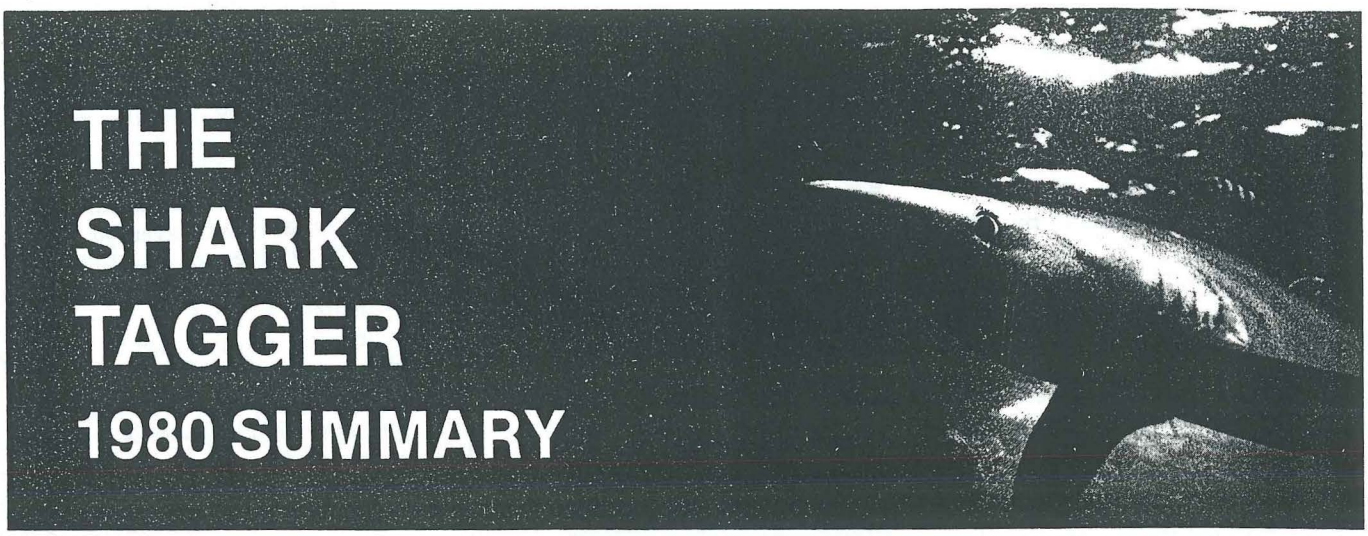
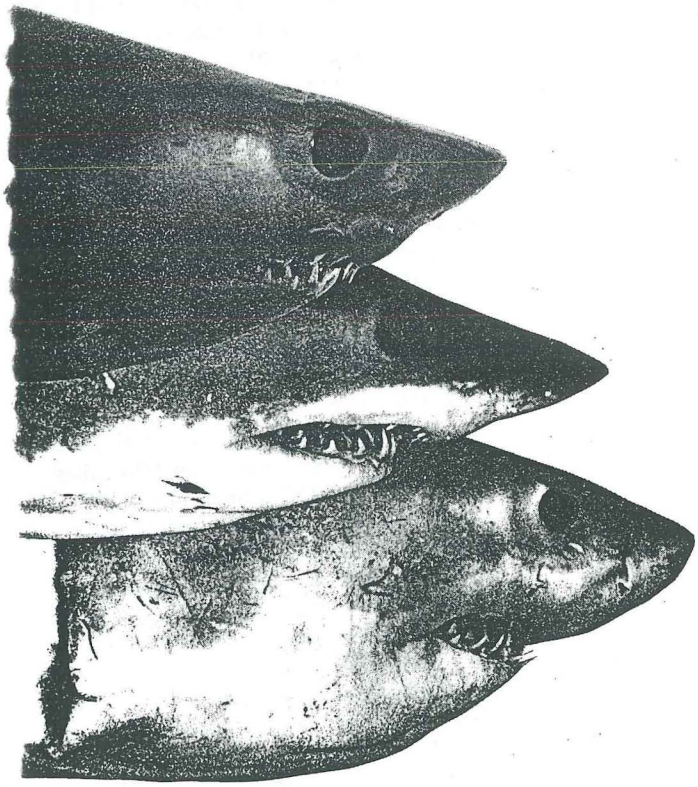
THE SHARK TAGGER
1980 SUMMARY



JOHN CASEY, HAROLD WES PRATT, CHARLES STILLWELL

PHOTO BY H. W. PRATT



LONGFIN MAKO
SHORTFIN MAKO
WHITE SHARK

See Page 6-7

1980 OVERVIEW

- OVER 5000 SHARKS TAGGED IN 1980
- FIVE BLUE SHARKS SHOW TRANSATLANTIC MOVEMENTS
- RECORD DISTANCE OF 3630 MI SET BY BLUE SHARK
- RECORD TIME AT LIBERTY OF 15.2 YRS SET BY SANDBAR SHARK
- 1st TAGGED SHORTFIN MAKO TRAVELS FROM ATLANTIC INTO GULF OF MEXICO
- 1st TAGGED LONGFIN MAKO RECAPTURED
- 5 TAGGED SWORDFISH RECAPTURED

In 1980, 5,236 sharks representing 34 species were tagged and released under the NMFS cooperative shark tagging program. In addition 253 teleosts of 11 species were also tagged. Volunteer taggers accounted for 95% of the releases (see Table 1). In the same period 146 tags were returned from 14 species of sharks and 2 teleosts. Recaptures came from blue sharks (87), sandbar (14), shortfin mako (10), blacktip (7), tiger (4), dusky (4), and 14 from other sharks. Tags from five swordfish and one white marlin were also returned (Table 2). U.S. fishermen accounted for 118 (81%) of the recaptures of which 70 were by rod and reel fishermen, 31 by longliners, and 17 by other U.S. fishermen. Foreign fishermen accounted for 28

(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 the Bay Shore Tuna Club.

OVERVIEW *(Continued from Page 1)*

(19%) of the tag returns. These came from fishermen representing the following twelve countries and island territories: Mexico (6), Spain (4), Japan (3), Cuba (3), Korea (3), Martinique (2), Grenada (2), and one each from Canada, Taiwan, Guadeloupe, St. Lucia, and Bermuda. Twenty of the foreign recaptures were taken by longlines; 8 by other gear.

Fish released by Captain Steven Connett aboard the RV *Geronimo* (St. Georges School, Newport, R.I.) accounted for 23 tag returns. Releases by NMFS Foreign Fishery Observers resulted in 22 returns, and releases by Narragansett biologists accounted for 9 returns. Other cooperators, primarily sportfishermen and commercial longliners accounted for the remaining 92 returns.

About the same number of fish were tagged in 1980 as last year (5,489 vs. 5,409 in 1979) with 21 fewer recaptures. The lower number of blue shark returns in 1980 accounted for the difference.

Blue Sharks—Five blue sharks showed transatlantic movements from the U.S. to the European and African coasts. All were at liberty from 9 to 18 months. One of these, tagged off Montauk, N.Y., and recaptured 9 months later off the coast of Liberia (Lat. 1°34'N Long. 21°07'W), travelled 3,630 miles in a straight line. This is a new long distance record for a shark tagged under our program and it is also the most southern tag return. We have never had a tagged shark cross the equator but this individual was within 100 miles of doing so. Other interesting recaptures from the eastern Atlantic came from a Japanese longliner who sent us two tags from blue sharks caught in the same area off the Cape Verde Islands within a few days of each other. One was tagged off New York and travelled 3,150 miles in 483 days. The other was a British tag very likely from a blue shark released off southern England or in the Bay of Biscay. We are awaiting additional details on the English tag and will include them in our next newsletter.

