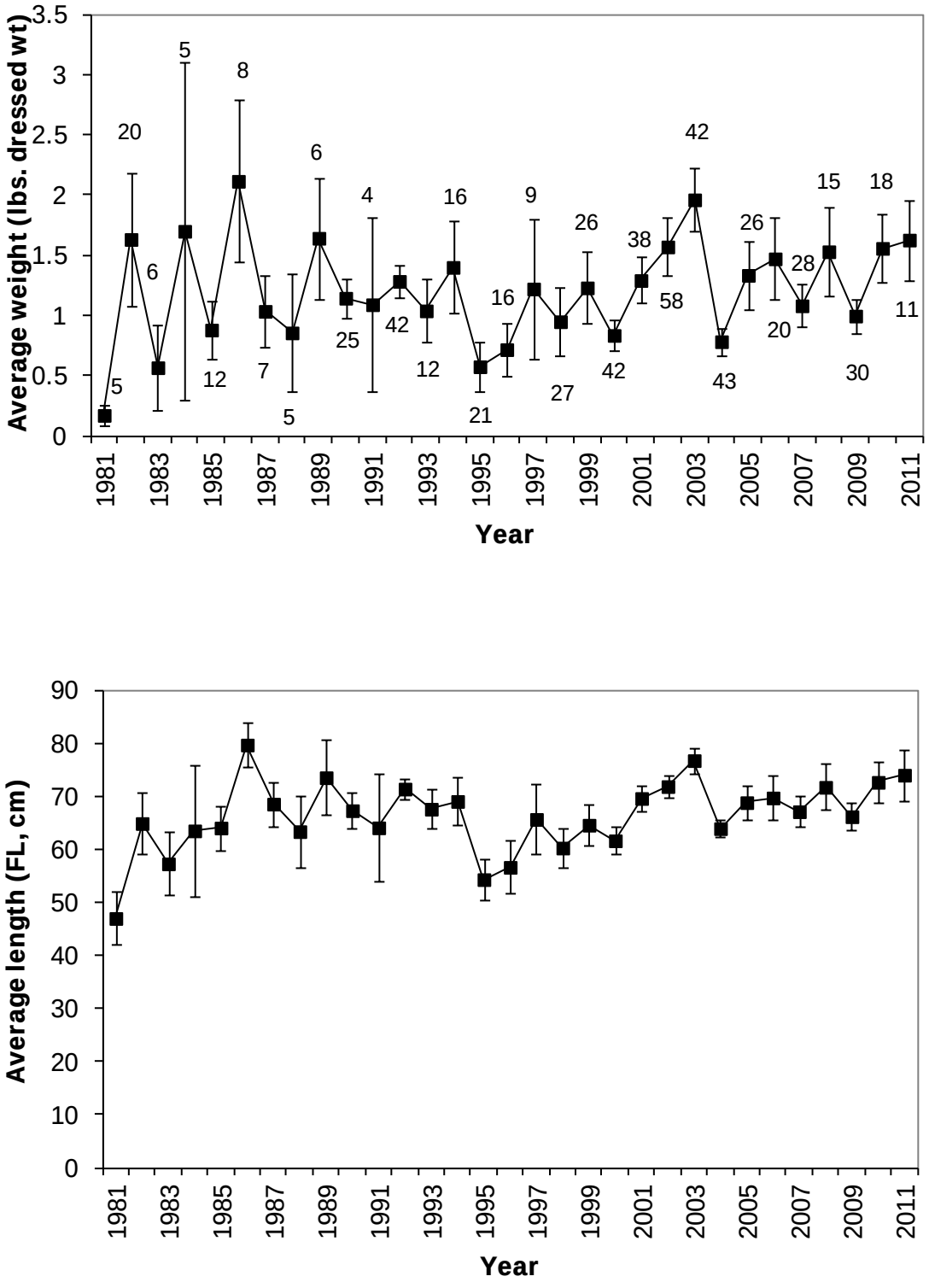
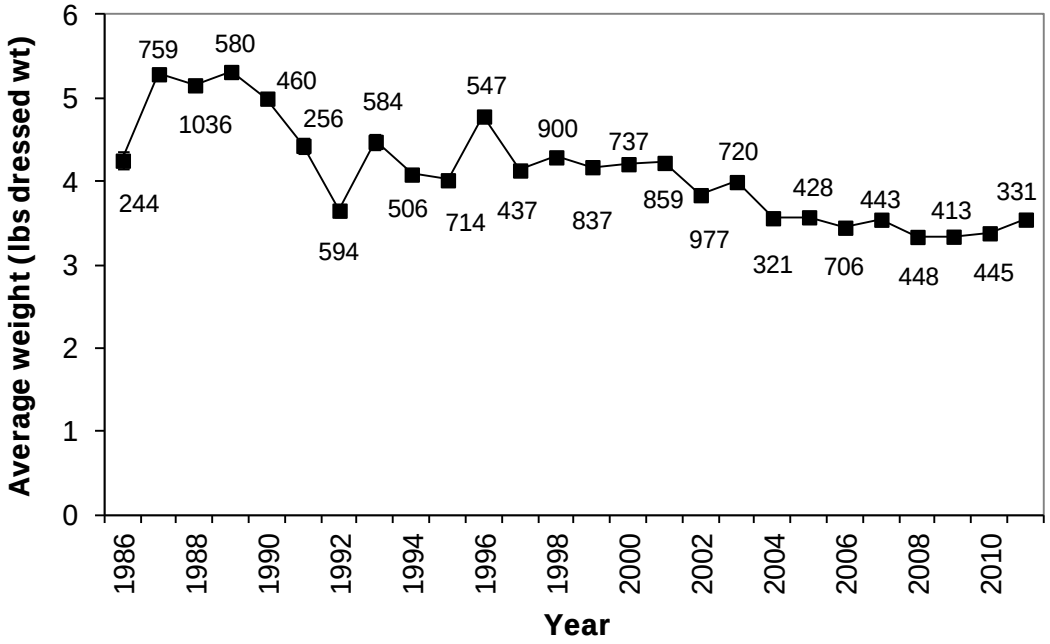


Figure 16. Average weight (top) and length (bottom) of bonnethead sharks observed in the Marine Recreational Fishery Statistics Survey. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.



