Tag and recapture data for blacknose, *Carcharhinus acronotus*, sandbar, *C. plumbeus*, and dusky shark, *C. obscurus*, as kept in the NOAA Fisheries Southeast Fisheries Science Center Elasmobranch Tagging Management System, 1999-2009

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Summary

Tag and recapture information for blacknose, *Carcharhinus acronotus*, sandbar, *C. plumbeus*, and dusky shark, *C. obscurus*, is summarized from the NOAA Fisheries Cooperative Gulf of Mexico States Shark Pupping and Nursery (GULFSPAN) survey at the Panama City Laboratory from 1999-2009 and the NOAA Fisheries Mississippi Laboratories bottom and pelagic longline cruises 2004-2009. Summary information includes number of males and females tagged by life stage, number of sharks recaptured, and overall recapture rate, time at liberty, and distance traveled per recaptured individual.

Background

The Panama City Laboratory and Mississippi Laboratories of the NOAA Southeast Fisheries Science Center (SEFSC) and the Cooperative Shark Tagging Program (CSTP) at the NOAA Northeast Fisheries Science Center (NEFSC) have tagged over eleven-thousand elasmobranchs in the Gulf of Mexico and US southeast Atlantic Ocean since 1994.

The creation of the Gulf of Mexico State Shark Pupping and Nursery (GULFSPAN) survey in 2003 greatly expanded the elasmobranch tagging effort in the northeast Gulf of Mexico. Because this survey was headed by the Shark Population Assessment Group at the NOAA Fisheries Panama City Laboratory, the contact information on tags pointed to the NOAA Fisheries Panama City Laboratory. That same year, NOAA Mississippi Laboratories ceased using M-tags whose contact information pointed to the NOAA Northeast Fisheries Science Center. Instead, scientists began tagging elasmobranchs with M- and roto-tags that pointed to the NOAA Fisheries Panama City Laboratory. By 2006, all GULFSPAN participants and the two NMFS observer programs housed at the Panama City Laboratory (Bottom Longline and Gillnet) were supplied with tags whose contact information pointed to the NOAA Fisheries Panama City Laboratory. In 2009, a survey modeled after the Mississippi Laboratories bottom longline survey began in Texas (Texas Parks and Wildlife Department) and was supplied with tags. Tags are not supplied to recreational or commercial fisherman to avoid species identification and measurement errors. The primary goal of this ongoing tagging cooperative is to gain information on migration routes, growth rates, stock identity, and population dynamics of elasmobranch species in the Gulf of Mexico and southeast Atlantic Ocean.

Recognizing the need to standardize data collection, we developed an elasmobranch tagging management system for NOAA SEFSC. The ultimate goal of the database is to provide managers, researchers, and the public involved in elasmobranch research in the Gulf of Mexico and southeast Atlantic Ocean with a system to archive and recall elasmobranch tag and recapture data.

Materials and Methods

The purpose of this document is to summarize tag and recapture information for blacknose, sandbar, and dusky sharks collected from fishery-independent surveys at NOAA Fisheries Panama City and Mississippi Laboratories and covering the period 1999-2009. 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 for recaptured individuals.

GULFSPAN surveys were modeled after those developed by Carlson and Brusher (1999) and summary information can be found in Carlson et al. (2003), Carlson et al. (2004), Bethea et al. (2006), Bethea et al. (2007), Bethea et al. (2008), Bethea et al. (2009), and Bethea et al. (2010). Summary information of the Mississippi Laboratories surveys can be found in Cruise Results OT-04-04 (260), OT-05-02 (263), OT-05-05 (266), OT-05-06 (267), 0T-06-02 (269), 0T-06-04 (272), 0T-07-04 (277), 0T-08-05 (283), R2-09-04 (288), 09-05 (56), 72/0403, and 72/0404. Summary information for the Texas Parks & Wildlife Department can be found via personal communication with Fernando Martinez-Andrade (Coastal Fisheries Division, Texas Parks and

Wildlife Department, Fernando.Martinez-Andrade@tpwd.state.tx.us) as this survey is in its infant stages and no formal cruise reports have been submitted.

The SEFSC uses 4 basic types of tags: 1) dart tags (plastic-tipped 7 and 10 cm, and metal-tipped 18 cm long; ©Floy Tag & Mfg., Inc.), placed in the cartilage at the base of the first dorsal fin of sharks, 2) roto-tags (4.5 cm long; ©Premier1Supplies), punched through the cartilage of the first dorsal fin of sharks, 3) cinch-loop tags (©Hallprint Pty Ltd.) looped through the spiracle of rays, and 4) electronic tags (PIT tags, ©Digital Angel; satellite tags, ©Wildlife Computers; and acoustic tags, ©VEMCO). Some animals are tagged with more than one type of tag.

