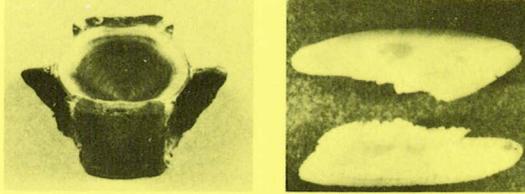
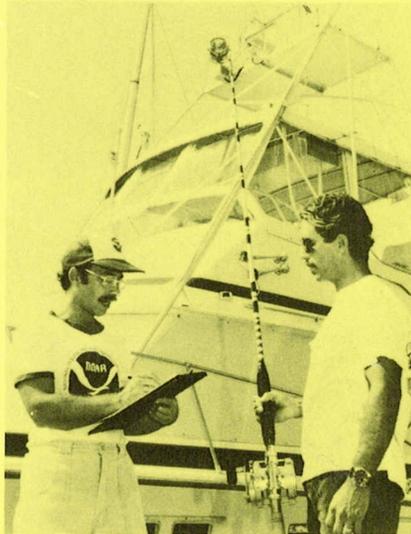


**SEFC OCEANIC PELAGICS PROGRAM  
1986**



**RESEARCH ON AGE AND GROWTH**  
Eric D. Prince and Dennis W. Lee



**RECREATIONAL BILLFISH SURVEYS**

**GULF OF MEXICO**  
Paul J. Pristas

**WESTERN NORTH ATLANTIC**  
Joseph P. Contillo



**COOPERATIVE GAMEFISH TAGGING**

Edwin L. Scott and Joseph E. Tashiro

JUNE 1987



U.S. DEPARTMENT OF COMMERCE  
Malcolm Baldrige, Secretary  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
Anthony J. Calio, Administrator  
NATIONAL MARINE FISHERIES SERVICE  
William E. Evans, Asst. Administrator for Fisheries

NOAA Technical Memorandum NMFS-SEFC-195

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SEFC Oceanic Pelagics Program, 1986

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## PREFACE

The National Marine Fisheries Service (NMFS) Southeast Fisheries Center's Miami Laboratory has the responsibility of collecting and analyzing data on pelagic marine fishes<sup>1</sup>. This is part of a commitment by the United States to develop national programs for conserving and managing these species through Regional Fishery Management Councils and with the International Commission for the Conservation of Atlantic Tunas (ICCAT). The ICCAT coordinates scientific investigations on stocks of tunas and tuna-like fishes, including billfishes, in the Atlantic Ocean and adjacent seas and Gulf of Mexico. Data collected through NMFS programs are used in the assessments of the status of stocks of Atlantic billfishes and tunas, and these results are presented to the Regional Fishery Management Councils and to the international scientific community at ICCAT.

The Oceanic Fisheries Division of the Miami Laboratory is responsible for providing comprehensive biological profiles of tunas and billfishes, and using these profiles to assess the status of these stocks. The three major activities associated with biological profiles are research on age and growth, recreational billfish surveys, and cooperative gamefish tagging. This document covers information on all three activities in order to provide a comprehensive report of our work to the fishing public and recognize those who support the program. We hope the information in this report will not only be useful but will encourage anglers to participate in various parts of our oceanic pelagics activities, particularly our new SAVE IT FOR SCIENCE program. News releases about significant events will continue to be issued as they occur throughout the year.

Research on age and growth of oceanic pelagic fishes was first initiated at the Miami Laboratory in 1974. Bluefin tuna were of particular interest at that time; and more recently (1980), blue and white marlin have been targeted for studies on age and growth. Other species under consideration for studies on age and growth include sailfish and swordfish. Although the section on research currently emphasizes work on age and growth, the topic area of our research program can be expected to change over time as information needs on the biology of these fishes change. This type of research provides critical information necessary for the assessment of the status of these fish populations. This section of the summary was prepared by Eric D. Prince and Dennis W. Lee.

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<sup>1</sup> The primary species covered in this program summary include blue marlin, Makaira nigricans; white marlin, Tetrapturus albidus; sailfish, Istiophorus platypterus; and bluefin tuna, Thunnus thynnus. Additional information is also given for Atlantic spearfish, Tetrapturus pfluegeri; broadbill swordfish, Xiphias gladius; yellowfin tuna, Thunnus albacares; and albacore, Thunnus alalunga.

Recreational billfish surveys have been conducted in the Gulf of Mexico since 1971 and in the Atlantic Ocean and Caribbean Sea since 1972 (Fig. 1). These surveys were initiated to monitor annual trends in recreational billfish catch and effort. A composite list of tournament and dock sampling sites arranged in chronological order is in Appendix Table 1 for all Atlantic, Gulf, and Caribbean areas that were included in the 1986 billfish survey. During 1986, 89 tournaments and 9 docks were monitored and 65,846 hours of effort were recorded. The recreational billfish survey section of this summary is presented in two parts. The first part is by Paul J. Pristas and covers the Gulf of Mexico. The second part is by Joseph P. Contillo and covers the western North Atlantic (U.S. east coast, Bahamas, Caribbean Sea, and Florida east coast and Keys).

The Cooperative Gamefish Tagging Program was initiated at Woods Hole Oceanographic Institution in 1954 by Frank J. Mather, III. This program is a cooperative effort between recreational anglers, commercial fishermen, and fishery scientists to tag and release oceanic pelagic fishes and provide basic information on their movements and migrations in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (Fig. 1). Beginning in 1973, the program was jointly funded and operated by Woods Hole and the National Marine Fisheries Service's Miami Laboratory. In 1980, the Miami Laboratory took over sole responsibility for the program. Since 1954, 110,518 fish of 36 different species have been tagged and released; 5,655 recaptures have been recorded. The Cooperative Gamefish Tagging section of this summary was prepared by project leader Edwin L. Scott and Joseph E. Tashiro.

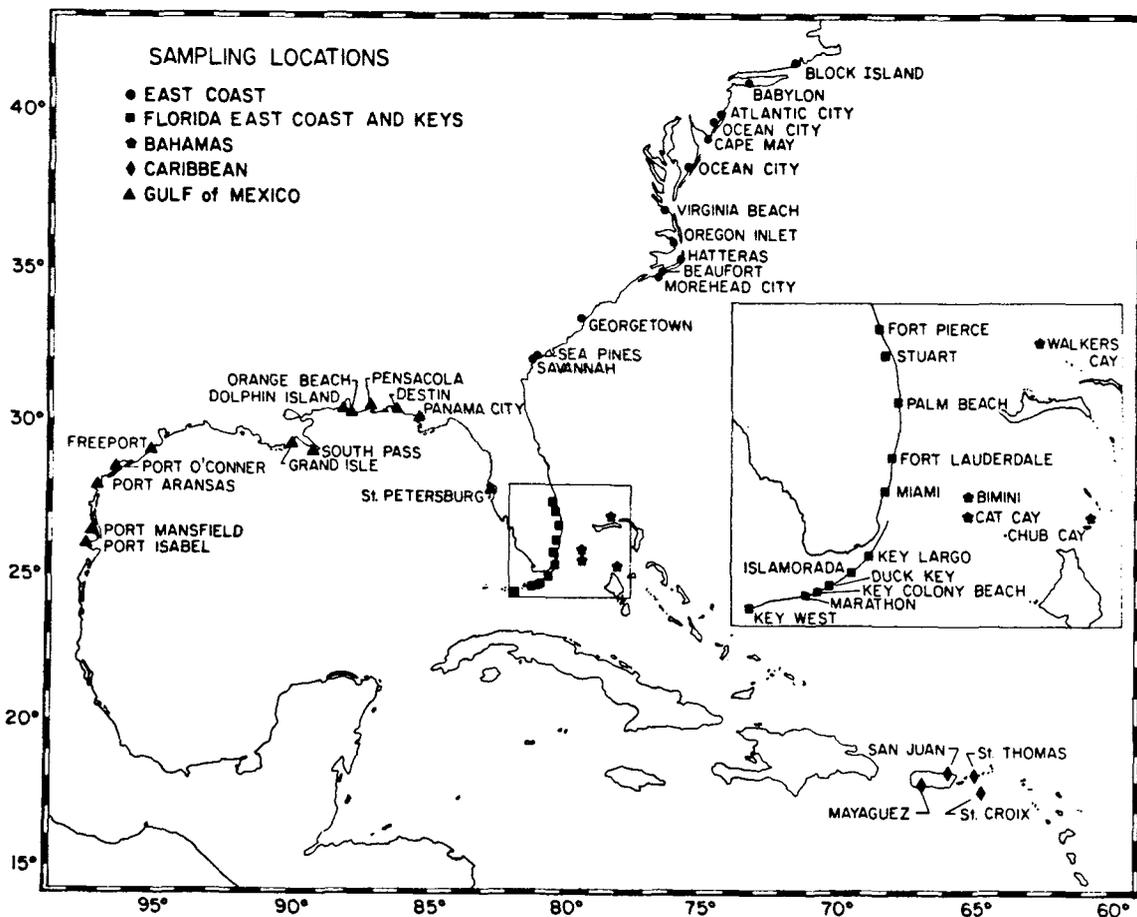


Figure 1- Sampling locations for Recreational Billfish Surveys and general area of coverage for the Cooperative Gamefish Tagging Program and Research on Age and Growth of the Oceanic Pelagics Resources Division, Miami Laboratory.

All three activities (research, billfish surveys, and tagging) are closely associated and are being conducted simultaneously in the same geographical region (Fig. 1). For example, many of the billfish tagged for cooperative gamefish tagging are tagged during the tournaments that are also monitored by the billfish surveys. Conversely, tagged billfish that are recaptured after being at-large for extended periods are sampled for skeletal structures to aid validation of the accuracy of our ageing studies. In addition, many of the fish sampled for age and growth studies are obtained at tournaments or from docks monitored by the billfish surveys. Accordingly, activities within the Oceanic Pelagics Resources Division are not only closely associated with each other but their success is highly dependent on cooperation from fishermen.

We extend our sincere appreciation to all cooperating parties for their help, and we hope the information provided in this report will be useful and encourage anglers to continue or start participating in the various program activities.

ERIC D. PRINCE

## AGE AND GROWTH RESEARCH

Eric D. Prince and Dennis W. Lee

Age and growth research is an important component of fishery science. For example, to assess the well-being of an entire population of fish, it is often necessary to separate catch or landing statistics by age, so each year-class can be followed through the fishery as they get older. In this way, assessment models can be used to determine the health or general status of each component of the population and management recommendations can be adjusted accordingly.

One of the approaches we use to determine the age and growth rate of fish is analogous, in principle, to the methods used in estimating the age of trees. The number of concentric rings in the trunks of trees are generally representative of yearly growth (i.e. one ring is equal to one calendar year of life). The spacing between these rings is proportional in size to the rate of growth for that particular year; the larger this spacing, the faster the rate of growth. In temperate regions, faster growth usually occurs in summer and slowest growth in winter. In much the same manner, the age and growth rate of fishes are estimated by counting concentric rings or growth bands which form in their skeletal tissues, such as spines, fin rays, vertebrae, scales, or inner ear bones called otoliths. One problem in using this approach to age fish is that the time span between the formation of those rings in skeletal structures needs to be determined. This is referred to as validating the accuracy of age determination methods, it is a critical part of ageing studies, and is one of the major themes we address in this portion of the program summary.

## Our Save It For Science Program

Several NMFS programs on oceanic pelagic fishes traditionally depend entirely on the cooperation of recreational and commercial fishermen. Specifically, the success of the Cooperative Gamefish Tagging Program and the Recreational Billfish Surveys are two examples where participating anglers and captains have played a significant role for many years. More recently, fishermen have been saving skeletal structures from tag-recaptured tuna and billfish (Table 1) and unusually small and large billfish for our studies on age and growth. These rare catches occur only a few times each year but when they do, fishermen who save these special fish for our program make significant contributions. In fact, in many cases the ONLY way we can validate the accuracy of our ageing methods, correctly interpret the growth bands on skeletal structures, or determine maximum longevity is to examine skeletal structures from tag-recaptured tuna and billfish, and very small and very large billfish.

Table 1. Tag-recaptured oceanic pelagic fishes where skeletal structures were recovered for age and growth studies, National Marine Fisheries Service, Southeast Fisheries Center's Miami Laboratory, 1980-86.

Species	Release Data				Recapture Data				Time at large	Skeletal structures recovered
	Date	Location	Size	Angler	Date	Location	Size	Angler		
White Marlin	9/26/70	Maryland	35 lb	A. Yellot	7/10/82	New York	65 lb	F. Muid	11 yr, 6 mo	spines, vertebrae
	5/6/80	Mexico (Cozumel)	25 lb	J. Rybovich	6/27/81	Louisiana	47 lb	A. Stumpf	1 yr, 2 mo	spines, vertebrae otoliths
	10/31/81	Florida	50 lb	D. Winter	9/19/82	Florida (Destin)	51.5 lb	A. Stinson	10.5 mo	spines, vertebrae otoliths
	6/17/82	Louisiana	55 lb	W. Billops	9/17/82	Florida (Destin)	60.5 lb	B. Lloyd	4 mo	spines, vertebrae otoliths
	5/18/82	Florida	60 lb	C. Griffith	11/12/85	Florida (Panama City)	45 lb	C. Crockett	3 yr, 6 mo	spines, otoliths
	9/13/84	Florida	40 lb	S. Smith	8/27/85	Mobile (Alabama)	41 lb	L. Varley	11.5 mo	spines, otoliths
	10/04/85	Florida	60 lb	C. Fox	9/17/86	New Orleans (Louisiana)	49 lb	C. Rich	1 yr, 11 mo	spines, otoliths
Bluefin Tuna	8/5/65	New Jersey	25 lb	Canadian Scientists	5/28/81	Bahamas (Cat Cay)	493 lb	K. Jenkins	15 yr, 8 mo	caudal vertebrae
	6/24/80	Virginia	25 lb	U.S. Scientists	2/11/84	New Jersey	159 lb	Japanese Longliner	3 yr, 8 mo	caudal vertebrae
Albacore	8/17/78	Spain	11 lb	Spanish Scientists	12/30/84	New Jersey	51 lb	Japanese Longliner	6 yr, 4 mo	spines, vertebrae otoliths
	6/23/80	France	11 lb	French Scientists	12/31/84	New Jersey	42 lb	Japanese Longliner	4 yr, 6 mo	spines, vertebrae
Sailfish	3/5/73	Florida (Islamorada)	40 lb	W. Tindall	1/14/84	Florida (Poynton Bch)	54 lb	R. Harrison	10 yr, 10 mo	spines, vertebrae otoliths
	1/ /84	Florida	50 lb	E. Duda	1/19/86	Florida (Poca Raton)	45 lb	R. Gunn	2 yr, 1 mo	spines, vertebrae otoliths
	1/25/86	Florida	50 lb	D. Williams	4/27/86	Florida (Pt. Lauderdale)	34.5 lb	M. Guilfayle	3 mo	spines, otoliths

### Billfish Conservationist Of The Year

To recognize participants in our SAVE IT FOR SCIENCE PROGRAM, last year we initiated an award for BILLFISH CONSERVATIONIST OF THE YEAR in cooperation with MARLIN magazine. The second recipient of this award was given to Captain Larry Dukehart of Islamorada, Florida (see article in MARLIN, 1986, vol. 6(2),14). Captain Dukehart has served as the cornerstone of the SAVE IT FOR SCIENCE PROGRAM in the Florida Keys and has provided our research program with many samples of skeletal parts from unusual size blue and white marlin and sailfish. Several of these samples were very rare baby blue marlin and sailfish, which have been extremely valuable to our research efforts. In addition, Captain Dukehart has been a strong supporter of our tagging program (see section on tagging) and has tagged hundreds of billfish since the early 1970's. Congratulations, Captain Dukehart, and we hope your example encourages others to participate in our SAVE IT FOR SCIENCE PROGRAM.