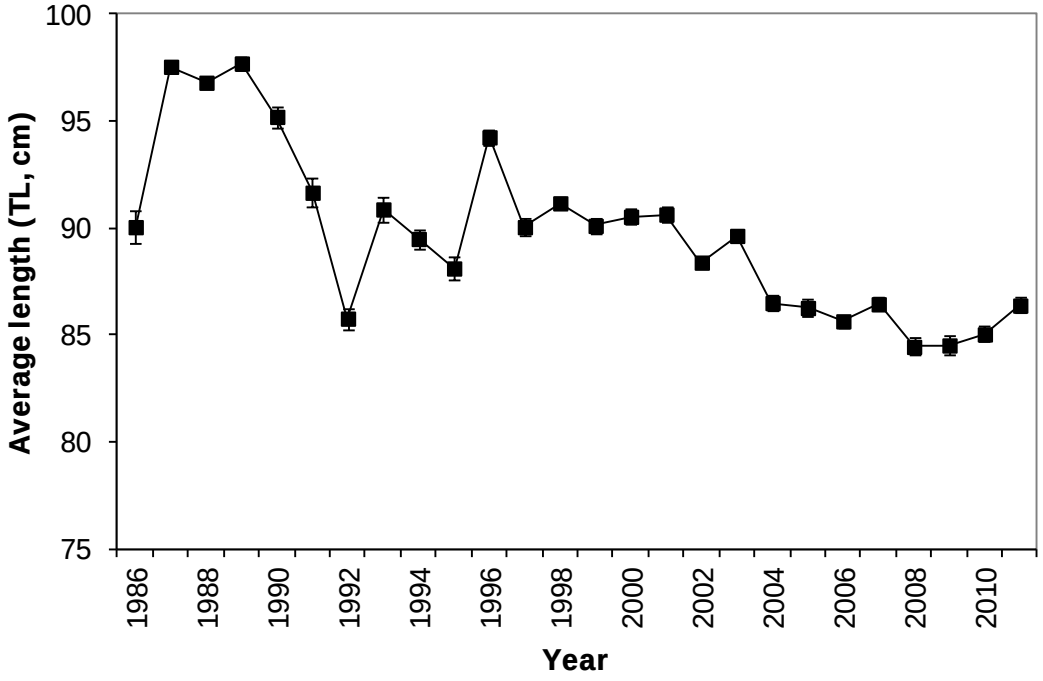
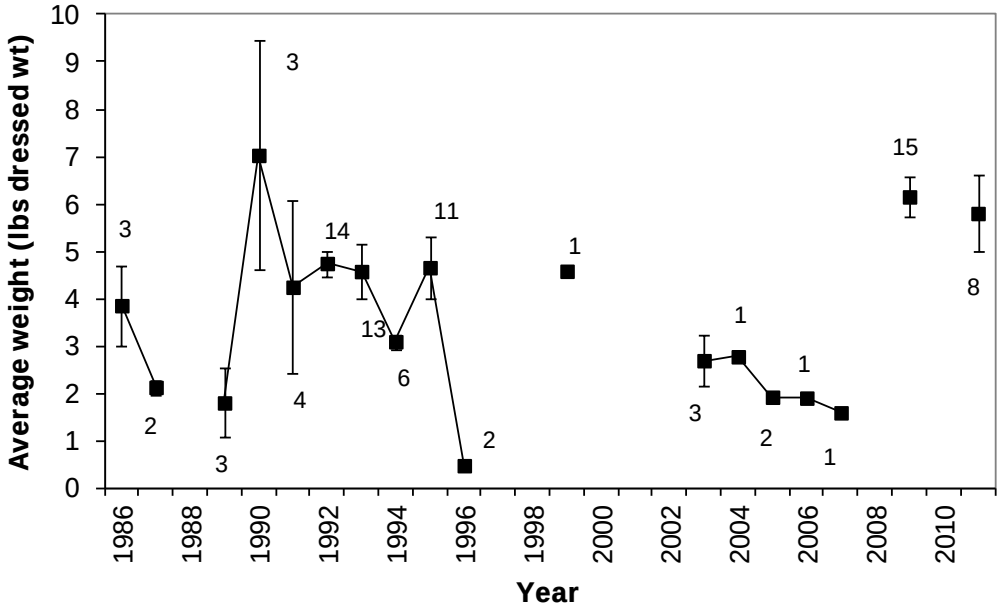


Figure 17. Average weight (top) and length (bottom) of Atlantic sharpnose sharks observed in the Headboat Survey. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.



