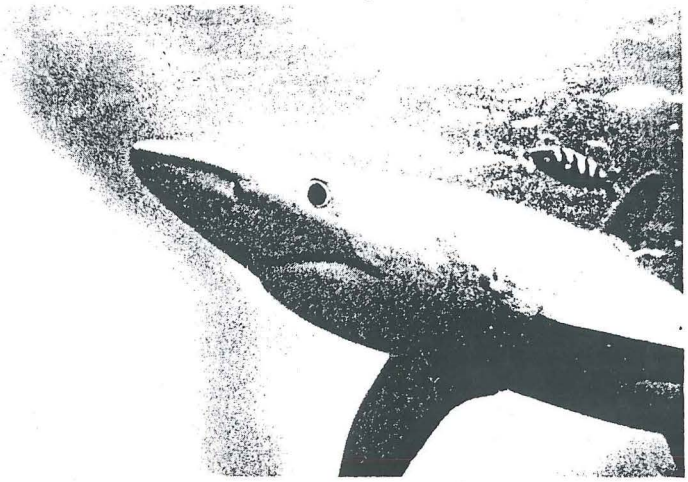
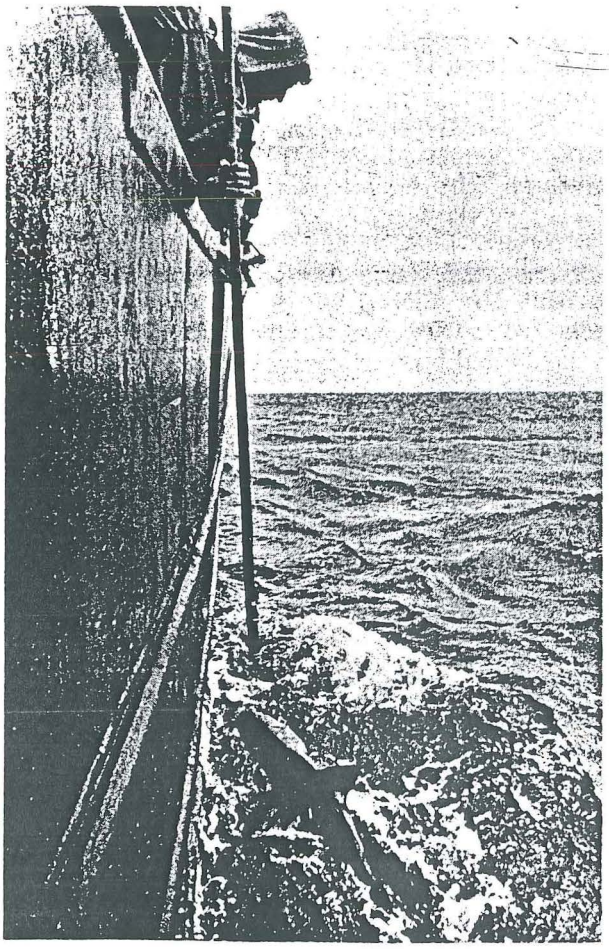
# THE SHARK TAGGER 1984 SUMMARY



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

PHOTO BY H. W. PRATT



## 1984 OVERVIEW

- FRESHWATER RUNOFF SHIFTS BLUE SHARK POPULATION OFFSHORE IN 1984. ANGLERS CATCHES DOWN
- FIRST TAGGED WHITE SHARK RECAPTURED
- FIRST TAGGED MAKO SHOWS TRANSATLANTIC MOVEMENT (U.S. TO EUROPE)
- FIRST DUSKY SHARK TRAVELS FROM NORTH AMERICA TO SOUTH AMERICA
- TAGGED TIGER SHARK SETS NEW RECORD OF 5.4 YEARS AT LIBERTY
- TAGGED SWORDFISH RECAPTURED AFTER 5 YEARS INCREASES 246 LBS. IN DRESSED WEIGHT, AND $1,036 IN VALUE

In 1984 a total of 3,775 sharks and teleosts (bony fishes) representing 40 species were tagged under the Cooperative Shark Tagging Program (Table 1). The categories of fishermen who accounted for the releases were: anglers (36%), U.S. Foreign Fisheries Observers (26%), R/V *Geronimo* (20%), NMFS and other biologists (16%) and commercial fishermen (2%). The number of releases in 1984 was about 2,000 less than the record year of 1983 when over 5,800 fish were tagged. The lower number of tagged fish in 1984 was largely due

*(Continued on Page 2)*



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 1984

| SPECIES | TAGGED BY COOPERATIVE TAGGERS | NARRAGANSETT BIOLOGISTS | TOTALS |
|---|---|---|---|
| **Sharks** | | | |
| Blue shark | 1,592 | 68 | 1,660 |
| Sandbar shark | 569 | 39 | 608 |
| Dusky shark | 196 | 0 | 196 |
| Bull shark | 16 | 0 | 16 |
| Blacktip shark | 104 | 0 | 104 |
| Spinner shark | 13 | 0 | 13 |
| Oceanic whitetip shark | 4 | 0 | 4 |
| Silky shark | 7 | 1 | 8 |
| White shark | 3 | 0 | 3 |
| Shortfin mako shark | 178 | 24 | 202 |
| Porbeagle shark | 22 | 0 | 22 |
| Sand tiger shark | 3 | 0 | 3 |
| Spiny dogfish shark | 2 | 0 | 2 |
| Bonnethead shark | 21 | 0 | 21 |
| Great hammerhead shark | 4 | 0 | 4 |
| Scalloped hammerhead shark | 58 | 74 | 132 |
| Smooth hammerhead shark | 7 | 0 | 7 |
| Atlantic sharpnose shark | 50 | 0 | 50 |
| Blacknose shark | 5 | 0 | 5 |
| Tiger shark | 127 | 12 | 139 |
| Finetooth shark | 5 | 0 | 5 |
| Lemon shark | 122 | 0 | 122 |
| Nurse shark | 50 | 0 | 50 |
| Bigeye thresher shark | 14 | 0 | 14 |
| Common thresher shark | 1 | 0 | 1 |
| Night shark | 2 | 41 | 43 |
| Bignose shark | 1 | 43 | 44 |
| Basking shark | 9 | 0 | 9 |
| Reef shark | 57 | 0 | 57 |
| Greenland shark | 3 | 0 | 3 |
| Galapagos shark | 21 | 0 | 21 |
| Hexanchus vitulus | 1 | 0 | 1 |
| Hammerhead unspecified | 35 | 4 | 39 |
| Thresher unspecified | 9 | 0 | 9 |
| Dogfish unspecified | 1 | 0 | 1 |
| Sand unspecified | 2 | 0 | 2 |
| Miscellaneous* | 3 | 1 | 4 |
| Total sharks | 3,317 | 307 | 3,624 |
| **Teleosts** | | | |
| Swordfish | 87 | 0 | 87 |
| White marlin | 2 | 0 | 2 |
| Blue marlin | 4 | 0 | 4 |
| Bluefin tuna | 22 | 0 | 22 |
| Yellowfin tuna | 0 | 28 | 28 |
| Miscellaneous | 8 | 0 | 8 |
| Total teleosts | 123 | 28 | 151 |
| Grand Total | 3,440 | 335 | 3,775 |

*Includes species reported as "shark".

## OVERVIEW 1984 - *Continued*

to lower catches of blue sharks by anglers. In 1984, anglers tagged approximately half as many sharks as they did in 1983. We mentioned in our last newsletter, record rainfall in parts of the northeast during May and June of 1984 resulted in unusually high runoff from the river systems in the Middle Atlantic States. As a consequence, less saline water extended 70 miles out onto the continental shelf. Normally the effects of this fresh water runoff is confined to the inshore 30 miles off the Middle Atlantic States. Blue sharks, moving northward between Cape Hatteras and eastern Long Island last June, remained further offshore and were less available to sportsmen in New Jersey and New York. We suggested that this shift in distribution, rather than a decline in actual abundance, better explained the lower angler catches in 1984. Our contention has since been supported by offshore longliners and Foreign Fisheries Observers who reported strong concentrations of blue sharks off Georges Bank and southern New England last fall. A possible contributing factor to the fewer shark releases by sportsmen was that 1984 was a good year for bluefin and yellowfin tuna off the northeastern U.S. and very likely some fishing effort directed at sharks in previous years was shifted to tunas in 1984. (As this Newsletter was being printed, we received data on 1,000 additional tagged sharks from the Polish research vessel *Wieczno* fishing off the African coast. We will provide details in our next Newsletter.)

