SMALL COASTAL SHARK 2007 SEDAR DATA WORKSHOP DOCUMENT

Preliminary Mark/Recapture Data for Four Species of Small Coastal Sharks in the Western North Atlantic

Nancy E. Kohler and Patricia A. Turner

NOAA/NMFS/NEFSC
Apex Predators Investigation
28 Tarzwell Drive
Narragansett, RI 02882

Nancy.Kohler@noaa.gov
Pat.Turner@noaa.gov

February 2007

SUMMARY

Mark/recapture information from the National Marine Fisheries Service (NMFS) Cooperative Shark Tagging Program (CSTP) covering the period from 1965 through 2005 are summarized for five species of small coastal shark-Atlantic sharpnose shark (*Rhizoprionodon terranovae)*, bonnethead (*Sphyrna tiburo*), finetooth shark (*Carcharhinus isodon*), blacknose shark (*C. acronotus*), and Atlantic angel sharks (*Squatina dumeril*) in the western North Atlantic. The extent of the tagging effort, areas of release and recapture, and movements and length frequencies of tagged sharks are reported. Two areas were distinguished in order to identify exchange between the Atlantic and Gulf of Mexico and to examine any regional trends in size. Only data with information on size and mark/recapture location were included in the regional analyses. Overall, there was no movement between the Atlantic and Gulf of Mexico and limited exchange between the US and the Mexican-managed portion of the Gulf of Mexico. This exchange was shown for Atlantic sharpnose sharks (8) and bonnethead (1). The true extent of this movement is unclear due to the possibility of under-reporting of recaptures.

INTRODUCTION

The purpose of this document is to summarize mark/recapture information from the NMFS Cooperative Shark Tagging Program (CSTP) for five species of small coastal shark-Atlantic sharpnose shark (*Rhizoprionodon terranovae*), bonnethead (*Sphyrna tiburo*), finetooth shark (*Carcharhinus isodon*), blacknose shark (*C. acronotus*), and Atlantic angel sharks (*Squatina dumeril*) in the western North Atlantic. These data cover the period from 1965 through 2005 presenting the extent of the tagging effort, areas of release and recapture, and movements of tagged sharks. Data synopses include numbers of fish tagged and recaptured, overall recapture rate, maximum and mean distance traveled, maximum time at liberty, mean lengths, and length frequencies.

METHODS

Summary information on the history and methods of the CSTP has been published previously (Casey 1985, Casey and Kohler 1992, Kohler et al. 1998, Kohler and Turner 2001) and excerpts from these reports are included here. The two principal CSTP tags are a fin tag (Jumbo Rototag) and a dart tag ("M" tag). Tagging studies have been mostly single release events in which recoveries are made opportunistically by recreational and commercial fishermen. When a marked shark is re-caught, information similar to that obtained at release is requested from the recapturer. Distance traveled in nautical miles (nm) between tagging and recapture sites is a minimum straight-line distance. Tagging and recapture sizes are originally recorded in fork length (FL) or total length (TL). Fork length is used throughout this report with TL converted to FL using the relationship for all carcharhinids reported in Kohler et al. (1996). Fish with tags were included from the Gulf of Mexico and the US Atlantic waters within the EEZ. Two areas were distinguished in order to identify exchange between the Atlantic and Gulf of Mexico and to examine any regional trends in size. The Gulf of Mexico was defined as west of 80°25’ longitude. Only data with information on size and mark/recapture location were included in the regional analyses.

RESULTS

ATLANTIC SHARPNOSE SHARK

A total of 3,705 Atlantic sharpnose sharks were released with tags along the U.S. east coast and the Gulf of Mexico between 1969 and 2005 (Table 1). Of the 3,494 fish of known sex, 1,970 (56%) were males and 1,524 (44%) were females resulting in a 1:1.3 male:female sex ratio. For 3,690 sharks included in the regional database, the mean overall size of ~70 cm FL was similar for males and females and across regions (Table 2, Figure 1, 2). A total of 55 sharks were recaptured from 1969 through 2005 with an overall recapture rate of 1.5% and mean distance traveled of 128 nm. The Atlantic sharpnose shark at liberty the longest was 7.3 years and was recaptured 70 nm from its original tagging location. The longest distance traveled was 570 nm from a fish that was originally tagged off Texas and recaptured in Mexican waters 4.8 months later. There was no movement between the Atlantic and Gulf of Mexico (Figure 3). The majority of the recaptured fish showed Atlantic coastal movements with some exchange between US Gulf and Mexican waters. Eight Atlantic sharpnose sharks that were tagged off Texas were recaptured off Mexico. This represents 0.2% of the total numbers tagged and 1.0% of the total number of sharpnose sharks tagged in the Gulf of Mexico.

BONNETHEAD

A total of 2,485 bonnethead were released with tags along the U.S. east coast and the Gulf of Mexico between 1965 and 2005 (Table 1). Of the 2,333 fish of known sex, 619 (27%) were males and 1,714 (73%) were females resulting in a 1:0.4 male:female sex ratio. For 2,482 sharks included in the regional database, the mean overall size for males and females was 59 and 74 cm FL, respectively, with larger fish tagged in the Atlantic (Table 2, Figure 4,5). A total of 75 sharks were recaptured from 1972 through 2005 with an overall recapture rate of 3.0% and mean distance traveled of 10 nm. The bonnethead at liberty the longest was for at total of 6.9 years. This fish was a multiple recapture-released and recovered in Bulls Bay, SC both times, the first at liberty for 3 years and the second for 3.9 years. The bonnethead showing the longest movement was also originally tagged in Bulls Bay, SC and recaptured 301 miles south, off Melbourne Beach, FL 7.9 months later. This fish was released again with the tag in place. There was no movement between the Atlantic and Gulf of Mexico (Figure 6). The majority of the recaptured fish showed small Atlantic and Gulf coastal movements with only one bonnethead recovered just into Mexican waters (0.04% of the total numbers tagged and 0.1% of the total number of bonnetheads tagged in the Gulf of Mexico).

FINETOOTH SHARK

A total of 1,191 finetooth sharks were released with tags along the U.S. east coast and the Gulf of Mexico between 1966 and 2005 (Table 1). Of the 1,168 fish of known sex, 549 (47%) were males and 619 (53%) were females resulting in a 1:0.9 male:female sex ratio. For 1,191 sharks included in the regional database, the mean overall size of ~64 cm FL was similar for males and females with larger fish tagged in the Gulf of Mexico (Table 2, Figure 7, 8). A total of 20 sharks were recaptured from 1998 through 2003 with an overall recapture rate of 1.7% and mean distance traveled of 58.5 nm. The finetooth shark at liberty the longest was 3.7 years and was tagged and recaptured off Ocracoke Inlet, NC. The longest distance traveled was 351 nm, from Bulls Bay, SC to Stuart, FL. Finetooth sharks were tagged along the coast of the US Atlantic and Gulf of Mexico with one fish also tagged in Mexican waters (Figure9). Finetooth sharks were only recaptured in the Atlantic with no Gulf of Mexico recoveries and no movement between the Atlantic and Gulf of Mexico.

BLACKNOSE SHARK

A total of 1,100 blacknose sharks were released with tags along the U.S. east coast and the Gulf of Mexico between 1965 and 2005 (Table 1). Of the 1,052 fish of known sex, 442 (42%) were males and 610 (58%) were females resulting in a 1:0.7 male:female sex ratio. For 1,100 sharks included in the regional database, the mean overall size of ~91 cm FL was similar for males and females with slightly smaller fish tagged in the Gulf of Mexico (Table 2, Figure 10, 11). A total of 12 sharks were recaptured from 1979 through 2005 with an overall recapture rate of 1.1% and mean distance traveled of 70.8 nm. The blacknose shark at liberty the longest was 9.5 years and the longest distance traveled was 196 nm. This fish was originally tagged off Ponte Verde, FL and recaptured off St. Lucie Inlet, FL. Blacknose sharks were tagged along the coast of the US Atlantic and Gulf of Mexico with one fish also tagged in Mexican

waters (Figure 12). There was no movement between the Atlantic and Gulf of Mexico and no recaptures in Mexican waters.

ATLANTIC ANGEL SHARK

A total of 145 Atlantic angel sharks were released with tags along the U.S. east coast and the Gulf of Mexico between 1973 and 2005 (Table 1). Of the 123 fish of known sex, 60 (49%) were males and 63 (51%) were females resulting in a 1:1 male:female sex ratio. For 145 sharks included in the regional database, the mean overall size of ~97 cm FL was similar for males and females (Table 2, Figure 13, 14). One shark was tagged and recaptured in 1990 with an overall recapture rate of 0.7%. This fish was originally tagged and recaptured in nearly the same location, southeast of Pascagoula, MS (Figure 15).

Overall, there was no movement between the Atlantic and Gulf of Mexico and limited exchange between the US and the Mexican-managed portion of the Gulf of Mexico. This exchange was shown for Atlantic sharpnose sharks (8) and bonnethead (1). The true extent of this movement is unclear due to the possibility of under-reporting of recaptures.

REFERENCES

Casey, J.G. 1985. Trans-Atlantic migrations of the blue shark: a case history of cooperative shark tagging. *In*: R.H. Stroud (ed.), World angling resources and challenges, pp. 253-267. Proceedings of the First World Angling Conference, Cap d Agde, France, September 12-18, 1984.

Casey, J.G. and N.E. Kohler. 1992. Tagging studies on the shortfin mako shark *Isurus oxyrinchus* in the Western North Atlantic. Australian Journal of Marine Freshwater Research, 43:45-60.

Kohler, N.E., J.G. Casey and P. Turner. 1996. An analysis of length-length and length-weight relationships for 13 species of sharks from the western North Atlantic. NOAA Technical Memorandum, NMFS-NE-110. 22 pp.

Kohler, N.E., J.G. Casey and P.A. Turner. 1998. NMFS Cooperative Shark Tagging Program, 1962-1993: An atlas of shark tag and recapture data. Marine Fisheries Review 60:1-87.

Kohler, N.E. and P.A. Turner. 2001. Shark tagging: a review of conventional methods and studies. Environmental Biology of Fishes 60:191-223.

Table 1. Number of sharks tagged and recaptured by species and region including maximum times at liberty, and maximum and mean distance traveled.

