UPDATED CATCHES OF ATLANTIC SHARKS

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Summary

This document presents updated commercial and recreational landings and discard estimates of Atlantic sharks up to 2004, with special emphasis on sharks of the Large Coastal complex. Species-specific information on the geographical distribution of both commercial and recreational catches is presented along with the different gear types used in the commercial fisheries. Length-frequency information and average weights of the catches in three separate recreational surveys and in the directed shark bottom-longline observer program are also included.

1. Background and Management History

U.S. Atlantic shark catches increased rapidly during the late 1980's and early 1990's to more than 9,500 mt, but were limited by a suite of regulations including commercial quotas and recreational bag limits. Because species-specific catches of sharks were generally not documented by all states until 1994, they were grouped by similar life-history and habitat characteristics for the purpose of management. Most of the recent U.S. catch of sharks for the market is of species grouped as large coastal sharks. Some pelagic sharks (e.g., mako, thresher, porbeagle) are also valued by U.S. fishers targeting tunas and swordfish. Four species of small coastal sharks (Atlantic sharpnose, bonnethead, blacknose, and finetooth) are also regularly landed in commercial fisheries and caught by recreational fishers.

The first Federal fisheries management plan (FMP) for sharks developed by the National Marine Fisheries Service for the Secretary of Commerce was implemented in 1993 (NMFS 1993). The 1993 shark FMP divided Atlantic shark fisheries into three management groups: 1) large coastal sharks, which included tiger, lemon, smooth hammerhead, scalloped hammerhead, great hammerhead, blacktip, sandbar, dusky, spinner, silky, bull, bignose, Caribbean reef, Galapagos, night, narrowtooth, and nurse sharks; 2) small coastal sharks, which included Atlantic and Caribbean sharpnose, finetooth, blacknose, bonnethead, smalltail, and Atlantic angel sharks; and 3) pelagic sharks, which included longfin and

shortfin mako, blue, porbeagle, thresher, bigeye thresher, oceanic whitetip, sevengill, sixgill, and bigeye sixgill sharks. As a result of indications that the abundance of large coastal sharks had declined, new management measures were introduced in 1997. In particular, the commercial quota for the large coastal complex was reduced from 2,570 to 1,285 mt dressed weight (dw). A commercial quota for small coastal sharks was also established at 1,760 mt dw and the recreational bag limit for all Atlantic sharks was reduced to 2 sharks per vessel per trip, with an additional allowance of 2 Atlantic sharpnose sharks per person per trip. The commercial quota for pelagic sharks was reduced from 1,560 to 580 mt dw. Possession of five species of sharks was also prohibited (i.e. whale, basking, sand tiger, bigeye sand tiger, and white sharks).

Based in part on the results of the 1998 Shark Evaluation Workshop (NMFS 1998), the new 1999 FMP (NMFS 1999) proposed new management measures intended to further restrict commercial quotas and recreational bag limits on sharks. The plan divided shark species into "large coastal species", "small coastal species", "pelagic species", and "deep water and other species", and set total allowable catches (TACs) for large coastal, small coastal, and pelagic species. These newer shark regulations included the following management measures: 1) reduce the annual commercial quota for large coastal sharks from 1,285 mt dw to 816 mt dw, apportioned between ridgeback (i.e., sandbar, silky, and tiger; 620 mt dw) and non-ridgeback (i.e., blacktip, spinner, bull, lemon, nurse, and scalloped, great and, smooth hammerheads; 196 mt dw) sharks; 2) reduce the annual commercial quota for small coastal sharks from 1,760 mt dw to 359 mt dw (this was 10% higher than the 1997 landings); 3) increase the annual commercial quota for pelagic sharks from 580 mt dw to 853 mt dw apportioned between porbeagle (92 mt dw), blue sharks (273 mt dw), and other pelagic sharks (488 mt dw), also reduce the pelagic shark quota by any overharvest in the blue shark quota; 4) establish a minimum size of 137 cm fork length for ridgeback sharks; 5) reduce the recreational bag limit to 1 shark per vessel per trip from 2 sharks allowed, with a minimum size of 137 cm fork length for all sharks, and an additional 1 Atlantic sharpnose shark per person per trip (which used to be a limit of 2); 6) prohibit possession of 19 species of sharks (Atlantic angel, basking, bigeye sand tiger, bigeye sixgill, bigeye thresher, bignose, Caribbean reef, Caribbean sharpnose, dusky, Galapagos, longfin mako, narrowtooth, night, sand tiger, sevengill, sixgill, smalltail, whale and white); 7) count all sources of mortality, including dead discards and all landings in state waters, against the quota; and 8) prohibit finning for all shark species. Of the above measures, only (3), (5), (6), and (8) were implemented due to litigation. In all, the new plan manages 72 species of sharks.

In 2003, Atlantic shark resources were managed through an emergency rule implemented by NOAA Fisheries to ensure that the commercial management measures in place for 2003 were based on the best available science (i.e., the results of both the 2002 SCS and LCS stock assessments). For the first time, the emergency rule for the 2003 fishing year implemented the breakdown between ridgeback and non-ridgeback LCS sharks proposed in the 1999 FMP. Further details of the management history and current status of Atlantic shark fisheries can be found in NMFS (2003). In 2004, commercial shark management measures in place included two semi-annual seasons with three regional quotas for LCS and SCS (1,017 mt dw for LCS divided into 42% for the Gulf of Mexico, 54% for the South Atlantic, and 4% for the North Atlantic; 454 mt dw for SCS divided into 4% for the GOM, 83% for

the SA, and 13% for the NA), and quotas for blue (273 mt dw), porbeagle (92 mt dw), and other pelagic sharks (488 mt dw). Recreational measures remained the same. In 2005, HMS further adjusted the regional quotas and implemented trimester quotas for LCS and SCS based on updated landings information, as well as implemented a time/area closure for vessels with bottom longline gear in an area off the South and North Carolina and Virginia coasts from January to July.

Estimates of total catch and dead discarded large coastal sharks for the period 1981-2001 were summarized in Table 1 of Cortés and Neer (2002) and used with some modifications in the 2002 stock assessment of large coastal sharks (Cortés et al. 2002). Cortés (2003, 2005) updated the information to include up to 2002 and 2003, respectively, and the present report provides updated or revised catch information of LCS up to 2003 and preliminary estimated catches for 2004, which are presented in ***Table 1*** herein. Species-specific commercial and recreational landings are also presented for the three main management groups (including prohibited species) as well as catch histories for the blacktip and sandbar sharks. Geographical information on the commercial and recreational catches and a breakdown of the gear used in commercial fisheries is presented. Length-frequency information and average weights of the catches in three separate recreational surveys and in the directed shark bottom-longline observer program are also included.

2. Commercial Landings

As has been reported previously, the U.S. commercial shark fishery is primarily a southern coastal fishery extending from North Carolina to Texas. During 1997-2004, 92-99% of large coastal sharks and the vast majority of small coastal sharks (80-100%) came from the southeastern (Gulf of Mexico and South Atlantic) region, whereas 37-49% of pelagic sharks were landed in the northeastern (mid-Atlantic and North Atlantic) region during that same period. Among large coastal sharks, the most sought-after species in this fishery continue to be blacktip and sandbar sharks, although others are also taken (NMFS 1998, Cortés et al. 2002). Shortfin mako and thresher sharks are the two pelagic species more frequently landed, and among small coastal sharks, four species (Atlantic sharpnose, blacknose, finetooth, and bonnethead) are regularly harvested.

U.S. commercial landings of Atlantic sharks in 1996-2004 were compiled based on Northeast Regional and Southeast Regional general canvass landings data, and the SEFSC quota monitoring data based on southeastern region permitted shark dealer reports. Landings prior to 1996 were taken as reported in NMFS (1998) and Cortés et al. (2002). Landings in southeastern states reported in the general canvass and quota monitoring data files were combined to define the species composition and volume of landings.

The quota monitoring data generally provide a more diverse species listing than the general canvass data, whereas the general canvass data apportion a higher volume of shark landings as unclassified. The larger reported landing of a given species in the two data sets was taken as the actual landed volume for that species. The positive difference between the quota monitoring data and the general canvass data was then subtracted from the unclassified

sharks category of the general canvass data to maintain the total landings volume equal to that reported in the general canvass data files. For the state of North Carolina (NC), it was assumed that some "dogfish" might also have been assigned to the unclassified sharks category. To adjust for this possibility for the state of NC, the NC unclassified sharks were first apportioned between the large coastal, small coastal, pelagic, prohibited, and dogfish categories based on the reported distribution of landings by species and gear for that state. For states other than NC, the remainder of unclassified shark landings was assigned to the large coastal group unless the harvesting gear was pelagic longline, in which case the landings were assigned to the pelagic group. The updated commercial landings estimates for 2003 and preliminary estimates for 2004 are shown in ***Table 2***.

Updated data from the quota monitoring system (for the southeast region only) reveal that the Gulf of Mexico region accounted for 70%, 72%, 59%, 64%, 55%, 45%, 51%, and 44% of total LCS landings (mean=57%), whereas the South Atlantic region accounted for 31%, 28%, 42%, 37%, 45%, 55%, 49%, and 56% (mean=43%), respectively, from 1997 to 2004 (***Table 3***). By state, Louisiana made up the majority of the landings in 1997 and 1998 (33-53%), whereas the west and east coasts of Florida predominated from 1999 to 2004, together accounting for 46-67% of total landings. North Carolina also had significant contributions, accounting for 11-21% of total landings during 1997-2004.

Also according to updated quota monitoring data, the South Atlantic region accounted for the vast majority of pelagic shark landings during 1997-2004 (59-93%, mean=75%; ***Table 3***). By state, pelagic sharks were mostly landed in North Carolina during 1997-2004 (52-83%), with Florida (12-35%) and Louisiana (3-19%) accounting for a smaller portion of the landings. Most small coastal sharks were also landed in the South Atlantic region (81-96%; mean=91%) during 1997-2004 (***Table 3***). By state, Florida's east coast accounted for the vast majority of the landings (73-95%) during 1997-2004, with the west coast of Florida contributing 11% and 10% in 1997 and 2000, respectively, and Alabama, 12% of the total landings in 2003.

According to general canvass data from the southeast and northeast regions, the Gulf of Mexico region contributed on average 57% (range: 47-63%), the South Atlantic region, 40% (range: 33-49%), and the mid-Atlantic region, 3% (range: 1-5%) of the total landings of LCS during 1997-2004. Pelagic sharks were predominantly landed in the South Atlantic (mean=46%, range: 36-56%) and Mid Atlantic (mean=31%, range: 22-40%) regions, with the North Atlantic and Gulf of Mexico regions contributing 13% (range: 9-16%) and 11% (range: 6-19%), respectively. Small coastal sharks were landed predominantly in the South Atlantic region (mean=87%, range: 74-98%), with few landings reported from the Gulf of Mexico region (mean=9%, range: 2-26%).

Total commercial landings of large coastal sharks in 1998-2004 exceeded the allowed quotas. This can be attributed to state landings occurring after each of the two federal semi-annual season closures. For example, according to southeast general canvass data, 1998 Louisiana landings (mostly of unclassified sharks likely to belong to the LCS complex) after the first semi-annual season closure amounted to about 679,000 lb dw (308 mt dw). Total landings of large coastal sharks in 1999-2004 were considerably lower than in 1998, whereas

landings of pelagic sharks during 1999-2002 were lower than in 1998, but landings in 2003-2004 exceeded those in 1998. Landings of small coastal sharks were higher in 1999 and 2001 than in 1998, but lower in 2000 and 2002-2004 than in 1998. Lower LCS landings in 1999-2004 can be due, at least in part, to a closed season for the commercial harvest of sharks in waters of the state of Louisiana between April 1 and June 30, which was implemented in 1999.

General canvass data revealed that longlines were the primary gear type used in all regions to catch large coastal sharks from 1987 to 2004. Gillnets were the second-most common gear utilized, followed by lines. The two most important species in the landings—blacktip and sandbar sharks—were predominantly caught with longline gear and mostly in the Gulf of Mexico region in most years (***Tables 4-7***). Gillnets were important in some years for blacktip sharks caught in the Mid and South Atlantic regions, and other gear and lines in some years in the Gulf of Mexico region (***Figure 1***). Gillnets were also important for sandbar sharks caught in the Mid-Atlantic region (***Figure 2***).

3. Bottom-Longline Shark Fishery Observer Program Information

As has been reported in previous documents (e.g., Cortés 2000, Cortés and Neer 2002, Cortés 2003, 2005), information from observer sampling on board commercial shark vessels targeting sharks (formerly run jointly by the Gulf and South Atlantic Fisheries Development Foundation and the University of Florida, then by the University of Florida alone, and presently by NFS Panama City Laboratory) was summarized to obtain estimates of the average size of sharks harvested by the commercial fleet. Differences in predicted (obtained by back-transforming from fork lengths) and observed sample weights were reported previously and attributed mainly to the opportunistic nature of weight measures taken during the observer program. This generally resulted in substantially fewer direct weight measurements than length measurements, and almost no weights being taken starting in 1999 (G. Burgess, U. of Florida, pers. comm.). For this update, average weights were calculated from lengths of sharks measured in the program by applying length-weight regressions summarized in SB-III-5 and in other published and unpublished sources. It is assumed that average weights predicted from length are a closer approximation to the actual dressed weights of sharks caught in the commercial fishery and thus the estimates in Table 1 are calculated based on predicted weights.

The predicted average weight for the LCS complex was 32.76 lb dw (14.86 kg, n=2,912) in 1996, 30.53 lb (13.85 kg, n=2,238) in 1997, 26.21 lb (11.89 kg, n=4,451) in 1998, 34.66 lb (15.72 kg, n=2,856) in 1999, 33.38 lb (15.14 kg, n=513) in 2000, 35.90 lb (16.28 kg, n=3,711) in 2001, 34.72 lb (15.75 kg, n=3,440) in 2002, 34.95 lb (15.85 kg, n=5,430) in 2003, and 32.42 lb (14.70 kg, n=4,762) in 2004. The average weight of the LCS complex observed in the shark bottom longline observer program has remained relatively stable over the twelve-year data set (1993-2004), showing a declining trend in 1993-1998, followed by a sharp increase in 1999, and a rather flat trend in 1998-2004 (***Figure 3***). The average weight and length of blacktip sharks increased steadily from 1994 to 2001, but showed a decrease in 2002 and 2003, and an uptrend in 2004 (***Figure 4***). Sandbar sharks

showed decreasing average size from 1993 to 1998, followed by a generally increasing trend from 1998 to 2004 (***Figure 5***).

Length-frequency distributions of sandbar and blacktip sharks observed in this program were constructed for the South Atlantic and Gulf of Mexico regions, and additionally for the Mid-Atlantic region for 2002-2004. There was a mode centered mostly around 140-160 cm FL for sandbar sharks observed in the South Atlantic region during 1993-2004, except for 1998 when the mode was at 90-120 cm FL and 1996 when the 140-160 cm FL mode was accompanied by another mode at 90-110 cm FL (***Figure 6***). The same 140-160 cm FL mode was observed for sandbar sharks in the Gulf of Mexico region during 1994-2004 (***Figure 7***) and in the Mid-Atlantic region in 2002, whereas the mode was centered around 130-150 cm FL in the Mid-Atlantic region in 2003 and 2004 (***Figure 8***).

For blacktip sharks in the South Atlantic region, there was a fairly uniform distribution of observed lengths in 1994, followed by a mode centered mostly around 120-140 cm FL during 1995-1997, a mode around 130-150 cm FL during 1998-2001, and again a mode around 120-140 cm FL during 2002-2004 (***Figure 9***). There was a less clear pattern for blacktip sharks in the Gulf of Mexico region, with lower modes during 1994-1996 and a higher mode around 110/120-140 cm FL during 1997-1999, 2002, and 2004. In 2003, there was a return to a lower mode of 100-110 cm FL (***Figure 10***). Blacktip sharks observed in the Mid-Atlantic region in 2002 showed a mode at 80-90 cm FL and another at 130-140 cm FL (***Figure 11***).

Using the updated average size information, the estimated U.S. commercial landings of Atlantic LCS were 2,387 mt dw (about 160,600 fish) in 1996, 1,809 mt (130,600 fish) in 1997, 2,080 mt (174,900 fish) in 1998, 1,753 mt (111,500 fish) in 1999, 1,684 mt (111,200 fish) in 2000, 1,558 mt (95,700 fish) in 2001, 1,944 mt (123,400 fish) in 2002, 1,935 mt (122,100 fish) in 2003, and 1,454 mt (98,900 fish) in 2004. These levels represent a reduction from peak recorded commercial landings (about 4,600 mt, approximately 350,000 fish in 1989; SB-III-6) of this grouping of sharks. Commercial catches of LCS in numbers in 1996, 1997, 1998, 1999, 2000, 2001, 2002, and 2003 are estimated to be about 72%, 59%, 79%, 50%, 50%, 43%, 55%, 55%, and 45%, respectively, of those in 1995 (***Table 1***). Total catches in numbers for 1999-2003 are estimated to be about 37%, 27%, 32%, 40%, and 37% lower than those in 1998, respectively. Preliminary total catch for 2004 is 48% lower than the 1998 catch.

4. Recreational Harvest Estimates

Recreational fishing for sharks also results in significant harvests of large coastal and other shark species (SB-III-5). Recreational harvest of sharks occurs all along the U.S. Atlantic and Gulf of Mexico coasts. Recreational fishing estimates were obtained, as previously reported, from three data collection programs: the Marine Recreational Fishery Statistics Survey (MRFSS), the NMFS Headboat Survey (HBOAT) operated by the SEFSC Beaufort Laboratory, and the Texas Parks and Wildlife Department Recreational Fishing Survey (TXPWD). During 1998-2004, an average of 95% and 97% of the total reported recreational

harvest of large coastal and pelagic sharks, respectively, came from MRFSS, whereas 79% of small coastal sharks were also reported by that survey.

The majority of recreational LCS landings from 1981-2004 occurred in the Gulf of Mexico region (53%), followed by the South Atlantic region (31%; ***Figure 12***). The mid-Atlantic region contributed 15% of the catch. Blacktip sharks were taken primarily in the Gulf of Mexico (74%), whereas sandbar sharks were taken primarily in the Mid-Atlantic region (50%), but also considerably in the South Atlantic region (34%; ***Figure 13***).

Recreational harvest of LCS decreased since 1996 from an estimated 191,500 fish to a low of 76,300 fish in 2002 (***Table 1***; note that the estimates from 1998 on have changed somewhat with respect to those last reported in Cortés [2003, 2005] because they have undergone revisions [P. Phares, SEFSC, Miami, FL, pers. comm.]). Preliminary estimates for 2004 are the lowest ever recorded, on the order of 66,300 fish. In 2000 and 2001, an estimated 126,000 and 125,000 LCS, respectively, were reported by MRFSS, in contrast to the almost 160,000 and 84,000 reported in this survey in 1998 and 1999, respectively. The MRFSS estimates for 2002, 2003, and 2004 were down to 72,000, 83,000, and 63,000 LCS (LCS estimates for 2000-2004 do not include prohibited species). Estimated catches of LCS from the Headboat Survey did not exceed 1,500 fish from 2000 to 2004, whereas estimated catches from the TXPWD survey for 2001-2004 have not exceeded 4,000 LCS. The more recent combined estimates (1994-2004) are considerably lower than those from 1981-1993. Additionally, from 1995 to 2003, about 25,000, 27,000, 16,000, 8,000, 7,000, 11,000, 25,000, 5,000, 18,000, and 27,000 unidentified sharks, respectively, were estimated to have been harvested by the recreational fishery, some of which might have been large coastal sharks. Recreational catches of large coastal sharks in numbers in 2004 are estimated to be 37%, 35%, 39%, 39%, 72%, 50%, 52%, 87%, and 77% of those in 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, and 2003, respectively. The 1996, 1997, 2000, and 2001 recreational catch estimates in numbers were greater than those from the commercial sector, whereas the 1998, 1999, and the more recent 2002-2004 estimates were lower (***Table 1***). Recreational harvest estimates for 2002-2004 are shown in ***Table 8***.

Length-frequency distributions of animals measured in each of the three recreational surveys were constructed. For MRFSS, blacktip and sandbar sharks were observed from 1982 through 2004, with the majority of the observed sharks being smaller than 110 cm TL (***Figures 14 and 15***). Blacktip sharks observed in the Headboat survey during 1986-2003 were also generally smaller than 110 cm TL, with the exception of the earlier years of data (1986-1989; ***Figure 16***). The majority of blacktip sharks observed in the TXPWD survey during 1983-2003 were also less than 110 cm TL (***Figure 17***).

The average weight and length of the LCS complex observed in the MRFSS have remained relatively stable over the 24-year data set (1981–2004; ***Figure 18***). The average weight and length of blacktip sharks fluctuated between approximately 3-9 lb dw and 80-100 cm TL, respectively, during 1981-1986, reached a minimum of about 2 lb dw and 66 cm TL in 1987, and followed a generally increasing trend that oscillated between 3-7 lb and 73-90 cm TL during 1988-2004 (***Figure 19***). Sandbar shark average weight and length decreased slightly over the period 1982-2000, with peaks in 2001 and 2002, followed by a decrease in

2003 and 2004 (***Figure 20***). It must be noted that the samples sizes are relatively small, especially for the sandbar shark.

The Headboat survey data indicate that the average weight and length of LCS have decreased since 1986-1989, and have shown a slightly upward trend since 1990, with peaks in 1999 and 2002, and especially in 2004 (***Figure 21***). Data for the blacktip shark follow a very similar trend, although sample sizes for the latest years were very small (***Figure 22***). Data for the sandbar shark indicate that the average weight and length have remained fairly stable since 1988, but the sample sizes for this species are also very small (***Figure 23***). Data for the LCS complex and blacktip shark from the TXPWD survey show similar, generally increasing tendencies (***Figures 24 and 25***).

5. Bycatch and Discard of Sharks

As reported in previous documents (e.g., NMFS 1996, 1998; Cortés 2000, Cortés and Neer 2002, Cortés 2003, 2005), bycatch of sharks occurs in many fisheries, including trawl, set-net, and hook and line fisheries. For instance, in the Gulf of Mexico, shark bycatch by the U.S. shrimp trawl fleet consists mainly of sharks too small to be highly valued in the commercial market (SB-III-23). Bycatch of sharks in trawl and other fisheries outside of the Gulf of Mexico also likely occurs with regularity.

Pelagic longline fisheries targeting swordfish and tunas can, at times, have shark bycatches that exceed the catch of targeted species. In the U.S. pelagic longline and drift gillnet fisheries, logbook and scientific observer reports indicate shark bycatch varies with target species (e.g., yellowfin tuna, bigeye tuna or swordfish), gear characteristics, and fishing season. Estimates of the annual dead discarded tonnage of large coastal sharks by U.S. pelagic longline fisheries between 1987 and 1995 range from about 140-875 mt (approximately 5,000-21,000 fish; SB-III-4). For 1996, 1997, and 1998 approximately 5,700, 5,600, and 4,300 large coastal sharks, respectively, were estimated to have been discarded dead by these fleets (SB-IV-22, SB-IV-33). In 1999 and 2000, 9,000 and 9,400 fish, respectively, were estimated as dead bycatch (Cramer 2000; unpublished data), whereas in 2001, 2002, 2003, and 2004, 5,600, 2,400, 3,500, and 5,200 fish, respectively, were estimated as dead bycatch (G. Diaz, SEFSC, Miami, FL, pers. comm.).