Despite the fewer number of sharks tagged, 1984 was highly successful with respect to recaptures. A total of 167 tags were returned from 15 species of sharks and 3 species of teleosts (Table 2). The sources of the recaptures were from: U.S. anglers 43 (26%), foreign fishing vessels and U.S. Foreign Fisheries Observers 37 (22%), U.S. longline vessels 36 (22%), all other U.S. fishermen and biologists 51 (30%). Fishermen from the following 13 countries returned tags: U.S. (129), Japan (11), Cuba (4), Spain (4), Canada (3), Mexico (3), Venezuela (3), Bahamas (2), Barbados (2), Bermuda (2), Puerto Rico (2), Poland (1), and Taiwan (1).

The sources of the tagging effort from which tags were returned in 1984 were: anglers 75 (45%), Foreign Fisheries Observers 22 (13%), R/V *Geronimo* 17 (10%), Polish research vessel *Wieczno* 9 (5%), commercial fishermen 6 (4%), NMFS and other biologists 7 (4%) and an experiment by Dr. S. Gruber of the University of Miami, Florida, 31 (19%) (Table 2).

**BLUE SHARKS** (47 returns) were recaptured after a maximum of 4.3 yr at liberty and a maximum distance of 2,992 miles. All of the recaptures came from blue sharks released in the Middle Atlantic Bight (i.e., Cape Hatteras to Cape Cod). For 9 (19%) of the returns the distance between release and recapture location exceeded 600 miles. Long distance returns for blue sharks tagged off the U.S. came from off Nova Scotia, the Azores, and the coasts of Spain, Barbados, and Venezuela, S.A. One blue shark travelled from off Moriches, New York to Venezuela in 7 months; another tagged off Montauk was recovered off Spain after 27 months. Many of the returns from blue sharks in 1984 were at liberty for nearly a year or more. This is a higher proportion of long-term recaptures compared to previous years. Normally, blue sharks remain off Long Island for a few weeks and it is not unusual to have several recaptures from tagged sharks that have stayed in the same area. In 1982, for example, we had 18 sharks retagged a second and third time off New York. The absence of blue sharks on the inshore fishing grounds in 1984 accounts for the lower number of short-term recaptures.

**SANDBAR SHARKS** (19 returns) were recaptured after a maximum of 10.7 years at liberty and a maximum distance of 1,975 miles. Nine sandbar sharks were recaptured within 1 year of tagging; 4 were at liberty from 1 to 3 years and 6 were at liberty from 3 to 10.7 years. Most of the returns came from sharks tagged along the Atlantic coast between Virginia and New York. Recaptures came from the Carolinas, Florida, and the Mexican coast near Tampico. Mexican recaptures are evidence of mixing between the Atlantic and Gulf of Mexico populations. However, all of the returns to date show movements from the Atlantic into the Gulf and it is not known whether sandbar sharks that travel as far as Mexico ever return. Additional tagging off Mexico would help to clarify this point and we are currently planning joint studies with Mexican scientists that will include tagging off Yucatan.

**MAKO SHARKS** (20 returns) were recaptured after a maximum of 2.7 years at liberty and a maximum distance of 2,452 miles. Makos tagged in the Middle Atlantic Bight were recaptured in the Sargasso Sea, off Cuba, in the Gulf of Mexico, and off Portugal. The latter recapture is the first tagged mako shark in the 20-year history of the program to demonstrate transatlantic movement. In the past, we have had makos tagged off the northeastern U.S. that were subsequently recaptured off Bermuda, off South America, and in the Gulf Stream about halfway to Europe. The transatlantic recapture may be an example of an individual straying from the main western Atlantic population, but it may also be first evidence that the species commonly makes transatlantic movements. This particular mako was tagged by an observer aboard a Japanese longline vessel and recaptured by a Spanish swordfish longliner.

Thirteen (65%) of the 1984 mako returns were tagged by Foreign Fisheries Observers or by biologists aboard research vessels. We recognize that the mako is a highly desirable food and trophy species. Those of you who tag some of your catches have our very special thanks.

**TIGER SHARKS** (14 returns) were recaptured after a maximum of 5.4 years at liberty and a maximum distance of 629 miles. A return from an individual tagged off Alabama that was recaptured off Cuba is the third recovery that shows movements of tiger sharks from the Gulf of Mexico into the Atlantic. An interesting series of recaptures came from 3 tiger sharks that were captured on Feb. 9 and 10 at the same location off North Carolina by the same fisherman. The sharks were at liberty for 2, 19, and 31 months, and included 2 males and a female that were approximately 7', 10', and 11.5' in total length at recapture. Tag returns from tiger sharks to date are difficult to interpret. Some tiger sharks seem to stay in one location, while others have travelled up to 1,850 miles. Some occur on the continental shelf (at times very close to shore), while others are found far at sea, around islands, and in a variety of oceanographic conditions. Tiger sharks that are found off the Middle Atlantic States in summer may commonly overwinter off the Carolinas depending on water temperatures and the abundance of food. The overall range of the tiger shark during the winter extends over nearly all tropical and subtropical waters and it will require additional recapture information to understand how different segments of the western Atlantic population are related.

**Recaptures from other species** included: DUSKY SHARKS were recaptured after 6.6 years at liberty and a distance of 1,544 miles. The shark that travelled 1,544 miles was tagged off Bermuda and recaptured off Guyana, South America, over 4 years later. This is the farthest distance travelled by a tagged dusky and is the first recapture showing movements from North to South America. Another dusky that travelled 1,317 miles is only the third tagged dusky to show movement from the U.S. to Mexico (Virginia to Yucatan). The first tag return from a WHITE SHARK was received in 1984. This shark, estimated at 4' in total length when released, was tagged by a Foreign Fisheries Observer aboard a foreign squid trawler fishing 7 miles off Long Island, N.Y. It was recaptured 2.5 years later 55 miles off Murrells Inlet, S.C. To our knowledge very few white sharks have been tagged anywhere in the world and this is the first one to be recaptured. (We are still maintaining our file on white sharks, so please let us hear from you with your landing and sighting information.) SHARPNOSE SHARKS were recaptured after 5 years at liberty and over a distance of 500 miles. Recaptures from LEMON and NURSE sharks were primarily from an ongoing experiment by Dr. S. Gruber dealing with young sharks on nursery grounds in the Bahamas. Recaptures from SWORDFISH included two individuals tagged on the Grand Banks that were recaptured off Georges Bank and in the Straits of Florida after 2.8 and 2.6 years, respectively. Another return came from a small swordfish released off Cape Hatteras, N.C. in October 1979 that was recaptured off Georges Bank in September 1984. The fish, estimated at 30 lbs. total weight at release, was 269 lbs. dressed weight at recapture. Assuming this swordfish had a dressed weight of 23 lbs. when released (i.e. 75% of the total wt) it gained 246 lbs. in dressed weight during the 4.9 years it was at liberty. We checked the New York market and found that the price paid to fishermen for "pup" swordfish in October 1979 was $1.75/lb. The price for large swordfish in September 1984 was $4.00/lb. At those prices this swordfish was worth about $40 in 1979 and $1076 in 1984. The increase in dollar value was $1036 (average $211/year) for a fish that grew an average of 50 lbs. per year in dressed weight.

