Preliminary tag and recapture data of small coastal sharks (Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, blacknose shark, *Carcharhinus acronotus*, bonnethead shark, *Sphyrna tiburo*, and finetooth shark, *C. isodon*) in the northeastern Gulf of Mexico

Dana M. Bethea
Lisa Hollensead
John K. Carlson

NOAA, National Marine Fisheries Service
Southeast Fisheries Science Center
Panama City Laboratory
Shark Population Assessment Group
3500 Delwood Beach Road
Panama City Beach, FL 32408

Summary

Tag and recapture information from the NOAA Fisheries Cooperative Gulf of Mexico States Shark Pupping and Nursery (GULFSPAN) survey at the Panama City Laboratory from 1994 to 2006 are summarized for the Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, blacknose shark, *Carcharhinus acronotus*, bonnethead shark, *Sphyrna tiburo*, and finetooth shark, *C. isodon*, in the northeastern Gulf of Mexico. Summary information includes number of males and females tagged by life stage, number of sharks recaptured, overall recapture rates by species, time at liberty, and distance traveled.

Background

From 1993-2002, the Shark Population Assessment Group at the NOAA Fisheries Panama City Laboratory executed a fishery-independent assessment of juvenile sharks in coastal areas of the northeast Gulf of Mexico. In 2003, the NOAA Fisheries Cooperative Gulf of Mexico States Shark Pupping and Nursery (GULFSPAN) survey was formed in order to help understand the dynamics of sharks in coastal areas. This survey is ongoing and funded by the NOAA Highly Migratory Species Office. The Shark Population Assessment Group has played an important role in this survey, tagging over three-thousand sharks in the northeast Gulf of Mexico since 1994.

Materials and Methods

The purpose of this document is to summarize tag and recapture information for small coastal sharks collected from fishery-independent surveys at the Panama City Laboratory covering the period 1994-2006. Data includes 1) numbers of sharks tagged by species, sex, and life stage, 2) numbers of sharks recaptured by species and sex, 3) overall recapture rate, 4) time at liberty, and 5) distance traveled. Surveys were modeled after those developed by Carlson and Brusher (1999). Summary information of the GULFSPAN survey can be found in Carlson et. al (2003), Carlson et. al (2004), Bethea et. al (2006), and Bethea et. al (In Prep).

The Shark Population Assessment Group uses two types of tags: 1) a dart tag (7, 10, and 18 cm long; Floy Tag Manufacturing), placed in the flesh at the base of the first dorsal fin, and 2) a roto-tag (4.5 cm long; Premier Tags), punched through the cartilage of the first dorsal fin. Until recently, the group used 18 cm dart tags provided by NOAA Fisheries Narragansett Lab. This report does not reflect sharks tagged or recaptured with those tags.

Before a tagged shark is released, species, size (fork length, FL, in cm), sex, life stage (young-of-the-year, juvenile, or adult), tag number, and location (latitude, longitude) is recorded. When a tagged shark is recaptured, similar information is asked of the fishermen. For this report, time at liberty is calculated as the number of days between release and recapture. Distance traveled is measured in kilometers and calculated as a straight line between release and recapture sites (assuming the earth is a perfect sphere with a radius of 6378.0 km).

Results and Discussion

Atlantic sharpnose shark, *Rhizoprionodon terraenovae*

Tagging Data

A total of 1425 Atlantic sharpnose sharks were tagged by the Shark Population Assessment Group from 1994-2006. Of those, 1242 were collected using gillnet and 183 were collected using longline. Of the 1421 fish of known sex, 1071 (75.4 %) were male and 350 (24.6 %) were female. For males, 74 (6.9 %) were young-of-the-year, 393 (36.7 %) were juveniles, and 604 (56.4 %) were adults. For females, 60 (17.1 %) were young-of-the-year, 269 (76.9 %) were juveniles, and 21 (6.0 %) were adults (Table 1).

The average size for tagged male and female young-of-the-year Atlantic sharpnose was 37.8 cm FL (range 26-58 cm FL) and 37.0 cm FL (26-54 cm FL), respectively. Tagged juvenile males averaged 55.7 cm FL (39-81 cm FL) while tagged juvenile females averaged 52.2 cm FL (39-70 cm FL). The average sizes of tagged adults were 75.5 cm FL (65-87 cm FL) and 75.6 cm FL (50-91 cm FL) for males and females, respectively.

Recapture Data

From 1994-2006, recapture data was collected for 50 Atlantic sharpnose sharks for an overall recapture rate of 3.5 % (Table 1). Data on these fish were returned by recreational anglers using hook and line (68.0 %), GULFSPAN surveys using gillnet (26.0 %), and commercial fishermen (6.0 %) (Tables 2-4).