Numbers Tagged and Recaptured by Species - Overall

	Tagged				Recaptured							
	Total	Male	Female	Unknown	Number	%	Male	Female	Unknown	Max. Time (yr)	Max. Dist. (nm)	Mean Dist. (nm)
Atlantic sharpnose shark	3,705	1,970	1,524	211	55	1.5	28	17	10	7.3	570	128.1
Bonnethead	2,485	619	1,714	152	75	3.0	5	66	4	6.9	301	9.7
Finetooth shark	1,191	549	619	23	20	1.7	8	12	0	3.7	351	58.5
Blacknose shark	1,100	442	610	48	12	1.1	5	6	1	9.5	196	70.8
Atlantic angel shark	145	60	63	22	1	0.7	0	0	1	-------	1	-------

Numbers Tagged and Recaptured by Species - Atlantic

	Tagged				Recaptured				
	Total	Male	Female	Unknown	Number	%	Male	Female	Unknown
Atlantic sharpnose shark	2,918	1,546	1,219	153	42	1.4	22	11	9
Bonnethead	1,628	344	1,231	53	61	3.7	3	56	2
Finetooth shark	1,003	459	525	19	20	2.0	8	12	0
Blacknose shark	765	342	391	32	10	1.3	4	6	0
Atlantic angel shark	131	57	60	14	0	0.0	0	0	0

Numbers Tagged and Recaptured by Species - Gulf of Mexico

	Tagged				Recaptured				
	Total	Male	Female	Unknown	Number	%	Male	Female	Unknown
Atlantic sharpnose shark	787	424	305	58	13	1.7	6	6	1
Bonnethead	857	275	483	99	14	1.6	2	10	2
Finetooth shark	188	90	94	4	0	0.0	0	0	0
Blacknose shark	335	100	219	16	2	0.6	1	0	1
Atlantic angel shark	14	3	3	8	1	7.1	0	0	1

Table 2. Mean fork lengths of sharks tagged by species and region.

Mean Fork Length - Overall								
	Total	Mean FL	Male	Mean FL	Female	Mean FL	Unknown	Mean FL
Atlantic sharpnose shark	3,690	70.5	1,967	70.1	1520	71.2	203	69.4
Bonnethead	2,482	69.8	619	59.0	1712	74.2	151	64.7
Finetooth shark	1,191	64.4	549	62.7	619	65.8	23	68.4
Blacknose shark	1,100	90.8	442	89.5	610	91.5	48	92.8
Atlantic Angel shark	145	97.2	60	101.3	63	96.5	22	88.3

Mean Fork Length - Atlantic								
	Total	Mean FL	Male	Mean FL	Female	Mean FL	Unknown	Mean FL
Atlantic sharpnose shark	2,905	71.2	1,544	70.4	1,216	72.1	145	71.8
Bonnethead	1,627	73.8	344	61.3	1,230	77.6	53	65.8
Finetooth shark	1,003	59.3	459	57.3	525	60.7	19	69.7
Blacknose shark	765	92.2	342	91.0	391	92.9	32	95.8
Atlantic Angel shark	131	98.2	57	101.1	60	96.2	14	95.1

Mean Fork Length - Gulf of Mexico								
	Total	Mean FL	Male	Mean FL	Female	Mean FL	Unknown	Mean FL
Atlantic sharpnose shark	785	68.0	423	69.1	304	67.4	58	63.3
Bonnethead	855	62.3	275	56.0	482	65.6	98	64.1
Finetooth shark	188	91.5	90	90.2	94	94.0	4	62.0
Blacknose shark	335	87.5	100	84.4	219	89.0	16	86.8
Atlantic Angel shark	14	87.8	3	105.0	3	101.0	8	76.4

Figure 1. Length frequencies for Atlantic sharpnose sharks – sexes combined, males, and females.

Atlantic sharpnose sharks (*Rhizoprionodon terranovae*)

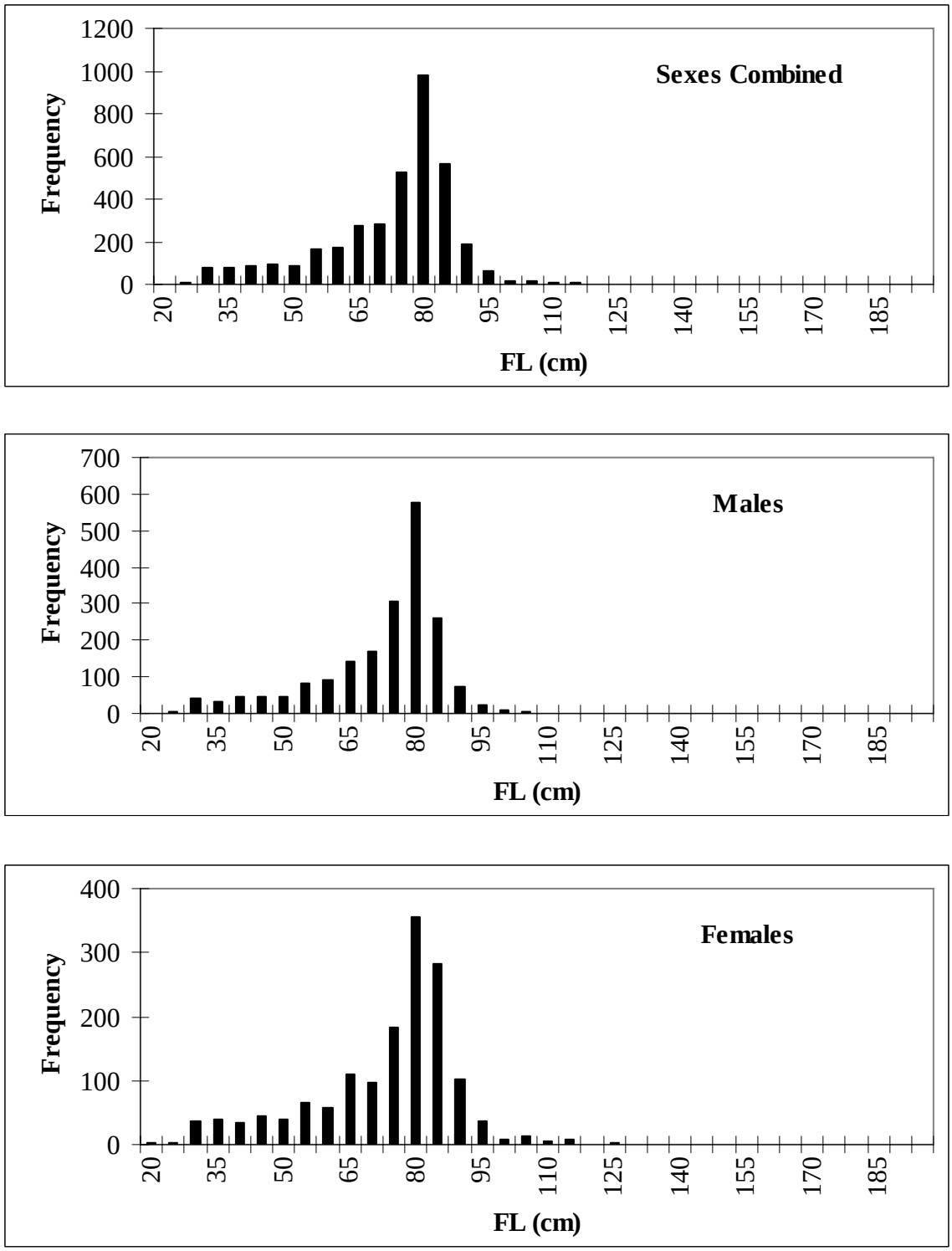
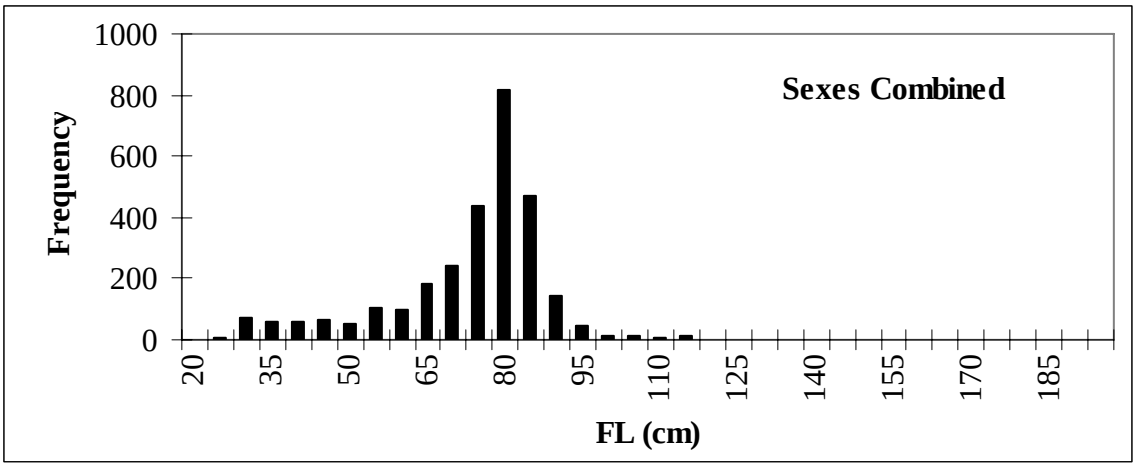


Figure 2. Length frequencies for Atlantic sharpnose sharks by region – sexes combined.

Atlantic sharpnose sharks (*Rhizoprionodon terranovae*)

Atlantic



Gulf of Mexico

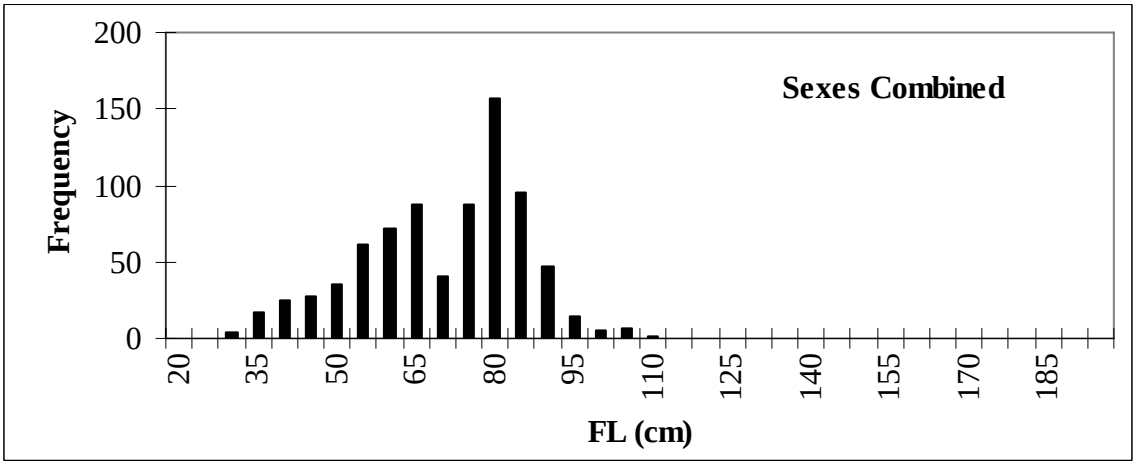


Figure 3a. Atlantic sharpnose sharks tagging distribution.