Before a tagged animal is released, species, size (in the case of sharks, pre-caudal, PCL, total, TL, and 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 animal 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). Herein, lengths are reported as FL.

Results and Discussion

Blacknose shark, *Carcharhinus acronotus*

Tagging Data

A total of 466 blacknose sharks are present in the tagging database from 1999-2009. Of those tagged, 270 (58 %) are male, 193 (41 %) are female, and 3 (1 %) have no recorded sex. In the

case where FL was not recorded upon the tagging event, length was reconstructed using regression analysis of GULFSPAN data (1994-2008, n = 245, FL = 0.8412*TL - 1.2597, R^2 = 0.99). Animals less than 41 cm FL (50 cm TL) are considered young-of-the-year and animals greater than 83 cm FL (100 cm TL) are considered mature based on SEDAR-13-DW-17. Those in between are considered juvenile. For males, 11 (4 %) are young-of-the-year, 75 (28 %) juvenile, 182 (67 %) mature, and 2 (1 %) have an undetermined maturity state because no length was recorded at time of tagging. For females, 21 (11 %) are young-of-the-year, 75 (39 %) juvenile, and 97 (50 %) mature (Table 1).

The average size of tagged young-of-the-year was 38.8 cm FL (range 35.5-40.0 cm FL) for males and 37.2 cm FL (32.0-40.0 cm FL) for females. The average size for tagged male and female juvenile blacknose sharks was 69.8 cm FL (43.0-83.0 cm FL) and 64.9 cm FL (41.0-83.0 cm FL), respectively. Tagged adult males averaged 90.5 cm FL (83.5-104.9 cm FL) while tagged adult females averaged 94.2 cm FL (83.1-109.0 cm FL).

Recapture Data

Three blacknose sharks are recorded as recaptured in the database from 1999-2009 for an overall recapture rate of 0.64 % (Table 1). Data was returned by recreational anglers using hook and line (Table 2). For recapture data on blacknose prior to 1999, see SEDAR-13-DW-03.

The blacknose shark at liberty the longest was a female tagged 17 May 2005 in St. Joseph Bay, FL, and recaptured 798 days later in the same bay. All animals were recaptured relatively close

to where they were tagged. Two were recaptured in the same bay where they were tagged and the other was recaptured off Texas only 21.6 km northwest from where it was tagged (Table 2).

Sandbar shark, *Carcharhinus plumbeus*

Tagging Data

A total of 172 sandbar sharks are present in the tagging database from 1999-2009. Of those tagged, 82 (48 %) are male, 89 (52 %) are female, and 1 (<1 %) has no recorded sex. In the case where FL was not recorded upon the tagging event, length was reconstructed using the regression formula presented in Kohler (1995). Based on SEDAR-21-DW-06, animals less than 60 cm FL are considered young-of-the-year and animals greater than 155 cm FL are considered mature. Those in between are considered juvenile. For males, 6 (7 %) are young-of-the-year, 63 (77 %) juvenile, and 13 (16 %) mature. For females, 5 (6 %) are young-of-the-year, 50 (56 %) juvenile, and 34 (38 %) mature. One mature animal of unknown sex was tagged (FL = 160 cm) (Table 3).

The average size of tagged young-of-the-year is 48.3 cm FL (range 43.0-53.5 cm FL) for males and 52.0 cm FL (47.0-59.0 cm FL) for females. The average size of tagged male and female juvenile sharks was 128.1 cm FL (69.0-154.0 cm FL) and 120.0 cm FL (67.0-154.0 cm FL), respectively. Tagged adult males averaged 159.6 cm FL (155.0-165.0 cm FL) while tagged adult females averaged 168.2 cm FL (156.0-216.0 cm FL).

Recapture Data

Two sandbar sharks are recorded as recaptured in our database from 1999-2009 for an overall recapture rate of 1.2 % (Table 3). Data was returned by recreational anglers using hook and line (Table 4).

The sandbar shark at liberty the longest was tagged near the Flower Garden National Marine Sanctuary on a NOAA Fisheries Mississippi Laboratories bottom longline cruise on 08 Sept 2006 and recaptured 417 days later only 33 km to the northeast (Figure 2). The other recaptured sandbar shark was tagged via the GULFSPAN survey on 14 Aug 2001 on the gulf-side of St. Vincent Island, FL, and recaptured 320 days later inside Apalachicola Bay, FL (Figure 3).

