

PROGRESS REPORT ON THE DIRECTED SHARK GILLNET FISHERY: RIGHT WHALE
SEASON, 2000

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May 2000

Sustainable Fisheries Division Contribution No. SFD-99/00-90

INTRODUCTION

Observations of the east Florida-Georgia shark drift gillnet fishery have been previously conducted and reports of the catch and bycatch from these observations were developed (Trent et al., 1997; Carlson and Lee, 1999). The Atlantic Large Whale Take Reduction Plan and The Biological Opinion issued under Section 7 of the Endangered Species Act mandate that, with respect to the southeast shark gillnet fishery, 100% observer coverage is required during the Right Whale Season (15 Nov-1 Apr) for vessels operating from West Palm Beach, FL to Sebastian Inlet, FL. The objectives of this report are to document protected species bycatch and to estimate catch and bycatch rates in the southeast US coastal directed shark gillnet fishery for the right whale season, 2000.

METHODS AND MATERIALS

Methods as described by Carlson and Lee (1999) were employed. The observer was placed in a position similar to that reported for the swordfish drift gillnet fishery (Cheryl Ryder, NEFSC-Woods Hole, MA; personal communication). Observers in the swordfish drift gillnet fishery record incidental take of sea turtles and also record fall-out of sea turtles in the net from the position where they are stationed. Because of the similarities of the swordfish drift gillnet fishery to the shark drift gillnet fishery and the observer's position on deck, if fall-out did occur, observers would also be in a position to record this information.

Observations were made as the net was hauled aboard. The observer remained about 3-8 m forward of the net reel in an unobstructed view and recorded species, numbers and lengths (± 30 cm) of sharks and other species caught as they were suspended in the net just after passing over the power roller. When species identification was questionable, the crew stopped the reel so that the observer could examine the animal(s). Disposition of each species brought onboard was recorded as kept, discarded alive, or discarded dead. Data were submitted to the SEFSC Sustainable Fisheries Division on a weekly basis. The data were entered by SEFSC staff, examined by NMFS SEFSC Sustainable Fisheries Division staff, and reviewed with Johnson Controls contract staff to resolve any questions.

NMFS-approved contract observers were placed at various field locations from 2 Jan-25

February when funds were exhausted. For each set and haul of the net observers recorded: beginning and ending times of setting and hauling; estimated length of net set; sea and wind states; latitude and longitude coordinates; and water depth.

DESCRIPTION OF FISHERY

Driftnet vessels, fishing gear, and fishing techniques has been previously described in Trent et al. (1997) and Carlson and Lee (1999). Observations of driftnet vessels, gear, and techniques did not deviate from that described in Trent et al. (1997). Beginning in 1999, some fishers began strikenetting for sharks using similar gear that was used during driftnet operations. Observed strikenet effort increased during the right whale season 2000 likely due to the success rate in harvesting sharks, low bycatch, and the fact that strikenetting is permitted in the SEUS Restricted Area (32°00'-27°51' N).

Driftnet fishery

Observed driftnet fishing effort occurred in two major areas: between Ft. Pierce, FL and Port Salerno, FL (~27° 03'-27° 39' N) and northwest of Key West, FL (~24° 42'-24° 58' N) (Figure 1 and 2).

Driftnet vessels carried nets ranging in length from 547.2-2,736 m; depths from 9.1-13.7 m and mesh sizes from 12.7-25.4 cm. With the exception of trips observed northwest of Key West, FL, usually only one set was made per night and the vessel returned to port the following morning. Trips observed northwest of Key West, FL remained at sea for several days. For all observed driftnet sets, set duration averaged 0.46 hrs (± 0.20 S.D.). Haulback usually began at about 0600 hrs (range: 2300-7.33 hrs). Net retrieval and processing averaged 3.6 hrs (± 1.94 S.D.). Average soak time for the driftnet (time net was first set minus time haulback ended) was 12.8 hrs (± 3.7 S.D.).

