

Shark SEDAR Data Workshop Document

**The Commercial Shark Fishery Observer Program: History, collection methodology
and summary statistics 1994-2005(1)**

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Summary

The Commercial Shark Fishery Observer Program (CSFOP) was housed at the Florida Museum of Natural History from 1994-2005(1) (1) and was responsible for hiring, training and deploying fisheries observers aboard commercial bottom longline vessels targeting large coastal sharks. A total of 34 individual observers observed the capture of 57,265 sharks, representing 34 species during this time period. The history, methods used for training and data collection and summary statistics are included in the following document.

Introduction

The Commercial Shark Fishery Observer Program (CSFOP) began in 1994 as a cooperative effort of the Florida Program for Shark Research at the Florida Museum of Natural History (FLMNH), the Gulf and South Atlantic Fisheries Development Foundation (GSAFDF), and the fishers of the United States Atlantic commercial shark fishery. Historically this program was supported by grants from two U.S. Department of Commerce funding programs, Marine Fisheries Initiative (MARFIN) and Saltonstall-Kennedy (SK), and later by the Highly Migratory Species division of the National Marine Fisheries Service. In 2002 as a result of increased difficulty in placing observers aboard commercial bottom longline vessels, the program became mandatory under the Highly Migratory Species Division (HMS) of the National Marine Fisheries Service (NMFS). The CSFOP program was housed at the Florida Museum of Natural History located on the University of Florida campus from 1994 until April of 2005(1). In May 2005(1), the program was moved to the NMFS Southeast Fisheries Science Center (SEFSC) Panama City Laboratory. The following document will describe the history, methods and summary statistics of the CSFOP during its tenure at the FLMNH.

History

The development of an onboard shark fishery observer program was a research initiative of Steven Branstetter, then of GSAFDF (now NMFS SEFSC, St. Petersburg, FL), and George H. Burgess of the FLMNH. Branstetter and Burgess were interested in monitoring the progress of the newly enacted NMFS shark fishery management measures and hoped to provide basic and enhanced fishery data that could be used in producing better stock assessments, resulting in the fine-tuning of those measures. They also saw the opportunity for using appropriately trained fishery observers as at-sea samplers of biological data and specimens for badly needed life history studies on individual species. Throughout the duration of the program's existence at the FLMNH, observers recorded both catch and biological data and brought back vertebrae (for aging), reproductive tissues, tissue for DNA and contaminant studies, and parasites. Much of those fishery and biological data and specimens have been or are in the process of being studied by the staff of the FLMNH's Florida Program for Shark Research, but biological samples also were retained for cooperating or independent researchers within the NMFS and the academic and private sector. CSFOP observers also tagged released sharks for NMFS's Apex Predator Program throughout the study period. Over time and concurrently with the above activities, the CSFOP adopted protocols that mirrored those of other federally supported national fishery observer programs, including protected species measures, observer training, wage standards, etc. As a result, the CSFOP became a hybrid program of fishery monitoring and biological research.

Methods

The Commercial Shark Fishery Observer Program relies on fisheries observers to collect an array of biological and fishery data from commercial bottom longline fishing vessels targeting large coastal sharks. Observers were hired by the University of Florida,

and were required to have at a minimum a bachelor's degree in biology (or related field). From 1994-2001, the CSFOP hired two full time observers and one part time observer. The full time observers entered and maintained the data collected during the season into an Access database. The part time observer only worked in the field and was employed solely during the designated fishing seasons. A total of 13 individual observers were employed by the CSFOP during this time period. The length of employment varied from one season to several years. From 2002-2005(1), two or three (depending on available funding) full time observers entered and maintained the database and one to four part time observers worked only in the field. A total of 21 individual observers were employed during these three years. The retention rate for observers was similar to the previous time period, ranging from one season to several years.

