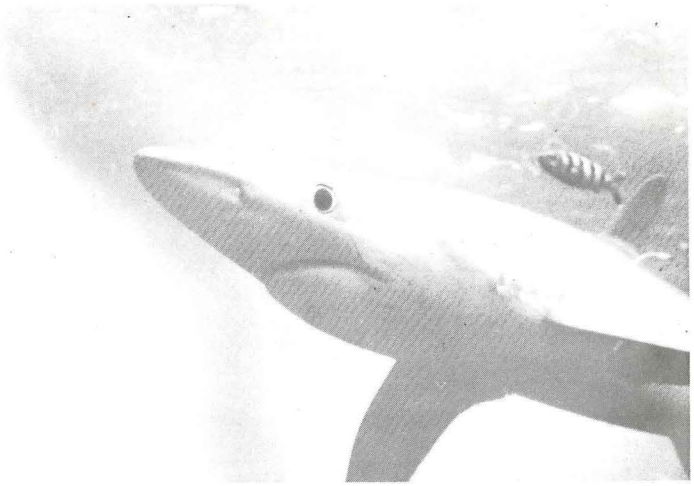
THE SHARK TAGGER 1985 SUMMARY

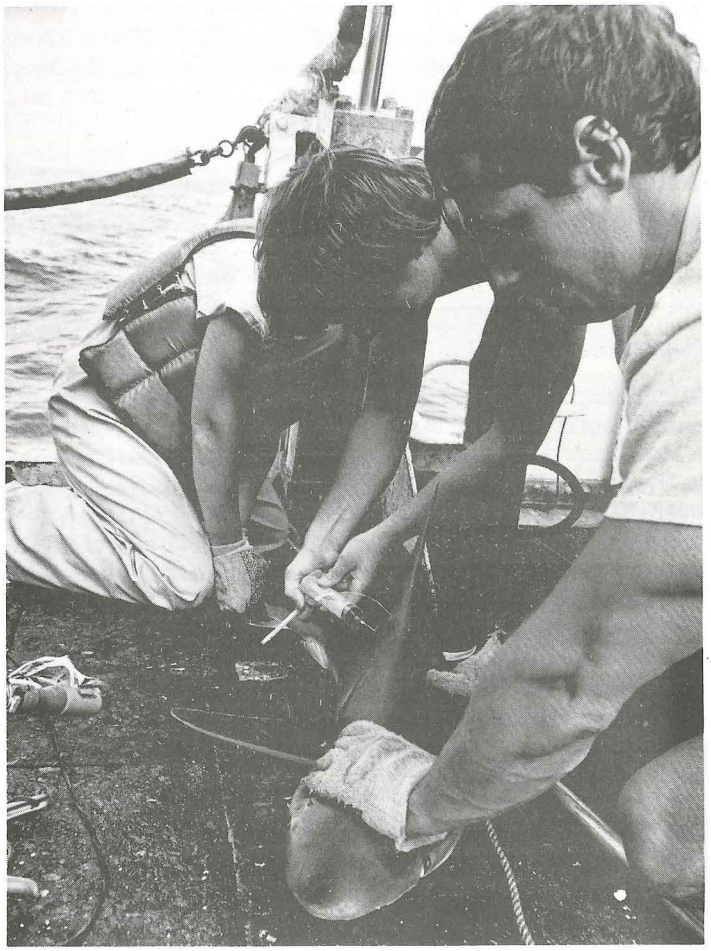


J. Casey, H. W. Pratt, C. Stillwell and N. Kohler

PHOTO BY H. W. PRATT

1985 OVERVIEW

- RECORD NUMBER OF SHARKS TAGGED (7,100) AND RECAPTURED (251) IN 1985
- FIRST TAGGED BLUE SHARK FROM WESTERN ATLANTIC CROSSES EQUATOR INTO SOUTHERN HEMISPHERE
- BLUE AND MAKO SHARKS RECAPTURED AFTER 8+ YEARS SET NEW TIME AT LIBERTY RECORDS FOR BOTH SPECIES
- SANDBAR SHARK RECAPTURED AFTER 19+ YEARS SETS NEW TIME AT LIBERTY RECORD FOR ALL SHARKS
- TAGGED FEMALE SANDBAR SHARK EXAMINED AFTER 17 YEARS—STILL IMMATURE
- LONG-TERM RECAPTURES SUPPORT PREVIOUS GROWTH ESTIMATES FOR SANDBAR AND MAKO SHARKS



The number of fish tagged (7,194) and the number of fish recaptured (256) in 1985 are both records for the 22-year history of the Cooperative Shark Tagging Program. About the same number of sharks were tagged in 1985 as in the first 7 years of the program, and more sharks were recaptured last year than in the first 9 years of the program. Nearly 3,500 more sharks were released last year than in 1984. The 1985 results are

(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

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Table 1. Summary of sharks and teleosts tagged, January-December 1985.

SPECIES	TAGGED BY COOPERATIVE TAGGERS	NARRAGANSETT BIOLOGISTS	TOTALS
Blue shark	4242	240	4482
Sandbar shark	498	129	627
Dusky shark	273	28	301
Bull shark	20	0	20
Blacktip shark	90	0	90
Spinner shark	6	0	6
Oceanic whitetip shark	112	0	112
Silky shark	37	5	42
Shortfin mako shark	213	27	240
Porbeagle shark	18	0	18
Sand tiger shark	9	0	9
Smooth dogfish shark	4	0	4
Bonnethead shark	29	0	29
Great hammerhead shark	13	0	13
Scalloped hammerhead shark	129	178	307
Smooth hammerhead shark	4	1	5
Atlantic sharpnose shark	88	0	88
Blacknose shark	10	0	10
Tiger shark	123	12	135
Finetooth shark	8	0	8
Lemon shark	130	0	130
Nurse shark	83	0	83
Bigeye thresher shark	17	8	25
Common thresher shark	1	0	1
Night shark	2	9	11
Bignose shark	4	22	26
Basking shark	21	0	21
Angel shark	2	0	2
Reef shark	68	0	68
Longfin mako shark	8	0	8
Greenland shark	7	0	7
Galapagos shark	20	0	20
Small tail shark	8	0	8
Smalleye hammerhead shark	1	0	1
Brazilian sharpnose shark	2	0	2
Brown/Dusky unspecified	2	0	2
Hammerhead unspecified	18	0	18
Thresher unspecified	11	0	11
Sand unspecified	12	0	12
Blacktip unspecified	12	0	12
Carcharhinus unspecified	76	0	76
Miscellaneous*	9	1	10
Total sharks	6440	660	7100
Teleosts			
Swordfish	51	1	52
Bluefin tuna	3	0	3
Yellowfin tuna	0	1	1
Albacore	1	0	1
Sailfish	15	0	15
White marlin	14	0	14
Blue marlin	6	0	6
Miscellaneous	2	0	2
Total teleosts	92	2	94
Grand Total	6532	662	7194

*Includes species reported as "shark".