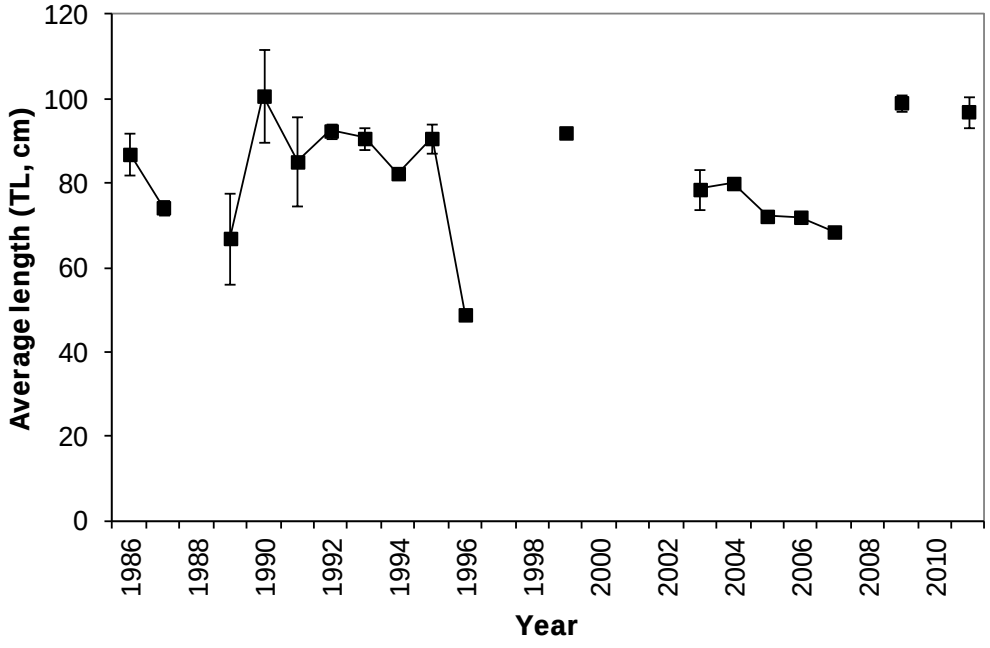
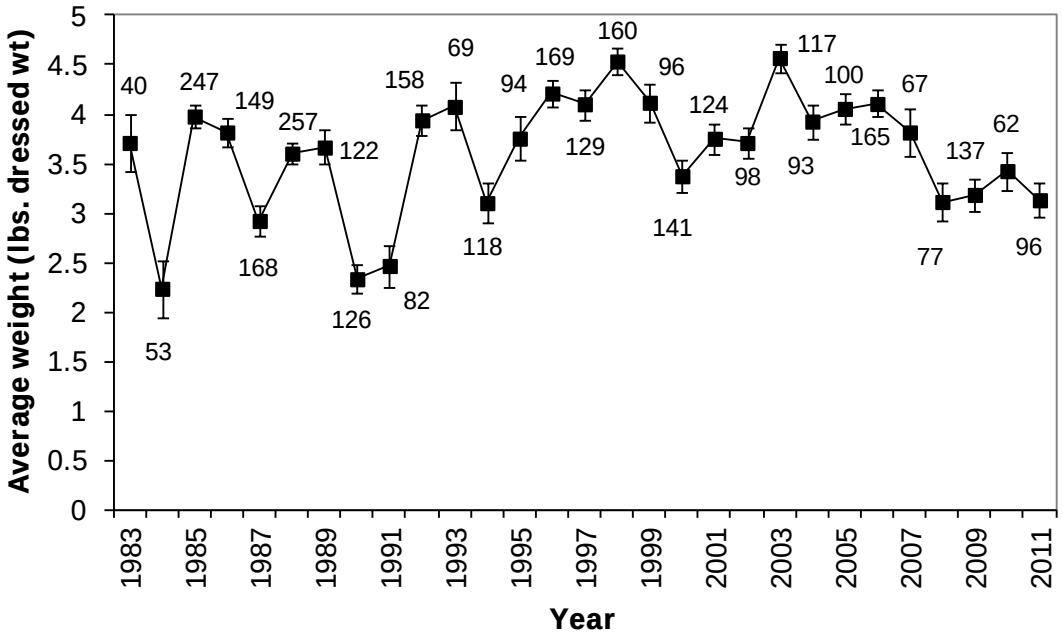


Figure 18. Average weight (top) and length (bottom) of bonnethead sharks observed in the Headboat Survey. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.



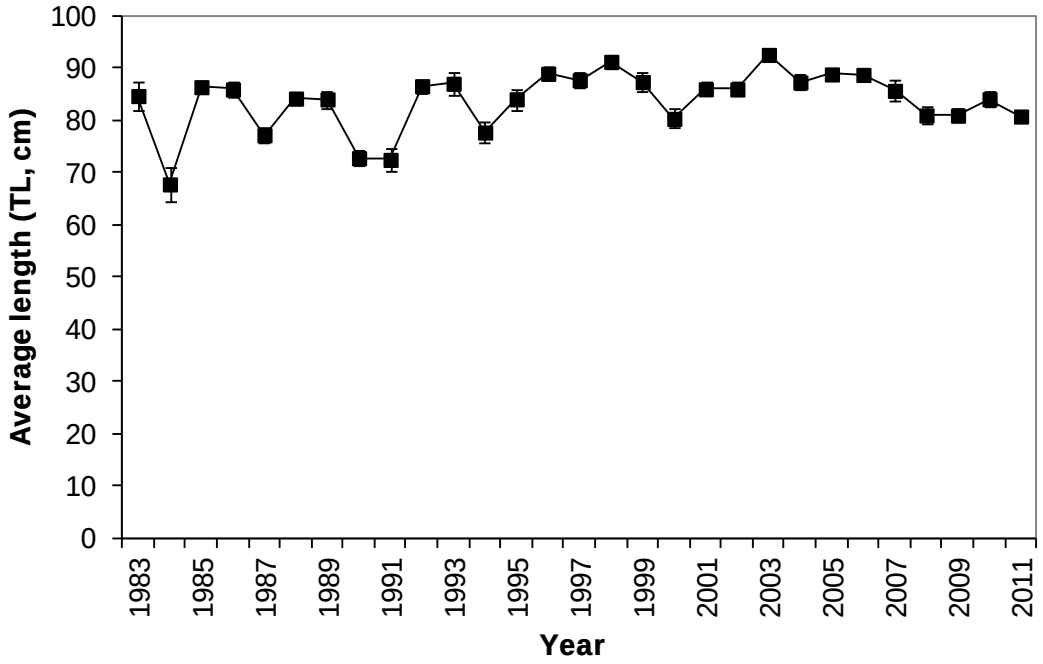
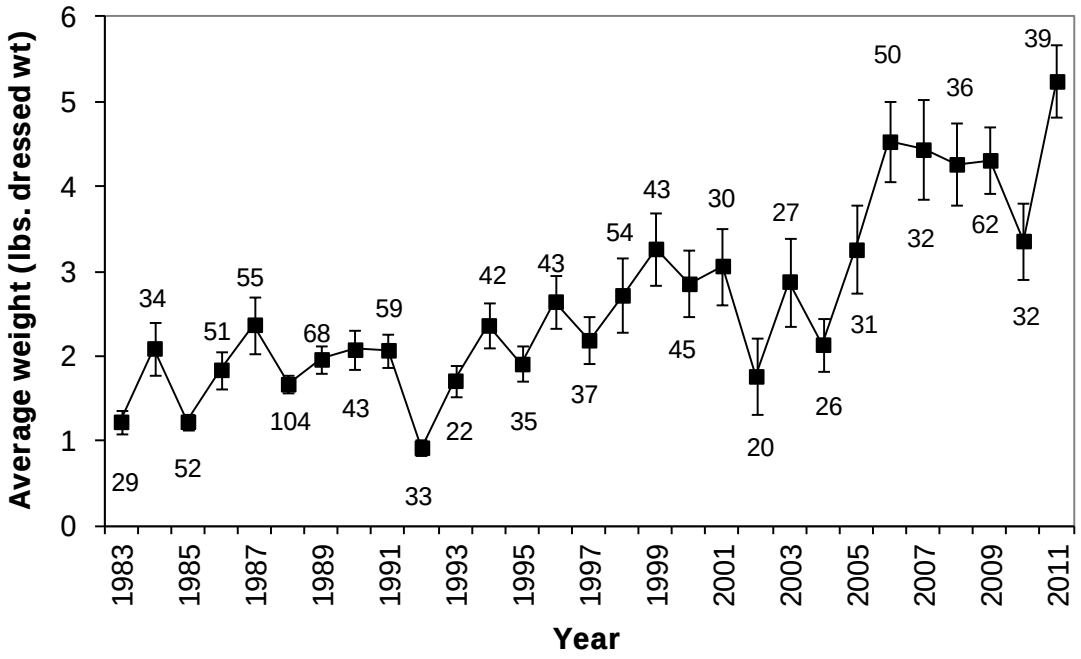