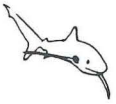


Table 2. Tag recoveries: January-December 1984

| SPECIES | GENERAL LOCATIONS TAGGED | RECAPTURED | MONTHS/ LIBERTY | DIST. & DIR. TRAVELLED N. MI. | | CAPTURE METHOD TAGGING | RECAPT. | TAGGED BY TAGGER | RESIDENCE |
|---|---|---|---|---|---|---|---|---|---|
| Blue shark | S Nantucket, MA | N Barbados | 41 | 1708 | S | LL | RR | Stephen Connett | RI |
| " " | S Martha's Vineyard, MA | SE Martha's Vineyard, MA | 18 | 122 | E | LL | LL | Stephen Connett | RI |
| " " | S Martha's Vineyard, MA | SE Martha's Vineyard, MA | 7 | 149 | E | LL | LL | Stephen Connett | RI |
| " " | SE Nantucket, MA | S Nantucket, MA | 5 | 310 | S | LL | LL | Walter Quinn NMFS Obs. | MA |
| " " | SE Moriches, NY | SE Oregon Inlet, NC | 5 | 282 | SW | RR | LL | Vin Pascale | NY |
| " " | S Nantucket, MA | S Nantucket, MA | 1 | 111 | S | RR | LL | Skip Maddigan | MA |
| " " | SE Shinnecock, NY | E Nantucket, MA | 8 | 477 | E | RR | LL | Ray Hendrickson | NY |
| " " | SE Moriches, NY | W Blanquilla, Venezuela | 7 | 1769 | S | FS | RR | Lou Pastore | NY |
| " " | S Fire Island, NY | E Oregon Inlet, NC | 9 | 257 | S | RR | LL | Phil Bruckner | NY |
| " " | E Montauk, NY | SE Montauk, NY | 21 | 162 | SE | LL | LL | Biologist (NMFS) | RI |
| " " | SE Fire Island, NY | SE Shinnecock, NY | 11 | 34 | NE | RR | RR | Pete Cerasole | NY |
| " " | SE Block Island, RI | SE Atlantic City, NJ | 10 | 193 | SW | FS | RR | Ernest Dunphy | RI |
| " " | S Montauk, NY | SE Block Island, RI | 11 | 40 | E | FS | RR | Steve Babbitz | CT |
| " " | S Block Island, RI | SW Block Island, RI | 24 | 13 | W | RR | RR | Warren Hayder | NY |
| " " | S Nantucket, MA | S Montauk, NY | 23 | 88 | W | HL | RR | Stephen Connett | RI |
| " " | S Block Island, RI | SE Montauk, NY | 11 | 21 | S | RR | RR | Charlie Donilon | RI |
| " " | SE Montauk, NY | SE Montauk, NY | 11 | 15 | NW | FS | RR | Frank Mundus | NY |
| " " | SE Moriches, NY | SE Block Island, RI | 12 | 65 | E | FS | RR | Floyd Carrington | NY |
| " " | E Cape Henry, VA | SE Manasquan, NJ | <1 | 147 | N | LL | RR | Biologist (NMFS) | RI |
| " " | SE Barnegat, NJ | SE Cape May, NJ | <1 | 54 | SW | RR | RR | R. A. Rapp | NJ |
| " " | SE Block Island, RI | S Montauk, NY | 11 | 62 | W | FS | RR | Ernest Dunphy | RI |
| " " | SE Block Island, RI | S Cape Sable, Nova Scotia | 11 | 243 | NE | LL | LL | Stephen Connett | RI |
| " " | E Montauk, NY | S Martha's Vineyard, MA | 12 | 12 | SE | RR | RR | Al Anderson | RI |
| " " | SE Nantucket, MA | SE Nova Scotia, Canada | 9 | 590 | NE | LL | LL | M. Williamowsky NMFS Obs. | MA |
| " " | SE Block Island, RI | SE Manasquan, NJ | <1 | 106 | SW | RR | RR | George Hehner | RI |
| " " | SE Montauk, NY | W Cadiz, Spain | 13 | 2992 | E | RR | LL | Joe McBride | NY |
| " " | SE Nantucket, MA | S Martha's Vineyard, MA | 24 | 98 | NW | LL | HL | C. Idelberger NMFS Obs. | MA |
| " " | SW Nantucket, MA | S St. Michaels, Barbados | 22 | 1774 | S | LL | HL | Stephen Connett | RI |
| " " | SE Montauk, NY | S Montauk, NY | 12 | 145 | S | RR | LL | Gary Keiffer | NY |
| " " | SE Shinnecock, NY | SE Nomans Land, MA | 13 | 70 | E | FS | RR | Robin Lehman | NY |
| " " | S Nomans Land, MA | SW Nomans Land, MA | 2 | 33 | N | LL | RR | Stephen Connett | RI |
| " " | SE Block Island, RI | SE Block Island, RI | 0 | 2 | N | LL | LL | Stephen Connett | RI |
| " " | SE Block Island, RI | N Azores | 9 | 1903 | E | FS | LL | John Mazza | RI |
| " " | S Nantucket, MA | S Nantucket, MA | <1 | 15 | NW | LL | LL | Dan Driscoll NMFS Obs. | MA |
| " " | SE Block Island, RI | SE Block Island, RI | 3 | 3 | S | RR | TN | Robert Rowan | RI |
| " " | SW Montauk, NY | W Pontevedra, Spain | 35 | 2461 | NE | RR | LL | Ray Hendrickson | NY |
| " " | SE Block Island, RI | E Nantucket, MA | 2 | 198 | E | LL | LL | Stephen Connett | RI |
| " " | SE Montauk, NY | SE Montauk, NY | 51 | 121 | E | RR | LL | Robert Hauser | CT |
| " " | S Moriches, NY | Blanquilla, Venezuela | 27 | 1703 | S | RR | LL | Fred Walker | NY |
| " " | SE Block Island, RI | SE Beach Haven, NJ | 11 | 179 | SW | RR | RR | Al Anderson | RI |
| " " | SE Nantucket, MA | SE Charleston, SC | <1 | 662 | SW | LL | LL | J. Cahill NMFS Obs. | MA |
| " " | SE Montauk, NY | E Chincoteague, VA | 16 | 216 | SW | RR | LL | Gloria Hayn | NY |
| " " | S Shinnecock, NY | SE Nantucket, MA | 16 | 177 | E | RR | LL | Fred Wedley | NY |
| " " | S Block Island, RI | SE Nantucket, MA | 15 | 278 | E | RR | LL | Jim McCusker | RI |
| " " | SE Block Island, RI | SE Block Island, RI | 5 | 86 | S | HL | LL | Stephen Connett | RI |
| " " | S Block Island, RI | E Cape Henry, VA | 18 | 239 | SW | RR | LL | R. J. Cadorette | NY |
| " " | SE Cape Henry, VA | NW Azores | 20 | 1979 | NE | LL | LL | Rene Eppi NMFS Obs. | MA |
| Mako shark | NE Oregon Inlet, NC | E Cape Canaveral, FL | 30 | 456 | S | LL | LL | John Bazuin NMFS Obs. | MA |
| " " | NE Oregon Inlet, NC | SE Cape May, NJ | 12 | 128 | N | LL | RR | Stephen Connett | RI |
| " " | E Oregon Inlet, NC | S Panama City, FL | 33 | 1185 | SW | LL | LL | Alan Criss NMFS Obs. | MA |
| " " | SE Cape Hatteras, NC | SE Manasquan, NJ | 15 | 285 | N | LL | RR | Biologist (NMFS) | RI |
| " " | SE Manasquan, NJ | SE Ocean City, MD | 11 | 107 | SW | RR | RR | Steve Pepe | NJ |
| " " | E Cape Hatteras, NC | SE Fire Island, NY | 33 | 309 | N | LL | RR | Steve Bouck NMFS Obs. | MA |
| " " | SE Nantucket, MA | SE Fire Island, NY | 11 | 294 | W | LL | RR | Rene Eppi NMFS Obs. | MA |
| " " | SW Block Island, RI | SE Montauk, NY | 22 | 56 | W | LL | RR | Stephen Connett | RI |
| " " | SE Barnegat Inlet, NJ | SE Jones Inlet, NY | 1 | 31 | N | RR | RR | Mal Brown | NJ |
| " " | E Cape Hatteras, NC | E Cape May, NJ | 16 | 222 | N | LL | RR | Biologist (NMFS) | RI |
| " " | E Cape Charles, VA | SE Montauk, NY | 1 | 214 | NE | LL | LL | Biologist (NMFS) | RI |
| " " | S Ocean City, NJ | SE Cape May, NJ | 10 | 115 | NE | RR | RR | David Moss | NJ |
| " " | SE Chincoteague, VA | SW Fire Island, NY | 3 | 165 | N | LL | RR | Biologist (NMFS) | RI |
| " " | SE Ocean City, NJ | E Nantucket, MA | 10 | 424 | E | RR | LL | David Moss | NJ |
| " " | SE Belmar, NJ | E Cape Henry, VA | <1 | 176 | S | RR | LL | Dick O'Connell | NJ |
| " " | SE Manasquan, NJ | S Shinnecock, NY | 2 | 51 | NE | RR | RR | J. R. Jeck | NJ |
| " " | S Nantucket, MA | E Barnegat, NJ | 2 | 148 | W | LL | LL | Tom Baum NMFS Obs. | MA |
| " " | SE Montauk, NY | E Barnegat, NJ | 1 | 78 | SW | RR | LL | Steve Szoke | NY |
| " " | SE Nantucket, MA | W Lisbon, Portugal | 9 | 2452 | E | LL | LL | M. Williamowsky NMFS Obs. | MA |
| " " | E Machipango, VA | N Havana, Cuba | 6 | 925 | SW | LL | LL | Biologist (NMFS) | RI |
| Sandbar shark | E Barnegat Inlet, NJ | S Key West, FL | 66 | 1035 | SW | RR | LL | Ted Urban | NY |
| " " | E Ocean City, NJ | SE Ft Pierce, FL | 79 | 769 | SW | RR | LL | David Moss | NJ |
| " " | SE Brielle, NJ | S Beaufort, NC | 65 | 356 | SW | RR | LL | Barry Boyce | NJ |
| " " | Chincoteague Bay, VA | Wachapreague Inlet, VA | 11 | 25 | SW | RR | RR | Biologist (NMFS) | RI |
| " " | Chincoteague Bay, VA | Bogue Inlet, NC | 9 | 212 | S | RR | GN | Biologist (NMFS) | RI |
| " " | SE Manasquan, NJ | Hog Island, VA | 11 | 181 | SW | RR | RR | Bruce Miller | NJ |
| " " | S Fire Island, NY | Cape Lookout, NC | 35 | 357 | SW | RR | LL | Richard Addeo | NY |
| " " | N Corolla, NC | Chesapeake Bay, VA | 8 | 55 | NW | PS | RR | E. F. Lawler | NC |
| " " | S Jones Beach, NY | W Clearwater, FL | 34 | 906 | SW | RR | LL | Daniel O'Neill, Sr. | NY |
| " " | Quinby Inlet, VA | Quinby Inlet, VA | <1 | 0 | -- | LL | GN | J. Colvocoresses | VA |
| " " | Sand Shoal Inlet, VA | Hog Island Bay, VA | 11 | 8 | E | LL | GN | J. Colvocoresses | VA |
| " " | SE Manasquan, NJ | E Ft. Pierce, FL | 97 | 821 | SW | RR | LL | Richard Rand | NJ |
| " " | SE Fire Island, NY | SE Tampico, Mexico | 129 | 1975 | SW | RR | HL | George Mussler | NY |
| " " | SE Beach Haven, NJ | E Isle of Palms, SC | 40 | 488 | SW | RR | TN | Bill Figley | NJ |
| " " | SE Manasquan, NJ | S Montauk, NY | 26 | 88 | NE | RR | GN | John Meyer | NJ |
| " " | E Block Island, RI | S Montauk, NY | 2 | 85 | W | RR | GN | Ted Karbowski | CT |
| " " | Ormond Beach, FL | NE Ponce, FL | 5 | 13 | SE | RR | LL | Arnold Sharkey | FL |
| " " | S Moriches, NY | E Oregon Inlet, NC | 5 | 303 | SW | RR | TN | Gary Bruckner | NY |
| " " | S Block Island, RI | S Beaufort, NC | 15 | 363 | S | RR | LL | Ed Nielson | RI |