Table 2. Size categories of interest for age and growth studies of blue marlin, white marlin, sailfish, and swordfish, National Marine Fisheries Service, Southeast Fisheries Center's Miami Laboratory, 1986.

Species	Size Categories of Interest	
	Small Sizes (equal to or less than)	Large Sizes (equal to or greater than)
Blue marlin	50 lbs	500 lbs
White marlin	30 lbs	90 lbs
Sailfish	20 lbs	80 lbs
Swordfish	10 lbs	500 lbs

### Age Validation

The use of skeletal structures from recaptured tagged tunas and billfishes for age and growth validation studies are based on the premise that these fishes, which have been at-large for known periods, are essentially fish of known age. This condition usually exists only if the fish is tagged when it is very young or at a small size, where age can be more accurately predicted based only on size. Information from tagging records can then be accumulated to closely establish the fish's true age. If skeletal structures are recovered from these types of tag-recaptures, then they can be examined for growth bands and comparisons can be made between the age known from tagging records and age estimated from skeletal structure analysis. Thus, the relative accuracy of our ageing techniques can be established.

### How You Can Help

Anglers capturing a tagged tuna or billfish or an unusually small or large billfish (see Table 2 for size categories by species) should contact us immediately BEFORE DISPOSING OF THE FISH. This is the most critical step in our SAVE IT FOR SCIENCE PROGRAM. An example of some of the unusually small and large billfishes we have been able to sample during the last five years are given in Table 3. We will accept collect calls at any time, day or night, and make whatever arrangements are necessary to obtain these fish. Contact Dr. Eric Prince or Mr. Dennis Lee at the Southeast Fisheries Center's Miami Laboratory at (305) 361-4248, 361-4225, or Dr. Prince at his home (305) 598-0944 at night or weekends. In many cases, fishermen catching tagged fish or very small fish are releasing them and valuable scientific data are being lost. In other instances, tagged fish or very large fish are being eaten or mounted as trophies and the skeletal structures we use in our ageing studies are being thrown away. Our sampling methods will not interfere with taxidermy procedures, nor will the sampling affect the amount of edible flesh. We prefer to sample the fish ourselves. However, when the fish can't be sampled by Miami Laboratory personnel, the following procedures should be followed for marlin, sailfish, tuna, and swordfish:

Table 3. Examples of some unusual size billfishes provided by anglers participating in the SAVE IT FOR SCIENCE PROGRAM, National Marine Fisheries Service, Southeast Fisheries Center's Miami Laboratory, 1986 and 1987.

- 
1. 7.75, 25, and 55 lb blue marlin provided by Captain Mike Benitez, San Juan, Puerto Rico 12-12-86 and 1-11-87.
  2. 918 lb blue marlin provided courtesy of Government of the Virgin Islands, Division of Fish and Wildlife and caught by Captain Dale Wheatby on 9-20-86.
  3. 1174 lb blue marlin caught by Bill Sweedler off Montauk Point, NY, on 9-20-86.
  4. 22 lb white marlin caught by an American longliner in the Gulf of Mexico on 9-22-86.
  5. 10 inch swordfish provided by Joe Kononchik that was discovered in the stomach of a dolphin caught off Ft. Lauderdale, FL, on 6-17-86.
  6. 5.5 lb sailfish caught by Rosen Tousan, Jr., off Ft. Lauderdale, FL, on 10-26-86.
  7. 33 lb blue marlin caught by Bobby Crawford off Key West, FL, on 5-29-86.
- 

#### Sampling Marlin and Sailfish

1. SAVE ENTIRE FISH if it has a tag (cut out tag) or if fish is an UNUSUALLY SMALL OR LARGE SPECIMEN (as indicated in Table 2) and provide information below:
  - o DATE, LOCATION caught;
  - o LOWER JAW FORK LENGTH in inches or centimeters (Fig. 2);
  - o TOTAL WEIGHT (round weight) in pounds or kilograms;
  - o Determine SEX as shown in Figure 3 or cut a small 2-4 inch piece of gonad cross section and include with the sample;
    - o The FIRST 6 DORSAL SPINES are one of the most important hardparts for ageing marlin and sailfish. These can be taken by grabbing the tallest spine, pulling forward to spread the spine system, and cutting the tissue separating spines 6 and 7. Continue making a parallel cut 4-6 inches deep along each side of the spine down to the spine roots so the entire perimeter of the spines has been encircled. This will release the spine system so they can be pulled out by hand. DO NOT CUT THE SPINES AT THE SKIN SURFACE since the spine roots (Fig. 2) are important to us;

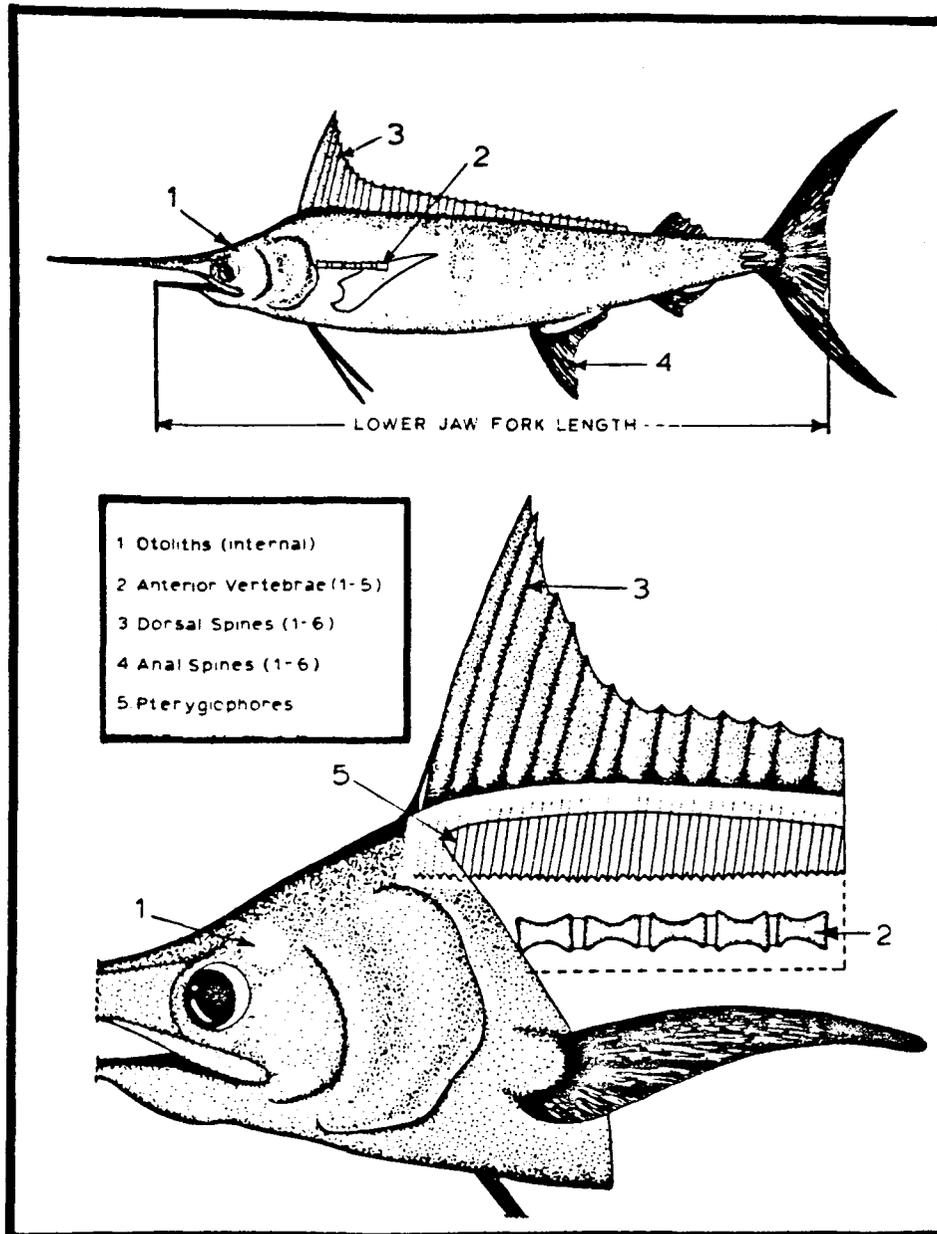


Figure 2 - Skeletal structures and measurements necessary from billfish for age and growth studies, National Marine Fisheries Service, Miami Laboratory. See text for explanation of procedures.

o The HEAD UNIT illustrated in Figure 2 has 3 kinds of hardparts -- DORSAL SPINES, OTOLITHS (inner ear bones inside the skull), and ANTERIOR VERTEBRAE (1-6). All these parts can be conveniently taken in ONE unit by cutting off the bill at the nostrils, filleting the meat away from the backbone to the 6th vertebrae, and separating this from the rest of the body (Fig. 2). The lower jaw and bill can be removed to save storage space.

2. All samples need to be FROZEN or REFRIGERATED.

### SEX DETERMINATION - MARLIN

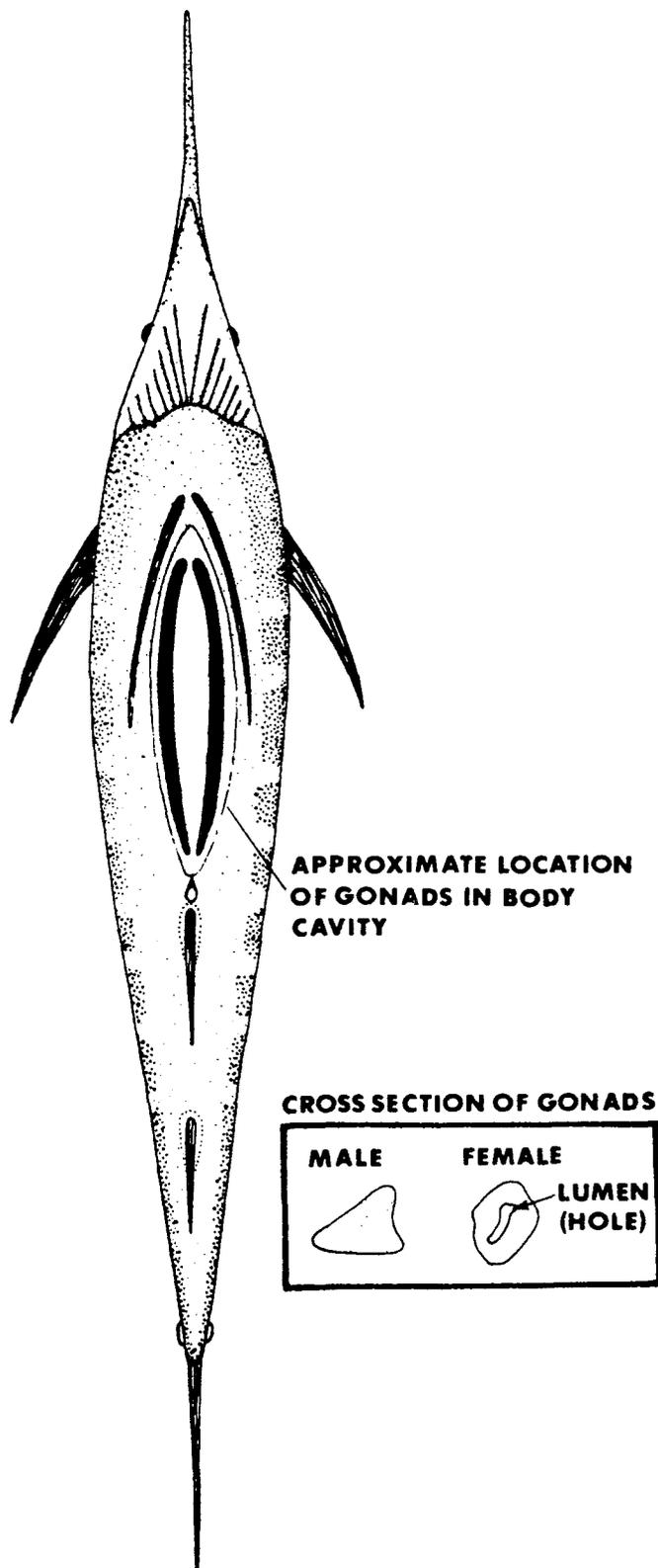


Figure 3- Schematic showing the location of gonads and sex determination in Atlantic billfish. Sex determination in Atlantic tunas can be taken in a similar manner. If sex is in doubt, cut out a small piece of gonad and save it with the rest of the sample.

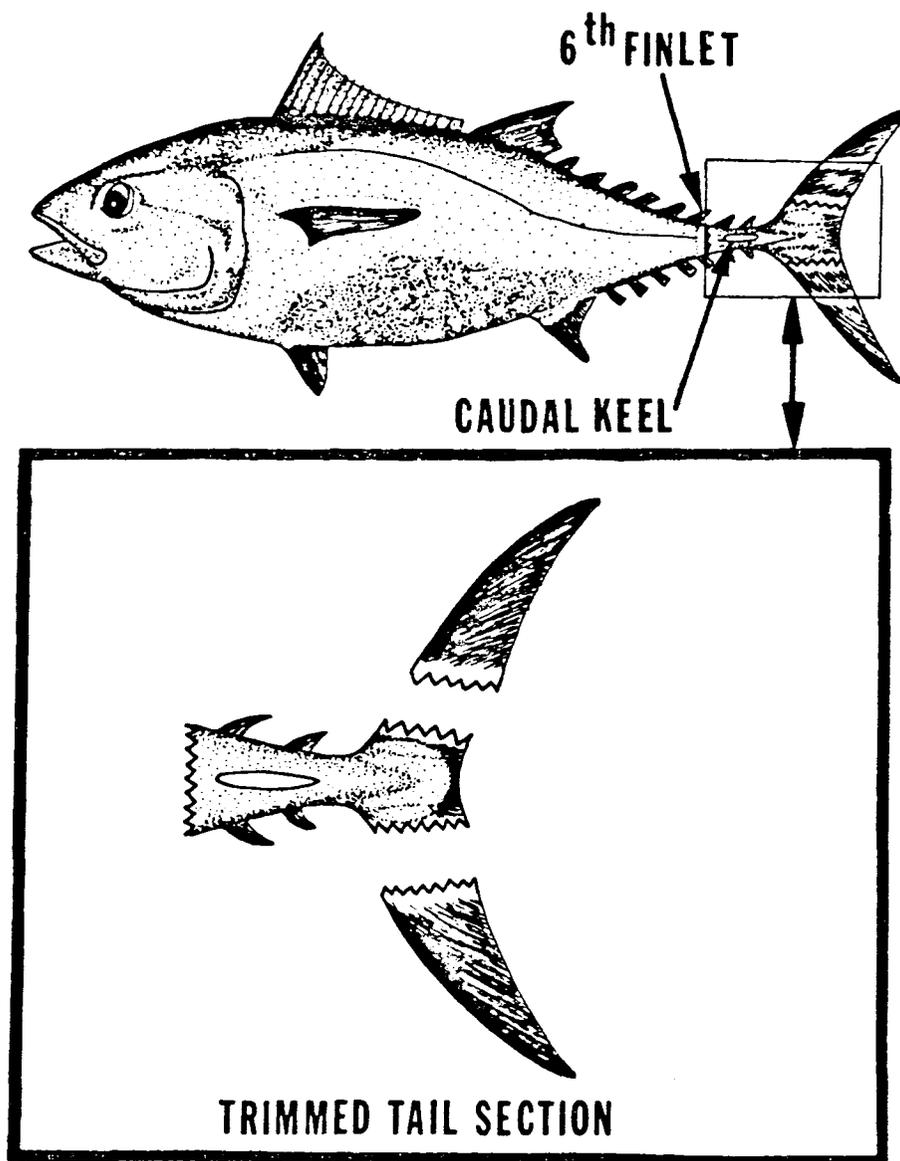


Figure 4- Removing the caudal peduncle (containing vertebrae) from Atlantic bluefin tuna for age and growth studies. The head (containing otoliths) should also be saved by cutting behind the gill covers and fork length taken in inches or centimeters by measuring from the tip of the nose to the fork of the tail.

