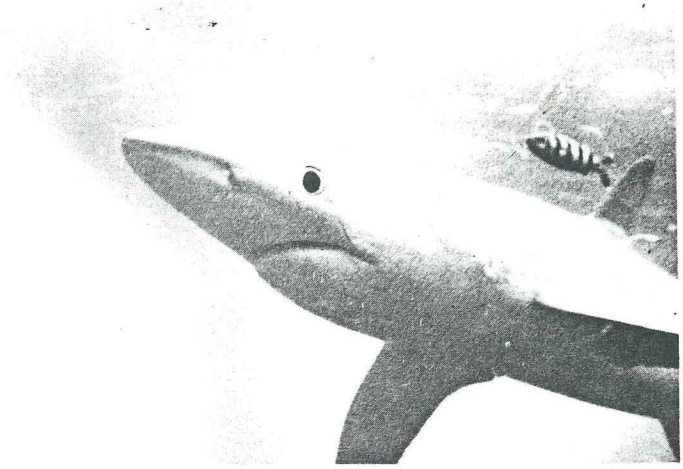
THE SHARK TAGGER 1988 SUMMARY



J. Casey, H. W. Pratt, N. Kohler and C. Stillwell

PHOTO BY H. W. PRATT

1988 OVERVIEW

- RECORD NUMBER OF TAGGED SHARKS RECAPTURED IN 1988
- SANDBAR SHARK RECAPTURED AFTER 22.9 YEARS SETS RECORD TIME AT LIBERTY FOR ALL SHARKS
- TIME AT LIBERTY RECORDS SET FOR COMMON THRESHER (8 YEARS), SILKY (7 YEARS), BULL (7 YEARS), REEF (5 YEARS), PORBEAGLE (4 YEARS) AND BIGNOSE SHARKS (4 YEARS)
- BIGNOSE SHARK SETS SPECIES DISTANCE RECORD (1,400+ MILES) FROM MARYLAND TO MEXICO
- SAND TIGER SHARK SHOWS LONG DISTANCE MOVEMENT FROM FLORIDA TO DELAWARE (600+ MILES)
- VERTEBRAE MARKED WITH ANTIBIOTIC RECOVERED FROM TAGGED BLUE SHARK
- FASTEST RATE OF TRAVEL RECORDED FOR TAGGED SWORDFISH (22 MI/DAY) - CAPE SABLE, CANADA TO HAITI (1,200+ MILES)

Along the northeast coast of the United States, between New Jersey and southern New England, June is a prime month for blue shark fishing. It is a transition month in which oceanographic conditions, including salinity and especially surface temperatures, can differ widely from year to year. In years when conditions are favorable, recreational fishermen catch and tag hundreds of blue sharks. In years when conditions are unfavorable, recreational catches of blue sharks can be extremely low. In 1988, the June surface water temperatures on the continental shelf between mid-Long Island and New Jersey were colder than normal. As a consequence, several shark fishing tournaments had low catches of blue sharks, and fewer blue sharks were tagged in this region in 1988 (see related article). The abundance of blue sharks off eastern New York and southern New England last June was about normal compared

(Continued on Page 2)

Distribution of this newsletter is limited to active participants in the NMFS Cooperative Shark Tagging Program. This information is preliminary and subject to revision.

Newsletter of the
Cooperative Shark Tagging Program
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center
Narragansett, Rhode Island 02882

Printed compliments of Carl Darenberg, Jr. Montauk Marine Basin, Montauk, N.Y.

Table 1. Summary of sharks and teleosts tagged, January-December 1988.

SPECIES	TAGGED BY COOPERATIVE TAGGERS
Blue shark	3100
Sandbar shark	1016
Tiger shark	350
Dusky shark	274
Blacktip shark	177
Lemon shark	173
Shortfin mako	113
Atlantic sharpnose shark	72
Scalloped hammerhead	71
Nurse shark	71
Porbeagle	53
Reef shark	43
Bonnethead	40
Sand tiger	38
Spinner shark	38
Bull shark	31
Blacknose shark	25
Spiny dogfish	21
Silky shark	19
Great hammerhead	10
Basking shark	10
Smooth dogfish	7
Finetooth shark	4
Night shark	4
Atlantic angel shark	3
Smalltail shark	3
Common thresher shark	3
Bigeye thresher	3
Bignose shark	1
Smooth hammerhead	1
Caribbean sharpnose shark	1
Longfin mako	1
Hammerhead unspecified	54
Brown/Dusky unspecified	11
Carcharhinus unspecified	6
Thresher unspecified	5
Miscellaneous *	21
Total sharks	5873
Teleosts	
Swordfish	115
White marlin	18
Sailfish	12
Skipjack tuna	2
Bigeye tuna	1
Bluefin tuna	1
Yellowfin tuna	1
Miscellaneous	21
Total teleosts	171
Grand Total	6044

*Includes species reported as "shark".

(Overview continued)

to the past five years. Despite the lower abundance of blue sharks on some of the sport fishing grounds last spring, the Cooperative Shark Tagging Program had an exceptionally successful year.

In 1988 a total of 5873 sharks, representing 32 species, were tagged (Table 1). An additional 171 fishes, primarily swordfish, were also tagged with shark tags. Of the total releases, volunteer anglers accounted for 57%, followed by commercial fishermen 16%, RV Geronimo 14%, U.S. fisheries observers on foreign vessels 10% and other biologists 3%. For the second year in a row, NMFS biologists did not tag sharks so the tagging program was completely dependent on the 3500 volunteer taggers who participate in the program. The total number of sharks tagged in 1988 was about average for the past five years with a decrease in the number of releases by Foreign Fisheries Observers and an increase by commercial shark fishermen. Most of the tagging by commercial fishermen was in the Gulf of Mexico and off the east coast of Florida where shark fisheries have developed in recent years. Sport fishermen continue to be the core of the program and we annually receive hundreds of requests for tags from new shark anglers. Nevertheless, it is because of the combined support of different interest groups that the NMFS Cooperative Shark Tagging Program is by far the largest of its kind in the world, past or present.

Cover Photo—NMFS biologist, C. Stillwell, examines commercial shark catch in South Carolina (See Field Studies). *Photo by L. Natanson*

Tag Returns

A total of 304 tags from 19 species were returned in 1988 (Table 2). This represents the largest number of recaptures in a single year since the program started twenty-five years ago. The sources of the recaptures were: U.S. anglers 42%, U.S. commercial fishermen 37%, foreign fishermen (primarily longliners) 13%, Foreign Fisheries Observers 4%, and other sources 4%. Returns came from the following 14 countries and island territories: U. S. (256), Japan (16), Spain (13), Mexico (6), Venezuela (3), Faroe Is. (2), and one each from Colombia, Dominican Republic, Portugal, Puerto Rico, St. Martin, St. Lucia, Azores, and Malta. The major types of gear that accounted for the returns were: rod and reel 42%, longline 49%, gill net 3%, trawl net 2%, other gear 4%. Compared to previous years, the number of recaptures by commercial fishermen was slightly higher in 1988. The fishing gear that was originally used in tagging the sharks that were recaptured this year was: rod and reel 173 (57%), longline 111 (37%), handline 10 (3%), free swimming 4 (1%), trawl net 4 (1%), other 2 (<1%). From the above recapture information, it is apparent that sharks are caught in a variety of directed and incidental fisheries. Depending on the species, several nations are involved and some shark fisheries are expanding, including those in the U.S. It is also apparent that, although sharks must be treated gently to insure their survival, many tagged sharks survived after their initial capture by different fishing gear.

BLUE SHARKS (130 RETURNS)

The maximum time at liberty for a blue shark was 3.8 years and the maximum distance travelled was 2,479 miles. Many of the returns were "local" recaptures taken within 100 miles of the tagging site after less than a year. Some blue sharks were recaptured in the same locality after three years at liberty. Local tag returns are important in the study of all species of sharks. They are vital to understanding unanswered questions about homing and to explain whether a species returns to particular areas for mating, pupping, feeding, and other facets of their complex but poorly understood life histories. Long distance movements of blue sharks tagged off the U.S. in 1988 included several recaptures from off Canada, the Grand Banks, the Azores, Europe, the West Indies, and South America. Two sharks tagged off Rhode Island on the same day in 1985 were recaptured within 14 days of each other 2.7 years later off South America (1726 and 2113 miles respectively). Several long distance returns came from Spanish longliners that fish in the mid- Atlantic between the Azores and the Grand Banks. These areas are also fished by U.S., Canadian, and Japanese tuna and swordfish longliners. Fishery biologists, particularly from Spain, Canada, and Japan have been extremely helpful in returning tags with detailed recapture information. Included among the interesting tag returns from blue sharks were 18 returns from which the vertebrae were removed and sent to us for age studies, and

28 returns from fishermen who retagged and released the sharks. Two returns came from blues tagged on nursery grounds off Portugal that were at liberty for nearly a year. These returns provided good growth information and demonstrated that at least some of these very small (18" to 21" fork length) blues survive tagging. Another blue shark, at liberty for over a year, was tagged in the Adriatic Sea off the northeast coast of Italy and recaptured in the Mediterranean Sea off the Island of Malta (513 miles). A particularly valuable return came from a blue shark that was caught by a Rhode Island commercial longliner and brought in whole for our examination. This shark had been injected with an antibiotic that marks the vertebrae and provides a "growth mark" for age studies (see photo). Over a hundred blue sharks have been injected, but this is only the second recapture from which vertebrae were recovered. The shark was at liberty for 1.5 years and grew 19" in fork length. This growth rate supports our earlier estimates using other ageing techniques and is important to a current detailed study of blue shark age.