Figure 19. Average weight (top) and length (bottom) of Atlantic sharpnose sharks observed in the Texas Parks and Wildlife Department Survey. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.



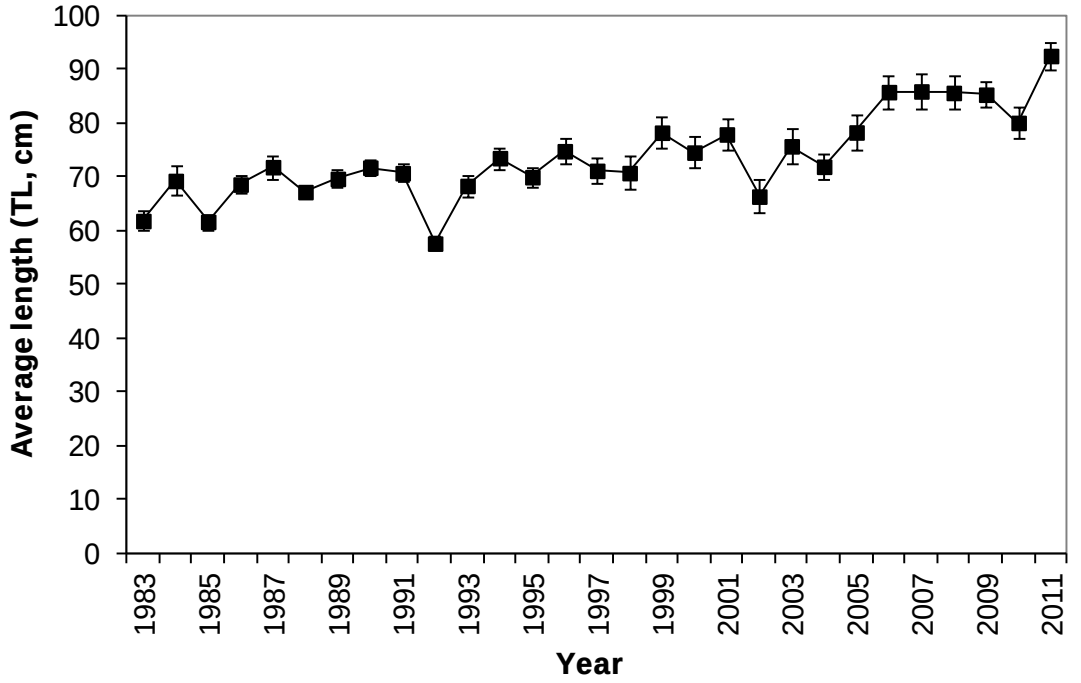


Figure 20. Average weight (top) and length (bottom) of bonnethead sharks observed in the Texas Parks and Wildlife Department Survey. Error bars represent +/- one standard error; sample sizes are indicated in the top panel.