Observer data collected from the directed bottom-longline shark fishery (SB-IV-1, 2, 3 and G. Burgess and A. Morgan, U. of Florida, pers. comm.) indicate that large coastal sharks discarded from the fishery represented about 5% of the total mortality attributable to the LCS grouping harvested by the fishery from 1994 to 2004. These discard rates include sharks discarded dead and also those used for bait. The fraction of large coastal sharks discarded was 7.2%, 6.2%, 4.8%, 6.4%, 5.7%, 3.4%, 4.3%, 6.4%, 4.0%, 5.5%, and 3.6% for 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, and 2004, respectively. Observer data collected from the Gulf of Mexico menhaden fishery operating mainly off Louisiana for the period 1994-1995 (de Silva et al. 2001) indicated that 75% of the sharks encountered in this fishery died; 97% were large coastal and 3% were small coastal sharks. The total number of sharks caught by this fishery was estimated to be about 36,000 in 1994

and 33,000 in 1995, or about 26,200 (36,000×0.75×0.97) and 24,000 large coastal sharks discarded dead in 1994 and 1995, respectively. The average number of large coastal sharks caught in this fishery during 1994-95 (25,100 fish) was used as an estimate for subsequent years (1996-2004; ***Table 1***).

6. Species-Specific Catch Histories

Estimates of the historical catch time series for blacktip and sandbar sharks were first prepared in 1998 for the purpose of conducting species-specific stock assessments and have been updated in various documents (Cortés 1999, 2000, 2003, 2005; Cortés and Neer 2002). Here, the so-called "updated" scenarios identified by the Catch Working Group during the 2002 Shark Evaluation Workshop (NMFS 2002) are updated with data up to 2004. Estimated landings of blacktip (***Table 9***) and sandbar (***Table 10***) sharks were based on the proportional allocation of commercial landings of unclassified sharks by gear type and region defined in NMFS (1996) for the period 1986-1995 and using the species breakouts defined in SB-IV-12 for 1996, in Table 2 of Cortés (1999) for 1997, in Table 2 of Cortés (2000) for 1998 and 1999, in Table 2 of Cortés and Neer (2002) for 2000, in Table 2 of Cortés (2003) for 2001, in Table 2 of Cortés (2005) for 2002, and in ***Table 2*** herein for 2003 and 2004. Unclassified sharks in 1996-2004 attributed to the LCS grouping were proportionally allocated to sandbar and blacktip sharks, respectively, based on the species-specific landings identified in SB-IV-12, Table 2 in Cortés (1999, 2000, 2003, 2005), Table 2 in Cortés and Neer (2002), and ***Table 2*** herein.

Unreported landings were based on the assumed proportions of the values reported in Table 1 of SB-IV-12: 75% blacktip and 25% sandbar for the period 1986-1987, and 50% blacktip, 50% sandbar for the period 1988-1991. Species-specific recreational catches for 1986-2004 are as reported (or updated from what was reported) in SB-III-7, SB-IV-12, Cortés (1999, 2000, 2003, 2005), Cortés and Neer (2002), and in ***Table 8*** herein. Levels of dead discarded blacktip and sandbar sharks are assumed to be negligible for U.S. pelagic longline fisheries. Average weights for these species caught in commercial fisheries are taken as predicted weights from length measurements taken by observers in the directed bottom longline fishery for the period 1994-2004. Prior to 1994, values assumed are indicated (***Tables 9 and 10***). Estimates of numbers of sharks caught and landed by the directed commercial fleet are taken as estimates of lb (dressed) landed/average wt (dressed lb). Mexican catches are as reported in Tables 2 and 3 of the 2002 LCS stock assessment (Cortés et al. 2002), with catches for 2002-2004 assumed to be equal to those in 1993-2001.

Bycatch of blacktip and sandbar sharks in the Gulf of Mexico menhaden fishery (de Silva et al. 2001) was also incorporated in the 2002 LCS stock assessment (Cortés et al. 2002). The rationale (see Cortés 1999, 2000, 2003, 2005; Cortés and Neer 2002) for the estimates used is based on the study by de Silva et al. (2001) in which blacktip sharks represented 45.3%, and sandbar sharks 1.8%, of the total bycatch observed during 1994-95. Considering the reported 75% mortality rate among all sharks, this results in an estimated bycatch of 12,200 (36,000×0.453×0.75) and 11,200 dead blacktip sharks, and 486 and 445 sandbar sharks, in 1994 and 1995, respectively. The averages of the 1994 and 1995 values

(11,700 fish for blacktip sharks and 465 fish for sandbar sharks) were used as estimated dead bycatch for 1996-2004.

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SB-IV-2. Branstetter, S. and G. Burgess. Gulf and South Atlantic Fisheries Development Foundation and University of Florida. Commercial shark fishery observer program 1997-1998. Document presented at the 1998 Shark Evaluation Workshop.

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SB-IV-33. Cramer, J., and H. M. Adams. 1998. Pelagic longline bycatch. Sust. Fish. Div. Contrib. SFD-97/98-06. Document presented at the 1998 Shark Evaluation Workshop.

Table 1. *Estimates of total landings and dead discards for large coastal sharks (numbers of fish in thousands), modified from the 1998 and 2002 Report of the Shark Evaluation Workshop (NMFS 1998, 2002), Cortés and Neer (2002), and Cortés(2003, 2005) .*

Year	Col 1 Commercial Landings	Col 2 Longline Discards	Col 3 Rec. Catches	Col 4 Unre-ported	Col 5 Coastal Discards	Col 6 Menhaden Fishery Bycatch	Col 7 Total
81	16.2	0.9	265.0				282.1
82	16.2	0.9	413.9				431.0
83	17.5	0.9	746.6				765.0
84	23.9	1.3	254.6				279.8
85	22.2	1.2	365.6				389.0
86	54.0	2.9	426.1	24.9			507.9
87	104.7	9.7	314.4	70.3			499.0
88	274.6	11.4	300.6	113.3			699.9
89	351.0	10.5	221.1	96.3			678.8
90	267.5	8.0	213.2	52.1			540.8
91	200.2	7.5	293.4	11.3			512.4
92	215.2	20.9	304.9				541.1
93	169.4	7.3	249.0		11.3		437.0
94	228.0	8.8	160.9		16.3	26.2	440.2
95	222.4	5.2	180.8		13.9	24.0	446.3
96	160.6	5.7	191.5		7.6	25.1	390.5
97	130.6	5.6	168.1		8.3	25.1	337.7
98	174.9	4.3	170.7		9.9	25.1	384.9
99	111.5	9.0	91.7		3.8	25.1	241.1
00	111.2	9.4	131.9		4.8	25.1	282.4
01	95.7	5.6	128.6		6.1	25.1	261.1
02	123.4	2.4	76.3		4.9	25.1	232.1
03	122.1	3.5	86.0		6.7	25.1	243.4
04	98.9	5.2	66.3		3.6	25.1	199.1

Column 1, commercial landings - These data are the landings reported under the established NMFS cooperative statistics program (see document SB-III-6 for a description of this data collection program) and also the SEFSC quota monitoring program (see text for a description of this program and the procedure to arrive at final landings estimates). The data are collected in landed or dressed weight. Various sources of weight per fish estimates were used to convert pounds to numbers of fish. For the period 1981 through 1985, a generic factor of 45 pounds dressed weight per fish was used. For 1986 through 1991, an average weight for all species was used. These averages are those used in the 1992 assessment. For 1992 and 1993, average weights for coastal species observed in longline

catches were used in document SB-III-6, but the Working Group felt that these weights were too high to apply to fish caught nearer shore in the directed large coastal fishery. Therefore, a weight of 40 pounds per fish was used for these two years. For 1994 and 1995, predicted weights from lengths based on the observer program (Branstetter and Burgess 1997) and data from the pelagic longline database were used. Average weights used for 1996-2004 came from the shark bottom longline fishery observer program and are given in the text. Estimates for 2004 must still be considered preliminary.

Column 2, pelagic longline discards - The data for this column are from the analyses of the discards by pelagic longline vessels (see document SB-III-4). The estimates prior to 1987 are calculated using the average ratio of the discards to commercial landings for the data for 1987 through 1992 (discards as a fraction of combined landings and discards averaged 5.12% over this period). Estimates for 1993-2000 are from SB-III-4, SB-IV-22, SB-IV-33, and Cramer (1999, 2000, unpublished data). The estimates for 2001-2004 are from G. Diaz (SEFSC, pers. comm.).

Column 3, recreational harvest - These data are updated from data originally reported in document SB-III-5 and include estimated catches from the NMFS MRFSS, Headboat and charter boat surveys and the Texas Parks and Wildlife Department (TXPWD) recreational creel survey. The estimates from the three surveys have undergone several revisions through the years and the estimates for 2004 must still be considered preliminary.

Column 4, unreported catches - These data are from a single source, which owned a fleet of vessels that fished in the Gulf of Mexico and off the coast of North Carolina. The estimate for 1988 was determined from company landings records. The estimates for other years were prorated based on the 1988 landings record and financial statements indexing income from shark fishing (SB-III-30). The Working Group (NMFS 1998) did not have any way of determining the amount, if any, of these catches that were included. Therefore, the Working Group made the assumption that none of the catches were included and kept these data separate, listing them as unreported. The implicit assumption in doing this is that the landings were off-loaded in Alabama docks, but not sold to Alabama dealers.

Column 5, discards by coastal fishery - These data are from the Gulf and South Atlantic Fisheries Development Foundation/University of Florida observer program (SB-IV-1,2,3 and G. Burgess, pers. comm.). Revised estimates show that 7.2% and 6.2% of large coastal species were discarded by the directed fishery in 1994 and 1995. The calculated percentages for 1994 and 1995 were averaged (6.7%) and applied to the recorded landings for 1993 to give an estimate of the discards in 1993. Discard rates of 4.8%, 6.4%, 5.7%, 3.4%, 4.3%, 6.4%, 4.0%, 5.5%, and 3.6% were applied in 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, and 2004, respectively, based on the whole dataset (G. Burgess and A. Morgan, U. of Florida, pers. comm.). The discarded species are non-marketable animals that are included in the LCS management unit and regulatory discards.

Column 6, bycatch by menhaden fishery - These data are bycatch estimates of large coastal sharks in the US Gulf of Mexico menhaden fishery for 1994-95 (de Silva et al. 2001). It was estimated that 75% of the sharks encountered died and that about 97% of all sharks observed were large coastal sharks. The average for 1994 and 1995 was used as an estimate for 1996-2004.

Column 7, total - The numbers in this column are the sum of columns 1-6.

Table 2. *Estimated U.S. Atlantic commercial shark landings in 2003 and 2004 for the Large Coastal, Small Coastal, and Pelagic Management Groups. Landings of Prohibited Species (denoted by an asterisk) and fins are also included (but not counted in the total). All landings are dressed weights.*

Large Coastal Sharks	Landed lbs	**Small Coastal Sharks**	Landed lbs	**Pelagic Sharks**	Landed lbs
2003:		**2003:**		**2003:**	
Shark, bignose *	318	Shark, Atlantic angel *	1,375	Shark, blue	6,324
Shark, blacktip	1,474,362	Shark, Atlantic sharpnose	190,960	Shark, shortfin mako	151,428
Shark, bull	93,816	Shark, blacknose	131,511	Shark, longfin mako *	1,831
Shark, dusky *	23,288	Shark, bonnethead	38,614	Shark, mako	33,203
Shark, hammerhead	150,368	Shark, finetooth	163,407	Shark, oceanic whitetip	2,559
Shark, large coastal	51,433	Shark, unclassified	8,634	Shark, pelagic	79,439
Shark, lemon	80,688			Shark, porbeagle	1,738
Shark. night *	20			Shark, thresher	46,502
Shark, nurse	70			Shark, unclassified	314,300
Shark, sand tiger *	624				
Shark, sandbar	1,425,628				
Shark, silky	51,588				
Shark, spinner	12,133				
Shark, tiger	18,536				
Shark, unclassified	908,077				
Shark, unclassified, fins	181,431				
Shark, white *	1,454				
Total:	4,266,699 (1,935 mt)	Total:	533,126 (242 mt)	Total:	635,493 (288 mt)
2004:		**2004:**		**2004:**	
Shark, blacktip	1,092,600	Shark, Atlantic angel *	818	Shark, blue	423
Shark, bull	49,556	Shark, Atlantic sharpnose	230,880	Shark, shortfin mako	217,171
Shark, dusky *	1,025	Shark, blacknose	68,108	Shark, longfin mako *	1,827
Shark, hammerhead	116,546	Shark, bonnethead	29,402	Shark, mako	51,413
Shark, lemon	67,460	Shark, finetooth	121,036	Shark, oceanic whitetip	1,082
Shark, nurse	317	Shark, unclassified	1,407	Shark, porbeagle	5,779
Shark, sand tiger *	1,832			Shark, thresher	44,915
Shark, sandbar	1,223,082			Shark, bigeye thresher *	719
Shark, silky	11,808			Shark, unclassified	356,522
Shark, smooth hammerhead	92				
Shark, spinner	14,806				
Shark, tiger	30,976				
Shark, unclassified	599,134				
Shark, unclassified, fins	128,409				
Shark, white *	58				
Total:	3,206,377 (1,454 mt)	Total:	450,833 (204 mt)	Total:	677,305 (307 mt)

Table 3. Percentage of large coastal, small coastal, and pelagic shark commercial landings by region from General Canvass Southeast and Northeast data and Quota Monitoring data.

	Canvass				Qms	
Year	**GOM**	**SA**	**MA**	**NA**	**GOM**	**SA**
Large coastal sharks						
1997	47.5	49.1	2.6	0.0	69.5	30.5
1998	49.2	43.1	3.0	0.0	72.0	28.0
1999	59.3	36.0	2.8	0.0	58.5	41.5
2000	62.1	34.1	3.8	0.0	63.5	36.5
2001	63.0	33.6	1.9	0.0	55.0	45.0
2002	52.5	45.4	2.1	0.0	44.9	55.1
2003	60.7	37.9	1.3	0.0	50.9	49.1
2004	57.8	37.3	4.8	0.1	44.2	55.8
mean	*56.5*	*39.6*	*2.8*	*0.0*	*57.3*	*42.7*
Small coastal sharks						
1997	2.3	77.1	0.0	0.0	14.1	85.9
1998	3.0	91.8	0.0	0.0	4.9	95.1
1999	3.0	87.3	0.1	0.0	4.4	95.6
2000	3.2	96.8	0.0	0.0	9.7	90.3
2001	2.0	97.9	0.0	0.0	5.9	94.1
2002	10.6	89.4	0.0	0.0	4.5	95.5
2003	22.2	77.8	0.0	0.0	19.4	80.6
2004	25.8	74.2	0.0	0.0	10.1	89.9
mean	*9.0*	*86.5*	*0.0*	*0.0*	*9.1*	*90.9*
Pelagic sharks						
1997	10.2	50.3	26.1	13.3	17.8	82.2
1998	18.8	36.3	29.3	15.6	27.2	72.8
1999	11.9	39.7	39.5	8.8	30.1	69.9
2000	10.4	42.4	37.3	9.9	32.2	67.8
2001	9.3	44.1	36.0	10.6	40.9	59.1
2002	5.9	45.1	35.1	14.0	32.3	67.7
2003	11.0	51.3	24.5	13.3	13.2	86.8
2004	6.7	55.8	21.6	15.8	7.2	92.8
mean	*10.5*	*45.6*	*31.2*	*12.7*	*25.1*	*74.9*

GOM (Gulf of Mexico) includes Alabama, Florida west coast, Louisiana, and Texas; SA (South Atlantic) includes Florida east coast, Georgia, South and North Carolina; MA (Mid Atlantic) includes Virginia, Maryland, Delaware, New York, and New Jersey; NA (North Atlantic) includes Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.

Table 4. Percentage of blacktip shark commercial landings by region and gear for all years combined. (Years listed under each region indicate those used in the summary calculation.)

	Region		
Gear	**Gulf of Mexico** (1987 - 2004)	**Mid Atlantic** (1987 - 2004)	**South Atlantic** (1991 - 2004)
Diving	0.00	0.00	0.01
Gillnets	5.40	25.27	33.82
Lines	10.17	8.71	2.83
Longlines	47.79	62.48	62.85
Other	26.37	0.12	0.09
Other nets	0.07	0.02	0.05
Other trawl	0.04	0.00	0.00
Otter trawl	0.33	1.46	0.32
Pots & traps	0.03	0.02	0.00
Purse seine	0.01	0.08	0.00
Unknown	9.80	1.83	0.02

Table 5. Percentage of blacktip shark commercial landings by region and year for all gear combined.

	Region		
Year	**Gulf of Mexico**	**Mid Atlantic**	**South Atlantic**
1987	85.9	14.1	0.0
1988	100.0	0.0	0.0
1989	99.6	0.4	0.0
1990	94.3	5.7	0.0
1991	34.1	38.8	27.1
1992	35.4	28.6	36.0
1993	44.4	16.0	39.6
1994	55.2	3.0	41.9
1995	47.0	8.5	44.5
1996	49.6	2.9	47.4
1997	48.2	1.0	50.8
1998	58.4	4.7	36.9
1999	86.9	2.1	10.9
2000	82.0	2.7	15.3
2001	77.3	0.2	22.6
2002	58.4	1.6	40.0
2003	71.1	0.4	28.5
2004	70.5	5.5	24.0

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

	Region		
Gear	**Gulf of Mexico** (1991 - 2004)	**Mid Atlantic** (1989 - 2004)	**South Atlantic** (1991 - 2004)
Diving	0.08	0.00	0.00
Gillnets	0.10	34.12	3.02
Lines	3.59	1.31	1.33
Longlines	95.93	58.05	95.53
Other	0.27	0.00	0.00
Other nets	0.01	0.43	0.03
Other trawl	0.00	0.00	0.00
Otter trawl	0.01	4.54	0.09
Pots & traps	0.00	0.00	0.00
Purse seine	0.00	0.00	0.00
Unknown	0.00	1.55	0.00

Table 7. Percentage of sandbar shark commercial landings by region and year for all gear combined.

	Region		
Year	**Gulf of Mexico**	**Mid Atlantic**	**South Atlantic**
1987	100.0	0.0	0.0
1988	94.4	0.0	5.6
1989	6.2	93.8	0.0
1990	0.0	100.0	0.0
1991	91.8	6.6	1.5
1992	66.7	11.9	21.3
1993	85.6	10.2	4.2
1994	68.4	3.6	28.0
1995	58.1	3.8	38.1
1996	49.3	4.1	46.6
1997	51.2	3.4	45.3
1998	51.5	2.6	45.9
1999	33.9	3.9	62.1
2000	45.0	5.0	49.9
2001	54.3	3.3	42.3
2002	48.4	2.7	49.0
2003	53.0	0.0	47.0
2004	46.3	4.9	48.8

Table 8. *Recreational harvest estimates of U.S. Atlantic sharks for 2002, 2003, and 2004 from MRFSS, the Headboat Survey, and the Texas Parks & Wildlife Department Survey (TXPWD). Data for 2004 are preliminary and subject to change. Landings of prohibited species (denoted by an asterisk) are also included (but not counted in the total for consistency with reporting of commercial catches). All catches are in numbers.*

Large Coastal Sharks	Catch	**Small Coastal Sharks**	Catch	**Pelagic Sharks**	Catch
2002:		**2002:**		**2002:**	
Shark, blacktip	38,237	Shark, Atlantic sharpnose	89,365	Shark, bigeye thresher *	65
Shark, bull	1,893	Shark, blacknose	11,416	Shark, shortfin mako	3,206
Shark, dusky *	1,047	Shark, bonnethead	50,903	Shark, thresher	1,467
Shark, great hammerhead	4	Shark, finetooth	2,942		
Shark, hammerhead genus	5,293			Total:	4,673
Shark, lemon	3,454				
Shark, nurse	2,680				
Shark, reef	741				
Shark, requiem family	2,827				
Shark, requiem genus	6,708				
Shark, sandbar	8,324				
Shark, scalloped hammerhead	1,087				
Shark, silky	1,780				
Shark, smooth hammerhead	2				
Shark, spinner	3,835			**Unknown Sharks**	
Shark, tiger	170				
				Shark, unclassified	5,359
Total:	76,294	Total:	154,626	Total:	5,359
2003:		**2003:**		**2003:**	
Shark, blacktip	40,442	Shark, Atlantic sharpnose	86,340	Shark, blue	376
Shark, bull	3,344	Shark, blacknose	6,705	Shark, shortfin mako	3,957
Shark, dusky *	2,731	Shark, bonnethead	39,863		
Shark, great hammerhead	68	Shark, finetooth	1,774		
Shark, lemon	4,879				
Shark, nurse	647			Total:	4,333
Shark, requiem family	10,570				
Shark, requiem genus	11,516				
Shark, sandbar	5,185				
Shark, scalloped hammerhead	2,816				
Shark, silky	1,998				
Shark, smooth hammerhead	1				
Shark, spinner	4,460				
Shark, tiger	110				
				Unknown Sharks	
				Shark, unclassified	18,136
Total:	86,036	Total:	134,682	Total:	18,136
2004:		**2004:**		**2004:**	
Shark, bignose *	71	Shark, Atlantic sharpnose	70,469	Shark, shortfin mako	5,144
Shark, blacktip	31,197	Shark, blacknose	15,126		
Shark, bull	4,885	Shark, bonnethead	42,354		
Shark, great hammerhead	9		581		
Shark, lemon	5,710	Shark, finetooth	11		
Shark, nurse	3,594	Shark, smalltail *			
Shark, reef *	692			Total:	5,144
Shark, requiem family	6,720				
Shark, requiem genus	5,746				
Shark, sandbar	3,843				

Shark, scalloped hammerhead	714			**Unknown Sharks**	
Shark, silky	502				
Shark, spinner	3,380			Shark, unclassified	27,322
Shark, tiger	1				
Total:	66,301	Total:	128,530	Total:	27,322

Table 9. *Estimates of the annual catches of blacktip sharks based on area-gear definitions described in NMFS (1996) and species breakouts in SB-IV-12, Cortés (1999, 2000), Cortés and Neer (2002), Cortés (2003, 2005), and Tables 2 and 8 of this document. Commercial and recreational landings estimates for 2004 are preliminary.*

Year	Blacktip lb landed	Average Wt	lb landed/ Ave Wt	Recreational Harvest	Rec+Com	Unreported	Mexico small fish	Menhaden Fishery bycatch	Total
1986	1,213,040	20.5	59,173	162,402	221,575	18,675	15,642		255,892
1987	1,463,544	20.5	71,392	129,551	200,943	52,725	22,346		276,014
1988	3,300,321	20.5	160,991	139,806	300,797	56,650	29,050		386,497
1989	3,832,421	20.5	186,947	111,368	298,315	48,150	35,754		382,219
1990	2,052,287	20.5	100,112	94,136	194,248	26,050	42,458		262,756
1991	2,744,292	20.5	133,868	150,794	284,662	5,650	49,161		339,473
1992	3,610,218	20.5	176,108	157,663	333,771		55,865		389,636
1993	3,086,965	20.5	150,584	109,057	259,641		62,569		322,210
1994	3,829,364	19.3	198,413	66,106	264,519		62,569	12,200	339,288
1995	2,915,797	20.5	142,234	61,271	203,505		62,569	11,200	277,274
1996	2,121,714	21.8	97,326	81,482	178,808		62,569	11,700	253,077
1997	2,170,597	23.6	91,974	72,501	164,475		62,569	11,700	238,744
1998	2,626,806	25.5	103,012	82,762	185,774		62,569	11,700	260,043
1999	1,650,319	29.4	56,133	34,404	90,537		62,569	11,700	164,806
2000	1,684,420	32.8	51,354	69,538	120,892		62,569	11,700	195,161
2001	1,427,422	33.5	42,610	48,651	91,261		62,569	11,700	165,530
2002	1,412,500	27.9	50,627	38,237	88,864		62,569	11,700	163,133
2003	1,902,117	19.2	99,069	40,442	139,511		62,569	11,700	213,780
2004	1,343,675	22.1	60,800	31,197	91,997		62,569	11,700	166,266

Table 10. *Estimates of the annual catches of sandbar sharks based on area-gear definitions described in NMFS (1996) and species breakouts in SB-IV-12, Cortés (1999, 2000), Cortés and Neer (2002), Cortés (2003, 2005), and Tables 2 and 8 of this document. Commercial and recreational landings estimates for 2004 are preliminary.*