SANDBAR SHARKS (57 RETURNS)

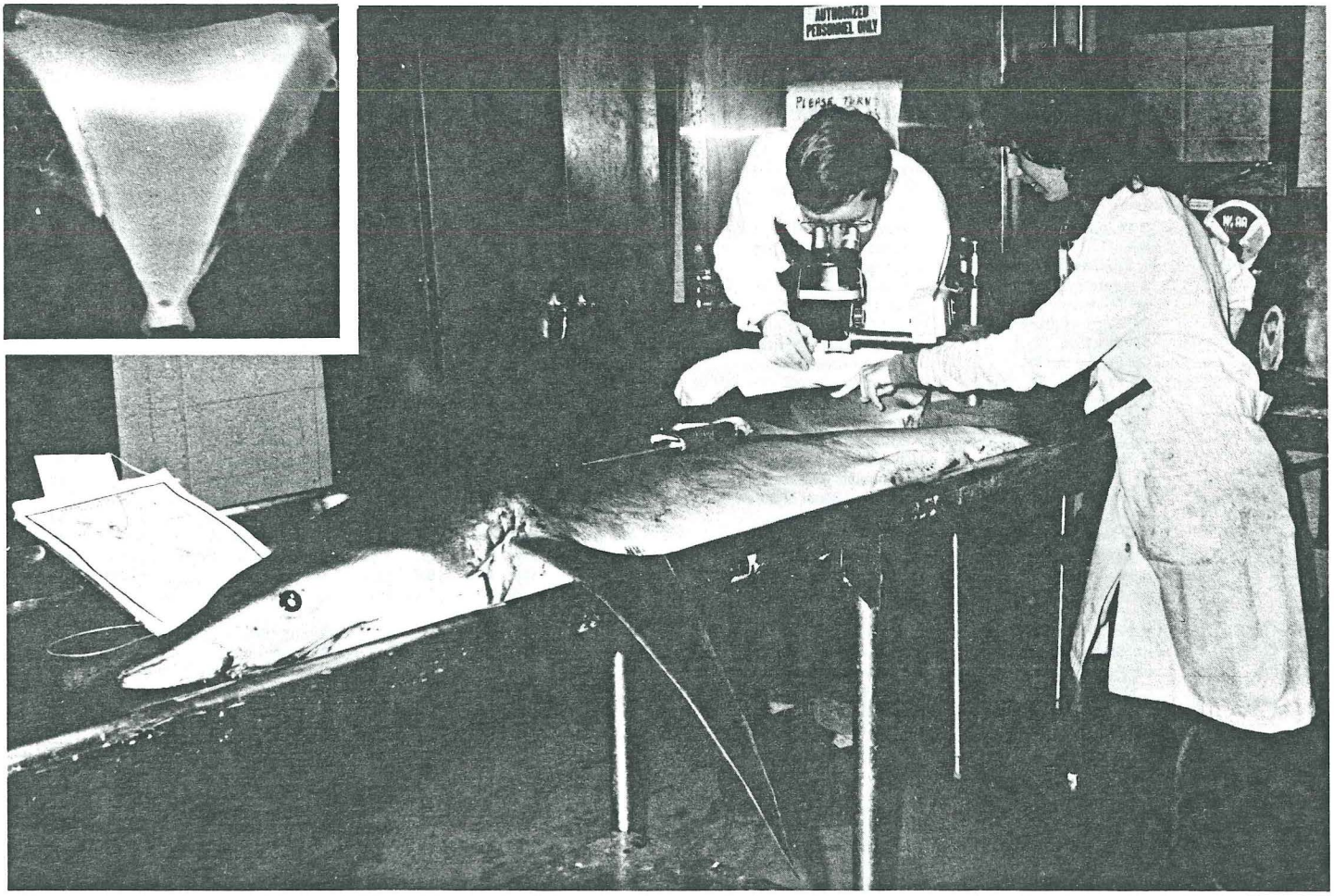
The maximum time at liberty for a sandbar shark was 22.9 years and the maximum distance travelled was 1,990 miles. The 23 year return is a new maximum time at liberty for any species tagged in the program. This particular shark was tagged in a shark gill net fishery in Virginia in 1965 and was recaptured on a shark longline off Sarasota, FL (1217 miles). The sandbar shark returns for 1988 showed 11 were free for less than one year, 31 were free from one to five years, 12 from five to ten years, and 3 were at liberty for over ten years.

Thirty-one (54%) of the returns came from sandbar sharks that were tagged off southern New England and the mid-Atlantic states and were recaptured off Florida and in the Gulf of Mexico. Two of these returns came from the coast of Mexico. The increasing numbers of recaptures from those areas reflects the expanding commercial shark fisheries there. About a dozen commercial shark fishermen in Florida and the Gulf are tagging sharks, collecting vertebrae, and otherwise assisting in NMFS studies. Vertebral samples from seven recaptured sandbar sharks were sent in by these fishermen in 1988.

MAKO SHARKS (17 RETURNS)

The maximum time at liberty for a mako shark was 3.4 years and the maximum distance travelled was 1703 miles. Ten of the recaptures were tagged by U.S. Fisheries Observers aboard foreign vessels (primarily Japanese tuna longliners), six were originally tagged by anglers and one by a cooperating biologist. Anglers recaptured ten (59%), and commercial fishermen seven (41%) of the makos returned in 1988. Three of the commercial returns came from Spanish longliners fishing off the Grand Banks and the Azores. Two of the returns, tagged by a fisheries observer off

(Continued on Page 11)



H.W. Pratt and L. Natanson examine a recaptured blue shark, previously injected with the antibiotic tetracycline. *(Photo by P. Manning)*

A vertebral section illuminated by ultraviolet light shows the resultant glowing tetracycline band. *Photo by H.W. Pratt*