Table 2. Continued.

| SPECIES | GENERAL LOCATIONS TAGGED | RECAPTURED | MONTHS/ LIBERTY | DIST. & DIR. TRAVELLED | | CAPTURE METHOD TAGGING | RECAPT. | TAGGED BY TAGGER | RESIDENCE |
|---|---|---|---|---|---|---|---|---|---|
| Lemon shark[1] | Bimini, Bahamas | Bimini, Bahamas | 7 | 0 | -- | BR | RR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 11 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 1 | 0 | -- | BR | RR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 23 | 0 | -- | RR | LL | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 3 | 1 | S | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 2 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | <1 | 5 | S | LL | RR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 6 | 5 | SE | BR | RR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 4 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 6 | 0 | -- | RR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 6 | 0 | -- | RR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | <1 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 8 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 8 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 20 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 4 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 4 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 8 | 2 | S | BR | LL | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 11 | 1 | S | BR | RR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 11 | 0 | -- | BR | LL | Dr. S. Gruber | FL |
| " " | Long Key, FL | Long Key, FL | 2 | 0 | -- | RR | RR | Vince Orzel | PA |
| " " | Islamorada, FL | W Islamorada, FL | 5 | 13 | W | RR | GN | Ted Avellone | FL |
| " " | Islamorada, FL | N Lignumvitae Key, FL | 1 | 13 | NW | RR | RR | Ted Avellone | FL |
| " " | Eagle Pass, FL | Eagle Pass, FL | 6 | 0 | -- | RR | GN | Dr. S. Gruber | FL |
| Nurse shark | Bimini, Bahamas | Bimini, Bahamas | 8 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 8 | 0 | -- | BR | LL | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | <1 | 0 | -- | LL | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | <1 | 0 | -- | RR | RR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 4 | 2 | E | LL | LL | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 4 | 2 | E | BR | LL | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 10 | 0 | -- | BR | BR | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 2 | 5 | S | LL | LL | Dr. S. Gruber | FL |
| " " | Bimini, Bahamas | Bimini, Bahamas | 7 | 4 | N | LL | LL | Dr. S. Gruber | FL |
| " " | Key Colony Beach, FL | Marathon, FL | 9 | 1 | W | RR | RR | William Botten | FL |
| " " | Redington Shores, FL | Redington Shores, FL | 26 | 0 | -- | RR | RR | Wayne Hanners | FL |
| " " | S Ponce, Puerto Rico | W Cabo Rojo, Puerto Rico | 1 | 30 | W | RR | RR | Jose Collazo | PR |
| Tiger shark | E Barnegat Inlet, NJ | E Charleston, SC | 5 | 494 | SW | RR | LL | David Moss | NJ |
| " " | SE Manasquan, NJ | S Morehead City, NC | 4 | 388 | SW | RR | LL | Ronald Aareskjold | NJ |
| " " | SE Barnegat Inlet, NJ | S Beaufort, NC | 19 | 362 | SW | RR | LL | Pete Barrett | NJ |
| " " | NE Barnegat Inlet, NJ | S Beaufort, NC | 31 | 389 | SW | RR | LL | Steven Rubin | NY |
| " " | SE Rudee Inlet, VA | S Beaufort, NC | 2 | 161 | SW | TN | LL | Jay Taylor NMFS Obs. | MA |
| " " | S Ponce, Puerto Rico | S Salinas, Puerto Rico | 5 | 17 | NE | LL | RR | Celso Cruz | PR |
| " " | E Ocean City, MD | E Cape Charles, VA | 7 | 82 | SW | TN | LL | Daniel Driscoll NMFS Obs. | MA |
| " " | E Ocean City, MD | NE Cape Hatteras, NC | 7 | 176 | S | TN | LL | Alan Usinger NMFS Obs. | MA |
| " " | SE Eleuthera, Bahamas | Conception Island, Bahamas | 2 | 76 | SE | LL | HL | Stephen Connett | RI |