All observers were required to participate in a training session prior to their first deployment. Training sessions addressed the following areas: marine safety, sea turtle handling and resuscitation techniques, data collection and species identification. The marine safety, data collection and species identification sections were all taught in-house. The sea turtle handling techniques were taught by the NMFS SEFSC Miami laboratory protected species division, under the direction of Sheryan Epperly. Marine safety training followed closely the standards set forth by the Alaskan Marine Safety Education Association (AMSEA), and was taught in tandem during several sessions with the Pelagic Observer Program.

Species identification was a major component of the training sessions. The CSFOP used field guides, slides, and lectures in the classroom and preserved specimens in the laboratory. Three individuals, George Burgess, Franklin Snelson and Alexia Morgan, assisted the observers in specimen identification. This part of the training session was divided up over three days, and concluded with a laboratory practical and classroom identification session. The correct identification of several species, including the sandbar (*Carcharhinus plumbeus*), dusky (*Carcharhinus obscurus*), blacktip (*Carcharhinus limbatus*), spinner (*Carcharhinus brevipinna*) and hammerheads (great, *Sphyrna mokarran*; scalloped, *Sphyrna lewini*; and smooth, *Sphyrna zygaena*) was emphasized during training. Identification of these species can be problematic in the field and as such, observers were shown multiple key field identification characteristics, provided with additional field guides (including a self-produced hammerhead identification guide), and taught how to take pictures of key features on questionable specimens in the field so that they could be identified in the laboratory.

Data collection techniques were taught in the classroom using lectures, homework, and graded testing. Observers were taught how to identify shark and bycatch species to genus/species; properly measure and record lengths of sharks and bycatch determine sex of sharks; obtain and record GPS positions, water/air temperatures and depth, date, set length, number, size and type of hook, bait used, and target species; and record whether the shark was alive or dead when brought on board and its final disposition. These techniques were standardized over the duration of the program and were provided to the observers in the form of an observer manual. Observers were provided with a "tips and hints" laminated page addressing key procedures for easy use in the field.

During the period 1994-2001 observers were responsible for soliciting individual longline vessel operators for permission to ride on their vessel for the purpose of

observation. Since participation was entirely voluntary, operators could and often did decline an observer. The targeted observer coverage during this time period was 2 percent. Percent observer coverage was calculated by dividing the total number of large coastal sharks landed on observed trips by the total large coastal landings for the same time period (Cortes and Neer, 2003). Yearly coverage ranged from 0.9-3.3% during this time period, with the average being 1.6% (Table 1).

The program became mandatory in 2002, at which point the National Marine Fisheries Service's Highly Migratory Species division selected vessels for observer coverage. Vessels were selected by querying the NMFS logbook database of shark landings. Vessels identified as catching sharks in the database were matched with vessels holding current shark permits from the permit database. Those vessels, whose landings were represented by more than 25% shark from the same season of the previous year, were eligible for selection. A SAS program with a random number generator was used to select vessels by region. The number of vessels selected was based on the targeted number of observer sea days funded by NMFS (per. comm., Chris Rilling, NMFS HMS, Silver Spring, MD). Vessels selected during this time period were required to call the observer coordinator at least 48 hr prior to leaving on any trip where large coastal sharks were going to be targeted or caught incidentally using bottom longline fishing gear. Observers were deployed to vessels by the observer coordinator. The target number of observer sea days for a given season was derived from a projected 4-5% coverage rate. In order to carry an observer the vessels were required to have a Commercial Fishing Vessel Safety Decal, issued by the United States Coast guard, and to provide food and board equivalent to that of the crew. In addition to these Federally mandated rules, the CSFOP did not deploy observers aboard vessels below 30 ft in size, or on a ship with a crew that had a pronounced alcohol/drug abuse problem or other safety issues as reported by observers and documented by the CSFOP. Observation effort for the mandatory time period is only available for 2002 (2.5% Table 1) because 2003-2004 total large coastal landings for that time period is not yet available.

