CRUISE RESULTS

02/01/2006 – 03/21/2006
Longline Survey
Pelagic Sharks and Finfish

NOAA Ship OREGON II
Cruise OT-06-02 (269)

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Pelagic Longline Survey
Pelagic Sharks and Finfish
NOAA Ship OREGON II OT-06-02 (269)
U.S. Atlantic Coast

SURVEY PERIOD: 02/02/2006 – 03/20/2006

AREA OF OPERATION: The U.S. Atlantic coast from Cape Hatteras, NC south to Cape Canaveral, FL (Figure 1).

OBJECTIVES:

1) Conduct a pilot study to assess the distribution and abundance of pelagic sharks and finfish.
2) Collect biological and environmental data.
3) Tag and release sharks, billfish and tuna.
4) Collect time/depth/temperature data per hook for each capture.
5) Field test SCS and FSCS data acquisition procedures and prototype software.

MATERIALS AND METHODS:

The pelagic longline gear components were 5 n. mi. (the distance between the first and last hyflyer) of 454 kg monofilament mainline (4.0 mm diameter, 1000 lb test), radar reflector hyflyers (strobe light equipped) to mark distal mainline ends and mid set (3 hyflyers), bullet floats (50) and 2 gangions attached between bullet floats (100 gangions per set). Gangions (22 m length,12 fm) were constructed with #18/0 non-offset steel circle hooks with a 0.5 m length of multistrand stainless steel fishing wire (364 kg breaking strength) attached between the hook and a 60 g weighted swivel. The 21.5 m length of gangion monofilament (2.0 mm diameter, 179 kg test or 400 lb test) connected the weighted swivel with the gangion mainline clip. All gangions were equipped with hook timers attached to the gangion mainline clip. Time-temperature-depth recorders (TDRs) were attached to each gangion at the weighted swivel. Gangions were numbered sequentially with numeric tags attached to the hook timers and TDRs. The hook depth beneath surface (fishing depth) was a minimum of 40 m (22 fm) but could be deeper depending on line cantenary, activity of hooked catch or sea conditions.

To maintain even spacing of longline components during gear set operations an electronic beeper was used to determine the time interval for attaching hyflyers, bullet floats and gangions along the mainline. The beeper time interval was based on vessel speed through water; for most sets vessel speed through water was 3.5 knots and gear was attached at 34 second intervals. The pelagic longline gear configuration followed current NMFS recommendations for mitigating sea turtle captures; the gangion length was greater than floatline length so captured turtles could surface to breathe if hooked, and using a #18 non-offset steel circle hook to minimize swallowing of the hook. The 18 m floatline length determined the mainline depth and was established to allow deep draft

vessels to pass over the gear without entanglement. All longline sets were made over bottom depths greater than 183 m (100 fm) to avoid gear tangling with the sea bottom. Bait was frozen Atlantic mackerel (*Scomber scombrus,* 400 g – 600 g weight) cut into halves or thirds depending on bait size; most bait was double hooked.

The pelagic longline gear was deployed at randomly selected locations along the U.S. Atlantic Ocean coast between Cape Hatteras, NC and Cape Canaveral, FL. Two sampling strata were designated; west or shoreward of the median axis of the Gulf Stream (as determined from NOAA Chart 11009, 2004) but not shallower than 183 m (100 fm) to establish the sampling area inner boundary, and from the median Gulf Stream axis east for 50 n. mi to establish the survey area outer boundary. Off the coast of eastern Florida the eastern limit of the sampling area was confined by the international boundary with the Bahamas. All longline sets were made within U.S. territorial waters. The number of randomly selected stations were determined by proportional allocation based on the strata area within contiguous 60 n. mi. sampling zones from latitude 36 N to latitude 28 N (8 sampling zones delineated). Geographically broad sampling zones were allocated more sampling sites than narrow zones. Due to prohibitive weather some pre-selected sites were eliminated by random selection. Most of the sample sites that were eliminated were during survey operations in the northern-most sampling zones and were eliminated to allow effort throughout the total survey area.