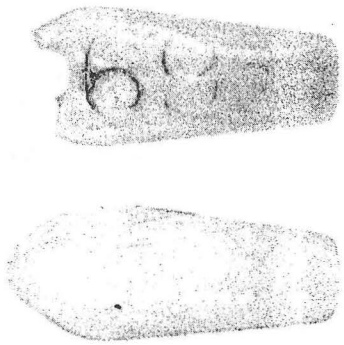
In addition to the transatlantic movements, 5 blue sharks tagged off the U.S. northeast coast travelled 1,500 to 1,800 miles to the West Indies, and another was recaptured in the Caribbean off Venezuela (1,810 mi.). Of these returns three were at liberty for less than a year, two for 2½ years, and one was returned after 5 years. The longer times at liberty for the recaptures in the West Indian region, compared to those from the eastern Atlantic, may be indicative of round trip movements between North America and Europe. The round trip distance from off New York to Portugal, then south near the Canary Islands and back across the Atlantic, into the Caribbean, through the Yucatan Straits and the Straits of Florida to New York is about 9,500 miles. The average current speed over this route is 0.65 knots (faster in the Gulf Stream, slower in the eastern Atlantic). A fish passively drifting at the surface over this route would theoretically cover 15.6 miles per day and make the entire trip in 609 days (20 months). A similar route that excludes the Caribbean and runs east of the West Indies and the Bahamas to Cape Hatteras and New York would cover about 8,300 miles. This shorter route would take 25 months to complete in a slower average drift (0.45 knots) that does not take full advantage of the Gulf Stream. All of these estimates do not account for any swimming on the part of the shark. Preliminary results of sonic tracking experiments this summer showed the average swimming speeds of blue sharks to be just less than one knot, or about 20 miles per day (mpd). Although sharks with sonic tags did not travel in a purposeful direction we have in the past had three tagged blue sharks cover more than 20 mpd over distances exceeding 1700 miles. At that rate (20 mpd) a blue shark could make the 9,500 mile round trip in about 15 months.

Although our hypothetical movements of sharks may bear little relationship to the real world, information on swimming rates and current speeds helps to explain returns from widely separated areas of the Atlantic during the same season. How their movements are influenced by reproductive cycles, food habits, and the effects of environmental factors is a continuing challenge.

Mako sharks—Distances between tag and recovery locations for the ten shortfin mako returns included three over 1,000 miles, one over 500 miles, and two over 250 miles. The times at liberty ranged from 6 months to 3.2 years. Compared to 1979, twice as many shortfin makos were recaptured in 1980. The long distance tag returns showed movements from: Virginia to St. Lucia in the Caribbean; from Southern New England to the Florida Keys; and from Cape Hatteras, N.C., to the Dry Tortugas. The latter return is the first mako tagged in the Atlantic to be recaptured in the Gulf of Mexico. Of the 167 makos tagged last year, rod and reel fishermen released 37, longline fishermen 24, and biologists and NMFS Fishery Observers accounted for 106. Without question makos are a highly prized sports and commercial species. Nevertheless there is much to be learned about the mako and we hope you will release part of your catches, particularly if you land several small individuals on the same day.

Longfin mako—The longfin mako shark is a widely distributed offshore species. In the Atlantic and Gulf of Mexico it is considered rare except

NEW ROTO TAGS



FIN TAG RETURNED AFTER 15 YEARS

The above tag returned from a sandbar shark after 15 years established a new time at liberty record (see text). Since the legend was completely worn away, we received the information only because of the alertness of William Murphy (NMFS Port Sampler) who was aware of our program. *If you learn about any tag on a shark, please have it sent to us.*

along the coast of Cuba. Longfin makos are caught almost exclusively on longlines and we have no record of one being taken on rod and reel. Anyone who looks for the difference in the pectoral fins is not likely to mistake the shortfin for the longfin (see pages 6 and 7). Tags were returned from two longfin makos in 1980. These are the first recaptures from this species. Both were tagged by NMFS Fishery Observers aboard Japanese longline vessels and were at liberty for two months. One travelled from the northern Gulf of Mexico to Cuba, the other was tagged and recaptured off North Carolina.

Sandbar sharks—Tag returns from sandbar sharks showed movements of up to 1,500 miles and time at liberty of over 15 years. Long-term recaptures also included one after nearly 9 years, and one after 5 years. With respect to distances between tag and recovery site, three returns were over 1,000 miles, four were over 500 miles, and three were over 200 miles. The longest distance (1,527 miles) came from a shark tagged off New Jersey and recaptured in the Gulf of Mexico off Alabama. Sandbar sharks tagged off the Middle Atlantic States were recaptured off North and South Carolina, Florida, Cuba, and Alabama. Most of the long distance recaptures came from juveniles that ranged from 4′-5′ (1.2-1.5 m) in total length. They were tagged offshore rather than in bays and sounds of the Middle Atlantic States where smaller sizes are common in summer.

Two returns from sandbar sharks tagged in Texas and recaptured in Mexico were particularly interesting. On October 7, 1979, Daniel Ruhle tagged two sandbar sharks from a fishing pier at Corpus Christi, Texas. Both were recaptured within 19 days and 128 miles of each other off Veracruz, Mexico (534 and 406 miles, respectively). Whether or not sandbar sharks commonly migrate between Mexico and Texas, or to other areas of the Atlantic requires additional information. However, considering the relatively few sharks tagged off Texas, it is tempting to speculate that these two returns indicate a part of the normal migratory route for this species in the Western Gulf.

The most dramatic of the sandbar shark tag returns came from the individual that was recaptured after 15.2 years. This is a new time-at-liberty-record for any shark tagged under our program. The fish was tagged on June 22, 1965, by Chuck Stillwell in Great Machipongo Inlet, Virginia, and was recaptured on September 18, 1980, off Block Island, Rhode Island. The address on the tag was worn away but fortunately the number was still legible (see photo p. 2). At tagging the total length of the shark, a young male, measured 119 cm (47 inches), and at recapture its estimated length was 168 cm (66 inches). The commercial fisherman who returned the tag provided reliable weight information which allowed us to calculate the average growth of the shark at 3.3 cm (1.3 inches) per year during the time it was at liberty. We have long known that the sandbar shark is long-lived and slow-growing, but these data indicate the shark was over 20 years old and had not reached maturity. As we have pointed out in previous newsletters, sharks as a group are slow-growing and produce relatively few young. Consequently, they can be depleted by intensive fishing.

Table 1

SUMMARY OF SHARKS AND TELEOSTS TAGGED
JAN.-DEC. 1980

SPECIES	TAGGED BY COOPERATIVE TAGGERS	TAGGED BY NARRAGANSETT BIOLOGISTS	TOTALS
SHARKS			
Blue shark	2692	85	2777
Sandbar shark	402	51	453
Dusky shark	366	13	379
Bull shark	11	0	11
Blacktip shark	101	0	101
Spinner shark	14	0	14
Oceanic whitetip shark	64	2	66
Silky shark	67	11	78
White shark	8	0	8
Shortfin mako shark	140	27	167
Longfin mako shark	10	0	10
Porbeagle shark	10	0	10
Sand tiger shark	11	0	11
Spiny dogfish shark	2	0	2
Smooth dogfish shark	11	0	11
Bonnethead shark	35	0	35
Great hammerhead shark	6	0	6
Scalloped hammerhead shark	92	49	141
Smooth hammerhead shark	3	1	4
Atlantic sharpnose shark	136	0	136
Blacknose shark	8	0	8
Tiger shark	144	3	147
Finetooth shark	11	0	11
Lemon shark	26	0	26
Nurse shark	33	0	33
Bigeye thresher shark	10	4	14
Common thresher shark	4	0	4
Night shark	7	7	14
Bignose shark	5	14	19
Angel shark	1	0	1
Basking shark	11	0	11
Reef shark	20	0	20
Greenland shark	2	0	2
Florida smoothhound shark	1	0	1
Galapagos shark	9	0	9
Hammerhead unspecified	33	1	34
Dogfish unspecified	2	0	2
Thresher unspecified	17	0	17
Sand unspecified	5	0	5
Blacktip unspecified	3	0	3
Brown shark unspecified	397	0	397
Grey shark unspecified	2	0	2
Brown/Dusky shark unspecified	14	0	14
Carcharhinus unspecified	11	0	11
Unknown*	11	0	11
Total Sharks	4968	268	5236
TELEOSTS			
Swordfish	199	15	214
Sailfish	1	0	1
White marlin	20	0	20
Blue marlin	2	0	2
Longbill spearfish	2	0	2
Bluefin tuna	1	0	1
Amberjack	2	2	4
Crevalle jack	1	0	1
Dolphin	1	0	1
Sunfish	6	0	6
Escolar	1	0	1
Total Teleosts	236	17	253
GRAND TOTAL	5204	285	5489

*Includes species reported as "shark".