Data pertaining to the fishing gear used during individual bottom longline sets was collected prior to the start of each set. The size and number of hooks, time and latitude/longitude coordinates when the first and last hooks entered the water, bait used, and length of mainline were recorded by the observer during the setting of the gear. Soak time was calculated (automatically in the custom-designed observer database) from the time that the last hook entered the water until the first hook was removed from the water. Observers counted the hooks and determined their size prior to the set. The captains provided the length of the set mainline through their GPS or other computer system. Observers recorded latitude and longitude points from the vessel's GPS system. Loran points were converted in the laboratory using the Coast Guard POSAID2 ver 2.1a computer program. Depth was recorded using a Stowaway XTI temperature/depth recorder (Onset Computer Corporation), which was deployed on the mainline during the set and downloaded onto a laboratory computer.

Observers were required to record the following for sharks and bycatch: species, whether the animals were alive or dead when brought on board, disposition, and length. In addition observers recorded the sex and clasper length (males) for every shark that was caught. Sharks and bycatch were deemed alive if there was any response to stimuli. There were no varying degrees of alive. Disposition was identified and recorded by the

observer. Sharks that were kept and sold were considered “*carcassed*,” those that were kept and used on future sets for bait, “*bait*,” released alive, “*released*,” those returned to sea dead, “*discarded*,” those tagged with a NMFS dart tag, “*tagged*,” those brought back to land for use in museum collections, “*museum*,” and those utilized for any other purpose, “*other*.”

Summary Statistics

CSFOP observers documented the capture of 57,265 sharks, representing 34 species, between 1994 and 2005(1). The sandbar (35.3%) and Atlantic sharpnose (*Rhizoprionodon terraenovae*, 27.4%) shark were the two most commonly caught species followed by the tiger (*Galeocerdo cuvier*, 10.5%) and blacktip shark (9.0%). Nearly two-thirds (62.9%) of the total catch was represented by large coastal species. The sandbar shark represented over half of the large coastal catch (56.0%), with the tiger (16.85%) and blacktip (14.3%) sharks representing the second and third most commonly caught large coastal species, respectively. Eleven protected species were caught during this time period, representing just less than four percent (3.8%) of the total catch. Over three-quarters (76.7%) of the protected group catch and 2.9% of the total catch was dusky shark (Table 2).

The disposition for the sandbar and blacktip shark varied little between regions. Over ninety percent (94.5%) of all sandbar and blacktip (96.7%) sharks caught were carcassed and landed for sale. Sandbars that were not kept for sale were most commonly tagged (2.1%) or released (1.8%). Blacktip sharks not kept for sale were most commonly discarded (1.4%) or kept for bait (1.2%) (Table 3).

Conclusion

The CSFOP employed, trained and deployed fisheries observers that monitored the commercial bottom longline fishery from 1994-2005(1). Training (except for protected species training), data entry and management all took place at the Florida Museum of Natural History on the University of Florida campus. Observers were required to collect data on the fishing gear, effort and species composition on all bottom longline sets during a trip, and to record biological life history data and acquire biological specimens. During this time period a total of 57,265 sharks representing 34 species in all five-management units were observed. The commercially important sandbar and blacktip shark represented the first and fourth most commonly captured species, respectively, with more than 90% retained and carcassed for sale.

Acknowledgments

We thank the many observers who worked under often very trying conditions and the commercial fishers who allowed them to collect badly needed data. We also are grateful of the observer-technicians who proofed, entered and provided preliminary analyses of the field data. Although too many to name individually, we greatly appreciate your considerable efforts.

Literature Cited

Cortes, E. and Neer, J.A. 2003. Updated catches of sharks. 2002 Shark Evaluation Workshops, Panama City, Florida. SB-02-15. 9 pages +15 tables +26 figures.

Table 1. The percent observed of landed large coastal sharks caught in the commercial bottom longline large coastal shark fishery between 1994 and 2005(1).