(Overview 1985 Continued)

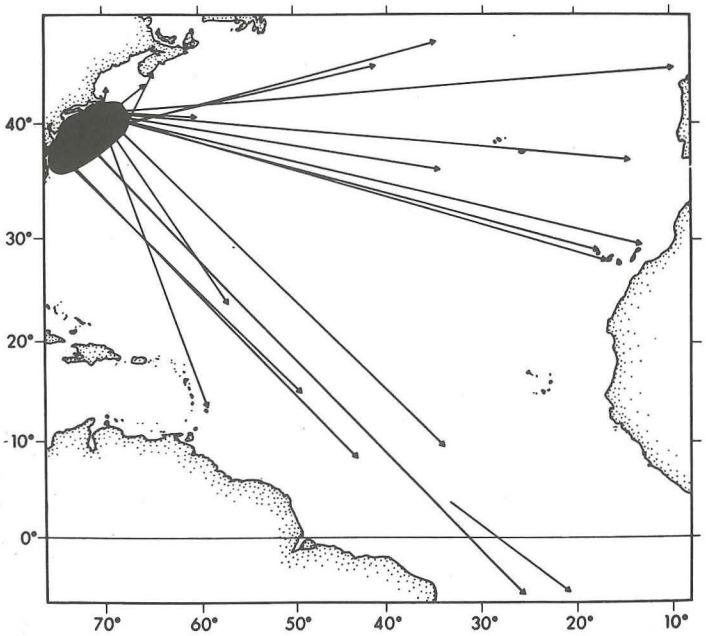
in part explained by: the return of the blue sharks to inshore sportfishing grounds off New Jersey and New York where they were essentially absent in 1984; an increase in the number of shark anglers, shark tournaments, and overall interest in shark fishing along the U.S. Coast; and an increase in the tagging efforts of NMFS Fisheries Observers primarily aboard Japanese longline vessels. Fisheries Observers alone tagged over 2,400 sharks in 1985 which is more than double the number for 1984. Of the total 7,194 releases in 1985, anglers accounted for 36%, Fisheries Observers 33%, R/V *Geronimo* 15%, NMFS biologists 9%, other biologists 5%, and commercial fishermen 2%. Table 1 summarizes the number of each species tagged.

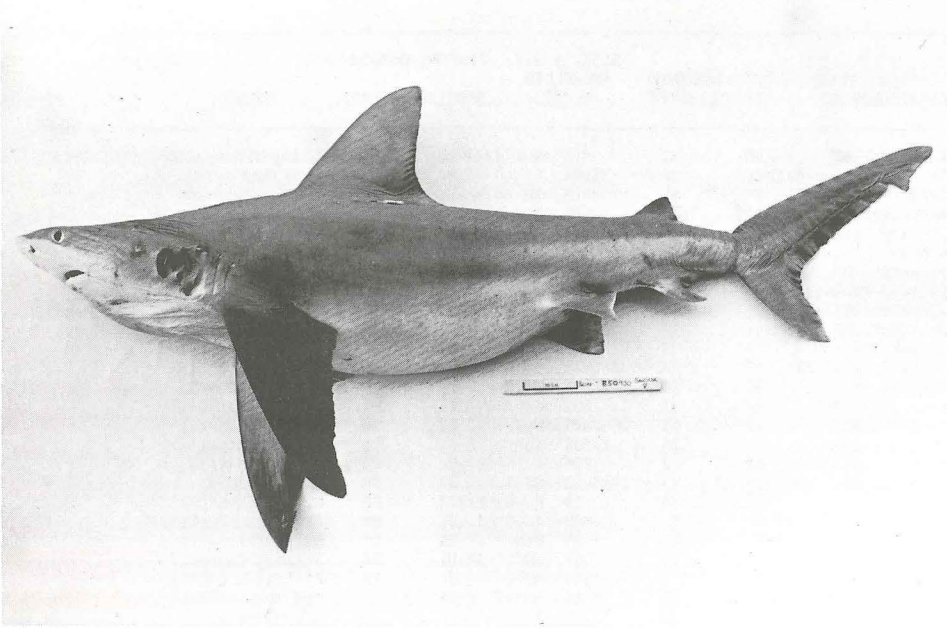
For the 256 recaptures the types of gear on which the sharks were originally caught and tagged were: rod and reel 113 (44%), longline 101 (40%), handline 19 (7%), tagged free swimming 12 (5%) and "other" types including handnet, trawl and gillnet 11 (4%). The gear types on which tagged sharks were recaptured were: longline 122 (48%), rod and reel 93 (36%), handline 12 (5%), trawl net 10 (4%) and "other" types 19 (7%). Tags were returned by fishermen from the following fifteen countries and island territories: U.S. (169), Japan (45), Spain (13), Canada (10), Mexico (5), Cuba (3), Korea (3), and one each from the Dominican Republic, Poland, Taiwan, Barbados, Bahama Islands, Italy, Canary Islands and Puerto Rico. The above recaptures do not include 39 additional local recaptures from lemon and nurse sharks that were part of a study by Dr. S. Gruber of the University of Miami.

BLUE SHARKS (155 returns) were recaptured after a maximum of 8.5 years at liberty and over a distance of 3,740 miles (New York to Brazil). The 8.5 year recapture is the longest time at liberty for over thirty thousand blue sharks we have tagged over the past 22 years. The previous record for a tagged blue shark was 6 years. Age studies by European scientists suggest blue sharks may live for 20 years. From our tagging data we have not been able to confirm that blues normally live that long. In fact, they may not be long-lived compared to some other sharks such as the sandbar shark which we know lives to well over 20 years. Our ongoing age studies will analyze tag and recapture data, vertebral rings and other information to better understand age and growth in the blue shark. Toward that end we have injected over 200 sharks with a harmless amount of antibiotic (see cover photo). When examined under ultraviolet light, the antibiotic shows up as a fine fluorescent ring in the vertebrae. Vertebrae from recaptured sharks are invaluable to our age studies and we ask that you continue to call us or take samples if you catch a tagged shark (see box on page 3). Foreign Fisheries Observer Georg Hinteregger recently collected the first vertebral sample from an injected blue shark that was at liberty for several months. The fluorescent ring was clearly visible. We have discussed long-range recaptures of blue sharks in several past newsletters. Rather than repeating this information with 1985 data (Table 2), permit us to simply point out that it took 12 years of tagging to demonstrate the first transatlantic movement of a blue shark. In 1985 alone there were 9 transatlantic returns and another 5 returns showed movements exceeding 1,000 miles with recapture locations distributed from near the equator to the Grand Banks. And yet, the 1985 New York to Brazil return is a new long distance record and is also first evidence that blue sharks from the western Atlantic cross the equator. Many questions regarding the life history of sharks remain unanswered, and indeed the answers are often slow in coming. Nevertheless, your continuing efforts have truly helped to advance the scientific knowledge of sharks, and we feel privileged to be working with you.

BLUE SHARKS

1985 LONG DISTANCE TAG RETURNS



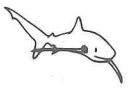


SANDBAR SHARK RECAPTURED AFTER 17 YEARS AT LIBERTY. Tagged off Long Island, NY in August 1968 and recaptured off Panama City, FL in July 1985, the above shark was estimated to be 4′0″ (TL) at tagging and measured 6′1″ (TL) at recapture (estimated growth-1.5″ per year). Internal examination of this approximately 23 year old female revealed it was still immature.

SANDBAR SHARKS (18 returns) were recaptured after a maximum of 19.7 years at liberty and over distances of 1,692 miles (New York to Mexico). The two sandbar shark returns at liberty for over 19 years are the longest for any species since the start of the program. Both were juveniles tagged during the same week in 1965, one in Delaware Bay the other in a Virginia bay and both were recaptured about 100 miles apart in the Gulf of Mexico during the same week in 1985. These two returns are perhaps best explained as an interesting coincidence, however, these and other recaptures continue to show movements of sandbar sharks between the East Coast and Gulf of Mexico. Nine (50%) of the sandbar sharks recaptured in 1985 were tagged in the Atlantic and recaptured in the Gulf of Mexico, 4 (22%) from the Mexican Coast. Since most of the tagging is done in the Atlantic, additional tagging in the Gulf of Mexico is a clearly recognized need. We are currently planning joint tagging studies with Mexican biologists in the Yucatan. Nine (50%) of the sandbar recaptures were at liberty from 5 to 19 years. Information on growth from 8 long-term recaptures 5 to 19 years at liberty showed an average growth of 1.7 inches (4.3 cm) per year. This supports our published account of slow growth in the sandbar and in fact some individuals appear to grow much slower than our earlier estimates.