Other sharks—Recaptures from other species of sharks include movements by two tiger sharks, one from the Central Gulf to Yucatan, Mexico (268 mi.), and another from North Carolina to Florida (590 mi.). Dusky sharks travelled across the Gulf from the Dry Tortugas to Mexico (758 miles), and from New York to Mexico (1,464 miles). A whitetip shark tagged off the Dry Tortugas was recaptured in the Gulf Stream off Cape Canaveral (490 miles in 28 days), and a silky shark also tagged off the Dry Tortugas was recaptured in the Gulf Stream off Georgia (720 miles).

Swordfish—Commercial longline fishermen and NMFS Fishery Observers were instrumental in tagging an unprecedented 214 swordfish in 1980. Five swordfish were recaptured with times at liberty up to nearly 3 years and distances of over 500 miles. These returns showed movements from the Gulf into the Atlantic (Dry Tortugas to Palm Beach, Florida), and from off Virginia to Nova Scotia. With the possible exception of giant bluefin tuna the swordfish is the most vigorously pursued of all the large predatory fishes. Their high commercial value and desirability as big gamefish makes this understandable. The increased fishing effort directed at swordfish along the U.S. coast in recent years has given rise to concern for the health of the stocks and emphasized the need for information on their migrations, growth and other elements of their biology. We recognize that the commercial value of swordfish and our requests that you tag them poses a dilemma for some fishermen. All we can say is "thanks" to those of you who chose to tag them.

In summary, 1980 was a highly successful year because we, once again, received enthusiastic support from the thousands of cooperators who make this research possible.