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
EGM (CSFOP observed)	149	1022	677	335	386	843	0	477	896	987	782	310
SA (CSFOP observed)	698	810	503	403	806	552	658	825	1516	2805	2464	354
MAB (CSFOP observed)	1275	1893	1507	1063	2634	979	0	1815	517	885	536	0
Total (CSFOP observed)	2122	3725	2687	1801	3826	2374	658	3117	2929	4677	5786	2669
NMFS total	228000	222400	160600	130600	174900	111500	111200	95700	118000	na	na	na
% observed CSFOP	0.9%	1.7%	1.7%	1.4%	2.2%	2.1%	0.6%	3.3%	2.5%			
Average 1994-2001	1.6											

Table 2. Observed species composition for the commercial bottom longline large coastal shark fishery between 1994 and 2005(1).

Species	EGM	MAB	SA	Total	% Mgmt.	% Total catch
Large Coastal						
<i>Carcharhinus plumbeus</i> , sandbar shark	5561	11925	4860	22346	51.28	34.15
<i>Galeocerdo cuvier</i> , tiger shark	1088	2044	3875	7007	16.08	10.71
<i>Carcharhinus limbatus</i> , blacktip shark	4205	366	1680	6251	14.34	9.55
<i>Carcharhinus obscurus</i> , dusky shark*	58	1468	181	1707	3.92	2.61
<i>Ginglymostoma cirratum</i> , nurse shark	1162	7	471	1640	3.76	2.51
<i>Sphyrna lewini</i> , scalloped hammerhead	554	213	256	1023	2.35	1.56
<i>Carcharhinus leucas</i> , bull shark	699	45	76	820	1.88	1.25
<i>Carcharhinus brevipinna</i> , spinner shark	598	47	110	755	1.73	1.15
<i>Carcharhinus falciformis</i> , silky shark	340	21	255	616	1.41	0.94
<i>Sphyrna mokarran</i> , great hammerhead	302	34	130	466	1.07	0.71
<i>Negaprion brevirostris</i> , lemon shark	350	11	33	394	0.90	0.60
<i>Carcharius taurus</i> , sandtiger shark*	0	352	31	383	0.88	0.59
<i>Carcharhinus signatus</i> , night shark*	45	0	46	91	0.21	0.14
<i>Carcharhinus altimus</i> , bignose shark*	16	11	7	34	0.08	0.05
<i>Carcharhinus perezi</i> , Caribbean reef shark*	13	3	4	20	0.05	0.03
<i>Carcharodon carcharias</i> , white shark*	2	1	15	18	0.04	0.03
<i>Sphyrna zygaena</i> , smooth hammerhead	0	0	6	6	0.01	0.01
<i>Carcharhinus galapagensis</i> , Galapagos shark*	0	0	2	2	0.00	0.00
Total	14993	16548	12038	43579	100.00	66.59
Small Coastal						
<i>Rhizoprionodon terraenovae</i> , Atlantic sharpnose shark	3459	2628	11810	17897	85.37	27.35
<i>Carcharhinus acronotus</i> , blacknose shark	1843	42	1014	2899	13.83	4.43
<i>Carcharhinus isodon</i> , finetooth shark	79	1	6	86	0.41	0.13
<i>Sphyrna tiburo</i> , bonnethead shark	24	0	56	80	0.38	0.12
<i>Squantina dumerili</i> , angel shark*	0	1	0	1	0.00	0.00
Total	5405	2672	12886	20963	100.00	32.03
Pelagic						
<i>Isurus oxyrinchus</i> , shortfin mako shark	5	6	3	14	26.42	0.02
<i>Hexanchus griseus</i> , sixgill shark*	9	0	1	10	18.87	0.02
<i>Heptranchias perlo</i> , sevengill shark	9	0	0	9	16.98	0.01
<i>Alopias vulpinus</i> , common thresher shark	0	1	8	9	16.98	0.01
<i>Alopias superciliosus</i> , bigeye thresher shark*	4	0	4	8	15.09	0.01
<i>Hexanchus vitulus</i> , big-eye sixgill shark*	3	0	0	3	5.66	0.00
Total	30	7	16	53	100.00	0.08
Dogfish						
<i>Mustelus canis</i> , smooth dogfish	226	426	77	729	90.22	1.11
<i>Mustelus norrisi</i> , Florida smoothhound	39	0	2	41	5.07	0.06
Table 2 (cont.).	21	0	0	21	2.60	0.03