SHORTFIN MAKO SHARKS (30 returns) were recaptured after a maximum of 8.2 years at liberty and over distances of 1,583 miles. The 8.2 year recovery was the longest time at liberty for a mako. Previously the record was 4.3 years recaptured in 1981. Two additional 1985 returns were from makos at liberty for over 4 years. Both were about 32 inches (81 cm) in fork length when released and 78 inches (198 cm) at recapture. These fish showed an annual growth rate of 11 inches (27.9 cm) which supports our previous growth estimates for makos of this size. One of the more interesting returns came from a mako that was tagged by Capt. Phil Ruhle near the Flemish Cap east of Newfoundland and recaptured off Georges Bank 3 years later. This is the most easterly release of a mako that has been recovered in U.S. waters. Although we have published a scientific paper on the age and growth of the shortfin mako, for follow up studies we need additional vertebrae and recapture data particularly from very large individuals. Please do not hesitate to call us if you catch: 1) a tagged mako, 2) any mako over 10′ (or 900 lbs.) or 3) any pregnant mako.

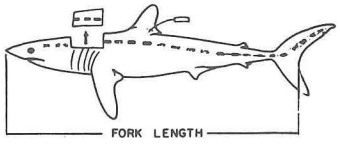
OTHER SPECIES (see Table 2) included recaptures of a BLACKNOSE SHARK after 9.2 years; NIGHT SHARK after 4.4 years; a SHARPNOSE SHARK after 2 years; and short-term or local recaptures from TIGER, BONNETHEAD, SILKY, SPINNER, REEF, LEMON and NURSE SHARKS. The 4 SWORDFISH were recaptured after up to 5 years at liberty and over distances of 686 miles. Swordfish are so valuable and opportunities to tag them so rare, that NMFS biologists at Narragansett and Miami have encouraged tagging swordfish with tuna, billfish and shark tags. Most of the swordfish tagging has been by U.S. commercial longliners and U.S. Foreign Fisheries Observers aboard Japanese tuna vessels. The swordfish tag and recapture data generated by the two laboratories have been combined for a single publication (see page 9).



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).