The longline soak time was 3 hr as determined from the time the last hyflyer was deployed until the first hyflyer was retrieved at the beginning of the gear haulback. In order to collect gear set, gear haulback and catch data in realtime, weather resistant laptop computers were hard wired via deck network ports to the ship's Scientific Computer System (SCS), and were operated with software designed for the Fisheries Science Computer System (FSCS) to record gear and biological events. Utilizing the ship's SCS data allowed GMT time/date stamps and the corresponding position (latitude/longitude) to be associated with set and haulback events (e.g., hyflyer, buoy and gangion deployments and retrieval). In addition, hook timer information and hook status (e.g., bait status upon retrieval, capture on hook, ancillary comments) could be recorded on a per event basis. Other SCS data included a variety of ship's sensor information written to file with every FSCS event (e.g., wind speed and direction, barometer reading, bottom depth, ship's speed through water, water temperature). TDRs were downloaded if their associated gangion had a capture, the hook timer had been activated or once weekly. TDR files were named with the vessel code, cruise number, station number and hook number to facilitate association of TDR information to SCS and FSCS events.

Most captures were digitally photographed and photographs were catalogued with associated data needed to identify captures (vessel code, survey number, station number, hook number and common or scientific name). When possible live specimens were tagged and released. Fin clips were collected from most captures for DNA sample archival. Biological data collected from specimens typically included various lengths measurements, weight, sex and stage of sexual development. For large specimens it was often necessary to use an aluminum frame and mesh landing sling to obtain measurements, weights, identification photographs, fin clip samples and to properly tag

specimens. The landing sling was deployed with the ship's forward deck crane and was equipped with a remotely controlled electronic scale for obtaining accurate weights.

CTD casts were conducted from sea surface to 300 m depth prior to setting the longline gear. The CTD recorded temperature, salinity, dissolved oxygen and pressure (depth).

RESULTS

Fifty-four pelagic longline sets were completed over 42 sea days. Ten sea days were lost due to prohibitive weather and 4 other sea days were partially impacted; 3.5 sea days were used to steam from Cape Canaveral, FL to Pascagoula, MS to end the survey.

Elasmobranch captures (113 captures, Table 2) included 11 shark species; silky, night, scalloped hammerhead, great hammerhead, thresher, bigeye thresher, shortfinned mako, sandbar, dusky, tiger and oceanic whitetip. For 2 sharks positive identifications were not possible due to them being too far below surface when they broke free from the longline gear. The most frequently captured shark was the silky shark (31% of shark captures). Eighty sharks were tagged and released and 82 fin clip samples were collected for DNA sample archival.

Finfish captures (23 captures, Table 2) included; swordfish, yellowfin tuna, lancetfish, oilfish, wahoo, blue marlin, dolphinfish and barracuda. The most frequently captured finfish was the swordfish (35% of finfish captures). Two finfish were tagged and released (1 swordfish and 1 yellowfin tuna) and 4 fin clip samples were collected from finfish for DNA sample archival.

A loggerhead turtle was captured (Table 1, station 11), and was measured, weighed, photographed, tagged with both an internal pit tag and external tags, and released in excellent condition. From the TDR data associated with the loggerhead capture the turtle surfaced at least 13 times during its capture (estimated time on hook was 210 minutes), however, the turtle did not pull on the gangion with enough force to trip the hook timer (4 kg - 6 kg force needed), even though the weight of the turtle was 25 kg (55 lb).

The SCS/FSCS data collection system proved adaptable for documenting longline set and haulback operations, however, there were 2 primary problems that interfered with SCS/FSCS operations. The most frequent problem was if a ship generated SCS glitch occurred, the computer network and FSCS software would shut down and data would be lost. The other problem was with the network plug connectors. Both the connecting cable pins and the on deck weatherproof access boxes fouled and had to be cleaned or replaced. The weatherproof laptop computers did not malfunction due to sea spray or rain. Sun generated glare on the computer screen could be mitigated by using a 3-sided glare shield. Operation of the weatherproof computers to monitor gear set or haulbacks required a fully dedicated scientist to maintain data entry. Set and haulback information that could not be captured in realtime or that needed editing could be included in the

primary data base once the on deck operations were complete and the SCS/FSCS data were downloaded into a database format.