Table 2. Tag recoveries: January-December 1988

	GENERAL LOCATIONS		MONTHS AT	DIST. (MI) AND DIR.		CAPTURE METHOD		TAGGED BY	
	TAGGED	RECAPTURED	LIBERTY			TAG	REC.	TAGGER	RESIDENCE
Blue shark	SE Montauk Pt, NY	S Pt Judith, RI	<1	5	NE	RR	RR	Tom Federico	NY
" "	E Montauk Pt, NY	SE Pt Judith, RI	<1	6	E	RR	RR	Bill Ricca	NY
" "	SE Montauk Pt, NY	SE Montauk Pt, NY	<1	1	E	RR	RR	Bill Hojohn	NY
" "	SSE Montauk Pt, NY	S Nantucket, MA	35	78	E	RR	RR	John Wolf	NY
" "	S Pt Judith, RI	SW Martha's Vin, MA	<1	27	NE	RR	RR	Tom McLaughlin	CT
" "	E Montauk Pt, NY	E Montauk Pt, NY	<1	9	W	RR	RR	Bill Hornbeck	NY
" "	S Montauk Pt, NY	SE Montauk Pt, NY	1	26	N	RR	RR	Joe McBride	NY
" "	SE Moriches Inlet, NY	S Pt Judith, RI	1	47	NE	RR	RR	Charles Joscher	NY
" "	S Pt Judith, RI	SE Pt Judith, RI	<1	19	E	RR	RR	Fred Gallagher	RI
" "	S Pt Judith, RI	SE Pt Judith, RI	<1	42	E	RR	RR	Charles Donilon	RI
" "	S Pt Judith, RI	SE Martha's Vin, MA	<1	43	E	RR	RR	Charles Donilon	RI
" "	SE Montauk Pt, NY	SE Pt Judith, RI	<1	26	NE	RR	RR	Mel Stier	NY
" "	SE Pt Judith, RI	S Martha's Vin, MA	1	31	E	RR	RR	Andy Dangelo	RI
" "	SE Montauk Pt, NY	E Montauk Pt, NY	<1	18	E	RR	RR	Bruce Reynolds	CT
" "	SE Montauk Pt, NY	S Block Is, RI	<1	10	NW	RR	RR	Bill Hojohn	NY
" "	S C Finisterre, Spain	NE C Finisterre, Spain	11	67	NE	LL	LL	Stephen Connett	RI
" "	S Pt Judith, RI	S Pt Judith, RI	1	13	S	RR	RR	Charles Donilon	RI
" "	E Montauk Pt, NY	SE Montauk Pt, NY	<1	19	W	RR	RR	Bill Ricca	NY
" "	SE Montauk Pt, NY	S Shinnecock Inl, NY	<1	59	W	RR	RR	Joe McBride	NY
" "	SE Montauk Pt, NY	Atlantis Canyon	<1	70	SE	RR	RR	Joe McBride	NY
Blue shark	S Nantucket, MA	SW Nantucket, MA	2	26	W	LL	HL	Stephen Connett	RI
" "	SE Montauk Pt, NY	SE Pt Judith, RI	1	21	NE	RR	RR	Joe McBride	NY
" "	S Pt Judith, RI	SW Montauk Pt, NY	<1	45	SW	RR	RR	Charles Donilon	RI
" "	SE Martha's Vin, MA	SE Montauk Pt, NY	1	60	W	LL	RR	Stephen Connett	RI
" "	SE Pt Judith, RI	E Montauk Pt, NY	<1	15	SW	RR	RR	Charles Donilon	RI
" "	SE Montauk Pt, RI	S Montauk Pt, NY	<1	24	SW	RR	RR	Zac Grossman	NY
" "	S Pt Judith, RI	E Manasquan Inl, NJ	1	117	SW	RR	RR	Andy Dangelo	RI
" "	SE Pt Judith, RI	SE Pt Judith, RI	<1	14	SE	RR	RR	Al Anderson	RI
" "	S Powell Canyon	S Oceanographer Canyon	6	92	S	LL	LL	Arv Poshkus, NMFS Obs.	MA
" "	S Martha's Vin, MA	SE Montauk Pt, NY	14	42	W	LL	RR	Stephen Connett	RI
" "	SE Montauk Pt, NY	S Montauk Pt, NY	14	22	SW	RR	RR	Joe McBride	NY
" "	E Cape May, NJ	ESE Montauk Pt, NY	12	174	NE	RR	RR	Alan Koch	NJ
" "	S Pt Judith, RI	S Pt Judith, RI	<1	1	SW	RR	RR	Charles Donilon	RI
" "	SE Pt Judith, RI	S Pt Judith, RI	<1	20	W	RR	RR	Tony Tolentino	MA
" "	NE Gloucester, MA	NE Gloucester, MA	1	42	SW	RR	RR	Greg Walts	ME
" "	SE Veatch Canyon	SE Montauk Pt, NY	11	132	NW	LL	RR	Jerzy Cygler, NMFS Obs.	MA
" "	SE Pt Judith, RI	S Montauk Pt, NY	<1	41	W	RR	RR	Tony Tolentino	MA
" "	S Pt Judith, RI	Block Canyon	14	74	S	RR	LL	Al Anderson	RI
" "	S C Finisterre, Spain	NW C Finisterre, Spain	12	74	NW	LL	LL	Stephen Connett	RI
" "	SE Montauk Pt, NY	SE Moriches Inl, NY	3	51	SW	RR	RR	Howard Kiedaisch	NY
Blue shark	S Pt Judith, RI	S Nantucket, MA	<1	52	SE	RR	LL	Fred Gallagher	RI
" "	NR	S Cape Sable, Canada	NR	NR		LL	LL	Walter Quinn, NMFS Obs.	MA
" "	S Munson Canyon	S Corsair Canyon	11	44	NE	LL	LL	Walter Quinn, NMFS Obs.	MA
" "	S Atlantis Canyon	SE Cape Sable, Canada	1	328	E	LL	LL	Ralph Tegge, NMFS Obs.	MA
" "	SE Pt Judith, RI	N St Lucia, W Indies	41	1,672	S	LL	RR	Stephen Connett	RI
" "	NE Cape Hatteras, NC	W Cartagena, Colombia	22	1,594	S	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	SE Block Is, RI	SW Pt d'Enfer, Martinique	NR	NR		RR	RR	Greg Dubrule	CT
" "	SE Pt Judith, RI	N Georgetown, Guyana	32	2,113	S	LL	LL	Stephen Connett	RI
" "	SE Pt Judith, RI	S Montauk Pt, NY	11	40	W	RR	RR	George Lockhart	RI
" "	ESE Block Is, RI	S Oceanographer Canyon	4	182	SE	RR	LL	Charles Donilon	RI
" "	SW Powell Canyon	S Veatch Canyon	10	102	SW	LL	LL	Linda Craig, NMFS Obs.	MA
" "	S Shinnecock Inl, NY	S Montauk Pt, NY	2	46	NE	RR	TO	Doug Wells	NY
" "	S Nantucket Is, MA	NW Madeira Is	33	2,479	E	LL	LL	Stephen Connett	RI
" "	SE Pt Judith, RI	SE Flemish Cap	7	1,428	E	RR	LL	Charles Donilon	RI
" "	N Sao Miguel, Azores	NW Sao Miguel, Azores	16	480	W	LL	LL	Butch Winters	FL
" "	SE Pt Judith, RI	NW Cumana, Venezuela	33	1,726	S	LL	LL	Stephen Connett	RI
" "	SW Nantucket Is, MA	E Grenada	7	1,765	S	LL	LL	Stephen Connett	RI
" "	S Oceanographer Canyon	S San Pedro, D Rep	27	1,273	S	LL	HL	Pat Michalik, NMFS Obs.	MA
" "	S Pt Judith, RI	S Veatch Canyon	11	120	SE	RR	LL	Al Anderson	RI
" "	SE Montauk Pt, NY	SE Moriches Inl, NY	11	28	W	FS	RR	Peter Fagan	NY
Blue shark	S Veatch Canyon	S Pt Judith, RI	7	140	NW	LL	RR	Georg Hinteregger, NMFS Obs.	MA
" "	SE Shinnecock Inl, NY	S Pt Judith, RI	<1	16	NE	RR	RR	Bill Williams	NY
" "	SE Powell Canyon	S Martha's Vin, MA	17	160	W	LL	RR	David Felch, NMFS Obs.	MA
" "	E Powell Canyon	SE Montauk Pt, NY	5	206	W	LL	RR	Randall Raeder, NMFS Obs.	MA
" "	E Montauk Pt, NY	E Montauk Pt, NY	<1	6	E	RR	RR	Bill Hornbeck	NY
" "	S Powell Canyon	SE Manasquan Inl, NJ	9	258	W	LL	RR	Roger Dow, NMFS Obs.	MA
" "	SE Pt Judith, RI	E Hudson Canyon	<1	82	S	RR	LL	Al Anderson	RI
" "	SW Cape May, NJ	E Hudson Canyon	<1	172	NE	RR	LL	Andy Merendino	NJ
" "	S Montauk Pt, NY	S Montauk Pt, NY	<1	16	W	RR	RR	Don Toth	NY
" "	S Montauk Pt, NY	SW Montauk Pt, NY	<1	8	NW	RR	RR	Chris Stathis	NY
" "	SE Fire Is Inl, NY	SE Jones Inl, NY	<1	3	E	RR	RR	Larry Luce	NY
" "	SE Pt Judith, RI	S Pt Judith, RI	<1	8	NW	RR	RR	Lee Pepin	RI
" "	NR	SE Montauk Pt, NY	NR	NR		RR	RR	Tom McLoughlin	CT
" "	S Shinnecock Inl, NY	S Montauk Pt, NY	24	32	NE	RR	RR	Terrence Stoner	NY
" "	S Martha's Vin, MA	SE Martha's Vin, MA	11	22	E	RR	RR	Oscar Amoroso	NY
" "	SE Montauk Pt, NY	SE Montauk Pt, NY	<1	21	NW	RR	RR	Frank Mundus	NY
" "	S Montauk Pt, NY	S Pt Judith, RI	<1	47	NE	FS	RR	Ed Parbst	NY
" "	S Shinnecock Inl, NY	S Pt Judith, RI	1	42	NE	RR	RR	Gary Nodine	NY
" "	SE Block Is, RI	S Gloucester, MA	25	75	NE	RR	HL	Andy Dangelo	RI
" "	S Corsair Canyon	SE Flemish Cap	17	1,253	E	LL	LL	Jay Cartner, NMFS Obs.	MA
Blue shark	SE Pt Judith, RI	SSE Shinnecock Inl, NY	<1	52	W	RR	RR	Tom McLoughlin	CT
" "	SE Martha's Vin, MA	E Montauk Pt, NY	<1	45	W	HL	RR	Stephen Connett	RI
" "	SE Martha's Vin, MA	SSE Montauk Pt, NY	<1	68	W	HL	RR	Stephen Connett	RI

Table 2 continued.