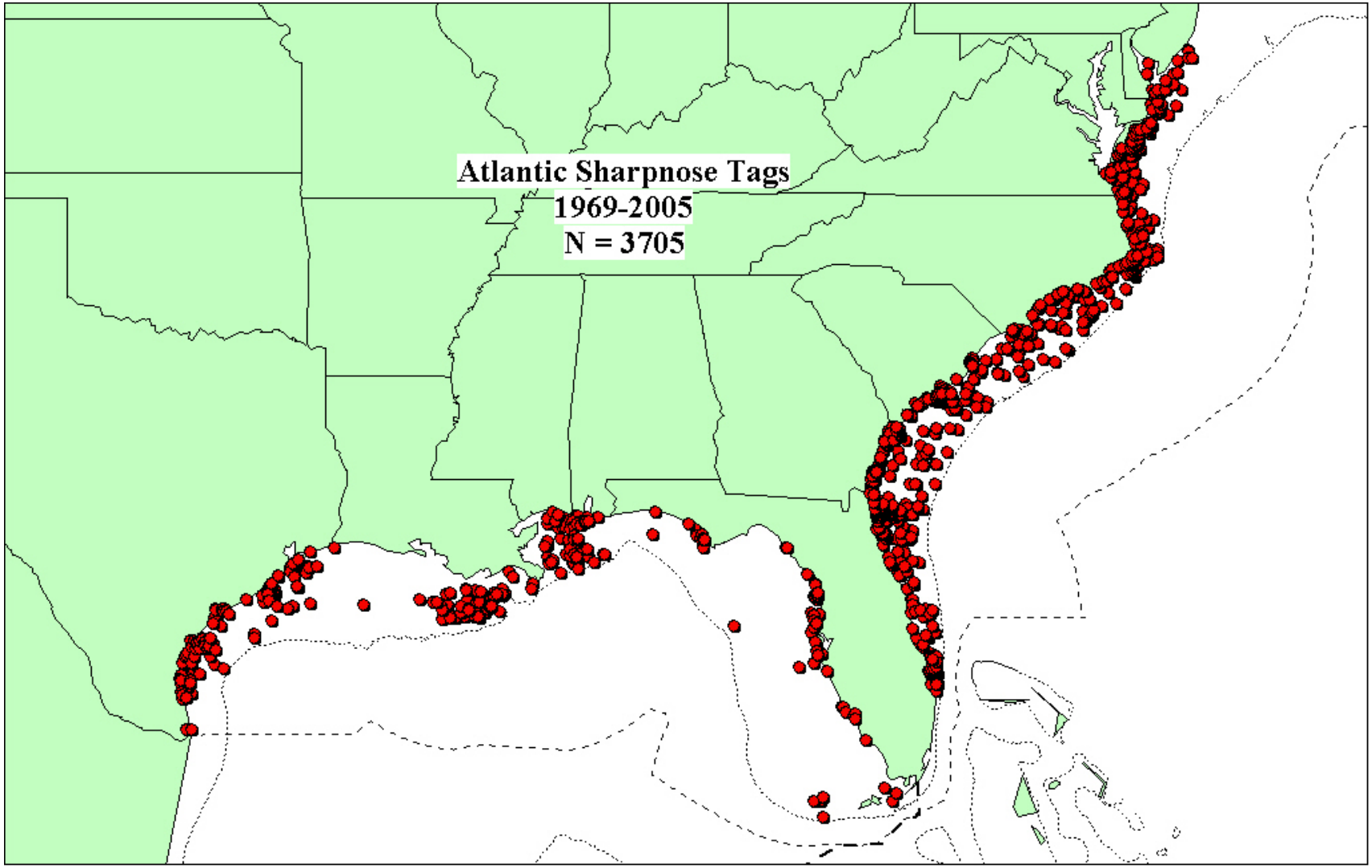


Figure 3b. Atlantic sharpnose sharks recapture distribution.

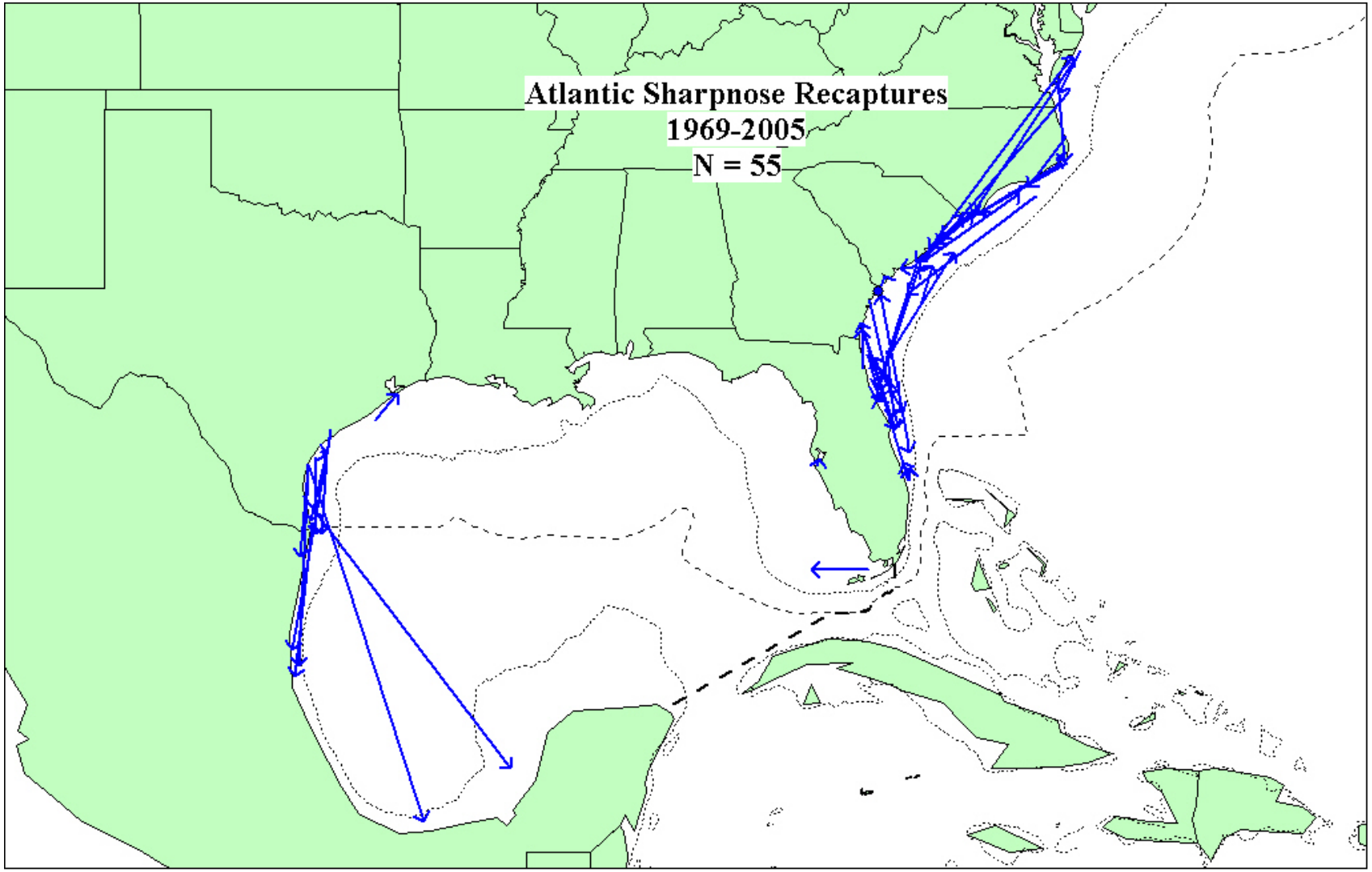


Figure 4. Length frequencies for bonnethead – sexes combined, males, and females.

Bonnethead (*Sphyrna tiburo*)