Four Atlantic sharpnose sharks were at liberty for longer than 3 years (Table 2). All four of these sharks were male and both tagged and recaptured in Crooked Island Sound, FL. The shark at liberty the longest was tagged on October 4, 1993, and recaptured 2461 days later on June 14, 2000 (Table 2). Majority of sharks (34 of 50) were recaptured within the same bay system where they were tagged. Of those 34, 31 were recaptured <1 km from where they were originally released (Tables 2-4). The longest distance traveled was 399.6 km by a juvenile female tagged in Crooked Island Sound, FL, and recaptured 50 mi south of Venice, LA (Table 3). All Atlantic sharpnose sharks were recaptured in US waters of the Gulf of Mexico (Tables 2-4).

Blacknose shark, *Carcharhinus acronotus*

Tagging Data

A total of 89 blacknose sharks were tagged from 1994-2006; 69 were collected using gillnet and 20 were collected using longline. Of those tagged, 30 (33.7 %) were male and 59 (66.3 %) were female. For males, 11 (36.7 %) were young-of-the-year, 8 (26.6 %) were juveniles, and 11 (36.7 %) were adults. For females, 19 (32.2 %) were young-of-the-year, 28 (47.5 %) were juveniles, and 12 (20.3 %) were adults (Table 5).

The average sizes of tagged young-of-the-year were 41.1 cm FL (range 36-48 cm FL) and 40 cm FL (32-51 cm FL) for males and females, respectively. The average size for tagged male and female juvenile blacknose sharks was 62.6 cm FL (50-80 cm FL) and 61.3 cm FL (49-88 cm FL), respectively. Tagged adult males averaged 90.9 cm FL (84-97 cm FL) while tagged adult females averaged 95.5 cm FL (83-107 cm FL).

Recapture Data

Six blacknose sharks were recaptured from 1994-2006 for an overall recapture rate of 6.7 % (Table 5). Data on these fish were returned by recreational anglers using hook and line (66.7 %) and GULFSPAN surveys using gillnet (33.3 %) (Table 6-7).

The blacknose shark at liberty the longest was a female tagged on June 3, 1994 in Crooked Island Sound, FL, and recaptured 1821 days later on May 29, 1999 in St. Andrew Bay, FL (Table 6). For the most part, blacknose shark were recaptured relatively close to where they were tagged (all recapture locations <35 km from tagging locations). The longest distance traveled was 32.2 km by a juvenile tagged in Crooked Island Sound, FL, and recaptured offshore of Panama City Beach, FL (Table 7). All blacknose sharks were recaptured in US waters of the Gulf of Mexico (Tables 6, 7).

Bonnethead shark, *Sphyrna tiburo*

Tagging Data

A total of 481 bonnethead sharks were tagged in surveys from 1994-2006. All except one were collected using gillnet. The other was collected using longline. Of those, 207 (43 %) were male and 274 (57 %) were female. For males, 24 (11.6 %) were young-of-the-year, 81

(39.1 %) were juveniles, and 102 (49.3 %) were adults. For females, 33 (12 %) were young-of-the-year, 97 (35.4 %) were juveniles, and 144 (52.6 %) were adults (Table 8).

Tagged young-of-the-year males averaged 39.6 cm FL (range 35-48 cm FL) while tagged young-of-the-year females averaged 41.7 cm FL (33-60 cm FL). The average sizes of tagged juveniles were 55.2 cm FL (39-77 cm FL) and 60.4 cm FL (39-82 cm FL) for males and females, respectively. The average size for tagged male and female adult bonnethead sharks was 68.9 cm FL (57-82 cm FL) and 82.7 cm FL (65-96 cm FL), respectively.

Recapture Data

Eight bonnethead sharks were recaptured from 1994-2006 for an overall recapture rate of 1.7 % (Table 8). Data on these fish were returned by GULFSPAN surveys using gillnet (37.5 %), recreational fishermen using hook and line and trammel net (25.0 %), commercial fishermen using trawl (12.5 %), colleagues at Mote Marine Labs using gillnet (12.5 %), and colleagues at NOAA Fisheries Panama City Lab using hook and line (12.5 %) (Tables 9-11).

The bonnethead shark at liberty the longest was also the shark the moved the greatest distance. A bonnethead tagged on the gulf-side of St. Vincent Island, FL, on October 11, 1993, traveled 342.6 km to be recaptured 617 days later on June 21, 1995 south of Cedar Key, FL (Table 11). One other bonnethead showed the same southwest movement. It was tagged on the gulf-side of St. Vincent Island, FL, on October 11, 1993 and was recaptured 222 days later on May 22, 1994 at the mouth of the Suwannee River, FL. All bonnethead sharks were recaptured in US waters of the Gulf of Mexico (Tables 9-11).