Table 2

TAG RECOVERIES: JANUARY - DECEMBER 1980

SPECIES	GENERAL LOCATIONS TAGGED	GENERAL LOCATIONS RECAPTURED	MONTHS/ LIBERTY	DIST. & DIR. TRAVELED N mi	CAPTURE METHOD TAGGING	CAPTURE METHOD RECAPT.	TAGGED BY TAGGER	TAGGED BY RESIDENCE
Blue Shark	Marbella, Spain	Cartagena, Spain	12	221 E	RR	LL	Gordon Bland	Spain
" "	31 mi SE Montauk, NY	40 mi S Fire Is. Inlet, NY	11	60 SW	RR	RR	Terry McConnell	NY
" "	35 mi SE Montauk, NY	27 mi SE Barnegat Inl, NJ	10	112 SW	RR	RR	Terry McConnell	NY
" "	20 mi SE Jones Inl, NY	33 mi SE Martha's Vineyard	50	118 E	FS	LL	Ken Feeley	NY
" "	SE Shinnecock Inl, NY	260 mi W Portugal	9	2820 E	RR	LL	Ken Ehlers	NJ
" "	25 mi E Montauk, NY	10 mi W Grenada, WI	9	1883 S	RR	HP	Peter Van Alst	NY
" "	35 mi SSW Cuttyhunk Is.,MA	30 mi SE Shinnecock, NY	11	45 SW	RR	RR	Lionel Gelinas	CT
" "	25 mi SE Montauk, NY	Martinique, WI	11	1590 SE	RR	RR	Frank Mundus	NY
" "	12 mi E Block Is., RI	18 mi SE Shinnecock, NY	11	50 SW	RR	RR	Charlie Donilon	RI
" "	40 mi S Montauk, NY	820 mi W Liberia	9	3630 SE	RR	LL	Al Schaumberg	CT
" "	32 mi S Moriches, NY	24 mi SSE Montauk, NY	<1	55 NE	RR	RR	Norman Docteroff	NY
" "	35 mi SE Montauk, NY	28 mi S Montauk, NY	<1	21 E	FS	RR	Charles Joscher	NY
" "	13 mi SE Block Is., RI	20 mi SE Manasquan Inl, NJ	12	113 SSW	RR	RR	Mark Marosa	NY
" "	SE Jones Inlet, NY	33 mi SE Manasquan Inl, NJ	<1	22 SSW	RR	RR	Capt. Arnold	NY
" "	13 mi SW Shinnecock, NY	35 mi E Manasquan Inl,NJ	11	48 SW	RR	RR	Ray Hendrickson	NY
" "	20 mi SW Montauk Pt, NY	18 mi S Block Is., RI	<1	0	RR	RR	J. R. Wolf	NY
" "	33 mi SE Fire Is. Inl, NY	25 mi SE Moriches Inl, NY	<1	39 NE	RR	RR	Joe Carter	NY
" "	14 mi S Moriches Inl, NY	15 mi S Shinnecock, NY	<1	18 E	RR	RR	Jack Lynch	NY
" "	25 mi SE Fire Is. Inl, NY	15 mi E Block Is., RI	1	99 NE	RR	RR	Ronald Lamano	NY
" "	25 mi SE Montauk Pt, NY	36 mi SE Fire Is. Inl, NY	12	77 W	RR	RR	Frank Mundus	NY
" "	20 mi SE Montauk Pt, NY	21 mi SE Montauk Pt, NY	<1	3 SE	FS	RR	Allan Kapuse	CT
" "	16 mi E Barnegat Inl, NJ	14 mi SW Martha's Vineyard	<1	155 NE	RR	TN	Steve Pepe	NJ
" "	25 mi SE Shinnecock Inl, NY	20 mi SSE Moriches Inl, NY	13	27 W	RR	RR	Brad Otis	NY
" "	33 mi E Barnegat Inl, NJ	27 mi SE Moriches Inl, NY	<1	63 NE	RR	RR	Bill Darney	NJ
" "	26 mi SE Fire Is. Inl, NY	20 mi SW Montauk Pt, NY	2	58 NE	RR	RR	Joe Carter	NY
" "	15 mi SE Montauk Pt, NY	28 mi S Montauk Pt, NY	<1	23 SSW	RR	RR	Murray Roth	NY
" "	25 mi S Shinnecock, NY	27 mi S Montauk Pt, NY	<1	27 ENE	RR	RR	Dan Leo	NY
" "	25 mi SW Montauk, NY	35 mi SE Block Is, RI	2	57 E	RR	LL	Ronnie Deluca	NY
" "	25 mi SE Montauk, NY	15 mi S Block Is, RI	1	9 N	RR	HL	Frank Mundus	NY
" "	20 mi S Patchogue, NY	45 mi NE Oregon Inl, NC	<1	280 SW	RR	LL	L. Lund	NY
" "	16 mi SE Moriches, NY	22 mi SE Shinnecock, NY	<1	15 E	RR	RR	Vin Pascale	NJ
" "	34 mi SE Block Is, RI	26 mi SSE Montauk, NY	1	30 W	RR	RR	Mike Albronda	NY
Blue Shark	8 mi E Block Is, RI	15 mi SW Montauk, NY	1	36 SW	FS	RR	Charlie Donilon	RI
" "	30 mi SSE Montauk Pt, NY	30 mi S Montauk, NY	<1	17 W	FS	RR	Eugene Greenstein	NY
" "	12 mi ESE Block Is, RI	12 mi ESE Block Is, RI	12	0	RR	RR	Dave Laurie	RI
" "	23 mi SE Shinnecock, NY	15 mi S Block Is, RI	<1	39 NE	RR	RR	Ken Ehlers	NJ
" "	15 mi SE Montauk, NY	25 mi S Montauk, NY	12	13 S	RR	RR	Harvey Smith	NY
" "	35 mi S Montauk, NY	78 mi SE Nantucket Is, MA	2	131 ESE	RR	LL	Dave Willis	CT
" "	30 mi S Montauk, NY	86 mi S Nantucket Is, MA	13	102 E	RR	LL	Jim Humphrey	CT
" "	25 mi S Montauk, NY	66 mi ESE Ocean City, MD	2	175 SW	FS	LL	Bob Schaeffer	CT
" "	50 mi SE Fire Is Inl, NY	250 mi WSW Cape Verde Is.	16	3150 SE	RR	LL	Alex Levy	NY
" "	Marbella,Spain	Malaga,Spain	54	30 E	RR	LL	Gordon Bland	Spain
" "	185 mi E Ocean City, MD	Vieux Port, Guadeloupe WI	60	1692 S	LL	NR	Phil Ruhle	RI
" "	15 mi S Montauk, NY	89 mi S Nantucket Is, MA	3	127 SE	RR	LL	Nick Diterlizzi	NY
" "	22 mi SE Block Is, RI	460 mi W Cape Verde Is.	12	2760 SE	RR	LL	Harvey Smith	NY
" "	60 mi SE Montauk Pt, NY	43 mi SE Montauk Pt, NY	2	24 W	RR	RR	Harvey Smith	NY
" "	40 mi S Nantucket Is, MA	44 mi SE Montauk Pt, NY	13	58 W	LL	RR	Stephen Connett	RI
" "	51 mi SE Montauk Pt, NY	167 mi E Nantucket Is, MA	15	207 E	LL	LL	Stephen Connett	RI
" "	36 mi S Nantucket Is, MA	93 mi NE Virginia Bch, VA	15	273 SW	LL	LL	Stephen Connett	RI
" "	48 mi SE Block Is, RI	32 mi SE Block Is, RI	2	15 NE	FS	RR	Biologist	RI
" "	36 mi S Martha's Vineyard	82 mi S Nantucket Is, MA	1	64 SSE	FS	LL	Biologist	RI
" "	60 mi NE Cape Hatteras, NC	3 mi SE Isle of Shoals, ME	5	542 NE	LL	HL	Biologist	RI
" "	60 mi NE Cape Hatteras, NC	110 mi W Portugal	18	3059 W	LL	LL	Biologist	RI
" "	90 mi S Block Is, RI	30 mi S Montauk, NY	8	60 N	LL	RR	Biologist	RI
" "	73 mi SE Cape May, NJ	W of Grenada WI	6	1545 S	LL	LL	Biologist	RI
" "	40 mi S Nantucket Is, MA	12 mi SE Block Is, RI	11	65 NW	LL	RR	Stephen Connett	RI
" "	60 mi SE Block Is, RI	103 mi SE Nantucket Is, MA	2	107 SE	LL	LL	Stephen Connett	RI
" "	36 mi SE Block Is, RI	SE Fire Is. Inl, NY	11	80 SW	LL	RR	Stephen Connett	RI
" "	24 mi SE Block Is, RI	30 mi E Barnegat Inl, NJ	22	128 SW	HL	RR	Stephen Connett	RI
" "	36 mi SE Block Is, RI	St. Lucia, WI	31	1763 S	LL	HL	Stephen Connett	RI
" "	35 mi SE Block Is, RI	15 mi SE Block Is, RI	11	20 NW	LL	RR	Stephen Connett	RI
" "	35 mi SE Block Is, RI	16 mi SE Montauk Pt, NY	2	28 WNW	LL	RR	Stephen Connett	RI
" "	30 mi SE Barnegat Inl, NJ	38 mi S Nantucket Is, MA	2	172 NE	RR	LL	Paul Falla	NJ
" "	27 mi SE Block Is, RI	37 mi S Nantucket Is, MA	12	55 ESE	FS	LL	Scott Roth	NY
" "	40 mi S Martha's Vineyard	25 mi S Shinnecock Inl, NY	12	72 W	LL	RR	Stephen Connett	RI
" "	45 mi S Nantucket Is, MA	25 mi S Montauk, NY	<1	85 W	HL	RR	Stephen Connett	RI
" "	47 mi S Nantucket Is, MA	91 mi SE Nantucket Is, MA	1	69 ESE	HL	LL	Stephen Connett	RI
" "	36 mi S Nantucket Is, MA	80 mi S Nantucket Is, MA	1	45 S	LL	LL	Stephen Connett	RI
" "	38 mi S Nantucket Is, MA	120 mi E Atlantic City, NJ	<1	123 SW	LL	LL	Stephen Connett	RI
Blue Shark	39 mi S Nantucket Is, MA	86 mi SE Nantucket Is, MA	1	53 SE	LL	LL	Stephen Connett	RI
" "	40 mi SE Block Is, RI	25 mi S Montauk Pt, NY	2	40 W	LL	RR	Stephen Connett	RI
" "	32 mi SE Block Is, RI	25 mi SE Montauk Pt, NY	2	17 NW	LL	RR	Stephen Connett	RI
" "	39 mi SE Block Is, RI	25 mi S Montauk Pt, NY	3	39 W	LL	RR	Stephen Connett	RI
" "	40 mi SE Block Is, RI	25 mi S Montauk Pt, NY	2	42 W	LL	RR	Stephen Connett	RI
" "	88 mi S Nantucket Is, MA	430 mi ESE Savannah, GA	7	544 S	LL	LL	G. H. Spake, NMFS Obs	MS
" "	96 mi E Chincoteague, VA	50 mi SE Manasquan, NJ	7	118 N	LL	RR	G. H. Spake, NMFS OBs	MS
" "	142 mi SSE Nantucket Is, MA	15 mi SE Montauk Pt, NY	7	150 NW	LL	RR	Brad Walters, NMFS Obs	MS
" "	83 mi S Montauk, NY	25 mi SSE Shinnecock, NY	20	54 NNW	LL	RR	Marty Bartlett	GA
" "	187 mi SE Montauk, NY	30 mi S Montauk, NY	9	164 NW	LL	RR	Brad Walters, NMFS Obs	MS
" "	92 mi SE Nantucket Is, MA	101 mi SE Nantucket Is, MA	1	28 NE	LL	LL	Mark Houck, NMFS Obs	MS
" "	97 mi SE Nantucket Is, MA	150 mi E Barnegat Inl, NJ	<1	83 W	LL	LL	Mark Houck, NMFS Obs	MS
" "	47 mi S Nantucket Is, MA	124 mi SE Nantucket Is, MA	2	114 E	LL	LL	Stephen Connett	RI
" "	15 mi S Montauk, NY	123 mi SE Nantucket Is, MA	28	195 SE	RR	LL	Jon Grossman	NY
" "	79 mi E Ocean City,MD	15 mi NW Blanquilla, Venez.	32	1810 S	LL	LL	Biologist	RI
" "	38 mi SE Block Is, RI	38 mi SE Block Is, RI	<1	4 W	RR	RR	Lee Pepin	CT
" "	32 mi SE Montauk, NY	30 mi S Block Is, RI	13	10 NE	RR	TN	R. C. Flanagan	CT
" "	25 mi SE Moriches, NY	15 mi E Block Is, RI	1	64 NE	RR	RR	Robert Mistina	NJ
Longfin Mako Shark	132 mi SE Mississippi R.	East of Havana, Cuba	2	405 SE	LL	LL	Brad Walters, NMFS Obs	MS
" " "	185 mi SE Cape Fear, NC	270 mi SE Cape Lookout, NC	2	148 E	LL	LL	G. H. Spake, NMFS Obs	MS
Mako Shark	22 mi ESE Manasquan, NJ	20 mi E Barnegat Inl, NJ	14	18 S	RR	RR	Thomas Bonanno	NJ
" "	90 mi S Nantucket Is, MA	380 mi E Savannah, GA	16	535 SW	LL	LL	Marty Bartlett	GA
" "	45 mi NE Oregon Inl, NC	28 mi S Fire Is, NY	39	260 NE	LL	RR	Biologist	RI
" "	330 mi E Chincoteague, VA	30 mi E Barnegat Inl, NJ	22	258 NW	LL	RR	Phil Ruhle	RI
" "	200 mi ENE Cape Hatteras,NC	65 mi W Dry Tortugas, FL	6	1095 SW	LL	LL	Mark Houck, NMFS Obs	MS
" "	25 mi E Ocean City, NJ	43 mi S Fire Is. Inl, NY	11	59 NE	RR	RR	Dave Moss	NJ
" "	30 mi E Manasquan Inl, NJ	21 mi E Barnegat Inl, NJ	12	19 S	RR	RR	Nick Miraglilo	NJ
" "	42 mi S Martha's Vineyard	30 mi S Sombrero Key, FL	23	1197 SSW	LL	LL	Stephen Connett	RI
" "	180 mi E Chincoteague, VA	25 mi S Shinnecock, NY	10	162 NW	LL	RR	G. H. Spake, NMFS Obs	MS
" "	357 mi E Assateague, VA	580 mi E St. Lucia Is, WI	13	1690 SE	LL	LL	G. H. Spake, NMFS Obs	MS
Sandbar Shark	Great Machipongo Inl, VA	6 mi S Block Is, RI	185	306 NE	GN	GN	Biologist	RI
" "	42 mi SE Fire Is. Inl, NY	E Fort Pierce, FL	57	865 SW	RR	RR	J. Schneider	NY
" "	Corpus Christie, TX	Alvarado, Veracruz, Mex.	4	534 S	RR	GN	Daniel Ruhl	TX
" "	Corpus Christie, TX	Tamiahua, Veracruz, Mex.	3	406 S	RR	GN	Daniel Ruhl	TX
" "	SE Jones Inl, NY	20 mi S Charleston, SC	104	654 S	RR	TN	Richard Krueger	NY
" "	Great Bay, Atlantic Co,NJ	Diamond Shoals Tower, NC	6	270 S	RR	TN	Bob Mangold	NJ
" "	SE Fire Island Inl, NY	25 mi W Clearwater Pass,FL	69	1400 SW	RR	RR	Ray Wittmann	NY
" "	Kiawah Island Inl, SC	Stono Inlet, SC	<1	3 SW	RR	RR	Rick Stringer	SC
" "	39 mi SE Fire Is Inl, NY	8 mi E Cape Canaveral, FL	17	821 S	RR	TN	Bill Mahler	NY