### Sampling Tuna

1. SAVE ENTIRE FISH if it has a tag (cut out tag) and provide information below:
  - o DATE, LOCATION caught;
  - o FORK LENGTH in inches or centimeters (Fig. 4);
  - o TOTAL WEIGHT (round weight) in pounds or kilograms;
  - o Determine SEX as shown for billfish in Figure 3 or cut a small 2-4 inch piece of gonad cross section and include with the sample;
  - o Cut off HEAD behind gills;
  - o Cut off CAUDAL PEDUNCLE (tail) at sixth finlet as shown in Figure 4.
2. All samples need to be FROZEN or REFRIGERATED.

## Sampling Swordfish

1. SAVE ENTIRE TAG if it has a tag (cut out tag) or if fish is an UNUSUALLY SMALL OR LARGE SPECIMEN (as indicated in Table 2) and provide information below:

- o DATE, LOCATION caught;
- o LOWER JAW FORK LENGTH in inches or centimeters (as indicated for marlin in Fig. 2);
- o TOTAL WEIGHT (round weight) in pounds or kilograms;
- o Determine SEX as shown for billfish in Figure 3 or cut a small 2-4 inch piece of gonad cross section and include with the sample;
- o The FIRST 6 ANAL SPINES are one of the most important skeletal hardparts for ageing swordfish (see Fig. 2). These can be taken by grabbing the tallest spine, pulling forward to spread the spine system, and cutting the tissue separating spines 6 and 7. Continue making a parallel but shallow cut just beneath the skin surface, along each side of the spine so the entire perimeter of the spine has been encircled. This will release the spines so they can be pulled out by hand;
- o OTOLITHS (inner ear bones) are inside the skull and the head can be taken by cutting the bill off at the nostrils and cutting the head off behind the gill plates. The head can be trimmed by cutting off the lower jaw and gills so that only the skull (area between the eyes) is left.

2. All samples need to be FROZEN or REFRIGERATED.

### Shipping Samples

It is possible that funds can be made available for reimbursement of costs incurred while providing these samples. However, clearance of these costs would have to be made in advance through the Miami Laboratory. Please contact us ANY TIME day or night (we will accept collect calls):

Dr. Eric Prince or Dennis Lee  
 National Marine Fisheries Service  
 Southeast Fisheries Center, Miami Lab  
 75 Virginia Beach Drive  
 Miami, Florida 33149

Phone (office) (305) 361-4248 commercial  
 or 361-4225 commercial  
 350-1248 FTS

Phone (home) (305) 598-0944  
 on weekends or after 5:00 pm

## RECREATIONAL BILLFISH SURVEY

Gulf of Mexico

Paul J. Pristas

This is the 16th consecutive year that biologists from the NMFS Laboratory in Panama City, Florida, conducted recreational billfishing surveys in the northern Gulf of Mexico. Port samplers made on-site interviews from seven billfishing ports within their areas to collect information on fishing effort, catches, and other pertinent data. Additional fishing data are also submitted by big game fishing constituents throughout this area. In appreciation for this cooperation, we publish this annual report for the public, summarizing each season's results. Data in this report are, generally, shown by major geographical area and for the ports within those areas. In the northwestern Gulf, east Texas encompasses the area from the Texas-Louisiana border to Freeport; central Texas includes the area between Port O'Connor and Corpus Christi; and south Texas is comprised of the area from Port Mansfield to the Texas-Mexico border. Only catches of billfishes in the recreational fishery are included in this report.

## Catch and Effort

Although many factors (e.g. weather, economy,) can affect fishing intensity during a season, the delayed start and reduced coverage of the 1986 survey were apparent in our results. For example, a total of 24,905 hr of trolling effort was recorded in 1986 (Table 4), which was 14% below the 1985 total. Even though the amount of effort recorded in 1986 was below that reported during each of the previous six seasons, the 1986 effort was still 8% greater than the average for the entire northern Gulf during the previous 15 years. Consequently, the results of the 1986 recreational billfishing survey should be sufficient to measure any apparent changes that might have occurred in the fishery.

In conjunction with the trolling effort reported in 1986, anglers reported catching (including releases) 944 billfishes (Table 4). An additional 140 billfishes were reported caught for which no fishing effort was reported (Table 5). This total of 1,084 billfishes was 5% (60) below the number reported caught in 1985. In 1986, 34% (364) of the catches were released compared to 26% (292) the previous year. Blue marlin accounted for 41% (443) of the catch. Of these 443 fish, 28% (126) were released. White marlin composed 45% (483) of the billfish catch and anglers released 41% (199) of the white marlin catches. Only 14% (154) of the catch was sailfish, and of these 39 (25%) were released.

The number of billfishes hooked-per-hour-of-trolling (HPUE) are shown in Figure 5. We used this rate measure as our index of apparent relative abundance. This index is our best estimate of resource abundance, although we realize that many uncontrollable variables (i.e., angling skills, weather, fishes not striking at baits) can influence this rate.

Table 4. Hours trolled and billfishes raised (R), hooked (H), and boated/released (B/R) in the northern Gulf of Mexico, 1986.

	Hours trolled	Blue marlin			White marlin			Sailfish			Swordfish			Spearfish			All species combined		
		R	H	B/R	R	H	B/R	R	H	B/R	R	H	B/R	R	H	B/R	R	H	B/R
Northeastern Gulf	10,247	273	221	109/15	533	411	153/93	19	17	9/3	1	1	1/0	0	0	0/0	826	660	272/111
Panama City	1,822	31	25	9/1	126	102	49/15	5	5	2/1	0	0	0/0	0	0	0/0	162	132	60/17
Destin	2,492	103	68	37/8	168	83	22/38	6	4	3/1	0	0	0/0	0	0	0/0	277	155	62/47
Pensacola	2,524	66	58	28/3	112	105	50/15	5	5	2/1	0	0	0/0	0	0	0/0	182	168	80/19
Mobile	3,409	74	70	35/3	127	121	32/25	3	3	2/0	1	1	1/0	0	0	0/0	205	195	70/28
Northcentral Gulf	9,671	465	310	88/65	233	151	52/53	7	7	3/2	0	0	0/0	1	1	1/0	706	469	144/120
South Pass	7,821	435	285	79/57	208	128	40/51	6	6	3/2	0	0	0/0	1	1	1/0	650	420	123/110
Grand Isle	1,850	30	25	9/8	25	23	12/2	1	1	0/0	0	0	0/0	0	0	0/0	56	49	21/10
Northwestern Gulf	4,987	198	166	74/31	134	99	47/22	208	152	92/31	0	0	0/0	0/0	0/0		540	417	213/84
East Texas	300	18	14	6/1	29	13	5/3	3	3	3/0	0	0	0/0	0	0	0/0	50	30	14/4
Central Texas	2,595	95	71	27/8	81	62	32/7	139	98	57/14	0	0	0/0	0	0	0/0	315	231	116/29
South Texas	2,092	85	81	41/22	24	24	10/12	66	51	32/17	0	0	0/0	0	0	0/0	175	156	83/51
Total all areas	24,905	936	697	271/111	900	661	252/168	234	176	104/36	1	1	1/0	1	1	1/0	2,072	1,536	629/315

The HPUE rate (0.028) for blue marlin in 1986 was slightly lower than that (0.029) of the previous season, but remained a little above the 16-yr average rate (0.027). In the last eight years, the HPUE's for blue marlin have nearly equalled or exceeded the 16-yr average, except in 1974. The northwestern Gulf continued to have the highest rate (0.033) for blue marlin (Fig. 5). Compared to 1985, the northcentral Gulf increased 7% (0.030 vs. 0.032) and the northeastern Gulf decreased 15% (0.026 vs. 0.022).

Table 5. Numbers of billfishes reported as boated or released (/) with no accompanying data on fishing effort in the northern Gulf of Mexico, 1986.

	Number					All species combined
	Blue marlin	White marlin	Sailfish	Swordfish	Spearfish	
Northeastern Gulf	28/6	27/25	7/0	1/0	1/0	63/31
St. Petersburg	8/0	16/0	4/0	0	1/0	29/0
Panama City	1/0	1/0	0	0	0	2/0
Destin	7/0	2/0	2/0	1/0	0	12/0
Pensacola	12/4	7/23	0	0	0	19/27
Mobile	0/2	1/2	1/0	0	0	2/4
Northcentral Gulf	1/2	0/1	0	0	0	1/3
South Pass	0/2	0/1	0	0	0	0/3
Grand Isle	1/0	0	0	0	0	1/0
Northwestern Gulf	17/7	5/5	4/3	0	0	26/15
East Texas	11/7	2/5	0/3	0	0	13/15
Central Texas	5/0	3/0	3/0	0	0	11/0
South Texas	1/0	0	1/0	0	0	2/1
Total all areas	46/15	32/31	11/3	1/0	1/0	91/49

For white marlin, the 1986 HPUE (0.027) increased 8% from 1985 (Fig. 5), but remained well below the 16-yr average (0.041). Even though the HPUE rates for white marlin have fluctuated considerably in the 16-yr period, a recent decline is becoming apparent since 1984. The northeastern Gulf continued to have the highest rate (0.040) for white marlin (Table 4), increasing 5% from 1985. In the northcentral Gulf, the 1986 HPUE (0.016) for white marlin changed little from the previous season's rate (0.017). The HPUE rate for white marlin in the northwestern Gulf increased 43% (0.014 vs. 0.020) over the previous season.

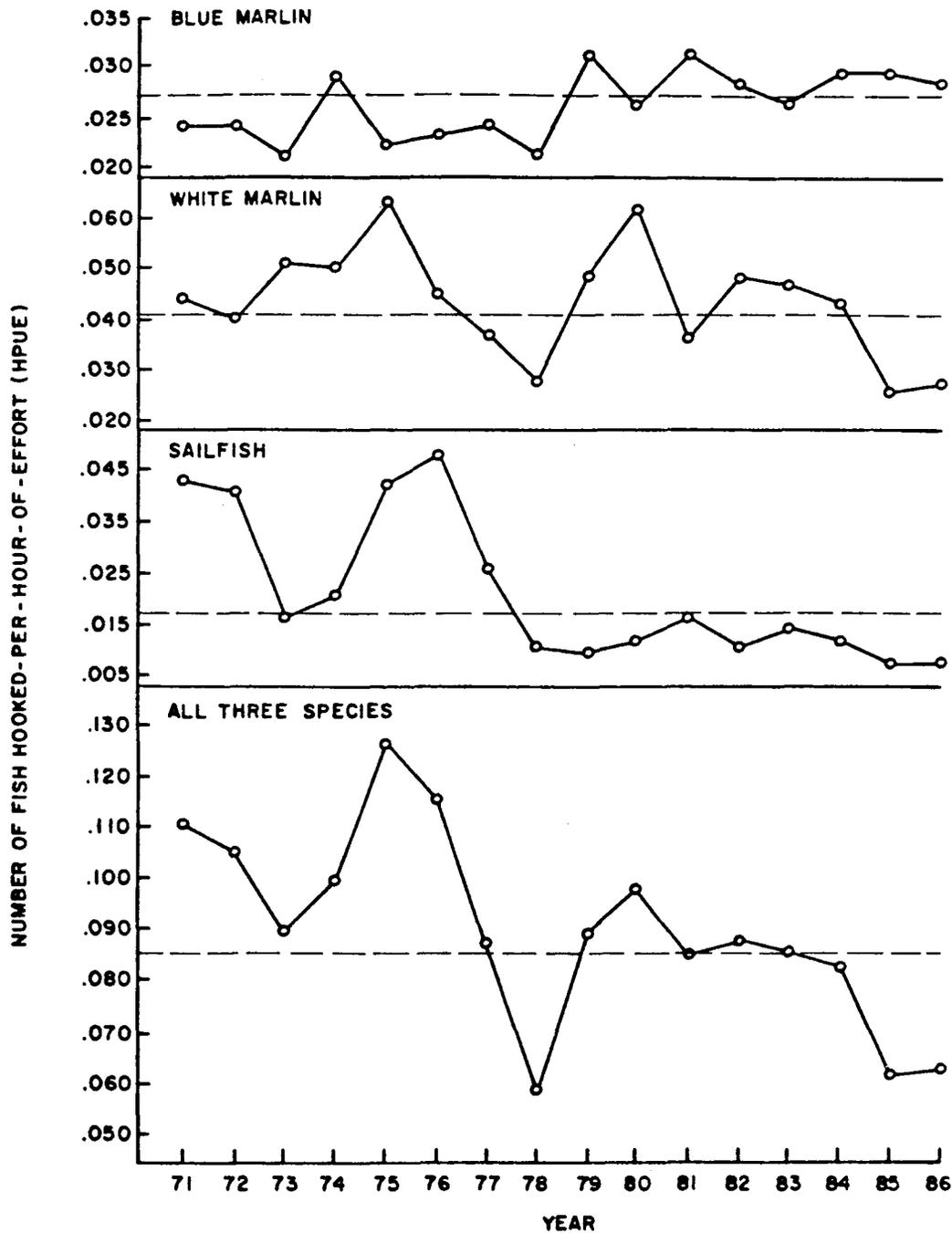


FIGURE 5. Number of billfishes hooked-per-hour-of-effort (HPUE) in the northern Gulf of Mexico, 1971-1986. Dashed line indicates 16 year average for each category.



## Size Composition

Whenever time permitted, size data (i.e., weight, length) were collected in conjunction with catch and fishing effort. A summary of the weights recorded during the season are presented in Table 6. Yearly average weights and the 16-yr accumulative averages for marlins and sailfish are shown in Figure 6. In 1986, the largest marlins and sailfish were landed in the northeastern Gulf (Table 6). This is the second consecutive year that the largest marlins recorded for the northern Gulf were landed in the northeastern area. Although the average weight of blue marlin increased 5 lb from the previous season, it still remained below the 16-yr average weight (Fig. 6). Over the past seven years, there appears to be a slightly decreasing trend in the average weight of this species. For white marlin, the decreasing trend in the average weight that occurred between 1975 and 1984 (with the exception of 1978) did not continue. The average weights for white marlin in 1985 and 1986 exceeded or equalled the 16-yr average. The average weight of sailfish remained above the 16-yr average (42 lb) and has not shown any increasing or decreasing trend over the period of this study.