Finetooth shark, *Carcharhinus isodon*

Tagging Data

Three hundred and thirty-three (333) finetooth sharks were tagged from 1994-2006. Of those, 323 were collected using gillnet and 10 were collected using longline and 179 (53.8 %) were male and 154 (46.2 %) were female. For males, 17 (9.5 %) were young-of-the-year, 87 (48.6 %) were juvenile, and 75 (41.9 %) were adult. For females, 16 (10.4 %) were young-of-the-year, 87 (56.5 %) were juvenile, and 51 (33.1 %) were adult (Table 12).

The average size for tagged male and female young-of-the-year bonnethead sharks was 50.9 cm FL (range 39-71 cm FL) and 51.9 cm FL (42-55 cm FL), respectively. Tagged juvenile males averaged 85.8 cm FL (56-101 cm FL) while tagged juvenile females averaged 86.8 cm FL (58-117 cm FL). The average sizes of tagged adults were 101.9 cm FL (87-130 cm FL) and 108.2 cm FL (91-125 cm FL) for males and females, respectively.

Recapture Data

A total of 9 finetooth sharks were recaptured from 1994-2006 for an overall recapture rate of 2.7 % (Table 12). Data on these fish were returned by recreational fishermen using hook and line (77.8 %), GULFSPAN surveys using gillnet (11.1 %), and commercial fishermen using bottom longline (11.1 %) (Tables 13-15).

The finetooth shark at liberty the longest was a male tagged on August 23, 2001, in Crooked Island Sound, FL, and recaptured 1167 days later on November 2, 2004 near Cape San Blas, FL (Table 13). Recaptured finetooth sharks traveled longer distances to different locations than any small coastal shark tagged by surveys at the NOAA Fisheries Panama City Laboratory. The longest distance traveled was 333.4 km by an adult male tagged on the gulf-side of St.

Vincent Island, FL, and recaptured offshore of Venice, FL (Table 13). Other tagged finetooth were recaptured off Biloxi, MS (309.0 km traveled, 814 days at large), the mouth of the Ochlockonee River, FL (88.5 km, 467 days), the west end of Panama City Beach, FL (64.4 km, 239 days), and Cape San Blas, FL (13.9 km, 489 days and 13.9 km, 305 days). All finetooth sharks were recaptured in US waters of the Gulf of Mexico (Tables 13-15).

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Table 1. Atlantic sharpnose sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Sex	Life Stage		Number Tagged	Number Recaptured	Recapture Rate
Male	Young-of-the-year		74		
	Juvenile		393		
	Adult		604		
		n	1071	32	2.9 %
Female	Young-of-the-year		21		
	Juvenile		269		
	Adult		60		
		n	350	8	2.3 %
Unknown	Juvenile		3		
	Adult		1		
		n	4	10	
		Total	1425	50	3.5 %

Table 2. Recapture information for male Atlantic sharpnose sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
GULFSPAN	2461	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	1816	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	1476	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	1352	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	793	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	744	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	719	1.6, W	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	696	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	609	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	406	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	360	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	315	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	218	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	218	24.1, E	St. Vincent Island, FL	St. George Island, FL
GULFSPAN	140	19.3, E	Crooked Island Sound, FL	14142.2 46908.1 (LORAN)
Recreational Angler	101	8.1, E	St. Vincent Island, FL	St. George Island, FL
Recreational Angler	75	37.0, W	Crooked Island Sound, FL	St. Andrew Bay, FL
Recreational Angler	67	27.8, W	Crooked Island Sound, FL	St. Andrew State Park, FL (Pier)
Recreational Angler	67	<1	St. Joe bay, FL	St. Joe Bay, FL
Recreational Angler	57	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	37	5.1, E	St. Vincent Island, FL	St. Vincent Island, FL
Recreational Angler	35	169.4, W	Crooked Island Sound, FL	Pensacola Beach, FL (Pier)
GULFSPAN	34	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	30	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	25	3.8, W	St. Andrew Bay, FL	St. Andrew Bay, FL (Near Pass)
Recreational Angler	20	8.8, E	St. Joe bay, FL	St. Joe Bay, FL
Recreational Angler	19	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	16	<1	St. Joe bay, FL	St. Joe Bay, FL
Recreational Angler	10	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	9	<1	St. Joe bay, FL	St. Joe Bay, FL
Recreational Angler	8	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	5	<1	St. Andrew Bay, FL	St. Andrew Bay, FL

Table 3. Recapture information for female Atlantic sharpnose sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	437	399.6, SW	Crooked Island Sound, FL	50 mi S of Venice, LA
Recreational Angler	228	321.9, SW	Crooked Island Sound, FL	Offshore Gulfport, MS
Recreational Angler	37	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	32	4.6, W	Crooked Island Sound, FL	Offshore Panama City, FL
Recreational Angler	12	32.2, E	Crooked Island Sound, FL	St. Joe Bay, FL
Recreational Angler	9	<1	West Pass Apalachicola Bay, FL	West Pass Apalachicola Bay, FL
Recreational Angler	8	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	3	<1	Crooked Island Sound, FL	Crooked Island Sound, FL