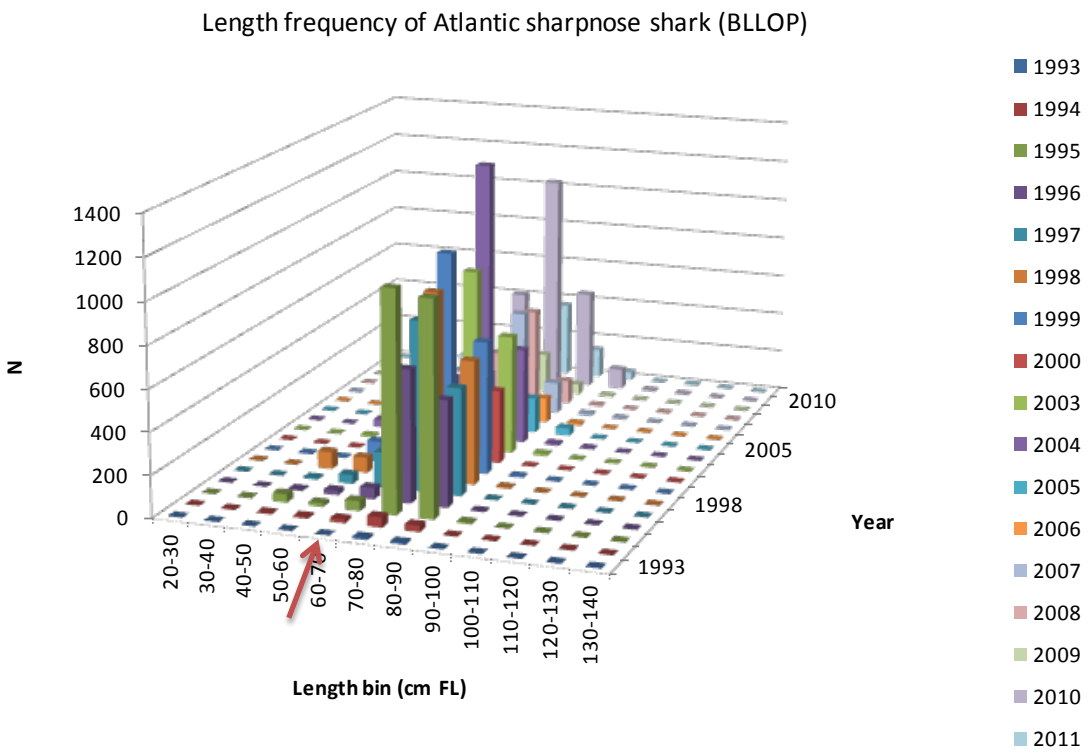


Figure 21. Length-frequency distribution of Atlantic sharpnose sharks from the BLLOP. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are fork lengths.

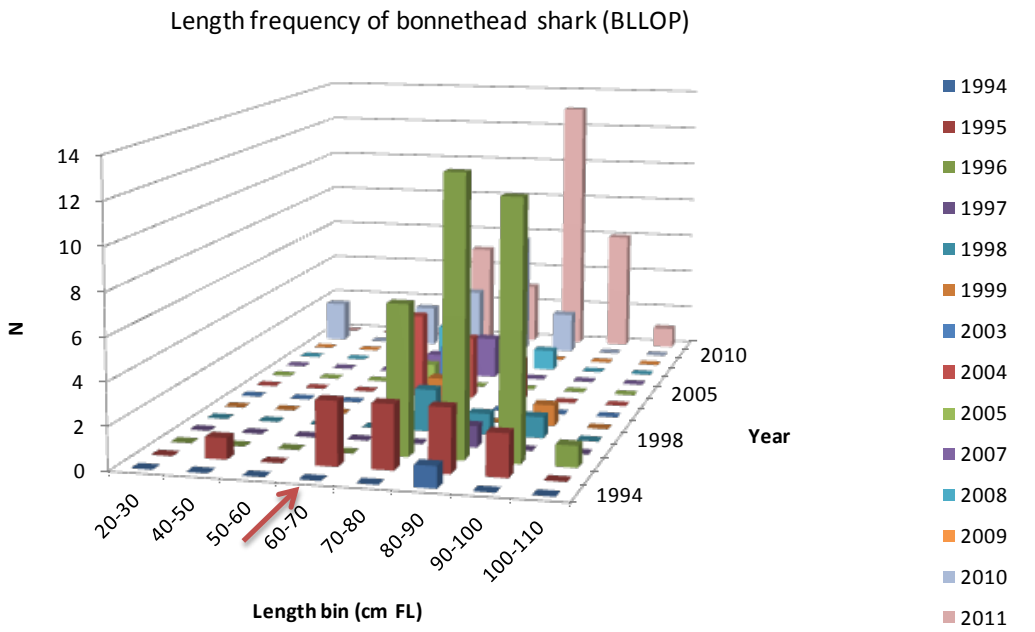


Figure 22. Length-frequency distribution of bonnethead sharks from the BLLOP. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are fork lengths.

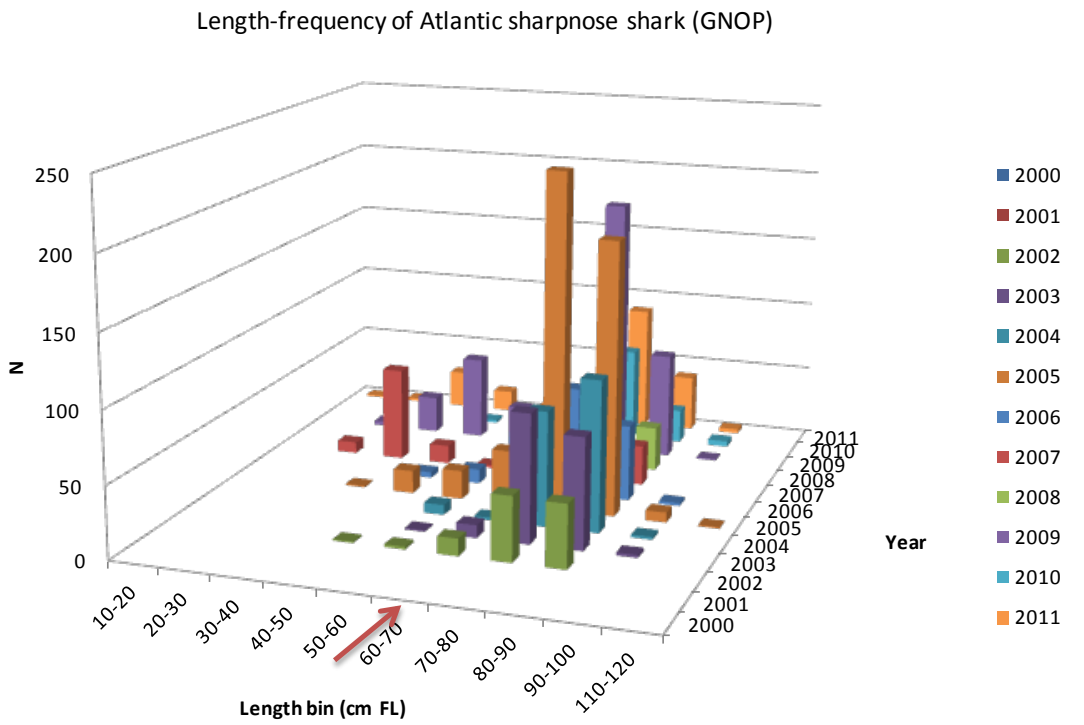


Figure 23. Length-frequency distribution of Atlantic sharpnose sharks from the GNOP. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are fork lengths.