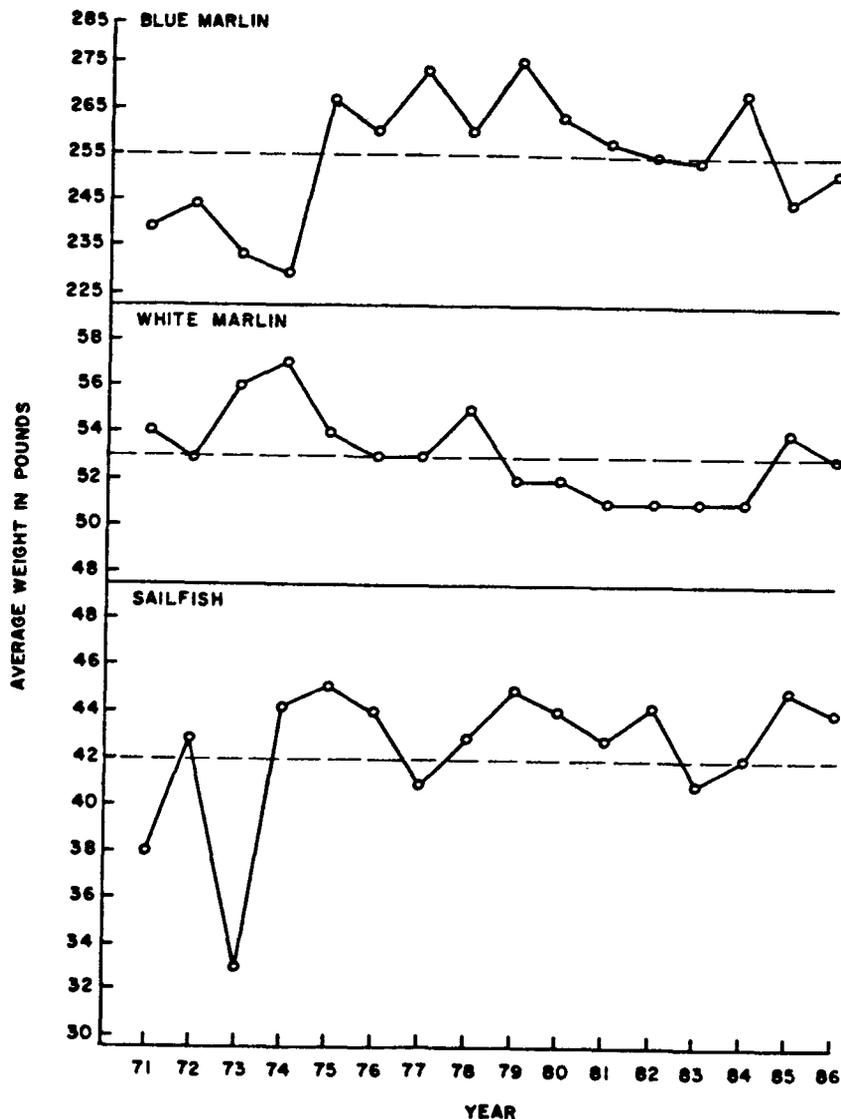


FIGURE 6 - Average weight (pounds) of billfishes in the northern Gulf of Mexico, 1971-1986. Dashed lines indicate 16 year average for each category.

## Bait Preferences

A brief summarization of the data concerning the various baits trolled in the northern Gulf are shown in Table 7. We use the HPUE rate for each bait type as an indicator of bait preference, with the understanding that billfishes may strike at a bait for reasons other than feeding activity. The popularity of artificial baits (i.e., lures) is reflected in the reported trolling effort (22,756 hr or 89%) done solely with lures. Trolling with both lures and natural baits simultaneously comprised almost 7% of the effort, while the use of dead baits and live baits only accounted for about 4% and 1%, respectively, of the total effort. The use of dead baits produced the highest HPUE (0.090) in the northern Gulf in two (northeastern, northwestern) of the three areas. Natural baits are used so infrequently in the northcentral area, that a valid comparison between natural and artificial baits in this area is not feasible. Artificial baits had the higher HPUE in all areas covered by the survey when both bait types were trolled at the same time.

Table 7. Hours trolled and numbers of billfishes hooked-per-hour-of-trolling (HPUE) with various baits fished in the northern Gulf of Mexico, 1986.

	Dead bait only		Live bait only		Artificial bait only		Both simultaneously		
	Hours trolled	HPUE	Hours trolled	HPUE	Hours trolled	HPUE	Hours trolled	Nat. HPUE	Art. HPUE
Northeastern Gulf	436	0.087	35	0.057	8,864	0.060	1,138	0.018	0.047
Northcentral Gulf	8	0	25	0.040	9,905	0.047	47	0	0.021
Northwestern Gulf	546	0.093	81	0.062	3,987	0.081	495	0.034	0.040
All three areas	990	0.090	141	0.056	22,756	0.058	1,680	0.025	0.045

## Fishing Areas

Figures 7-9 showing the number of billfish raised over the fishing grounds remains one of the most popular parts of this report. To maintain consistency with earlier reports, indices of low, mid, and high abundances derived from the numbers of billfishes raised-per-hour-of-trolling are provided for squares in which 10 hr or more of fishing effort was reported. Fishing areas are outlined in heavy black lines, with blank squares indicating no fish raised.

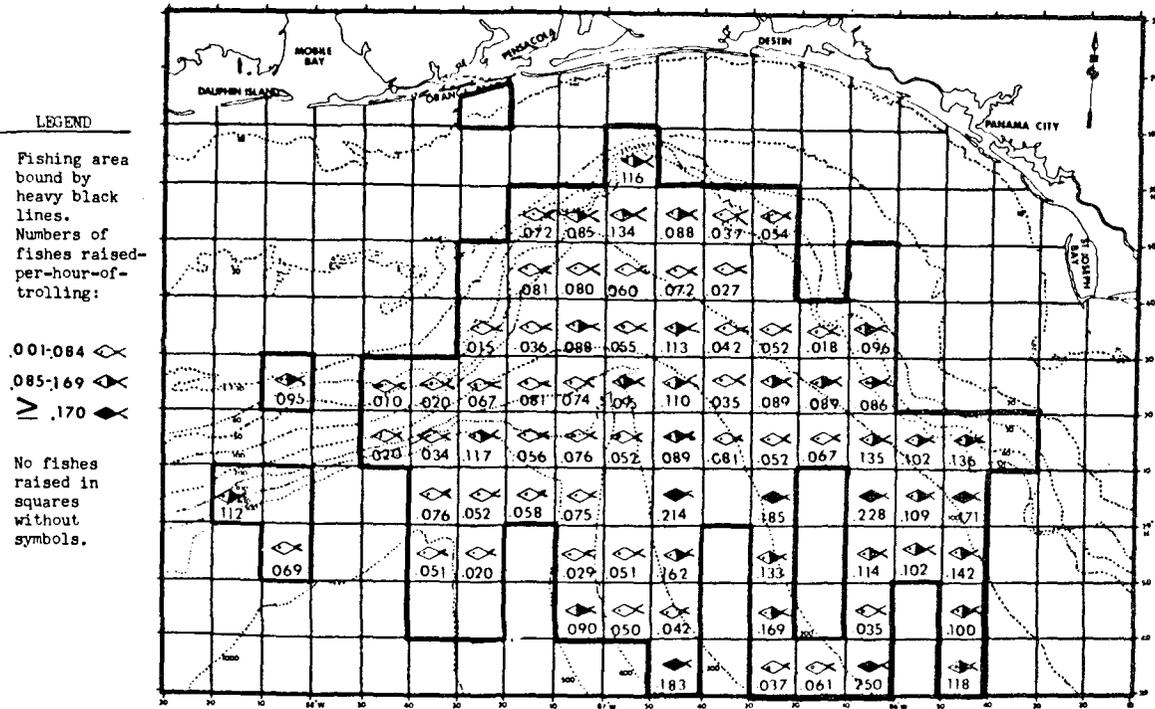


Figure 7---Numbers of billfishes raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min squares, 1986.

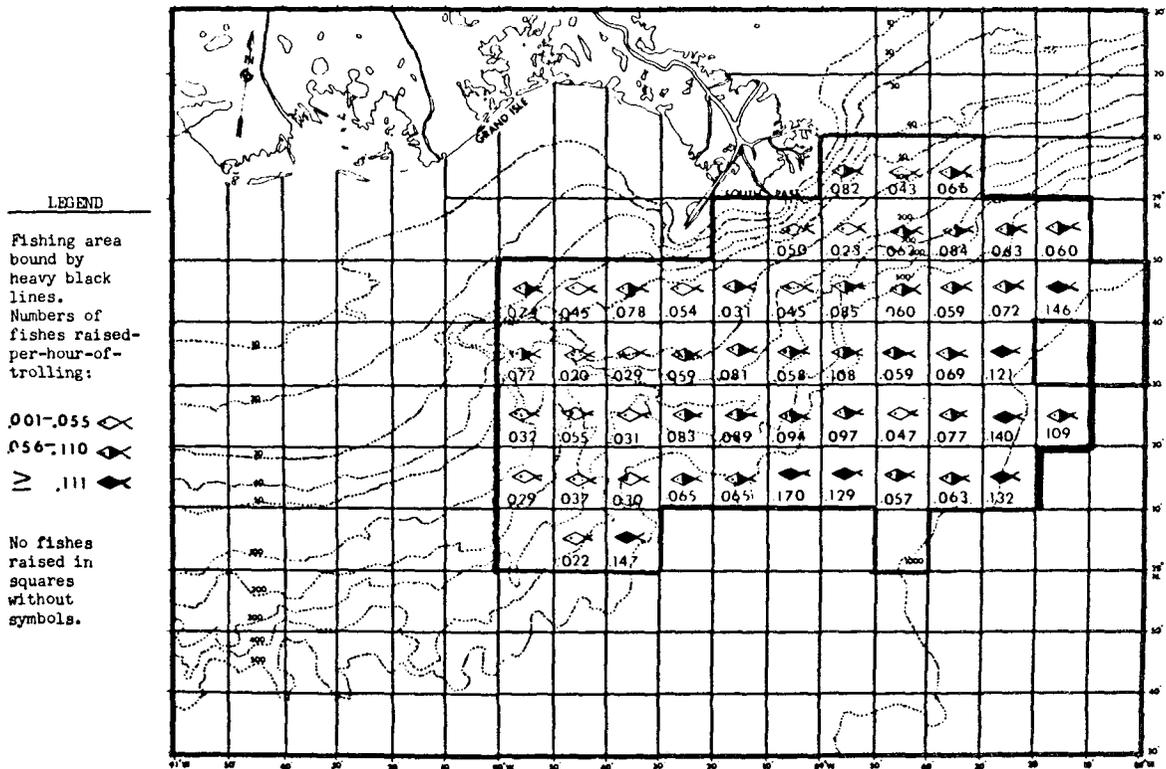


Figure 8--- Numbers of billfishes raised-per-hour-of-trolling in the northcentral Gulf of Mexico by 10-min squares, 1986.

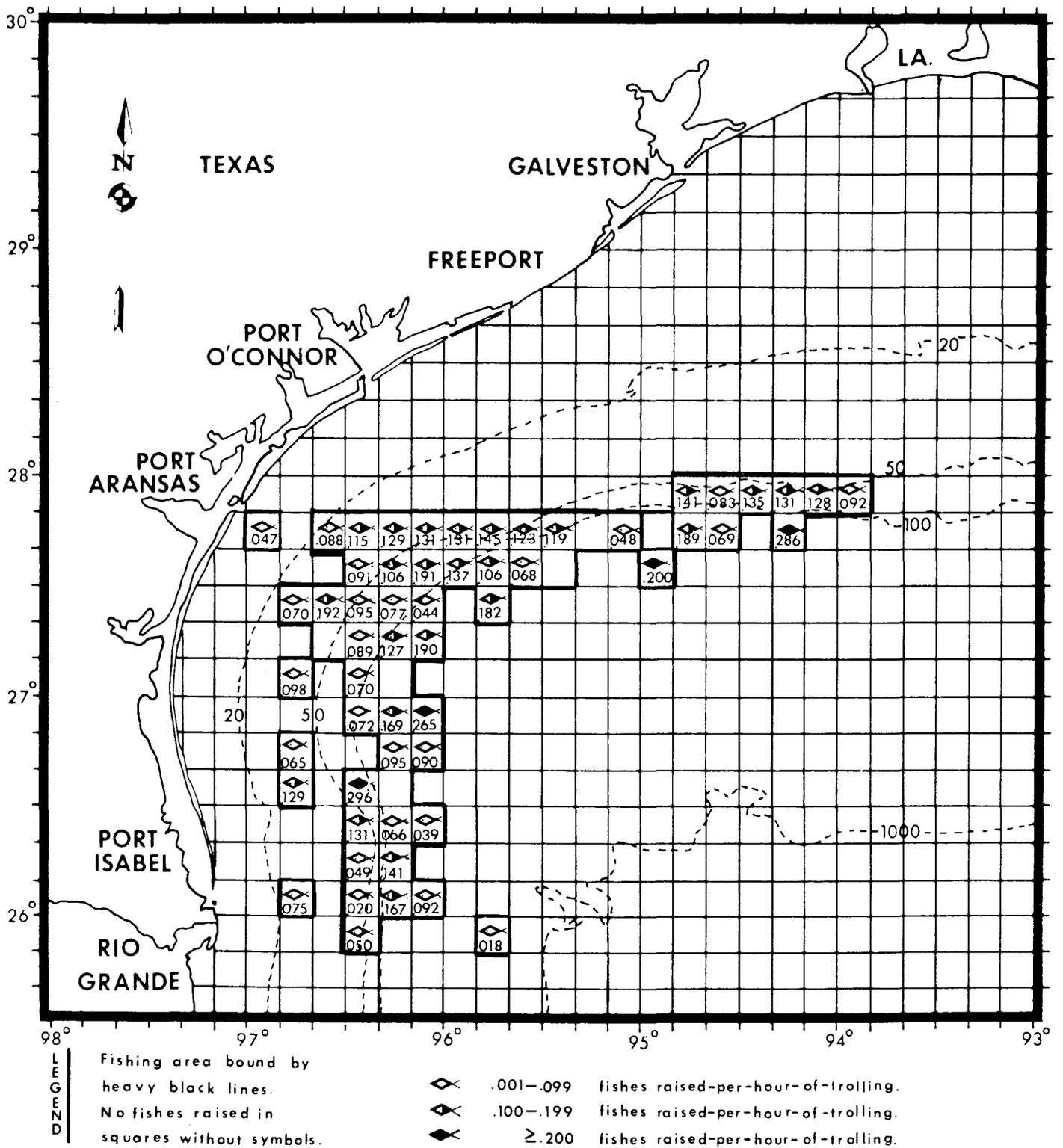


Figure 9--Numbers of billfishes raised-per-hour-of-trolling in the northwestern Gulf of Mexico by 10-min squares, 1986.

In the northeastern Gulf (Fig. 6), fishing effort was expended over a 12% larger area during the season than in 1985. In both years, some fishing was reported south of the boundary ( $28^{\circ} 30'N$ ) of our chart. However, these reports were infrequent, occurring only when anglers could not locate "blue" water closer inshore. Billfishes were raised in 89% (77 squares) of the area fished compared to 94% the previous year. The percentages of mid and high value squares were very similar in both years, while the percentage of low value squares decreased slightly (6%) from 1985. The 7% (6 squares) of high value squares occurred mainly offshore this season, in contrast to the more inshore distribution reported in 1985.

In the northcentral Gulf (Fig. 7), fishing effort was distributed over a slightly larger area than in 1985 (58 vs. 54 squares). In both years, a few infrequent trips were reported east of  $88^{\circ}W$  longitude. In contrast to 1985 when 63% of the area fished was west of  $89^{\circ}W$  longitude, the 1986 area fished was equally distributed east and west of this longitude. Although the HPUEs in 1986 and 1985 were nearly identical (0.048 vs. 0.047), the percentage (12%) of high value squares doubled in 1986, while the percentage of mid value squares was nearly five times greater than in 1985. These results would tend to indicate that billfishes were more evenly distributed throughout the area fished in 1986 than they had been during the previous season.

In the northwestern Gulf (Fig. 8), the fishing area decreased by 31% compared to 1985. I feel these findings reflect, in part, the late start and reduced effort in our survey and that the actual fishing area may have been underrepresented. However, the percentage of high value squares doubled and the percentage of mid value squares increased nearly three times over the 1985 percentages, while the combined percentage of low value and blank squares decreased 31% from 1985. These trends also coincide with the increased HPUE (0.084) in 1986 compared to 0.066 in 1985. Interpreted together, these data indicate that recreational anglers in the area enjoyed better fishing in 1986 than during the previous season.