Table 2. Tag recoveries: January-December 1985

SPECIES	GENERAL LOCATIONS TAGGED	GENERAL LOCATIONS RECAPTURED	MONTHS/ LIBERTY	DIST. & DIR. TRAVELLED N. MI.		CAPTURE METHOD TAGGING	CAPTURE METHOD RECAPT.	TAGGED BY TAGGER	TAGGED BY RESIDENCE
Blue shark	E Nantucket, MA	E Nantucket, MA	<1	16	S	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	E Atlantis Canyon	NE St. John's, Barbados	16	1664	S	LL	LL	Rene Eppi, NMFS Obs.	MA
" "	SSW Nantucket, MA	NE Oregon Inlet, NC	18	312	SW	HL	LL	Stephen Connett	RI
" "	SE Block Island, RI	SE Nantucket, MA	7	113	E	LL	LL	Stephen Connett	RI
" "	SE Block Island, RI	NNW Canary Islands	30	2638	E	LL	LL	Stephen Connett	RI
" "	S Nantucket, MA	SW Azores	6	1683	E	LL	LL	Stephen Connett	RI
" "	SE Block Island, RI	E Nantucket, MA	8	471	E	HL	LL	Stephen Connett	RI
" "	SE Block Island, RI	SW Lisbon, Portugal	19	2584	E	LL	LL	Stephen Connett	RI
" "	SE Nantucket, MA	WSW Cape Verde Islands	15	2599	SE	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	SE Rudee Inlet, VA	E Nantucket, MA	17	537	NE	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	SSE Montauk Pt., NY	S Montauk Pt., NY	35	10	SW	RR	RR	J. R. Wolf	NY
" "	SE Block Island, RI	SE Block Island, RI	24	8	W	RR	RR	Al Anderson	RI
" "	SE Block Island, RI	E Barbados	21	1207	SE	LL	LL	Stephen Connett	RI
" "	E Rudee Inlet, VA	E Ocean City, MD	<1	105	N	LL	RR	Biologist (NMFS)	RI
" "	SE Fire Island Inlet, NY	S Freeport, NY	<1	23	W	FS	RR	Ron Kluesener	NY
" "	S Nantucket, MA	SE Nantucket, MA	23	158	NE	LL	LL	Robert Matus, NMFS Obs.	MA
" "	SE Nantucket, MA	SE Fire Island Inlet, NY	2	275	W	LL	RR	Georg Hinteregger, NMFS Obs.	MA
" "	S Montauk Pt., NY	SSW Montauk Pt., NY	<1	5	SW	RR	RR	Chris Smith	NJ
" "	Algarve, Portugal	Huelva, Spain	15	79	E	RR	RR	R. H. Streur	Portugal
" "	SE Block Island, RI	SE Moriches Inlet, NY	23	80	W	LL	RR	Stephen Connett	RI
" "	S Shinnecock Inlet, NY	SSW Moriches Inlet, NY	<1	30	SW	FS	RR	Bill Williams	NY
" "	SE Block Island, RI	SE Montauk Pt., NY	11	87	NW	HL	RR	Stephen Connett	RI
" "	NE Oregon Inlet, NC	SE Fire Island Inlet, NY	1	249	NE	LL	RR	Biologist (NMFS)	RI
" "	NR	SE Nantucket, MA	NR	NR		NR	LL	Tag lost in mail	NR
" "	S Block Island, RI	SE Block Island, RI	23	40	E	RR	TN	Bob Young	CT
" "	S Shinnecock Inlet, NY	E Manasquan Inlet, NJ	<1	43	SW	FS	RR	Luis Menocal	NY
" "	SE Shinnecock Inlet, NY	S Montauk Pt., NY	<1	16	NE	RR	RR	Bob Young	CT
" "	E Montauk Pt., NY	E Montauk Pt., NY	11	19	NE	RR	LL	Frank Mundus	NY
" "	SE Jones Inlet, NY	E Barnegat Inlet, NJ	<1	49	E	RR	RR	Harvey Smith	NY
" "	SW Block Island, RI	SE Montauk Pt., NY	24	54	NE	HL	RR	Stephen Connett	RI
" "	E Nantucket, MA	SE Nantucket, MA	5	19	W	LL	LL	Brad Chase, NMFS Obs.	MA
" "	SSW Fire Island Inlet, NY	ESE Fire Island Inlet, NY	<1	41	E	FS	RR	Dave Gourlay	NJ
" "	S Montauk Pt., NY	SE Montauk Pt., NY	24	12	E	FS	RR	Jack Eng	CT
" "	S Montauk Pt., NY	SE Block Island, RI	23	41	NE	RR	RR	Lou Davis	NY
" "	SW Shinnecock Inlet, NY	SW Moriches Inlet, NY	<1	14	E	RR	RR	Ray Hendrickson	NY
" "	S Block Island, RI	SE Shinnecock Inlet, NY	<1	37	W	RR	RR	Dave Preble	RI
" "	SE Moriches Inlet, NY	SE Fire Island Inlet, NY	<1	22	W	RR	RR	Tom Montalbano	NY
" "	SE Block Island, RI	E Nantucket, MA	23	174	E	HL	GN	Stephen Connett	RI
" "	SE Nantucket, MA	SSE Montauk Pt., NY	9	160	NW	LL	RR	J. Cahill, NMFS Obs.	MA
" "	SE Jones Inlet, NY	SE Montauk Pt., NY	<1	76	E	RR	LL	Joe D'Andria	NY
" "	E Nantucket, MA	SE Moriches Inlet, NY	4	208	W	LL	RR	Georg Hinteregger, NMFS Obs.	MA
" "	S Montauk Pt., NY	S Tenerife, Canary Islands	48	2776	E	RR	LL	Bob Weisz	NY
" "	E Block Island, RI	E Block Island, RI	24	17	E	RR	RR	Ed Nielson	RI
" "	SE Fire Island Inlet, NY	SE Moriches Inlet, NY	<1	23	NE	RR	RR	Bob Baltrunas	NY
" "	S Block Island, RI	SE Block Island, RI	<1	36	E	FS	HL	Robert Hauser	CT
" "	SE Block Island, RI	E Block Island, RI	24	27	NE	RR	TN	Mike Cunningham	CT
" "	S Nantucket, MA	SE Block Island, RI	4	134	NW	LL	HL	Georg Hinteregger, NMFS Obs.	MA
" "	SE Fire Island Inlet, NY	SE Barnegat Inlet, NJ	<1	55	SW	RR	RR	Herman Kornahrens	NY
" "	SE Shinnecock Inlet, NY	SSE Moriches Inlet, NY	<1	24	SW	RR	RR	Bob Young	NJ
" "	NR	SE Montauk Pt., NY	NR	NR		NR	LL	Tony Schultz	NY
" "	SE Block Island, RI	S Nantucket, MA	71	67	SE	HL	LL	Stephen Connett	RI
" "	SE Moriches Inlet, NY	SE Fire Island Inlet, NY	<1	27	SW	RR	RR	Tom Cashman	NY
" "	E Block Island, RI	SE Block Island, RI	<1	21	W	FS	RR	Charlie Donilon	RI
" "	S Shinnecock Inlet, NY	SSE Montauk Pt., NY	<1	38	NE	RR	RR	Ray Hendrickson	NY
" "	SE Nantucket, MA	SE Block Island, RI	4	192	NW	LL	HL	Jerzy Cygler, NMFS Obs.	MA
" "	SE Barnegat Inlet, NJ	SE Block Island, RI	1	147	NE	RR	HL	Steve Pepe	NJ
" "	SE Shinnecock Inlet, NY	E Cape Calcanhar, Brazil	16	3740	SE	FS	LL	Ray Hendrickson	NY
" "	SE Montauk Pt., NY	SE Moriches Inlet, NY	<1	34	W	RR	RR	Kirk Schroff	CT
" "	SSW Cape Verde Islands	E Cape Calcanhar, Brazil	4	937	SE	LL	LL	R/V Wieczno	Poland
" "	SE Montauk Pt., NY	Yarmouth Bar, Nova Scotia	17	311	NE	RR	TOF	Harry McAllister	NY
" "	S Nantucket, MA	SE Block Island, RI	<1	32	W	HL	RR	Stephen Connett	RI
" "	SSE Martha's Vineyard, MA	W LaCaruña, Spain	12	2606	NE	LL	LL	Stephen Connett	RI
" "	SE Nantucket, MA	ESE Port L'Hebert, Nova Scotia	6	244	NE	LL	TN	Georg Hinteregger, NMFS Obs.	MA
" "	S Block Island, RI	S Shinnecock Inlet, NY	1	47	SW	RR	RR	Mario Pagano	RI
" "	SE Oceanographer Canyon	S Lydonia Canyon	1	19	E	LL	LL	Walter Quinn, NMFS Obs.	MA
" "	S Lydonia Canyon	E Cape Race, Newfoundland	4	1461	NE	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	SE Martha's Vineyard, MA	SE Flemish Cap	21	1266	E	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	S Atlantis Canyon	S Martha's Vineyard, MA	<1	122	N	LL	HP	Jay Taylor, NMFS Obs.	MA
" "	S Martha's Vineyard, MA	E Flemish Cap	24	1456	NE	LL	LL	Stephen Connett	RI
" "	S Nantucket, MA	E Nantucket, MA	10	90	NE	HL	LL	Stephen Connett	RI
" "	S Veatch Canyon	SE Hydrographer Canyon	11	52	NE	LL	LL	J. Cahill, NMFS Obs.	MA
" "	SSE Nantucket, MA	SSE Veatch Canyon	<1	67	S	HL	LL	Stephen Connett	RI
" "	SSE Veatch Canyon	SE Oceanographer Canyon	11	79	E	LL	LL	Martin Williamowsky, NMFS Obs.	MA
" "	SSE Atlantis Canyon	SSE Block Canyon	<1	40	SW	LL	LL	Jay Taylor, NMFS Obs.	MA
" "	SSW Atlantis Canyon	SSE Oceanographer Canyon	<1	126	E	LL	LL	Georg Hinteregger, NMFS Obs.	MA
" "	SE Montauk Pt., NY	S Martha's Vineyard, MA	26	33	E	RR	RR	Gloria Hayn	NY
" "	SE Lydonia Canyon	SE Hydrographer Canyon	26	99	W	LL	LL	Jeffrey Armstrong, NMFS Obs.	MA
" "	S Martha's Vineyard, MA	SE Hydrographer Canyon	3	115	SE	LL	LL	Stephen Connett	RI
" "	S Nantucket, MA	NE Welker's Canyon	<1	89	E	HL	RR	Stephen Connett	RI
" "	SE Ocean City, MD	SW Corsair Canyon	3	408	NE	RR	LL	Rick Carney	DE
" "	SE Ocean City, MD	SE Atlantic City, NJ	<1	62	NE	RR	RR	Rick Carney	DE
" "	E Oregon Inlet, NC	SSE Oceanographer Canyon	101	405	NE	RR	LL	Biologist (NMFS)	RI
" "	SE Moriches Inlet, NY	SE Manasquan Inlet, NJ	1	51	SW	RR	RR	Patrick Martin	NY
" "	S Martha's Vineyard, MA	SW Corsair Canyon	<1	193	E	RR	LL	Al Anderson	RI
" "	SE Atlantic City, NJ	E Veatch Canyon	<1	196	E	RR	LL	Joseph Degual	PA
" "	Washington Canyon	N São Luis, Brazil	12	2440	SE	LL	LL	Biologist (NMFS)	RI
" "	S Nantucket, MA	SSW Nantucket, MA	<1	13	W	FS	HL	Stephen Connett	RI
" "	S Martha's Vineyard, MA	S Martha's Vineyard, MA	13	17	E	LL	HP	Stephen Connett	RI
" "	E Ocean City, MD	S Cape Sable, Nova Scotia	16	455	NE	LL	LL	Biologist (NMFS)	RI
" "	S Martha's Vineyard, MA	S Montauk Pt., NY	<1	38	W	FS	RR	Rodman Sykes	RI
" "	SE Block Canyon	SW Block Canyon	8	41	W	LL	LL	K. Bugley, NMFS Obs.	MA
" "	E Barnegat Inlet, NJ	SE Montauk Pt., NY	1	110	NE	RR	RR	Pete Barrett	NJ

Table 2. Continued.