	GENERAL LOCATIONS TAGGED	GENERAL LOCATIONS RECAPTURED	MONTHS AT LIBERTY	DIST. (MI) AND DIR.		CAPTURE METHOD TAG	CAPTURE METHOD REC.	TAGGED BY TAGGER	TAGGED BY RESIDENCE
Blue shark	SSE Martha's Vin, MA	E Manasquan Inl, NJ	1	138	W	HL	RR	Stephen Connett	RI
" "	S Martha's Vin, MA	SE Pt Judith, RI	<1	13	W	HL	RR	Stephen Connett	RI
" "	S Martha's Vin, MA	SE Montauk Pt, NY	1	47	W	HL	RR	Stephen Connett	RI
" "	NR	E Montauk Pt, NY	NR	NR		RR	RR	Michael Forman	NY
" "	SE Fire Is Inl, NY	E Pt Judith, RI	13	138	NE	RR	TN	Barry J. Mack	NY
" "	E Montauk Pt, NY	SE Montauk Pt, NY	<1	6	SW	FS	RR	Charles Berwind	NY
" "	E Montauk Pt, NY	E Montauk Pt, NY	<1	4	NE	RR	RR	Tom Dornfield	CT
" "	E Gloucester, MA	NE Gloucester, MA	<1	91	NE	HL	LL	Stephen Connett	RI
" "	SE Martha's Vin, MA	S Fire Is Inl, NY	2	159	W	LL	RR	Stephen Connett	RI
" "	E Montauk Pt, NY	SE Fire Is Inl, NY	<1	89	W	RR	RR	Al Phillips	NY
" "	S Martha's Vin, MA	N Norfolk Canyon	4	292	SW	HL	LL	Stephen Connett	RI
" "	S Veatch Canyon	SE Martha's Vin, MA	7	83	N	LL	LL	Georg Hinteregger, NMFS Obs	MA
" "	SE Pt Judith, RI	SE Martha's Vin, MA	<1	57	E	FS	HL	Gary Guidone	CT
" "	SE Martha's Vin, MA	SE Martha's Vin, MA	<1	2	SW	HL	LL	Stephen Connett	RI
" "	Tom's Canyon	N Block Canyon	12	92	NE	RR	HL	Ralph Leyrer	NJ
" "	S Hydrographer Canyon	E Saco River, ME	8	240	N	LL	RR	Micah Kieffer, NMFS Obs	MA
" "	SE Pt Judith, RI	SSE Block Is, RI	1	20	W	RR	RR	Andy Dangelo	RI
" "	NR	SE Montauk Pt, NY	NR	NR		RR	RR	Harvey Rude, Jr.	NJ
" "	S Pt Judith, RI	S Pt Judith, RI	35	10	SW	RR	RR	Mario Pagano	RI
" "	E Cape May, NJ	SE Fire Is Inl, NY	<1	90	NE	RR	RR	Ray Geary	NJ
Blue shark	S Munson Canyon	SE Martha's Vin, MA	5	152	NW	LL	HL	Georg Hinteregger, NMFS Obs	MA
" "	SE Montauk Pt, NY	S Munson Canyon	17	200	E	RR	LL	Joe McBride	NY
" "	SE Montauk Pt, NY	E Montauk Pt, NY	<1	30	NE	RR	RR	Pete Kazura	NY
" "	S Oceanographer Canyon	N Santa Maria Is, Azores	7	2,024	E	LL	LL	K. Joyce, NMFS Obs.	MA
" "	NR	S Martha's Vin, MA	NR	NR		RR	HL	Greg Dubrule	CT
" "	Hudson Canyon	S Pt Judith, RI	2	95	NE	RR	RR	Bob Carton	NJ
" "	NE Horta, Azores	S Horta, Azores	15	31	SW	LL	LL	Stephen Connett	RI
" "	SE Pt Judith, RI	E Manasquan Inl, NJ	2	116	SW	RR	RR	Andy Dangelo	RI
" "	SE Block Is, RI	S Block Is, RI	1	15	SW	RR	FD	Charlie Donilon	RI
" "	SW C de Roca, Portugal	NW Nazare, Portugal	8	65	NE	LL	LL	Stephen Connett	RI
" "	NE Pesaro, Italy	SE Malta	13	513	S	RR	LL	Giorgio Lucenti	Italy
" "	NR	SE Montauk Pt, NY	NR	NR		RR	RR	Richard Shaw	ME
" "	SE Montauk Pt, NY	SE Shinnecock Inl, NY	1	38	W	RR	RR	Bill Ricca	NY
" "	SE Pt Judith, RI	S Montauk Pt, NY	1	85	S	RR	LL	Richard Lema	RI
" "	SE Munson Canyon	S Cape Race, Canada	45	569	E	LL	LL	Arv Poshkus, NMFS Obs.	MA
" "	S Oceanographer Canyon	E Corsair Canyon	19	342	E	LL	LL	Jay Loubris, NMFS Obs.	MA
" "	S Montauk Pt, NY	SE Sable Is, Canada	3	590	E	RR	LL	Chip Rafaniello	CT
" "	SW Nantucket, MA	Veatch Canyon	18	71	E	LL	LL	Stephen Connett	RI
" "	S Powell Canyon	N Gloucester, MA	8	240	NW	LL	RR	Walter Quinn, NMFS Obs.	MA
" "	SE Pt Judith, RI	S Munson Canyon	5	184	E	RR	LL	Al Anderson	RI
" "	Hudson Canyon	Hudson Canyon	1	3	NW	RR	LL	John Mautner	NJ
" "	NR	SE Montauk Pt, NY	NR	NR		NR	RR	Robert Scattergood	NY
" "	Hudson Canyon	S Oceanographer Canyon	4	204	E	RR	LL	John Mautner	NJ
" "	E Montauk Pt, NY	Hudson Canyon	1	97	SW	RR	LL	Bill Hornbeck	NY
" "	S C Finisterre, Spain	NW C Finisterre, Spain	16	456	NW	LL	LL	Stephen Connett	RI
Sandbar shark	S Fire Is Inlet, NY	NE Ponce Inl, FL	78	721	SW	RR	LL	Bob Wesolowski	NY
" "	Buxton, NC	E Ponce Inl, FL	64	448	SW	RR	LL	Herb Lewis	VA
" "	SW Key West, FL	N Key West, FL	43	44	N	LL	LL	Jack Morton	FL
" "	S Fire Is Inl, NY	S Mobile, AL	8	1,603	SW	RR	LL	Lawrence W. Gorman	NY
" "	SE Fire Is Inl, NY	W Sarasota, FL	19	1,400	SW	RR	LL	Bob Baltrunas	NY
" "	Miami Beach, FL	NW Key West, FL	127	354	W	RR	LL	Ron Schatman	FL
" "	S Montauk Pt, NY	S Key West, FL	43	1,339	SW	RR	RR	Jack Blaisdell	CT
" "	SSE Manasquan Inl, NY	S Pascagoula, MS	7	1,555	SW	RR	LL	Matt Muzslay	PA
" "	S Ponte Vedre Bch, FL	E New Smyrna Bch, Fl	24	88	E	RR	LL	Les Wilsey	FL
" "	S Fire Is Inl, NY	W Sarasota, FL	93	1,387	SW	RR	LL	R. J. Kleinfield	NY
" "	SE Fire Is Inl, NY	Cosgrove Shoal, FL	80	1,286	SW	RR	LL	Al Andrus,	NY
" "	E Manasquan Inl, NJ	S Sarasota, FL	20	1,395	SW	LL	LL	Biologist (NMFS)	RI
" "	Great Machipongo, VA	NW Sarasota, FL	274	1,217	SW	GN	LL	Biologist (NMFS)	RI
" "	SE Rudee Inl, VA	E Manasquan Inl, NJ	49	241	NE	LL	SN	Stephen Connett	RI
" "	SSE Shinnecock Inl, NY	E Ponce Inl, FL	89	792	SW	RR	LL	Shaler Carrington	NY
" "	E Manasquan Inl, NJ	SE Little Egg Harbor, NJ	47	62	SW	RR	RR	John McShane	NY
" "	SE Jacksonville, FL	NR	NR	NR		LL	LL	Biologist (NMFS)	RI
" "	NE Ponce Inl, FL	NE Charleston, SC	2	231	N	LL	GN	Eric Sander	FL
" "	N Cape Henlopen, DE	S Mobile, AL	49	1,516	SW	LL	TN	Biologist (NMFS)	RI
" "	S Montauk Pt, NY	SE Block Is, RI	60	35	NE	RR	RR	Charles Berwind	NY
Sandbar shark	S Montauk Pt, NY	E Sota La Marina, Mexico	24	1,990	SW	RR	LL	Mike Poola	CT
" "	SE Fire Is Inl, NY	E Ponce Inl, FL	13	779	SW	RR	LL	Phil Bruckner	NY
" "	E Beach Haven, NJ	E Mississippi River, MS	48	1,568	SW	RR	TN	Ralph Leyrer	NJ
" "	E Beach Haven, NJ	Destin Bch, FL	12	1,560	SW	RR	RR	Jay Daveler	PA
" "	NE Beach Haven, NJ	E Indian River Inl, DE	1	86	SW	RR	RR	David Wentling	PA
" "	SE Pt Judith, RI	SE Ponce Inl, FL	16	861	SW	RR	LL	Dave Preble	RI
" "	NW Cape Henlopen, DE	SE Destin, FL	14	1,385	SW	LL	LL	Jackson Andrews	MD
" "	E Charleston, SC	SE Panama City Bch, FL	50	951	SW	LL	LL	Douglas Oakley	SC
" "	NE Barnegat Inl, NJ	S Panama City Bch, FL	61	1,545	SW	RR	LL	Dave Moss	FL
" "	SE Manasquan Inl, NJ	S Mobile, AL	26	1,581	SW	RR	LL	Tom Knoble	NJ
" "	E Rudee Inl, VA	E Matamoras, Mexico	72	1,703	SW	RR	LL	Bill Moffett	VA
" "	E Charleston, SC	W Sarasota, FL	22	937	SW	LL	LL	Biologist (NMFS)	RI
" "	SSE Ft Pierce Inl, FL	NE Cape Canaveral, FL	14	105	N	LL	LL	Stephen Connett	RI
" "	E Little Egg Inl, NJ	ESE Jacksonville, FL	19	698	SW	RR	LL	Steve Rubin	NY
" "	SE Montauk Pt, NY	SE Rudee Inl, VA	2	311	SW	RR	TN	Carl Safina	NY
" "	SW Charleston, SC	S Charleston, SC	<1	4	E	RR	GN	Rick Stringer	SC
" "	S Pt Judith, RI	N Ponce Inl, FL	3	840	SW	RR	LL	Fred Gallagher	RI
" "	SE Little Egg Inl, NJ	E St Augustine, FL	30	545	SW	RR	LL	Randy Jones	NJ
" "	NR	S Panama City, FL	NR	NR		RR	LL	Chris Falterer	CT

Table 2 continued.