| " " | SW Dauphin Island, AL | N Matanzas, Cuba | 65 | 629 | SE | LL | LL | Steve Branstetter | AL |
| " " | W Dry Tortugas, FL | SW New Pass, FL | 37 | 152 | NE | LL | RR | Alan Criss NMFS Obs. | MA |
| " " | E Rudee Inlet, VA | SW Montauk, NY | 56 | 293 | NE | TN | RR | George Bell NMFS Obs. | MA |
| " " | Bimini, Bahamas | Bimini, Bahamas | 11 | 1 | E | LL | LL | Dr. S. Gruber | FL |
| " " | E Chincoteague, VA | S Montauk, NY | 3 | 203 | NE | LL | GN | Biologist (NMFS) | RI |
| Dusky shark | E. Cape Henry, VA | NE Dzilam Bravo, Mexico | 33 | 1317 | SW | LL | GN | Biologist (NMFS) | RI |
| " " | E Bermuda | SW Bermuda | 17 | 30 | SW | LL | LL | Stephen Connett | RI |
| " " | NE Manasquan, NJ | E Pt Pleasant, NJ | 1 | 28 | SW | RR | TN | Jeffrey Baker | NJ |
| " " | E Bermuda | E Bermuda | 11 | 3 | SE | LL | HL | Stephen Connett | RI |
| " " | W Bermuda | W Bermuda | 11 | 3 | W | LL | RR | Stephen Connett | RI |
| " " | W Key West, FL | E Oregon Inlet, NC | 44 | 967 | NE | LL | LL | Bill Young NMFS Obs. | MA |
| " " | NE Ft Lauderdale, FL | E Pompano Beach, FL | 4 | 28 | E | RR | LL | Kevin McDaniel | FL |
| " " | SE Manasquan, NJ | E Cape Hatteras, NC | 9 | 307 | S | RR | GN | Tom Murphy | NJ |
| " " | Atlantic City, NJ | W St Petersburg, FL | 80 | 1235 | SE | RR | LL | David Moss | NJ |
| " " | SE Ocean City, MD | E Cape Romain, SC | 9 | 379 | SW | RR | LL | Glenn Biggerstaff | MD |
| " " | E Bermuda | N Georgetown, Guyana | 52 | 1544 | S | LL | LL | Stephen Connett | RI |
| Blacktip shark | N Port Mansfield, TX | S Corpus Christi, TX | <1 | 8 | E | RR | RR | Frank Eicholz | TX |
| " " | N Port Mansfield, TX | E Padre Island, TX | 1 | 50 | S | RR | RR | Frank Eicholz | TX |
| " " | N Port Mansfield, TX | SE Padre Island, TX | <1 | 105 | S | RR | RR | Frank Eicholz | TX |
| " " | S Port Aransas, TX | Soto La Marina, Mexico | 3 | 226 | S | RR | RR | Ted Hastings | TX |
| Silky shark | E Eleuthrea, Bahamas | NE Ft Pierce, FL | 3 | 247 | NW | LL | GN | Stephen Connett | RI |
| " " | SW Dry Tortugas, FL | NW Cojimar, Cuba | 37 | 56 | SE | LL | LL | Ken Hase NMFS Obs. | MA |
| Atlantic sharpnose | S Walker's Cay, Bahamas | N Walker's Cay, Bahamas | 34 | 66 | N | RR | RR | Bob Pelosi | FL |
| " " | S Charleston Hbr, SC | SE Brown's Inlet, NC | 59 | 519 | S | RR | TN | Rick Stringer | SC |
| Scalloped hammerhead | Miami Beach, FL | E Hillsboro, FL | 4 | 25 | N | RR | LL | Mark Quartiano | FL |
| Bonnethead shark | St Simons, GA | E St Simons, GA | <1 | 2 | E | RR | TN | Larry Kennedy | GA |
| Porbeagle | S. Nantucket, MA | SE Halifax, Nova Scotia | 31 | 402 | NE | TN | GN | Robert Matus NMFS Obs. | MA |
| White shark | SE Moriches, NY | SE Murrells Inlet, SC | 30 | 546 | SW | TN | HL[2] | Raymond Sutherland NMFS Obs. | MA |
| Thresher shark | NR | E Cape Canaveral, FL | NR | NR | NR | NR | LL | Tag lost in mail | NR |
| Unknown species | NR | Ponte Vedra Beach, FL | NR | NR | NR | RR | DOB | Steve McEvoy | FL |
| Swordfish | NE Cape Hatteras, NC | E Nantucket, MA | 59 | 533 | NE | LL | GN | Phil Ruhle, Jr. | RI |
| " | Tail of Grand Banks | E Ft Pierce, FL | 32 | 1735 | SW | LL | LL | Phil Ruhle, Sr. | RI |
| " | Tail of Grand Banks | SE Nantucket, MA | 34 | 940 | W | LL | LL | Phil Ruhle, Sr. | RI |
| " | SE Nantucket, MA | E Atlantic City, NJ | 17 | 344 | W | LL | LL | Charlie Johnson | ME |
| Yellowfin Tuna | E Beaufort, NC | E Oregon Inlet, NC | <1 | 76 | NE | LL | HL | Biologist (NMFS) | RI |
| Bluefin Tuna | E Block Island, RI | SE Nantucket, MA | 29 | 143 | E | RR | LL | Bob Main | RI |

NOTE: BR=Block Rig; DOB=Dead on Beach; FS=Free Swimming; GN=Gill Net; HL=Hand Line; LL=Longline; NR=Not Reported; Obs.=Foreign Fisheries Observer; PS=Purse Seine; RR=Rod & Reel; and TN=Trawl Net.

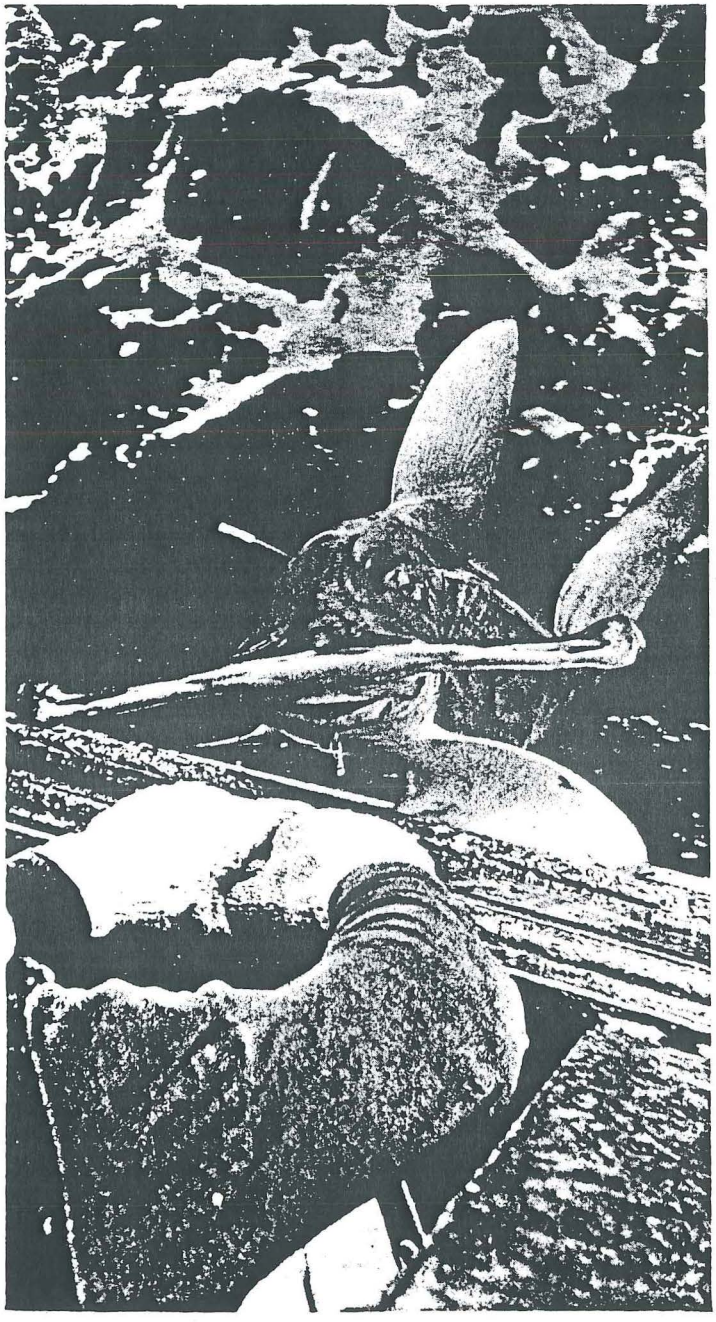
[1]Returns from a concentrated study of the lemon shark by Dr. S. Gruber, Univ. of Miami.