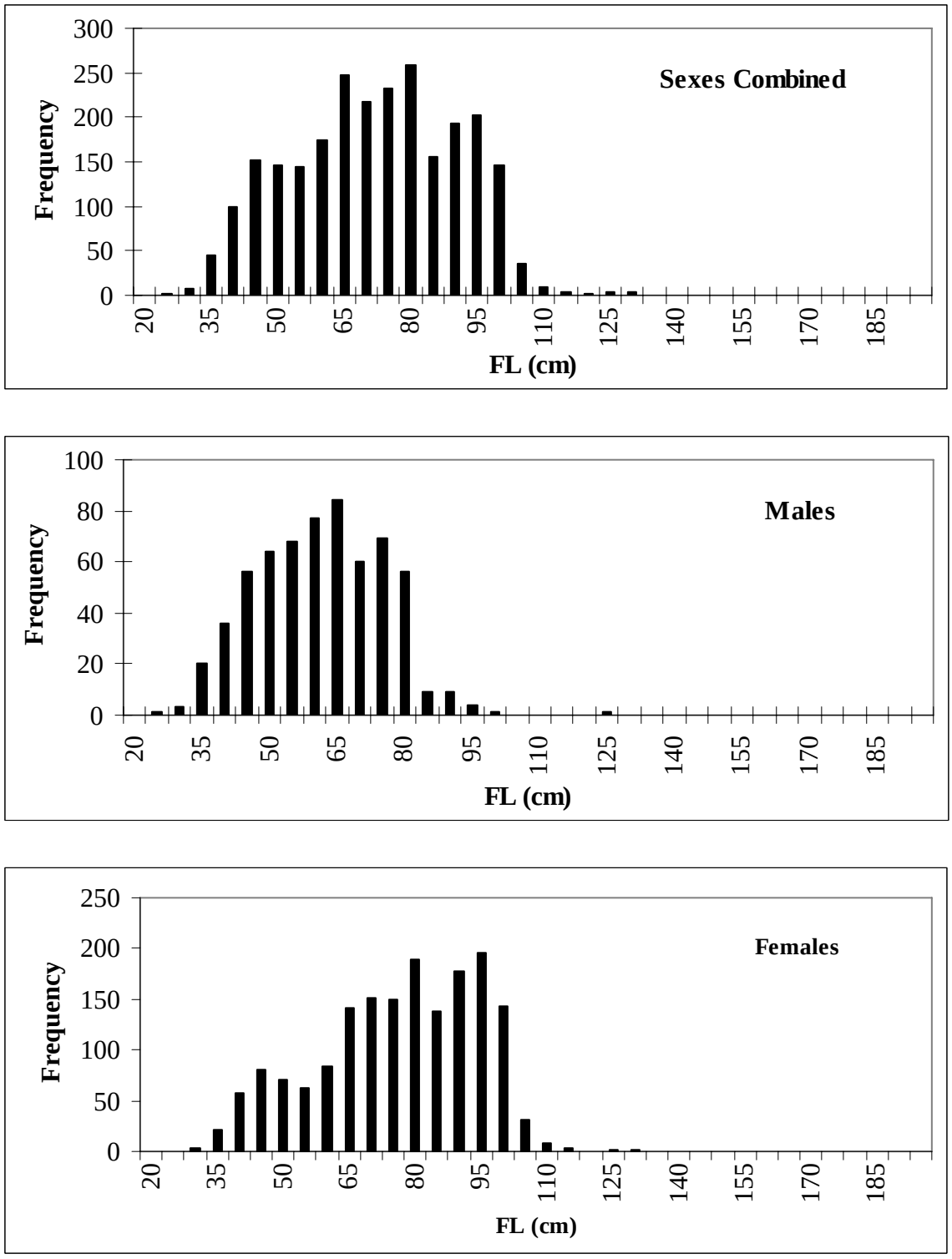
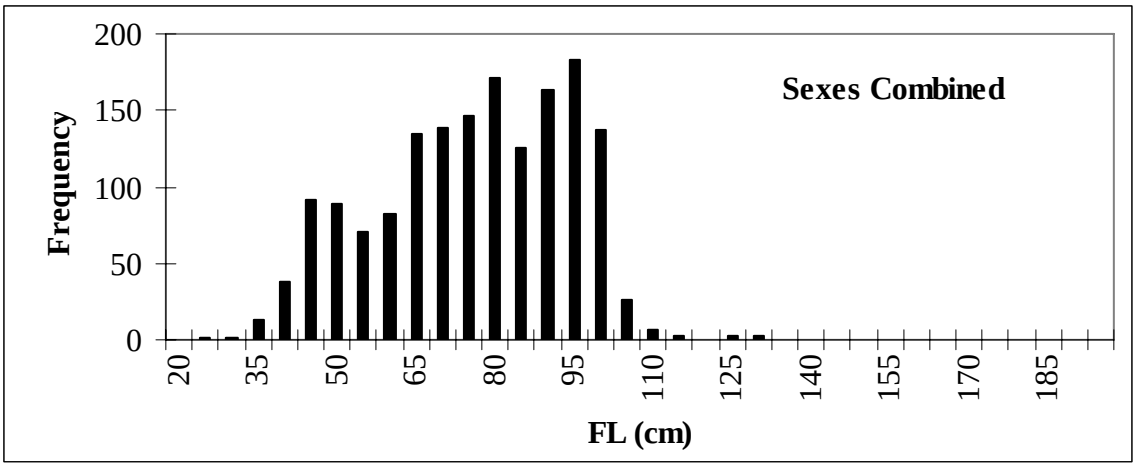


Figure 5. Length frequencies for bonnethead by region – sexes combined.

Bonnethead (*Sphyrna tiburo*)

Atlantic



Gulf of Mexico

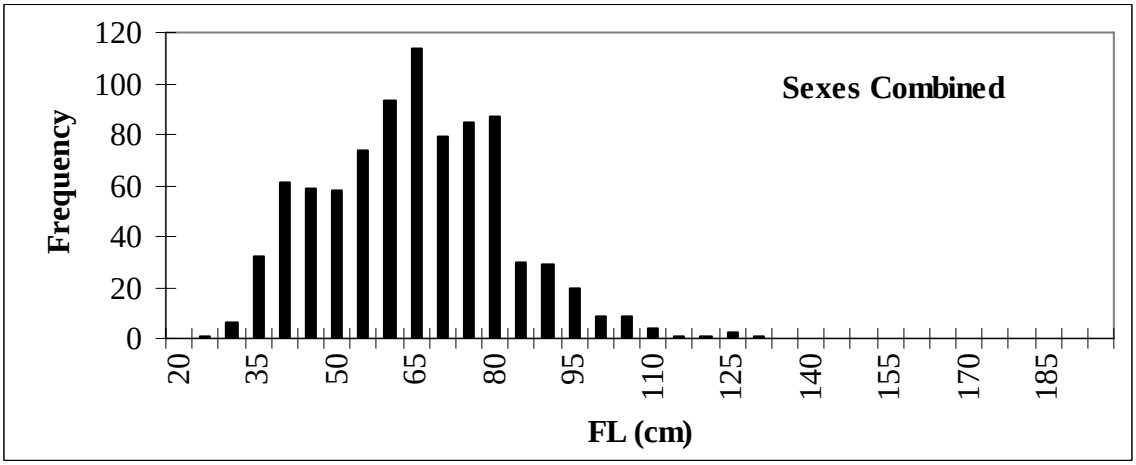


Figure 6a. Bonnethead tagging distribution.

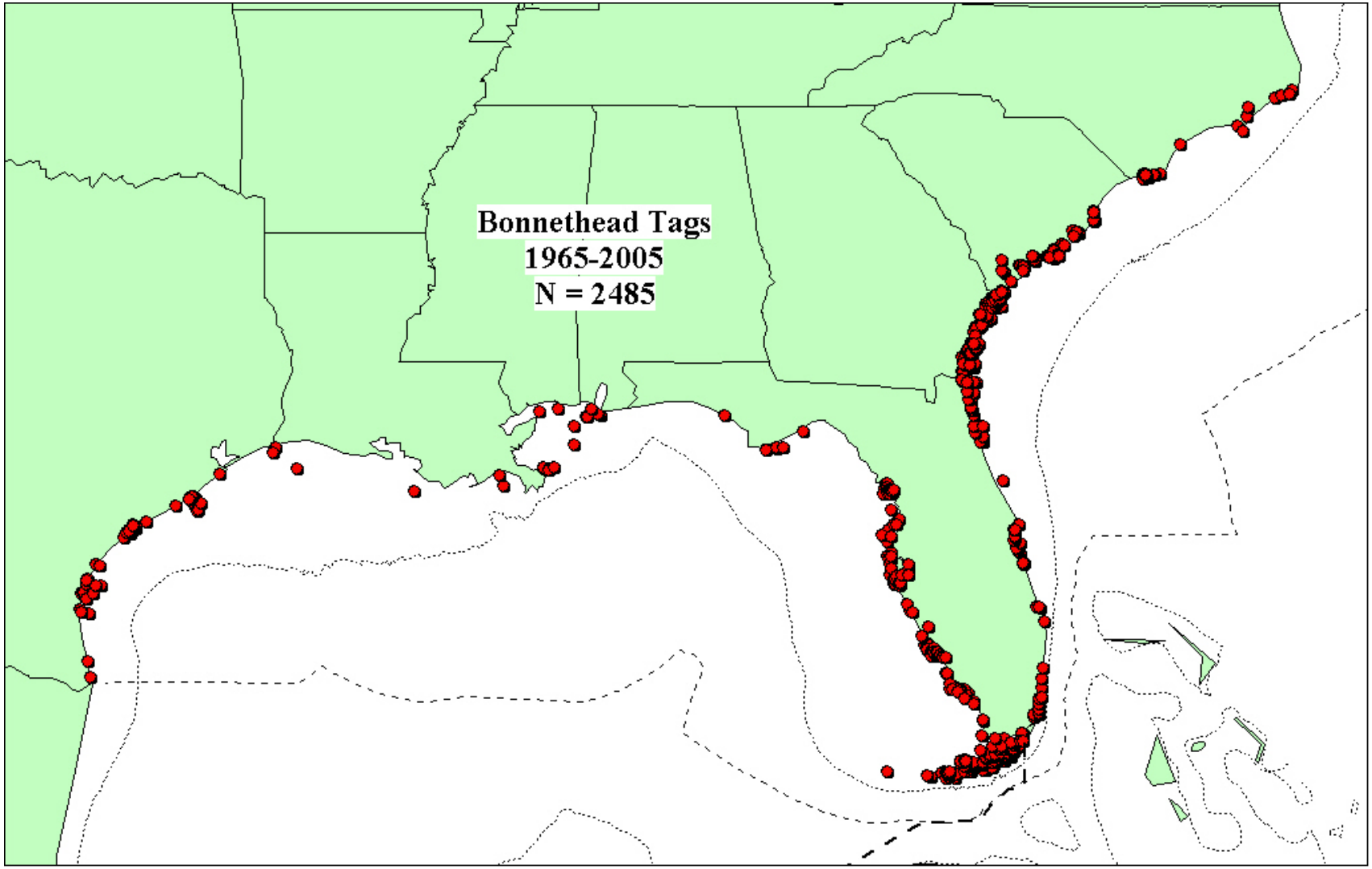


Figure 6b. Bonnethead recapture distribution.