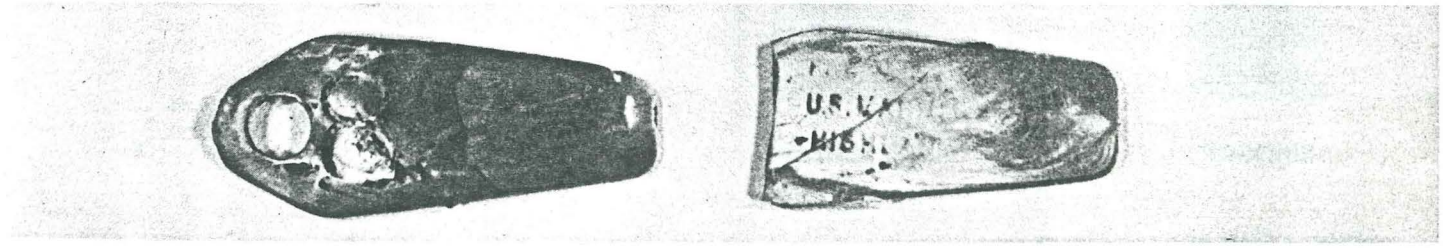
	GENERAL LOCATIONS TAGGED	GENERAL LOCATIONS RECAPTURED	MONTHS AT LIBERTY	DIST. (MI) AND DIR.		CAPTURE METHOD TAG	CAPTURE METHOD REC.	TAGGED BY TAGGER	TAGGED BY RESIDENCE
Sandbar shark	SE Moriches Inl, NY	E Ocean City, MD	47	155	SW	RR	LL	Larry Lund	NY
" "	E Montauk Pt, NY	NW St Petersburg, FL	46	1,549	SW	LL	LL	Stephen Connett	RI
" "	E Manasquan Inl, NJ	E Carolina Bch, NC	39	390	SW	RR	RR	David Krypel	NJ
" "	S Moriches Inl, NY	S Morehead City, NC	88	431	SW	RR	LL	Paul Schwack	NY
" "	SSW Montauk Pt, NY	NE Ponce Inl, FL	14	812	SW	RR	LL	Mike Finazzo	NY
" "	S Cape Charles, VA	S Morehead City, NC	101	186	S	RR	LL	Donald R. Cordts	NJ
" "	NW Baltimore Canyon	S Cape Lookout, NC	25	307	SW	TN	LL	Roger Dow, NMFS Obs.	MA
" "	S Cape May, NJ	E Ponce Inl, FL	3	634	SW	RR	LL	Terry Bosserman	PA
" "	S Fire Is Inl, NY	NE Jacksonville Bch, FL	23	676	SW	RR	LL	Roy T. Allen, Jr	NY
" "	E Manasquan Inl, NJ	SE Daytona Bch, FL	136	705	SW	RR	LL	Ray Schmidt	NY
" "	SE Montauk Pt, NY	E Savannah, GA	52	679	SW	RR	LL	Murray L. Roth	NY
" "	SSE Shinnecock Inl, NY	NE Charleston, SC	15	523	SW	RR	LL	Ed Lopez	NY
" "	SE Ft Pierce Inl, FL	NW Dry Tortugas, FL	89	413	W	LL	LL	Stephen Connett	RI
" "	SE Fire Is Inl, NY	W Key West, FL	NR	1,266	SW	RR	LL	Bob Karman	NY
" "	SE Ocean City, NJ	E Lake Worth, FL	22	796	SW	RR	LL	Joe Harper	NJ
" "	Jacksonville, FL	E Ponce Inl, FL	NR	95	SE	RR	LL	Chuck Scholl	FL
" "	E Rehobeth Bch, DE	SE Cape Canaveral, FL	79	722	SW	RR	LL	Pete Floyd	DE
Tiger shark	E Ponce Inl, FL	NE Ponce Inl, FL	1	13	NE	LL	LL	Tris Colket	FL
" "	E Ponce Inl, FL	E Ponce Inl, FL	<1	2	SW	LL	LL	Tris Colket	FL
" "	ENE Ponce Inl, FL	S Cape Lookout, NC	1	352	NE	LL	LL	Eric Sander	FL
" "	SE Pt Judith, RI	E St Augustine, FL	31	825	SW	LL	LL	Stephen Connett	RI
" "	E Ponce Inl, FL	E Ponce Inl, FL	1	13	W	RR	LL	Sid Preskitt	FL
" "	E Ponce Inl, FL	Cape Point, NC	3	451	NE	LL	RR	Eric Sander	FL
" "	E St Augustine, FL	E St Augustine, FL	<1	33	W	LL	LL	Sid Preskitt	FL
" "	SE Manasquan Inl, NJ	S Cape Hatteras, NC	48	303	S	RR	LL	Michael Marcon	NJ
" "	SW Mobile, AL	SE Galveston, TX	7	199	N	LL	RR	Dan Gregg, NMFS Obs.	MS
" "	E Ponce Inl, FL	ENE St Augustine, FL	1	67	N	LL	LL	Sid Preskitt	FL
" "	NE Ponce Inl, FL	E Fernandina, FL	7	87	N	LL	LL	Tris Colket	FL
" "	NE St Augustine, FL	NE St Augustine, FL	2	17	W	LL	LL	Don Thoburn	FL
" "	N Ponce Inl, FL	E St Augustine, FL	<1	10	NE	LL	LL	Tris Colket	FL
" "	NNE Ponce Inl, FL	NE Ponce Inl, FL	<1	19	S	LL	LL	Tris Colket	FL
" "	NE Ponce Inl, FL	NE Ponce Inl, FL	<1	21	NW	LL	LL	Tris Colket	FL
" "	NE Ponce Inl, FL	E Ponce Inl, FL	1	14	S	LL	LL	Tris Colket	FL
" "	SE Rudee Inl, VA	SW Morehead City, NC	38	131	SW	RR	LL	Bill Moffett, Jr.	VA
" "	SW Mobile, AL	W Mobile, AL	10	204	NW	LL	LL	David Millar	FL
" "	SE Rudee Inl, VA	NE Rudee Inl, VA	22	39	N	LL	LL	Biologist (NMFS)	RI
" "	NE St Augustine, FL	E St Augustine, FL	1	22	SE	LL	LL	Tris Colket	FL
Tiger shark	SW Panama City Bch, FL	S Panama City Bch, FL	1	13	SE	RR	LL	Clancy Robertson	FL
" "	SW Puerto Rico	NR	60	NR		LL	LL	CODREMAR	Puerto Rico
" "	ENE Ponce Inl, FL	NE Ponce Inl, FL	1	13	N	LL	LL	Eric Sander	FL
" "	E Ponce Inl, FL	NE Ponce Inl, FL	2	33	N	LL	LL	Tris Colket	FL
" "	NE Ponce Inl, FL	E Ponce Inl, FL	NR	12	S	LL	LL	Tris Colket	FL
" "	E Eleuthera Pt, Bahamas	E Cape Canaveral, FL	NR	322	NW	LL	LL	Stephen Connett	RI
" "	NE Ponce Inl, FL	N Ponce Inl, FL	1	26	W	LL	LL	Tris Colket	FL
" "	E Ponce Inl, FL	E St Augustine, FL	<1	32	N	LL	RR	Tris Colket	FL
" "	NE Ponce Inl, FL	E Cape Canaveral, FL	3	52	SE	LL	LL	Eric Sander	FL
" "	NE Ponce Inl, FL	NE Jacksonville Bch, FL	<1	96	N	LL	LL	John Fraser	FL
" "	E Ponce Inl, FL	SE St Augustine, FL	3	5	S	LL	RR	Eric Sander	FL
Mako shark	S Cape Hatteras, NC	E Oregon Inl, NC	NR	64	NE	LL	LL	Stephen Connett	RI
" "	SW Powell Canyon	SE Charleston, SC	9	719	SW	LL	RR	Georg Hinteregger, NMFS Obs.	MA
" "	S Powell Canyon	E Oregon Inl, NC	20	414	SW	LL	RR	Martha Rowan, NMFS Obs.	MA
" "	S Veatch Canyon	SE Flemish Cap	9	1,266	E	LL	LL	Jay Taylor, NMFS Obs.	MA
" "	E Manasquan Inl, NJ	SSE Sandy Hook, NJ	<1	23	E	RR	RR	Carmine Vastrala	NJ
" "	SW Montauk Pt, NY	N Block Canyon	1	50	SE	RR	RR	Robin Lehman	NY
" "	SE Manasquan Inl, NY	SE Barnegat Inl, NJ	11	20	S	RR	RR	Ralph Leyrer	NJ
" "	S Powell Canyon	S Moriches Inl, NY	8	269	W	LL	RR	Ralph Tegge, NMFS Obs.	MA
" "	E Manasquan Inl, NJ	SW Shinnecock Inl, NY	<1	53	NE	RR	RR	John Williams	NJ
" "	E Manasquan Inl, NJ	S Fire Is Inl, NY	12	35	N	RR	RR	Rick Sabarese	NJ
" "	SE Powell Canyon	E Cape May, NJ	7	362	W	LL	RR	Steven Slota, NMFS Obs.	MA
" "	S Veatch Canyon	W Horta, Azores	14	1,703	E	LL	LL	Jerzy Cygler, NMFS Obs.	MA
" "	S Oceanographer Canyon	W Horta, Azores	11	1,568	E	LL	LL	Jerzy Cygler, NMFS Obs.	MA
" "	SE Ocean City, MD	Washington Canyon	1	36	S	RR	RR	Donald Dunbar	MD
" "	SE Atlantis Canyon	SE Sable Is, Canada	NR	529	NE	LL	LL	Jay Taylor, NMFS Obs.	MA
" "	NW Oceanographer Canyon	SW Flemish Cap	40	889	NE	TN	LL	Paul Jones, NMFS Obs.	MA
" "	S Hydrographer Canyon	NR	11	NR		LL	LL	Steve Slota, NMFS Obs.	MA
Lemon shark	Fat Deer Key, FL	Fat Deer Key, FL	6	1	S	RR	RR	William Botten	FL
" "	S Mobile, AL	SW Mobile, AL	<1	328	N	LL	LL	Stan Nolan	AL
" "	Long Key, FL	Long Key, FL	23	2	NW	LL	LL	Sea World	FL
" "	Racoon Key, FL	Racoon Key, FL	3	0		RR	RR	William Botten	FL
" "	Long Point Key, FL	Vaca Key, FL	<1	7	SW	RR	RR	William Botten	FL
" "	Long Point Key, FL	Vaca Key, FL	<1	6	SW	RR	RR	William Botten	FL
" "	Long Point Key, FL	Vaca Key, FL	<1	6	SW	RR	RR	William Botten	FL
" "	Long Point Key, FL	Bamboo Key, Fl	<1	1	S	RR	RR	William Botten	FL
" "	Bamboo Key, FL	Duck Key, FL	14	3	E	RR	RR	William Botten	FL
" "	Fat Deer Key, FL	Fat Deer Key, FL	1	0		RR	RR	William Botten	FL
" "	NR	E Islamorada, FL	NR	NR		NR	RR	Samuel Gruber	FL
" "	Fat Deer Key, FL	Bamboo Key, FL	5	1	N	RR	RR	William Botten	FL
Dusky shark	SE Fire Is Inl, NY	SE Cape Canaveral, FL	30	830	SW	RR	LL	Ted Bingham	NY
" "	SSE Shinnecock Inl, NY	S Sarasota, FL	23	1,393	SW	RR	RR	Bill Imperiale	NY
" "	S Fire Is Inl, NY	SW Mobile, AL	57	1,593	SW	RR	LL	Steven Rubin	NY
" "	S Mobile, AL	E Soto La Marina, Mexico	7	621	SW	LL	LL	Daniel Gustafson, NMFS Obs.	MS

Table 2 continued.