Year	Sandbar lb landed	Average Wt	lb landed/ Ave wt	Recreational Harvest	Rec+Com	Unreported	Menhaden Fishery bycatch	Total
1986	796,509	35.9	22,187	123,660	145,847	6,225		152,072
1987	2,285,644	35.9	63,667	32,551	96,218	17,575		113,793
1988	2,737,938	35.9	76,266	64,792	141,058	56,650		197,708
1989	4,215,657	35.9	117,428	27,417	144,845	48,150		192,995
1990	4,026,470	35.9	112,158	58,814	170,972	26,050		197,022
1991	3,292,594	35.9	91,716	36,794	128,510	5,650		134,160
1992	3,470,449	35.9	96,670	36,294	132,964			132,964
1993	2,483,235	35.9	69,171	26,607	95,778			95,778
1994	4,691,470	37.1	126,455	14,974	141,429		486	141,915
1995	3,012,065	35.7	84,372	25,182	109,554		445	109,999
1996	2,004,759	30.6	65,515	36,037	101,552		465	102,017
1997	1,283,871	31.0	41,415	41,900	83,315		465	83,780
1998	1,494,078	23.8	62,776	35,766	98,542		465	99,007
1999	1,730,570	32.5	53,248	20,716	73,964		465	74,429
2000	1,538,020	41.2	37,331	10,877	48,208		465	48,673
2001	1,769,882	35.3	50,138	36,094	86,232		465	86,697
2002	2,394,556	42.5	56,342	8,324	64,666		465	65,131
2003	1,839,243	40.7	45,190	5,185	50,375		465	50,840
2004	1,504,141	38.5	39,069	3,843	42,912		465	43,377

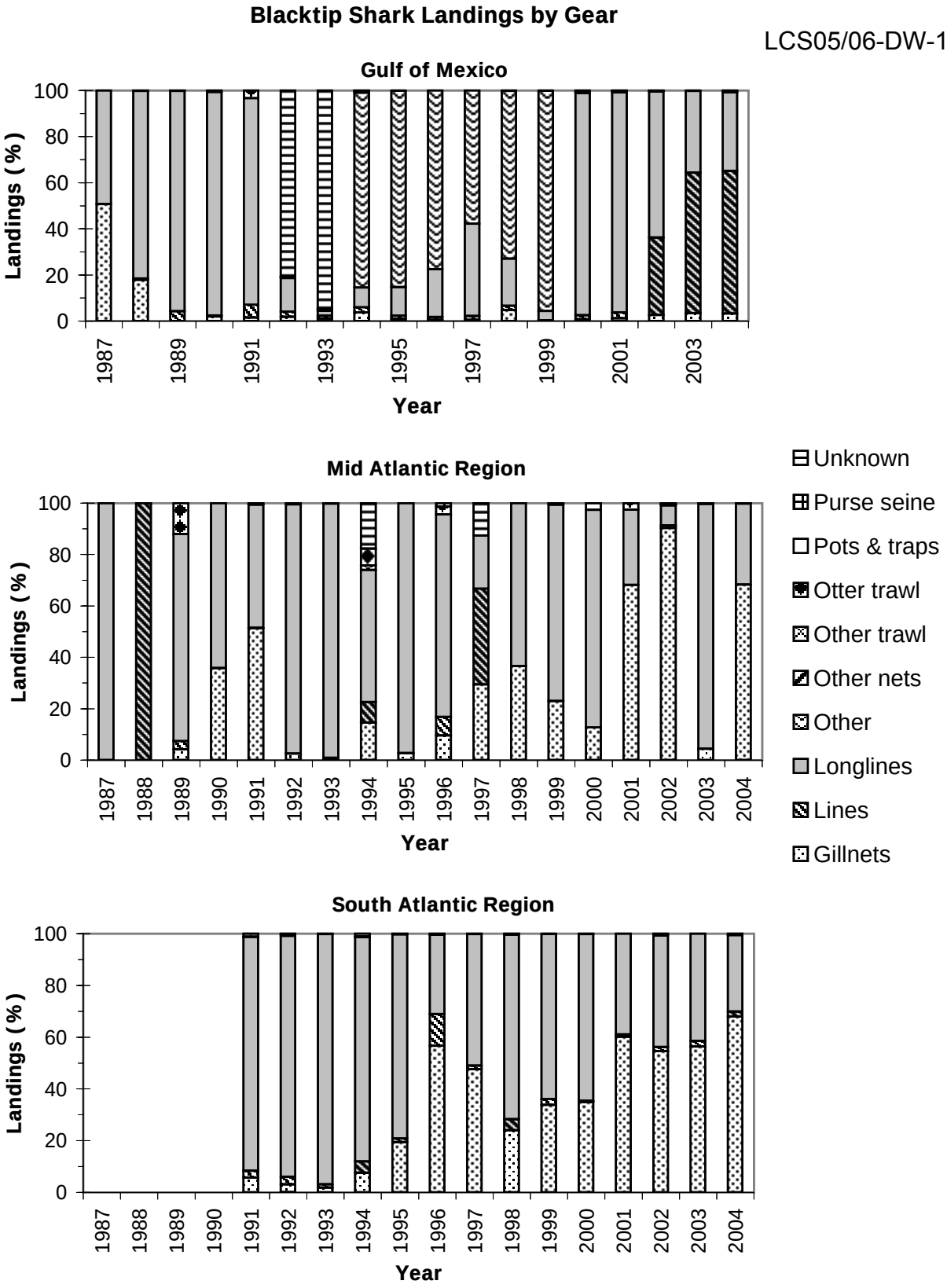


Figure 1. Commercial landings for the blacktip shark by region and gear type. Data are from the northeast and southeast general canvass.

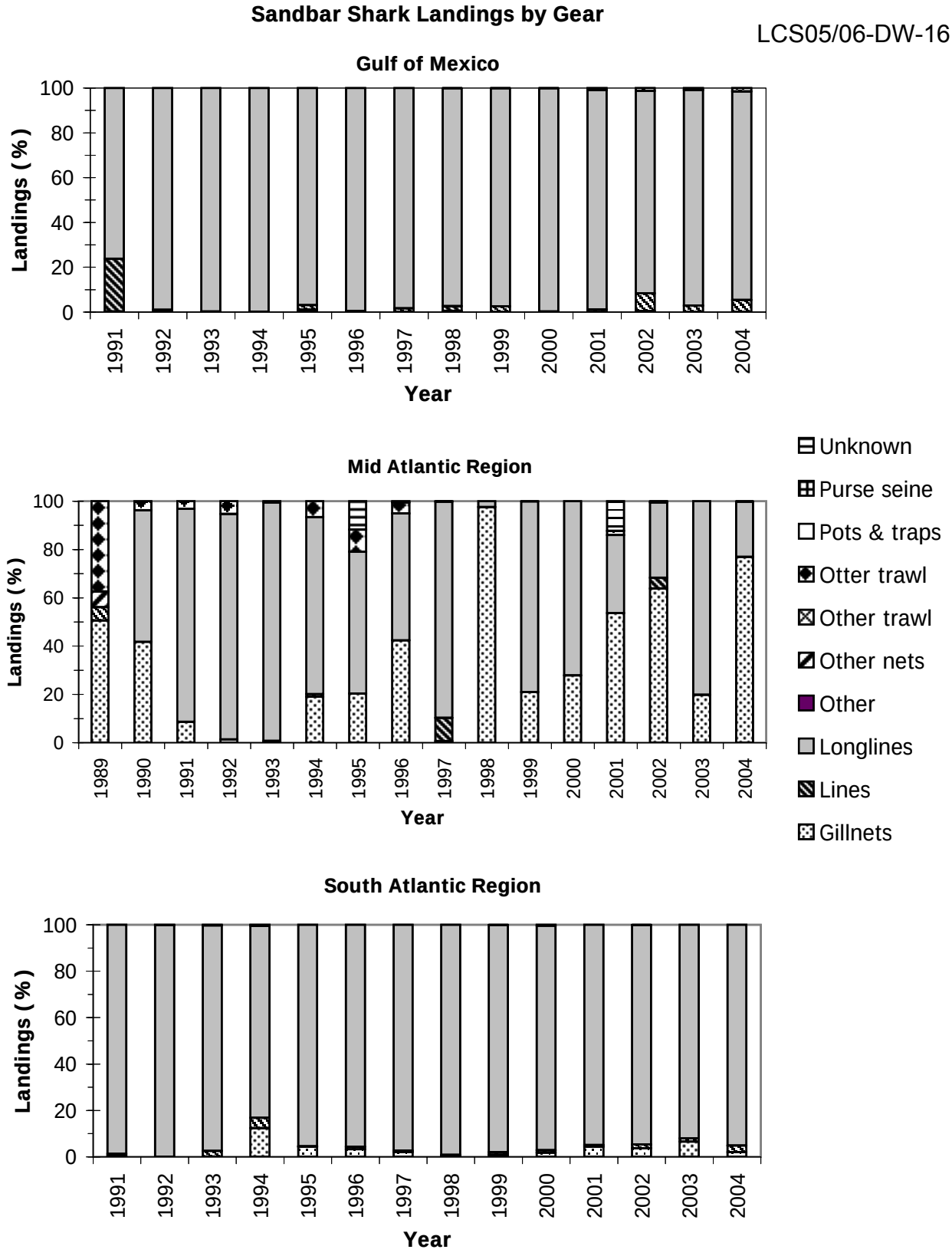
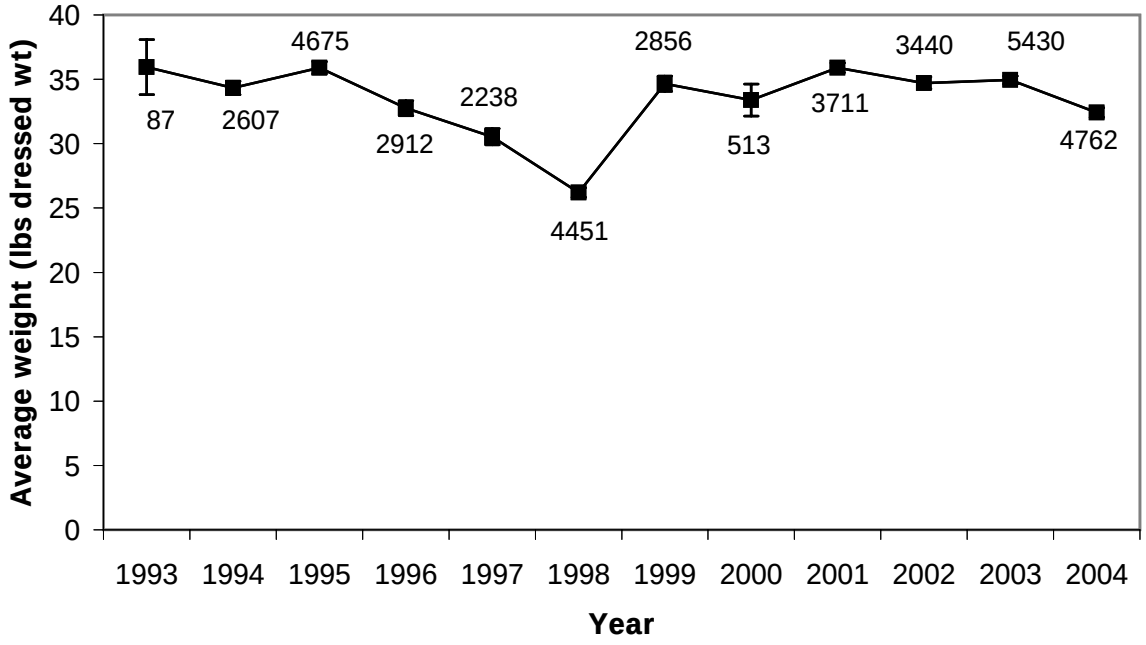


Figure 2. Commercial landings for the sandbar shark by region and gear type. Data are from the northeast and southeast general canvass.

A.



B.

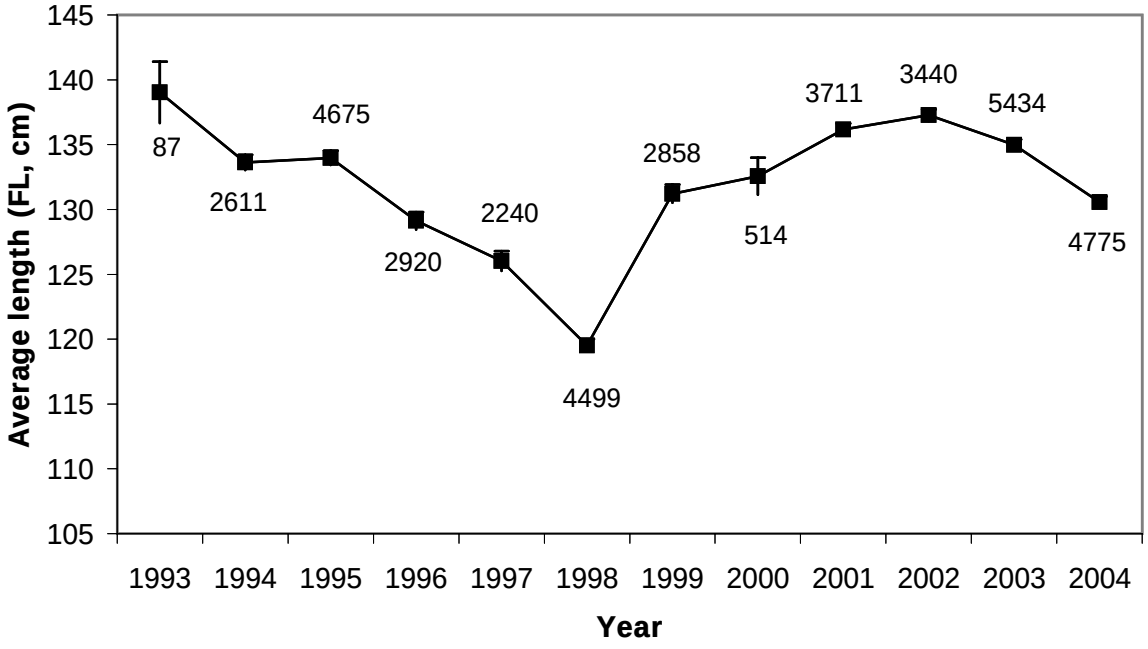
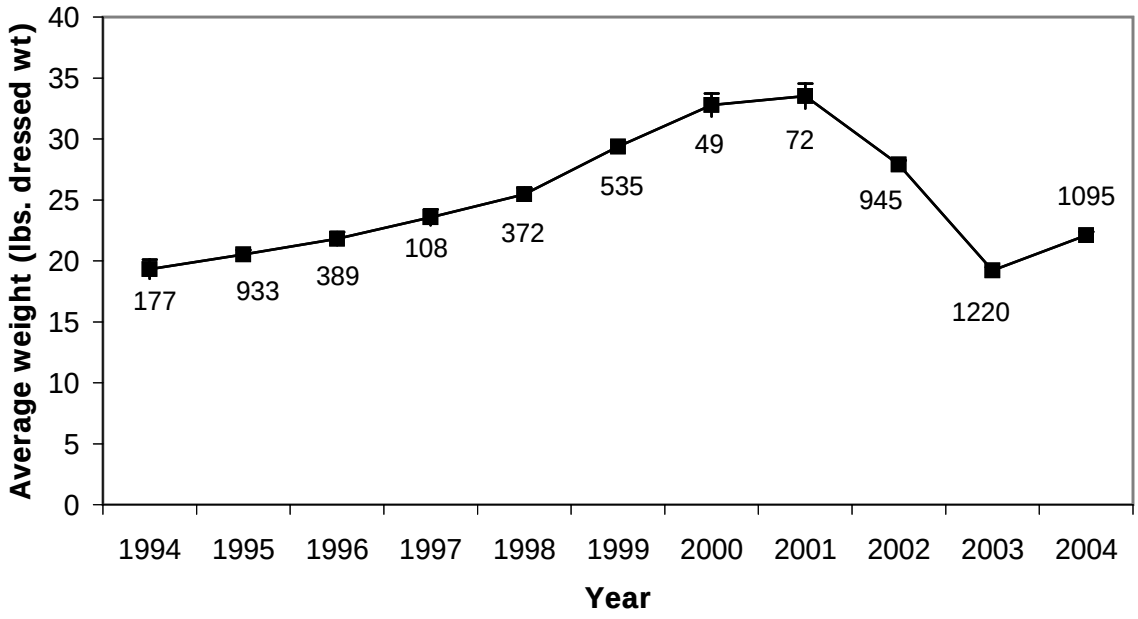


Figure 3. Average weight (A) and length (B) of large coastal sharks observed in the Shark Bottom Longline Observer Program. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

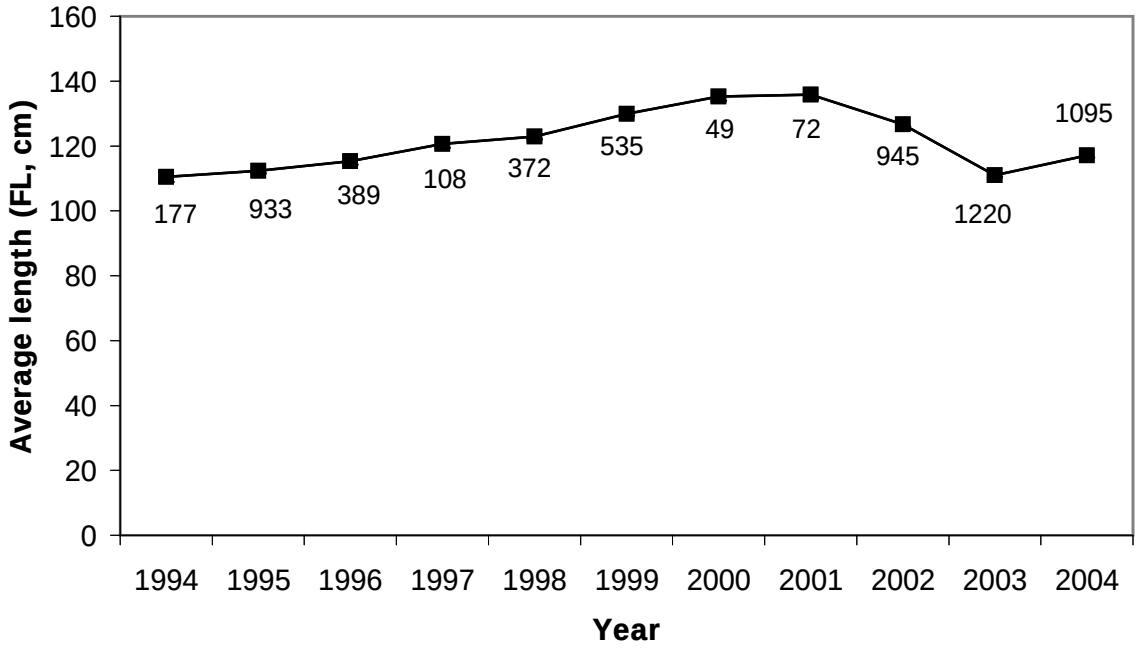
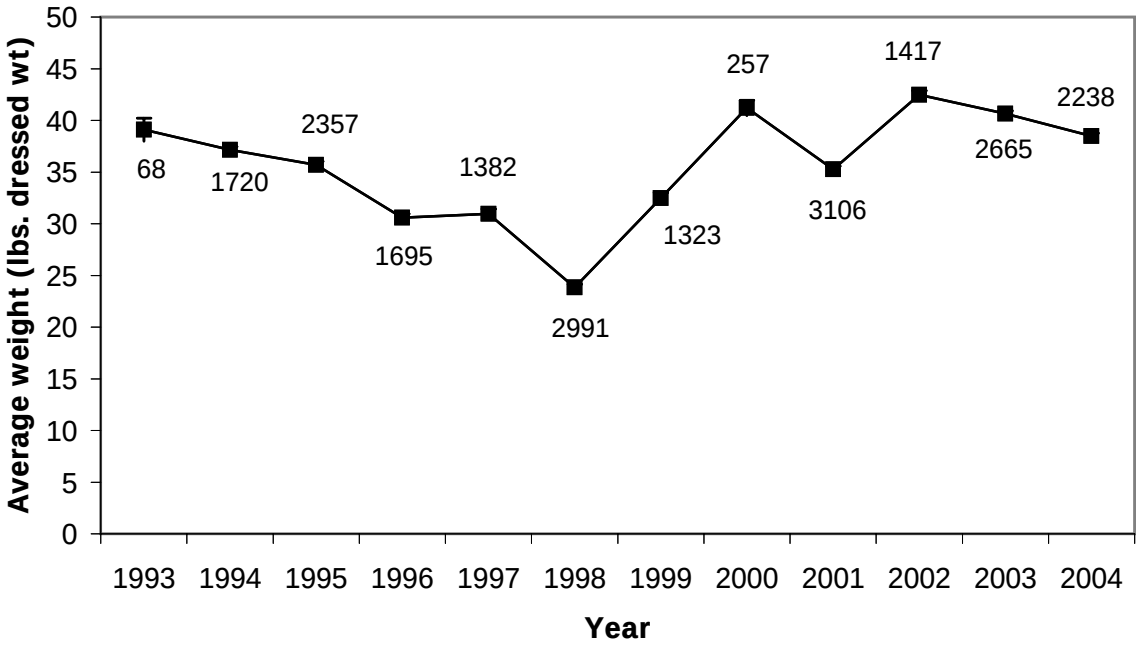


Figure 4. Average weight (A) and length (B) of blacktip sharks observed in the Shark Bottom Longline Observer Program. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

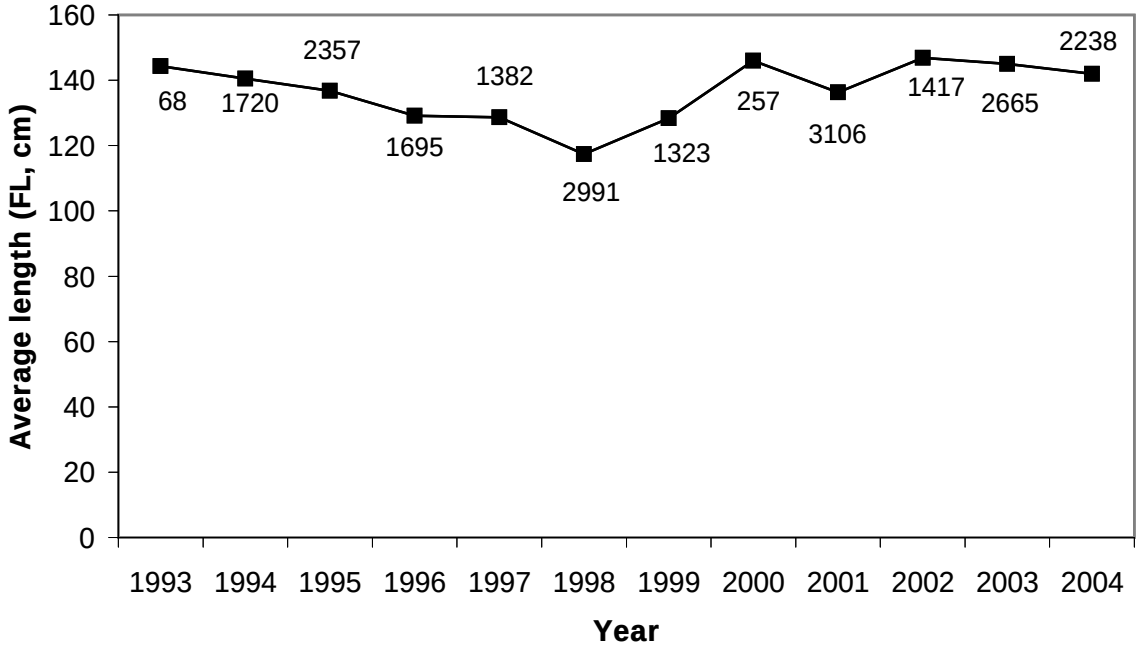


Figure 5. Average weight (A) and length (B) of sandbar sharks observed in the Shark Bottom Longline Observer Program. Error bars represent +/- one standard error; sample sizes are indicated.