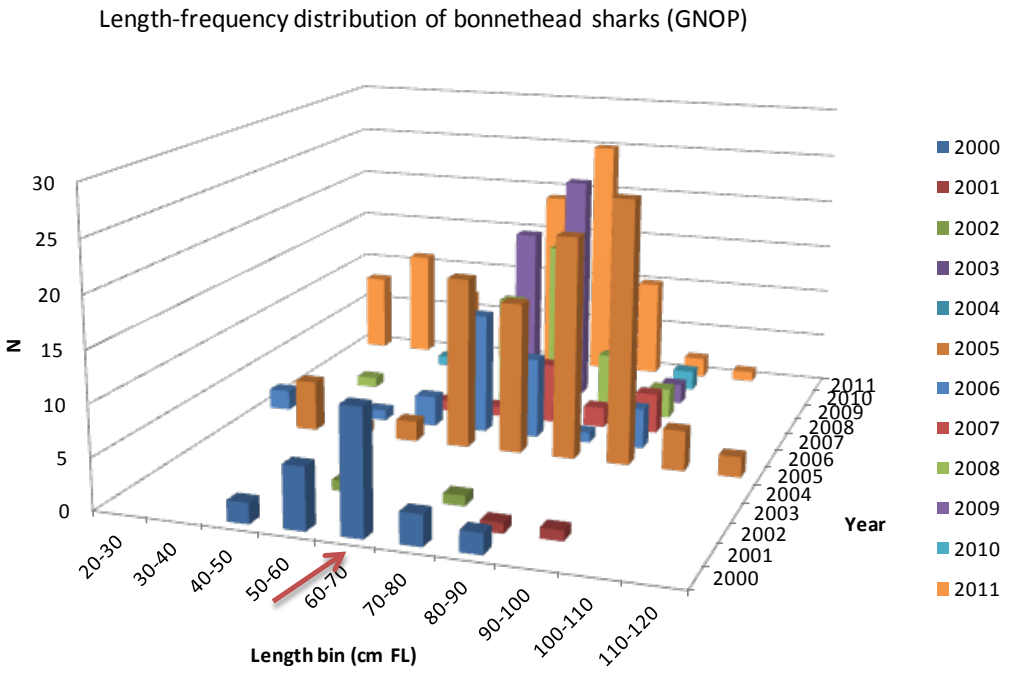


Figure 24. Length-frequency distribution of bonnethead sharks from the GNOP. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are fork lengths.

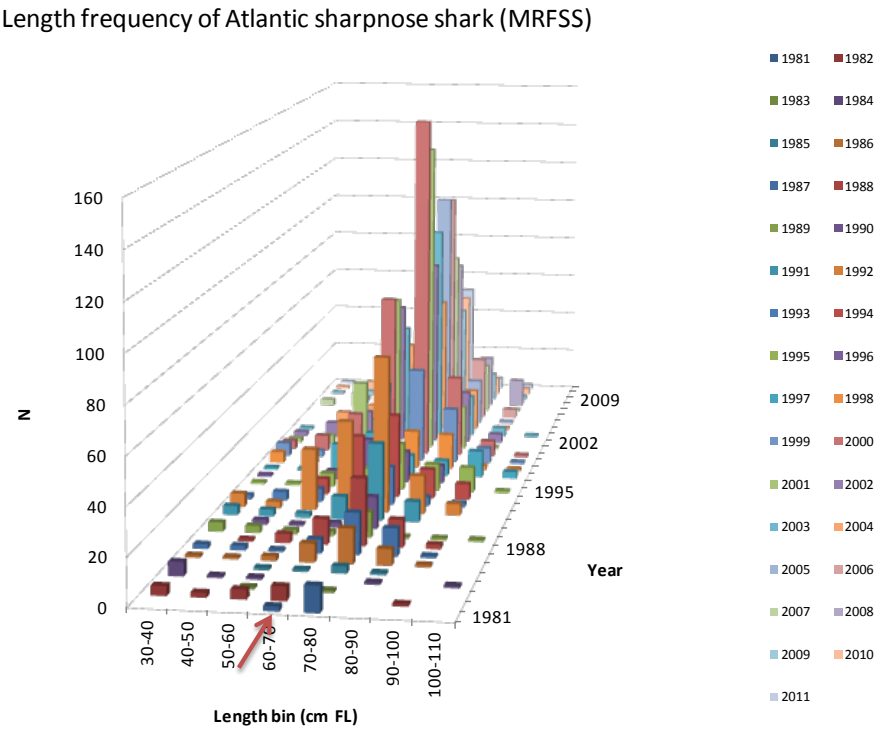


Figure 25. Length-frequency distribution of Atlantic sharpnose sharks from the MRFSS. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are fork lengths.