	GENERAL LOCATIONS TAGGED	GENERAL LOCATIONS RECAPTURED	MONTHS AT LIBERTY	DIST. (MI) AND DIR.		CAPTURE METHOD TAG	CAPTURE METHOD REC.	TAGGED BY TAGGER	TAGGED BY RESIDENCE
Dusky shark	S Moriches Inl, NY	S Sarasota, FL	59	1,386	SW	RR	RR	Joe Carter	NY
" "	NE Manasquan Inl, NJ	E Cape Hatteras, NC	63	325	S	RR	RR	Greg Nisito	NY
" "	SE Fire Is Inl, NY	E Savannah, GA	47	604	SW	RR	LL	Robert McReynolds	NY
" "	NE Cape May, NJ	Bogue Banks, NC	2	287	SW	RR	RR	Robert E. Jack	NJ
" "	SE Barnegat Inl, NJ	N Coatzacoalcas, Mexico	27	1,824	SW	RR	LL	Roy Rapp	NJ
Nurse shark	Long Point Key, FL	Long Point Key, FL	21	0		RR	RR	William Botten	FL
" "	Vaca Key, FL	Marathon, FL	25	2	W	RR	RR	William Botten	FL
" "	Vaca Key, FL	Vaca Key, FL	2	0		RR	RR	William Botten	FL
" "	Fat Deer Key, FL	Bamboo Key, FL	28	1	SE	RR	RR	William Botten	FL
" "	Little Crawl Key, FL	Little Crawl Key, FL	30	10	E	RR	RR	William Botten	FL
" "	Vaca Key, FL	Little Shark River, FL	16	36	N	RR	RR	William Botten	FL
Blacktip shark	NW Pt Mansfield, TX	NE Veracruz, Mexico	<1	459	S	RR	LL	Frank A. Eicholz	TX
" "	Pine Is Sound, FL	Pine Is Sound, FL	10	3	S	RR	GN	Don Case	FL
" "	Egmont Key, FL	St Petersburg, FL	<1	13	NE	RR	GN	Dave Moss	FL
" "	South Padre Is, TX	Mustang Is, TX	1	24	NE	RR	TO	Floyd Scroggin	TX
" "	Pine Is Sound, FL	Pine Is Sound, FL	<1	8	W	RR	RR	Don Case	FL
" "	SW Pascagoula, MS	E Ft Lauderdale, FL	11	758	E	LL	RR	David Millar	FL
" "	Boca Grande, FL	W Ft Meyers, FL	1	20	SE	RR	TN	John Douglas, Jr.	FL
" "	Pine Is Sound, FL	W Naples, FL	2	28	E	RR	GN	Don Case	FL
" "	Dauphin Is, AL	SW Mobile, AL	51	60	SW	RR	LL	Bob Hooker	AL
Sand Tiger	NE Ponce Inl, FL	E Rehobeth Bch, DE	27	641	NE	LL	LL	Tris Colket	FL
" "	Delaware Bay, DE	E Rehobeth Bch, DE	11	7	S	RR	RR	Bill Garrison	NJ
" "	NNE Ponce Inl, FL	E New Smyrna Bch, FL	11	13	SE	LL	LL	Norman Sander	FL
" "	NR	E Bowers Bch, DE	NR	NR		RR	RR	Bill Garrison	NJ
Porbeagle	SW Flemish Cap	S Cape Race, Canada	51	298	W	LL	LL	Phil Ruhle, Sr	RI
"	S Hydrographer Canyon	S Powell Canyon	<1	66	E	LL	LL	Jay Taylor, NMFS Obs.	MA
"	Gilbert Canyon	W Corsair Canyon	26	62	N	TN	TN	Walter Quinn, NMFS Obs.	MA
Reef shark	E Eleuthera, Bahamas	E Eleuthera, Bahamas	53	1	SE	LL	LL	Stephen Connett	RI
" "	Bimini, Bahamas	Bimini, Bahamas	29	1	NW	LL	RR	Samuel Gruber	FL
" "	N Acklins Is, Bahamas	N Acklins Is, Bahamas	12	4	W	LL	LL	Stephen Connett	RI
Bull shark	SW Mobile, AL	Lake Barre, LA	1	73	W	LL	GN	Stan Nolan	AL
" "	W Sarasota, FL	W Sarasota, FL	84	91	W	RR	LL	Steve Carman	FL
" "	SW Key West, FL	Charlotte Harbor, FL	5	155	N	RR	GN	Ray Lovell	FL
Bignose shark	SE Ocean City, MD	SW Mobile, AL	45	1,484	SW	LL	LL	Biologist (NMFS)	RI
" "	SE Ocean City, MD	E Veracruz, Mexico	50	1,778	SW	LL	LL	Biologist (NMFS)	RI
Atl. Sharpnose	NE Jacksonville, FL	NE Cape Canaveral, FL	7	107	SE	RR	TN	Chuck Scholl	FL
" "	SE Charleston, SC	NE Ponce Inl, FL	11	203	S	RR	LL	Ivan Schultz	SC
Hammerhead	E Manasquan Inl, NJ	SW Topsail Is, NC	15	383	SW	RR	GN	Art Walsh	NJ
" "	Cataret Canyon	N Ft Lauderdale, FL	92	816	SW	RR	LL	J. R. Jeck	NJ
Com. Thresher	SE Pt Judith, RI	SE Shinnecock Inl, NY	96	56	SW	LL	RR	Stephen Connett	RI
Spinner shark	S Mobile, AL	S Mobile, AL	2	26	S	TN	LL	Dan Gregg, NMFS Obs.	MS
Silky shark	W Dry Tortugas, FL	Cosgrove Shoal, FL	84	115	E	LL	LL	Hase, NMFS Obs.	MS
Shark	NR	Fire Is, NY	NR	NR		RR	TO	Peter Treat	RI
Bluefin Tuna	S Montauk Pt, NY	SE Munson Canyon	38	236	E	RR	LL	Al Ristori	NJ
Swordfish	S Cape Sable, Canada	NW Tortuga Is, Haiti	1	1,253	S	LL	LL	Micah Kieffer, NMFS Obs.	MA
"	SE Veatch Canyon	E Fort Pierce Inlet, FL	33	908	SW	LL	LL	Walter Quinn, NMFS Obs.	MA
"	E Flemish Cap	S Flemish Cap	24	232	SW	LL	LL	Charles Johnson	ME
"	S Oceanographer Canyon	Lydonia Canyon	5	36	NE	LL	LL	Walter Quinn, NMFS Obs.	MA

NOTE: FD=Found Dead; GN=Gill Net; HL=Hand Line; LL=Longline; RR=Rod & Reel; SN=Scallop Net; TO=Tag Only; TN=Trawl Net; Obs.=Foreign Fisheries Observer; NR=Not Reported.

[a]Not included are 15 local returns for 8 lemon sharks, 4 nurse sharks, and 3 tiger sharks from a concentrated study off Bimini, Bahamas, by Dr. S. Gruber, Univ. of Miami.



Red rototag (fin tag) from a sandbar shark recaptured after 22.9 years. The return address is worn away, but the number was still recoverable. Please contact NMFS, Narragansett, for information on any tagged shark. *Photo by H.W. Pratt*

SANDBAR SHARK FOOD STUDIES

This article is summarized from a manuscript prepared by staff members Charles Stillwell and Nancy Kohler. It includes information from juvenile and adult sandbar sharks (Carcharhinus plumbeus) captured off the northeast coast of the U.S. from Georges Bank, Massachusetts to Cape Hatteras, North Carolina and newborn pups from Chincoteague Bay, Virginia.

The sandbar shark is found worldwide in tropical and subtropical zones of the world's oceans and the Mediterranean Sea. It occurs from nearshore out to a depth of at least 130 fathoms and reaches a maximum size of about 8' in total length. The distribution of the sandbar shark along the U.S. east coast extends from Massachusetts to the Florida Keys and the Gulf of Mexico in the summer and southward from the Carolinas into the Gulf of Mexico during the winter. From May through September, newborn pups and small juveniles (2' to 4' in total length) are common to abundant in the shallow bays and estuarine systems along the coast from mid New Jersey to Cape Canaveral, Florida. In the northern part of their range the young sharks migrate offshore and south during the fall to wintering grounds south of Cape Hatteras, N.C., in depths to 75 fathoms. When the juvenile sandbars are about four feet long, they depart the shallow summer nursery areas and undertake more extensive seasonal migrations with increasing size.

The diversity of prey consumed by juvenile and adult sandbar sharks in the study area consisted almost exclusively of bottom dwelling species of fish and crustaceans (crabs, shrimp, etc.). A few midwater species including butterfish, mackerel and bluefish were occasional prey. Of 40 different food categories observed, only seven were found in the stomachs from both the nearshore and offshore sampling areas. These were squids, skates, skate egg cases, goosefish, bluefish, flounders, and animal remains (pork and beef refuse). The major food groups (by frequency of occurrence) were bony fish, followed by elasmobranchs, squid, and miscellaneous organisms including refuse. Prey size is important since the majority of items in the stomachs were swallowed intact. Those that were bitten into smaller pieces included skates, goosefish, bluefish, and smooth and spiny dogfish.

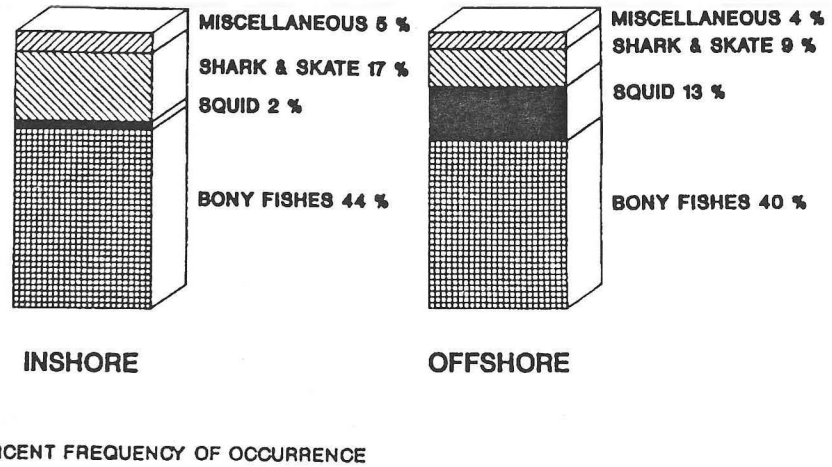
For adult sandbar sharks, most of the fish consumed was comprised of several species of flounders followed by goosefish ranging in size from two to eighteen inches. Bluefish and mackerel occurred in a few stomachs, but did not contribute significantly to the sandbars diet. Elasmobranch prey consisted almost exclusively of skates and some smooth and spiny dogfish. Squid was relatively unimportant in the diet of sandbars taken inshore but was common in stomachs from sharks captured in depths greater than 50 fathoms.

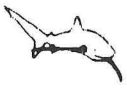
Stomachs examined from 94 young sandbars captured in the Chincoteague Bay estuary showed they fed primarily on soft shell blue crabs and other crab species. The occurrence of juvenile flounder, anchovy, silversides, and mullet in a few stomachs indicates some predation on a variety of fish species as well.

Overall, 49% of the 321 stomachs examined contained food. This figure approximates the percentage found for most of the shark species we have examined, with the exception of the mako shark in which almost 70% of the stomachs contained food.