Strikenet Fishery

Strikenetting implies a net that can be rapidly set in a circle around a school of sharks and

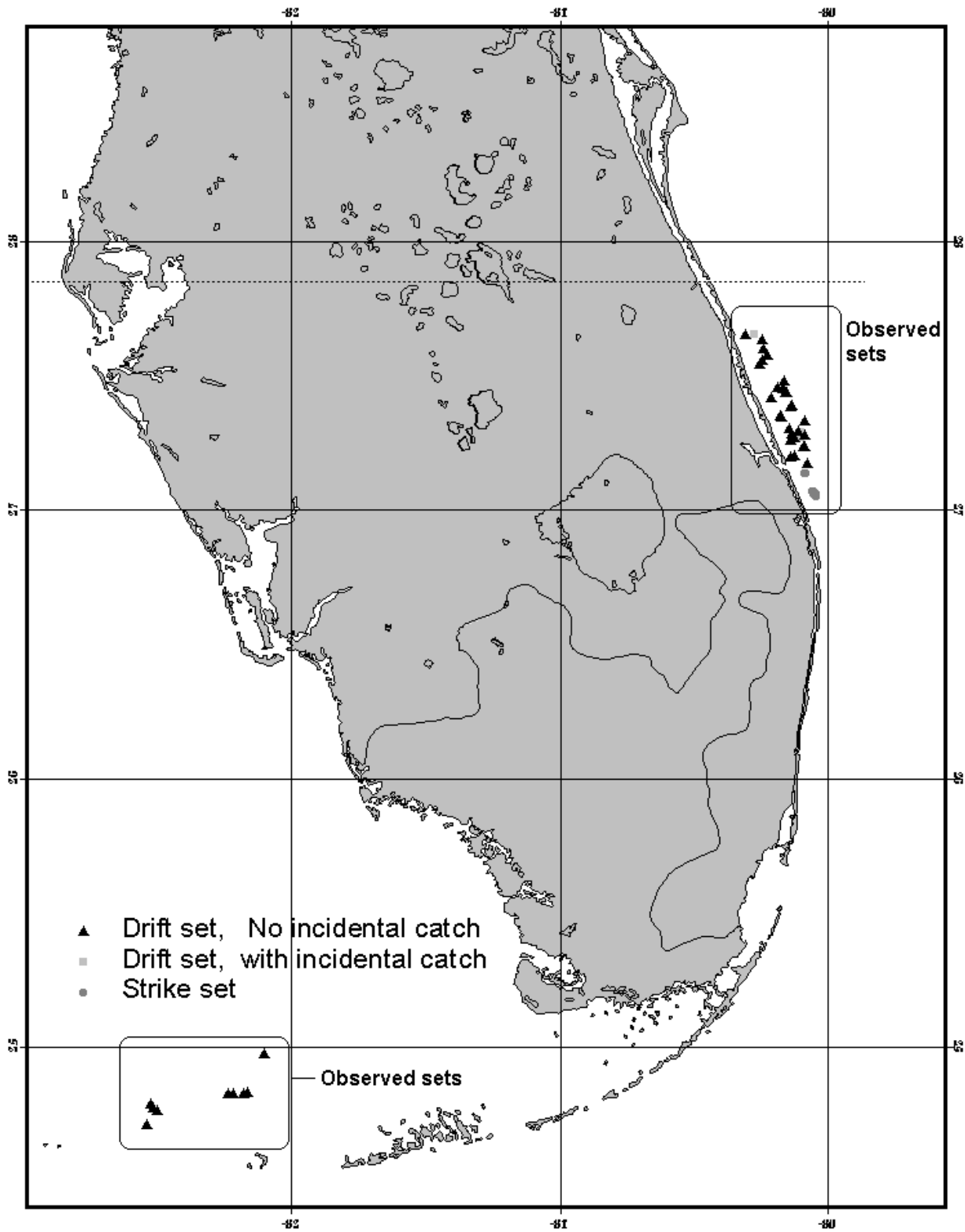


Figure 1. Distribution of observed sets for the strike and drift gillnet fishery during the right whale season, 2000. actively fished. This contrasts with a drift gillnet which is usually set in a straight line and left to

fish passively in a location where sharks are thought to be abundant or moving past the area. Vessels used for strikenetting sharks are smaller open boats, 6.6-8.2 m in length with a 3-4 m beam. Vessels are equipped with outboard motors (usually 200 horsepower) and either have no power roller system or a smaller electric power roller system that is used for retrieving smaller nets used for strikenetting Spanish mackerel.

Strikenet vessels carry nets ranging from 304-1,368 m long and 22.8-30.4 m deep. Mesh sizes ranged from 12.7-25.4 cm. The most frequently used net was 1094.4 m long and 30.4 m deep, with a mesh size of 25.4 cm.