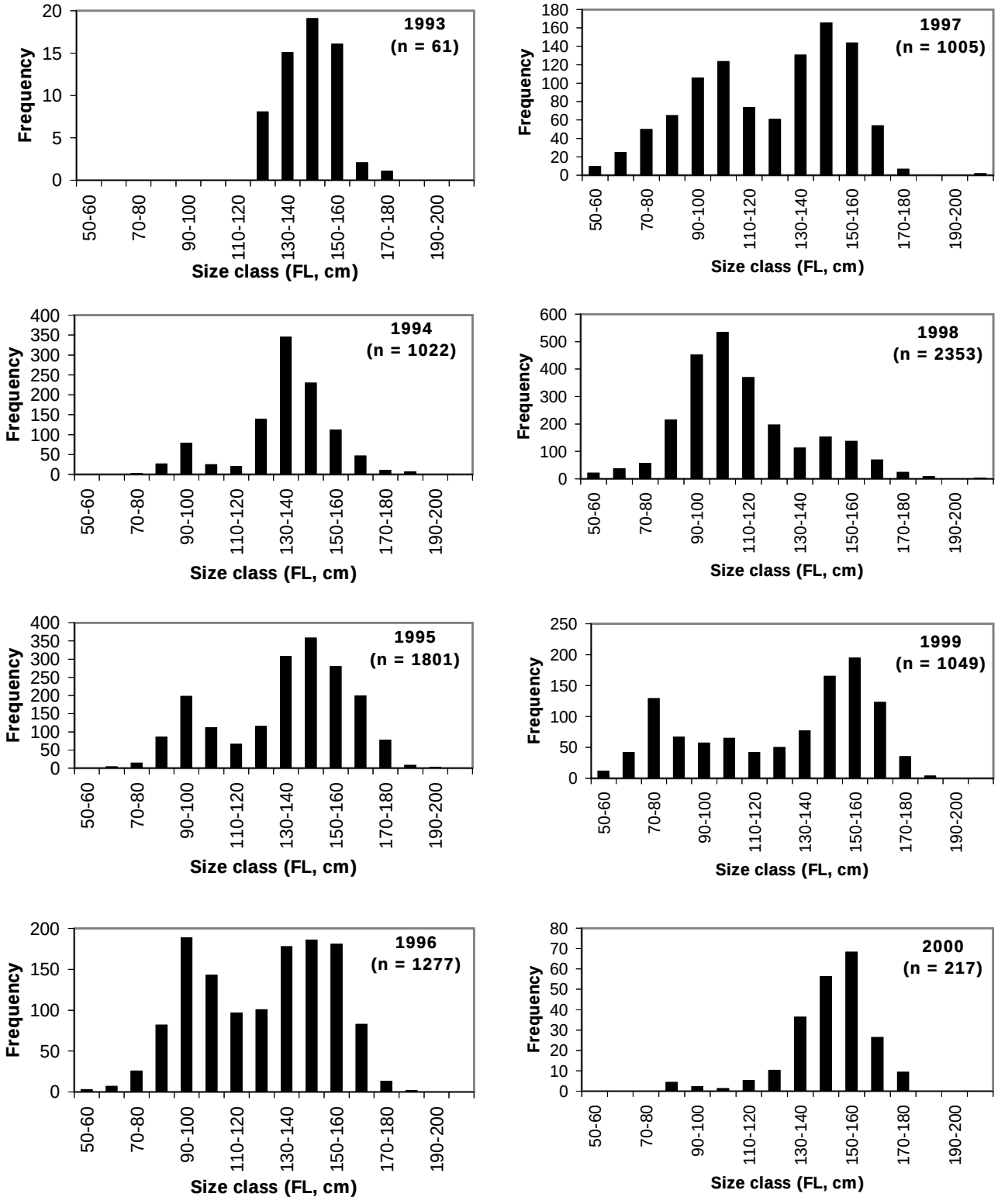


Figure 6: Length-frequency distributions for sandbar sharks observed in the South Atlantic Region in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.

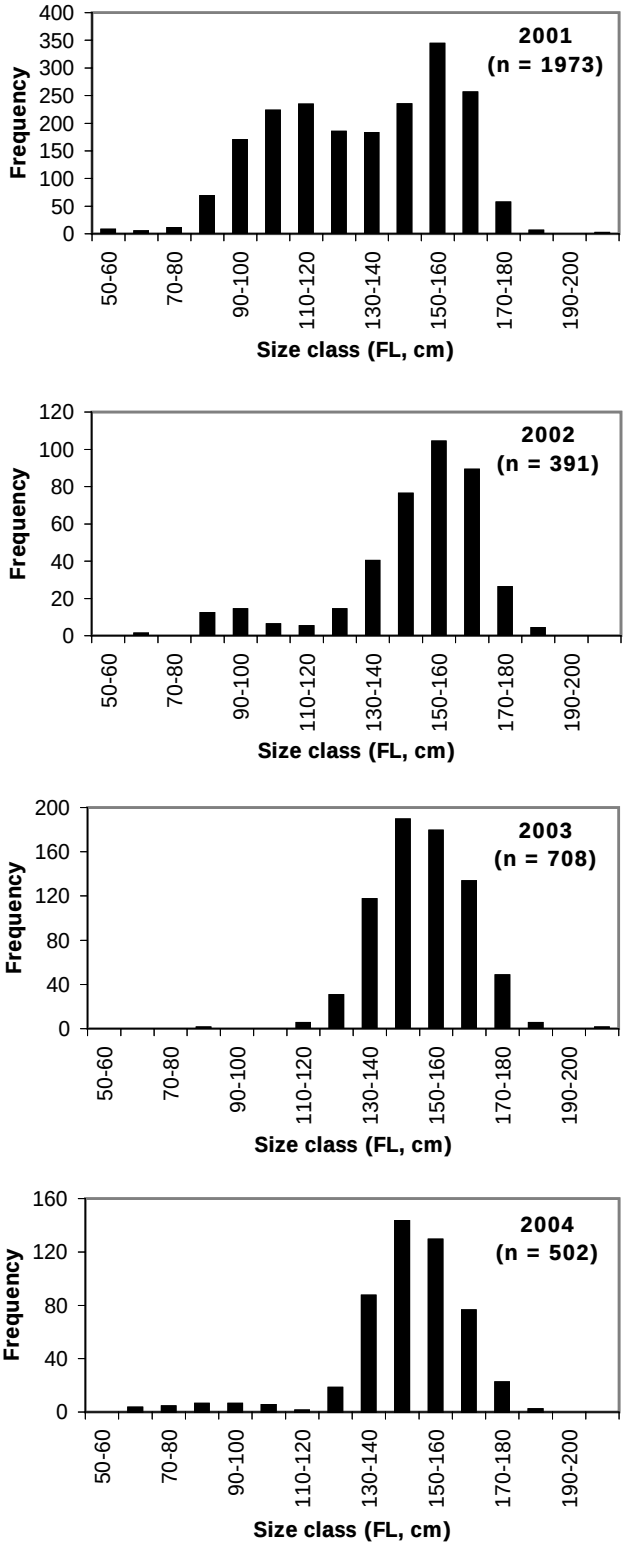


Figure 6 (cont.): Length-frequency distributions for sandbar sharks observed in the South Atlantic Region in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.

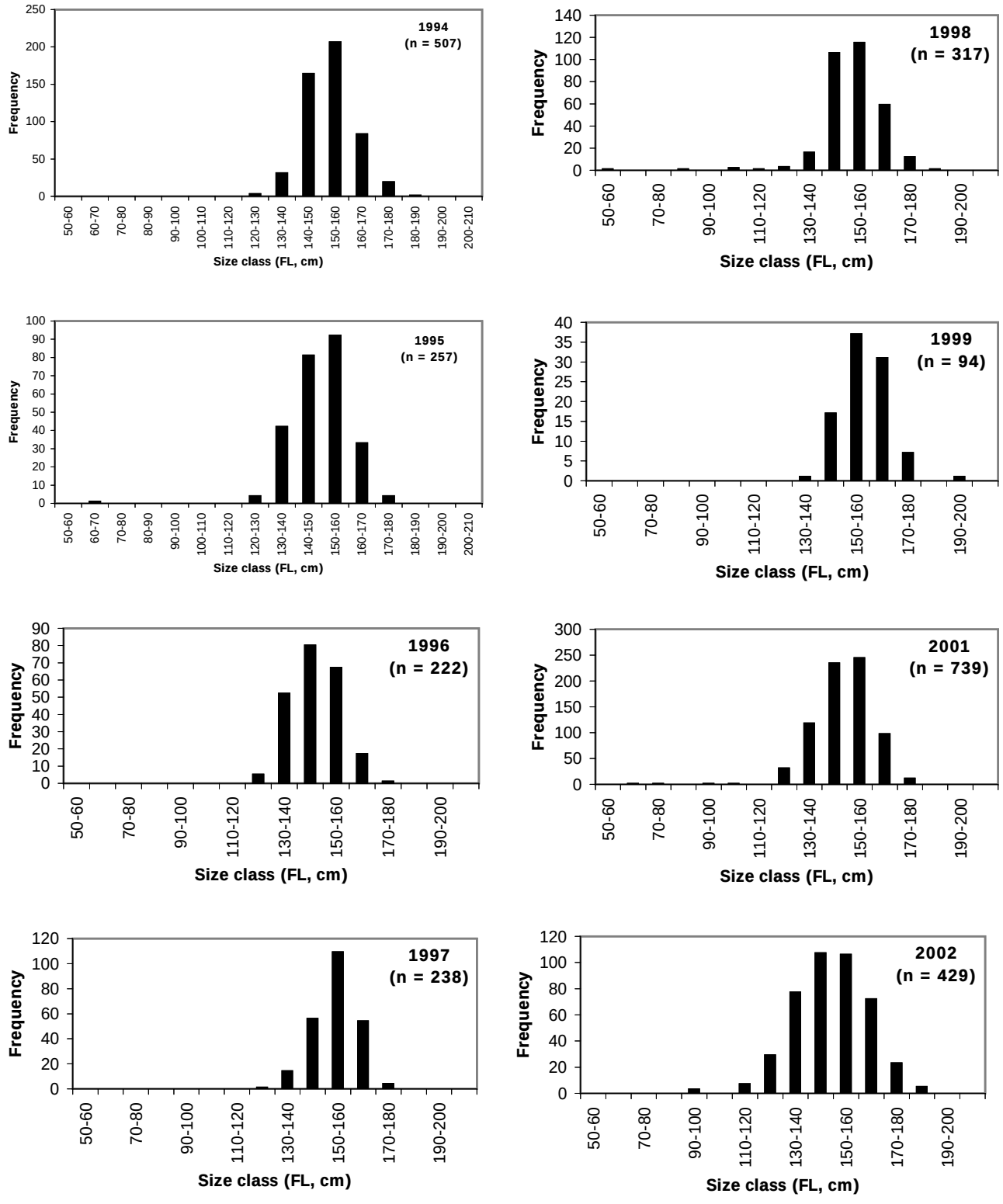
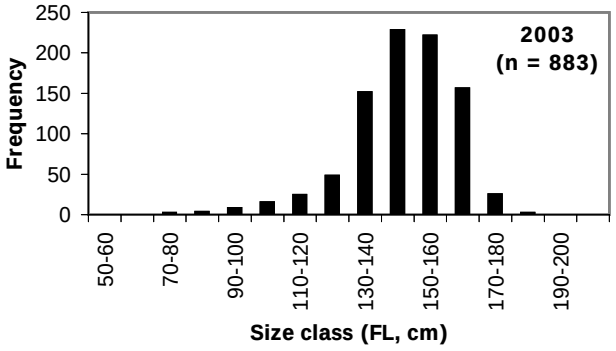


Figure 7: Length-frequency distributions for sandbar sharks observed in the Gulf of Mexico Region in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.



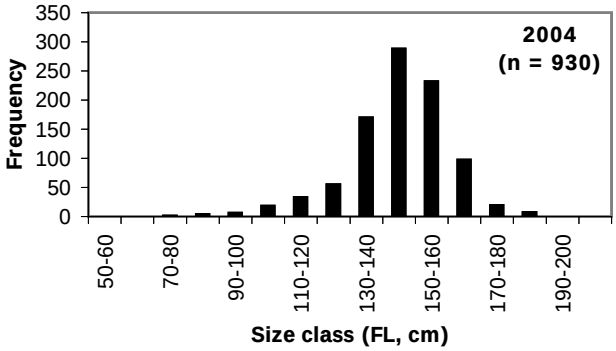


Figure 7 (cont.): Length-frequency distributions for sandbar sharks observed in the Gulf of Mexico Region in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.

Sandbar Shark
Mid-Atlantic Region
Shark Bottom Longline
Observer Program

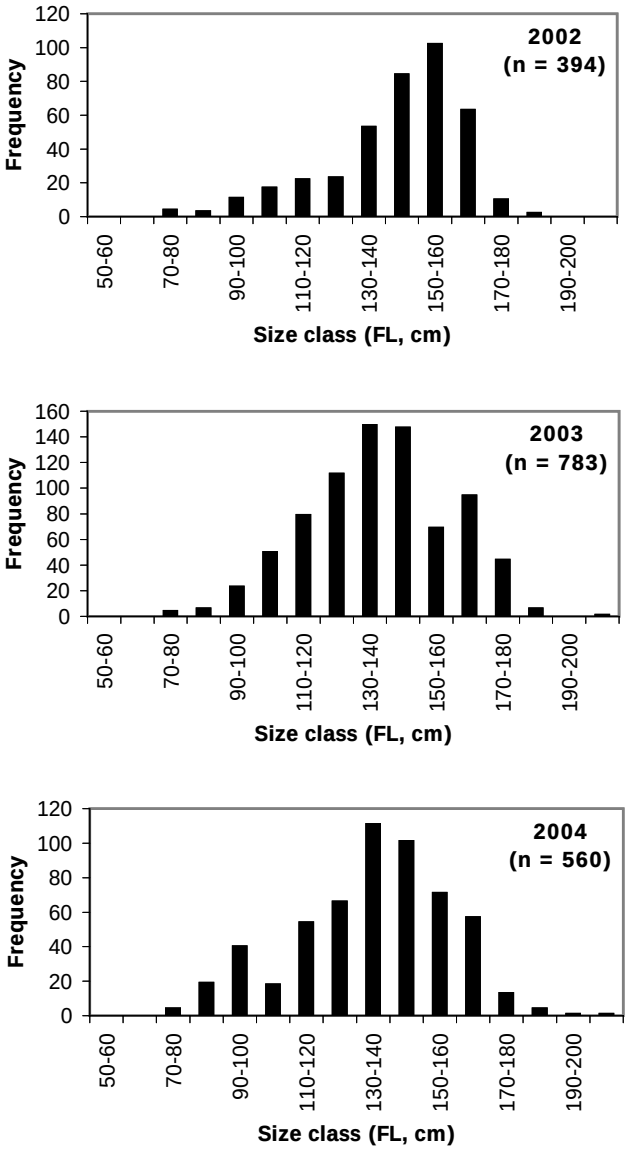


Figure 8: Length-frequency distributions for sandbar sharks observed in the Mid-Atlantic Bight in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.

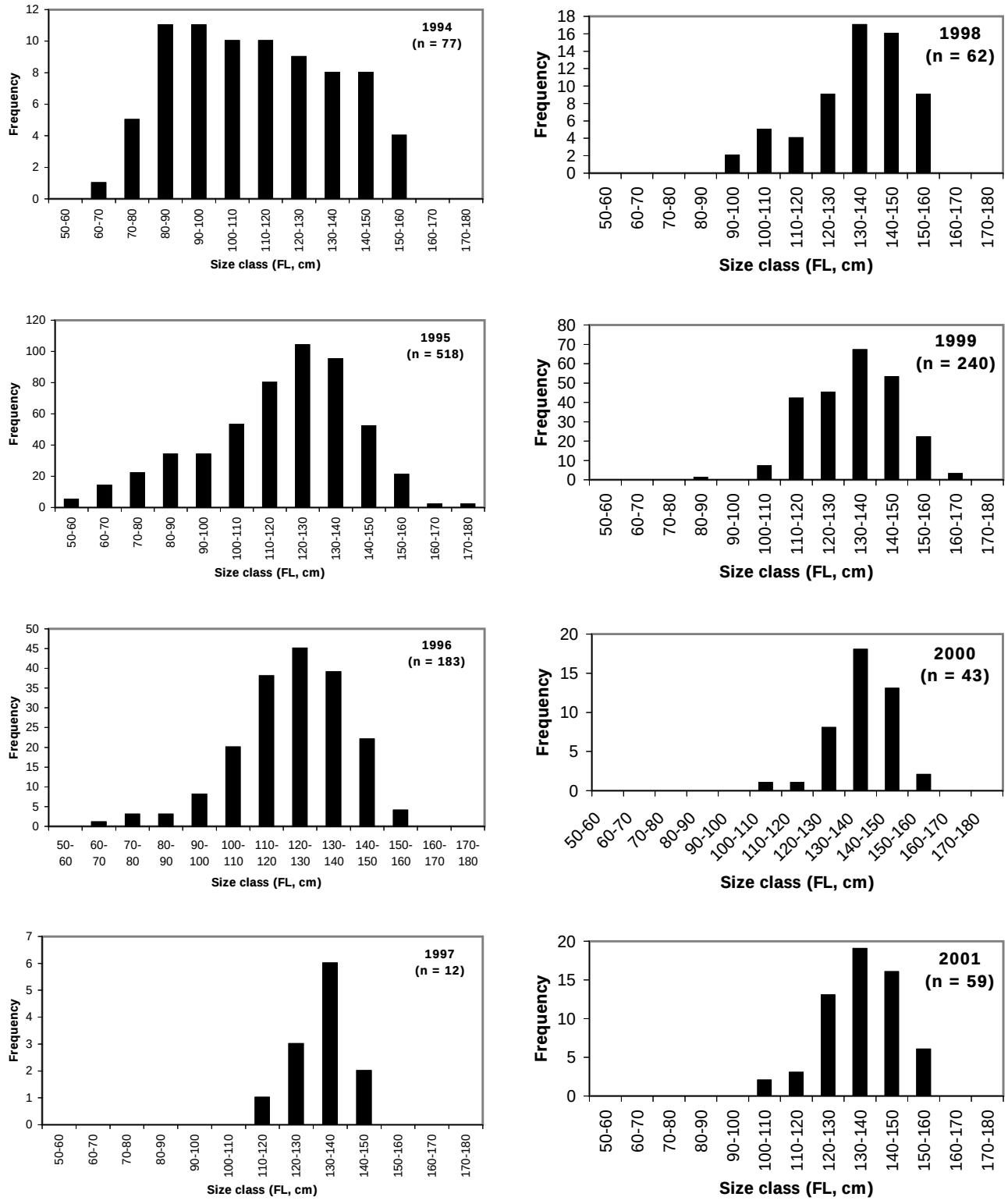
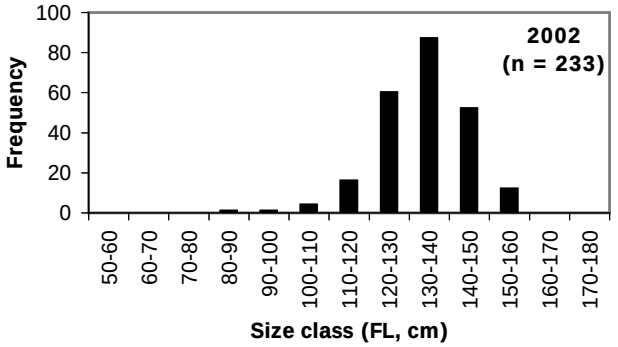
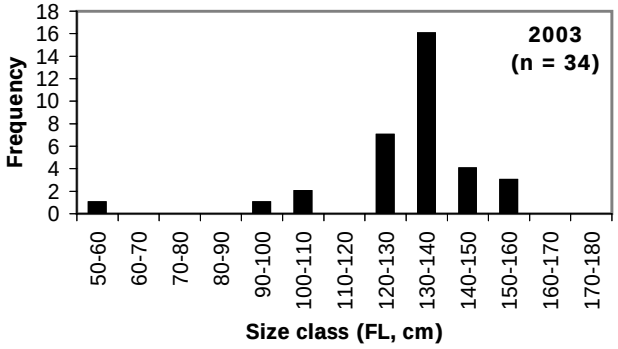


Figure 9: Length-frequency distributions for blacktip sharks observed in the South Atlantic Region in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.





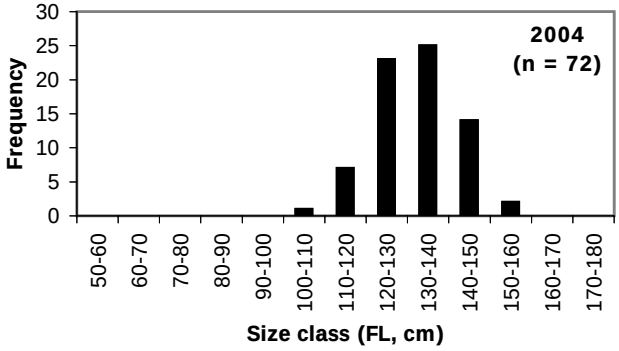


Figure 9 (cont.): Length-frequency distributions for blacktip sharks observed in the South Atlantic Region in the Shark Bottom Longline Observer Program. Note the different scales along the y-axis.

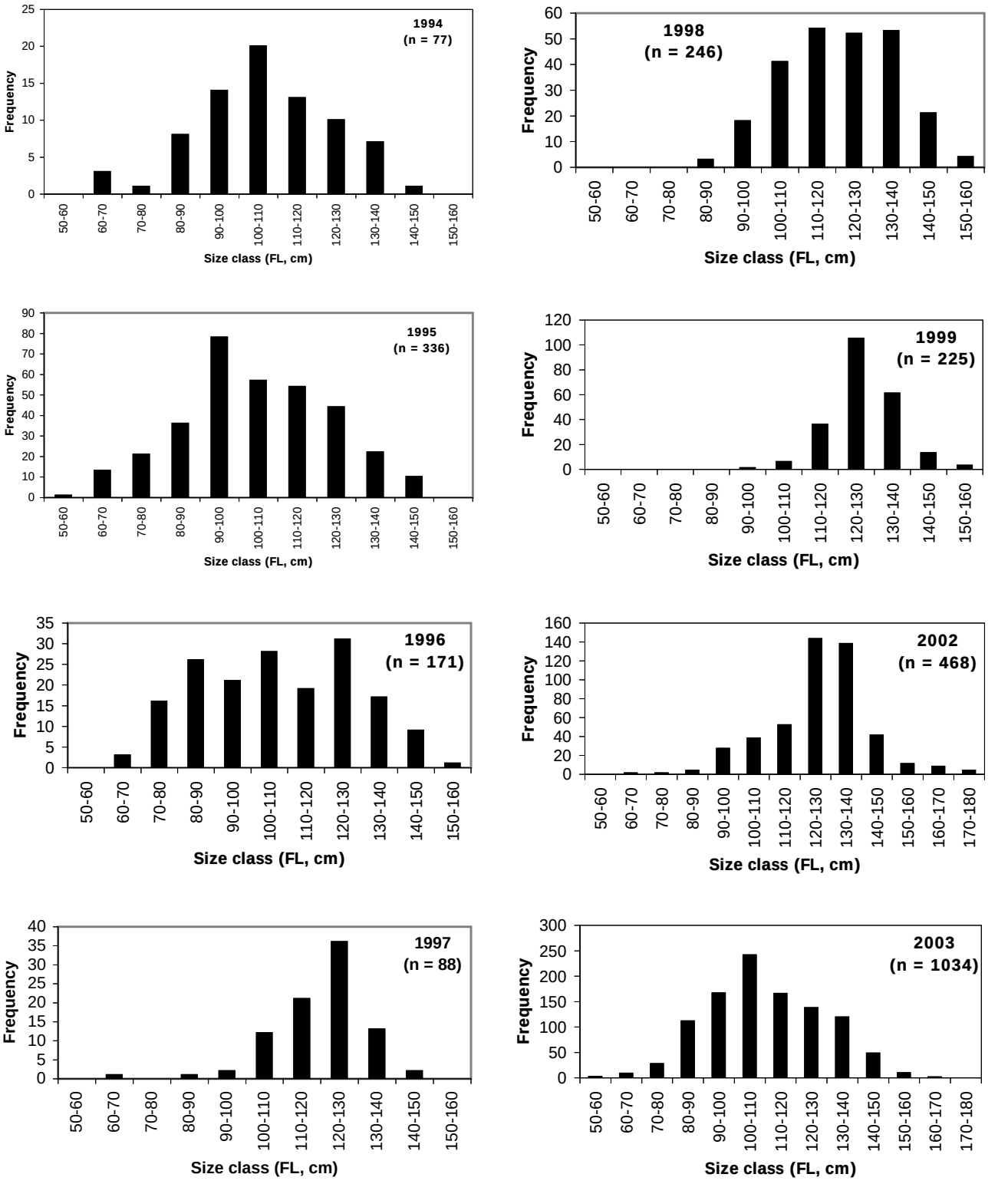


Figure 10: Length-frequency distributions for blacktip sharks observed in the Gulf of Mexico Region in the Shark Bottom Longline Observer Program. Only years where at least five sharks were observed are included. Note the different scales along the y-axis.