Dusky shark, *Carcharhinus obscurus*

Only four dusky sharks are present in the tagging database from 1999-2009. All four are immature females (64.3, 82.0, 84.6, 167.0 cm FL). No dusky sharks have been recaptured.

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CRUISE RESULTS 07/19/2004 - 09/22/2004 Atlantic Coastal Shark Red Snapper Cruise NOAA Ship RV GANDY, Cruise 72/0403 U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 07/27/2004 - 09/29/2004 Bottom Longline Survey Coastal Sharks – Red Snapper NOAA Ship OREGON II, Cruise OT-05-02 (263) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 10/06/2004 - 10/23/2004 Atlantic Coastal Shark Red Snapper Cruise NOAA Ship RV GANDY, Cruise 72/0404 U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 03/08/2005 - 04/06/2005 Bottom Longline Survey Coastal Sharks – Red Snapper NOAA Ship OREGON II, Cruise OT-05-02 (263) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 08/02/2005 – 11/16/2005 Pelagic Fish Longline Survey NOAA Ship OREGON II, Cruise OT-05-05 (266) and OT-05-06 (267) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 02/01/2006 – 03/21/2006 Longline Survey Pelagic Sharks and Finfish NOAA Ship OREGON II Cruise OT-06-02 (269) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 07/29 – 09/25/2006 Bottom Longline Survey Coastal Sharks – Red Snapper NOAA Ship OREGON II, cruise 0T-06-04 (272) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 08/10 – 09/27/2007 Bottom Longline Survey Coastal Sharks – Red Snapper NOAA Ship OREGON II, Cruise 0T-07-04 (277) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 07/29 – 09/30/2008 Bottom Longline Survey Coastal Sharks – Red Snapper NOAA Ship OREGON II, Cruise 0T-08-05 (283) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 07/27 – 09/30/2009 Bottom Longline Survey Coastal Sharks – Red Snapper NOAA Ship OREGON II, Cruise R2-09-04 (288) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast

Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

CRUISE RESULTS 10/12 – 11/23/2009 Small Pelagics Cruise NOAA Ship GORDON GUNTER, Cruise 09-05 (56) U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Southeast Fisheries Science Center Mississippi Laboratories Pascagoula Facility P.O. Drawer 1207 Pascagoula, MS 39568-1207

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SEDAR 13-DW-17: Driggers et al. : Life history and population genetics of blacknose sharks, Carcharhinus acronotus, in the western North Atlantic Ocean and the northern Gulf of Mexico

SEDAR 21-DW-06: Baremore and Hale : Reproduction of the sandbar shark Carcharhinus plumbeus in the U.S. Atlantic Ocean and Gulf of Mexico

Table 1. Recapture rates for blacknose sharks using the NOAA Southeast Fisheries Elasmobranch Tagging Management System, 1999-2009.

Sex	Life Stage	Number Tagged	Number Recaptured	Recapture Rate
Male	Young-of-the-year	11	0	--
	Juvenile	75	0	--
	Adult	182	0	--
	Undetermined	2	0	--
	n	*270*	*0*	*0.0%*
Female	Young-of-the-year	21	1	4.7%
	Juvenile	75	0	--
	Adult	97	2	3.1%
	n	*193*	*3*	*1.5%*
Unknown	***n***	*3*	*0*	--
	Total	***466***	***3***	***0.64%***

Table 2. Recapture information for blacknose sharks using the NOAA Southeast Fisheries Elasmobranch Tagging Management System, 1999-2009.

Fish #	Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
3013	Recreational Angler	18	<1	St. Andrew Bay, FL	St. Andrew Bay, FL
3257	Recreational Angler	181	21.6, NW	11 km offshore between Corpus Christi and Brownsville, TX (26.734N, -97.213W)	2 km offshore NW of tagging location (26.897N, -97.350W)
1463	Recreational Angler	798	<1	St. Joseph Bay, FL	St. Joseph Bay, FL

Figure 1. Tag and recapture information for blacknose shark, Fish# 3257.

Table 3. Recapture rate for sandbar sharks using the NOAA Southeast Fisheries Elasmobranch Tagging Management System, 1999-2009.

Sex	Life Stage	Number Tagged	Number Recaptured	Recapture Rate
Male	Young-of-the-year	6	0	--
	Juvenile	63	0	--
	Adult	13	0	--
	n	*82*	*0*	*0.0%*
Female	Young-of-the-year	5	0	--
	Juvenile	50	1	2.0 %
	Adult	34	1	2.9 %
	n	*89*	*2*	*2.2%*
Unknown	***n***	*1*	*0*	--
	Total	***172***	***2***	***1.2%***

Table 4. Recapture information for sandbar sharks using the NOAA Southeast Fisheries Elasmobranch Tagging Management System, 1999-2009.