#### Acknowledgments

A successful billfish survey in the northern Gulf of Mexico would not have been possible this year if it had not been for the support of the recreational fishing community. In addition to cooperative reporting, direct or indirect financial support was provided by many fishing organizations and tournament committees. For this support I sincerely thank the following organizations: Bay Point Invitational Tournament; Blue Marlin Classic Tournament; Coastal Conservation Association; Fort Walton Beach Sailfish Club; Golden Meadow Big Game Fishing Club; Liollio's Warmup Tournament; Mobile Big Game Fishing Club; New Orleans Big Game Fishing Club; Panama City Capt.'s Tournament; and Poco Bueno Tournament. I deeply appreciate the special efforts of the following individuals for reporting on fishing activity in their areas: George Ballard, Pensacola, FL; Eleanor Bonser, Juanita Millard, and Troy Coston, St. Petersburg, FL; Bert Bookout, Fort Walton Beach, FL; Steve Candileri, Largo, FL; Dick Hensley, Houston, TX; Jim Hubbard, Freeport, TX; Betty Tubbs, San Benito, TX; and Forrest Ware, Port St. Joe, FL.

There were about 2,949 interviews conducted by our 1986 port samplers. I thank Ann Campbell and Kit Doncaster, Port Isabel, TX; Myron Fischer, Grand Isle, LA; Julie Harding, Port Aransas, TX; Richard Kersten, Destin, FL; Sharon Priest, Orange Beach, AL/Pensacola, FL; and Joe Yurt, South Pass, LA.

## RECREATIONAL BILLFISH SURVEYS

## Western North Atlantic

Joseph P. Contillo

This is the 15th consecutive year that the Southeast Fisheries Center has conducted recreational billfish surveys in the western North Atlantic. This region includes the East Coast of the United States, the Florida East Coast and Keys, the Bahamas and Caribbean. Data were collected in the field this year by National Marine Fisheries Service biologists and fishery reporting specialists, by state and university personnel, and by cooperative fishing clubs and tournament committees.

This year's survey was unique because of the unprecedented amount of data voluntarily submitted to us from various tournaments in the southeast (Table 8). We hope this trend continues in the future, as this cooperation effort will reduce our cost of operation. Our initial experience with receiving tournament information from outside sources has been very positive; most of these data were complete. We certainly encourage anyone affiliated with billfish tournaments in our study area (western North Atlantic) to contact the NMFS Southeast Fisheries Center if you would like to help. We thank all who assisted us in the volunteer program this year.

Table 8. Tournament names, dates, locations and contact persons for data voluntarily submitted to NMFS western North Atlantic Billfish Survey, 1986.

Tournament	Location	Dates	Data Provided By
International Womens Fishing Association	Palm Beach, FL	7/22-7/24	Cathy Williams
Walkers Cay Annual Billfish (2nd Leg Bah Cha)	Walkers Cay, Bahamas	4/7-4/11	Godfrey Waugh
Bertram-Hatteras Shootout	Walkers Cay, Bahamas	4/24-4/26	Godfrey Waugh
Walkers Cay 2nd Leg	Walkers Cay, Bahamas	4/28-5/2	Godfrey Waugh
Bohicket-Seabrook Billfish	Charleston, SC	5/8-5/10	Don Hammond
Georgetown Blue Marlin	Georgetown, SC	5/23-5/24	Don Hammond
Treasure Cay International Billfish	Treasure Cay, Bahamas	5/26-5/30	Karen Roberts
Hilton Head Island Billfish	Sea Pines, SC	6/12-6/14	Don Hammond
Hemingway Days Tournament	Key West, FL	7/17-7/19	Art Barton
IBL Key West	Key West, FL	10/21-10/23	Linda Baron
Annual World Class Angler Billfish	Marathon, FL	10/26-10/30	Bailey Bobbitt
Annual Stuart Light Tackle Sailfish	Stuart, FL	12/10-12/14	Capt. Chuck Reed, III

Data collected from these surveys included fishing effort; the number of billfish (by species) hooked and caught; length, weight and sex of fish landed; the types of bait used; as well as various environmental data associated with each fishing trip. Hook-per-unit-effort (HPUE) was calculated by dividing the number of fish hooked by the number of hours spent trolling, and catch-per-unit-effort (CPUE) was calculated by dividing the number of fish caught by the number of hours spent trolling. A fish that is recorded as caught can be one that is boated, released, or tagged. Calculations of HPUE and CPUE for different baits -- natural (dead), artificial (lures), both trolled simultaneously, as well as live bait are also discussed. A total of 36,527 hours of fishing effort were documented for the western North Atlantic in 1986, compared to 29,102 hours of fishing effort documented in 1985.

### The East Coast of the United States

The 1986 U.S. East Coast tournament data includes only information collected from North and South Carolina. National Marine Fisheries Service biologists sampled billfish tournaments held in North Carolina, while the South Carolina Wildlife and Marine Resources Department provided data from tournaments held in South Carolina. The information collected from Virginia Beach, Virginia, northward was not available at press time and will be included in our 1987 program summary. The 1985 data, which were destroyed by fire at the Northeast Fisheries Center's Sandy Hook Laboratory, were reconstructed from field notes and are presented at the end of this report.

A total of 2,834 hours of tournament fishing effort from 5 tournaments (Table 9) was sampled in 1986. The incomplete reporting in 1986 from Virginia Beach, Virginia, northward obviously omitted a large portion of the survey from the East Coast. This is particularly obvious when 1986 effort is compared to the 5,105 hours of fishing effort from 6 tournaments recorded in 1985, and the over 8,500 hours from 18 tournaments recorded in 1984. Next year we plan to increase our sampling in this area.

Table 9. Hook-per-unit-effort (HPUE) of billfishes by species and geographical area recorded in NMFS recreational surveys of the northwest Atlantic in 1986.

Species	U.S. East Coast	Bahamas	Caribbean	Florida East Coast & Keys
Blue Marlin	0.017	0.015	0.079	0.011 <sup>1</sup>
White Marlin	0.011	0.005	0.001	0.000 <sup>2</sup>
Sailfish	--	0.003	0.000	0.033 <sup>2</sup>
Overall	0.028	0.023	0.080	0.041 <sup>2</sup>
Hours of fishing effort	2,834	13,588	3,735	5,449 <sup>2</sup>

<sup>1</sup>Data were from Key West Blue Marlin, IBL Key West and World Class Angler Billfish Tournaments only.

<sup>2</sup>Data were from Key West Blue Marlin, IBL Key West, World Class Angler Billfish, Key Colony Sailfish, Palm Beach Masters and Invitational Gold Cup Team Tournaments (Trolling) only.

Overall HPUE (all species combined) for 1986 was 0.028 (Table 9), which is down from last year's value of 0.066. The low hours of effort sampled this year probably affected the reliability of the 1986 HPUE values for this area and this must be considered when comparing the data with previous years. Individual HPUE's for blue and white marlin are also listed in Table 9. There was not enough data to calculate an HPUE for sailfish this year.

In 1986, 75% of the billfish reported caught from the East Coast of the United States during our surveys were released, compared with only 6% in 1985. Although this appears to be representative of an increasing trend toward the release of tournament caught billfish we have observed from all areas this year, the number of hours sampled and the formats of the individual tournaments we cover also influence these data.

The overall average weight of blue marlin caught off the East Coast of the United States was 280.6 pounds (Table 10), which is essentially the same as last year's value of 279.2 pounds. East Coast blue marlin have had the highest average weights in our 4 sampling areas for 13 of the 15 years we have been conducting our survey. The largest blue marlin we sampled in our 1986 East Coast survey weighed 575.0 pounds. However, a 1,174 pound blue marlin was reported landed off Montauk, N.Y. during the summer of 1986. Overall average weights for white marlin and sailfish were 45.3 pounds and 22.7 pounds, respectively; these weights are both down slightly from last year. Average weights by species and geographical areas for 1986, as well as 15 year average weights, are shown in Figure 10.

Table 10. Average weights (pounds) by species and geographical area, recorded in western North Atlantic recreational billfish surveys for 1986. Fifteen year averages are also included.

Species	U.S. East Coast <sup>1</sup>		Bahamas		Caribbean		Florida East Coast & Keys		All Areas Combined <sup>2</sup>	15 Yr. Average
	1986	15 yr. average	1986	15 yr. average	1986	15 yr. average	1986	15 yr. average		
Blue Marlin										
Male	175.9	191.2	143.8	147.7	126.3	136.4	212.3	153.8	164.6	148.1
Female	346.7	324.6	307.8	283.4	258.8	309.3	310.5	249.6	305.9	280.0
Overall	280.6	281.8	222.8	216.0	182.8	203.8	274.5	209.6	240.2	255.2
White Marlin										
Male	47.0	50.5	51.6	52.9	--	49.7	--	48.8	49.3	50.5
Female	--	56.1	57.7	68.6	47.7	60.8	57.5	61.3	54.3	62.9
Overall	45.3	51.6	56.1	60.6	47.7	57.5	54.6	52.5	50.9	55.8
Sailfish										
Male	--	34.9	45.4	39.2	--	43.4	39.8	31.8	42.6	38.0
Female	--	44.1	25.0	45.5	--	49.8	49.8	38.6	37.4	43.6
Overall	22.7	36.0	39.6	42.4	--	36.9	41.9	34.0	34.7	37.8

<sup>1</sup>Data does not include information from Virginia Beach, Virginia and north.

<sup>2</sup>Average weights of all fish weighed in 1986 by species.

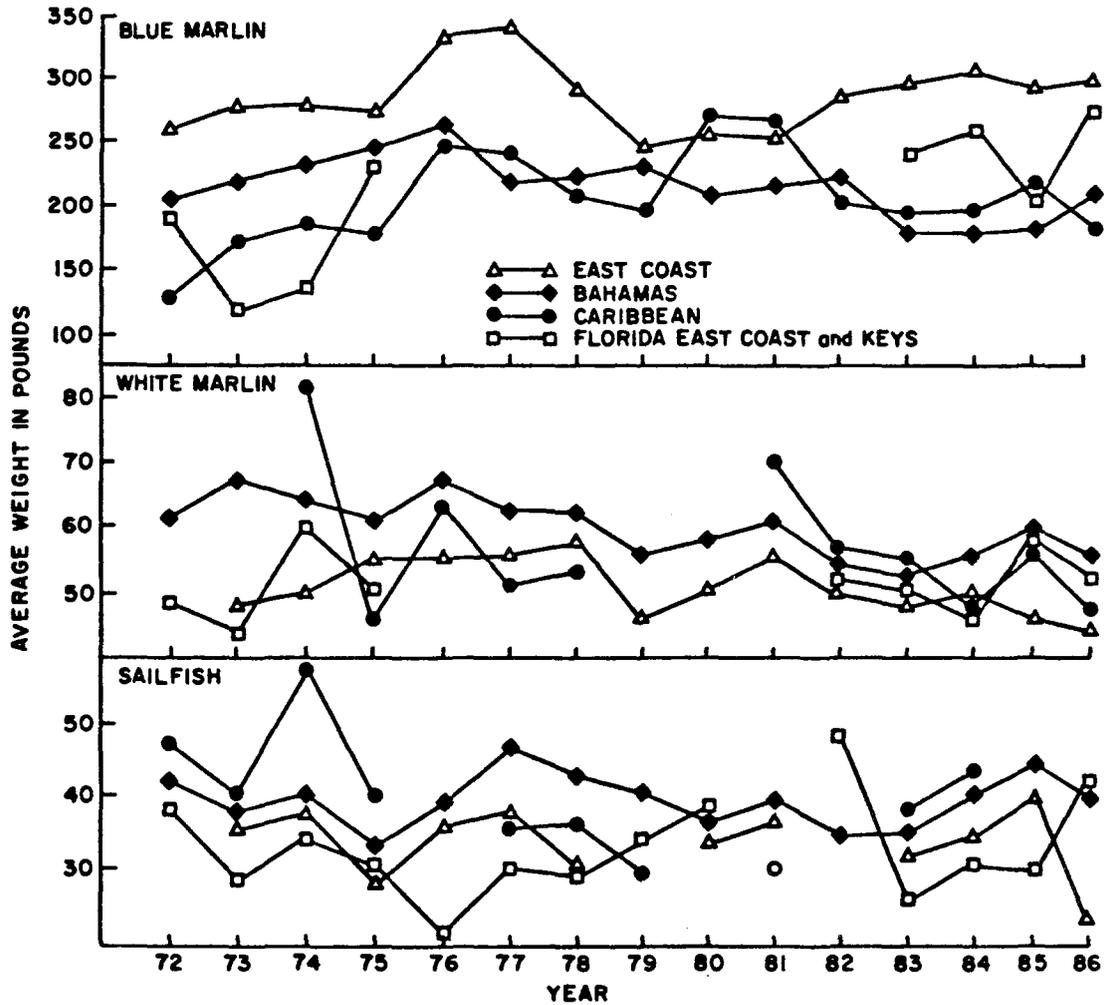


FIGURE 10. Average weights (pounds) of billfishes (both sexes combined) from the U.S. east coast (△), Bahamas (◆), Caribbean (●), and Florida east coast and Keys (□), 1972 - 1986.

### The Florida East Coast and Keys

We were able to expand our coverage of tournaments held along the Florida East Coast and Keys this year by relying on individuals outside NMFS to assist us in collecting these data. A total of 16,370 hours of effort was documented from this area in 1986, almost double the 8,480 hours reported in 1985. Much of the extra data were provided through the mail or over the phone, and we thank all those who helped in this effort (Table 8).

Several tournaments in this area changed rules and formats in 1986. A 300 pound minimum weight and a cash award encouraging tag-release were initiated for the first time during the Annual Key West Blue Marlin Tournament (KWBM). Anglers participating in the Florida Keys Triple Crown series were permitted to use live bait during all 3 tournaments for the first time in 1986. Also, the Ft. Lauderdale Semi-Annual Billfish Tournament switched to a tag-release format this year. These new rule changes, along with our volunteer reporting of tournament information, will influence the results of the survey from this area in 1986.

We documented 4,142 hours of fishing effort from the Florida East Coast and Keys directed specifically toward marlin in 1986. This figure was more than 30% higher than last year's total of 2,668 hours. In addition to the Key West Blue Marlin Tournament, we sampled the IBL Key West Tournament, the World Class Angler Billfish Tournament and the Hemmingway Days Tournament in our 1986 survey. Blue marlin HPUE for 1986 (0.011) was down from last year's all time high of 0.034. There were not enough data to calculate an HPUE for white marlin, while HPUE for sailfish hooked during marlin tournaments was 0.006.

The overall average weight of blue marlin sampled along the Florida East Coast and Keys in 1986 was 274.5 pounds (Table 10). This was a considerable increase over last year's value of 210.6 pounds, and is due largely to the influence of the new weight restrictions. The largest blue marlin sampled from this area in 1986 weighed 360.5 pounds and was caught on live bait during the Ft. Lauderdale Semi-Annual Billfish Tournament in April. Overall average weights for white marlin (54.6 lbs.) and sailfish (41.9 lbs.) were generally within the normal range of weights we have observed in past years.

We also expanded our coverage of sailfish tournaments in 1986 and were able to document the changes in effort associated with the new rules allowing the use of live bait. A total of 3,747 hours of trolling effort (dead bait and to a lesser extent artificials) was reported in 1986 as compared to last year's total of 5,142 hours, while 8,480 hours were spent live baiting this year compared with only 1,479 hours in 1985.

This year, and in subsequent reports, our sailfish tournament catch information from the Florida East Coast and Keys will, for the most part, be reported as catch-per-unit-effort (CPUE), rather than hook-per-unit-effort (HPUE). This means that in order for a sailfish to count statistically, it would have to be listed as caught (boated, released, or tagged). By using this approach, we will be able to include many more sailfish tournaments in our survey and greatly expand our coverage by utilizing volunteered data. Sailfish hook-per-unit-effort data will be reported for those Florida East Coast and Keys tournaments from which it is available (Table 9).