SPECIES	GENERAL LOCATIONS TAGGED	RECAPTURED	MONTHS/ LIBERTY	DIST. & DIR. TRAVELED N mi	CAPTURE METHOD TAGGING	RECAPT.	TAGGED BY TAGGER	RESIDENCE
Sandbar Shark	25 mi E Ocean City, NJ	15 mi NW Isabela, Cuba	22	1010 S	RR	LL	Dave Moss	NJ
" "	Hungar's Creek, VA	Onancock Creek, VA	1	20 N	GN	NR	Jim Colvocoresses	VA
" "	1 mi E Virginia Bch, VA	8 mi SE Oregon Inl, NC	2	74 S	LL	TN	Jim Colvocoresses	VA
" "	Great Bay, Atlantic Co,NJ	4 mi E Cape May, NJ	2	43 SW	RR	TN	Bob Mangold	FL
" "	33 mi SE Manasquan, NJ	10 mi SE Mobile Pt, AL	39	1527 SW	RR	TN	Bob Stephens	NJ
" "	Hungar's Creek, VA	Hungar's Creek, VA	<1	0	GN	GN	Jim Colvocoresses*	VA
Tiger Shark	139 mi SW Mississippi R.	28 mi S Dauphin Is, AL	7	222 NE	LL	TN	Brad Walters, NMFS Obs	MS
" "	87 mi E Cape Hatteras, NC	44 mi E Fort Pierce, FL	11	590 SW	LL	LL	Mark Houck, NMFS Obs	MS
" "	37 mi E Manasquan, NJ	28 mi SE Ocean City, NJ	<1	62 SW	RR	RR	Frank Janosz	NJ
" "	255 mi S Morgan City, LA	28 mi N Dzilamde Bravo, Mex	5	268 SE	LL	LL	G. H. Spake, NMFS Obs	MS
Dusky Shark	78 mi W Dry Tortugas, FL	3 mi off Tampico, Mex.	3	758 SW	LL	LL	Brad Walters, NMFS Obs	MS
" "	SE Shinnecock Inl, NY	56 mi N Cape Catoche, Mex.	55	1464 S	RR	HL	Harriet Disegni	NY
" "	Kure Beach, NC	Kure Beach, NC	48	NR	RR	RR	R. Jarvis	NC
" "	Challenger Bank, Bermuda	Challenger Bank, Bermuda	<1	NR	LL	NR	Stephen Connett	RI
Dusky/Blacktip Shark	350 mi SE Corpus Christi,TX	125 mi E Corpus Christi, TX	3	230 W	LL	LL	Brad Walters, NMFS Obs	MS
" "	70 mi W Dry Tortugas, FL	180 mi NE Progresso,Yuc,Mex.	3	214 WSW	LL	LL	Bill Young, NMFS Obs	MS
Blacktip Shark	Pine Island Sound, FL	Red Fish Pass, Captiva, FL	<1	6 NW	RR	NR	Don Case	FL
" "	Sombrero Key, FL	Sombrero Key, FL	<1	NR	RR	RR	W. H. Botten	FL
" "	Fat Deer Key, FL	Fat Deer Key, FL	<1	NR	RR	RR	W. H. Botten	FL
" "	13 mi S Mayport, FL	St. Augustine, FL	4	35 SE	RR	RR	Rick Frascello	FL
" "	Pine Island Sound, FL	Sanibel Island, FL	<1	8 S	RR	GN	David Case	FL
"	Pine Island Sound, FL	Sanibel Island, FL	<1	NR	RR	RR	Don Case	FL
" "	20 mi S Sand Is., AL	Ship Is. Channel, MS	12	40 NW	LL	TN	Steve Branstetter	AL
Silky/Dusky Shark	Lake Worth Inl, FL	SSW Cape Hatteras, NC	16	545 NE	RR	RR	Charlie Donilon	RI
" " "	225 mi S Pensacola, FL	N of Havana, Cuba	<1	340 S	LL	LL	Brad Walters, NMFS Obs	MS
Silky Shark	102 mi NW Dry Tortugas, FL	178 mi E Savannah, GA	5	720 N	LL	LL	G. H. Spake, NMFS Obs	MS
Scalloped Hammerhead	30 mi SW Dauphin Is, AL	12 mi SW Dauphin Is, AL	9	31 NE	LL	RR	Steve Branstetter	AL
Bonnethead Shark	Corpus Christi, TX	Aransas Bay, Rockport, TX	2	40 N	RR	RR	Romy Jugneta	TX
" "	Bayport, FL	3 mi W Aripeka, FL	<1	11 S	RR	RR	James Harper	FL
Smooth Hammerhead	Chesapeake Bay, VA	3 mi SE Beaufort, NC	22	184 S	RR	RR	Alan Paschall	VA
Oceanic Whitetip Shark	112 mi W Dry Tortugas, FL	35 mi E Cape Canaveral, FL	<1	490 NE	LL	LL	G. H. Spake, NMFS Obs	MS
Nurse Shark	Gulf Side Marathon, FL	Marathon, FL	16	NR	RR	RR	George E. Willis	FL
Lemon Shark	Big Pine Key, FL	Big Pine Key, FL	16	NR	RR	HL	Jeff Carrier	FL
White Marlin	60 mi E Ocean City, MD	80 mi S Shinnecock, NY	38	110 NE	RR	RR	Tiff Nevins	PA
Swordfish	35 mi S Dry Tortugas, FL	10 mi E Palm Beach, FL	10	263 NE	LL	LL	Phil Ruhle	RI
"	48 mi NE Oregon Inl, NC	60 mi SE Ocean City, MD	34	95 NNE	LL	LL	Phil Ruhle	RI
"	137 mi ESE Charleston, SC	117 mi ESE Savannah, GA	4	78 SW	LL	LL	Phil Ruhle, Jr	RI
"	49 mi E Oregon Inl, NC	69 mi E Machipongo Inl, VA	22	95 N	LL	LL	Scott Gilliland,NMFS Obs	MS
"	70 mi E Cape Henry, VA	73 mi S Cape Sable, NS,Can	23	535 NE	LL	LL	N. Lamey, NMFS Obs	MS

NOTE: NR=Not Reported; GN=Gill Net; LL=Longline; RR=Rod & Reel; HP=Harpoon; FS=Free Swimming; HL=Hand Line; TN=Trawl Net; Obs. = Foreign Fisheries Observer.

