

RESULTS OF UNITED STATES TAGGING OF ATLANTIC BILLFISHES,
OCTOBER 1, 1976 THROUGH SEPTEMBER 30, 1977

by

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SUMMARY

Participants in the Cooperative Game Fish Tagging Program reported tagging and releasing approximately 1,500 billfishes from October 1, 1976 through September 30, 1977 and recapturing 31 tagged billfishes. Release-recapture data from most sailfish and white marlin recoveries supported previously hypothesized seasonal migratory patterns for these species. Two sailfish recoveries, however, provided evidence that some sailfish move from the northwestern Caribbean in the spring to the Gulf of Mexico. For the first time in the history of the program a blue marlin recovery revealed a trans-Atlantic migration. This recovery indicated the possible complexity of the blue marlin migratory pattern and stock structure.

RESUME

Les participants du "Cooperative Game Fish Tagging Program" ont signalé qu'ils avaient marqué environ 1.500 marlins, et récupéré 31, entre le 1^{er} octobre 1976 et le 30 septembre 1977. Les données de marquage-recapture obtenues par la plupart des récupérations de voiliers et de makaires blancs appuient les hypothèses avancées antérieurement quant à des schémas migratoires saisonniers de l'espèce. La récupération de deux marques posées sur des voiliers a cependant fourni une preuve du déplacement de quelques voiliers au printemps, du nord-ouest de la Mer des Caraïbes au Golfe du Mexique. Pour la première fois depuis la création du programme, une récupération de makaire bleu a révélé l'existence d'une migration transatlantique. Cette récupération indiquerait que le schéma migratoire et la structure du stock du makaire bleu sont peut-être complexes.

RESUMEN

Los participantes en el "Cooperative Game Fish Tagging Program" informaron sobre el marcado y liberación de un número aproximado de 1.500 marlines, desde el 1 de octubre 1976 hasta el 30 de septiembre 1977, así como sobre la recaptura de 31 marlines marcados. Los datos de liberación y recaptura de la mayor parte de las recuperaciones de pez vela y aguja blanca apoyan las hipótesis previas sobre las pautas migratorias estacionales de estas especies. Sin embargo, 2 recuperaciones de pez vela aportaron evidencia de que algunos peces de esta especie emigran en primavera del noroeste del Caribe al Golfo de México. Por primera vez en el transcurso del programa, una recuperación de aguja azul señaló una migración trasatlántica. Este hecho indica la posible complejidad de la pauta migratoria y de la estructura del stock de la aguja azul.

INTRODUCTION

In this report we summarize billfish tag data obtained by the National Marine Fisheries Service - Woods Hole Oceanographic Institution Cooperative Game Fish Tagging Program (CGFTP) from October 1, 1976 through September 30, 1977. These data are from releases and recaptures of tagged sailfish, *Istiophorus platypterus*; white marlin, *Istiparus albidus*; blue marlin, *Makaira nigricans*; and swordfish, *Xiphias gladius*, in the North Atlantic. Tagging materials and procedures, along with recovery methods, were first described by Mather (1963) and updated by FAO (1972), Mather, Tabb, Mason, and Clark (1974), and Buchanan, Mather, and Mason (1977). Previous release and recovery data were presented by Mason and Buchanan (1977).

RELEASES

Sport fishermen voluntarily tagged and released 1,459 billfishes during the reporting period: 1,048 sailfish, 273 white marlin, 122 blue marlin (Tables 1, 2, and 3), and 16 swordfish. This was a decrease of 451 billfish from the number tagged during the 12 months preceding this report (Mason and Buchanan, 1977). As in previous years, most of the billfish were tagged and released seasonally in areas of concentrated sport fishing. Few releases occurred in areas where a market existed for billfish. Sailfish releases (885) were concentrated off southeast Florida during the winter, white marlin (199) off the Cape Hatteras-Cape May area during the summer, and blue marlin (74) off the Virgin Islands during the summer. Sportsmen also tagged and released 14 swordfish off southeast Florida. Two additional swordfish were tagged off Nova Scotia. These releases increased the cumulative number of Atlantic billfishes tagged since 1950 to 31,711.