SPECIES	GENERAL LOCATIONS TAGGED	GENERAL LOCATIONS RECAPTURED	MONTHS/ LIBERTY	DIST. & DIR. TRAVELLED N. MI.		CAPTURE METHOD TAGGING	CAPTURE METHOD RECAPT.	TAGGED BY TAGGER	TAGGED BY RESIDENCE
Sandbar shark	ESE Manasquan Inlet, NJ	W Pass-A-Grille, FL	66	1467	SW	RR	LL	R. L. Baduini	NJ
" "	SSE Montauk Pt., NY	N El Cuya, Yucatan, Mexico	159	1512	SW	RR	GN	John Wolf	NY
" "	SE Fire Island Inlet, NY	Boynton Beach, FL	78	898	SW	RR	RR	George Bezold	NY
" "	NW Villas, NJ	SW St. Petersburg, FL	236	1307	SW	LL	LL	Biologist (NMFS)	RI
" "	Great Machipongo, VA	SW Sanibel Island, FL	236	1084	SW	GN	LL	Biologist (NMFS)	RI
" "	E Lewes, DE	E Sebastian, FL	20	706	SW	RR	LL	Pete Floyd	DE
" "	NE Oregon Inlet, NC	E Cape Canaveral, FL	57	515	SW	TN	DN	Robert Gunthrie	NC
" "	SE Jones Inlet, NY	S Panama City, FL	204	1575	SW	RR	RR	William Kology	NY
" "	S Moriches Inlet, NY	S Cape Charles, VA	10	256	SW	RR	RR	Pete Jakits	NY
" "	SE Fire Island Inlet, NY	S Noman's Land, MA	12	100	NE	RR	RR	Fred Hagemeyer	NY
" "	SE Montauk Pt., NY	E Aldama, Mexico	47	1692	SW	RR	LL	Joe McBride	NY
" "	E Ocean City, NJ	N Alacranes Island, Mexico	84	1466	SW	RR	LL	David Moss	NJ
" "	SE Cape Canaveral, FL	E Tamps, Mexico	61	1018	W	LL	RR	Stephen Connett	RI
" "	SSE Montauk Pt., NY	SE Port Aransas, TX	48	1462	SW	RR	TN	C. Mark Marose	NY
" "	SE Jones Inlet, NY	E Cape Hatteras, NC	62	314	S	RR	PS	John Wellman	NY
" "	S Shinnecock Inlet, NY	E Seaside Heights, NJ	36	48	SW	RR	RR	James Gubista	NY
" "	SE Fire Island Inlet, NY	Delaware Bay	14	135	SW	RR	RR	Ted Bingham	NY
" "	Wachapreague, VA	E Great Machipongo, VA	<1	15	S	RR	GN	Jeffrey Potts	VA
Nurse shark[a]	Islamorada, FL	Islamorada, FL	11	13	W	RR	RR	Paul Copeland	FL
" "	Fat Deer Key, FL	Vacca Cut Channel, FL	3	27	E	LN	RR	William Botten	FL
" "	Long Point Key, FL	N Marathon, FL	5	5	N	RR	RR	William Botten	FL
" "	Fat Deer Key, FL	N Marathon, FL	9	1	N	LN	SP	William Botten	FL
" "	Key Colony Beach, FL	Key Colony Beach, FL	4	0		HL	HL	William Botten	FL
" "	Fat Deer Key, FL	Key Colony Beach, FL	4	1	NE	RR	HL	William Botten	FL
" "	Long Point Key, FL	Fat Deer Key, FL	7	1	E	LN	RR	William Botten	FL
" "	Long Point Key, FL	Fat Deer Key, FL	3	1	E	RR	RR	William Botten	FL
" "	S Long Key, FL	SE Long Key, FL	23	4	NW	RR	GN	Graham Guiler	FL
" "	E Marathon, FL	Key Colony Beach, FL	6	1	E	LN	RR	William Botten	FL
" "	Marathon, FL	Marathon, FL	3	3	E	RR	RR	William Botten	FL
Lemon shark[a]	Bimini, Bahamas	Bimini, Bahamas	6	1	W	RR	HN	Carlos Gonzales	FL
" "	Bimini, Bahamas	Cat Cay, Bahamas	35	36	S	LL	RR	Dr. S. Gruber	FL
" "	NE Mayaguez, Puerto Rico	W Mayaguez, Puerto Rico	7	26	NW	LL	LL	Hector Eli Dixon	Puerto Rico
" "	Biscayne Bay, FL	Biscayne Bay, FL	4	0		RR	RR	Thomas Holoway	FL
" "	Islamorada Key, FL	Islamorada, FL	14	2	S	RR	RR	Ted Avellone	FL
" "	Big Munson Island, FL	Big Munson Island, FL	<1	0		RR	RR	Tom Twyford, Jr.	FL
" "	Long Point Key, FL	Long Point Key, FL	4	1	W	RR	RR	William Botten	FL
Tiger shark	SE Block Island, RI	NE Ocracoke, NC	5	419	SW	LL	TN	Stephen Connett	RI
" "	Bimini, Bahamas	Bimini, Bahamas	20	1	S	LL	LL	Dr. S. Gruber	FL
" "	SSE Cape May, NJ	NE Ponce Inlet, FL	10	637	SW	RR	LL	Dave Cagnetti	PA
" "	W Venice, FL	S St. Petersburg, FL	1	36	S	RR	LL	G. W. Lose	FL
" "	E Cape Charles, VA	E Barnegat Inlet, NJ	13	177	NE	LL	RR	Biologist (NMFS)	RI
" "	SE Manasquan Inlet, NJ	SE Brielle, NJ	1	16	SW	RR	HL	John Williams	NJ
" "	NE Isla de la Muertos, P.R.	S San Pedro de Macons, Dom.R.	18	159	W	LL	HL	René Toro	Puerto Rico
Silky shark	S Miami, FL	S Miami, FL	<1	6	S	RR	RR	Mark Quartiano	FL
" "	ESE Wachapreague, VA	ENE Ponce Inlet, FL	32	561	SW	RR	LL	George Reiger	VA
" "	E Ft. Pierce, FL	E Savannah, GA	5	261	N	RR	RR	Jack Morton	FL
" "	E Ft. Pierce, FL	SE Oregon Inlet, NC	7	530	NE	RR	RR	Jack Morton	FL
" "	NE Oregon Inlet, NC	Wilmington Canyon	<1	157	NE	HL	LL	Biologist (NMFS)	RI
Dusky shark	E Rudee Inlet, NC	Onslow Bay, NC	17	177	SW	TN	HL	Rene Eppi, NMFS Obs.	MA
" "	SE Ocean City, MD	Charleston Harbor, SC	8	404	SW	RR	HL	Glenn Biggerstaff	MD
" "	Fernandina Beach, FL	Fernandina Beach, FL	0	0		RR	DOB	George Sarkees	FL
Dusky/Sandbar	E Atlantic City, NJ	E Cape May, NJ	27	45	W	RR	RR	Bill Deal	NJ
" "	SSE Beach Haven, NJ	E Atlantic City, NJ	12	33	NW	RR	RR	Don Kamienski	NJ
" "	SW Montauk Pt., NY	E Chincoteague Inlet, VA	2	165	SW	RR	GN	Charlie Krumenacker	NY
C. springeri	S Crooked Island, Bahamas	S Crooked Island, Bahamas	8	1	W	LL	LL	Stephen Connett	RI
" "	S Crooked Island, Bahamas	S Crooked Island, Bahamas	1	0		HL	HL	Stephen Connett	RI
Night shark	ENE Miami, FL	NW Nuevitas, Cuba	53	253	S	LL	LL	Ron Schatman	FL
" "	E Cape Hatteras, NC	SE Charleston, SC	12	272	SW	LL	LL	Biologist (NMFS)	RI
Atlantic sharpnose shark	E Jacksonville Beach, FL	NE Ponce Inlet, FL	26	74	S	RR	LL	Richard Morse	FL
Blacknose shark	E St. Augustine, FL	Cocoa Beach, FL	110	96	S	RR	HN	Richard Jenkins	FL
Bonnethead shark	W Marathon, FL	N Marathon, FL	2	3	NE	RR	RR	Mike May	FL
Porbeagle shark	Lydonia Canyon	SE Halifax, Nova Scotia	27	305	NE	TN	GN	A. Poshkus, NMFS Obs.	MA
Sandtiger shark	SW Montauk Pt., NY	Monomoy Island, MA	1	100	E	TN	TOF	Linda Craig, NMFS Obs.	MA
Scalloped hammerhead shark	ENE Oregon Inlet, NC	ENE Oregon Inlet, NC	<1	3	N	TN	TN	Ray Sutherland, NMFS Obs.	MA
Spinner shark	Ft. Lauderdale, FL	N Havana, Cuba	2	195	SW	RR	LL	William Rhule	FL
Unknown species	NR	Veracruz, Mexico	NR	NR		NR	LL	Robert Reitmeyer	NJ
Sailfish	W Palm Beach, FL	Miami Beach, FL	11	45	S	RR	RR	Marshall Helfand	NY
Swordfish	E Oregon Inlet, NC	E Ft. Lauderdale, FL	20	686	SW	LL	LL	Phil Ruhle, Jr.	RI
"	E Oregon Inlet, NC	E Sebastian, FL	13	540	SW	LL	LL	Martin Williamowsky, NMFS Obs.	MA
"	ESE Charleston, SC	W Bimini, Bahamas	61	412	S	LL	LL	Phil Ruhle	RI
"	E Folley Beach, SC	SE Block Island, RI	61	611	NE	LL	HP	Phil Ruhle, Jr.	RI