Location of schools of sharks was performed by spotter pilot. Once the school is located, the strikenet is set in a half to full circle around the school using the smaller strikenet vessel. The set is started by throwing a buoy overboard and the water resistance anchors the net as it is deployed over the stern of the boat. Set times averaged 0.27 hrs (± 0.14 S.D.). Because the strikenet vessel had inadequate space to store nets and catch, a larger drift gillnet vessel accompanied each strikenet vessel to haul the net and process the catch. Usually four vessels worked together (*i.e.* 2 open strikenet boats and 2 driftnet boats with power rollers), 2 nets were set independently in a half circle with the open end of the half circle facing each other and surrounding the school. After the set, the strikenet vessel was run rapidly around inside of the circle to panic and drive sharks into the net. Fishers on these vessels would also make noise by pounding on the water or on the hull of the vessel. Because nets were set in waters ranging from 16.7-18.0 m deep, the nets fished from the surface to bottom to prevent any sharks from escaping under the bottom of the net.

After soaking the net (1.09 ± 0.27 hrs), the driftnet vessels with the power roller system picked up one end of the net and began hauling back. Hauling the net was done in a way similar to that observed during drift gillnetting, *i.e.* using the hydraulic powered rollers. Haulback averaged 1.06 hrs (± 0.26 S.D.). The entire strikenetting process (time net was first set minus time haulback was completed) averaged 2.2 hrs (± 0.88 S.D.).

A total of 12 strikenet sets on 12 vessel trips were observed. However, approximately 8 additional trips were aborted (the observer departed with the vessel but no strike was made). Reasons for not striking for sharks included the inability to locate the school, sharks located in