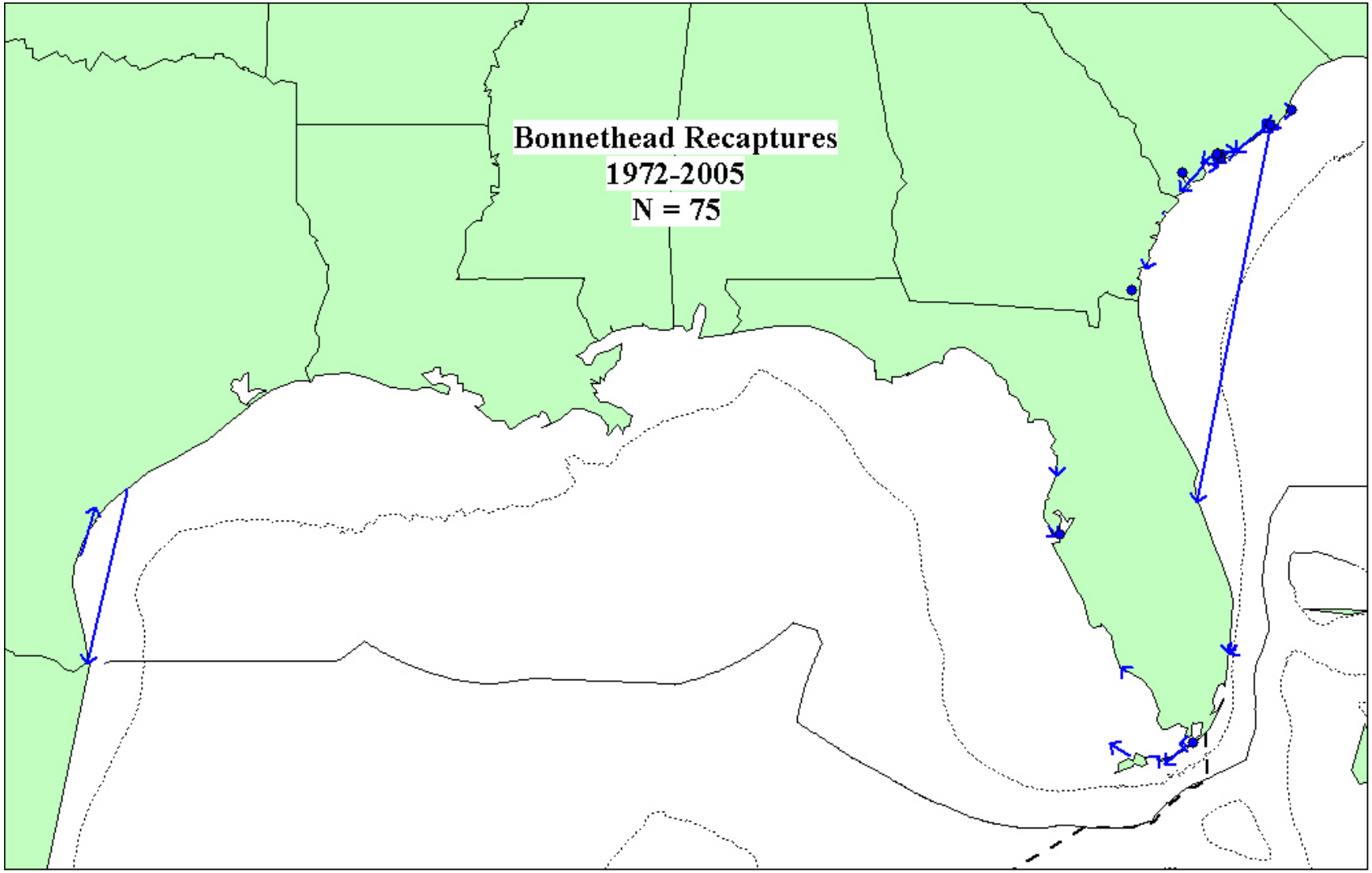


Figure 7. Length frequencies for finetooth sharks – sexes combined, males, and females.

Finetooth sharks (*Carcharhinus isodon*)

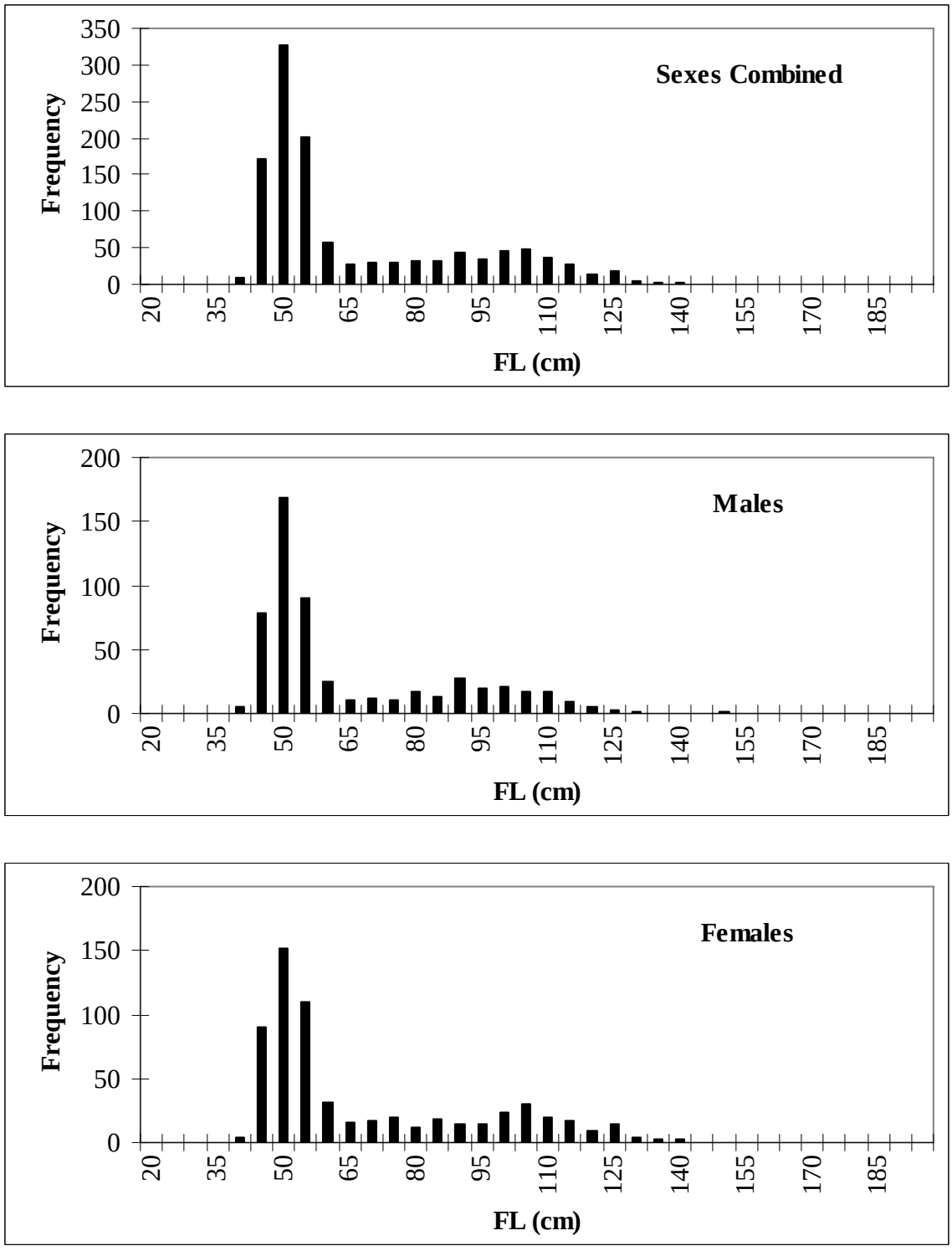
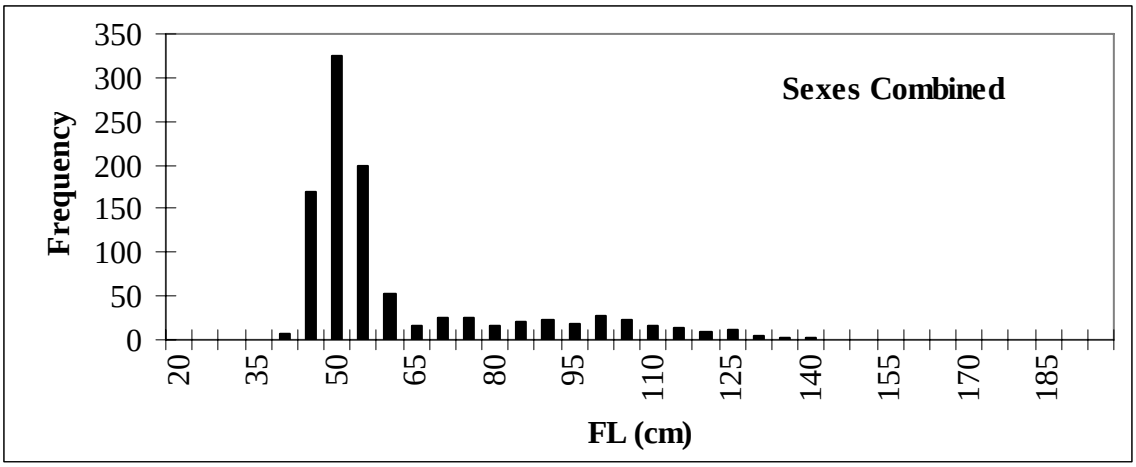


Figure 8. Length frequencies for finetooth sharks by region – sexes combined.

Finetooth sharks (*Carcharhinus isodon*)

Atlantic



Gulf of Mexico

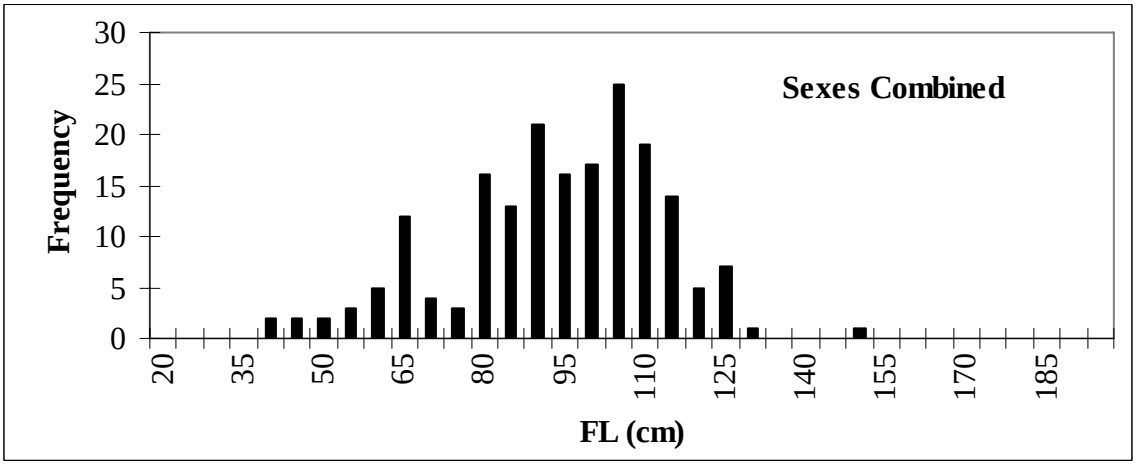


Figure 9a. Finetooth sharks tagging distribution.