RECOVERIES

Sailfish

We received recovery information for 20 recaptured sailfish (18 fully documented), which increased the total number of recoveries to 197 (Table 4). The new recoveries supported the general hypothesis advanced by Mather, Tabb, Mason, and Clark (1974) that sailfish have a tendency to move from the Straits of Florida and the Caribbean in winter to the Gulf of Mexico and the northern Florida-Cape Hatteras area in summer.

Thirteen of the new recoveries were released and recaptured off southeastern Florida. These recoveries, along with the majority of previous sailfish recoveries, indicate that sailfish move along the southeast Florida coast during winter. As summer approaches, some of these fish disperse northward to the Carolinas and northern Florida, returning southward the following winter.

A new recovery in the Gulf of Mexico of a sailfish tagged and released off southeast Florida brought the total number of gulf-southeast Florida recoveries to eight. Examination of these data indicate that not all sailfish found off southeast Florida in the winter move northward with summer or remain in the Straits of Florida, but move to the Gulf of Mexico.

Four new recoveries indicated that some sailfish move between the Caribbean and the coastal area off the southeastern United States and Gulf of Mexico. Two sailfish tagged and released off the Virgin Islands in the winter were recaptured off southeast Florida from 4 to 12 months later. The other two sailfish were recaptured in the Gulf of Mexico 1 to 2 months after being tagged and released off Cozumel, Mexico, in the spring. These recoveries were consistent with six previous recoveries.

White Marlin

Eight white marlin were recaptured in the western North Atlantic and two in the Gulf of Mexico -- increasing the total number of white marlin recoveries to 189 (Table 4). The Atlantic recoveries (tagged and released in the Mid-Atlantic Bight) supported the hypothetical seasonal migratory pattern for white marlin in the Mid-Atlantic Bight as proposed by Mather, Jones, and Beardsley (1972). These fish apparently move eastward in late summer and early fall, gradually turning southward to their wintering grounds off the northern coast of South America. Many of these fish return to the Mid-Atlantic Bight the following summer.

The gulf recoveries provide evidence on the movement of white marlin to and from the Gulf of Mexico. One white marlin was released in the eastern Gulf of Mexico in the summer and recaptured nearly 4 years later in the western gulf. The other gulf recovery was released in the Mid-Atlantic Bight in the summer and recaptured by a Japanese longliner south of Louisiana the following spring. Seven white marlin have now been recorded traveling from the Mid-Atlantic to the gulf.

Blue Marlin

Only one tagged blue marlin was recaptured during the last 12 months. It was the first documented trans-Atlantic billfish migration. It was tagged on August 9, 1976, off the Virgin Islands by a sportsman and recovered 6 months later off Africa's Ivory Coast by a French tuna boat. This increased the total blue marlin recoveries to 11. Although we have too few blue marlin recoveries to hypothesize a migratory pattern, the new recovery implies that blue marlin may have a complex migratory pattern and stock structure.

DISCUSSION

Analyses of sailfish recovery data suggest that sailfish in the western North Atlantic may not be from one homogeneous group, but rather from a number of groups with different seasonal migratory patterns. These groups may intermingle during certain seasons, resulting in a moderate amount of interchange. We are unable, however, to accurately distinguish these groups because of uneven fishing effort and distribution of releases and recaptures. For example, nearly 70 percent of all sailfish taggings occurred off southeast Florida. Tag data for distinguishing these groups can be obtained by increasing the number of sailfish tagged in the Gulf of Mexico, the Caribbean, and off South America.

Based on our tag data some white marlin migrate from the Mid-Atlantic Bight to the Gulf of Mexico. Thus we may suspect the existence of migrations in the reverse direction. However, we have no tag data to prove this. So far, only six white marlin tagged in the gulf have been recaptured; five in the gulf and one off Cuba. The latter recovery gave support to the likelihood that white marlin travel from the gulf to the mid-Atlantic between summers. These data suggest a need for a more intense tagging program in the Gulf of Mexico.