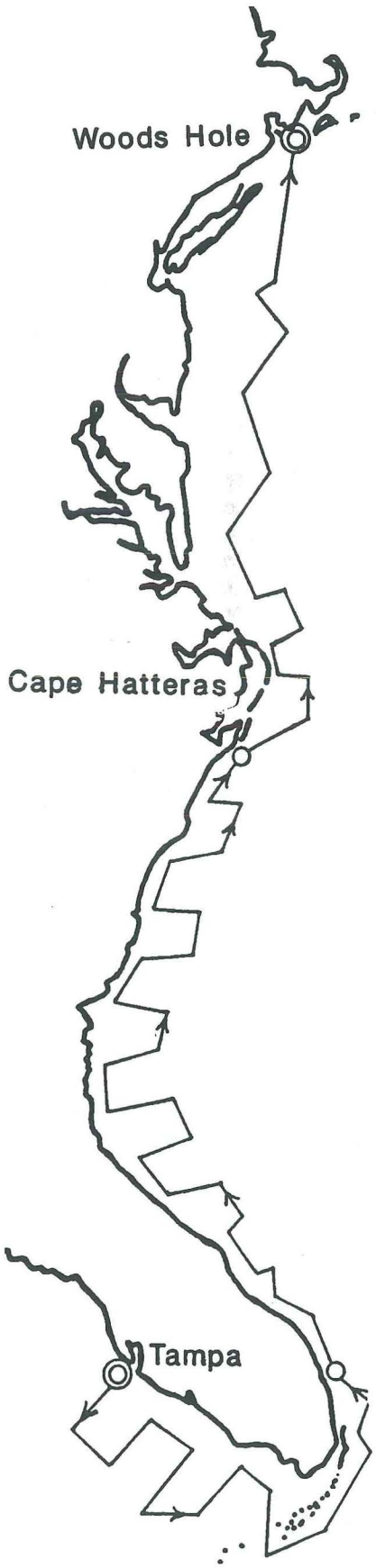
Food volumes in the stomachs ranged from trace amounts to a maximum of nearly seven pounds in an adult. The average for juveniles and adults was about one third of a pound which is about 0.6% of the body weight for a sandbar shark of medium size (60 lbs). This may approximate the daily food intake for the sandbar shark, and if so, is only about half the daily ration reported for many bony fishes.

SANDBAR SHARK PREY CATEGORIES





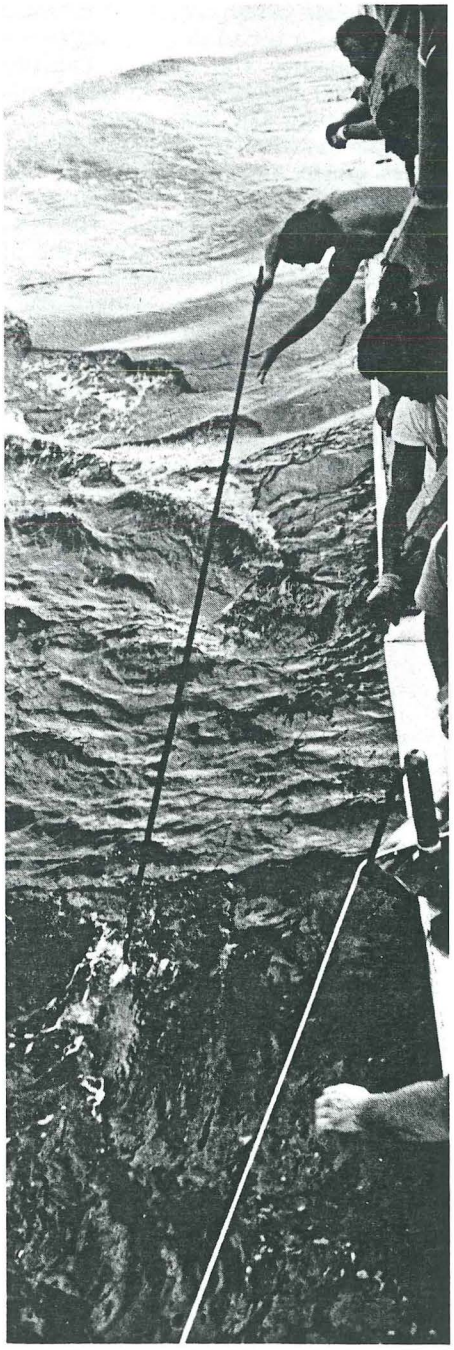
SHARK SURVEY CRUISE PLANNED FOR 1989



Cruise track of RV *Delaware*, April 17 to June 2, 1989.

The NMFS research vessel, *Delaware* II will be used to conduct a 47 day spring survey cruise for sharks along the U.S. east coast between Tampa, Florida and the mid-Atlantic states. The vessel will leave Woods Hole, Massachusetts on April 17 and return on June 2, 1989. The primary objectives of the cruise are to: 1) survey the species composition, abundance, and distribution of sharks in continental shelf, slope and Gulf Stream waters using standardized longline gear; 2) examine stomachs of sharks for predator-prey studies; 3) collect biological samples of sharks for age and reproductive studies; 4) tag several species of sharks for migration studies; 5) conduct exploratory fishing with heavy gear to search for pregnant mako sharks; and 6) compare New England longline fishing gear with other commercial shark fishing gear. Several visiting scientists from universities and other agencies will participate in the cruise to collect material for studies of shark parasites, genetics, and taxonomy.

The survey procedure at each fishing station will be to set 100 hooks of standardized longline gear for two hours. The gear will cover approximately 1.5 miles and will be buoyed every 10 hooks with red plastic floats marked "NMFS". Fishing stations will extend from nearshore to beyond the 100 fathom curve. The *Delaware* II, which is a large (156') white vessel, will stand by the gear and every effort will be made to avoid other fixed or floating gear. To further avoid gear conflicts, the *Delaware* II will attempt to contact fishermen in the area to explain the NMFS operations. We hope people will not disturb our gear out of curiosity, since it will be unfamiliar to fishermen in some areas. You could help by informing other fishermen who do not receive this newsletter about the cruise. This is the second large-scale shark survey cruise by NMFS in the Atlantic. The first was conducted aboard the Polish research vessel *Wieczno* in July and August of 1986 in the area extending from Cape Cod, MA to Miami, FL. Results of that cruise (reported in the 1986 SHARK TAGGER) included a total catch of 679 fish representing 32 species taken at 120 fishing stations. A wealth of biological information was realized from the *Wieczno* survey including several tag recoveries from the 424 sharks that were tagged and released. We enjoyed excellent cooperation from fishermen at sea during the 1986 cruise and we look forward to a productive cruise aboard *Delaware* II.



Tagging a shark aboard RV *Delaware*. *Photo by H.W. Pratt*

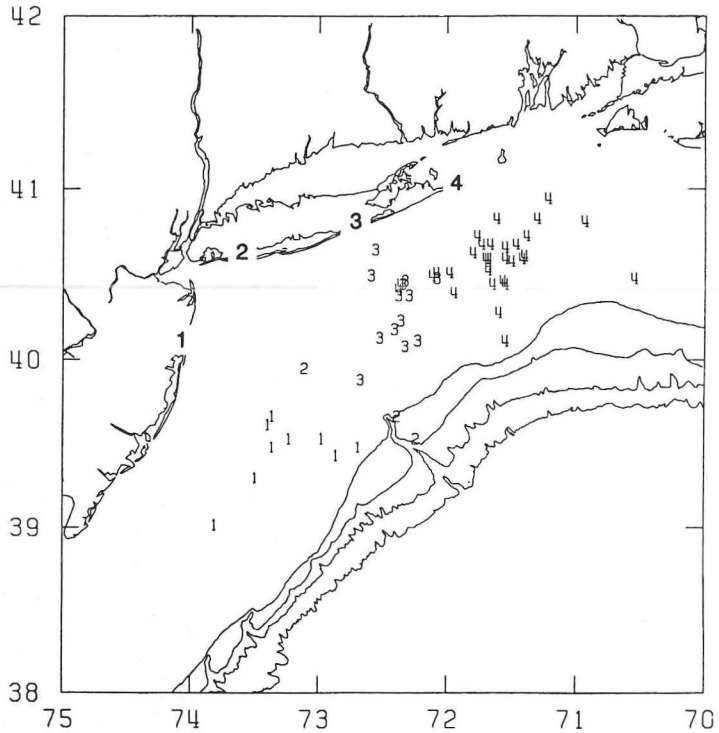
TOURNAMENT ANGLERS PROVIDE INSIGHTS ON SHARK DISTRIBUTIONS

For biologists, the increasing number of shark tournaments in the northeast are important sources of data and provide opportunities to examine sharks, distribute tags, and exchange information with fishermen who are indeed valuable windows to the sea. Last summer at eleven shark tournaments involving 1,200 boats in the area between New Jersey and eastern Long Island, NY, we attempted to collect information on shark catches by species, location, and surface water temperatures. The aim was to obtain simultaneous observations on shark distributions over a broad geographic area of approximately 150 miles of coastline and 8,000 square miles of continental shelf waters. The data could then be compared with the 25-year tagging data base, previous tournament records, and surface water temperatures, including satellite temperature maps. The catch information might then show the occurrence of sharks by species, size and sex, and more precisely define distributions with respect to water temperature. In short, tournament boats represented an opportunity for obtaining over 1,500 observations in a six day period. The procedure was to mail instructions to some captains prior to the tournaments and to explain the experiment at the captain's meetings the night before each tournament. Brief self-addressed post cards requesting the number of sharks landed, tagged or lost were distributed, and the captains were asked to hand them in, or mail them, after the tournament.

Summary results of the tournament catch cards from four tournaments held on June 17 and 18, in the area between New Jersey and eastern Long Island, New York are shown in the figure. One of the tournaments took place over two consecutive days, but only the first day's fishing results were used for comparisons. The average return rate of the cards from all tournament boats combined was relatively low (10%) and ranged from 4-32%. The highest rate was primarily due to a concerted effort by our staff to interview most of the anglers returning to the dock at one tournament. The species composition of the catch at each tournament correlated well with the surface water temperatures reported by anglers. The warmest surface temperatures (63-66°F) were reported in the New Jersey tournament (No. 1 in the figure) where the only makos were caught. The temperature decreased to the north and east with the lowest surface temperatures (58-63°F) at the Montauk, New York tournament (No. 4) where the highest catches of blue sharks were recorded. Catches of sharks at tournaments 2 and 3 consisted of only a few blue and thresher sharks. One week later, on June 25, the water warmed to about 68°F and tournaments off mid-Long Island had higher catches of blue, mako, and sandbar sharks as well as a white and dusky shark. A June 25 tournament off Montauk continued to produce blue sharks and some of the first mako sharks of the season in that area.