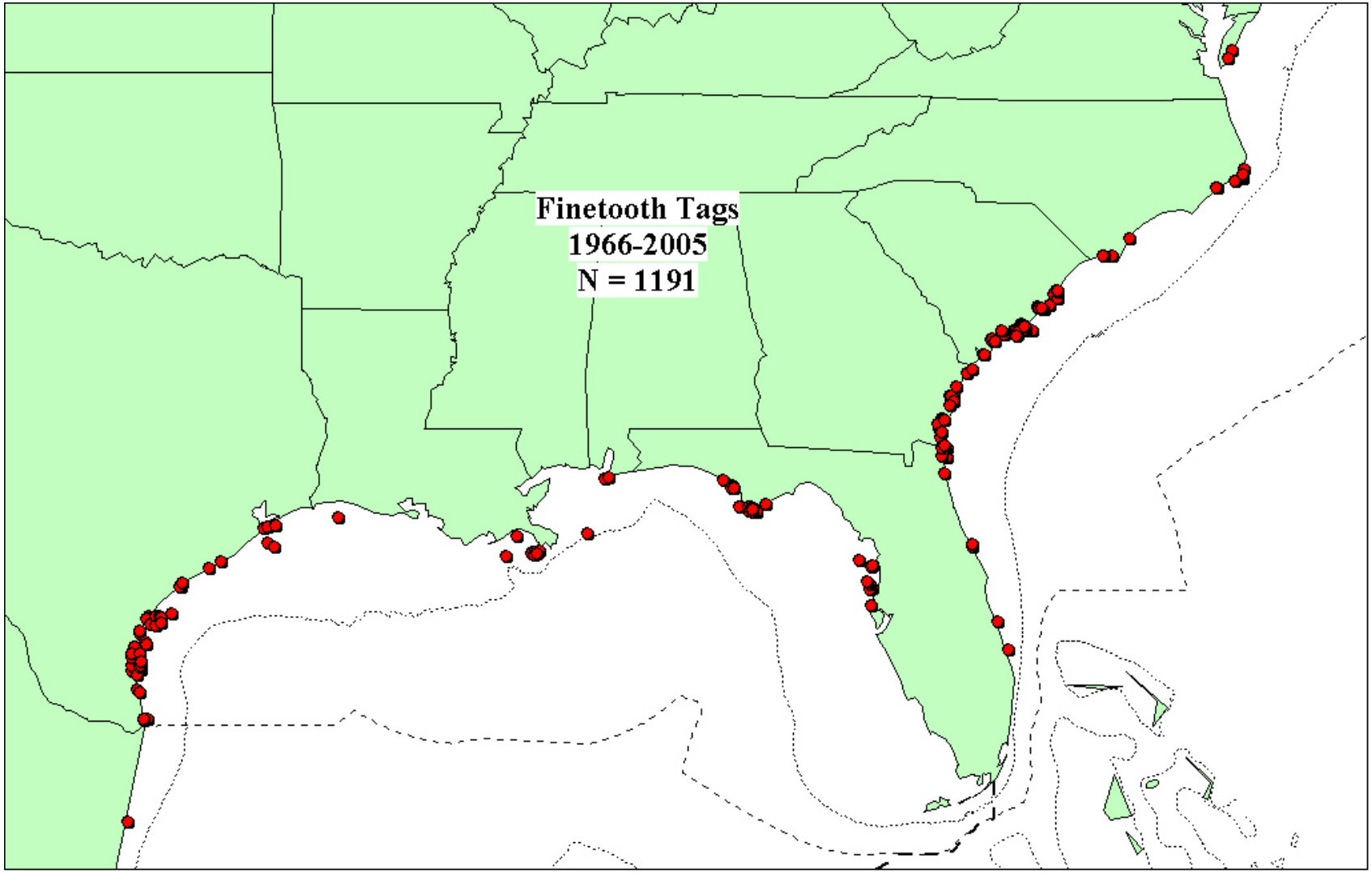


Figure 9b. Finetooth sharks recapture distribution.

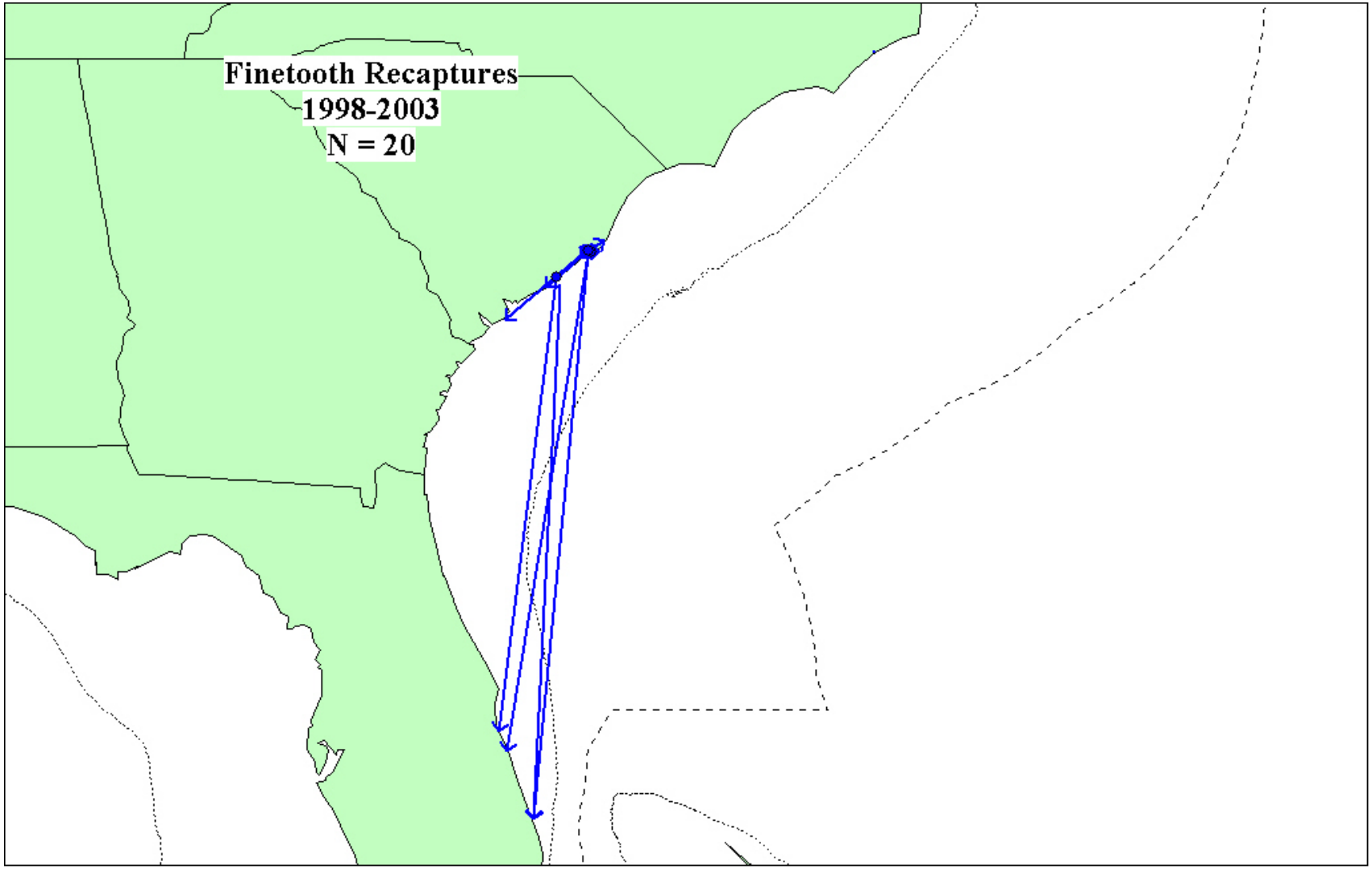


Figure 10. Length frequencies for blacknose sharks – sexes combined, males, and females.

Blacknose sharks (*Carcharhinus acronotus*)