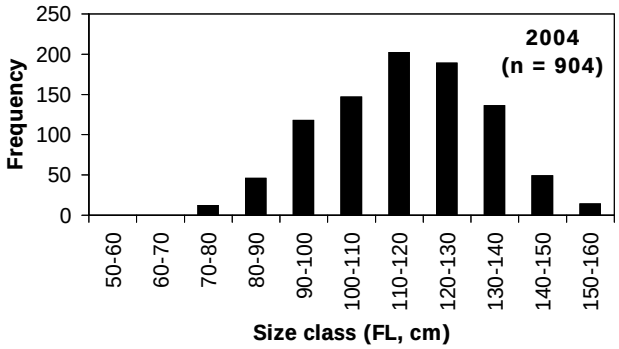


Figure 10 (cont.): Length-frequency distributions for blacktip sharks observed in the Gulf of Mexico Region in the Shark Bottom Longline Observer Program. Only years where at least five sharks were observed are included. Note the different scales along the y-axis.

Blacktip Shark
Mid-Atlantic Region
Shark Bottom Longline
Observer Program

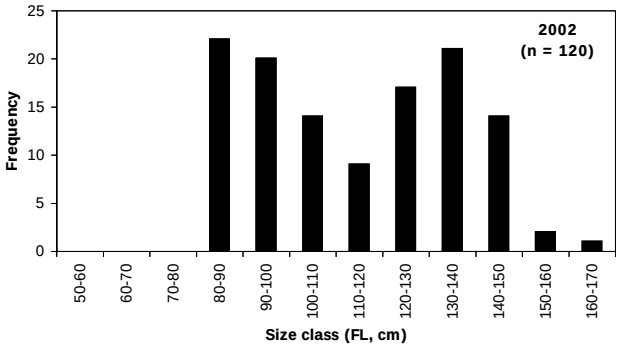


Figure 11: Length-frequency distributions for blacktip sharks observed in the Mid-Atlantic Region in the Shark Bottom Longline Observer Program.

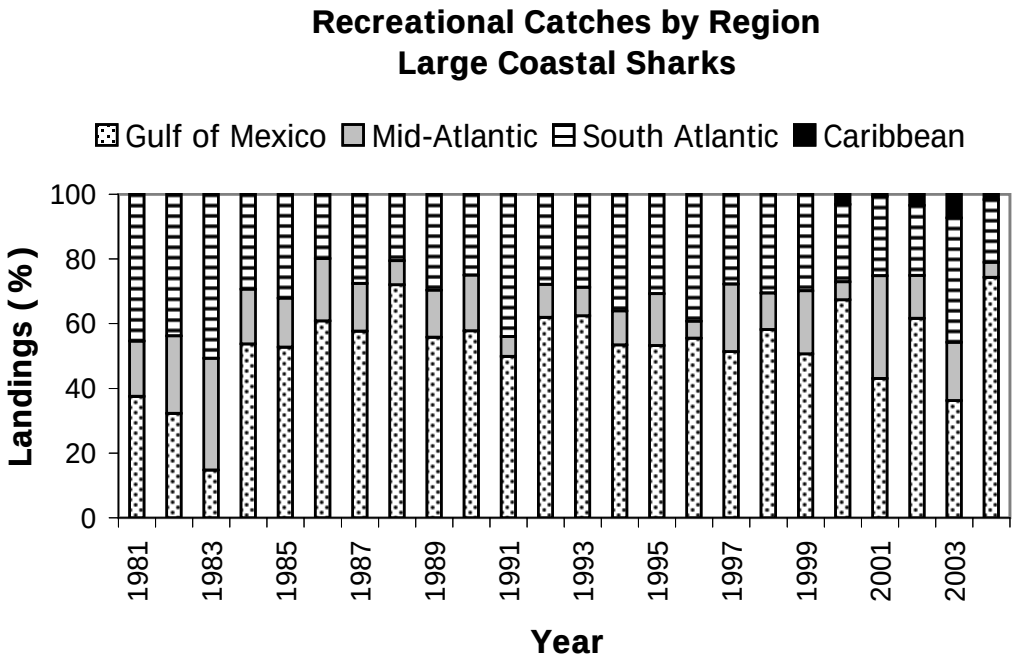
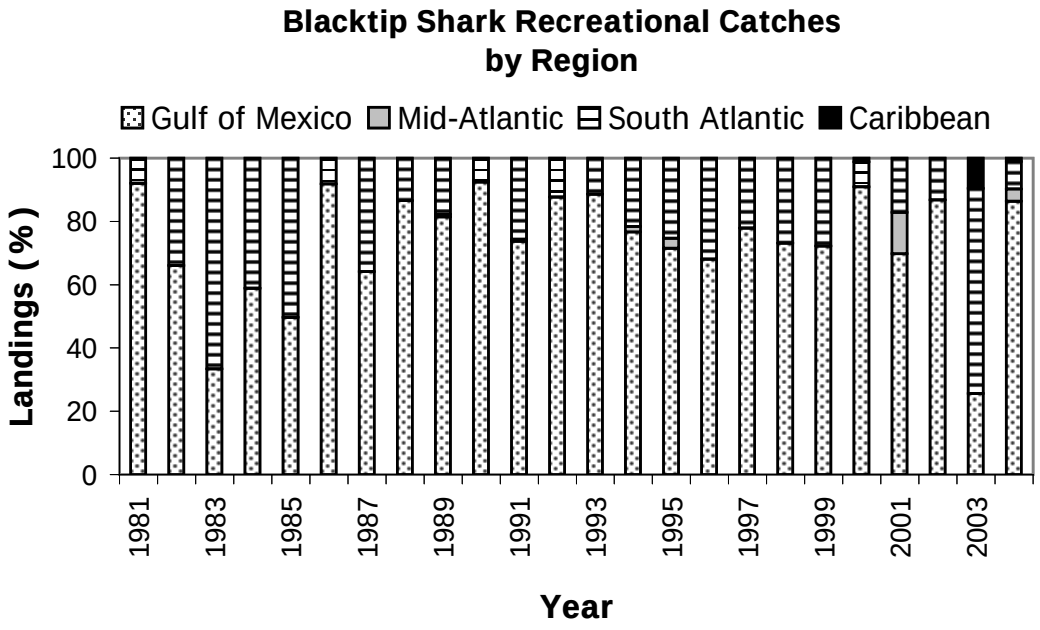


Figure 12. Recreational landings of the large coastal shark complex by region. Information for Caribbean (from MRFSS) added from 2000 on; large coastal sharks do not include prohibited species (previously identified as LCS) from 2000 on.



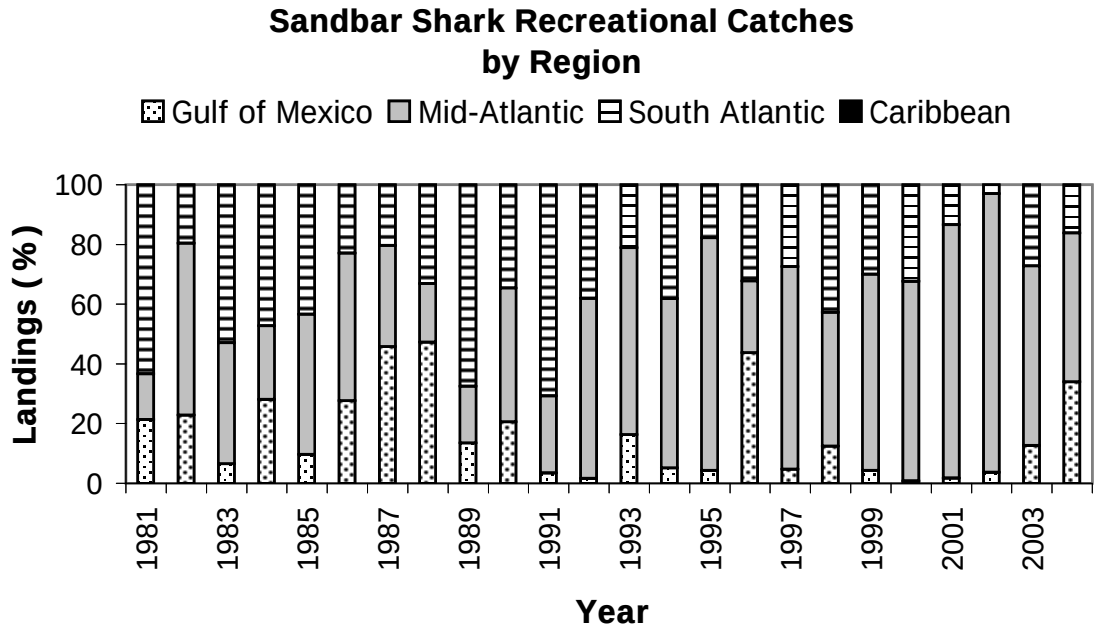


Figure 13. Recreational landings of blacktip and sandbar sharks by region. Information for Caribbean (from MRFSS) added from 2000 on.

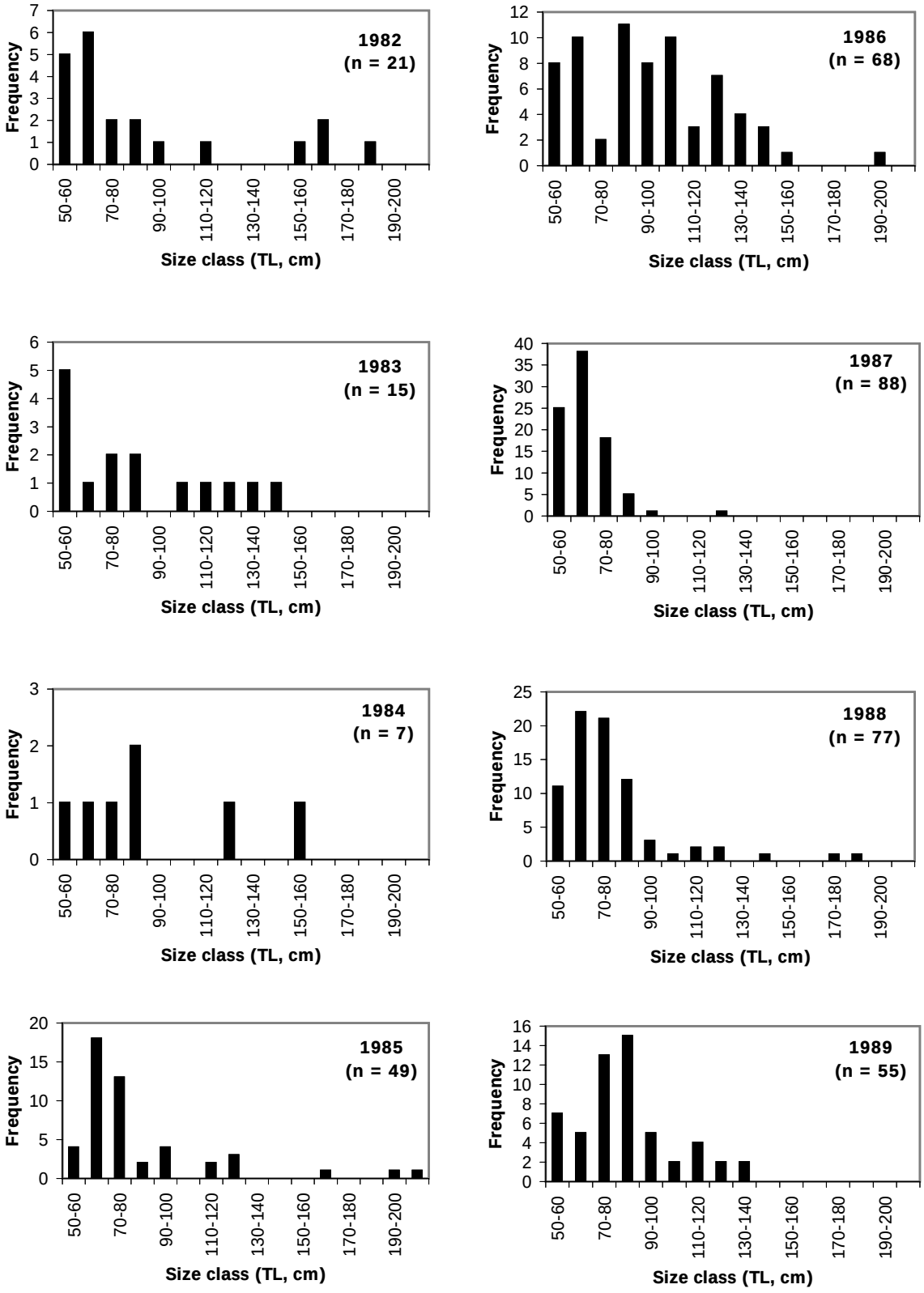


Figure 14: Length-frequency distributions for blacktip sharks observed in the MRFSS. Note the different scales along the y-axis.

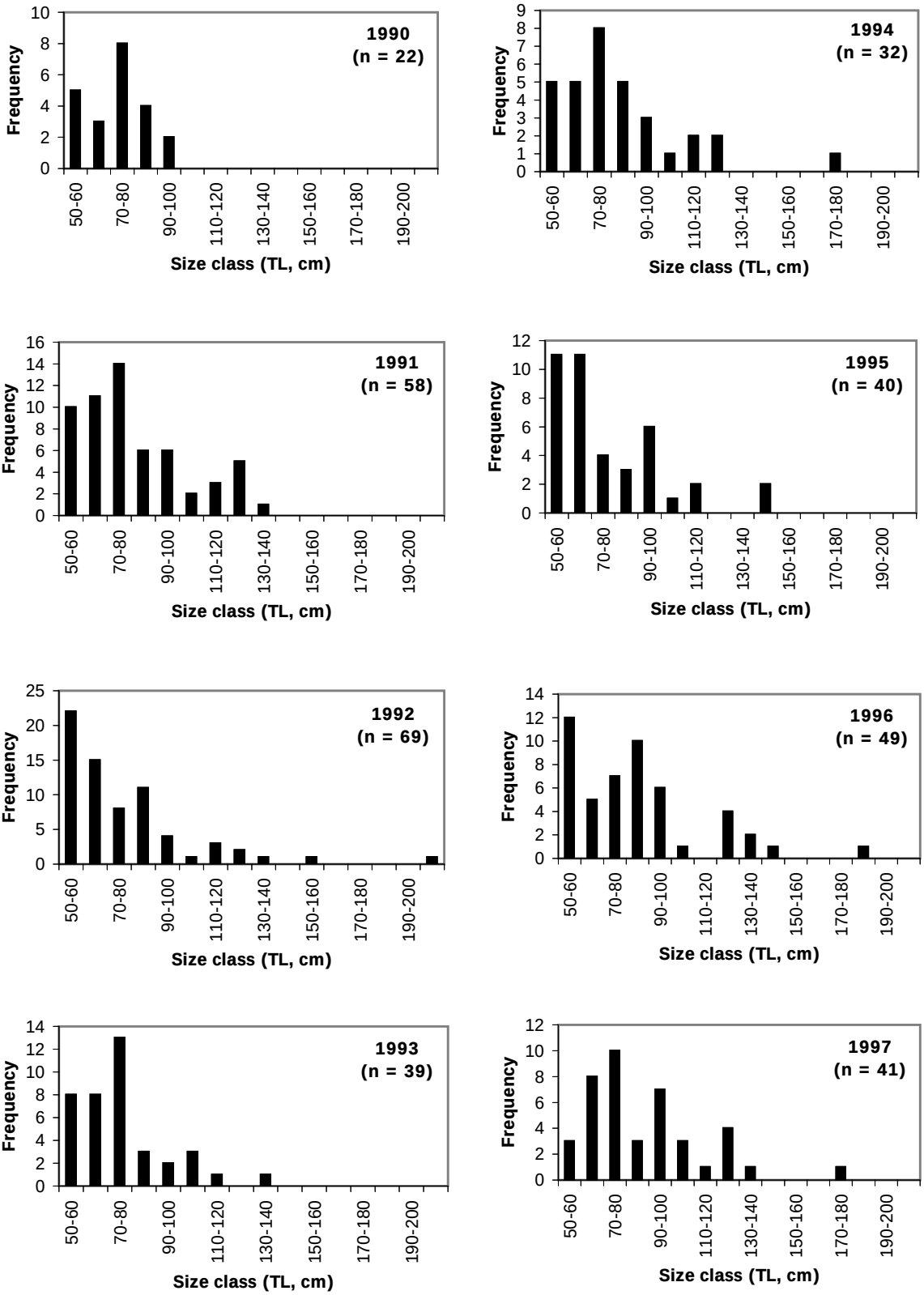


Figure 14 (cont.): Length-frequency distributions for blacktip sharks observed in the MRFSS. Note the different scales along the y-axis.

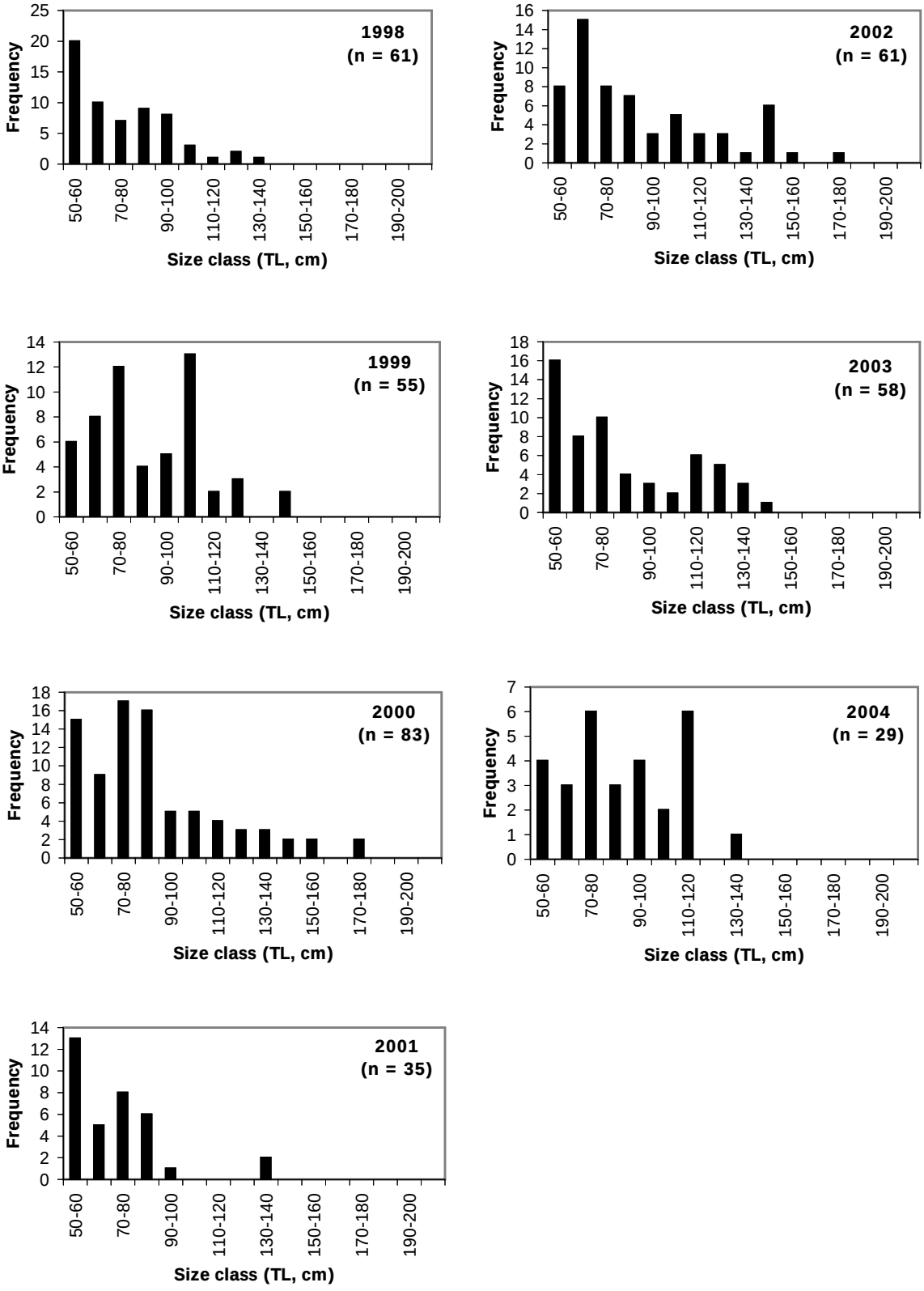


Figure 14 (cont.): Length-frequency distributions for blacktip sharks observed in the MRFSS. Note the different scales along the y-axis.