A sport fishery for swordfish began off southeast Florida in the summer of 1976, after successful exploratory fishing by commercial fishermen. A substantial sport fishery quickly developed the following spring. The popularity of tagging and releasing swordfish seems to be increasing with the popularity of the sport fishery. If so, it will give us a good opportunity to collect much needed tag data on the movement of swordfish.

LITERATURE CITED

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Table 1. Releases (before slash) and returns (after slash) for sailfish by year and area of release as of September 30, 1977.

| Year | Cape Hatteras to Cape May | Cape Lookout to Cape Canaveral | S.E. Florida | Bahamas | Gulf of Mexico | Cozumel, Mexico | Puerto Rico & Vir. Is. | Venezuela | South Atlantic | Unknown release area | Total |
|---------|---------------------------|--------------------------------|--------------|---------|----------------|-----------------|------------------------|-----------|----------------|----------------------|-----------|
| 1950 | | | 78/1 | | | | | | | | 78/1 |
| 51 | | | 112/1 | | | | | | | | 112/1 |
| 52 | | | 102/2 | | | | | | | | 102/2 |
| 53 | | | 140/1 | | | | | | | | 140/1 |
| 54 | | | 326/0 | | 76/0 | | | | | | 402/0 |
| 55 | | | 216/1 | | 45/1 | | | | | | 261/2 |
| 56 | | | 167/1 | | 34/0 | | | | | | 201/1 |
| 57 | | | 159/2 | | 20/0 | | | | | | 179/2 |
| 58 | | | 24/2 | | 57/0 | | | | | | 81/2 |
| 59 | | | 72/0 | | 83/1 | | | | | | 162/1 |
| 60 | 2/0 | | 746/5 | 4/0 | 221/0 | 1/0 | 5/0 | 7/0 | | | 1023/5 |
| 61 | 1/0 | 1/0 | 949/5 | 9/0 | 251/1 | | 3/1 | 44/0 | | | 1221/7 |
| 62 | 2/0 | 4/0 | 1141/10 | 32/0 | 99/0 | | 9/0 | 7/0 | | | 1287/10 |
| 63 | 4/0 | | 1000/9 | 45/0 | 103/0 | 10/0 | | | | | 1162/9 |
| 64 | 2/0 | | 925/6 | 73/0 | 69/0 | 6/0 | 5/0 | | | | 1080/6 |
| 65 | 1/0 | 3/0 | 928/7 | 34/1 | 95/0 | | 17/1 | 15/0 | | | 1093/9 |
| 66 | 2/0 | 1/0 | 565/9 | 57/0 | 156/0 | 22/0 | 150/1 | 186/7 | | | 1139/17 |
| 67 | 1/0 | 2/1 | 385/6 | 34/1 | 240/2 | 46/0 | 67/3 | 53/0 | | | 828/13 |
| 68 | | | 420/6 | 43/2 | 274/2 | 15/0 | 20/0 | 3/0 | | | 775/10 |
| 69 | 15/1 | | 339/3 | 71/0 | 178/2 | 47/0 | 53/0 | 60/1 | | | 763/7 |
| 70 | 28/0 | 2/0 | 254/2 | 38/0 | 144/0 | 76/0 | 47/0 | 32/0 | | | 621/2 |
| 71 | 22/0 | 2/0 | 450/3 | 39/0 | 112/1 | 351/1 | 75/0 | 31/0 | | | 1082/5 |
| 72 | 5/0 | | 455/5 | 49/0 | 75/0 | 184/0 | 126/1 | 23/0 | | | 917/6 |
| 73 | 4/0 | 2/0 | 626/18 | 23/0 | 23/0 | 155/0 | 95/0 | 8/0 | | | 936/18 |
| 74 | 3/0 | 1/0 | 489/10 | 13/0 | 25/0 | 260/0 | 60/0 | 4/0 | | | 855/10 |
| 75 | 2/0 | 2/0 | 625/17 | 33/0 | 38/0 | 219/0 | 82/0 | 6/0 | | | 1007/17 |
| 76 | 2/0 | 3/0 | 894/11 | 19/0 | 62/0 | 389/1 | 92/2 | 7/0 | | | 1468/14 |
| 77 | 4/0 | 1/0 | 548/5 | 22/0 | 25/0 | 58/1 | 13/0 | | 10/0 | | 681/6 |
| Unknown | | | | | | | | | | 13/13 | 13/13 |
| Total | 100/1 | 24/1 | 13135/148 | 638/4 | 2505/10 | 1839/3 | 919/9 | 486/8 | 10/0 | 13/13 | 19669/197 |