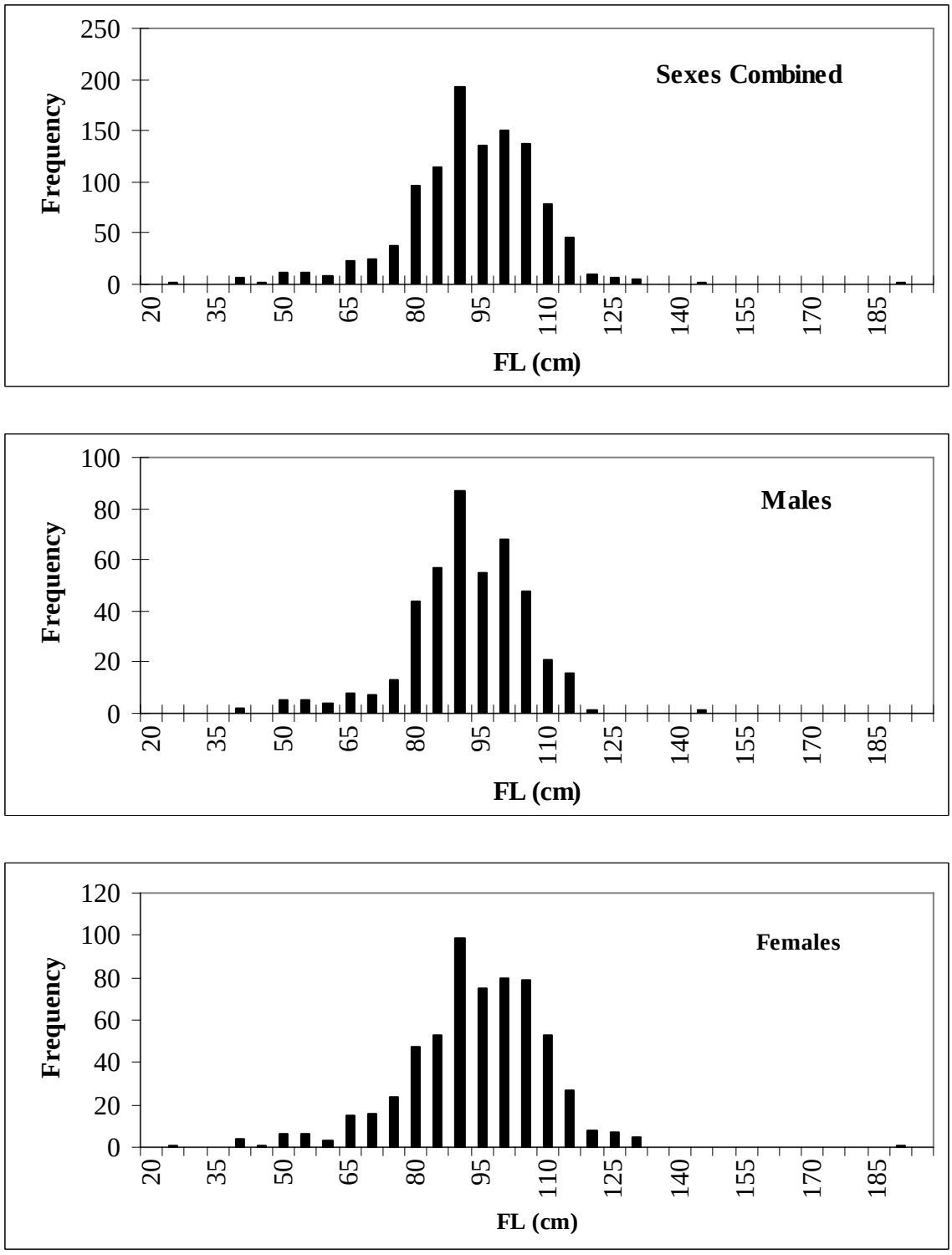
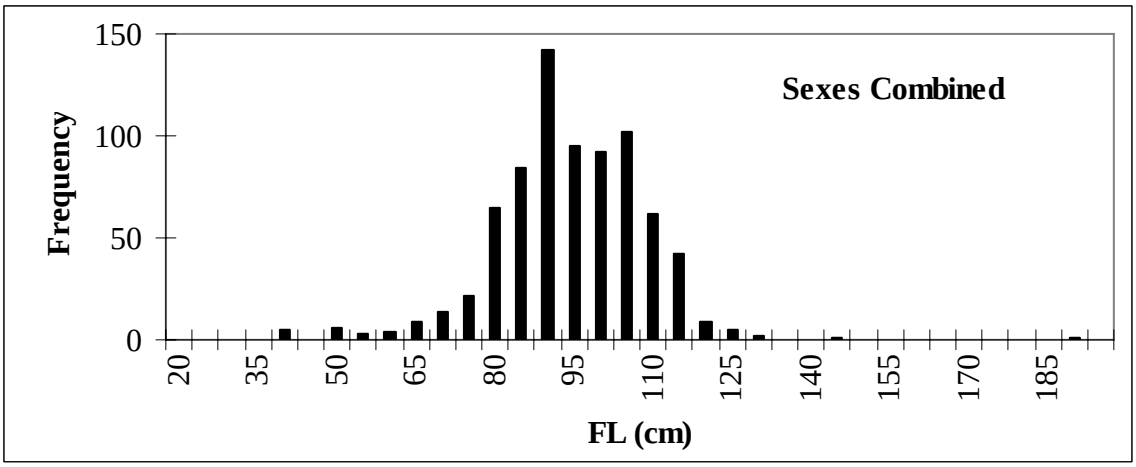


Figure 11. Length frequencies for blacknose sharks by region – sexes combined.

Blacknose sharks (*Carcharhinus acronotus*)

Atlantic



Gulf of Mexico

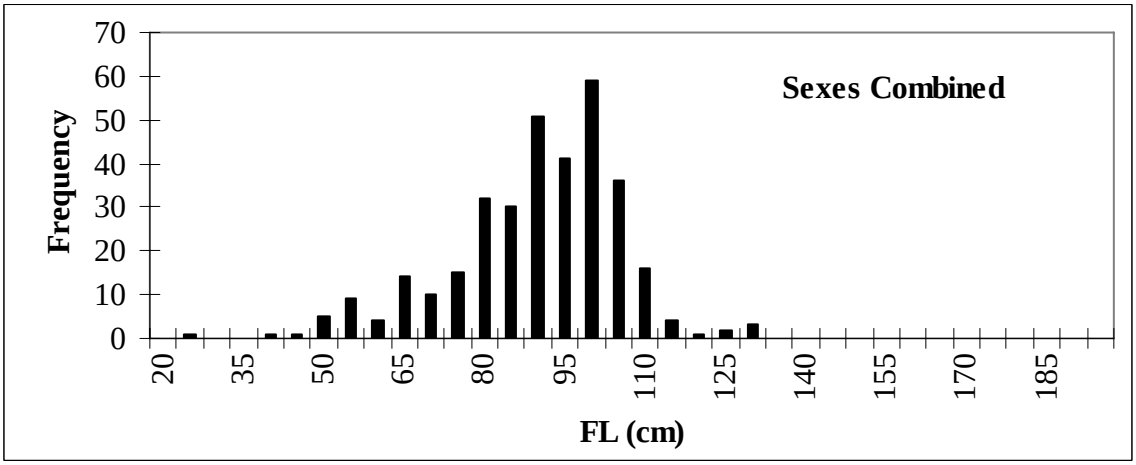


Figure 12a. Blacknose sharks tagging distribution.

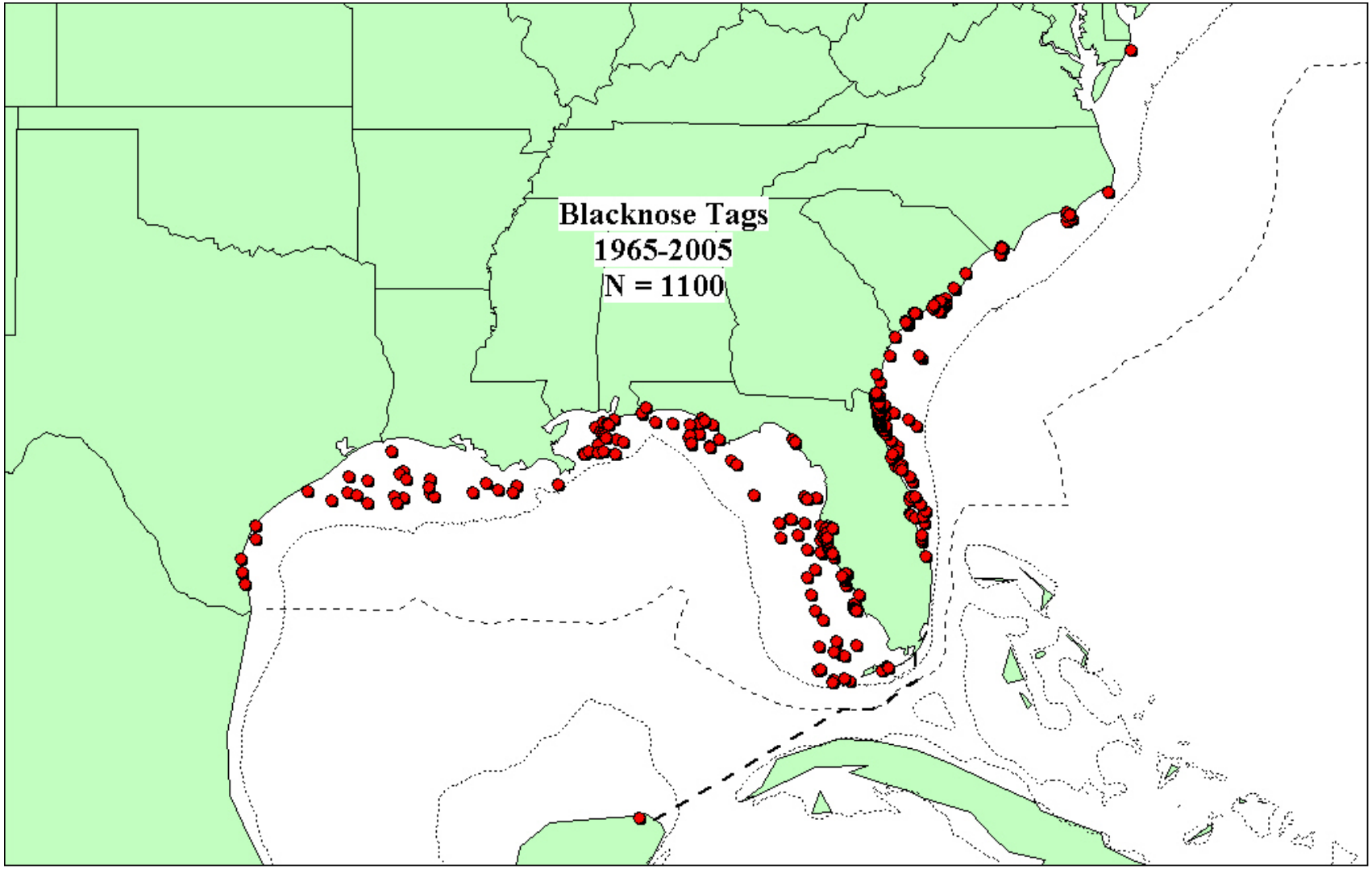


Figure 12b. Blacknose sharks recapture distribution.