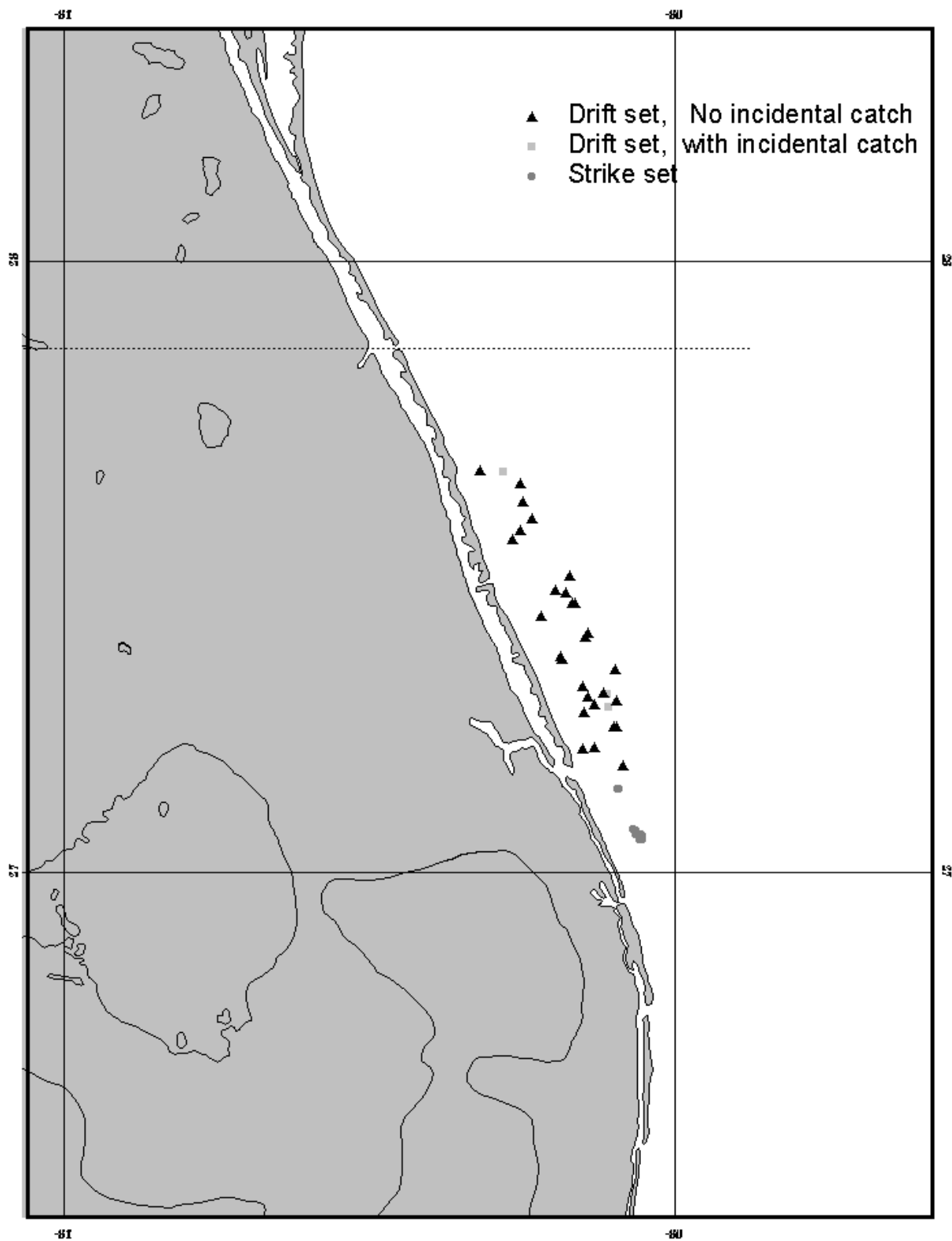


Figure 2. Location of observed drift and strikenet sets in the SEUS Observer Area for the right whale season, 2000. Dotted horizontal line represents the division (27° 51' N. Latitude) between SEUS Restricted Area to the north and SEUS Observer Area to the south.

state waters, and poor weather conditions (Jeff Trew, Johnson Controls, Inc., personal communication). All strikenet fishing activities occurred during daylight hours (sets began between 1200-1700 hrs). Observed strikenet fishing effort occurred between Ft. Pierce, FL and Port Salerno, FL (~27° 03' -27° 39' N) (Figure 1 and 2).

RESULTS AND DISCUSSION

Observed strikenet catches

Observed catch in the strikenet fishery consisted of 2 species of sharks (99.3% of total number caught) and 2 species of teleosts and rays (0.7% of total number caught). No marine mammals or sea turtles were observed caught (Figure 3). The blacktip shark, *Carcharhinus limbatus*, made up 99.9% of the number of sharks caught. Bycatch included manta ray, *Manta birostris*, and barracuda, *Sphyraena* spp.

Observed driftnet catches

The observed driftnet catch consisted of 14 species of sharks, 33 species of teleosts and rays, 1 species of sea turtle and 2 species of marine mammals. Total observed catch composition (percent of numbers caught) were 90.2% sharks, 5.3% teleosts, 4.5% rays, 0.02% sea turtles, and 0.03% marine mammals (Figure 4). Three species of sharks made up 93.1% (by number) of the observed shark catch (Figure 5). These species were the blacktip shark, finetooth shark, *Carcharhinus isodon* and bonnethead shark, *Sphyrna tiburo*. Seven species of teleosts and rays made up over 70% by number of the overall non-shark species (Figure 6). Cownose ray, *Rhinoptera bonasus*; spotted eagle ray, *Aetobatus narinari*; cobia, *Rachycentron canadum*; king mackerel, *Scomberomorus cavalla*; spanish mackerel, *Scomberomorus maculatus*; tarpon, *Megalops atlanticus*, and barracuda dominated the bycatch.

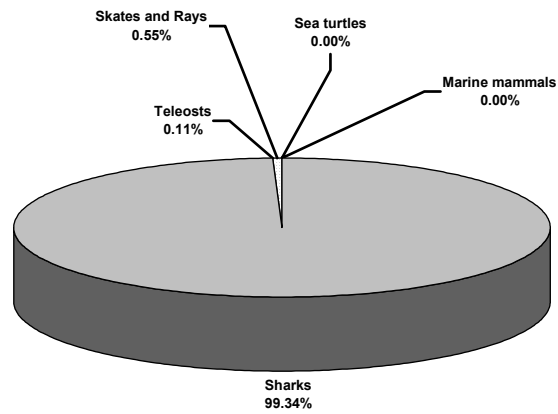


Figure 3. Strikenet observed total catch composition (percent of numbers caught).

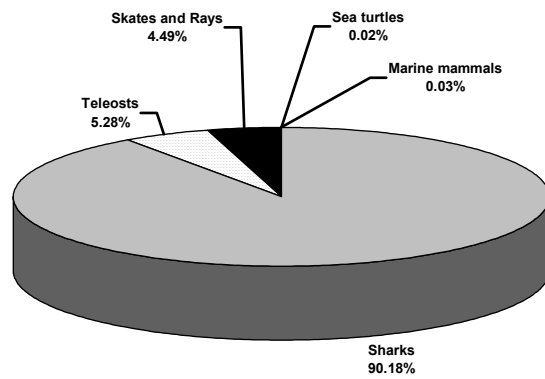


Figure 4. Driftnet observed total catch composition (percent of numbers caught).