Mustelus						
<i>Squalus acanthias</i> , spiny dogfish	0	1	7	8	0.99	0.01
<i>Squalus asper</i> , roughskin spiny dogfish	6	0	0	6	0.74	0.01
Squalus	3	0	0	3	0.37	0.00
Total	295	427	86	808	100.00	1.23
Other						
Carcharhinus	10	5	5	20	51.28	0.03
Unidentified	4	4	5	13	33.33	0.02
Carcharhinus	3	0	0	3	7.69	0.00
Unidentified	2	0	1	3	7.69	0.00
Total	19	9	11	39	100.00	0.06
TOTAL	20742	19663	25037	65442		
* prohibited species						

Table 3. Observed disposition for the sandbar (*Carcharhinus plumbeus*) and blacktip (*Carcharhinus limbatus*) sharks caught in the commercial bottom longline large coastal shark fishery between 1994 and 2005(1).

Sandbar			Blacktip		
Eastern Gulf of Mexico			Eastern Gulf of Mexico		
Disposition	Number	Percentage	Disposition	Number	Percentage
Bait	1	0.02	Bait	57	1.36
Carcass	5365	96.48	Carcass	4039	96.12
Discard	68	1.22	Discard	75	1.78
Display	0	0.00	Display	0	0.00
Escape	45	0.81	Escape	7	0.17
Museum	0	0.00	Museum	0	0.00
Other	2	0.04	Other	0	0.00
Release	44	0.79	Release	14	0.33
Tagged	36	0.65	Tagged	10	0.24
Total	5561	100.00	Total	4202	100.00
Mid Atlantic			Mid Atlantic		
Bait	22	0.18	Bait	3	0.82
Carcass	11151	93.51	Carcass	363	99.18
Discard	40	0.34	Discard	0	0.00
Display	0	0.00	Display	0	0.00
Escape	59	0.49	Escape	0	0.00
Museum	1	0.01	Museum	0	0.00
Other	7	0.06	Other	0	0.00
Release	277	2.32	Release	0	0.00
Tagged	368	3.09	Tagged	0	0.00
Total	11925	100.00	Total	366	100.00
Southern Atlantic			Southern Atlantic		
Bait	3	0.06	Bait	3	0.18
Carcass	4693	96.56	Carcass	1648	98.10
Discard	48	0.99	Discard	11	0.65
Display	18	0.37	Display	15	0.89
Escape	42	0.86	Escape	1	0.06
Museum	1	0.02	Museum	0	0.00
Other	2	0.04	Other	2	0.12
Release	45	0.93	Release	0	0.00
Tagged	8	0.16	Tagged	0	0.00
Total	4860	100.00	Total	1680	100.00
All regions			All regions		
Bait	26	0.12	Bait	63	1.01
Carcass	21209	94.91	Carcass	6050	96.83
Discard	156	0.70	Discard	86	1.38
Display	18	0.08	Display	15	0.24
Escape	146	0.65	Escape	8	0.13
Museum	2	0.01	Museum	0	0.00
Other	11	0.05	Other	2	0.03

Table 3 (cont).

Release	366	1.64	Release	14	0.22
Tagged	412	1.84	Tagged	10	0.16
Total	22346	100.00	Total	6248	100.00

Table 1. Number of observed sets by year and region from the commercial bottom longline large coastal shark fishery between 1994 and 2005 (1).