Table 4. Recapture information for Atlantic sharpnose sharks with unknown sex tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	359	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	260	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	252	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	246	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	240	34.8, E	Crooked Island Sound, FL	St. Joe Bay, FL
Commercial Fisherman	6	--	Crooked Island Sound, FL	--
Commercial Fisherman	1	--	Crooked Island Sound, FL	--
GULFSPAN	--	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
Recreational Angler	--	<1, E	St. Vincent Island	West Pass Apalachicola Bay, FL
Commercial Fisherman	--	--	--	Crooked Island Sound, FL

Table 5. Blacknose sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Sex	Life Stage	Number Tagged	Number Recaptured	Recapture Rate
Male	Young-of-the-year	8		
	Juvenile	11		
	Adult	11		
	n	30	0	0.0 %
Female	Young-of-the-year	28		
	Juvenile	19		
	Adult	12		
	n	59	2	3.4 %
Unknown	**n**	--	4	
	Total	89	6	6.7 %

Table 6. Recapture information for female blacknose sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	18	<1	St. Andrew Bay, FL	St. Andrew Bay, FL
Recreational Angler	14	<1	Crooked Island Sound, FL	Crooked Island Sound, FL

Table 7. Recapture information for blacknose sharks with unknown sex tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
GULFSPAN	1821	25.9, E	St. Andrew Bay, FL	Crooked Island Sound, FL
Recreational Angler	1441	27.8, S	Crooked Island Sound, FL	Offshore Mexico Beach, FL
GULFSPAN	5	--	Crooked Island Sound, FL	--
Recreational Angler	90	32.2, W	Crooked Island Sound, FL	Offshore Panama City Beach, FL

Table 8. Bonnethead sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Sex	Life Stage		Number Tagged	Number Recaptured	Recapture Rate
Male	Young-of-the-year		24		
	Juvenile		81		
	Adult		102		
		n	207	1	0.5 %
Female	Young-of-the-year		33		
	Juvenile		97		
	Adult		144		
		n	274	2	0.7 %
Unknown		**n**	--	5	
		Total	481	8	1.7 %

Table 9. Recapture information for male bonnethead sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
NOAA Fisheries PC Lab	141	21.5, NW	Crooked Island Sound, FL	St. Andrew Bay, FL

Table10. Recapture information for female bonnethead sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	82	<1	Crooked Island Sound, FL	Crooked Island Sound, FL
GULFSPAN	1	<1	Crooked Island Sound, FL	Crooked Island Sound, FL

Table 11. Recapture information for bonnethead sharks with unknown sex tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Mote Marine Labs	617	342.6, SE	St. Vincent Island, FL	15 mi SE Cedar Key, FL
Commercial Fisherman	224	--	St. Andrew Bay, FL	--
GULFSPAN	223	<1	St. Andrew bay, FL	St. Andrew Bay, FL
Recreational Angler	222	223.9, SE	St. Vincent Island, FL	Mouth of Suwannee River, FL
GULFSPAN	1	<1	Crooked Island Sound, FL	Crooked Island Sound, FL

Table 12. Finetooth sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Sex	Life Stage		Number Tagged	Number Recaptured	Recapture Rate
Male	Young-of-the-year		17		
	Juvenile		87		
	Adult		75		
		n	179	3	1.7 %
Female	Young-of-the-year		16		
	Juvenile		87		
	Adult		51		
		n	154	4	2.6 %
Unknown		**n**	--	2	
		Total	333	9	2.7 %

Table 13. Recapture information for male finetooth sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	1167	48.3, SE	Crooked Island Sound, FL	Cape San Blas, FL
Commercial Fisherman	358	333.4, SE	St. Vincent Island, FL	Offshore Venice, FL
Recreational Angler	239	64.4, NW	St. Vincent Island, FL	West End Panama City Beach, FL

Table 14. Recapture information for female finetooth sharks tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	814	309.0, NW	St. Vincent Island, FL	9 mi S Biloxi, MS
Recreational Angler	489	13.9, NW	St. Vincent Island, FL	Cape San Blas, FL
Recreational Angler	467	88.5, NE	St. Vincent Island, FL	Mouth of Ochlockonee River, FL
Recreational Angler	304	9.3, NE	St. Vincent Island, FL	St. George Island, FL

Table 15. Recapture information for finetooth sharks with unknown sex tagged by NOAA NMFS GULFSPAN survey at the Panama City Laboratory, 1994-2006.

Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
Recreational Angler	305	13.9, NW	St. Vincent Island, FL	Cape San Blas, FL
GULFSPAN	88	<1	St. Vincent Island, FL	St. Vincent Island, FL