*6 additional sandbars were recaptured on the same day as tagging.

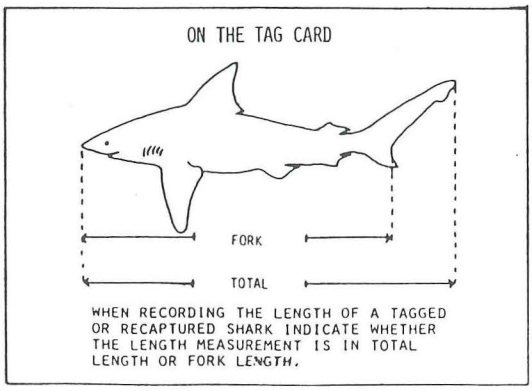
Movements of Sharks Between the Atlantic and Gulf of Mexico

In past newsletters we have highlighted recaptures from sharks that have shown transatlantic and other long-range movements between the Atlantic, Caribbean, and Gulf of Mexico. Information from long distance recaptures is interesting from a scientific viewpoint and it is also pertinent to any attempt to manage sharks on a national or international basis. Although knowledge of the relationships between the Atlantic (east coast) and Gulf of Mexico shark populations is far from complete, we are able to offer the following summary.

For the purpose of this discussion we selected 82° West Longitude (between Key West and Cuba) as the dividing line between the Atlantic and Gulf. Although this is somewhat artificial, we consider the movement of fish across this line as evidence of Atlantic-Gulf interchange.

During the past several years a total of 14 recaptures from 7 species of sharks indicates movements from the Atlantic into the Gulf. These came from sandbar (5), blue (2), night (2), silky (2), dusky (1), shortfin mako (1), and bignose sharks (1). There have been 5 recaptures from the following 5 species which indicate movements from the Gulf into the Atlantic: shortfin mako (1), longfin mako (1), tiger (1), silky (1), and whitetip sharks (1). Although only two species (shortfin mako and silky sharks) showed movements both ways, the fact that 19 sharks of 10 species crossed the Atlantic-Gulf boundary shows there is at least some interchange between the two regions. Moreover, if we consider the area in the Florida Straits between 81° and 82° West Longitude (between Key West and Sombrero Key and the north coast of Cuba) as a transition zone, there are 8 additional recaptures from blacktip, sandbar, dusky, shortfin mako, and blue sharks that suggest movements in or out of the Gulf.

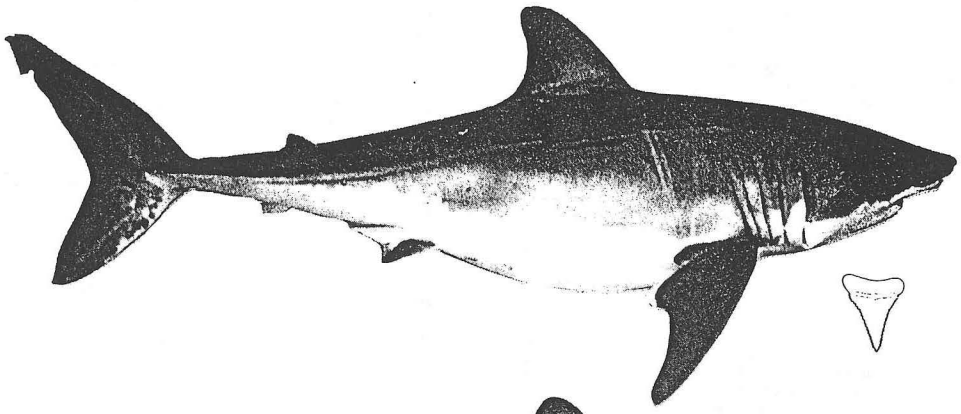
All of the recaptures mentioned above are from sharks which are distributed over a broad geographical range and it is too soon to determine whether or not those species that occur in the Gulf and in other areas of the Atlantic are part of the same populations. We cannot discount the possibility that some recaptures represent individuals that have strayed from the main populations, or that they indicate long range movements that take place on an intermittent rather than as a regular basis. An increase in tagging effort is essential for a better understanding of the stocks of highly pelagic Atlantic sharks and we welcome additional assistance, particularly from fishermen in the Gulf of Mexico.



SOURCE FOR TUNA TAGS

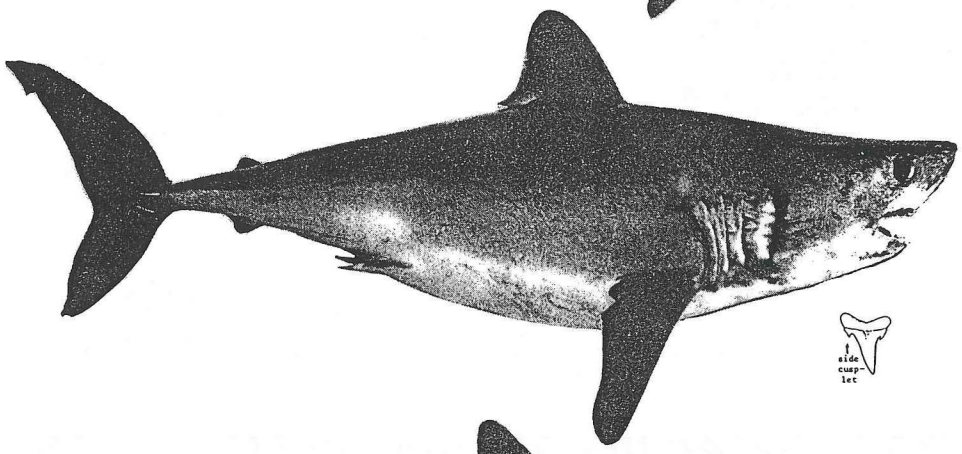
We encourage fishermen to participate in other research programs. If you plan on tagging tunas and billfish, please contact:

Edwin L. Scott
NOAA-NMFS
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, FL 33149



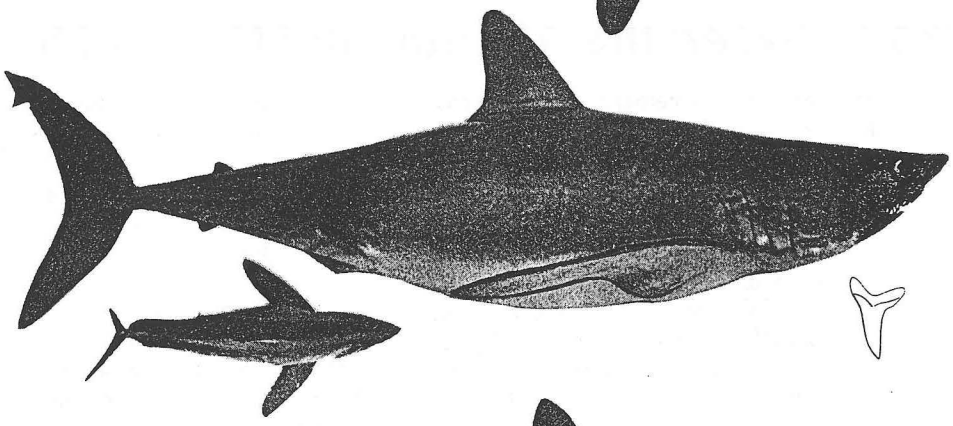
WHITE SHARK 4 FOOT SPECIMEN
CARCHARODON CARCHARIAS

* LARGE TRIANGULAR, SAW-EDGED TEETH
* DORSAL FIN LARGE, SAIL-LIKE - HEAD STOUT
* BLACK SPOT AT BASE OF PECTORAL FIN
* SLATE BROWN IN LIFE, DULL GREY TO BLACK IN DEATH
* MAX SIZE 21 FT POSSIBLY LARGER - OVER 5000 LBS
* INSHORE - OFFSHORE, TROPICAL AND TEMPERATE ZONES