NOTE: BR=Block Rig; DOB=Dead on Beach; DN=Dredge Net; FS=Free Swimming; GN=Gill Net; HP=Harpoon; HL=Hand Line; LL=Longline; LN= Landing Net; NR=Not Reported; Obs.=Foreign Fisheries Observer; PS=Purse Seine; RR=Rod & Reel; SG=Spear Gun; TOF=Tag Only Found; and TN=Trawl Net.

[a]Not included are local returns for 27 lemon sharks and 12 nurse sharks from a concentrated study off Bimini, Bahamas by Dr. S. Gruber, Univ. of Miami.

FIELD STUDIES, 1985

During 1985, staff biologists conducted field studies on two research cruises and at fishing tournaments held at various coastal ports from Massachusetts to New Jersey. The cruises were carried out on the NOAA research vessel *Delaware II* and the Polish research vessel *Wieczno*. Pelagic longline gear was fished along the outer edge of the continental shelf from Georges Bank to Cape Lookout, NC. Approximately one week was also spent in the southern part of the Gulf of Maine to fish for porbeagle sharks. On the two cruises, 911 fishes were caught, including 879 sharks (13 species) and 32 teleosts (7 species). Of these, 638 were tagged and most of the remaining 273 were taken on board for internal examination. The prevalent species were blue, scalloped hammerhead, sandbar, shortfin mako, dusky, bigeye thresher and porbeagle sharks. Yellowfin and bluefin tuna were the most abundant teleosts, but the catch also included swordfish, wahoo, white marlin, barracuda and longnosed lancetfish.

The collection of some unique life history information on various shark species highlighted both cruises. Reproduction studies were enhanced by the capture of a pregnant scalloped hammerhead and bigeye thresher. The hammerhead contained 30 fully developed embryos that appeared to be ready for birth. The bigeye thresher, on the other hand, had two embryos, one per uterus. Each was only 4 inches long and did not have the fully developed body characteristics of the adult.

In addition to the routine collection of vertebral samples for age and growth studies, we internally marked a number of tag-released sharks by injecting a low-dose antibiotic into the back muscle. Future recovery of vertebrae from these sharks should provide a "bench mark" to more accurately estimate the growth rates for these species.

On the *Delaware II* cruise, parasitologist George Benz of the University of British Columbia observed that blue, mako and scalloped hammerhead sharks were parasitized by 5, 6 and 8 different species of copepods, respectively. These small, banjo-shaped animals are the most common external parasite on sharks and are usually seen clustered together on the body or on the edges of the fins. The distribution of each copepod species indicates that they are highly selective for particular sites on the sharks, including the mouth, throat, nostrils, gills, fins and body surface. Typically, the result of an infestation is an ulceration of the tissue in the area of attachment. Also on the *Delaware II* cruise, Dr. Frank Carey and Jill Scharold of the Woods Hole Oceanographic Institution made preliminary metabolic rate measurements on 4 species of sharks. Using live-captured sharks in a specially constructed canvas tank, they measured the oxygen content of water before and after it passed over the gills to determine oxygen uptake by the shark (see photo). Water flow rate was controlled via a seawater hose placed in the shark's mouth. Preliminary results showed that shortfin makos exhibited the highest metabolic rate followed by sandbar, blue, and tiger sharks. The higher rate for the mako is reasonable when one considers the high activity level and elevated body temperature associated with this species. The unanesthetized sharks were held in the tank from 2 to 22 hours after which all were tagged and released.

The 13 porbeagle sharks captured on the *Wieczno* provided an opportunity to collect much-needed information for age, growth, reproduction and food studies of this species. In addition, we were able to record a series of organ (brain, eye, kidney, liver, stomach, spiral valve) and muscle temperatures from live fish as they came on board. Most of the organ and muscle temperatures ranged from 2 to 6 °C above ambient sea temperatures. These data were given to Dr. Carey to augment his studies of the heat retention system in the porbeagle shark.

Attendance at 10 tournaments resulted in length-weight measurements on 333 sharks, 6 bluefin tuna and 4 white marlin. At those tournaments attended by NMFS biologists, 268 sharks (10 species) were examined in detail for age and growth, reproduction and food habit studies. The predominant species were blue, mako, sandbar, common thresher and tiger sharks. The three tournaments attended by cooperating biologists yielded 65 sharks, primarily blues and makos. **It is important that tournament participants and officials are made aware of our need to obtain vertebrae from tagged sharks and to examine the unusual specimens requested in these newsletters. Please pass the information along to them, particularly if we are unable to attend some tournaments.**

IN APPRECIATION...