In 1986, anglers spent 3,748 hours trolling dead bait for sailfish and caught 222 sailfish, 2 white marlin, and one blue marlin; the total CPUE for all species combined was 0.060. The 8,480 hours spent livebaiting resulted in the catch of 327 sailfish, 2 blue marlin and 1 white marlin; the total CPUE for all species combined was 0.038. An explanation of these results are given in the bait preference section.

## The Bahamas

National Marine Fisheries Service biologists attended billfish tournaments held in Bimini, Cat Cay and Chub Cay, while Aqualife biologist Godfrey Waugh stationed at Walkers Cay, sampled at billfish tournaments held there. Tournament information from Treasure Cay was provided by Karen Roberts. A total of 13,588 hours of fishing effort were recorded from the Bahamas in 1986.

Overall HPUE for the Bahamas in 1986 was 0.023 (Table 9) compared to 0.039 in 1985. This is the lowest value reported from the Bahamas since sampling was initiated in 1972, and well below the previous 14 year average of 0.049. Individual HPUEs for blue marlin (0.015), white marlin (0.005), and sailfish (0.003) were also among the lowest values reported from the Bahamas in the 15 year history of our survey.

Minimum weights for tournament caught billfish were adopted in the Bahamas for the first time in 1986. The Bahamas Championship Series set minimum weights for blue marlin, white marlin and sailfish at 100 pounds, 50 pounds and 25 pounds, respectively. All other billfish tournaments we sampled in the Bahamas followed these minimum weights, with the exception of the Chub Cay Club which set a minimum weight for blue marlin at 200 pounds. These new weight rules will undoubtedly affect the size frequency of billfish boated in the Bahamas. For example, we have been recording overall average weights of under 200 pounds for blue marlin landed in the Bahamas since 1983 (Fig. 10). In 1986, the overall average weight for blue marlin was 222.8 pounds (Table 10), largely due to the absence of blue marlin below 100 pounds in our samples. Average weights by sex of blue marlin, white marlin and sailfish boated in the Bahamas this year are also included in this year's weight table (Table 10). Since male blue marlin rarely grow to over 250 pounds, the new size regulations will affect these sex data as well. The largest blue marlin we observed in our survey of the Bahamas weighed 661 pounds and was caught at Walkers Cay in April.

Of the 220 billfish boated in the Bahamas last year (1985), 51 (23%) would have been under the respective minimum weights established this year. In 1986, only 8 (9%) of the 94 billfish which were boated were "under weight". The minimum weight for blue marlin caught during the 1987 Bahamas Championship Series has been set at 200 pounds. If these new regulations had been in place during the 1986 Bahamas Championship Series, 16 (35%) of the blue marlin would have been over the 200 pound limit while 29 (65%) would have been under the 200 pound limit. In addition, 51% of all tournament caught billfish in the Bahamas this year were released and of these 23 were tagged. Only 8% of the tournament caught billfish in the Bahamas in 1985 were released and only one of these were tagged.

## Caribbean

A total of 3,735 hours of fishing effort was sampled in 1986. Biologist Marielle Brandon, from the U.S. Virgin Islands Division of Fish and Wildlife, sampled two tournaments in St. Thomas, and a NMFS biologist from the Southeast Fisheries Center attended the San Juan International Billfish Tournament in Puerto Rico.

As has been the case in past years, overall HPUE for all species combined (0.080) from the Caribbean (Table 9) was the highest of all areas sampled. The concentration of blue marlin in this area is the primary reason why this rate is so high; white marlin and sailfish make up a minor portion of the catch. The HPUE for blue marlin was 0.079 this year, up slightly from last year's value of 0.071.

The overall average weight of blue marlin decreased from last year's value of 232.7 pounds to 182.8 pounds in 1986 (Table 10). White marlin averaged 47.7 pounds, down from last year's average weight of 59.0 pounds. There were no sailfish reported caught in 1986 (Table 11). The largest blue marlin boated in the Caribbean during our sampling weighed 446 pounds and was caught during the San Juan International Billfish Tournament. However, the U.S. Virgin Islands Division of Fish and Wildlife reported a 918 pound blue marlin caught off St. Thomas in 1986.

Table 11. Number of billfish (by species) hooked, boated, lost, released, and tagged by geographical area in the western North Atlantic, 1986.

Species	U.S. East Coast	Bahamas	Caribbean	Florida East Coast & Keys
<b>Blue Marlin</b>				
Hooked	47	206	295	47
Boated	12	78	111	13
Lost	30	77	143	12
Released	5	37	6	1
Tagged	0	14	35	21
<b>White Marlin</b>				
Hooked	30	69	4	7
Boated	6	19	3	4
Lost	3	16	1	1
Released	20	29	0	2
Tagged	1	5	0	0
<b>Sailfish</b>				
Hooked	2	38	0	0
Boated	1	7	0	79
Lost	0	10	0	73
Released	1	17	0	352
Tagged	0	4	0	136
<b>Overall</b>				
Hooked	79	313	299	694
Boated	19	104	114	96
Lost	33	103	144	86
Released	26	83	6	355
Tagged	1	23	35	157

Although most billfish caught during Caribbean tournaments we have monitored in the past have been boated, we observed a slight increase in the number of billfish released this year. Of the 155 billfish (mostly blue marlin) reported caught during tournaments which we monitored in 1986, 41 (26%) were released; 35 of these were tagged. In 1985, 25 (22%) of the 114 billfish reported caught were released and 11 of these were tagged.

### Bait Preference

The effectiveness of each bait type, in terms of HPUE and CPUE for billfish (all species combined), in the 4 geographical areas are given in Table 12. Bait categories include natural (dead), artificial (lures), and both (dead bait and lures) trolled simultaneously. This year an additional section was included comparing the CPUE values for live and dead bait from sailfish tournaments held along the Florida East Coast and Keys (Table 12).

Table 12. Hours trolled, hook-per-unit-effort (HPUE), catch-per-unit-effort (CPUE), and percent fish caught for three types of trolling baits (natural bait, artificial bait, and both simultaneously) in the four geographical areas of the western North Atlantic, 1986. Live and dead bait information for the Florida East Coast and Keys is also provided.

Bait Type	Hours Fished	HPUE	CPUE	Percent Fish Caught
East Coast <sup>1</sup>				
Natural	1,168	0.059	0.025	42
Artificial	681	0.028	0.015	52
Both Simultaneously	180	0.033	0.011	38
Bahamas				
Natural	3,958	0.037	0.025	67
Artificial	3,069	0.043	0.031	72
Both Simultaneously	1,450	0.018	0.010	55
Caribbean				
Natural	119	0.126	0.075	60
Artificial	1,290	0.153	0.084	55
Both Simultaneously	543	0.134	0.063	47
Florida East Coast & Keys <sup>2</sup>				
Natural	113	0.008	0.008	100
Artificial	2,281	0.013	0.009	70
Both Simultaneously	275	0.004	0.004	100
Florida East Coast & Keys <sup>1</sup>				
Dead	3,748	-	0.060	-
Live	8,480	-	0.038	-

<sup>1</sup>Data from Florida East Coast & Keys Sailfish Tournaments only.

<sup>2</sup>Data from Key West Blue Marlin Tournament.

There were no real changes in the trends in bait preference we have observed over the past several years. In general, natural baits were most effective in hooking and catching billfish along the East Coast of the United States, while artificials were slightly more effective than naturals in hooking marlin in the Caribbean, Bahamas, and Florida East Coast and Keys. Over the past several years, we have documented a steady increase in the number of hours spent trolling artificials in these areas. As in past years, trolling both baits (natural and artificial) simultaneously was generally most effective in hooking blue marlin in the Caribbean. This has been attributed to the methods of rigging natural baits in the Caribbean, which can be trolled at the higher speeds normally associated with lure fishing. Of the 71 blue marlin reported hooked in the Caribbean while trolling both baits simultaneously, 44 (62%) struck artificial baits while 27 (38%) struck the naturals. Overall, artificials were generally more effective than natural baits in catching billfish once they were hooked.

This year, we presented CPUE statistics for live and dead bait used during sailfish tournaments along the Florida East Coast and Keys (Table 12). Although more sailfish were actually caught using live bait (327 as opposed to 222 on dead bait), when the amount of hours spent fishing each bait are considered, dead baits were more effective in catching billfish in 1986. We believe this result is misleading because the data are heavily influenced by the fact that all 1986 Palm Beach tournaments we sampled, which did not allow live bait (Appendix Table I), were during the winter months when sailfishing is at its best. In addition, most of the sailfish tournaments that did allow live bait (e.g., Ft. Lauderdale Semi-Annual Billfish, Islamorada Sailfish) occurred in an area, or time, where sailfish were less abundant than the known winter concentration around Palm Beach. Next year we will have live bait data from Palm Beach and comparisons of bait preference will be more meaningful.

#### HPUE for all areas combined

When the data from all areas are combined, a yearly HPUE value can be generated for each species which may give a general overall indication of change in relative abundance from year to year. The trends illustrated in Figure 11 show the yearly fluctuations in HPUE for marlins and sailfish over the past 15 years of our survey. All three species had decreased HPUE values in 1986. The largest decrease in HPUE was shown for blue marlin (0.034 in 1985 to 0.025 in 1986) and is generally due to the poor blue marlin fishing experienced in the Bahamas and Florida Keys in 1986. Overall, total HPUE (for all 3 species) decreased from 0.052 in 1985 to 0.036 in 1986. This decline is a continuance of a downward trend in total HPUE, which started in 1983. However, 3 years of decreasing hook rates may not necessarily be indicative of a significant trend.

One of the more significant observations noted in this year's survey was the overall increase in the numbers of tournament caught billfish which were released and/or tagged in 1986. Many of these releases were a direct result of the new weight restrictions which were adopted in the Florida Keys and Bahamas this year. However, there has also been a tendency for the growing number of new billfish tournaments, as well as some of the more established events, to place more emphasis on releasing and tagging billfish. This year we have included released and tagged categories in Table 4, and we will continue to monitor these trends in future reports.

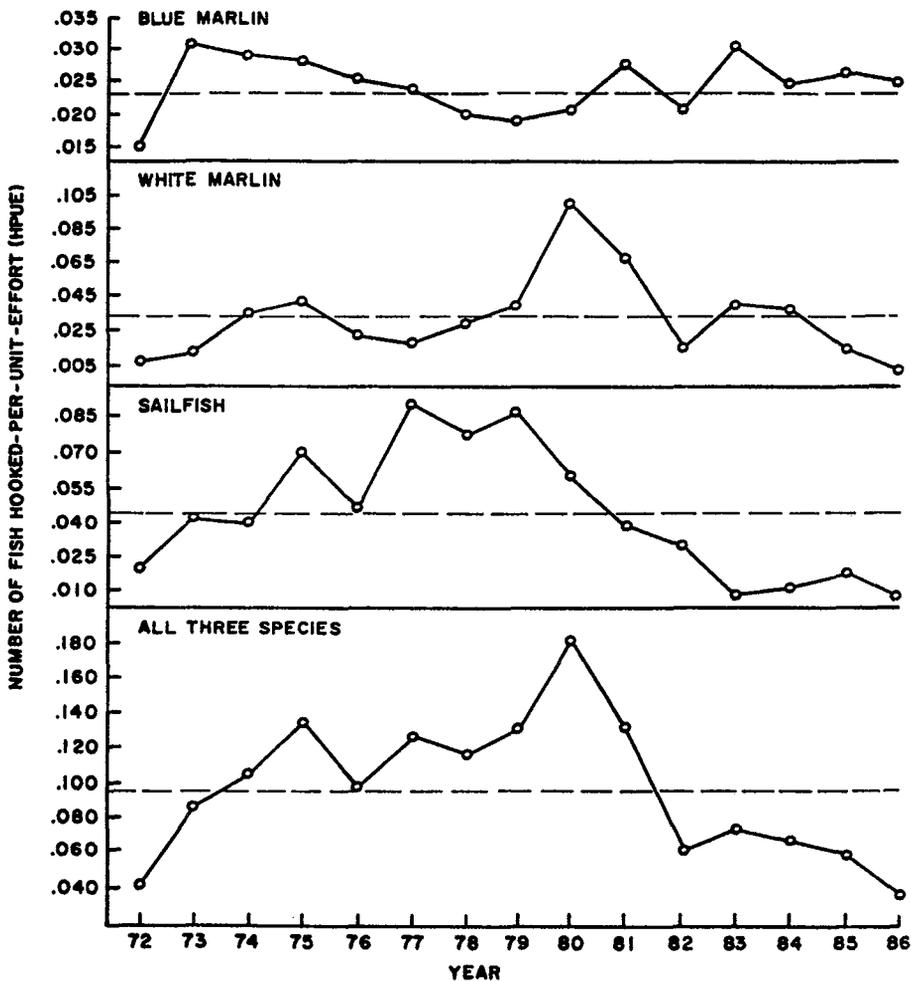


Figure 11. Number of billfishes hooked-per-unit-effort (HPUE) in the four geographical areas of the western Atlantic, 1972-1986. Dashed line indicates 15 year average for each category.

#### Northeast Data - 1985

A fire at the NMFS Northeast Fisheries Center's Sandy Hook Laboratory destroyed all data collected from Virginia Beach, Virginia, northward in 1985. As a result, the data were not available to be included in the 1985 summary. These data were reconstructed from field notes and are presented in this special section.

A total of 15,846 hours of fishing effort directed toward billfish in 1985 were documented by NMFS personnel conducting telephone surveys and random dock sampling of private, charter, and tournament fishing vessels. The information generated from these surveys only included fish caught and as a result, the data were reported as catch-per-unit-effort.

Overall catch-per-unit-effort (all species combined) for the northeast in 1985 was 0.025. A total of 394 billfish were reported caught (307 white marlin, 82 blue marlin, and 5 sailfish). Individual CPUE's for white marlin and blue marlin were 0.019 and 0.005 respectively. A CPUE value for sailfish was not calculated because so few were reported.

The overall average weights (both sexes) of blue marlin (343.9 pounds) were up from the average weight of 313.5 pounds reported from this area in 1984. Overall average weights of white marlin (48.7 pounds) and sailfish (35.0 pounds) were both down slightly from the values reported in 1984.

#### Acknowledgements

The success of this program is dependant upon the information collected from recreational fishermen. A great deal of gratitude is extended to all of the anglers, captains and crew members, as well as tournament directors and officials for their cooperation in this year's survey.

In addition to those people already mentioned, we would especially like to thank the following organizations and individuals for their support: the Bimini Big Game Fishing Club, Bimini Blue Water Ltd., the Cat Cay Club, the Chub Cay Club, Club Nautico de San Juan, Bill Allan, Charlie and Billie Anderson, Larry Dukehart, Bill Kelley, M. "Skippy" Pasteur, Dick Raffo, Mary Jo Spence, Dade Thornton, and Norm Wood.

## COOPERATIVE GAME FISH TAGGING PROGRAM

Edwin L. Scott and Joseph E. Tashiro

This report summarizes the activities of the Cooperative Game Fish Tagging Program for 1986. Program cooperators tagged and released 5,655 fish of 36 species. As in past years, billfish as a group led the species list with 4,091 tagged: 2,180 sailfish, 875 white marlin, 779 blue marlin, and 257 swordfish. There were 400 tuna tagged and released: 228 yellowfin, 64 blackfin, 51 bluefin, and 57 other miscellaneous tunas. Due to increased fishing pressure on the stocks of red drum and king mackerel, an increased effort was initiated to tag these species so more information on their life habits could be obtained. The Cooperative Game Fish Tagging Program assisted in this effort and in 1986, there were 300 red drum and 454 king mackerel tagged and released by scientists, sportfishermen, and commercial fishermen. There were 150 fish tagged of 18 miscellaneous species.