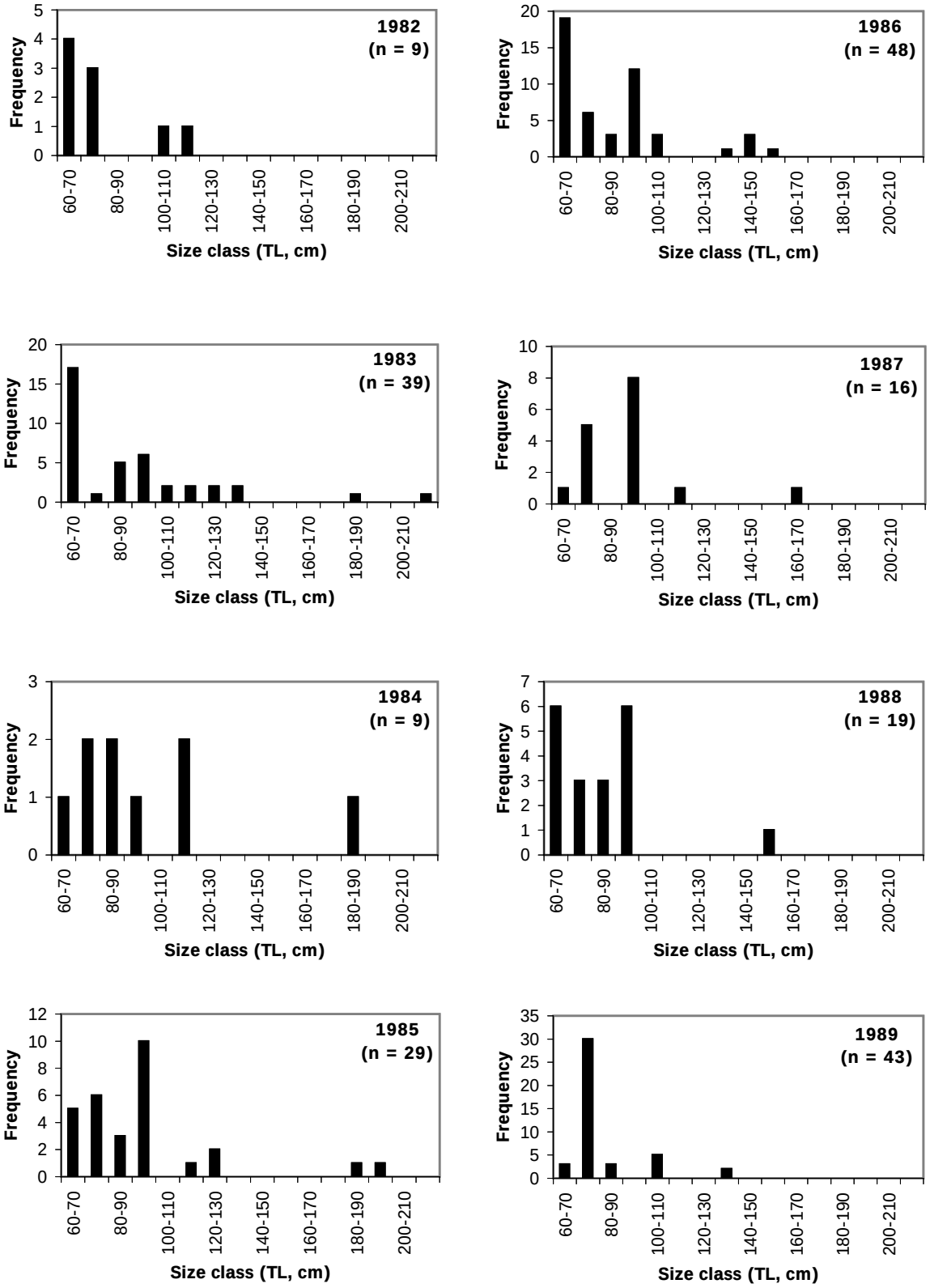


Figure 15: Length-frequency distributions for sandbar sharks observed in the MRFSS. Note the different scales along the y-axis.

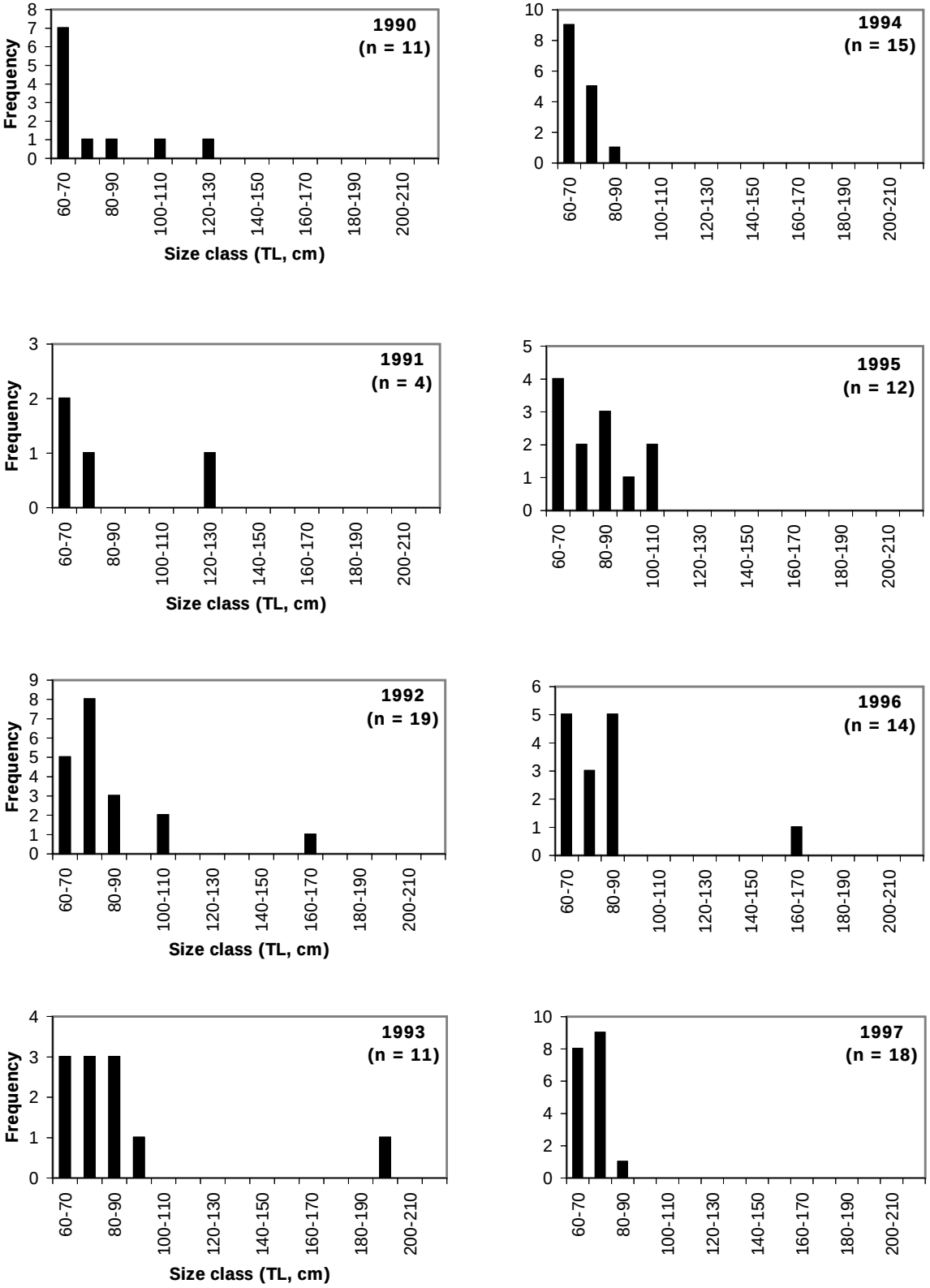


Figure 15 (cont.): Length-frequency distributions for sandbar sharks observed in the MRFSS. Note the different scales along the y-axis.

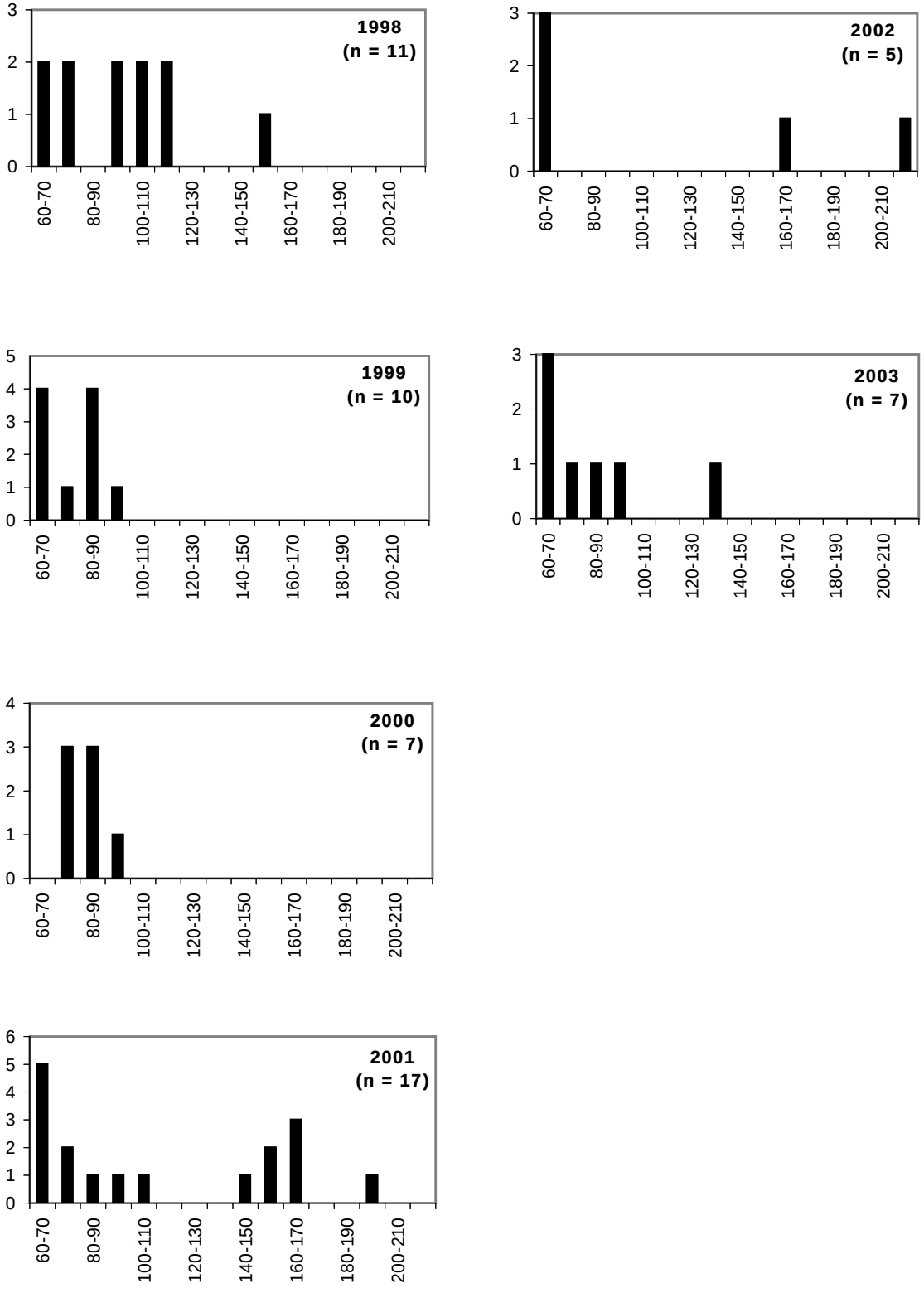


Figure 15 (cont.): Length-frequency distributions for sandbar sharks observed in the MRFSS. Note the different scales along the y-axis.

Blacktip Shark
Headboat Survey

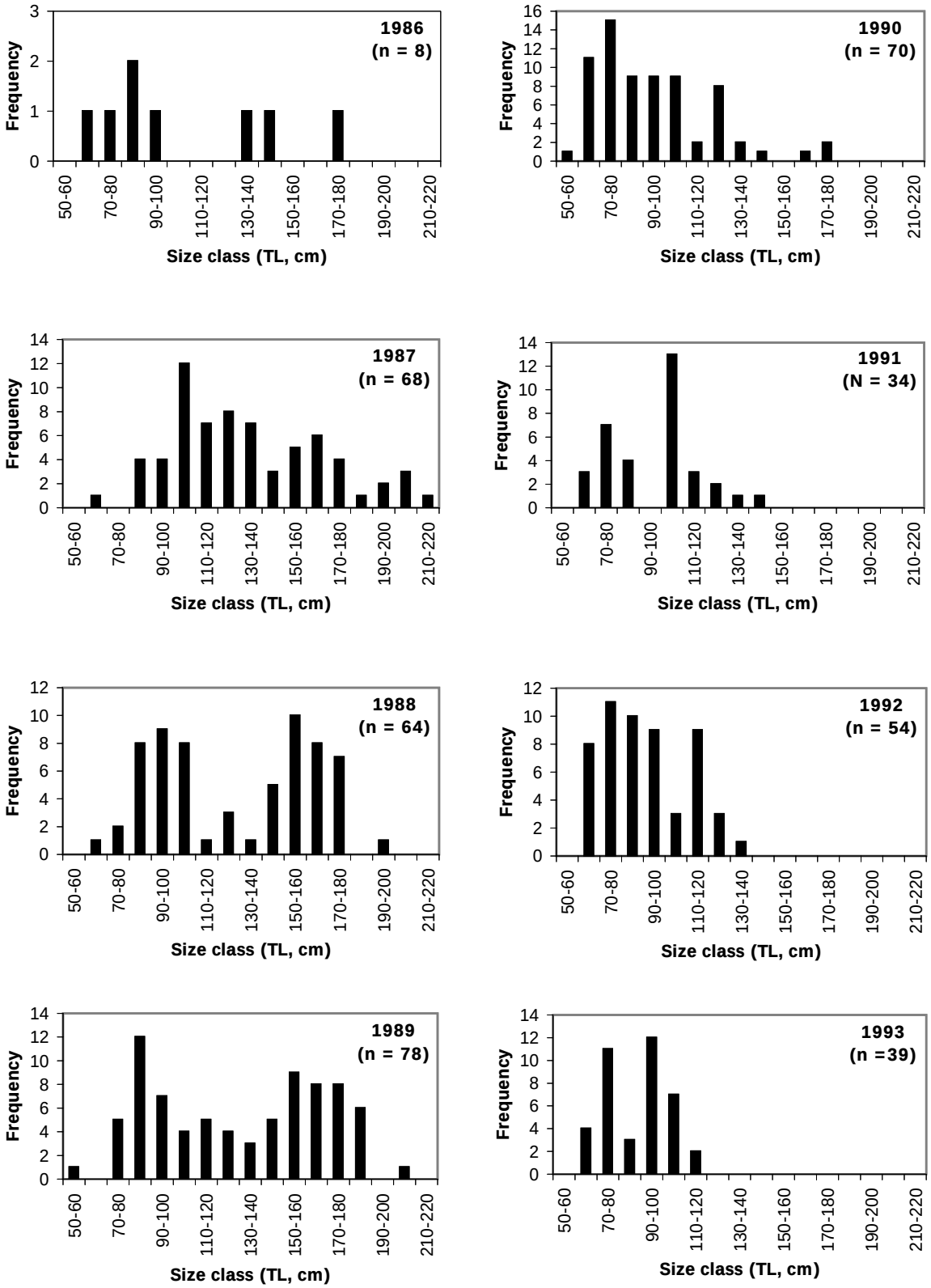


Figure 16: Length-frequency distributions for blacktip sharks observed in the Headboat Survey. Note the different scales along the y-axis.

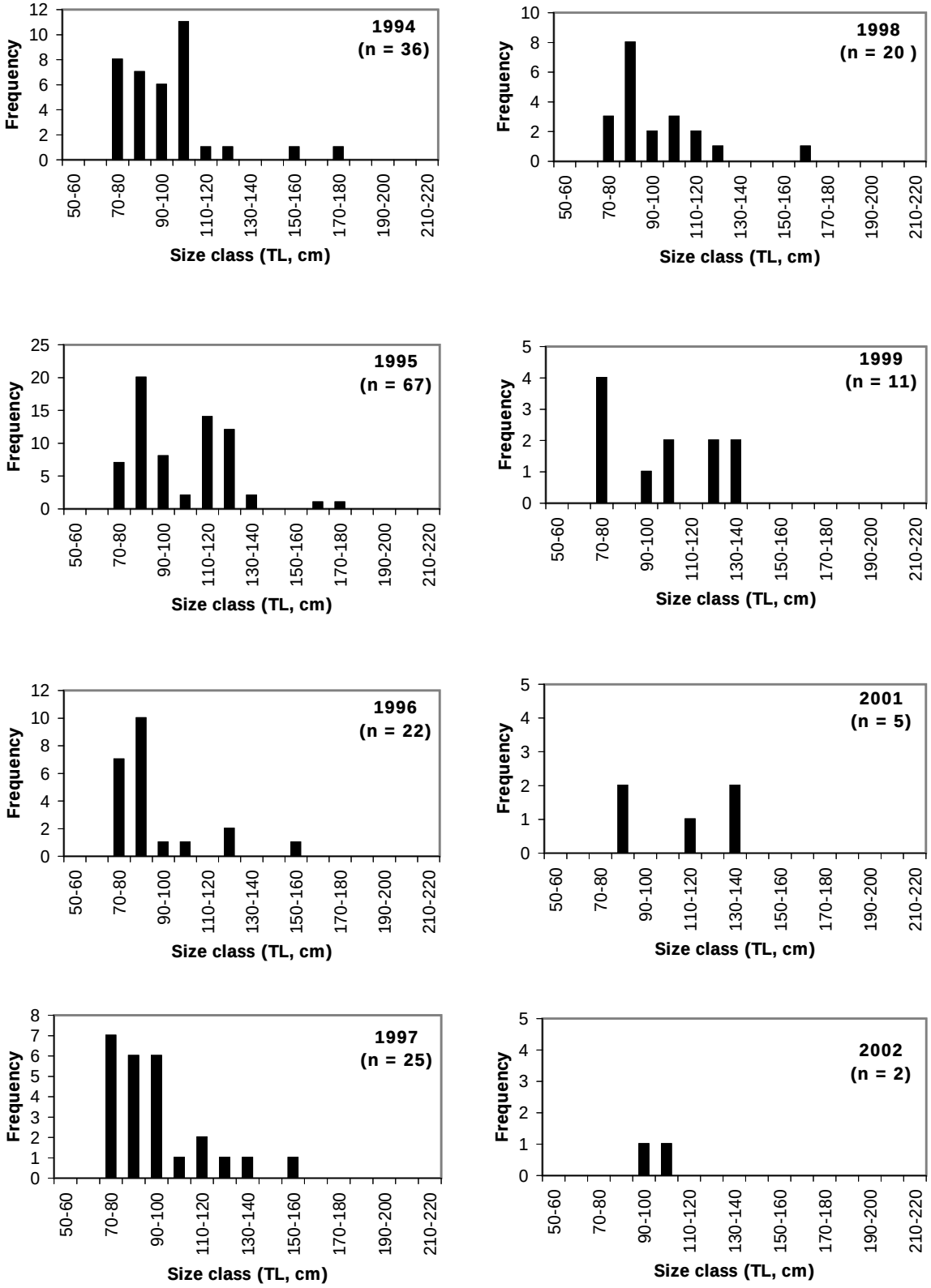


Figure 16 (cont.): Length-frequency distributions for blacktip sharks observed in the Headboat Survey. Note the different scales along the y-axis.

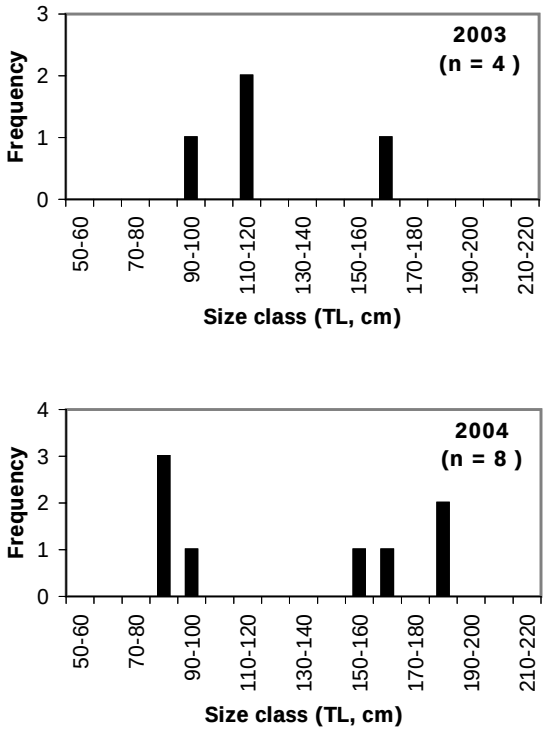


Figure 16 (cont.): Length-frequency distributions for blacktip sharks observed in the Headboat Survey. Note the different scales along the y-axis.

Texas Parks and Wildlife Department Survey

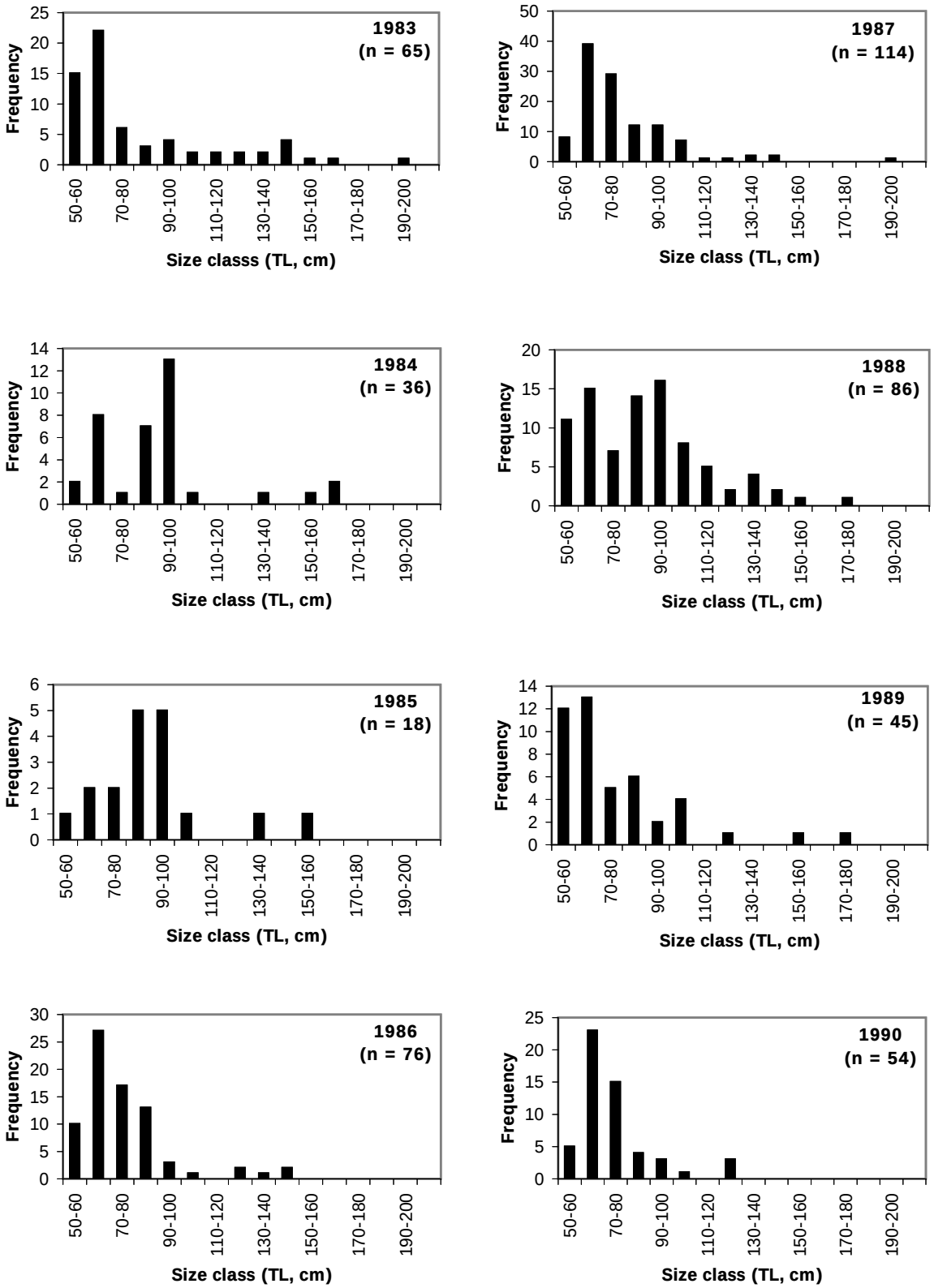


Figure 17: Length-frequency distributions for blacktip sharks observed in the Texas Parks and Wildlife Department Survey. Note the different scales along the y-axis.