Overall, June 1988 was a poor month for recreational shark fishing off New York and New Jersey. For example, one tournament with 300 boats landed only thirteen sharks. In another, in which 150 boats have historically caught hundreds of sharks, only twenty-five were landed. Oceanographic survey data for 1988 showed late May and June to be about 3-4 degrees cooler than average and salinity measurements showed above average amounts of low salinity water on the continental shelf during March through May. The source of this low salinity water was not due to high runoff from local river systems as was the case in 1984 when the catch of blue sharks was extremely low. The source of the fresh water in the spring of 1988 very likely came from the Gulf of St. Laurence where the highest river discharges on record were reported in late 1986 and early 1987. The timing was about right, since the effect of this runoff can take over a year to reach the mid-Atlantic states. The additional input of fresh water from the Hudson River may have further decreased the salinity off western Long Island, New York and New Jersey. The available information supports the hypothesis that cooler than normal water temperatures in late May and early June, combined with an influx of low salinity water, delayed the shoreward movements of the blue sharks onto the continental shelf off New Jersey and western Long Island. As the water temperatures increased later in June, warmer water species (i.e., sandbar and mako sharks) moved inshore off mid-Long Island. To determine whether these changes in oceanographic conditions best explain the lower abundance of blue sharks (off New Jersey and New York) will require more detailed comparisons of historical and future catch information with environmental data.

We are grateful to those anglers who provided catch and temperature information. Although the response was not overwhelming, these data provide a baseline for comparisons in future years. As long as there are hundreds of boats fishing, the opportunity for study remains and we would appreciate your suggestions for improvement, should similar experiments be undertaken in the future.

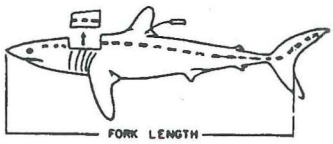


Distribution of sharks caught on June 17 and 18, 1988. Key to port of origin: **1**. Point Pleasant, NJ. **2**. Freeport, NY. **3**. Center Moriches, NY. **4**. Montauk, NY.

REQUEST FOR BACKBONES OF RECAPTURED SHARKS

The high numbers of sharks currently being recaptured by taggers offers a unique opportunity for you to assist us with age studies.

IF YOU CATCH A TAGGED SHARK



1. Measure fork length.
2. Record tag number and recapture details (date, location, sex, etc.).
3. Remove a 6 to 10 inch piece of backbone from over gills.
4. Freeze backbone overnight or pickle in rubbing alcohol.
5. Double wrap in plastic bags and airmail:
   Attention Shark Project
   Open Immediately
6. Telephone if you have any questions (401-789-9326).

FISHERY MANAGEMENT COUNCIL TAKES FIRST STEP TOWARD SHARK MANAGEMENT

The following is an excerpt from a news release from the Mid-Atlantic Fishery Management Council concerning the management of Atlantic sharks. Additional background information on this issue can be obtained from the MAFMC, Room 2115, Federal Building, 300 South New Street, Dover, DE 19901-6790.

At its 4-5 January 1989 meeting the Council voted to submit to the National Marine Fisheries Service (NMFS) a request that NMFS begin to collect data on the shark fishery in order to facilitate the development of a fishery management plan.

Making the request under Section 303(e)(2) indicates that the Council is convinced that management of the shark fishery is necessary, but data to develop a management plan is currently inadequate.

Council concerns that are motivating shark management efforts include: (1) an expanding, often non-discriminant commercial fishery; (2) an existing and rapidly expanding recreational fishery; (3) concern for extensive waste (especially the rapidly increasing fishery for fins only); (4) the reproductive strategy (few offspring, late maturation, and slow growth rates) of many shark species; and (5) realization that increased fishing pressure on specific shark species generally results rapidly in overfishing.

(Overview continued from Page 3)

Georges Bank in 1987, were recaptured in the same area off the Azores in the fall of 1988. Although there have been scattered tag returns from makos over broad areas of the North Atlantic, their migratory patterns, mating, pupping, and nursery grounds remain largely unknown. Additional tagging of mako sharks would help to advance the understanding of this important species.

TIGER SHARK (34 RETURNS)

The maximum time at liberty for a tiger shark was 5.0 years and the maximum distance travelled was 825 miles (Rhode Island to Florida). Many of the tiger sharks returned in 1988 were both tagged and recaptured off the east coast of Florida by commercial shark fishermen. In addition, they recaptured, measured and re- tagged eight tiger sharks that are still at liberty. Exact length measurements are valuable from any tagged shark and this is particularly true for sharks that have been measured and released more than once. Since fishermen have no way of knowing the history of a tagged shark, we ask that you measure the fork length of all tagged sharks that you catch and telephone NMFS/Narragansett (401-782-3200) if you have questions about any tagged shark.

OTHER SPECIES (66 RETURNS) included several which showed maximum distance travelled and/or maximum times at liberty. Some of the returns of general interest which are shown in Table 2 include: a **REEF SHARK** tagged and recaptured in the same place in the Bahamas after nearly 5 years, is still at liberty bearing the tag; two **BIGNOSE SHARKS** (a species very similar to the sandbar) tagged by NMFS biologists off Ocean City, MD in 1984, that were recaptured in 1988 off Alabama and Vera Cruz, Mexico (maximum time and distance records for the bignose shark); a **COMMON THRESHER** recaptured after eight years at liberty (a new time at liberty record for this species); a **PORBEAGLE SHARK** tagged east of the Grand Banks that moved 298 miles to Cape Race, Canada, in 4 years (a new time record); **BLACKTIP SHARKS** at liberty for over four years with one demonstrating the first movement of this species from the Gulf of Mexico into the Atlantic; a **SILKY SHARK** and **BULL SHARK** at liberty for seven years (a new time at liberty record for both species); and movement of a **SAND TIGER SHARK** from off Daytona, FL to Delaware Bay (641 miles — a maximum distance record and the first tagging evidence of south to north movement by this species). Other returns included eighteen local recaptures from **LEMON** and **NURSE** sharks primarily in the Florida Keys. Tag returns from four **SWORDFISH** showed a maximum time at liberty of nearly three years and a maximum distance of 1253 miles. The long distance movement was from a swordfish tagged off Cape Sable, Canada, that was recaptured off Haiti 57 days later (22 mi/day). This is the fastest rate of travel over a long distance for any tagged swordfish.

FIELD STUDIES

Staff biologists made a trip to South Carolina in May primarily to examine stomachs from sharks captured in commercial gill nets for comparisons with stomach data from sharks taken on longlines and rod and reel. The gill nets were 100 to 800 feet long with mesh sizes of 8 to 13 inches. They were anchored on the bottom parallel to the shore, one to four miles off the beach. Sharks caught in the nets ranged in size from small juveniles to full sized adults. Over a six day period, 80 sharks comprising nine species were examined. The most abundant species were sandbar, spinner, and blacknose sharks followed by bonnethead, Atlantic sharpnose, scalloped hammerhead, bull, sand tiger and dusky sharks. Analysis of the stomach data showed that 50% of the sandbar sharks taken in gill nets contained food remains. This value was close to the 49% we found in sandbar sharks caught on hook and line.

Other objectives of the trip were to obtain: (l) detailed measurements of body dimensions; (2) weights of fins and total and dressed carcass weights for determining conversion factors; (3) vertebrae for age studies; (4) reproductive information; and (5) photographs of common commercial shark species for identification purposes. The relationship between whole and dressed weights for the sandbar, spinner, blacknose and bonnethead sharks showed an average 50% weight loss after being prepared for market. The spinner sharks yielded the highest average saleable weight of 53%. Collections of reproductive tissue requires careful dissection, and in the warmth of early summer, the fisherman's objective was to dress the catch as rapidly as possible. Despite rather primitive working conditions (see cover photo) many sharks were examined and we had our first opportunity to examine pregnant blacknose sharks.

Additional contacts with commercial shark fishermen included meetings with Florida longliners (at Tampa and Daytona) where the shark fisheries have been expanding in recent years. Several longliners in these areas have been returning tags and tagging part of their catches. A staff biologist made a trip aboard one of the vessels to learn about the fishery and to examine the catch. In the Florida fisheries, the principal species are sandbar, blacktip, and spinner sharks. *These Florida and South Carolina commercial shark fishermen are among those who have been very helpful in our research, often at an additional cost to their operations.*

A total of 248 sharks, representing 13 species, were examined at 14 tournaments last year. Staff biologists attended those held in New England, New York, and New Jersey. Other biologists provided samples from two Florida tournaments. The most common species of sharks landed in the northern tournaments were blue, mako and common thresher, while the nurse, bull, and tiger sharks dominated the Florida catches. At 12 of the northern tournaments, staff biologists dissected 220 sharks including three large makos (574-878 pounds). Large makos (over 500 pounds) are rare and are particularly valuable for better understanding sexual maturity in this species. Tournament catches also provided opportunities to examine the reproductive systems of 11 common threshers and a pregnant dusky shark with four embryos. This was only the third pregnant dusky we have examined in the past ten years. The stomach contents of all species of sharks are routinely examined to monitor any changes in their diets that could reflect shifts in prey abundance or availability.

Although NMFS biologists are unable to attend every shark tournament, we emphasize that they are valuable sources of specimens and biological data. In 1988, for example, we were able to measure and examine 12 tagged sharks that were recaptured at tournaments. Participants also brought in unusual shark specimens at our request. *The National Marine Fisheries Service appreciates and thanks the anglers and tournament officials who assist in these research programs.*

NMFS biologist, N. Kohler, examines recaptured blue shark at Annual Shark T Tournament, Montauk Marine Basin, NY. *Photo by L. Natanson*