Table 2. Releases (before slash) and returns (after slash) for white marlin by year and area of release as of September 30, 1977.

| Year | Cape Hatteras to Cape Cod | Oceanic N. Atlantic | S.E. Florida and Bahamas | Puerto Rico & Vir. Is. | Gulf of Mexico | Venezuela | Cozumel, Mexico | Unknown Release Area | Total |
|---------|---------------------------|---------------------|--------------------------|------------------------|----------------|-----------|-----------------|----------------------|-----------|
| 1954 | 4/0 | | | | | | | | 4/0 |
| 55 | 116/1 | | | 8/0 | 21/0 | | | | 145/1 |
| 56 | 402/1 | | | 3/0 | 8/0 | | | | 413/1 |
| 57 | 144/0 | 1/0 | | | | | | | 145/0 |
| 58 | 41/0 | | | | | | | | 41/0 |
| 59 | 200/0 | | | | | 2/0 | | | 202/0 |
| 60 | 98/0 | | 4/0 | 1/0 | 4/0 | 4/0 | | | 111/0 |
| 61 | 199/2 | | 13/0 | 9/0 | 11/0 | 30/0 | | | 262/2 |
| 62 | 342/4 | | 41/0 | | 4/0 | | | | 387/4 |
| 63 | 612/4 | 3/0 | 35/0 | | 10/0 | | | | 660/4 |
| 64 | 441/12 | 5/0 | 67/1 | | 13/0 | | | | 526/13 |
| 65 | 278/8 | | 67/0 | 5/0 | 10/0 | 25/2 | | | 385/10 |
| 66 | 272/11 | 6/0 | 54/1 | 4/0 | 23/0 | 149/4 | | | 508/16 |
| 67 | 277/6 | | 88/0 | 7/0 | 46/1 | 103/0 | | | 521/7 |
| 68 | 703/20 | | 95/1 | 16/0 | 56/0 | 16/0 | | | 886/21 |
| 69 | 1214/20 | | 86/2 | 18/0 | 35/2 | 46/2 | | | 1399/26 |
| 70 | 838/27 | | 49/2 | 15/0 | 24/1 | 17/0 | 4/0 | | 947/30 |
| 71 | 824/17 | | 57/1 | 20/0 | 18/1 | 95/1 | 4/0 | | 1018/20 |
| 72 | 345/5 | | 36/0 | 11/0 | 62/0 | 21/0 | 1/0 | | 476/5 |
| 73 | 234/8 | | 25/0 | 6/0 | 15/1 | 4/0 | 2/0 | | 286/9 |
| 74 | 221/4 | | 12/0 | 4/0 | 30/0 | 5/0 | 4/0 | | 276/4 |
| 75 | 315/5 | | 26/0 | | 55/0 | 43/0 | 3/0 | | 442/5 |
| 76 | 196/3 | 1/0 | 28/0 | 3/0 | 45/0 | 25/0 | 6/0 | | 304/3 |
| 77 | 195/0 | | 39/0 | 1/0 | 26/0 | | | 1/0 | 262/0 |
| Unknown | 4/4 | | | | | | | 4/4 | 8/8 |
| Total | 8515/162 | 16/0 | 822/8 | 131/0 | 516/6 | 585/9 | 24/0 | 5/4 | 10614/189 |