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<i>EGM</i>												
Season 1	27	21	24	22	30	11	0	20	10	37	28	21
Season 2	19	32	16	4	8	20	0	3	54	45	42	0
Total	46	53	40	26	38	31	0	23	64	82	70	21
<i>SA</i>												
Season 1	4	37	45	25	32	27	25	27	26	49	23	13
Season 2	11	32	20	7	13	25	39	4	35	30	12	0
Total	15	69	65	32	45	52	64	31	61	79	35	13
<i>MAB</i>												
Season 1	22	23	17	15	22	5	0	11	0	18	9	0
Season 2	18	18	7	9	5	11	0	12	14	2	10	0
Total	40	41	24	24	27	16	0	23	14	20	19	0

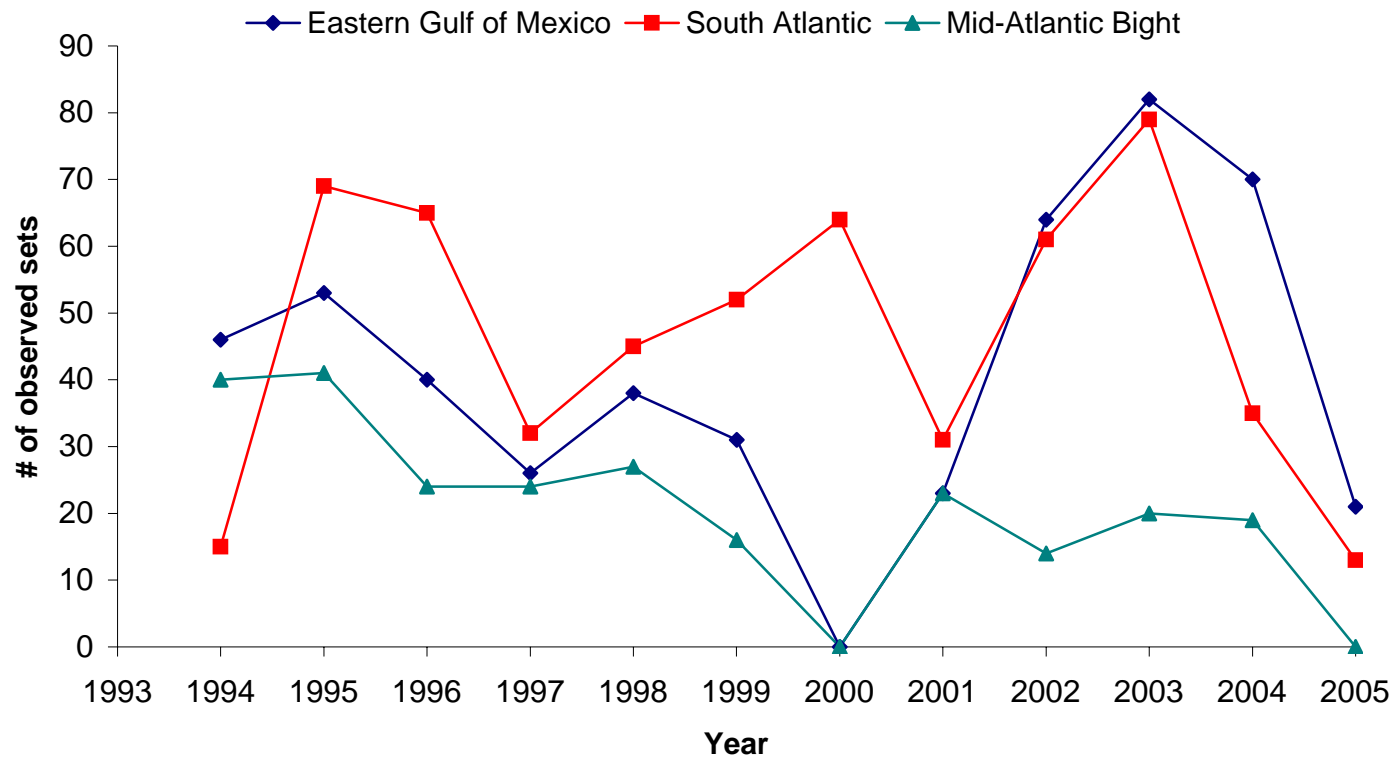


Figure 1. Total number of sets observed by year and region from the commercial bottom longline large coastal shark fishery between 1994 and 2005 (1).