Texas Parks and Wildlife Department Survey

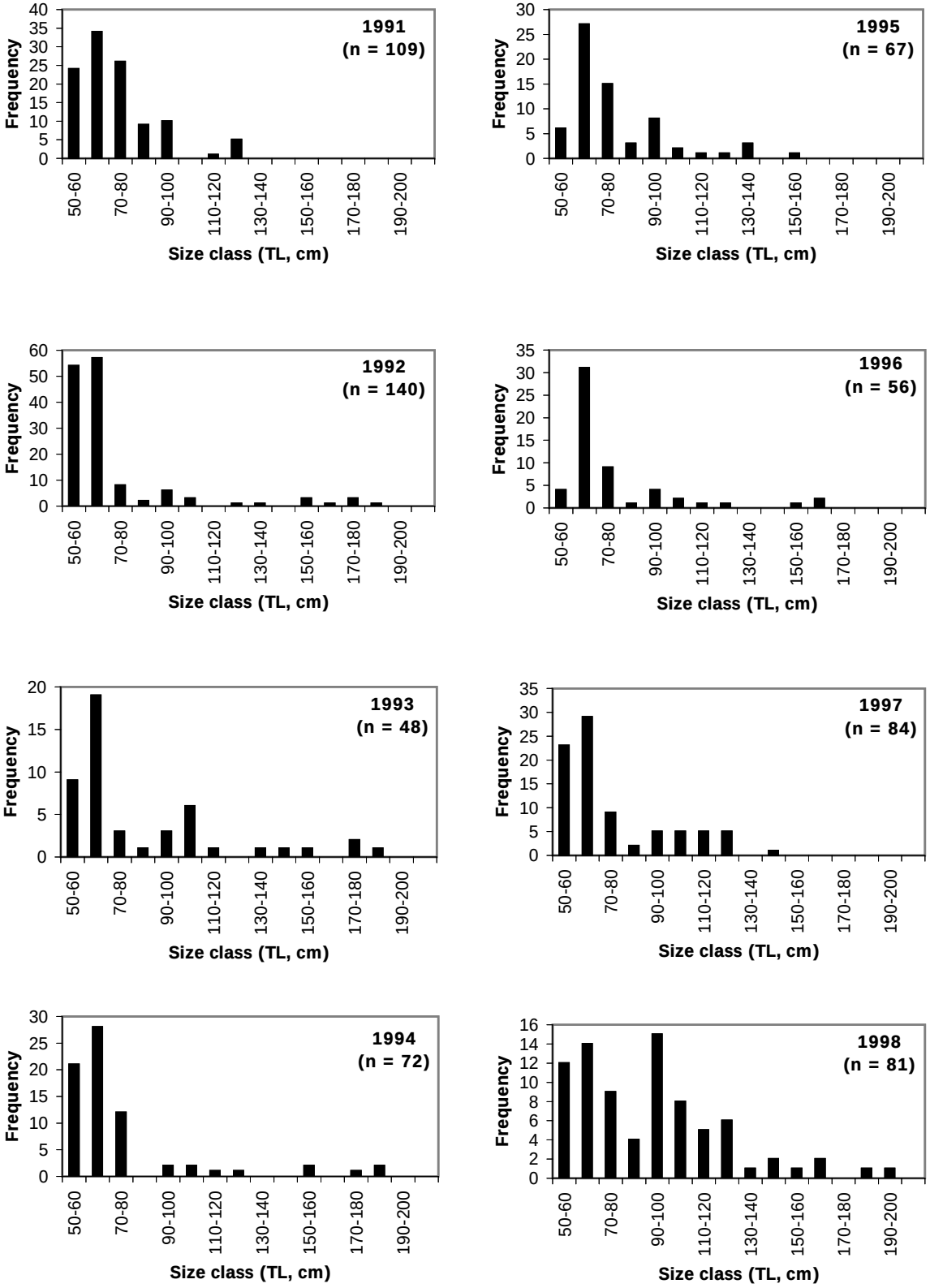
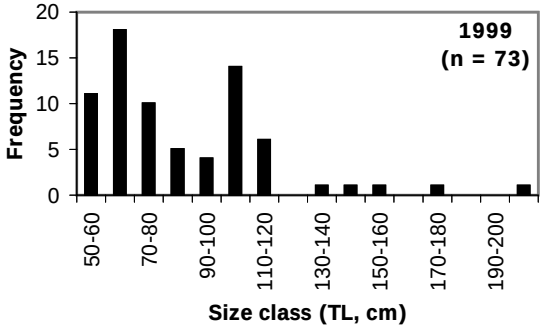
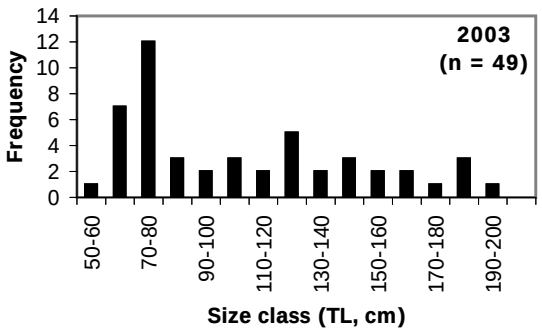
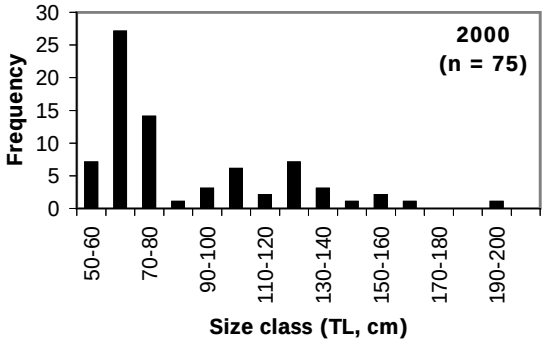
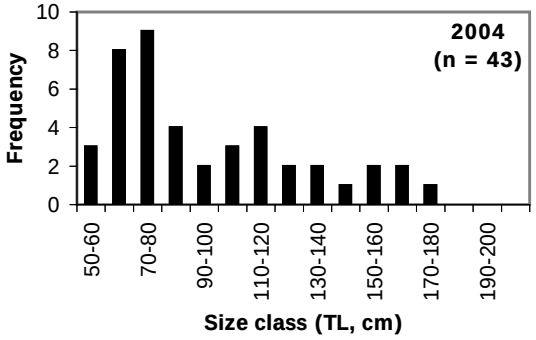


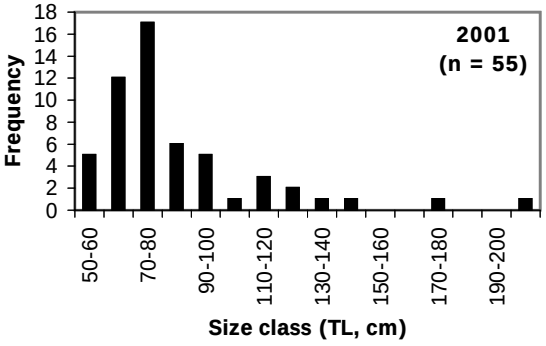
Figure 17 (cont): Length-frequency distributions for blacktip sharks observed in the Texas Parks and Wildlife Department Survey. Note the different scales along the y-axis.











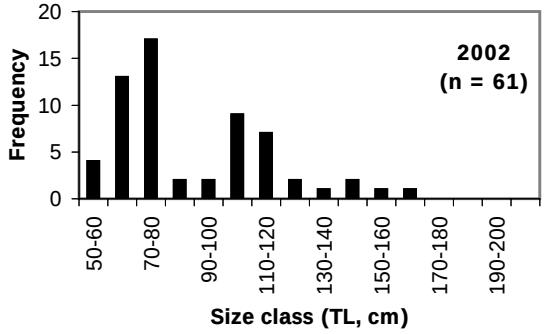
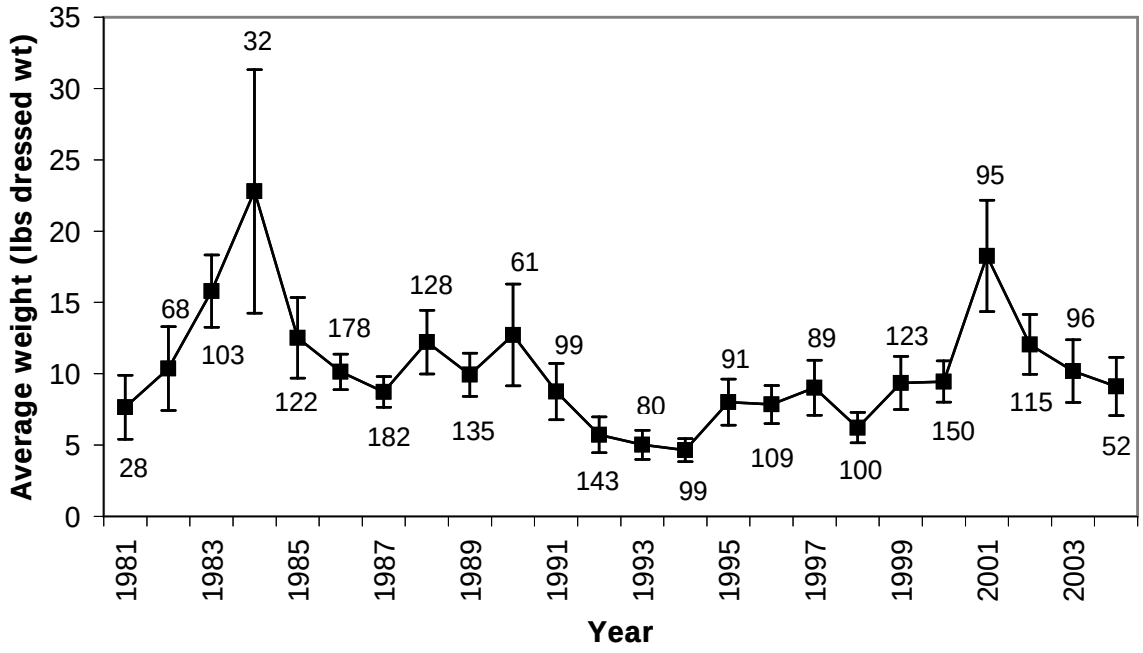


Figure 17 (cont): Length-frequency distributions for blacktip sharks observed in the Texas Parks and Wildlife Department Survey. Note the different scales along the y-axis.

A.



B.

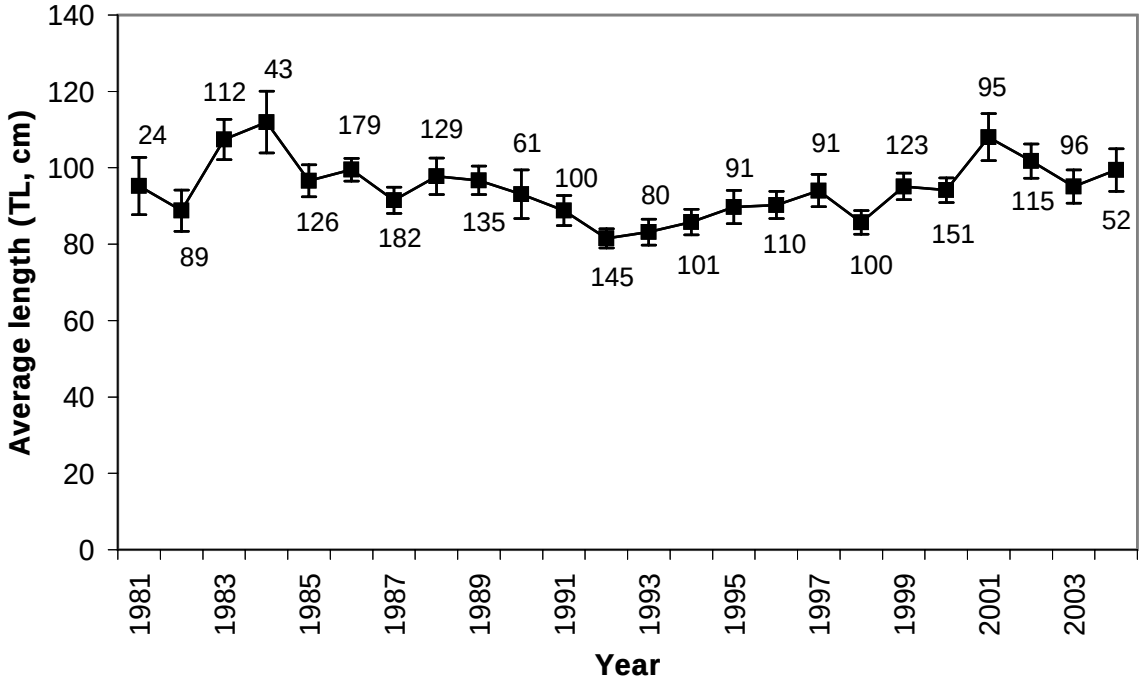
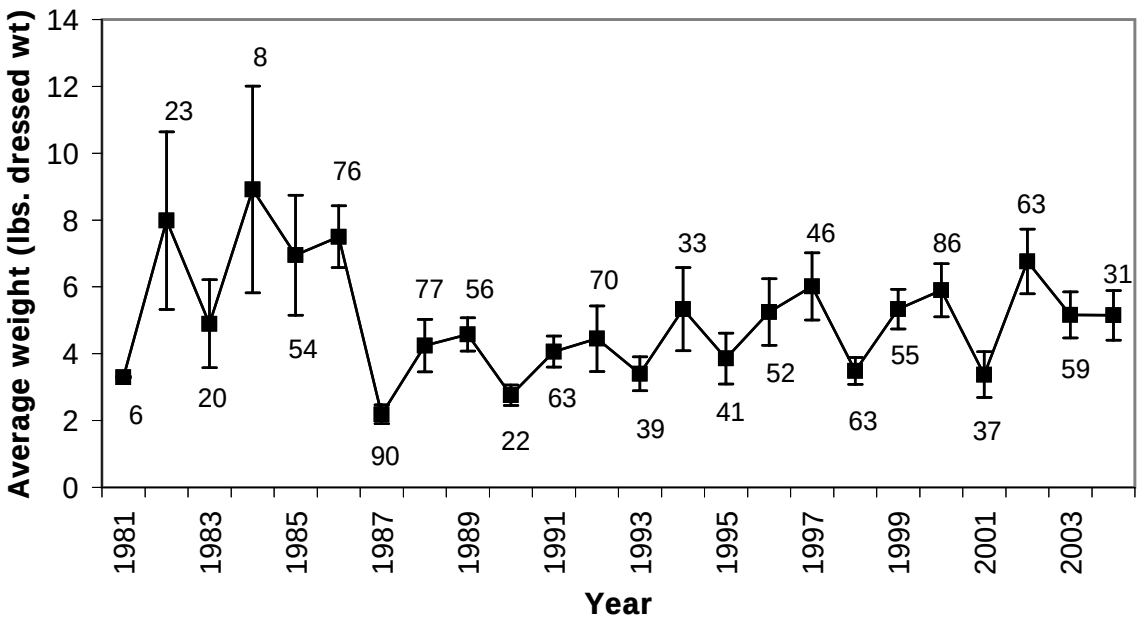


Figure 18. Average weight (A) and length (B) of large coastal sharks observed in the Marine Recreational Fishery Statistics Survey. Error bars represent +/- one error; sample sizes are indicated.

A.



B.

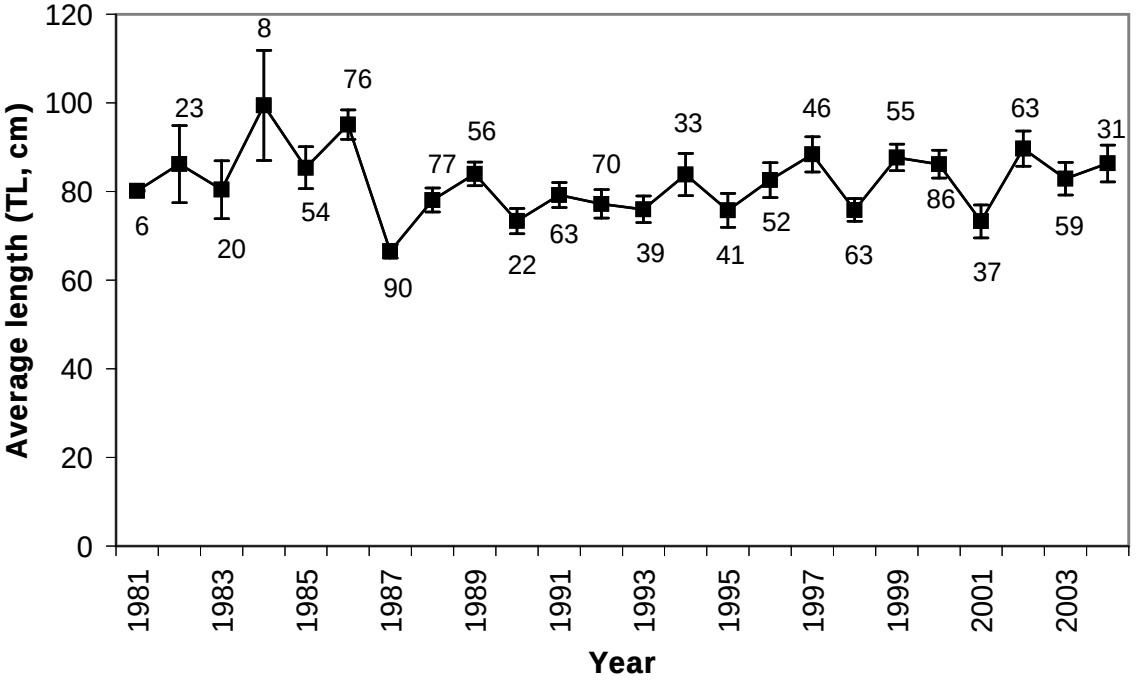
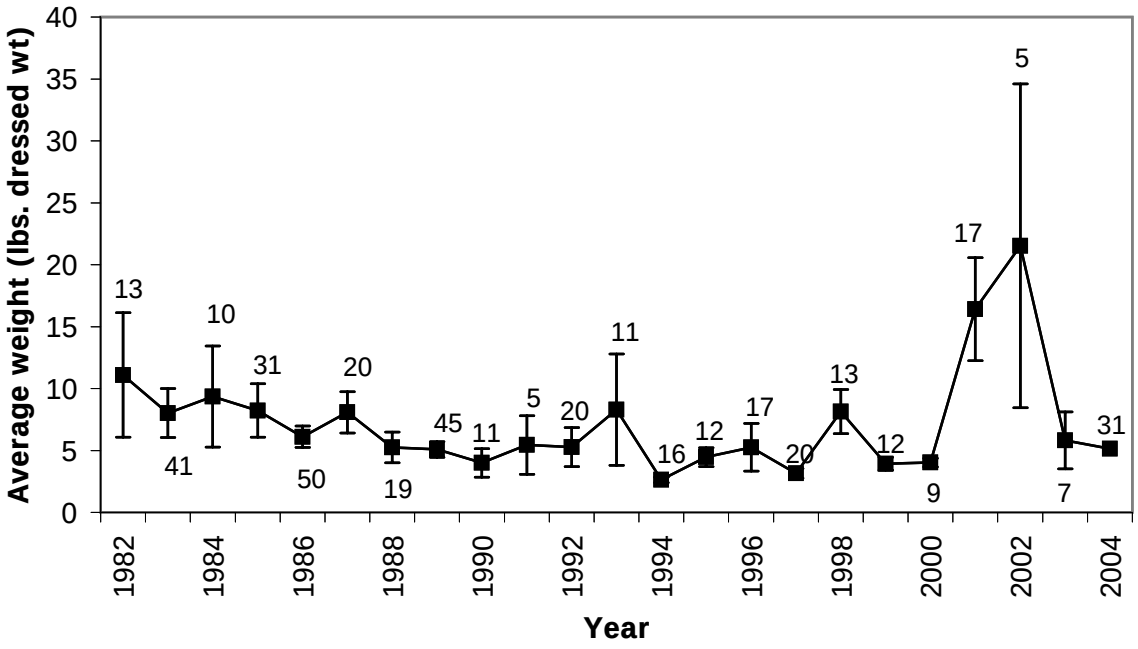


Figure 19. Average weight (A) and length (B) of blacktip sharks observed in the Marine Recreational Fishery Statistics Survey. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

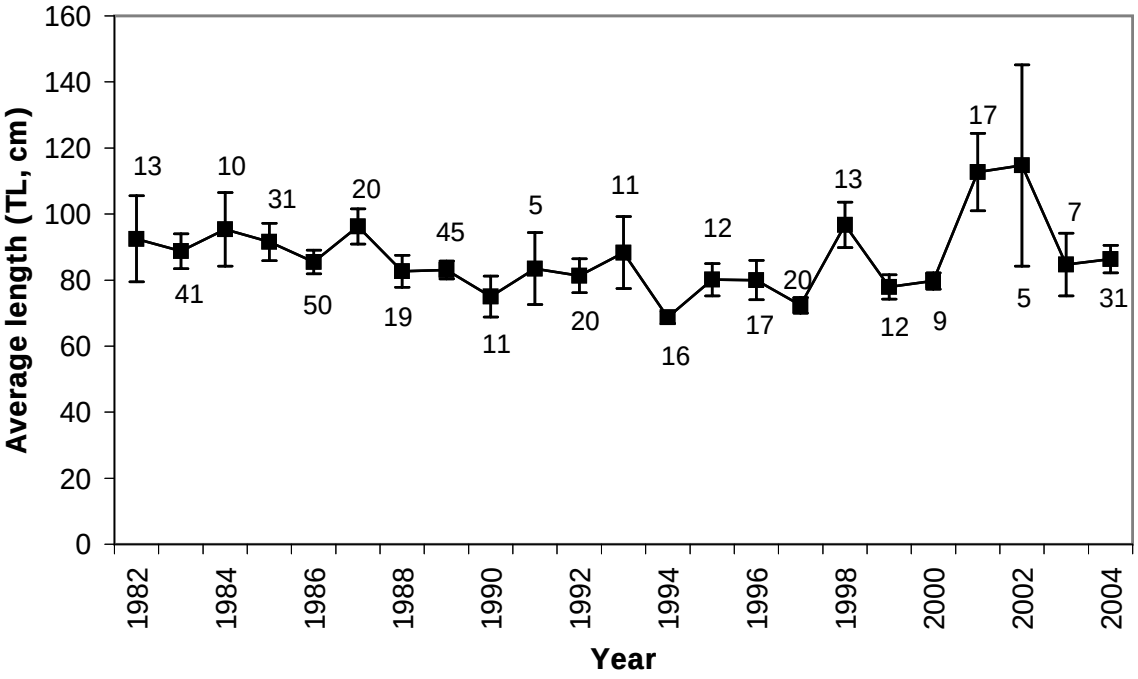
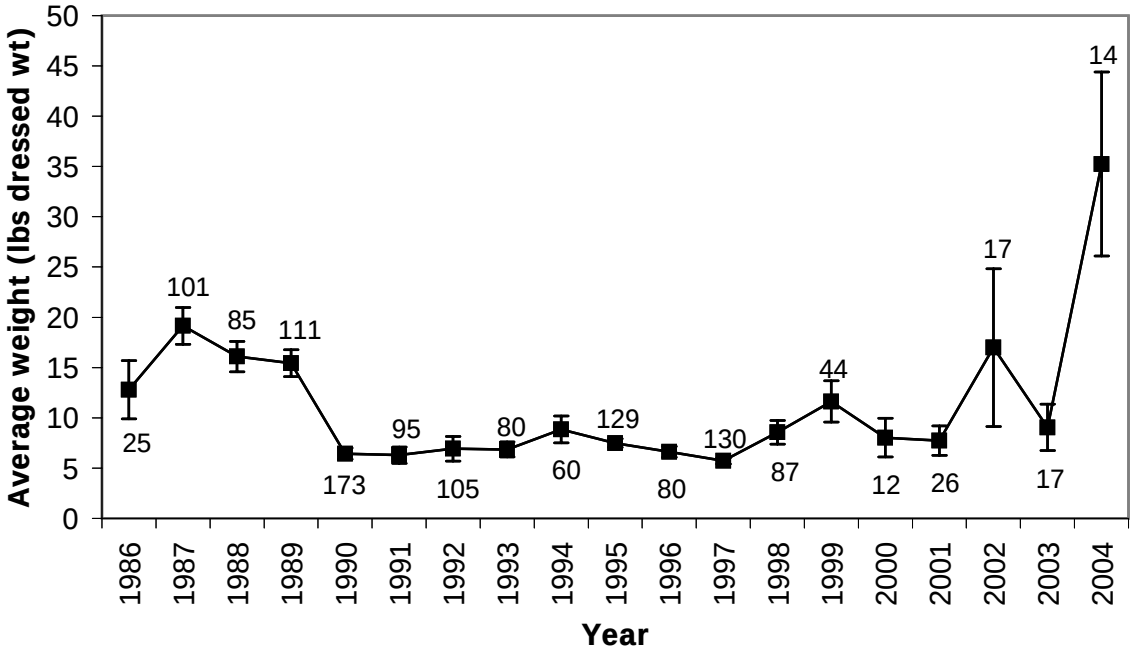