[2]First white shark recaptured.

## FIELD STUDIES, 1984

Field studies conducted in 1984 by staff biologists included a spring longline cruise on the Polish vessel R/V *Wieczno* and examination of sharks at fishing tournaments held at fishing ports from Massachusetts to New Jersey.

A cruise on the *Wieczno* to the northwestern part of the Sargasso Sea (370 miles east of Cape Hatteras) and the continental shelf between Cape Lookout, N.C., and the Virginia Capes resulted in the capture of 623 fish. The most common species in the catch were blue, scalloped hammerhead, night, sandbar, and tiger sharks along with yellowfin tuna. Three hundred and twenty-five sharks and tuna were tagged and the remainder were brought on board. Examinations of the catch were made for studies of age, growth, reproduction, food habits, shark parasites, and pathogenic organisms in tuna blood.



The best catches were made on night sets of the longline gear, particularly along strong thermal fronts. The species composition and catch rates differed with changes in surface temperature, depth of thermocline, and water depth. Blue sharks were taken in the Sargasso Sea and Gulf Stream, tunas along the edges of the continental shelf, and the remaining species of sharks on the continental shelf where water temperatures exceeded 65 °F. An attempt to examine a newly formed cold core ring in the Sargasso Sea area was hampered by poor weather, thereby limiting the catches to a few blue sharks and lancetfish. Fishing improved as we worked west toward the Gulf Stream and shelf area off the Carolinas.

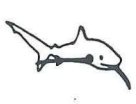
Biological samples for reproductive studies were collected from 60 sharks. Most of these were from juveniles, however, a mature male tiger shark and a large female blue shark (10.5 feet) were examined. The reproductive organs in the female indicated she had pupped the previous season and was ready to ovulate at time of capture, suggesting that blue sharks probably bear young every other year.

Food studies revealed that approximately half of the 116 shark stomachs examined were empty. Those with food had usually fed on squid and a variety of fish species. Over 50% of the blue sharks contained food and had the greatest variety of items (13), including squid, fish, salps, and starfish. Stomachs from scalloped hammerheads proved particularly valuable because 15 out of 30 (50%) contained food. In hammerheads, usually only 10 to 15% have food. Prey items common to the scalloped hammerhead, blue, and tiger sharks included bluefish, goosefish, and other sharks. Mammal remains (probably porpoise) were found in a few blue and tiger sharks along with remains of a turtle in one tiger. Tunas had fed chiefly on flying fish, squid, small fish, and shrimplike invertebrates (euphausids).

External and internal parasites were collected from sharks and teleosts by George Benz, a biologist with the Connecticut Dept. of Environmental Protection. Blue sharks proved to be the host for five different species of copepod, a small external parasite resembling a horseshoe crab.

A video recorder was used for the first time during this cruise to document the various activities on deck during and after haulback of the longline gear. Much of the footage of sharks taken aboard will be used in the development of a documentary film on shark identification that will eventually be available to taggers for educational purposes.

Catch statistics were collected at 23 shark fishing tournaments. Ten were attended by staff biologists, another 10 were monitored under a cooperative arrangement with new York and New Jersey biologists, and records were obtained for three tournaments held along the Gulf Coast of Florida. From a total of 410 sharks comprising 12 species landed at tournaments, we examined over half of the catch to obtain biological samples. The tournament catches were dominated by mako, blue, and sandbar sharks. Other species included tiger, hammerhead, dusky, thresher, white, blacknose, lemon, bull, and blacktip sharks. The last four species occur most frequently in the Gulf of Mexico and along the southeast coast of the U.S.



# TRANSATLANTIC MIGRATIONS OF THE BLUE SHARK; A CASE HISTORY OF COOPERATIVE SHARK TAGGING

*This article is an excerpt from a paper given by Jack Casey at the International Gamefish Association's First World Angling Conference in Cap D'Adge, France. The complete version will be published in the conference proceedings.*

The NMFS Cooperative Shark Tagging Program began in 1963 at the Sandy Hook Marine Laboratory (N.J.) and moved to Narragansett, R.I., in 1966 shortly before the formation of the National Marine Fisheries Service.

From 1963 through 1983 a total of 53,252 fish of all species were tagged and released under this continuing program. Participants are asked to concentrate on sharks and to tag swordfish, billfishes, and tunas on an opportunistic basis when other tags are not available. Sharks as a group (39 species) represent over 97% of all releases with blue, sandbar, dusky, hammerhead, and mako sharks the most common. Swordfish, billfishes, and tunas represent 2% of the releases. The table on page 8 summarizes some of the overall results of the program.

Much of the tagging effort has been concentrated off northeastern United States between Cape Hatteras, N.C., and Cape Cod, Mass., where the most extensive recreational shark fisheries are centered. The area from Cape Hatteras to the Grand Banks is also the region where U.S., Canadian and foreign longline fisheries for swordfish first began in the western North Atlantic 25 years ago. Since then, particularly in the past 10 years, both the recreational shark fishery and swordfish-tuna longline fisheries have expanded over a much broader geographical range along the North American coast. Consequently, the overall tagging area in the western Atlantic extends from the offings of Newfoundland to Florida and into the Gulf of Mexico.

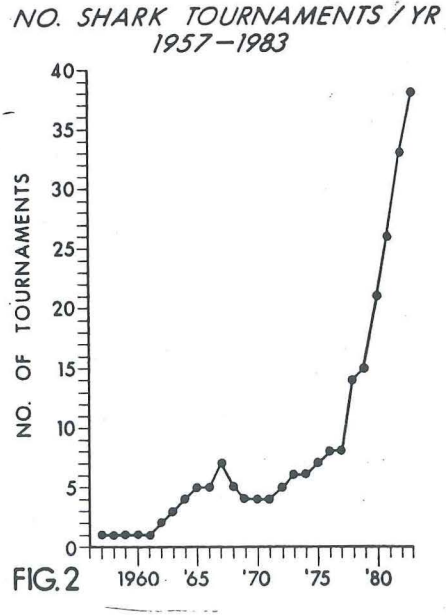


FIG. 2

In the eastern Atlantic the principal tagging effort has been by anglers in the Canary Islands and Spain, and by Polish scientists aboard the R/V *Wieczno* during exploratory longline fishing off the European and African coasts. Overall, anglers have accounted for about 50% of the number of releases (Fig. 1) and the growth of the recreational shark fishery continues to attract angler participation. Although statistics on anglers' catches of sharks are not collected on an annual basis, the increase in the number of U.S. shark tournaments (Fig. 2) is an indicator of the growth of this fishery.

In 1982 and 1983, Foreign Fisheries Observers accounted for a total of 1,887 tagged fish representing an average of 18% of the releases. Most of the observer tagging has been directed at blue and mako sharks from Japanese longline vessels fishing within the U.S. Fishery Conservation Zone.

The major sources of tag returns were from sportfishermen, U.S. and foreign commercial fishermen, NMFS and other biologists, and Foreign Fisheries Observers (Fig. 3). Foreign fishermen representing 33 different countries and island territories have returned tags with Japanese longliners accounting for the highest number (70), followed by Spain (49), Canada (47), Mexico (32), and Korea (24).

## Blue Shark Recaptures

Over 28,000 blue sharks were released between 1963 and 1983 (Fig. 4). The longest time at liberty was six years and the longest distance travelled was 3,630 miles. The maximum rate of movement for blue sharks that travelled in excess of 1,000 miles was 26.78 miles per day (mpd) by an individual tagged off New York and recaptured off Venezuela, South America (1,714 miles in 64 days).