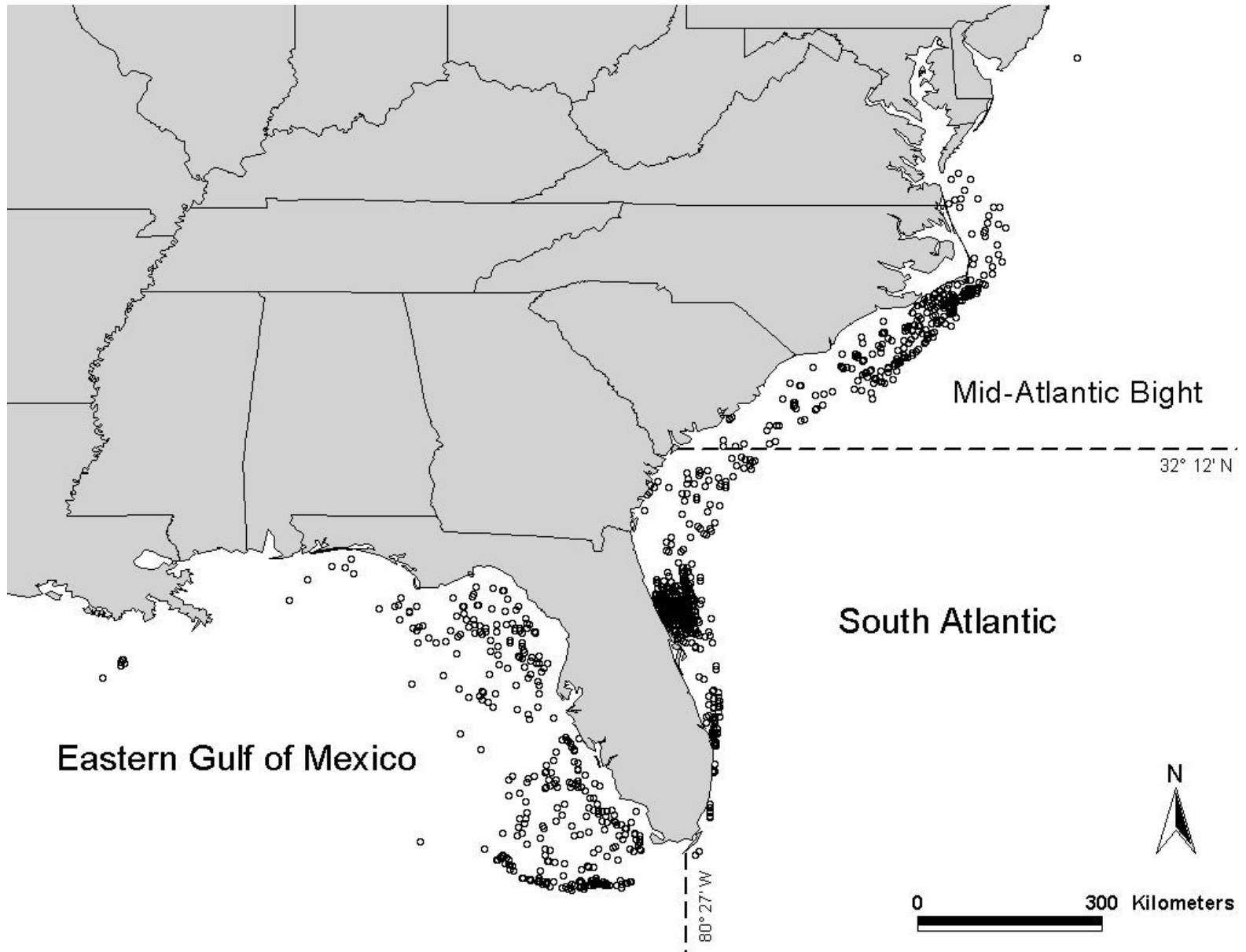


Figure 2. Distribution of observed sets in the commercial large coastal shark bottom longline fishery between 1994 and 2003.