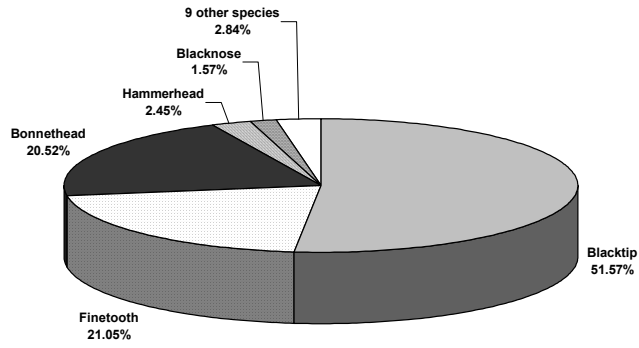


Figure 5. Observed driftnet shark catch composition (percent of numbers caught).

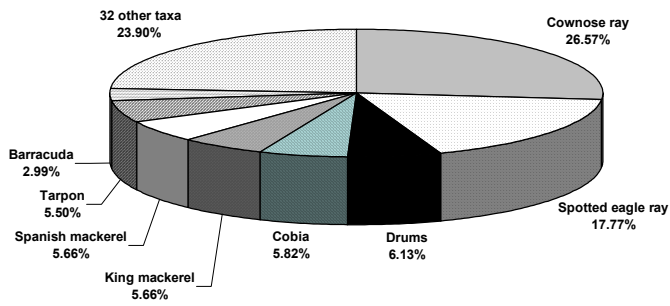


Figure 6. Observed driftnet bycatch composition (percent of numbers caught).

DISPOSITION OF CATCH

Portions of both the targeted catch (sharks) and incidental catch were discarded. The proportions discarded varied between strikenet and driftnet catches. In the strikenet fishery, no sharks were discarded (Table 1). For incidental catch taken in the strikenet fishery, only manta ray were discarded (100.0% alive) (Table 2).

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip	903	100.0	0.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead	1	100.0	0.0	0.0

Table 1. Total strikenet shark catch by species and species disposition in order of decreasing abundance during all observer trips.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Manta birostris</i>	Atlantic manta ray	5	0.0	100.0	0.0
<i>Sphyrna</i> spp.	Barracuda	1	100.0	0.0	0.0

Table 2. Total strikenet bycatch caught by species in order of decreasing abundance and species disposition during all observer trips.

Within the driftnet fishery, the highest amount of the targeted catch discarded dead was for scalloped hammerhead shark (40.9%), common thresher shark (62.2%), and great hammerhead shark (57.2%) (Table 3). In most cases, shark bycatch was discarded due to the lower quality of flesh and lower market value among the larger hammerheads (Table 3). Despite a fishery for thresher shark off the California coast (Hanan et al. 1993), thresher shark discards were related to no or low market value.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip	3013	99.8	0.1	0.1
<i>C. isodon</i>	Finetooth	1230	99.6	0.0	0.4
<i>Sphyrna tiburo</i>	Bonnethead	1199	98.7	0.3	1.0
<i>S. lewini</i>	Scalloped hammerhead	110	59.1	0.0	40.9
<i>C. acronotus</i>	Blacknose	92	100.0	0.0	0.0

<i>Alopias vulpinus</i>	Common thresher	45	26.7	11.1	62.2
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	32	34.3	30.3	34.4
<i>C. plumbeus</i>	Sandbar	29	96.5	0.0	3.5
<i>Sphyrna</i> spp.	Large hammerhead	26	100.0	0.0	0.0
<i>C. leucas</i>	Bull	24	100.0	0.0	0.0
<i>C. brevipinna</i>	Spinner	18	100.0	0.0	0.0
<i>C. falciformis</i>	Silky	7	100.0	0.0	0.0
<i>S. mokarran</i>	Great hammerhead	7	42.8	0.0	57.2
<i>Galeocerdo cuvier</i>	Tiger	6	66.7	33.3	0.0
<i>Negaprion brevirostris</i>	Lemon	5	100.0	0.0	0.0

Table 3. Total driftnet shark catch by species and species disposition in order of decreasing abundance during all observer trips.