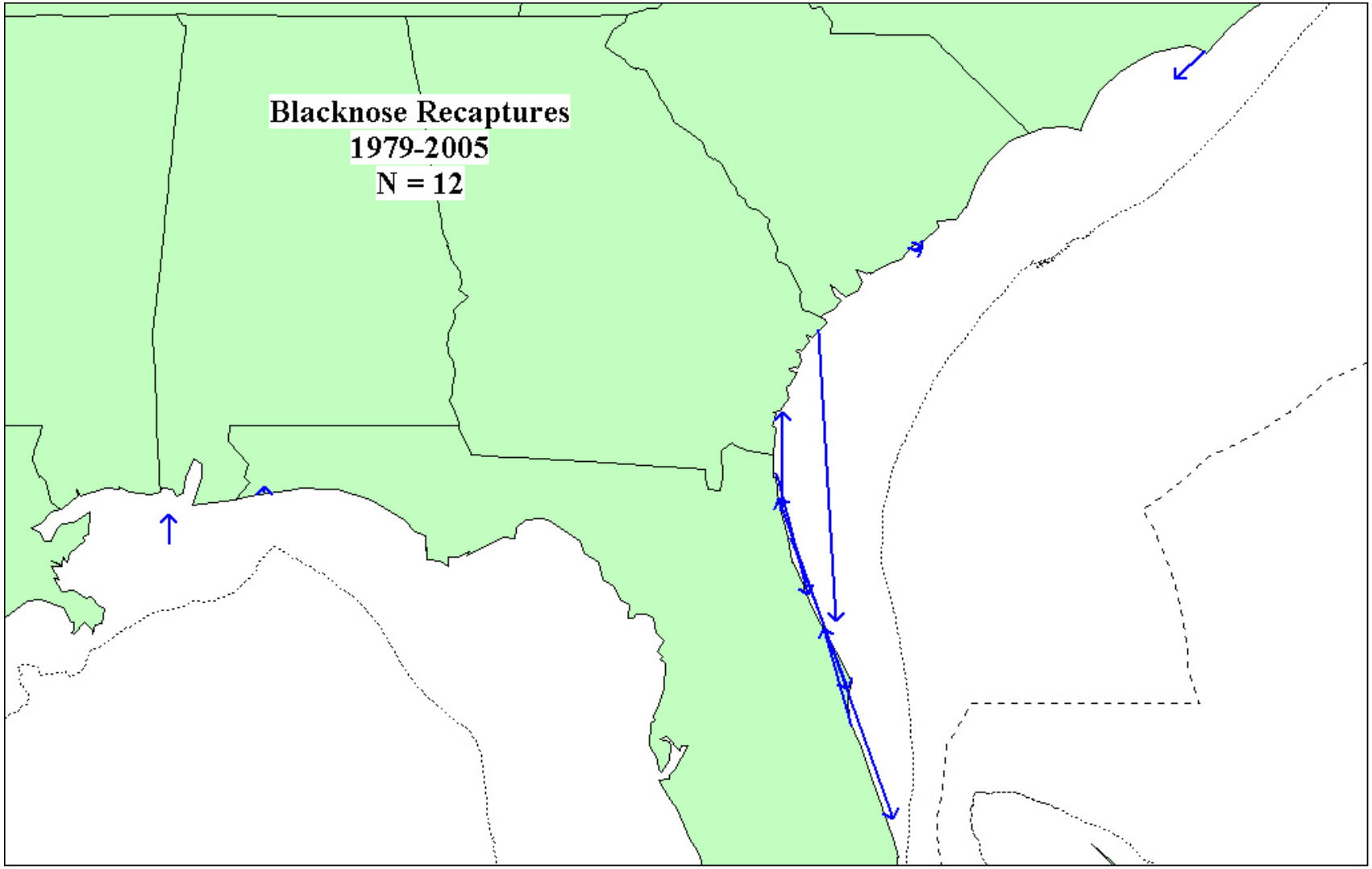


Figure 13. Length frequencies for Atlantic angel sharks – sexes combined, males, and females.

Atlantic angel sharks (*Squatina dumeril*)

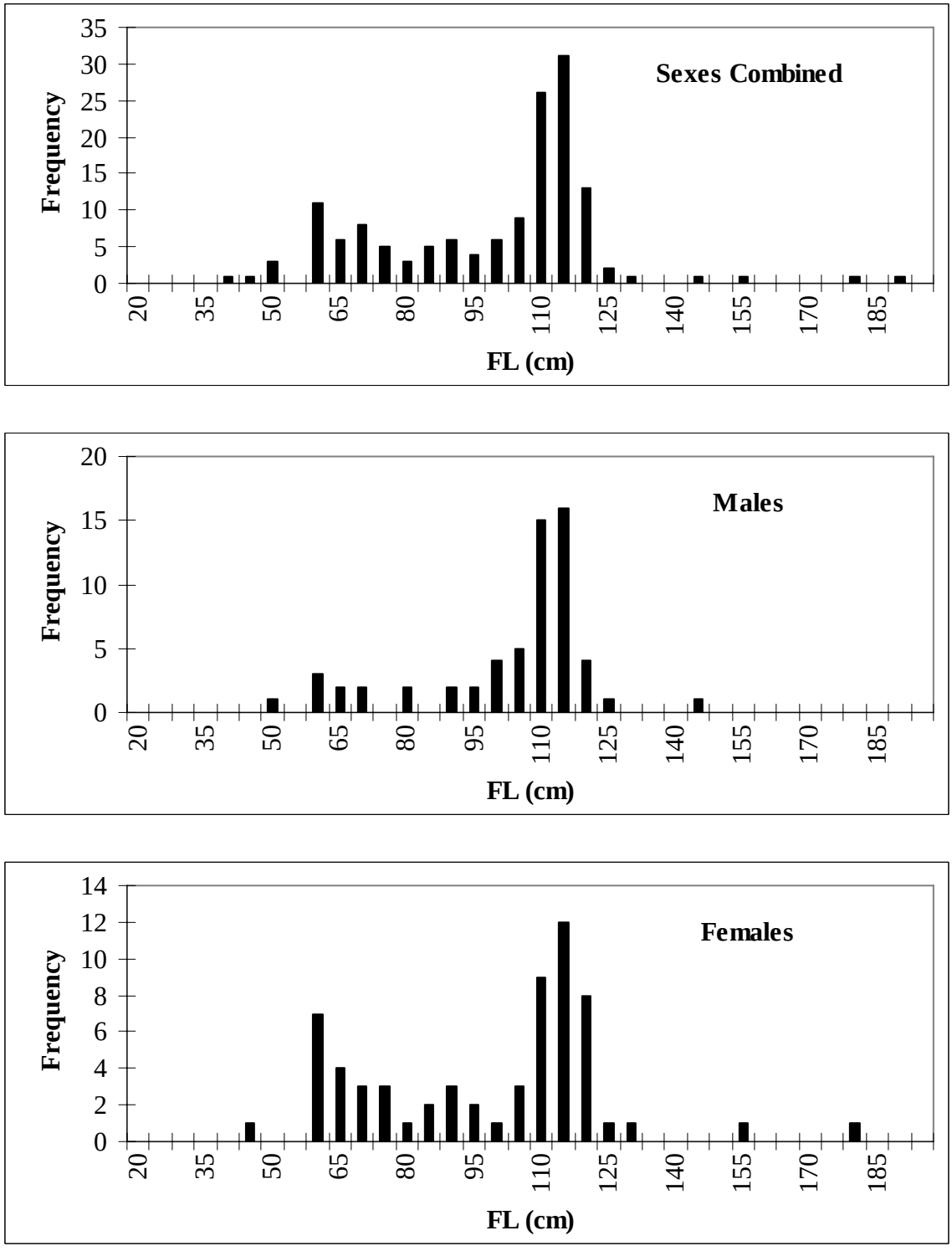
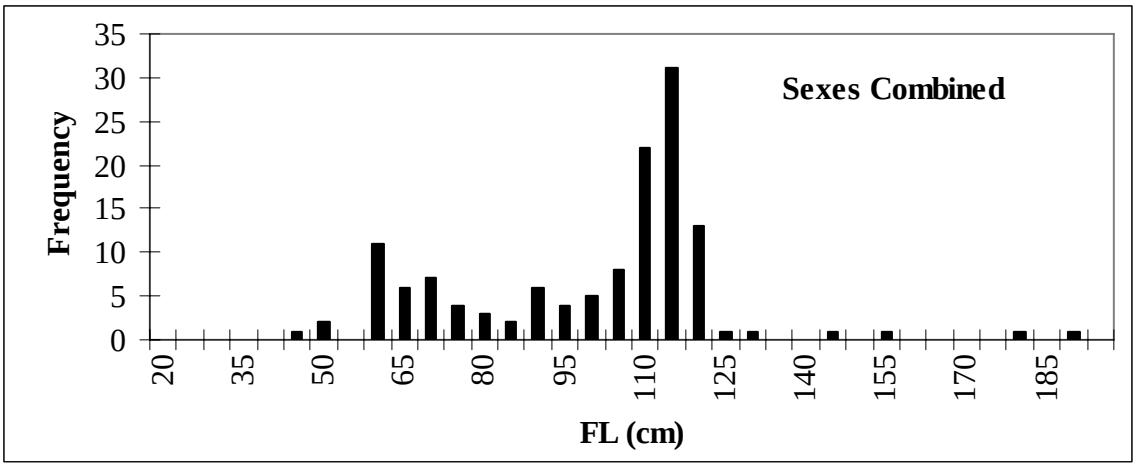


Figure 14. Length frequencies for Atlantic angel sharks by region – sexes combined.

Atlantic angel sharks (*Squatina dumeril*)

Atlantic



Gulf of Mexico

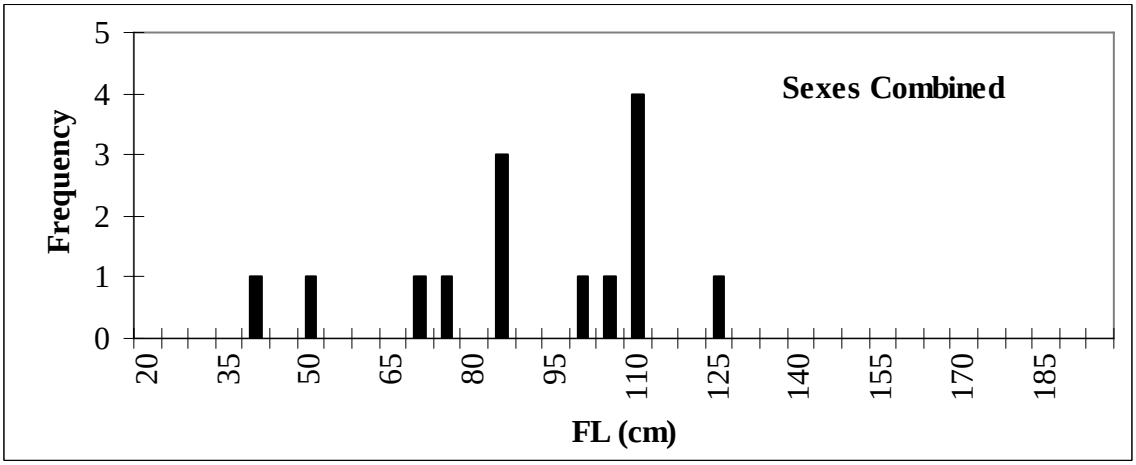


Figure 15. Atlantic angel sharks tagging and recapture distribution.