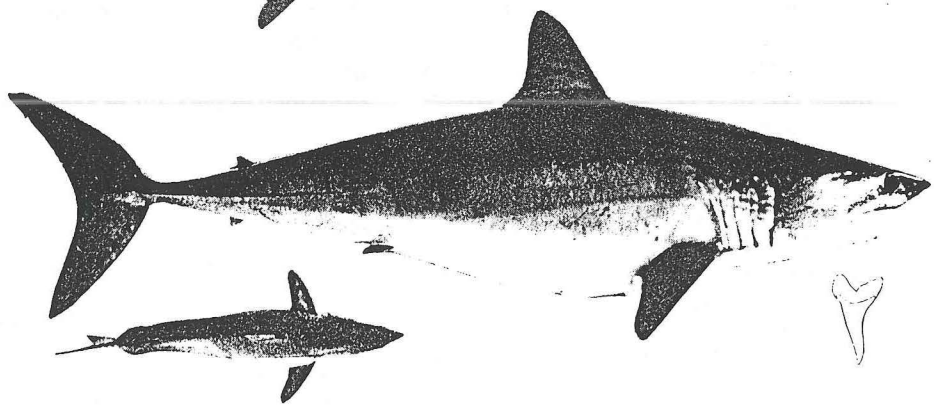
PORBEAGLE 2½ FOOT SPECIMEN
LAMNA NASUS

* TEETH DISTINCTIVE WITH 2 LATERAL CUSPS (OFTEN SMALL)
* SECOND KEEL ON CAUDAL FIN
* WHITE BELOW - BLUE GREY ABOVE - OFTEN WITH A WHITE SPOT ON 1ST DORSAL FIN
* MAX SIZE 10 FT - 465 LBS
* COLD WATER SHARK, SOUTH TO THE CAROLINAS



LONGFIN MAKO 6½ FOOT SPECIMEN
ISURUS PAUCUS

* TEETH SIMILAR TO SHORTFIN
* VERY LONG PECTORAL FINS
* BLUE ABOVE - LIGHT BLUE SIDES - WHITE BELOW EXCEPT FOR LOWER JAW
* LARGER EYE, BLUNTER SNOUT THAN SHORTFIN MAKO
* MAX SIZE 11 FT
* OFFSHORE - TROPICAL AND WARM TEMPERATE ZONES - RARE EXCEPT OFF CUBA



SHORTFIN MAKO 7 FOOT SPECIMEN
ISURUS OXYRINCHUS

* TEETH LONG AND OBVIOUS WHEN MOUTH CLOSED
* BODY MORE SLENDER THAN PORBEAGLE AND WHITE
* BLUE ABOVE - LIGHT BLUE SIDES - SNOW WHITE BELOW INCLUDING LOWER JAW
* MAXIMUM SIZE 12 FT - 1200 LBS
* INSHORE - OFFSHORE TROPICAL AND TEMPERATE ZONES

ATLANTIC MACKEREL SHARKS

FAMILY LAMNIDAE

1 FT = 30.5 CM
1 LB = .45 KG

Shark Identification

THE ATLANTIC MACKEREL SHARKS
(Family Lamnidae)

The distinguishing characteristics of the mackerel sharks are: a lunate shaped tail (i.e., upper and lower lobes are nearly equal in length), a sharply pointed, or at least conical, snout and a well developed keel (ridge) running along each side of the caudal peduncle from about the second dorsal fin onto the tail. They have small second dorsal and anal fins and five long gill slits.

Although the adults in this group are quite easy to identify, small individuals are quite similar. Young mackerel sharks, 3'-4' (91-121 cm), have relatively smaller, more rounded fins and stouter bodies than the adults. For this reason fin size, shape, and location are not good characters by themselves. The *Anglers' Guide to Sharks* provides additional details.

White Shark—Large white sharks are often confused with basking sharks because of their similar appearance. We provide a comparison of the two species in a previous newsletter. (Write if you would like a copy.) The basking shark attains a length of 11 m (36 feet), swims sinuously and lazily, and its gill slits extend almost completely around the head. The white shark seldom reaches 6.5 m (21 feet), swims in a stiffer more purposeful fashion, and its gill slits, while long, are confined to the sides of the head.

The dorsal surface of large white sharks is usually an even shade of brown ranging from mustard to greybrown. Basking sharks are often mottled with grey and black irregular patches.

The white shark is widely distributed in temperate and tropical seas but is nowhere abundant.

Porbeagle—The porbeagle most closely resembles the shortfin mako but in addition to the anatomical differences, porbeagles prefer colder water, 2° to 18°C (35° to 65°F). Porbeagles are caught occasionally in the spring and fall off southern New England and Long Island, but they are more abundant north of Cape Cod. It has not been reliably reported south of Cape Hatteras, N.C., or from the Gulf of Mexico.

Longfin and shortfin makos—The longfin mako wasn't recognized until 1966. In shape and coloration it generally resembles a stout-bodied blue shark. The teeth are similar to the shortfin mako but it has a larger eye, and the underside of the lower jaw is darkly colored. The most striking difference between the longfin and shortfin mako is the length of the pectoral fins. In the longfin the pectoral fins are as long or longer than the distance from the snout to the pectoral fin (head length). In the shortfin the pectoral fin is much shorter reaching only 55 to 75% of the head length.

The longfin mako is an offshore species that is rare everywhere except along the north coast of Cuba. In recent years longline fishermen have taken some longfins in the Gulf of Mexico, the Straits of Florida, and beyond 100 fathoms along the east coast. Nevertheless, of the thousands of records we have on mako sharks less than two dozen are for the longfin. To our knowledge the longfin mako has not been taken on the continental shelf north of Cape Hatteras, N.C.

RESEARCH CRUISES

Research cruises in 1980 were conducted aboard two foreign vessels, the RV *Wieczno* from Gdynia, Poland, and the *Jane R* from Lockeport, Nova Scotia; and two American vessels, the *Bird of Passage* from Woods Hole, Massachusetts, and the *Donna Lee* from Highlands, New Jersey. Areas of operation during the cooperative foreign cruises in March and August extended from the offings of Daytona Beach, Florida, northward along the edge of the continental shelf to Hydrographer Canyon on the southern margin of Georges Bank. Inshore activities on the American boats in June and July were conducted 35-40 miles SSW of Martha's Vineyard, Massachusetts, and off the northern coast of New Jersey.

The purpose of the cruises was to tag sharks and other large gamefish for migration studies and to collect biological data for life history studies of sharks and swordfish.

The primary fishing method was pelagic longlines except aboard the *Bird of Passage* where chumming, handlines and harpoons were employed. All fish captured were tagged (287) or taken on board for our studies of shark food habits, age and growth, and reproduction. Sharks predominated in the catches on each cruise and amounted to 83% of the 743 fish caught. Fourteen species were represented, the most numerous were the scalloped hammerhead (170), blue (118), sandbar (101), silky (80), mako (46), dusky (34), and bignose shark (24). Teleosts accounted for the remainder of the catch, consisting primarily of 113 swordfish.

Stomach examinations on makos and swordfish taken offshore during the March cruise showed that those with food had fed selectively on small bluefish (1.5-2.0 lbs.). The majority of stomachs from other sharks and teleosts examined at this time were empty. Those few stomachs with food included remnants of squid and small fish too digested to identify. In August, the diet of most of the sharks and swordfish we examined offshore consisted almost entirely of squid.

Reproductive information was collected from a total of 54 sharks. These included four pregnant females; an oceanic whitetip, a blue shark, a bigeye thresher and a scalloped hammerhead. The whitetip was near full term with six young and the blue shark contained 55 embryos that were 3-4 months from birth. Each uterus of the bigeye thresher held one embryo, 5.3 inches long. Accompanying each embryo was a supply of nutritive packets consisting of 10-12 unfertilized eggs. The scalloped hammerhead contained 28 recently fertilized eggs, 15 in the right uterus and 13 in the left.