For incidental catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was for drums (100.0%), herring (100.0%), tarpon (97.1%), bluefish (38.1%) and permit (33.3%) (Table 4). The lowest proportion discarded dead was for cobia (0.0%), great barracuda (0.0%), and king mackerel (2.8%). Cownose and spotted eagle rays had the highest discard proportion alive, 86.4% and 75.2%, respectively.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Rhinoptera bonasus</i>	Cownose ray	169	0.6	86.4	13.0
<i>Aetobatus narinari</i>	Spotted eagle ray	113	13.3	75.2	11.5
Sciaenidae	Drums	39	0.0	0.0	100.0
<i>Rachycentron canadum</i>	Cobia	37	100.0	0.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	36	97.2	0.0	2.8
<i>Scomberomorus maculatus</i>	Spanish mackerel	36	77.8	0.0	22.2
<i>Megalops atlanticus</i>	Tarpon	35	0.0	2.9	97.1
<i>Lobotes surinamensis</i>	Tripletail	24	91.7	8.3	0.0
<i>Pomatomus saltatrix</i>	Bluefish	21	61.9	0.0	38.1
<i>Sphyrna barracuda</i>	Great barracuda	19	100.0	0.0	0.0
Clupeidae	Herring	18	0.0	0.0	100.0
<i>Trachinotus falcatus</i>	Permit	15	66.7	0.0	33.3
<i>Brevoortia</i> spp.	Menhaden	9	0.0	0.0	100.0
<i>Cynoscion</i> spp.	Sea trout	9	0.0	0.0	100.0
Unidentified teleost		8	0.0	0.0	100.0
<i>Sciaenops ocellatus</i>	Red drum	6	33.3	66.7	0.0
<i>Dasyatis sabina</i>	Atlantic stingray	5	80.0	20.0	0.0
<i>Caranx crysos</i>	Blue runner	3	66.7	0.0	33.3
<i>Euthynnus alletteratus</i>	Little tunny	3	33.3	0.0	66.7
<i>Istiophorus platypterus</i>	Atlantic sailfish	3	0.0	0.0	100.0
<i>Manta birostris</i>	Atlantic manta ray	3	0.0	100.0	0.0
<i>Orthopristis chrysoptera</i>	Pigfish	3	0.0	0.0	100.0
<i>Chaetodipterus faber</i>	Spadefish	2	0.0	0.0	100.0

<i>Larimus fasciatus</i>	Banded croaker	2	0.0	0.0	100.0
<i>Trachinotus carolinus</i>	Pompano	2	100.0	0.0	0.0
<i>Acanthocybium solanderi</i>	Wahoo	1	100.0	0.0	0.0
Carangidae	Jacks	1	0.0	0.0	100.0
<i>Caranx hippos</i>	Crevalle jack	1	100.0	0.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	1	0.0	0.0	100.0
<i>Dasyatis centroura</i>	Southern stingray	1	0.0	0.0	100.0
<i>Mycteroperca bonaci</i>	Black grouper	1	100.0	0.0	0.0
<i>Mycteroperca microlepis</i>	Gag grouper	1	100.0	0.0	0.0
<i>Paralichthys</i> spp.	Flounder	1	100.0	0.0	0.0
<i>Peprilus alepidostus</i>	Harvestfish	1	0.0	0.0	100.0
<i>Pogonias cromis</i>	Black drum	1	100.0	0.0	0.0
<i>Sarda sarda</i>	Atlantic bonito	1	100.0	0.0	0.0
<i>Selene vomer</i>	Lookdown	1	0.0	0.0	100.0
<i>Stenella frontalis</i>	Spotted dolphin	1	0.0	100.0	0.0
<i>Tursiops truncatus</i>	Bottlenose dolphin	1*	100.0	0.0	0.0
<i>Caretta caretta</i>	Loggerhead turtle	1*	100.0	0.0	0.0
<i>Raja</i> spp.	Skate	1	100.0	0.0	0.0

Table 4. Total driftnet incidental catch by species and species disposition in order of decreasing abundance during all observer trips. * Indicates specimens were retained for necropsy by NMFS.

PROTECTED RESOURCE INTERACTIONS

Interactions with protected resources (3 individuals) occurred in 3 separate sets. Two species of dolphin, Atlantic spotted dolphin, *Stenella frontalis*, and bottlenose dolphin, *Tursiops truncatus*, were encountered (Table 4). One species of sea turtle, *Caretta caretta*, was also taken. Mortalities were reported for 1 bottlenose dolphin and 1 loggerhead turtle. In both cases, the animals were completely wrapped within the mesh and were cut loose in order to free them from the webbing.

LITERATURE CITED

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