CRUISE PARTICIPANTS:

Name	Title	Organization
Leg I, February 2 – 16, 2006; Morehead City, NC to Charleston, SC		
Mark Grace	FPC	NMFS/MS Lab
Trey Driggers	Biologist	NMFS/MS Lab
John Moser	Biologist	NMFS/MS Lab
Nick Hopkins	Biologist	NMFS/MS Lab
Michael Felts	Biologist	NMFS/MS Lab
Lee Saxon	Biologist	NMFS/MS Lab
Michael Hendon	Biologist	NMFS/MS Lab
Glenn Zapfe	Biologist	NMFS/MS Lab
Dana Bethea	Biologist	NMFS/Panama City, FL
Laura Goetz	Biologist	NMFS/Panama City, FL
Leg II, February 18 – March 4, 2006; Charleston, SC to Savannah, GA		
Mark Grace	FPC	NMFS/MS Lab
Trey Driggers	Biologist	NMFS/MS Lab
Walter Ingram	Biologist	NMFS/MS Lab
Carrie Horton	Biologist	NMFS/MS Lab
Carolyn Burks	Biologist	NMFS/MS Lab
Nick Hopkins	Biologist	NMFS/MS Lab
Michael Hendon	Biologist	NMFS/MS Lab
Kim Williams	Biologist	NMFS/MS Lab
Dana Bethea	Biologist	NMFS/Panama City, FL
Chris Palmer	Biologist	NMFS/Panama City, FL
Leg III, March 6 – March 20, 2006; Savannah, GA to Pascagoula, MS		
Mark Grace	FPC	NMFS/MS Lab
Trey Driggers	Biologist	NMFS/MS Lab
Carrie Horton	Biologist	NMFS/MS Lab
John Moser	Biologist	NMFS/MS Lab
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Michael Felts	Biologist	NMFS/MS Lab
Walter Ingram	Biologist	NMFS/MS Lab
Brooke Shipley	Biologist	NMFS/MS Lab
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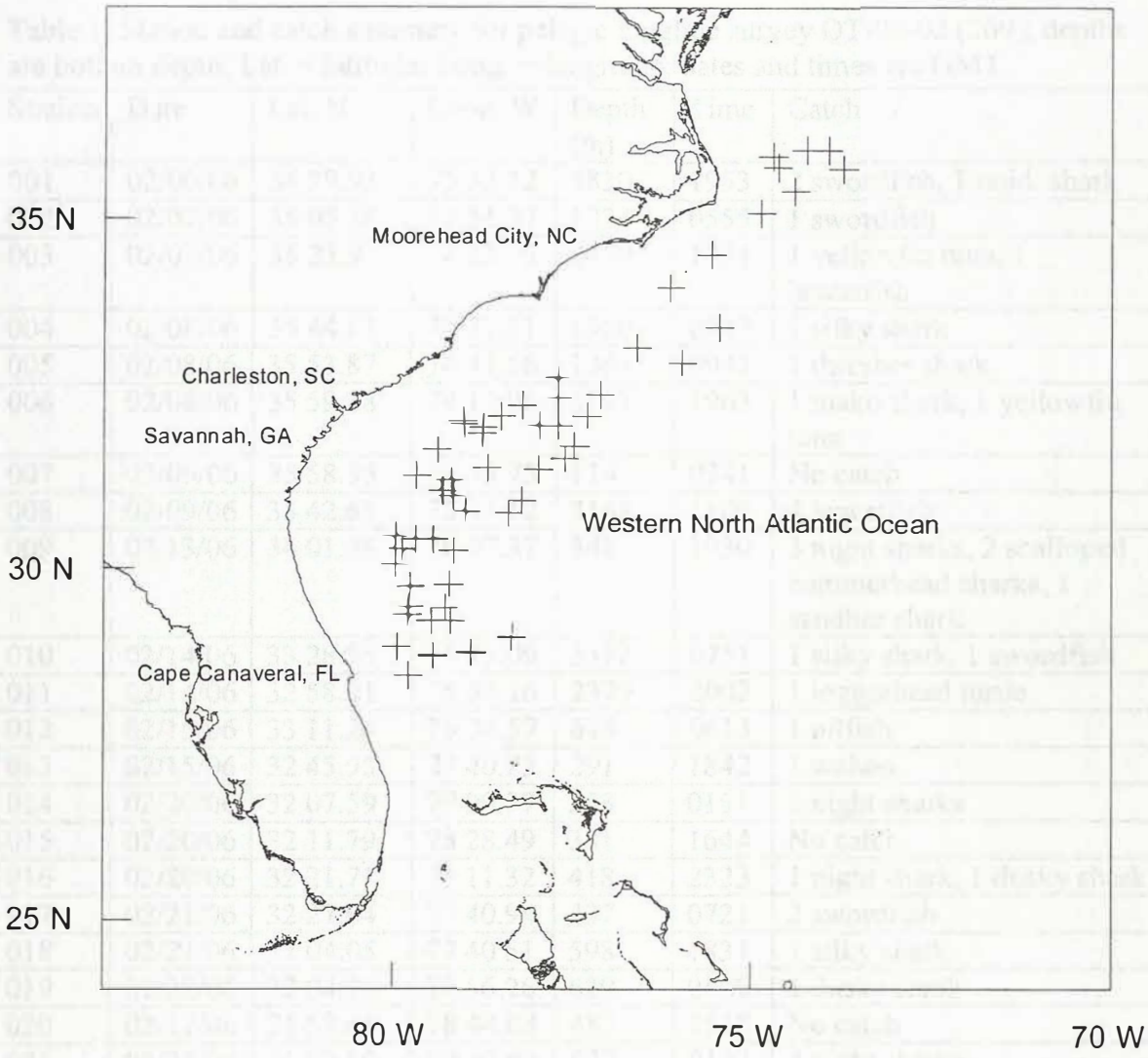