The *Jane R* cruise was our first cooperative U.S.-Canadian venture in eight years. The capture of 40 subadult (3.5-4.5 feet) male sandbar sharks on one longline set in the Hydrographer Canyon area was unusual. From our tagging program there is evidence that the male sandbars segregate and make longer migrations as they increase in size. However large numbers of males have not previously been reported this far north along the edge of the continental shelf.

A prime objective of the *Bird of Passage* cruise was to study the digestion rate in the blue shark with the use of sonic telemetry. The work was done in cooperation with Dr. Frank Carey of the Woods Hole Oceanographic Institution. In a series of experiments, blue sharks were attracted to the boat by chumming and one was selected and fed a specified number of whole mackerel. The shark was then tagged with a sonic transmitter and tracked for a predetermined number of hours. When the fish surfaced, it was harpooned and hauled on deck as rapidly as possible to prevent eversion of its stomach. As it turned out, three of five sonic tagged sharks appeared at the surface as expected. Two were successfully harpooned after 10 and 26 hours of tracking. Results of this experiment are discussed in the article on blue shark food habits (p. 8). Additional experiments of this kind are planned for the future to provide a data base from which shark digestion rates can be more precisely determined.

The *Donna Lee* cruise (July 21-August 8) involved longlining off the coast of New Jersey where Jack Casey caught sharks in the 1960's. Support for this work was provided by Sea World, Inc., Orlando, Florida. Casey served as consulting scientist and Wes Pratt, Nancy Kohler, and Alan Lintala participated intermittently. Sea World's goal was to obtain a live white shark for display at Orlando. Our interests were to compare catch results with earlier studies, to tag part of the catch and to examine stomach contents. Of the 46 sharks captured, 28 were tagged. Only one white shark was caught and it was dead on the line. Compared to the 1962-65 data, sharks were generally less abundant in 1980. Explanations for this lower abundance are speculative, but may have been related to climatic conditions. Late July and early August 1980 was an unusually hot, calm, period. Coastal waters east of Sandy Hook were strongly stratified with surface temperatures as high as 25°C (77°F) and bottom temperatures as low as 8°C (46°F). Surface temperatures were generally cooler in the 1960's and in those areas where the catches of sharks were higher, schooling fishes (primarily menhaden and bluefish) were quite common at the surface. In 1980 surface life in these same areas was negligible.

Food Habits of The Blue Shark

A thorough knowledge of the food and feeding habits of an animal is important to understanding its biology, abundance, and distribution and to the efficient management of its stocks. This report is a summary of work by Nancy Kohler and Chuck Stillwell on the blue shark, *Prionace glauca*.

The blue shark is the most abundant large oceanic shark in the Atlantic. In the western Atlantic they are found from the Grand Banks to Uruguay and are especially prevalent in the waters off New York and New Jersey during the warmer months.

Although blues are the most common offshore species of shark, little has been reported on their diet. In 1972 we undertook a study to determine the food habits of the blue shark in the western North Atlantic. Blues caught on sport tackle during shark fishing tournaments and on longline gear aboard commercial and research vessels were measured, sexed, weighed, and examined for stomach contents. To date, 523 stomach samples have been analyzed by area (inshore—less than 50 fathoms and offshore—greater than 50 fathoms) and for sexual differences with respect to the type and amount of food they contained. The percentage with food was higher offshore (88%) than inshore (51%). A comparison between sexes showed that more males (67%) than females (52%) had food in their stomachs. Overall, 62% of the stomachs contained food and 38% were empty.

The blue shark's diet consists mainly of fish and squid. Four kinds of fish are consumed with equal frequency—herring, hake, bluefish and mackerel. Other fish occurring less frequently include butterfish, flatfish, lancetfish, goosefish, scup, sand lance, snake mackerel, swordfish, sea raven and lanternfish. The presence of both pelagic and bottom species in the diet suggests that blue sharks feed at all water depths. Cephalopods are represented primarily by the boreal squid, *Illex illecebrosus*, the longfinned squid, *Loligo pealei*, some deep water squids and the pelagic octopus, *Alloposis mollis*.

A comparision of areas shows that fish, especially bluefish and hakes, are more important food items inshore whereas offshore the largest part of the diet is composed of squid. Fish found in offshore stomachs consists of lancetfish, swordfish, sea ravens, lanternfish and snake mackerel. Thus inshore, blues feed on a plentiful supply of schooling bluefish and red and silver hake. Offshore, blue sharks prey on an abundance of squid.

Males and females eat approximately the same food items in equal proportions. This is true when comparisons are made between sexes within each area and regardless of area.

The amount of food found in the blue shark stomachs ranged from none (empty) to a maximum of 15 lbs. The latter amount consisted of 21 yellowtail flounder, 3 hakes, 1 unidentified fish, and bait and represented 8.8% of the shark's body weight. Usually, blues do not contain much food. The average food weight per stomach for the total sample (including those empty) was 0.37 lbs or 0.4% of the body weight when 84.8 lbs was used as an average weight for the blue shark. More food per stomach was found inshore (0.42 lbs) than offshore (0.26 lbs).

The sonic tracking experiments conducted on the *Bird of Passage* cruise last summer provided first quantitative information on blue shark feeding rates under natural conditions (see section on Research Cruises). Results of these initial experiments indicate blue sharks are capable of digesting 2.6 lbs of mackerel in 24 hr, or 3% of their body weight per day.

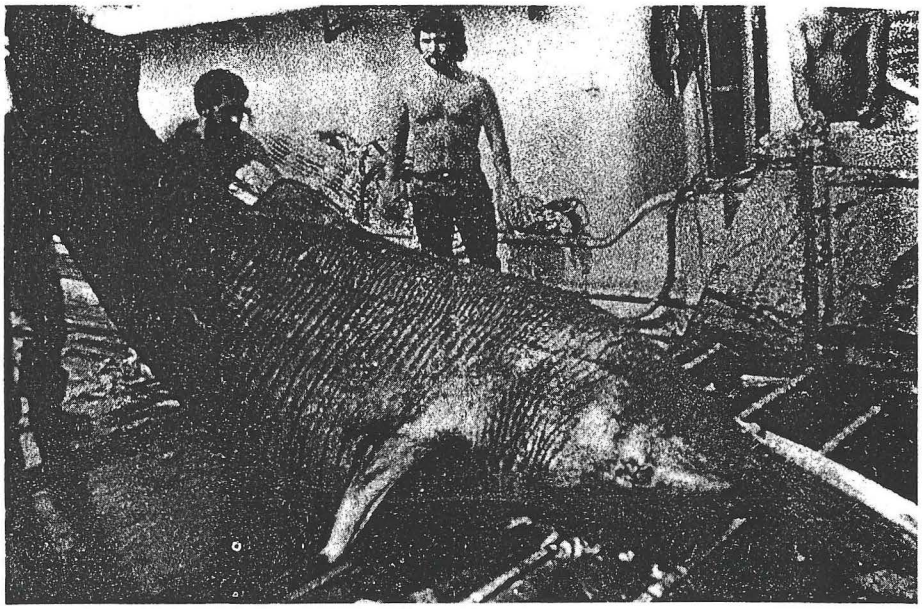


Photo by R. Dow

NMFS FISHERY OBSERVERS ADD A NEW DIMENSION TO SHARK RESEARCH

NMFS Fishery Observers, headquartered at Otis, Massachusetts, and Pascagoula, Mississippi, annually tag several hundred sharks aboard foreign vessels. Their activities on foreign trawlers and longline vessels are usually beyond the limit of our coastal taggers and have added new dimensions to our shark studies. The Greenland shark, *Somniosus microcephalus*, (pictured above) is one of several they have reported from off the middle Atlantic States in 1980. This boreal species is rare along the U.S. coast and has not previously been reported south of the Gulf of Maine.

PLEASE REMEMBER

1. Fill out tag cards completely, immediately after tagging a fish.
2. Report location by latitude and longitude whenever possible.
3. Record full address of Captain or person who received the tags and is on our mailing list.
4. Return completed tag cards promptly.
5. Do Not transfer your tags to someone else.

MARINE RESEARCH TAGGING PROGRAM N.M.F.S.