Figure 20. Average weight (A) and length (B) of sandbar sharks observed in the Marine Recreational Fishery Statistics Survey. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

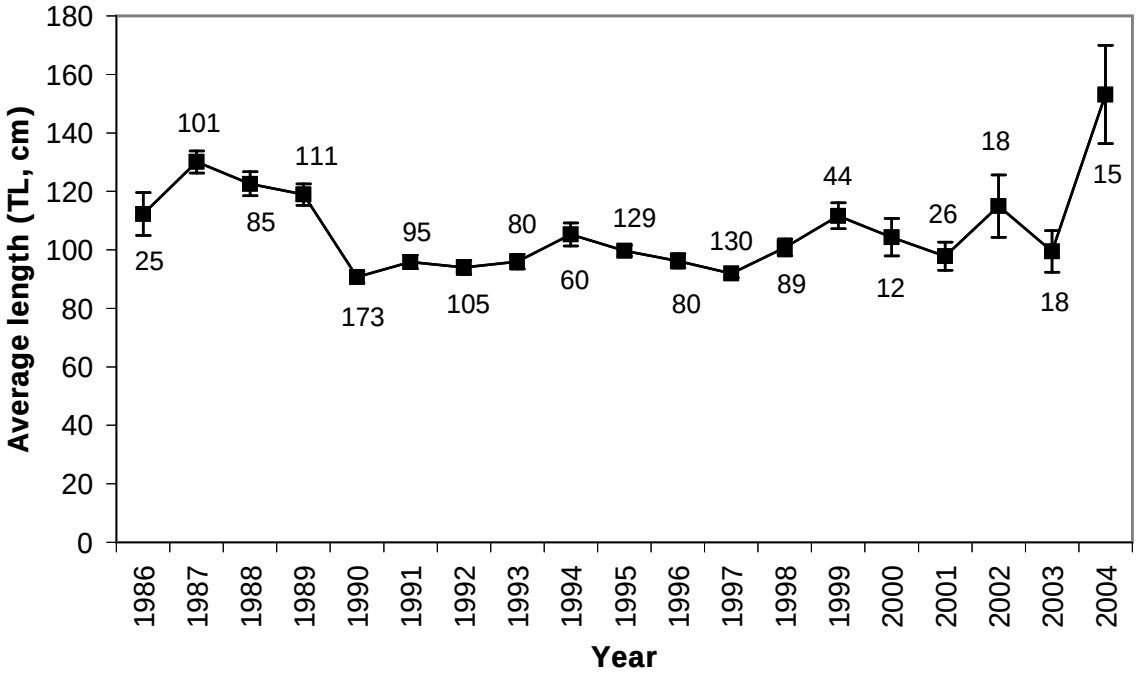
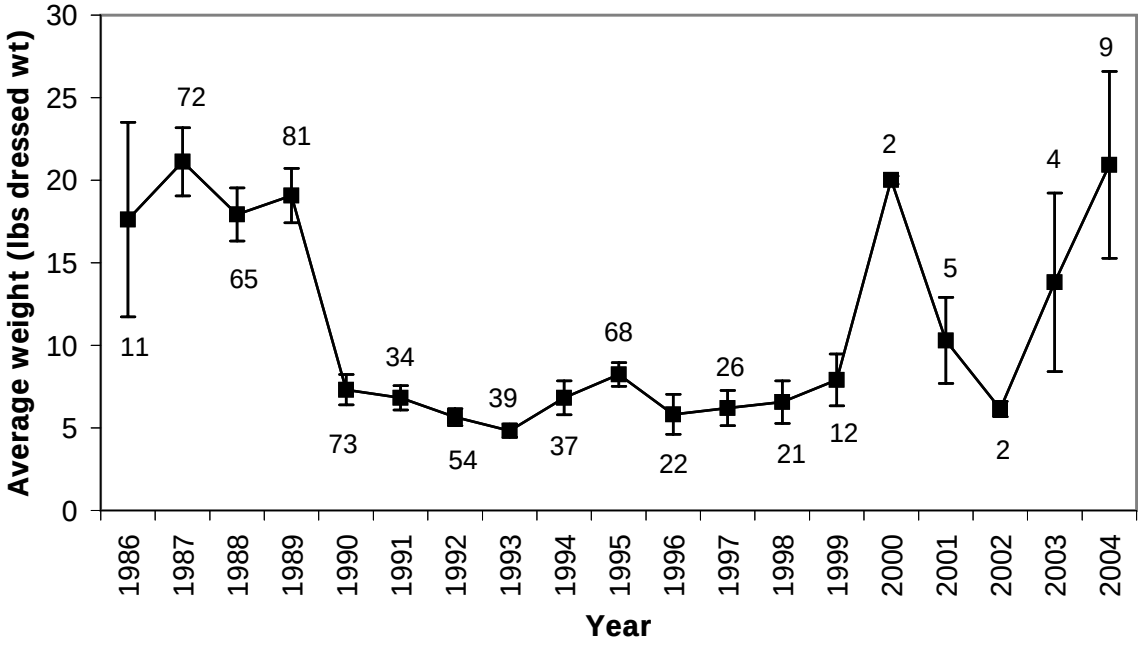


Figure 21. Average weight (A) and length (B) of large coastal sharks observed in the Headboat Survey. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

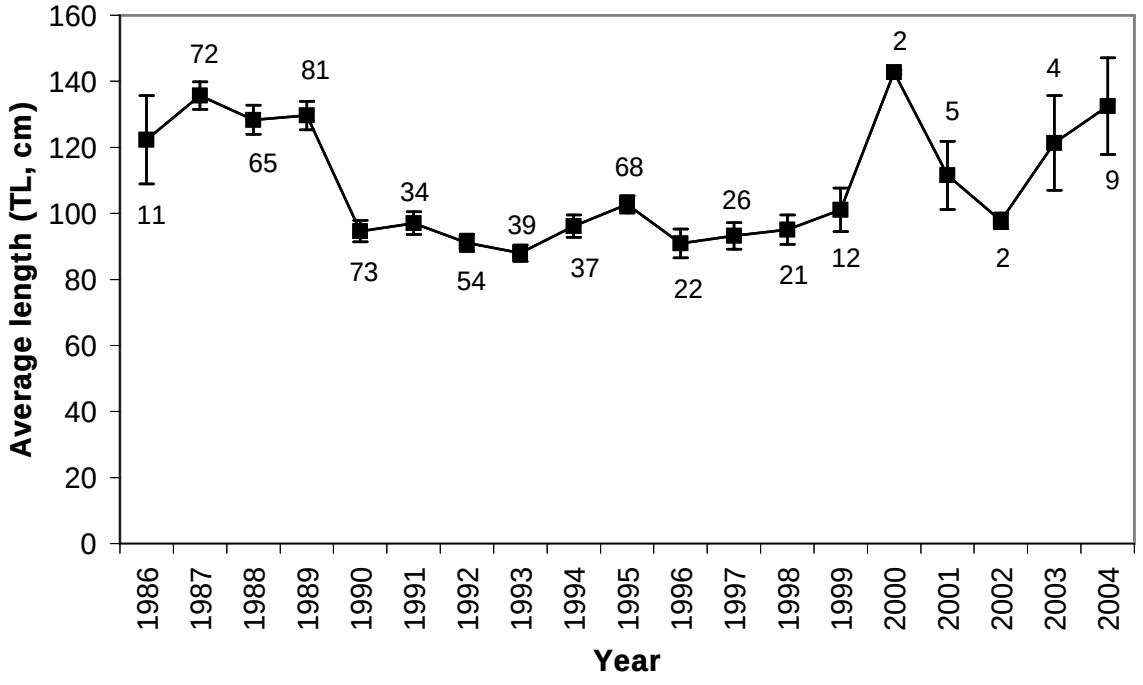
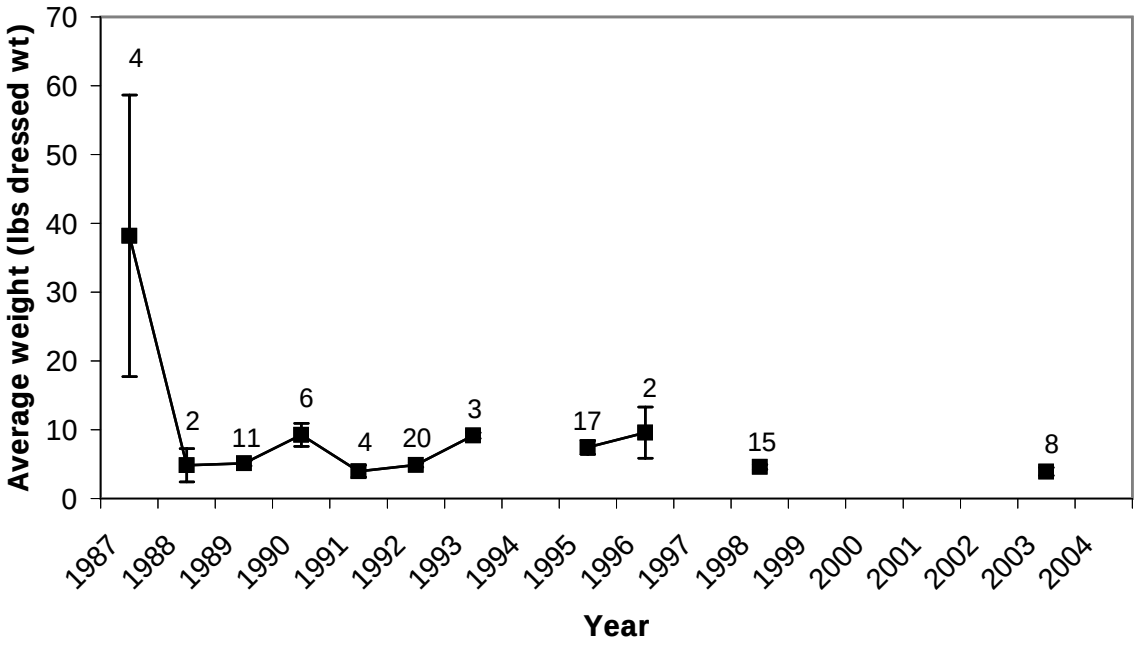


Figure 22. Average weight (A) and length (B) of blacktip sharks observed in the Headboat Survey. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

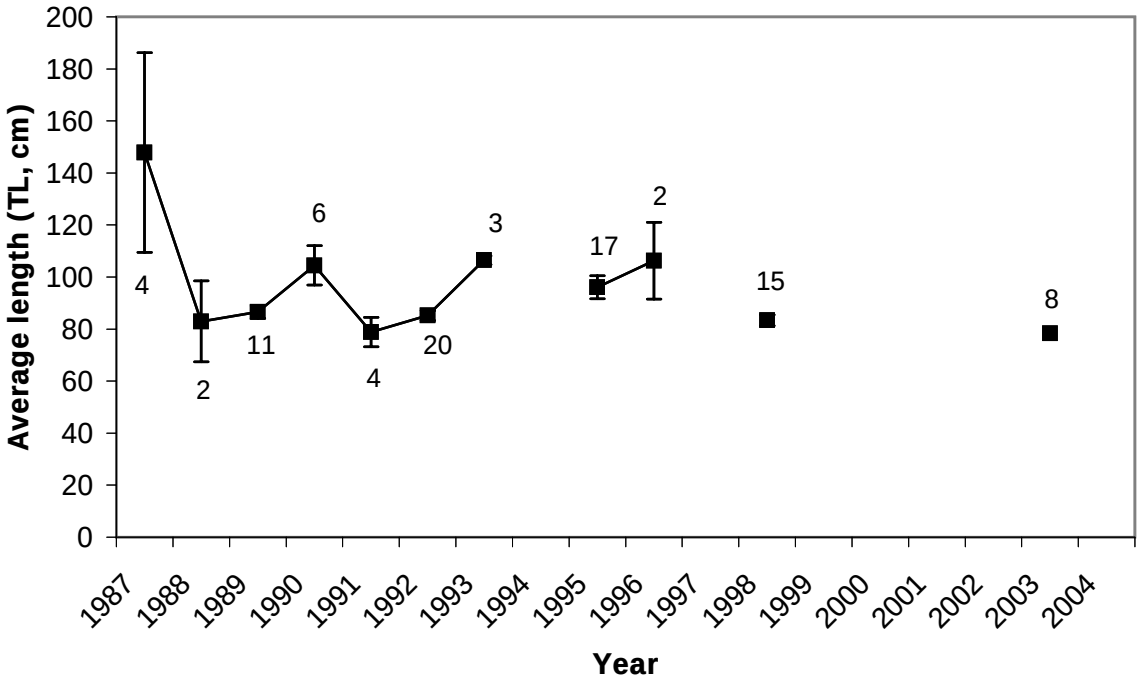
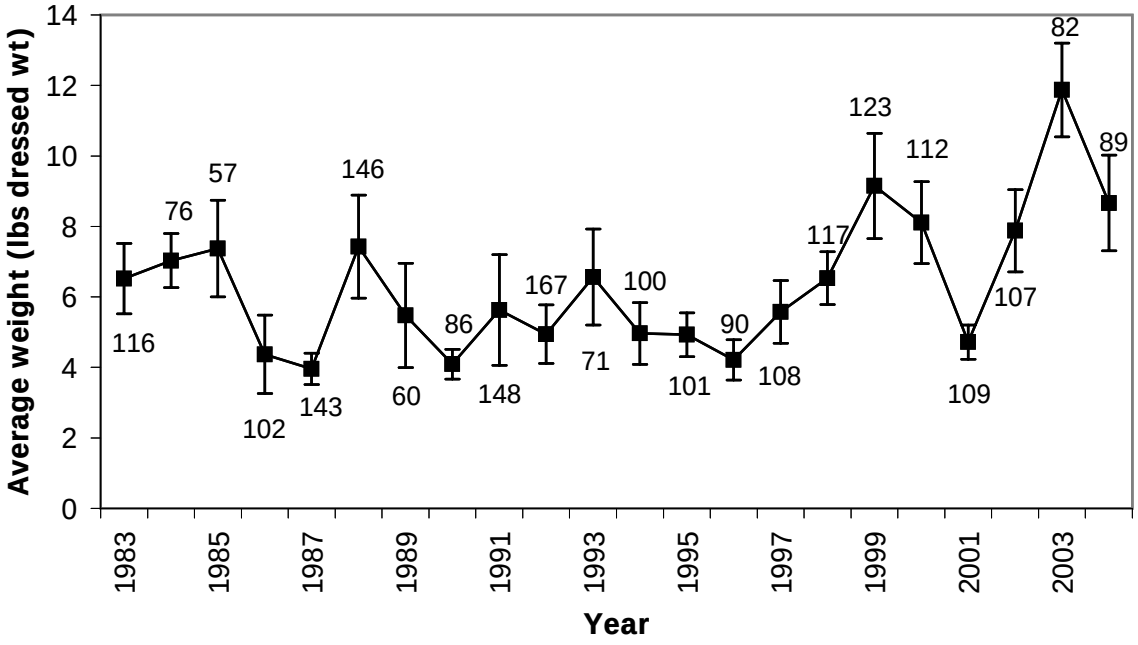


Figure 23. Average weight (A) and length (B) of sandbar sharks observed in the Headboat Survey. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

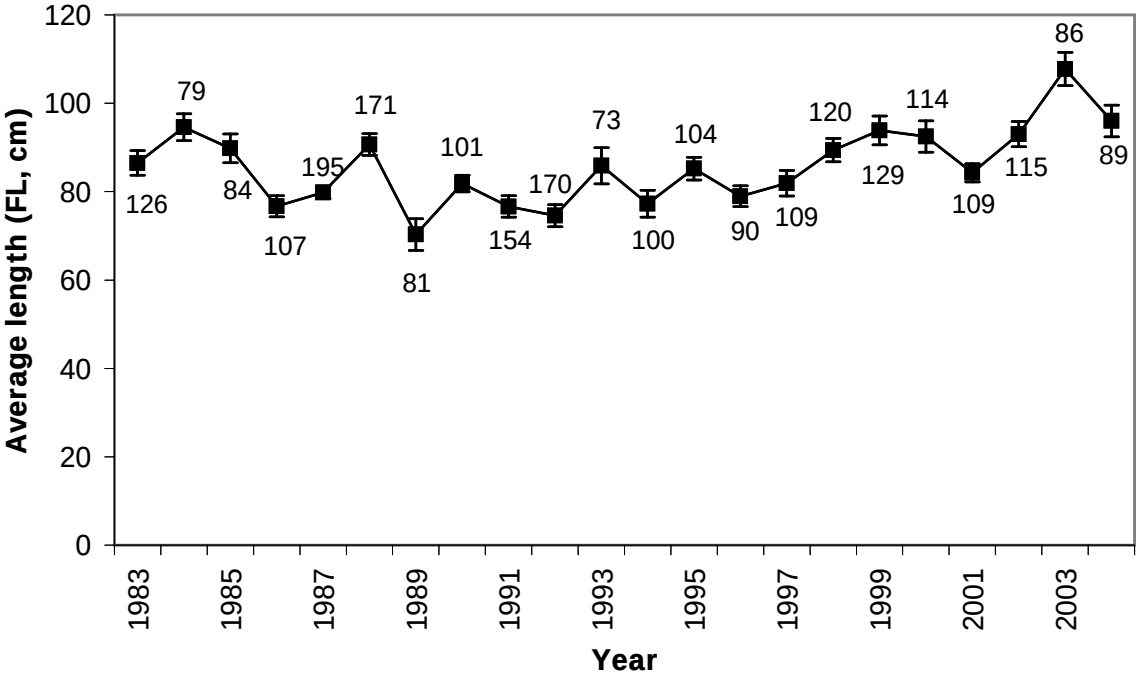
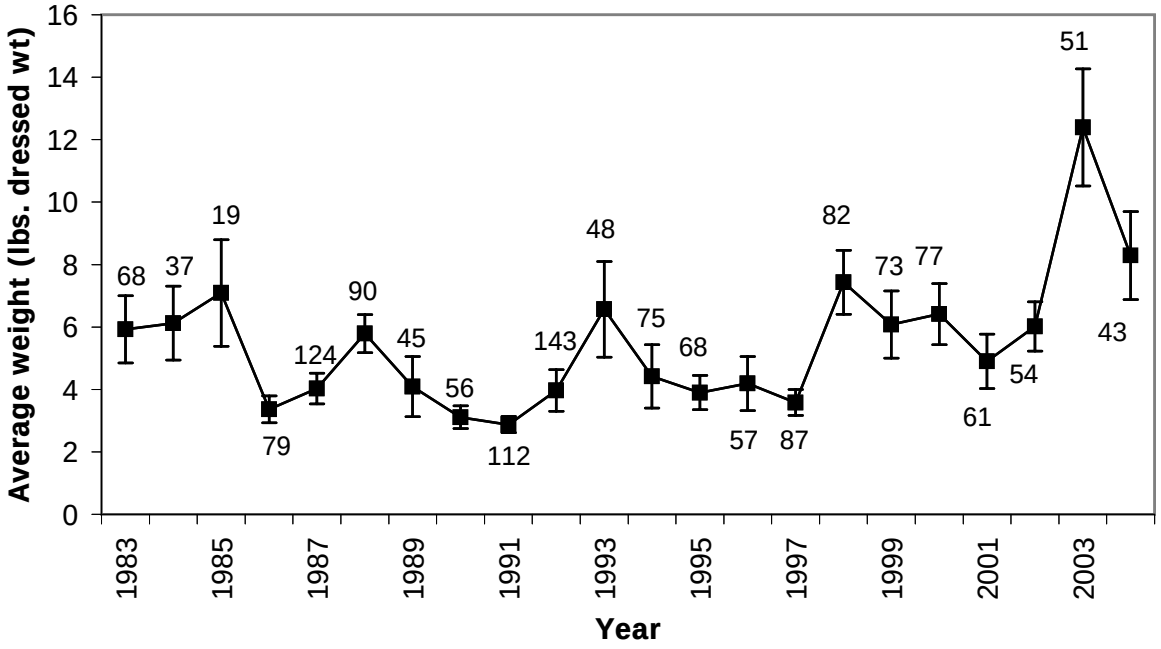


Figure 24. Average weight (A) and length (B) of large coastal sharks observed in the Texas Parks and Wildlife Department Survey. Error bars represent +/- one standard error; sample sizes are indicated.

A.



B.

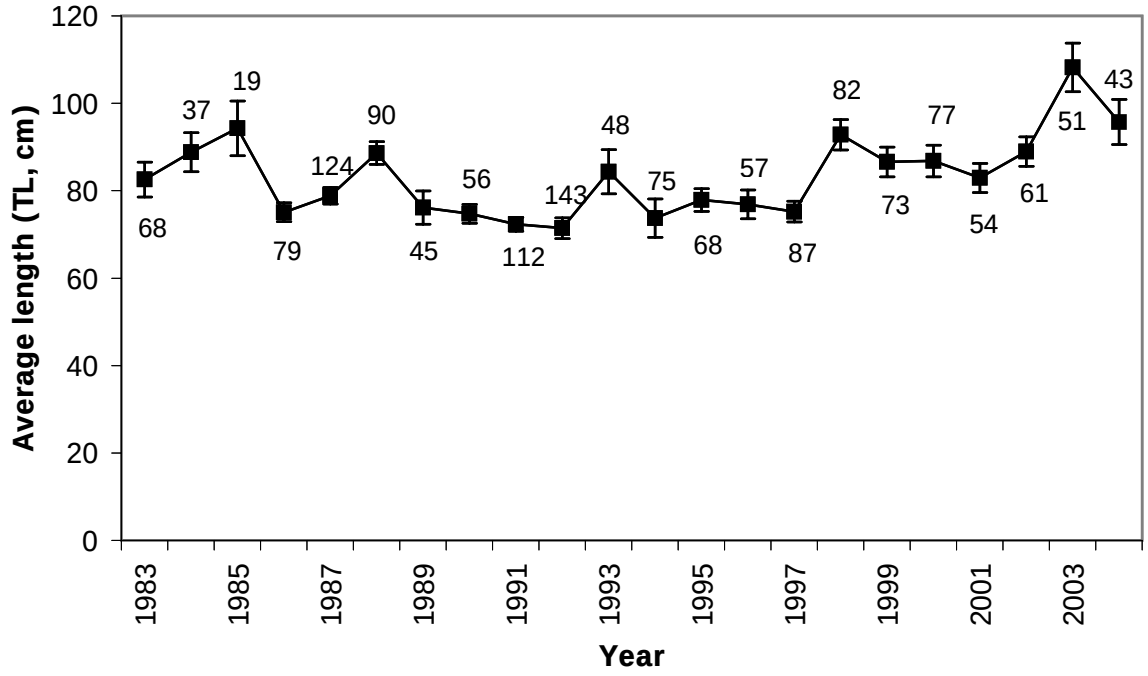


Figure 25. Average weight (A) and length (B) of blacktip sharks observed in the Texas Parks and Wildlife Department Survey. Error bars represent +/- one standard error; sample sizes are indicated.