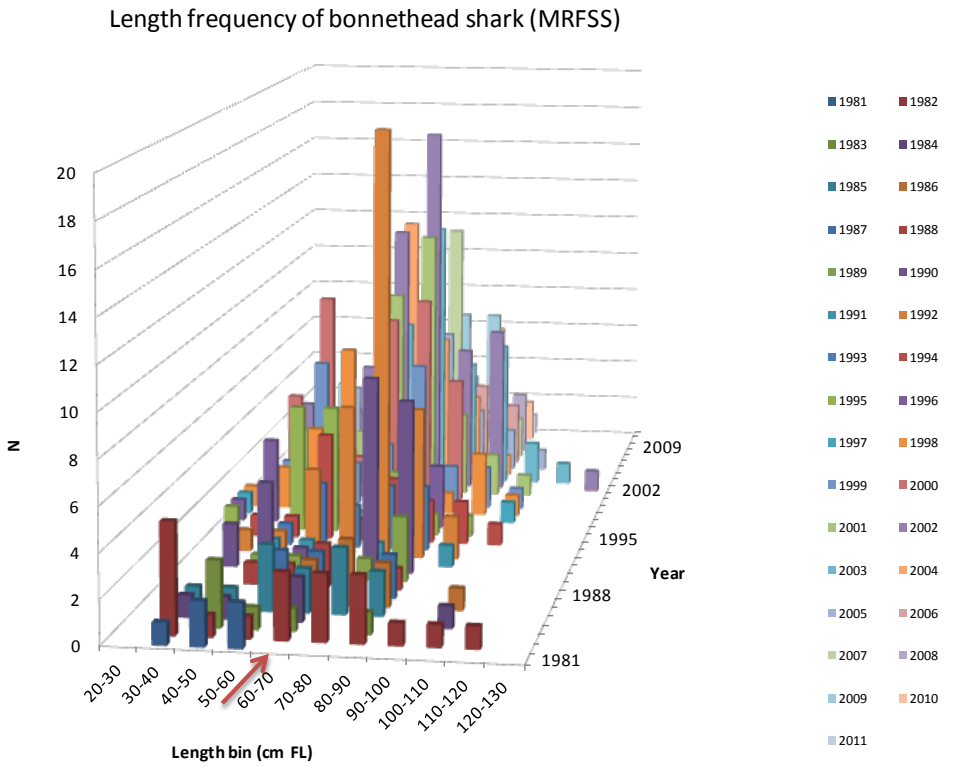


Figure 26. Length-frequency distribution of bonnethead sharks from the MRFSS. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are fork lengths.

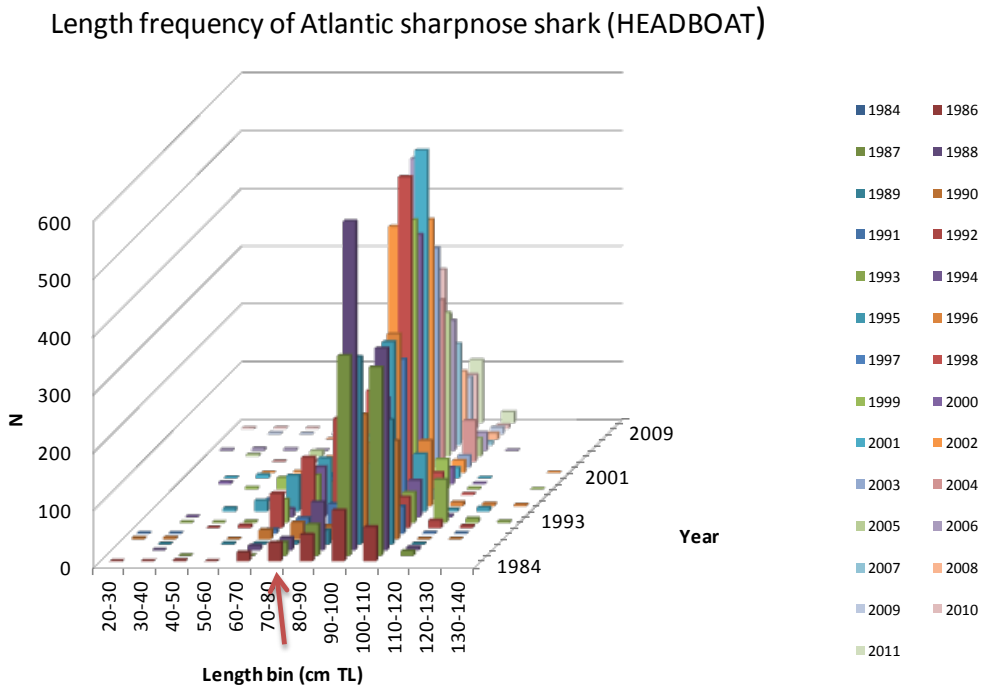


Figure 27. Length-frequency distribution of Atlantic sharpnose sharks from the Headboat survey. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are total lengths.

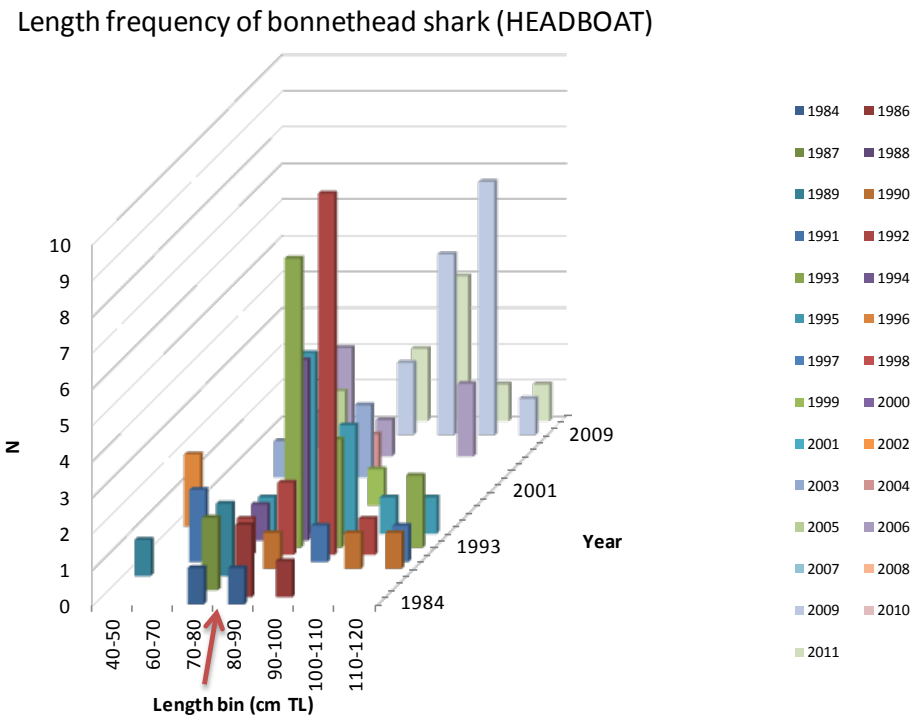


Figure 28. Length-frequency distribution of bonnethead sharks from the Headboat survey. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are total lengths.