*(Continued on Page 8)*

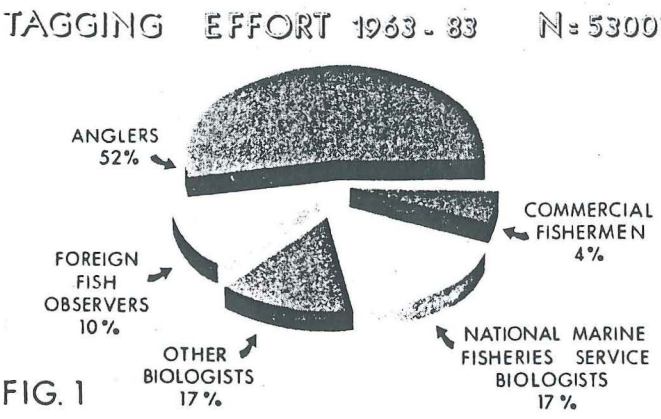


FIG. 1

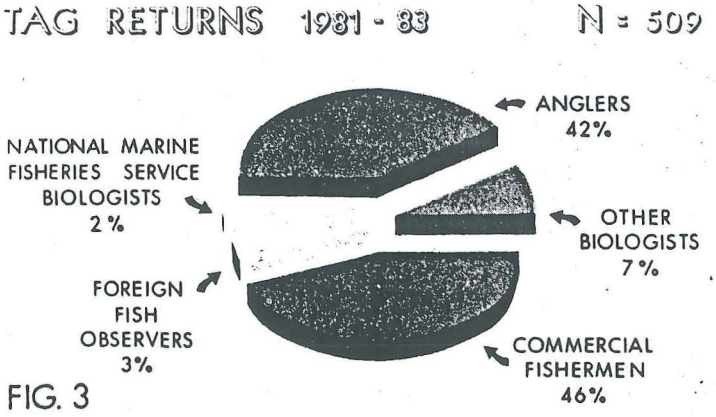


FIG. 3

### Blue Shark Movements in the Western Atlantic

In April or May, blue sharks begin moving from the Gulf Stream toward the North American coast. The population is comprised primarily of juveniles of both sexes and adult males. Large females are rare in this area. Throughout the summer blue sharks are common on the continental shelf in depths as shallow as 100 feet off New York and southern New England, but they are less abundant on the continental shelf between Virginia and New Jersey.

In late summer and autumn, blue sharks begin moving south and offshore from the North American coast. The migration routes are not clearly defined since some parts of the population move directly offshore while others follow a southerly route along the outer edge of the shelf to the vicinity of Cape Hatteras then to the margin of the Gulf Stream. While some blue sharks can be found in the Gulf Stream off Cape Hatteras at all times of the year, tag returns show others travel to the offings of Bermuda and as far south as the Caribbean Sea and South America (Fig. 5). Blue sharks were thought to be extremely rare in the Caribbean Sea and in the Straits of Florida, but recent deep water longline fishing has shown they regularly occur in those areas. Blue sharks have been reported over a range of temperatures from 46 ° to 81 °F, but they are most common when temperatures range between 55 ° and 64 °F.

### Blue Shark Movements in the Eastern Atlantic

In the eastern Atlantic, blue sharks also show north-south movements that are related to size and sex. Tag returns from releases in the Canary and Cape Verde Islands show some blues travelled northward along the African and European coasts over distances of at least 1,600 miles. The smallest blue sharks are more common in the western Mediterranean and along the southern coast of the Iberian Peninsula than anywhere in the Atlantic. It appears from our data that this area serves as an important nursery ground where young are born and remain for the first few years of life. Thirty-two recaptures from 239 small blue sharks tagged in the Mediterranean were all recovered in the Mediterranean. In Portugal's Bay of Sezimbra small blue sharks (1.5-3.0 feet) are so common in the fall that they are a traditional food at Christmas time.

There are two main movements of blue sharks off southwest England composed of an initial arrival of females in the beginning of the season followed by a movement of smaller fish, including more males near the end of July and early August. Nearly all of the blue sharks off southwest England are juveniles averaging about 5 feet (152 cm) in total length. Blue sharks move south from England during September with some remaining off northern Spain at least until November after which they move further south possibly to the Canary Islands.

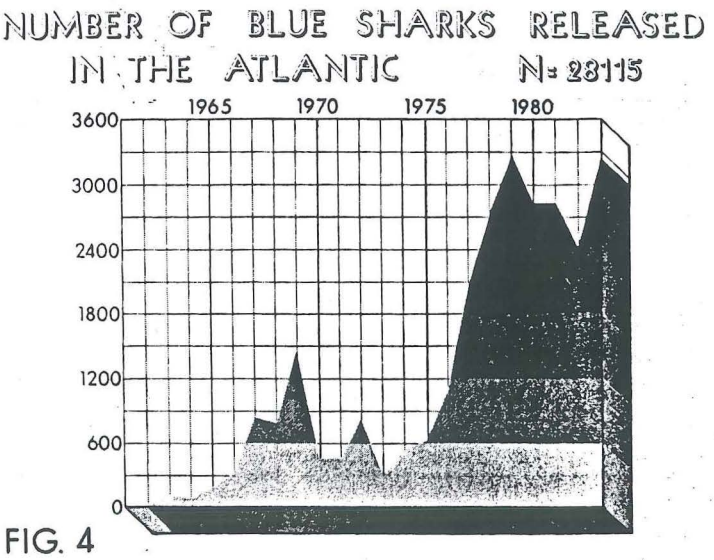
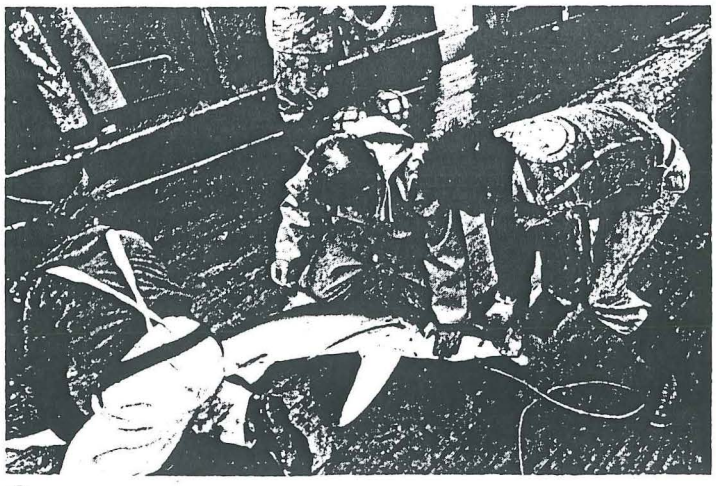


FIG. 4

### Transatlantic Movements of Blue Sharks

Twenty-one recaptures from blue sharks released in the western Atlantic showed transatlantic movements to the eastern Atlantic. The times at liberty ranged from 216 to 1,394 days and the straight line distances between tag and recapture locations were from 2,332 to 3,630 miles. East to west transatlantic movements have also been demonstrated by tagged blue sharks. Of 1,294 blue sharks released in the eastern Atlantic under the NMFS tagging program, two were recaptured in the western Atlantic.

The transatlantic recaptures suggest the blue shark may utilize or be carried by the major current systems over the entire Atlantic basin (see map, Fig. 5). For example, the round trip from New York to Europe and Africa, then back through the Caribbean, the Yucatan Straits, the Straits of Florida to New York is about 9,500



## TAGGING SUMMARY

*SPORTSMENS COOPERATIVE SHARK TAGGING PROGRAM*
*1963 - 1983*

| | |
|---|---|
| NO. FISH TAGGED | 53,000+ |
| NO. FISH RECAPTURED | 1,700+ |
| NO. SPECIES TAGGED | 47 |
| NO. SPECIES RECAPTURED | 32 |
| LONGEST DISTANCE TRAVELED | 3,630 MI. |
| LONGEST TIME AT LIBERTY | 17.5 YRS. |
| MAX. NO. MI. TRAVELED | 25/DAY |
| NO. ANGLERS PARTICIPATING | 2,500+ |