Figure 1. Survey area and pelagic longline locations for 2006 pelagic longline survey OT-06-02 (269).

Table 1. Station and catch summary for pelagic longline survey OT-06-02 (269); depths are bottom depth; Lat. = latitude; Long. = longitude; dates and times are GMT.

Station	Date	Lat. N	Long. W	Depth (m)	Time	Catch
001	02/06/06	34 29.93	75 33.12	1830	1953	2 swordfish, 1 unid. shark
002	02/07/06	35 05.38	74 51.37	1334	0555	1 swordfish
003	02/07/06	35 23.92	74 23.15	2470	1434	1 yellowfin tuna, 1 lancetfish
004	02/08/06	35 44.03	74 37.21	1960	0047	1 silky shark
005	02/08/06	35 53.87	74 41.56	1363	0942	1 thresher shark
006	02/08/06	35 59.18	74 13.96	2291	1903	1 mako shark, 1 yellowfin tuna
007	02/09/06	35 58.95	73 55.75	114	0341	No catch
008	02/09/06	35 42.61	73 43.12	3148	1509	4 lancetfish
009	02/13/06	34 01.98	76 07.37	341	1930	3 night sharks, 2 scalloped hammerhead sharks, 1 sandbar shark
010	02/14/06	33 28.95	75 25.09	3312	0751	1 silky shark, 1 swordfish
011	02/14/06	32 58.21	75 57.16	2379	2002	1 loggerhead turtle
012	02/15/06	33 11.24	76 34.57	618	0613	1 oilfish
013	02/15/06	32 45.95	77 40.25	291	1842	1 wahoo
014	02/20/06	32 07.59	79 00.37	253	0151	2 night sharks
015	02/20/06	32 11.79	78 28.49	381	1644	No catch
016	02/20/06	32 21.71	78 11.32	418	2323	1 night shark, 1 dusky shark
017	02/21/06	32 27.64	77 40.94	437	0721	2 swordfish
018	02/21/06	32 04.05	77 40.51	598	1831	1 silky shark
019	02/22/06	32 04.35	77 56.26	629	0429	1 dusky shark
020	02/22/06	31 57.61	78 44.63	487	1518	No catch
021	02/23/06	31 27.80	78 40.42	537	0123	4 night sharks
022	02/23/06	31 26.03	77 57.31	719	1112	No catch
023	02/24/06	31 43.32	79 21.72	251	0135	24 scalloped hammerhead sharks, 2 dusky sharks, 2 night sharks, 1 silky shark, 1 sandbar shark, 1 swordfish
024	02/24/06	31 21.48	79 39.10	226	1646	2 dusky sharks, 1 wahoo
025	02/25/06	31 07.44	79 17.51	633	0236	10 night sharks
026	02/27/06	32 04.73	78 59.23	421	1640	2 shortfin makos, 2 dusky sharks, 22 silky sharks, 1 wahoo
027	02/28/06	32 02.93	78 43.57	389	0310	1 swordfish
028	02/28/06	31 16.46	79 10.70	525	2111	2 night sharks, 2 silky sharks,1 bigeye thresher
029	03/01/06	30 26.05	79 24.95	805	1440	No catch
030	03/01/06	30 26.12	79 39.46	738	2245	No catch
031	03/02/06	30 17.72	79 50.35	594	0902	2 silky sharks