Fish #	Mode of Recapture	Days at Liberty	Distance Moved (km), Direction	Location Tagged	Location Recaptured
3510	Recreational Angler	320	27.2 km, E	Gulf-side of St. Vincent Island, FL	Apalachicola Bay, FL
4746	Recreational Angler	417	33.0 km, NE	Near Flower Garden Banks National Marine Sanctuary	Near Flower Garden Banks National Marine Sanctuary

Figure 2. Tag and recapture location for sandbar shark, Fish# 3510.

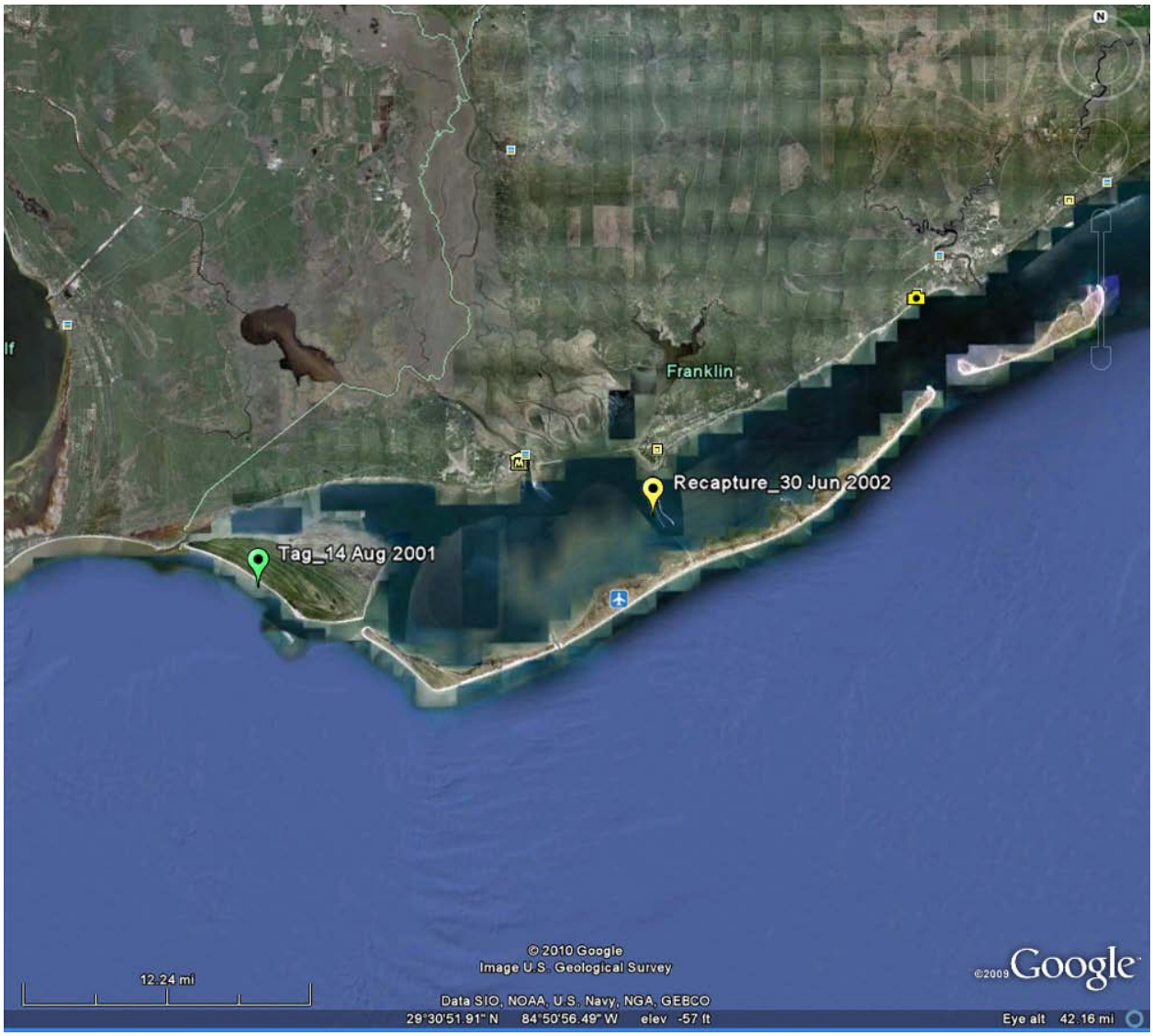

Figure 3. Tag and recapture information for sandbar shark, Fish# 4746.