Table 4. Release and recovery data from recaptured billfishes reported between October 1, 1976 and September 30, 1977.

| Tag No. | SAILFISH | | | | Recapture | | | | Gear |
|--------------|----------|--------|-----------|-------|-----------|--------|-----------|---------|------|
| | Release | | Recapture | | Release | | Recapture | | |
| | Lat. | Long. | Date | Gear | Lat. | Long. | Date | Gear | |
| H 88561 | 18°40' | 64°50' | 12/24/76 | R & R | 25°50' | 80°00' | 8/19/77 | R & R | |
| H 88566 | 18°40' | 64°50' | 1/22/76 | R & R | 26°50' | 79°50' | 1/5/77 | R & R | |
| H 98996 | UNKNOWN | | | | 26°50' | 80°00' | 1/31/77 | R & R | |
| H 46130 | UNKNOWN | | | | 25°40' | 80°00' | 4/8/77 | R & R | |
| H 88159 | 27°10' | 80°00' | (04/76) | R & R | 25°40' | 80°00' | 5/1/77 | R & R | |
| M 12507 | 27°20' | 80°00' | 12/26/75 | R & R | 26°10' | 80°00' | 1/5/77 | R & R | |
| H 82035 | 27°10' | 80°00' | 12/10/75 | R & R | 27°20' | 80°00' | 3/5/77 | R & R | |
| H 88537 | 27°10' | 80°00' | 1/3/76 | R & R | 26°50' | 79°50' | 1/9/77 | R & R | |
| H 87115 | 26°40' | 80°00' | 1/15/76 | R & R | 26°40' | 80°00' | 1/28/77 | R & R | |
| H 90631 | 26°50' | 79°50' | 2/5/77 | R & R | 26°50' | 80°00' | 7/10/77 | R & R | |
| H 25239 | 24°50' | 80°20' | 11/20/76 | R & R | 24°50' | 81°20' | 1/5/77 | R & R | |
| H 96725 | 27°10' | 80°00' | 12/11/76 | R & R | 26°50' | 80°00' | 12/29/76 | R & R | |
| H 88199 | 27°10' | 80°00' | 12/19/76 | R & R | 26°40' | 80°00' | 1/2/77 | R & R | |
| H 81691 | 26°50' | 80°00' | 1/9/77 | R & R | 24°30' | 81°00' | 4/10/77 | R & R | |
| H 95743 | 25°40' | 80°00' | 3/3/77 | R & R | 25°40' | 80°00' | 3/19/77 | R & R | |
| H 95844 | 26°50' | 80°00' | 8/21/77 | R & R | 27°00' | 80°00' | 8/21/77 | R & R | |
| H 91467 | 20°00' | 86°00' | 4/12/77 | R & R | 26°23' | 85°30' | 5/7/77 | LL | |
| H 42474 | 24°50' | 80°30' | 1/31/76 | R & R | 29°00' | 87°00' | 7/14/76 | LL | |
| H 90480 | 20°00' | 86°00' | 4/15/76 | R & R | 20°50' | 96°25' | 6/29/76 | LL | |
| H 25265 | 26°50' | 80°00' | 1/21/77 | R & R | 25°40' | 80°00' | 4/21/77 | R & R | |
| WHITE MARLIN | | | | | | | | | |
| H 84432 | 36°00' | 74°00' | 9/18/76 | R & R | 39°40' | 72°40' | 8/3/77 | R & R | |
| H 36761 | 36°13' | 73°51' | 7/18/75 | R & R | 25°40' | 80°00' | 4/15/77 | R & R | |
| H 51396 | 36°10' | 74°49' | 9/25/76 | R & R | 25°40' | 79°20' | 4/2/77 | R & R | |
| H 41010 | 38°20' | 73°30' | 7/22/75 | R & R | 37°00' | 74°50' | 7/7/77 | R & R | |
| H 35744 | 35°00' | 75°00' | 9/26/76 | R & R | 20°10' | 70°20' | 5/30/77 | LL | |
| H 41369 | 29°00' | 87°00' | 7/5/73 | R & R | 27°00' | 96°00' | 8/13/77 | R & R | |
| H 53375 | 37°00' | 74°30' | 9/27/75 | R & R | 38°10' | 73°40' | 8/5/77 | R & R | |
| H 22051 | 37°50' | 74°15' | 8/25/72 | R & R | 40°38' | 70°41' | 7/28/77 | Harpoon | |
| H 31231 | 36°13' | 73°51' | 7/17/75 | R & R | 26°42' | 90°40' | 4/22/76 | LL | |
| H 9603 | 36°50' | 73°40' | 7/30/75 | R & R | 36°11' | 67°28' | 9/14/76 | LL | |
| BLUE MARLIN | | | | | | | | | |
| WH 00053 | 18°30' | 65°00' | 8/9/76 | R & | 04°00' | 06°10' | 2/12/77 | LL | |