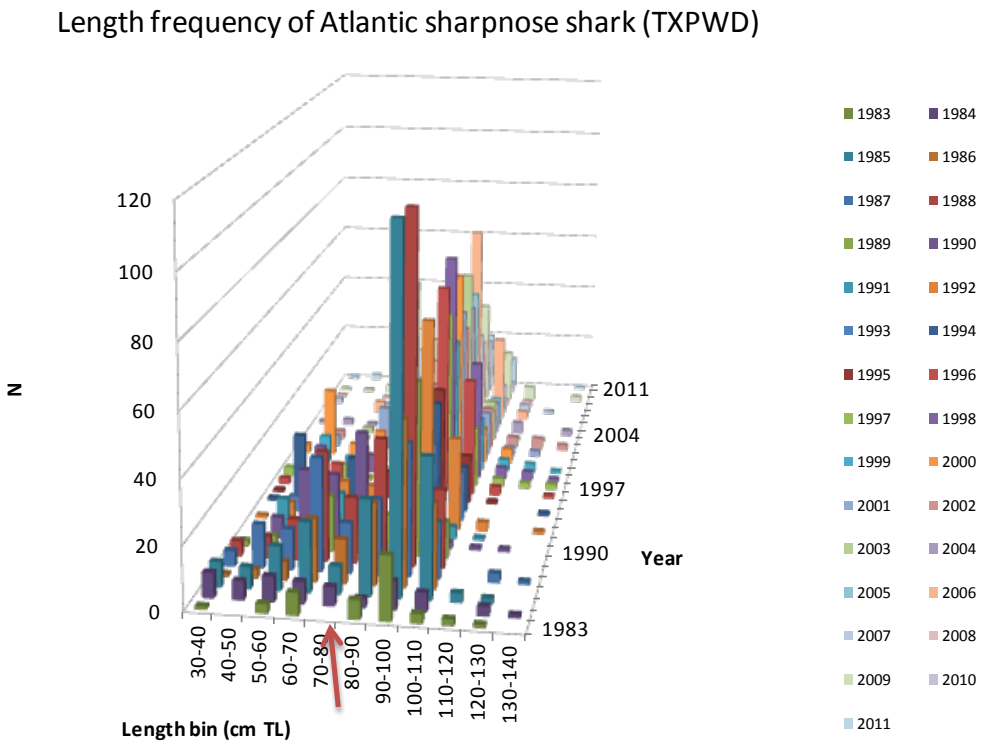


Figure 29. Length-frequency distribution of Atlantic sharpnose sharks from the TXPWD survey. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are total lengths.

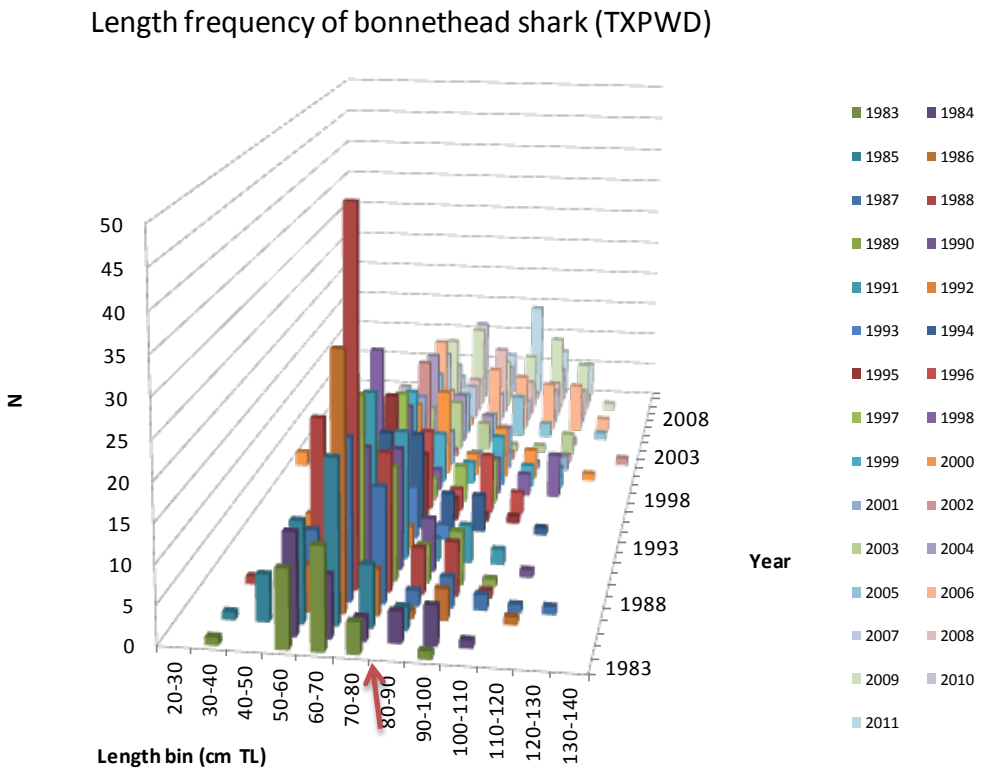


Figure 30. Length-frequency distribution of bonnethead sharks from the TXPWD survey. The arrow indicates the approximate midpoint of length at maturity for sexes and areas combined. Note that lengths are total lengths.