## Sailfish

There were 2,180 sailfish tagged and released in 1986. There were 2,141 tagged by sportfishermen and 39 by commercial fishermen. The east coast of Florida was the major tagging area with 1,196 releases; 360 off Cancun, Mexico; 280 off Venezuela; 208 off Cozumel, Mexico; 53 in the Gulf of Mexico; 36 in the Bahamas; 7 off the Mid-Atlantic Bight (Cape Cod, Massachusetts to Cape Hatteras, North Carolina); and 6 off the Virgin Islands and Puerto Rico. There were 34 sailfish tagged and released in the Pacific Ocean.

There were 44 sailfish recaptured in 1986 (Appendix Table II): 39 by sportfishermen, 4 by commercial fishermen, and 1 without gear information. There were 30 sailfish recaptured from releases between Palm Beach and Ft. Pierce, Florida: 21 were recaptured in the same area of release, 6 were recaptured in the Keys, 2 from Miami-Ft. Lauderdale areas, and 1 recaptured at Isla Mujeres, Mexico. There were three recaptures from sailfish released in the Florida Keys; all were recaptured in the same area. There were two recaptures from sailfish released at Isla Mujeres, Mexico; one was recaptured in the same area of release and the other recapture, the first that has been recaptured away from the general area of release, was made in the Gulf of Mexico (20°50'N, 87°00'W). There were two recaptures of sailfish released off Venezuela; one in the same area of release and the other off Trinidad, West Indies. A sailfish released off Key Biscayne, Florida, was recaptured off Boca Raton, Florida, and a sailfish released off Ft. Lauderdale, Florida, was recaptured off Juno Beach, Florida. We had our first recapture of a sailfish released at Dakar, Senegal, West Africa; it was recaptured in the same area of release. In 1986, we received a report of a sailfish recaptured in 1984 off the northeastern coast of Cuba that had been tagged and released off Cozumel, Mexico. Three recaptures did not have release information available.

There were two sailfish that were at liberty for less than 1 day. Seventeen sailfish were at liberty for less than 1 year; 8 for 1-2 years; 2 for 2-3 years, and 1 for 4 years and 2 weeks. The 1984 recapture reported from a Cozumel release was recaptured 199 days later off the northeastern coast of Cuba (21°31'N, 77°20'W).

### White Marlin

There were 876 white marlin tagged and released in 1986. Sportfishermen tagged 676, commercial fishermen tagged 200, and NMFS observers aboard Japanese longliners tagged 40 white marlin. The leading tagging area was the Gulf of Mexico with 327 releases; 210 off the coast of Venezuela, 132 in the Mid-Atlantic Bight, 54 off the Florida east coast, 46 in the Bahamas, 44 at Cozumel and Cancun, Mexico, 36 by commercial fishermen in the western North Atlantic (over 200 miles off the northeastern coast of the United States), 11 off the Virgin Islands and Puerto Rico, 9 off Bermuda, 3 off Hispaniola, 2 off Cuba, and 1 off Vitoria, Brazil.

There were 16 white marlin recaptured in 1986 (Appendix Table II). Nine recaptures were from white marlin released in the Gulf of Mexico, 8 were recaptured in the Gulf of Mexico, and one off the north coast of Cuba. There were 4 recaptures from releases off Venezuela (La Guaira area); all were recaptured in the same general area of release. There were 2 recaptures from the Mid-Atlantic Bight area; one was recaptured off Stuart, Florida, and the other off Curacao, Netherlands Antilles. There was one recapture of a release from Walkers Cay, Bahamas; it was recaptured in the northeastern Gulf of Mexico. There were 5 white marlin at-large for less than 1 year, 7 for 1-2 years, 2 for 2-3 years, 1 for 3.7 years, and 1 for 6.1 years. The longest distance traveled by a tagged and recaptured white marlin was from Oregon Inlet, North Carolina to Curacao, Netherlands Antilles, over 1500 n. miles. This fish was at liberty for 854 days.

### Blue Marlin

There were 778 blue marlin tagged and released in 1986. Sportfishermen tagged and released 727, commercial fishermen tagged 47, and NMFS observers aboard Japanese longline vessels tagged 4. St. Thomas, Virgin Islands, was the top tagging area with 348 blue marlin tagged and released. There were 126 blue marlin tagged in the northeastern Gulf of Mexico, 91 in the Bahamas, 54 off the Florida east coast, 43 off La Guaira, Venezuela, 30 off Bermuda, 22 off the Cayman Islands, 17 off Cozumel and Cancun, Mexico, 16 off the Mid-Atlantic Bight, 14 in the western Atlantic (over 200 miles offshore, tagged by commercial fishermen), 7 off Puerto Rico, 4 off Hispaniola, 2 off Cuba, 2 off the Canary Islands, 1 off the Ivory Coast, West Africa, and 1 off the California coast.

There were 2 blue marlin recaptured in 1986 (Appendix Table II). A blue tagged by a commercial longliner in the northeastern Gulf of Mexico (28°00'N, 85°00'W) was recaptured 134 days later by a sportfisherman off Key West, Florida. A blue marlin tagged by a sportfisherman in the northeastern Gulf of Mexico (28°00'N, 89°00'W) was recaptured 208 days later by a commercial longliner in the northern Bahamas (27°38'N, 78°03'W).

### Swordfish

In 1986, there were 257 swordfish tagged and released. Commercial fishermen tagged and released 193 swordfish, NMFS observers aboard Japanese longline vessels tagged 46, and sportfishermen tagged 18. There were 99 swordfish tagged

off the Florida east coast, 60 in the Gulf of Mexico, 43 in the western Atlantic (over 200 miles off the northeastern coast of the United States), 26 in the Mid-Atlantic Bight, 13 off the western Bahamas, 12 in the northeastern Atlantic (Georges Bank), 2 off the Virgin Islands and 2 off the northern coast of Cuba.

There were 5 swordfish recaptures in 1986 (Appendix Table II). Three fish that were tagged in the fall were recaptured south of their release area in the summer after being at-large for 597, 2,070, and 2,069 days. One fish tagged in the fall was recaptured north of the release area in the fall, after being at-large for 2,222 days. A fish tagged in the spring was recaptured north of the release area in the summer after being at liberty for 468 days. There were 2 swordfish at liberty for 1-2 years, 2 for 5-6 years, and 1 for 6.1 years.

### Bluefin Tuna

In 1986, 51 bluefin tuna were tagged and released. Sportfishermen tagged 35 and commercial fishermen tagged 16. There were 29 bluefin released off the Mid-Atlantic Bight, 5 off the Texas coast, 9 in the central Gulf of Mexico, 4 off the northern Bahamas, 1 off Cat Cay Bahamas, and 3 in the northeast Atlantic.

There were 15 bluefin recaptures in 1986 (Appendix Table II). All of the recaptures were from bluefin released in the Mid-Atlantic Bight area: 4 were recaptured south of the release area, 5 north of the release area, 1 east of the release area, 1 east-northeast, and 1 in the same general area of release. There were 3 bluefin tuna that made trans-Atlantic migrations; 1 was recaptured off southwest Spain in the Gibraltar area, and 2 of the most important recaptures were made in the Mediterranean Sea. These two fish were the first occurrence of bluefin tuna tagged in the western Atlantic and recaptured in the Mediterranean Sea. These recaptures add important data to the investigation of migratory routes of bluefin tuna.

Previous tag recapture data have shown that bluefin tunas make trans-Atlantic and trans-Equatorial migrations. Forty-four small bluefin (6-96 pounds) released off the northeastern coast of the United States were recaptured in the Bay of Biscay between 1959 and 1979. Small bluefin released in the Bay of Biscay have also been recaptured off the northeastern coast of the United States in past years. There was 1 bluefin at liberty for 1-2 years, 2 for 2-3 years, 1 for 3-4 years, 2 for 4-5 years, 1 for 5-6 years, 1 for 6-7 years, 1 for 7-8 years, 2 for 8-9 years, and 1 for 12.2 years.

Many anglers are aware of the importance to the Cooperative Game Fish Tagging Program of reporting tag numbers from recaptured fish, but few realize the importance of saving these recaptured fish to obtain skeletal hardparts for our work on age and growth. A complete explanation of our research and SAVE IT FOR SCIENCE PROGRAM are given in the first part of the program summary. Any tag-recaptured tunas or marlins should be saved by freezing and reported to:

Dr. Eric Prince  
 NMFS, SEFC, Miami Laboratory  
 75 Virginia Beach Drive  
 Miami, Florida 33149

305-361-4248 (work) and 305-598-0944 (home)

Call collect any time day or night BEFORE DISPOSING OF THE FISH and arrangements will be made to pick up samples. Sampling procedures do not prevent the fish from being mounted or eaten. Cooperators can be reimbursed for any cost incurred in securing samples but they must contact the Miami Lab before this is possible.

#### Other Tunas

There were 228 yellowfin tuna tagged and released in 1986. Sportfishermen tagged 211 and commercial fishermen tagged 17. The Mid-Atlantic Bight was the primary tagging area with 149 taggings; 48 in the Gulf of Mexico, 16 off Bermuda, 6 off the eastern Florida coast, 6 off the Bahamas, and 3 in the western North Atlantic.

There were 11 yellowfin tuna recaptures in 1986. There were 6 recaptures from yellowfin tagged and released in the Mid-Atlantic area; all were recaptured in the same area of release. One yellowfin was tagged and released off Montauk Point, New York, and this fish was recaptured off the Hudson Canyon (off the coast of New Jersey). There were 3 yellowfin recaptures in the Gulf of Mexico; all recaptures were near the area of release. A yellowfin tagged and released off the northern coast of Bermuda was recaptured in the same area. There were 6 yellowfin tuna at liberty for less than 1 year, 3 for 1-2 years, 1 for 2-3 years, and one for 3.8 years. There were 62 blackfin tuna tagged and released. As in past years, the majority (45) were tagged off the northern coast of Bermuda, 12 off the east coast of Florida, 3 in the northern Gulf of Mexico, and 1 each off Venezuela and the Bahamas. There were 7 recaptures of blackfin tuna; all had been tagged and recaptured off the northern coast of Bermuda. The longest time at-large for blackfin tuna was 3 years.

#### Red Drum and King Mackerel

Due to the heavy fishing pressure on red drum (Sciaenops ocellata) and king mackerel (Scomberomorus cavalla) and the need for more detailed biological data, the Cooperative Game Fish Tagging Program has added them to the list of target species. They have been the subject of intense public and political interest due to their importance to the federal and State economies. This interest and need for more detailed biological data have resulted in the initiation of numerous scientific investigations, many of which rely on data derived from tagging studies. This program is being conducted between the coastal states and the federal government. Both scientific and recreational groups are working to tag as many fish as possible. Since this is a new program, the returns from recent releases have all been from the same general area of release. The results should provide more data over time as the amount of tagged fish increases and the increase in time at-large provides more opportunity for dispersion of the tagged fish.

#### Tarpon

There were 260 tarpon tagged and released in 1986. Over one-half (156) were tagged off the west coast of Florida, 73 off the east coast of Florida and the Keys, 5 off the Florida panhandle, and 2 off Louisiana. Twenty-four were tagged and released off the southeast coast of Mexico.

There were three recaptures in 1986. One tarpon tagged in Boca Grande Pass, FL, was recaptured 420 days later in Southeast Pass, LA, over 400 miles away. The second was released in Boca Grande and recaptured about 140 miles away off Homosassa, FL, after 1,351 days at-large. The third tarpon was released in Boca Grande Pass, FL, and recaptured in the same locality after 383 days at-large.

#### Bait Box

In 1984, we began to analyze the tagging data to determine if there was a difference in recapture rates between the use of live and dead bait. We began requesting bait information in 1981 and at that time we received release data on 1,209 sailfish. Bait information was available on only 175 of those releases. Since 1981, we have received an increasing number of release cards for sailfish indicating the use of live bait (see table below). In 1981, 43% of the reported releases used live bait and by 1986, the percentage was 87%. The recapture rate in 1981 and 1982 was greater for dead bait. In 1983, the recapture rate was the same for both baits and in 1984-1986, the recapture rates were greater for live bait. This general pattern continues to support the conclusion we reported in last years program summary that the use of live bait does not appear to increase mortality of tag-released sailfish.

	1981		1982		1983		1984		1985		1986	
	DB*	LB*	DB	LB								
Released	100	75	174	236	229	285	253	372	218	624	111	726
Recaptured	17	5	14	8	4	6	4	13	3	10	2	26
Recapture Rate	.17	.07	.08	.03	.02	.02	.02	.03	.01	.02	.02	.04

\*DB = dead bait, LB = live bait

#### Tagging Awards

In 1986, four major conservation organizations sponsored special awards for the captains who were responsible for tagging and releasing the most sailfish, blue marlin, white marlin, and bluefin tuna.

The blue marlin trophy, sponsored by the National Coalition for Marine Conservation, was won by Captain William C. Harrison of Miami, Florida. Captain Harrison tagged 56 blue marlin in 1986. Captain Harrison operates "The Collection", a 54' Bertram and fished mostly in the Bahamas and in the Virgin Islands. He was one of the early pioneers of sailfish fishing in Cozumel in the mid-1960's and was the first to boat a bluefin tuna over 900 pounds in the Bahamas in 1975.

Captain Frank "Skip" Smith tagged and released 84 sailfish in 1986 to capture the sailfish trophy sponsored by the Sport Fishing Institute. Captain Smith along with his mate, Trevor Cackle, operates the "Hooker", a 48' GNS owned by Mr. Jerry Dunaway of Houston, Texas. Captain Smith was born and raised in Ft. Lauderdale and has been a captain for seven years. In 1986, he was the top sportfishing captain in the CGFTP by tagging and releasing 84 sailfish, 18 blue marlin, 24 white marlin and 1 bluefin tuna.

Captain Wade Bailey of Santa Rosa Beach, Florida, captured double honors in 1986 by tagging and releasing 62 white marlin to earn the white marlin trophy sponsored by the American Fishing Tackle Manufacturing Association, and 14 bluefin tuna for the bluefin tuna trophy sponsored by the International Game Fish Association. Captain Bailey, along with his crew, Kenny Aziz, Ron Parson, Johnny McDuffie, and Rodney Braden, operates the tuna longline vessel "Heavy Set" in the northern Gulf of Mexico. Captain Bailey tags and releases all billfishes captured by his gear.

The CGFTP would like to make special mention of the many U.S. longline captains who actively participate in our tagging program. Many of these vessels fish on a year-round basis and they tag and release substantial numbers of billfishes. Most of our tagged swordfish, for example, were released by commercial longliners. Because of this contribution, in 1987 the CGFTP will sponsor a special award to be given to the top overall billfish tagger among the U.S. longline fleet. All four conservation organizations have agreed to continue to sponsor their trophies to the top tagger among sportfishing captains. These are beautiful trophies and we extend our congratulations and deep appreciation to the winning captains and to the sponsoring organizations.

### Tagging Box

In 1976, we began to acknowledge participants of the Cooperative Game Fish Tagging Program. Program participants are acknowledged again this year in Tables 13 and 14. We cannot give participants credit for fish tagged and released unless we receive the tag-release cards. We send you acknowledgment cards as a check to ensure that we have received the release cards and to inform participants that we have received the tagging information. Due to operational changes, tag-release cards will only be sent to the captain. If a name and address is not listed for the captain, acknowledgment cards will be sent to the angler. If you wish a card to be sent to both angler and captain, please note this in the remarks section. If you do not receive an acknowledgment card, please inform us as soon as possible. The tag-release cards are occasionally lost in the mail, and if we can find out about the loss in time, there is a chance that we can work together to retrieve the lost data.