1/ longline (LL); Rod & Reel (R & R); Free Floating (FF)

Table 3. Releases (before slash) and returns (after slash) for blue marlin by year and area of release as of September 30, 1977.

| Year | Cape Hatteras to Cape Cod | Oceanic N. Atlantic | S.E. Florida | Bahamas | Gulf of Mexico | Cozumel, Mexico | Caribbean | Unknown release area | Total |
|---------|---------------------------|---------------------|--------------|---------|----------------|-----------------|-----------|----------------------|---------|
| 1954 | | | | | | | | | |
| 55 | | | | | 1/0 | | 6/0 | | 7/0 |
| 56 | | | | 1/0 | 2/0 | | 3/0 | | 9/0 |
| 57 | | | | 1/0 | | | | | 1/0 |
| 58 | | | | | | | | | 1/0 |
| 59 | 1/0 | | | | | | | | 1/0 |
| 60 | 1/0 | | | 2/0 | | | 2/0 | | 5/0 |
| 61 | | 1/0 | | 3/0 | | | | | 3/0 |
| 62 | 8/0 | | 3/0 | 4/0 | | 1/0 | | | 14/0 |
| 63 | 62/0 | 1/0 | 5/0 | 21/0 | 4/0 | | | | 90/0 |
| 64 | 15/0 | 1/0 | 1/0 | 34/0 | 2/0 | | | | 58/0 |
| 65 | 2/0 | | 1/0 | 30/0 | 1/0 | | 12/0 | | 47/0 |
| 66 | 1/0 | | | 24/0 | 3/0 | | 15/0 | | 44/1 |
| 67 | 1/0 | | | 29/0 | 6/0 | | 8/0 | | 44/0 |
| 68 | 1/0 | | | 40/1 | 6/0 | | 23/0 | | 70/1 |
| 69 | 8/0 | | 2/0 | 38/1 | 6/1 | | 45/1 | | 99/3 |
| 70 | 18/0 | | | 21/0 | 4/1 | 1/0 | 24/0 | | 68/1 |
| 71 | 37/0 | | | 30/1 | 3/0 | 1/0 | 44/0 | | 115/1 |
| 72 | 8/1 | 1/0 | | 18/0 | 8/0 | | 73/0 | | 108/1 |
| 73 | 15/0 | | 2/0 | 28/0 | | 2/0 | 53/0 | | 100/0 |
| 74 | 8/0 | | 1/0 | 12/0 | 4/0 | 1/0 | 64/1 | | 90/1 |
| 75 | 7/0 | | 1/0 | 16/0 | 2/0 | | 68/0 | | 94/0 |
| 76 | 9/0 | | | 12/0 | 8/0 | 2/0 | 108/1 | | 139/1 |
| 77 | 5/0 | | 4/0 | 22/0 | 16/0 | | 74/0 | | 121/0 |
| Unknown | | | | | | | | 1/1 | 1/1 |
| Total | 207/1 | 4/1 | 20/0 | 387/3 | 76/2 | 11/1 | 623/4 | 1/1 | 1329/11 |