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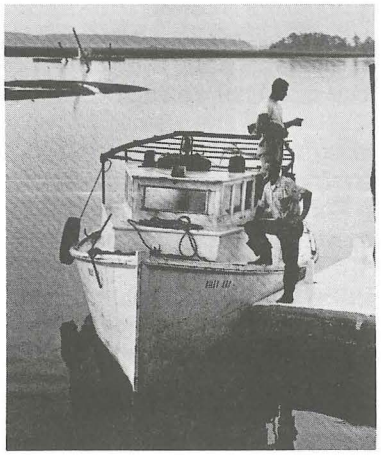

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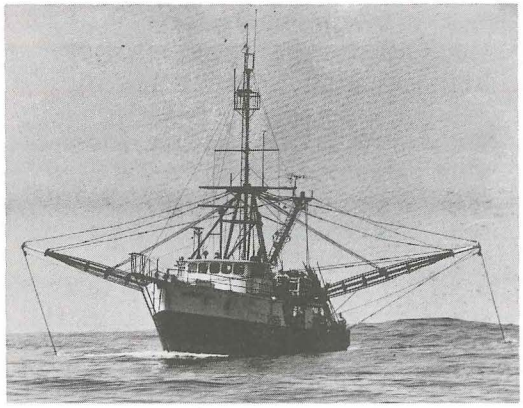

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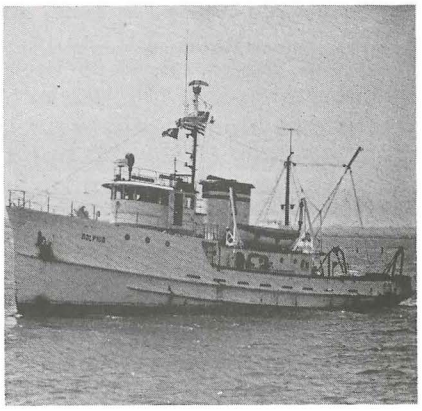

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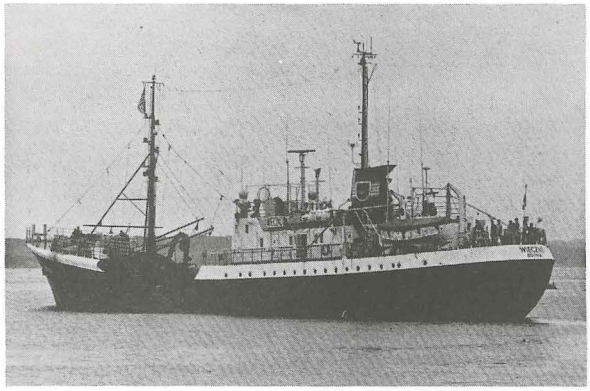

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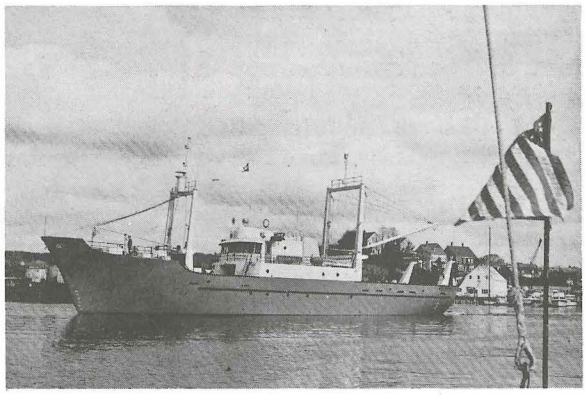
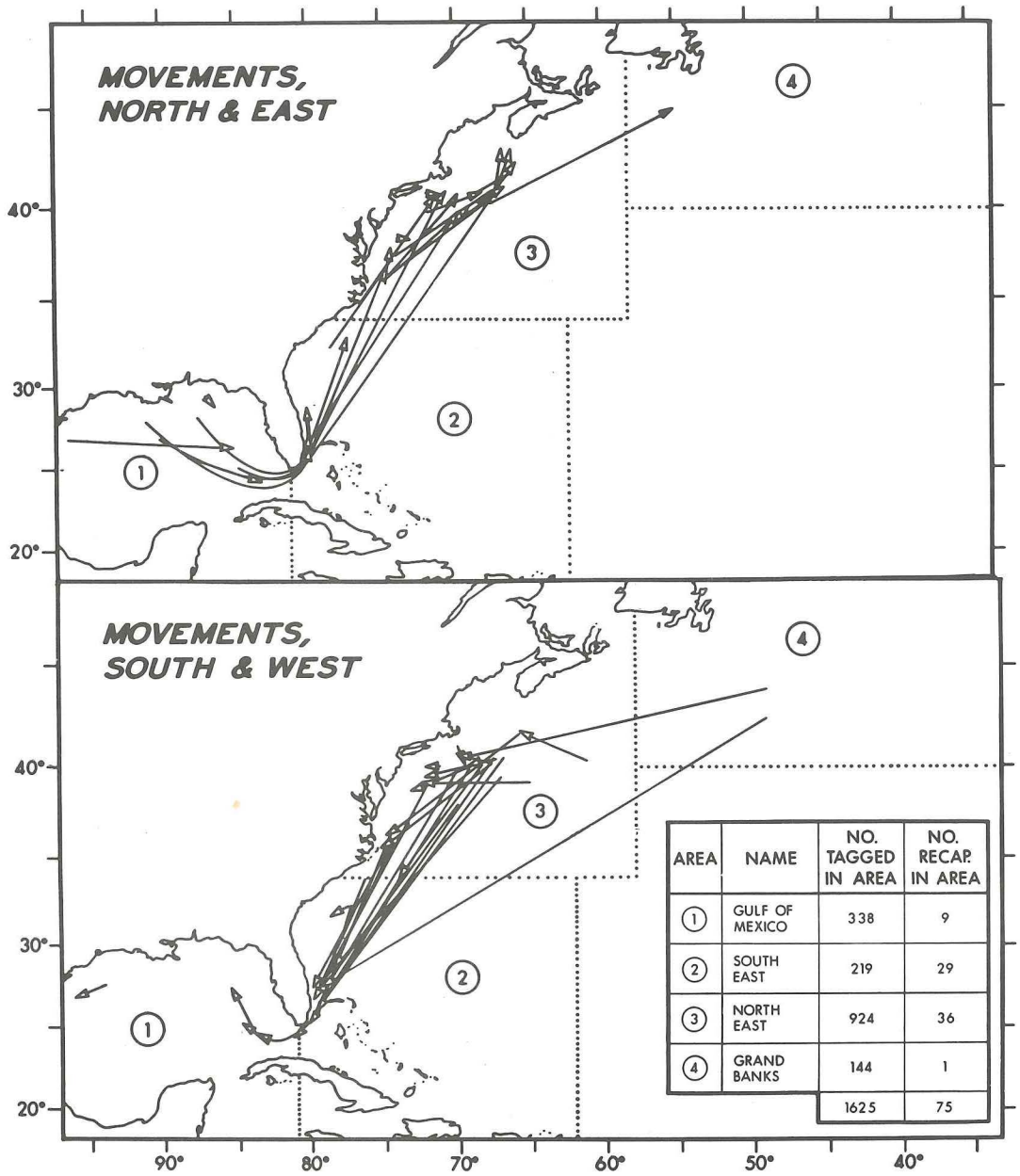


The above are some of the vessels on which we have sailed and whose captains and crews have made important contributions to our research. 1) R/V *Challenger* (NMFS), Sandy Hook Laboratory (1963-1966), longlining, Capt E. Wicklund; 2) F/V *Billy Kay*, Willis Wharf, VA (1965-1969), commercial gillnetter, the late Capts. J. and T. Smith; 3) R/V *Geronimo*, Newport, RI (1974-1985), longlining, Capt. S. Connett; 4) F/V *Chief Joseph Brant*, (1963-1970), longlining, rod and reel, the late Capt. J. S. Walton; 5) F/V *Audrey Lynn*, Newport, RI (1965-1984), longlining, Capt. P. Ruhle; 6) R/V *Dolphin* (NMFS), Sandy Hook Laboratory (1965-1970), longlining, Capts. R. Thorwaldson, R. Landsvik; 7) R/V *Wieczno*, Gdynia, Poland (1976-1985), longlining, Capts. B. Bogdanowicz, J. Cholyst, R. Zapolski; 8) R/V *Delaware II* (NMFS), Woods Hole, MA (1985), longlining, Capt. J. Miller. Not shown are other research vessels and many sport boats that provided space for us to go to sea at no cost; these include the R/V *Cape May* (Capt. J. Bortney), R/V *Chain* and *Gosnold* (Woods Hole Oceanographic Institution), R/V *Trident* (University of Rhode Island), and commercial longliners F/V *Darana R* (Capt. J. Ruhle, Wanchese, NC), F/V *Penobscot Gulf* (Capt. M. Bartlett, Camden, ME), and F/V *Capt. Bill II* and *IV* (Capt H. Klimm, Woods Hole, MA).