Table 1 continued.

032	03/02/06	30 04.98	79 55.71	577	2036	1 blue marlin
033	03/03/06	30 28.35	79 56.57	396	0452	No catch
034	03/03/06	31 03.29	79 08.60	713	1457	1 tiger shark
035	03/08/06	31 35.25	77 35.30	790	1706	1 oceanic whitetip
036	03/09/06	31 46.38	77 27.10	835	0240	3 oceanic whitetip sharks, 2 night sharks, 1 mako shark, 1 silky shark
037	03/09/06	32 12.61	77 16.05	784	1346	No catch
038	03/09/06	32 30.45	77 04.99	702	2201	No catch
039	03/11/06	30 59.01	78 10.40	841	1051	No catch
040	03/11/06	30 48.24	78 21.76	831	1903	1 yellowfin tuna
041	03/12/06	30 50.67	78 57.57	808	0432	No catch
042	03/12/06	30 15.93	79 08.10	804	1451	1 silky shark
043	03/12/06	29 47.59	79 11.26	786	2331	No catch
044	03/13/06	29 46.18	79 43.60	719	0903	1 tiger shark
045	03/13/06	29 27.52	79 44.58	731	2115	1 dolphinfish
046	03/14/06	29 21.64	79 45.99	702	538	No catch
047	03/14/06	28 54.88	79 55.24	353	1832	No catch
048	03/15/06	29 15.51	79 26.08	789	1111	2 silky sharks
049	03/15/06	29 27.13	79 15.02	795	1957	1 unidentified shark
050	03/16/06	29 15.79	79 10.11	800	0324	No catch
051	03/16/06	29 01.93	78 49.58	826	1142	1 great hammerhead, 1 tiger shark
052	03/16/06	28 48.52	78 53.35	829	1947	1 tiger shark
053	03/17/06	28 45.84	79 25.05	813	0437	No catch
054	03/17/06	28 28.54	79 45.71	471	1437	2 barracudas

Table 2. Catch summary for pelagic longline survey OT-06-02 (269)

Sharks
Silky, *Carcharhinus falciformis* (34)
Night, *Carcharhinus signatus* (26)
Scalloped hammerhead, *Sphyrna lewini* (26)
Dusky, *Carcharhinus obscurus* (8)
Oceanic whitetip, *Carcharhinus longimanus* (4)
Tiger, *Galeocerdo cuvier* (4)
Shortfin mako, *Isurus oxyrinchus* (4)
Sharks not identified (2)
Sandbar, *Carcharhinus plumbeus* (2)
Thresher, *Alopias vulpinus* (1)
Bigeye thresher, *Alopias supercilious* (1)
Great hammerhead, *Sphyrna mokarran* (1)

Finfish
Swordfish, *Xiphias gladius* (8)
Lancetfish, *Alepisaurus ferox* (5)
Yellowfin tuna, *Thunnus albacares* (3)
Wahoo, *Acanthocybium solandri* (2)
Barracuda, *Sphyraena barracuda* (2)
Blue marlin, *Makaira nigricans* (1)
Dolphinfish, *Coryphaena hippurus* (1)
Oilfish, *Ruvettus pretiosus* (1)

Other
Loggerhead turtle, *Caretta caretta* (1)