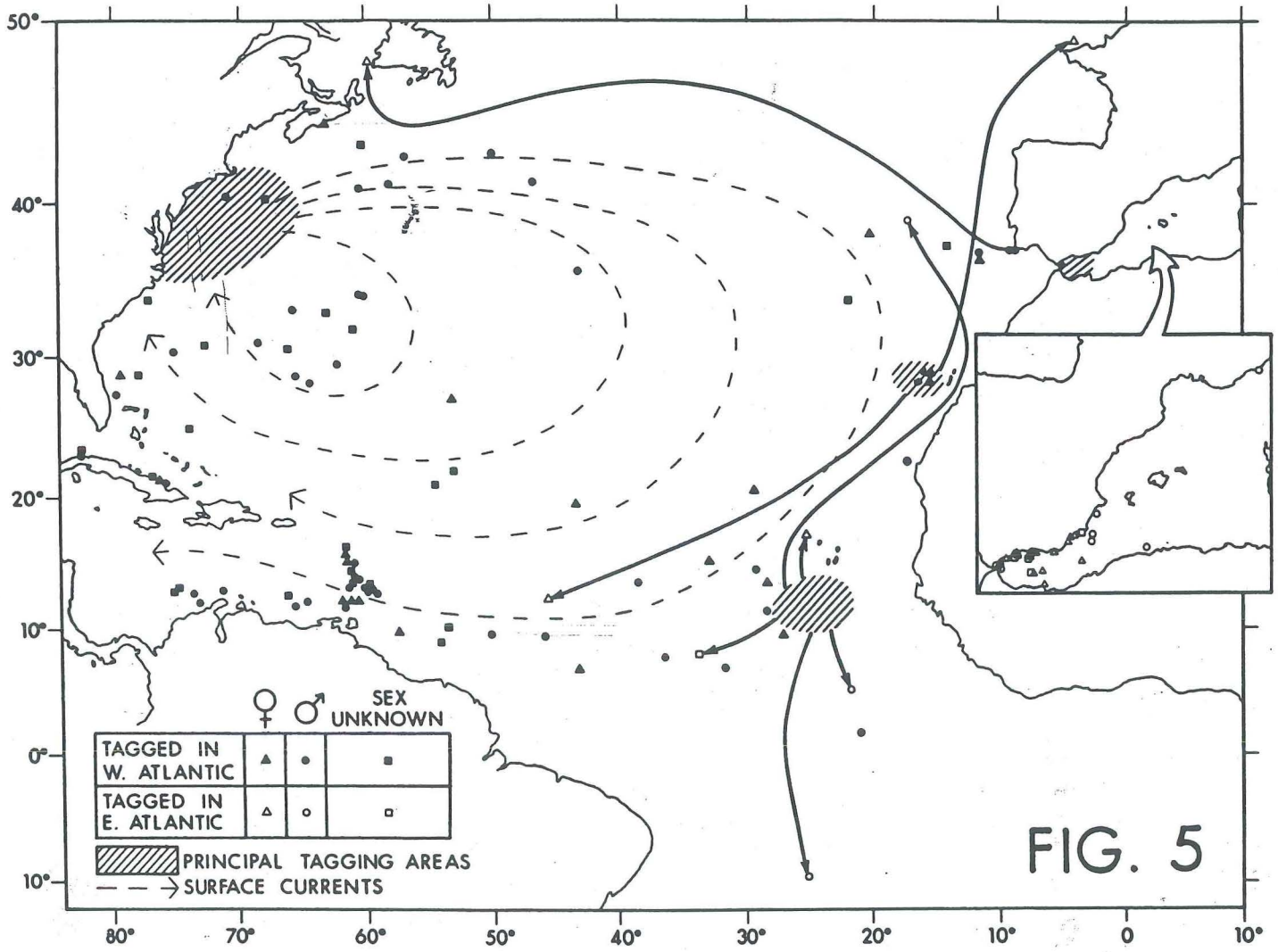



FIG. 5

miles. The average surface current speed over this course is 0.65 knots. A fish passively drifting at the surface over this course would cover 15.6 mpd and make the trip in 609 days (20 months). This time estimate does not account for any swimming on the part of the shark. Our tag returns and sonic tracking experiments by Frank Carey have demonstrated average swimming speeds for blue sharks to be about one knot/hr. or about 20 mpd. At an average rate of 20 mpd a blue shark could make the 9,500 mile trip described above in about 15 months.

Information on the size distribution and long range movements of the blue shark suggests a complex life cycle in which young are born primarily in the Eastern Atlantic and important mating grounds are located in the Western Atlantic.

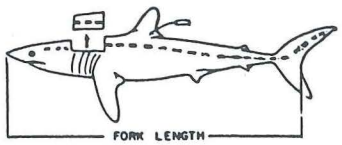
## Conclusions

Tagging studies have shown that the western and eastern populations of blue sharks intermix and probably represent a single stock. The blue shark is wide ranging, easily caught on pelagic longlines, highly important to U.S. recreational fisheries, and potentially valuable to a large number of countries. It is also important to scientific studies of large fishes that range over entire ocean basins. Therefore, any management initiatives directed toward the blue shark should be considered on an international basis.

### 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).

## FOOD AND FEEDING HABITS OF THE TIGER SHARK

More has been written over the years about the food habits of the tiger shark than most other shark species, perhaps because their stomachs reportedly contain an assortment of bizzare items. A partial list from popular and scientific accounts included: a rubber tire, roll of tar paper, roll of chicken wire, bag of potatoes, sack of coal, rags, bottles, shoes, dogs, a variety of land and sea birds and parts of sheep, cattle, and horses. The latter three items occurred in areas where the offal from slaughterhouses is dumped into coastal rivers or at sea. The head and forequarters of a crocodile was found in a 14 foot tiger shark captured off Durban, South Africa. Parts of dolphins, porpoises, and whales have been found by several investigators. The list goes on and is proof that the tiger shark is sometimes a scavenger. Despite this reputation, our studies show that their usual prey is more mundane, being comprised of various fishes, cephalopods (squid and octopus), crustaceans (crabs, lobsters, and shrimp), and sea turtles. The frequency with which certain items occur depends on how abundant it is and how much effort must be exerted to capture it. The tiger shark is most often associated with the shallower depths (from shore to 50 fathoms) around land masses and is usually considered a sluggish shark. Hence, its diet consists primarily of species found on the bottom, around reefs and outcroppings, or in the water column a few meters off the bottom.

Our studies of tiger shark stomachs collected between Cape Hatteras and Georges Bank showed that goosefish, searobins, sea ravens, lizard fish, and flounders occurred with the greatest regularity. Goosefish was the most predominant species and occurred most often in stomachs examined at tournaments held along the New York and New Jersey coasts. The occurrence of these bottom dwelling species shows that the tiger shark regularly feeds on the bottom in this area. We also found remains of bluefish, mackerel, and butterfish, but with less frequency. However, it does show that the tiger shark will feed on schooling prey, when conditions are right. Sharks, skates and rays occurred in 23% of the stomachs we examined over the geographical range of our study, indicating that elasmobranchs are common prey.

Muscle and blubber from marine mammals was found in 24% of the stomachs we examined. Because there is no evidence in the literature that tiger sharks successfully prey on healthy dolphins, porpoises, and whales, it is likely that these food items came from dead or moribund animals. Several species of sharks have been found with mammal remains in their stomachs, but the tiger shark with its cavernous mouth and large stomach capacity makes it particularly well adapted for devouring large prey. In addition, the large, bladelike teeth enable it to easily bite through bone and the shells of large sea turtles. Although our data suggests that predation on sea turtles is relatively low north of Cape Hatteras, other biologists have shown that in areas of higher turtle abundance (tropics and subtropics) turtle remains occur in tiger shark stomachs with much greater frequency (10-36%). The impact of shark predation on turtle populations is presently unknown but it could be a significant source of mortality in some of these areas. The primary evidence of attacks on turtles is from the remains of shells and flippers found in shark stomachs. Some maimed turtles heal and survive, but an unknown percentage must surely die. Trash items we found in stomachs included small stones, sand, plastic bags, land and sea birds, and assorted garbage such as pork chops, hot dogs, hamburgers, and beef bones. The small stones and sand were most likely ingested along with bottom-dwelling prey. Of the 57 stomachs examined, 46 (81%) contained some kind of food item.

Although the tiger shark is credited with consuming unusual items and large amounts of food, the average weight of the stomach contents from our data was 4.5 lbs. This amounts to 1.8% of the average body weight of 256 lbs. (weight range 18 to 732 lbs.).