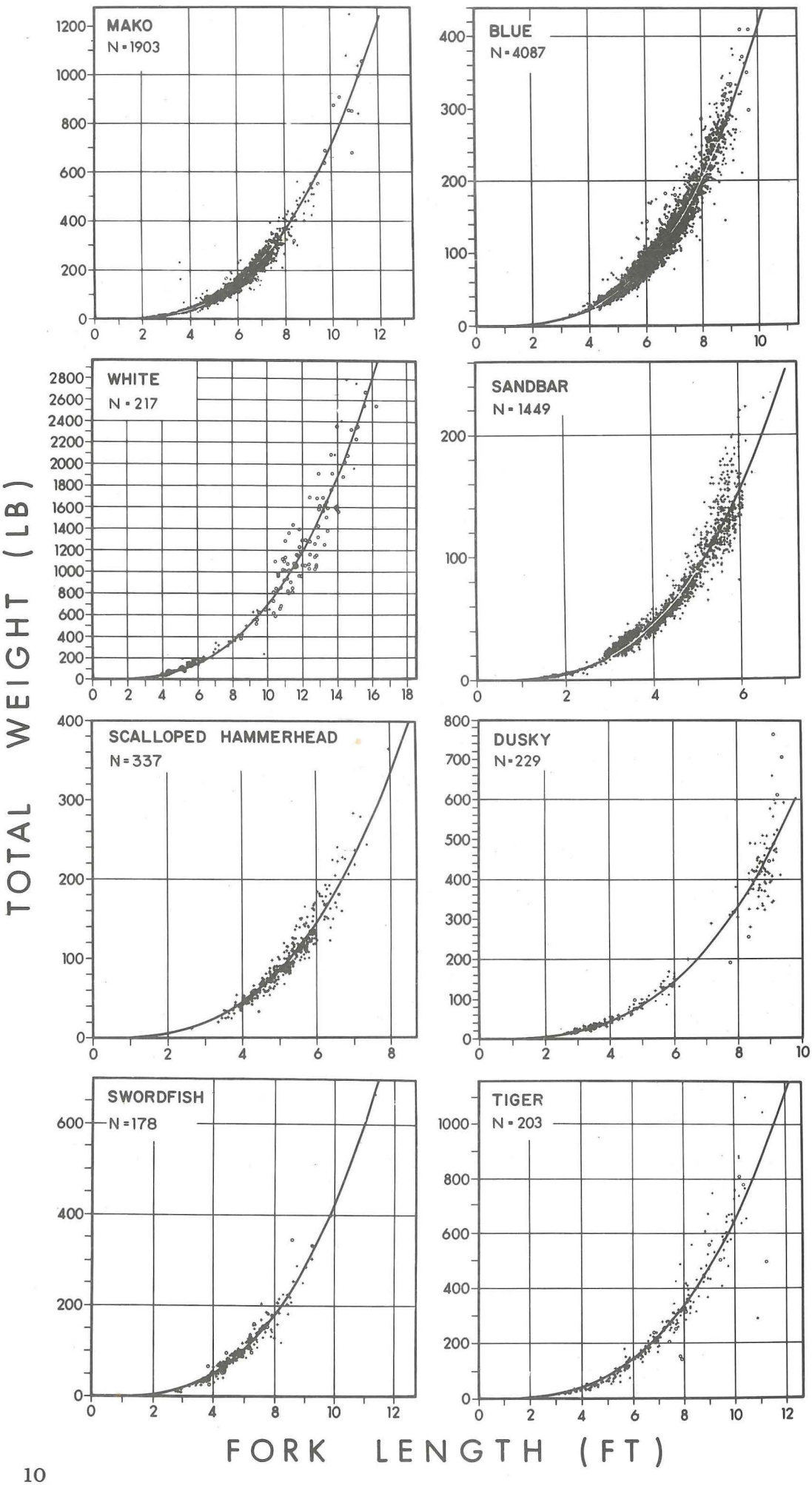
RETURNS FROM TAGGED SWORDFISH IN THE NORTHWEST ATLANTIC



AREA	NAME	NO. TAGGED IN AREA	NO. RECAP. IN AREA
1	GULF OF MEXICO	338	9
2	SOUTH EAST	219	29
3	NORTH EAST	924	36
4	GRAND BANKS	144	1
		1625	75

NMFS SWORDFISH TAG AND RECAPTURE SUMMARY

The above figures are taken from a publication being prepared by J. Casey, E. Scott and N. Kohler. Swordfish tag and recapture information from the NMFS data bases at the Northeast and Southeast Fisheries Centers (Narragansett, RI and Miami, FL) have been combined and include 1,625 releases and 75 recaptures over a 20 year period 1965-1985. Most of the tagging effort was by U.S. Foreign Fisheries Observers aboard Japanese longline vessels and by U.S. commercial longline fishermen. Some swordfish were also tagged from NMFS research vessels and by recreational fishermen. Understandably, most swordfish tagged by U.S. fishermen were small (<30 lbs), but with biologists and Fisheries Observer releases, the size at tagging ranged from about 5 to 400+ lbs. in round weight. The maximum time at liberty was 5.9 years from a swordfish tagged off Georges Bank in 1975 and recaptured off Florida in 1981. The maximum distance between tag and recapture was 1,867 miles between the Mississippi Delta (1974) and Georges Bank (1977). Of the 75 recaptures, 9 (12%) showed movements between the Gulf of Mexico and the Atlantic, and 9 (12%) also indicated movements between the U.S. and Canadian Fishery Conservation Zones. (The number of swordfish recaptured by area in the above figure are from fish tagged in all areas combined.) Tagged swordfish have not demonstrated transatlantic movements even though the species is distributed throughout most of the tropical and temperate zones of the world oceans. The stock relationships between different segments of the Atlantic population(s) are unknown and will very likely be clarified only through cooperative studies on an international scale. A more detailed account of the NMFS tag-recapture data will be included in a formal publication and will be updated in future newsletters.



LENGTH-WEIGHT RELATIONSHIPS FOR LARGE ATLANTIC SHARKS

The accompanying curves are taken from a detailed report on length-weight for several species of large Atlantic sharks that will be published later this year. Sharks of the same length can vary considerably in weight depending on their robustness and the material in their stomachs. For example, liver weights of blue sharks of the same length can vary by several pounds and the weight of stomach contents in blue and mako sharks can account for up to 10-15% of their total body weight. Stomachs of sharks weighed at tournaments are sometimes empty while others may contain natural food, bait, chum and/or ingested water. It is not always possible to adjust for these variables. Moreover, we have found that girth measurements incorporated into length formulas did not greatly increase the accuracy of weight estimates for some species. In addition, the length-weight relationships for males and females differ in some species but not in others. Generally, female sharks grow larger and are heavier than males as adults, but the length-weight relationships are similar in the smaller sizes. For practical purposes, the above curves provide reasonable estimates based on data obtained at tournaments and aboard research vessels over the past several years.

• MALE
+ FEMALE
o UNKNOWN