If you wish to tag fish in the Pacific Ocean, or to tag fish not included in our program, contact the following:

#### Sharks - Atlantic Ocean

Cooperative Shark Tagging Program  
Mr. Jack Casey  
NOAA/NMFS  
Northeast Fisheries Center  
Narragansett Laboratory  
P. O. Box 522A  
Narragansett, RI 02882

#### Unrestricted Species (angler pays nominal fee for tags)

American Littoral Society Fish Tagging Program  
American Littoral Society  
NOAA/NMFS  
Sandy Hook Laboratory  
Highlands, NJ 07732

## Billfishes - Pacific Ocean - U.S.

Cooperative Marine Game Fish Tagging Program  
 Mr. James L. Squire, Jr.  
 NOAA/NMFS  
 Southwest Fisheries Center  
 La Jolla Laboratory  
 P. O. Box 271  
 La Jolla, CA 92027

## All Species Recognized by IGFA - Australia

New South Wales State Fisheries  
 Box N211  
 Grosvenor St. Post Office  
 Sydney, NSW 2000, Australia

Table 13. Captains who made outstanding contributions to CGFP in 1986 by assisting in the tagging of 10 or more blue marlin (BM), white marlin (WM), sailfish (SF), tunas (TN), and swordfish (SW). Angler column signifies fish tagged by captains while fishing as anglers and is included in the total.

Captains	Species					Total	Tagged as Angler
	BM	WM	SF	SW	TN		
Frank "Skip" Smith	10	24	84		1	119	20
Ross Clark	23	25	60		1	109	1
Wade Bailey	7	62	2	6	22	99	
J. Scott Storer	3	45	44			92	20
Nick Smith			77		2	79	30
Brad Simonds	2	6	65			73	1
Charles P. Peyton Jr.		6	64			70	
Hank Halliger	4	17	7	39	1	68	
William C. Harrison	56	3				59	
William S. "Bill" Hart			59			59	
Joe Lopez	26	21	11			58	6
Randy Jendersee	17	5	31			53	2
Jeffrey Scott Rowe		12	1	37		50	
Bobby Kolb		1	47			48	1
Jimbo Barnes	20		27			47	1
Ray Walters	47					47	
Dan Timmons	32	2	10			44	
John Errante	9	14	8	12		43	1
James Roberts	3	1	39			43	
Glenn Corder	2	17	10	13		42	
Herb Brans		10	1	23	5	39	1
Barney Garnsey	4	21	14			39	
Darrell Weigelt	3	6	30			39	
Harry Hall		25	11			36	
Martin Snow	2	11	21			34	
Nacho Peon		4	29			33	
Rick Ross	4	12		15	1	32	3
David Meyer		1	30			31	
Chris Simmons	1	13	17			31	
Pete Barrett			2		27	29	
Sherwood "Red" Michael	10	10	9			29	
Kevin Winter	3	1			25	29	2
O.B. O'Bryan	27	1				28	
Allen De Silva	16	5			6	27	2
Stephen W. Gates	10	4	3	10		27	
Barry Corvin	2	6	17			25	1
Edly Herbert			25			25	
Roy Rockoff			25			25	
Lee Alonzo	13	2	9			24	5
Al Nelson	12	8	4			24	
Albert E. Wadsworth		2	22			24	
Ronny Barker	2	1	20			23	
Bill Bowman		1	21			22	1
Al Petrosky	20	1	1			22	
Scott Stanczyk	4	7	11			22	2
Bill Borer		3	18			21	1
Lloyd A. Dreyer	2	1	18			21	

Table 13. Continued.

Captains	Species					Total	Tagged as Angler
	BM	WM	SF	SW	TN		
Nick Guardalabene			21			21	
Mark Montoya	21					21	
Fred Rushin	1	7	3		10	21	
Fred Riffe		8	11		1	20	
Brent G. Meadors					19	19	2
Timothy J. Hyde	1	4	13		18		
Mike Butler	1	1	15			17	1
Skip Libbey			17			17	1
Donald Merten	12			1	4	17	1
Jim Loehsack			16			16	
Rick Murdoch		5	11			16	1
Nelson Applegate			15			15	1
Rafael De La Parra			15			15	
Pete Gordon			15			15	
Bob Hollinger		1	14			15	
Ted Sorg			15			15	
Mel Walker			15			15	1
Oscar Acevedo		1	14			15	1
Alan J. Card	3	2			9	14	4
Donald Combs	5	1	6	2		14	2
John B. Dudas			14			14	
Joel Greene	4	6			4	14	
John R. Hopwood			14			14	1
Juan Tito Martinez	14					14	3
Robert Rothrock			14			14	
Allen Bailey	1		12			13	1
Billy Black	6	3	4			13	1
Joseph Herbert	12		1			13	
Bob Taute	2		11			13	
Victor Genduso			12			12	
Jim Hayes	1		11			12	
Joe Mott				12		12	
Nick Patzig		11	1			12	3
Frank Pitale			12			12	
Gary Richardson	1	0	11			12	
Tim Adams	1	3	7			11	2
Frank J. Braddick					11	11	1
Fr Burroughs					11	11	2
James Hall	1	2	1	5	2	11	1
Walter B. Kitchen	5	1	3		2	11	1
Bill Noll			11			11	2
Larry Rush	3	7	1			11	
Chip Shafer			11			11	
Socko Gorenflo	1		9			10	
Charles Lachier	2	3			5	10	
Chris Moran	10					10	1
Glenn W. Putnam	2	5	1		2	10	

Table 14. Anglers who made outstanding contributions to CGFIP in 1986 by assisting in the tagging of 10 or more blue marlin (BM), white marlin (WM), sailfish (SF), tunas (TN), and swordfish (SW). Captain column signifies fish tagged by anglers while fishing as captains and is included in the total.

Anglers	Species					Total	Tagged as Captain
	BM	WM	SF	SW	TN		
Angelo Durante, Jr.			77		9	86	29
Sandra Storer	5	39	31			75	
Robin Lehman				2	70	72	12
Charles E. Bouchard		1	45			46	13
Mark Shackelford	2	2	35			39	
Russ Hensley	25	3	10			38	
Edward Gayton		23	11			34	
Ralph Christiansen	23	4				27	1
Nicki Campbell	1	16	6			23	
Penny McFadden			22			22	
J. Richard Jeck			19			19	2
Dan Lassiter			18			18	6
Thomas O'Connell	3	1	13			17	
Donald S. Leas, III		1	14			15	
Ben Orgain	4	5		6		15	4
Adrienne Sorg			15			15	
Gloria Applegate			14			14	
Ken Hulsey	2		12			14	
Ed Whalen, Jr.		3	2	8		13	
Charles Donato	12					12	4
Pete Fisher			12			12	
Mark Burroughs					11	11	2
Tim Cantwell			11			11	3
Dan Hibblen			11		11		
Horace 'Bo' Gray	1		9			10	
Jerry Millstein	4	4	2			10	
Dennis Rosa			10			10	4
Tim Rowe		4	1	5		10	
Bob Schneider			10			10	

We wish to thank all anglers and captains who have participated in our tag and release program. You not only conserve a great natural resource by releasing your catch, but by tagging you also help us in our research efforts to better understand the problems of increased fishing pressure and life histories of the species in our program. We hope that 1987 will bring you good fishing and good tagging.

Appendix Table I. Tournaments and docks sampled by oceanic gamefish personnel or by personnel from cooperating agencies, 1986.

TOURNAMENT	LOCATION	DATES	HOURS FISHED	NUMBER (DOKED)					
				BM	WM	SF	SW	BFT	YET
Masters Invitational Sailfish	Palm Beach, FL	Jan 7-Jan 11	643:39	0	0	68	0	0	0
Invitational Gold Cup	Palm Beach, FL	Jan 15-Jan 18	1185:00	0	2	73	0	0	0
International Womens Fishing Association Annual Bacardi Billfish	Palm Beach, FL	Jan 22-Jan 24	252:12	0	0	31 <sup>a</sup>	0	0	0
Ernest Hemingway Billfish <sup>b</sup>	Bimini, Bahamas	Mar 18-Mar 22	852:00	5	2	0	0	0	6
Walkers Cay Annual Billfish <sup>b</sup>	Bimini, Bahamas	Mar 25-Mar 28	1373:00	13	6	0	0	0	1
Annual His and Hers Billfish	Walkers Cay, Bahamas	Apr 7-Apr 11	2682:56	32	18	3	0	0	0
Members Only Billfish	Chub Cay, Bahamas	Apr 7-Apr 11	503:05	15	8	9	0	0	0
Gulf Coast Largest Tournament	Chub Cay, Bahamas	Apr 14-Apr 18	717:20	25	7	11	0	0	0
Bertran-Hatteras Shootout	Pensacola, FL	Apr 19-Apr 19	118:15	1	0	0	0	0	0
Semi-Annual Billfish	Walkers Cay, Bahamas	Apr 24-Apr 26	1320:00	23	3	0	0	0	0
Walkers Cay 2nd Leg (Formerly First)	Ft. Lauderdale, FL	Apr 25-Oct 26	15:00	1 <sup>a</sup>	0	1 <sup>a</sup>	0	0	0
South Texas BGFC First	Live Bait	Apr 25-Oct 26	5559:07	1 <sup>a</sup>	1 <sup>a</sup>	152 <sup>a</sup>	0	0	0
Bimini Championship <sup>b</sup>	Walkers Cay, Bahamas	Apr 28-May 2	658:00	1	2	0	0	0	0
Bohicket-Seabrook Billfish	Port Isabel, TX	May 3-May 4	231:15	3	1	0	0	0	7
New Orleans Big Game Fishing Club First	Drifting	May 3-May 4	5:00	0	0	0	0	0	0
Cat Cay Billfish <sup>b</sup>	Bimini, Bahamas	May 5-May 8	1223:30	10	6	2	0	0	0
Georgetown Blue Marlin	Charleston, SC	May 8-May 10	426:14	6	0	0	0	0	0
Mobile Big Game Fishing Club Memorial Day	South Pass, LA	May 9-May 10	357:16	8	1	0	0	0	12
South Pass Memorial Day	Cat Cay, Bahamas	May 14-May 17	1319:30	8	2	2	0	0	0
Annual Treasure Cay International Billfish	Georgetown, SC	May 23-May 24	661:46	17	0	0	0	0	0
Chub Cay Championship <sup>b</sup>	Orange Beach, AL	May 24-May 25	999:41	9	20	0	0	0	25
Cajun Classic (Formerly Golden Meadow Invit.)	Drifting	May 24-May 26	82:59	0	0	0	1	0	5
New Orleans Big Game Fishing Club Tag & Release	South Pass, LA	May 24-May 26	715:00	20	3	1	0	0	24
Hilton Head Island Billfish	Port Isabel, TX	May 25-May 25	82:00	5	0	0	0	0	1
Baton Rouge Big Game Fishing Club Invitational	Treasure Cay, Bahamas	May 26-May 30	1148:00	21	8	6	0	0	0
Liollio's Warmup Tournament	Club Cay, Bahamas	Jun 2-Jun 6	1007:41	28	6	2	0	0	3
South Texas BGFC Third	Grand Isle, IA	Jun 6-Jun 7	314:35	5	6	0	0	0	4
New Orleans Big Game Fishing Club Invitational	South Pass, LA	Jun 6-Jun 7	538:00	15	8	0	0	0	30
Liollio's Summer Open (Formerly Destin)	Sea Pines, SC	Jun 12-Jun 14	242:05	5	1	0	0	0	0
Bimini Summer Billfish Tournament	South Pass, LA	Jun 12-Jun 14	468:50	33	8	2	0	0	6
Texas Championship Billfish	Destin, FL	Jun 13-Jun 14	256:15	9	3	0	0	0	4
Capt. Fanny Blue Marlin	Port Isabel, TX	Jun 15-Jun 15	112:00	3	1	1	0	0	1
Celebrity Shootout	South Pass, IA	Jun 19-Jun 21	1571:16	47	20	0	0	0	59
Hemis July 4 Open	Destin, FL	Jun 20-Jun 21	632:00	20	6	0	0	0	28
Pensacola International Billfish	Drifting	Jun 20-Jun 21	12:30	0	0	0	2	0	0
Golden Meadow Tarpon Rodeo	Bimini, Bahamas	Jun 23-Jun 27	473:20	12	1	3	0	0	0
General Ray Huff Billfish	Port Aransas, TX	Jun 28-Jun 29	242:15	5	13	5	0	0	0
Galveston Blue Marlin Open	Beaufort, NC	Jun 30-Jul 4	977:55	13	19	1	0	0	0
South Texas BGFC Fourth	Pensacola, FL	Jul 2-Jul 2	104:15	0	10	1	0	0	4
Texas Womens Billfish	St. Thomas, VI	Jul 4-Jul 6	480:00	19	2	0	0	0	0
Chub Cay Blue Marlin	Pensacola, FL	Jul 4-Jul 5	1035:15	17	41	1	0	0	40
Deep Sea Roundup	Grand Isle, IA	Jul 4-Jul 6	257:30	0	4	0	0	0	2
Bay Point Invitational	South Pass, LA	Jul 4-Jul 5	538:06	18	12	0	0	0	6
New Orleans Big Game Fishing Club Ladies Day	Freeport, TX	Jul 4-Jul 5	18:00	1	0	0	0	0	0
Gulf Breeze Optimists Rodeo	Port Isabel, TX	Jul 4-Jul 4	75:15	4	0	2	0	0	5
Hemingway Days Tournament	Port Aransas, TX	Jul 5-Jul 6	319:00	3	2	16	0	0	0
Panama City Captains Day Billfish	Chub Cay, Bahamas	Jul 7-Jul 11	310:00	13	0	0	0	0	0
Poco Bueno	Port Aransas, TX	Jul 8-Jul 9	299:15	6	1	20	0	0	0
Port Mansfield Fishing	Panama City, FL	Jul 11-Jul 12	933:20	10	49	3	0	0	14
South Texas BGFC Fifth	South Pass, LA	Jul 11-Jul 12	633:15	18	12	0	0	0	12
Grand Isle Tarpon Rodeo	Pensacola, FL	Jul 12-Jul 12	90:50	1	3	1	0	0	4
Grand Isle Tarpon Rodeo	Key West, FL	Jul 17-Jul 19	711:00	5 <sup>a</sup>	3 <sup>a</sup>	0	0	0	0
Dean Hawn Memorial Billfish	Panama City, FL	Jul 18-Jul 19	415:30	8	24	1	0	0	10
Oyster Bar Small Boat Billfish	Port O'Connor, TX	Jul 18-Jul 19	618:33	19	18	21	0	0	6
MBGFC Junior Angler Tournament	Port Mansfield, TX	Jul 18-Jul 19	212:15	5	2	14	0	0	5
Annual Fort Walton-Destin Billfish	Port Isabel, TX	Jul 19-Jul 20	107:50	2	0	9	0	0	1
	Grand Isle, IA	Jul 24-Jul 26	366:00	1	4	0	0	0	0
	South Pass, LA	Jul 24-Jul 26	839:23	47	27	1	0	0	29
	Port Aransas, TX	Jul 25-Jul 26	332:00	8	14	10	0	0	0
	Pensacola, FL	Jul 26-Jul 27	244:20	4	5	0	0	0	8
	Orange Beach, AL	Jul 26-Jul 26	106:20	1	2	0	0	0	3
	Destin, FL	Aug 1-Aug 2	681:10	6	24	0	0	0	7
	Drifting		11:00	0	0	0	0	0	0

Appendix Table I. (continued)

TOURNAMENT	LOCATION	DATES	HOURS FISHED	NUMBER HOOKED					
				BM	WM	SE	SW	BPT	YPT
Texas International Fishing	Port Isabel, TX	Aug 1-Aug 2	346:45	2	5	10	0	0	6
Mobile Big Game Fishing Club Ladies	Orange Beach, AL	Aug 2-Aug 3	187:30	1	3	1	0	0	5
South Padre Island Invitational	Port Isabel, TX	Aug 8-Aug 9	318:00	7	4	5	0	0	0
	Drifting		55:15	0	0	0	5	0	0
Pensacola Ladies	Pensacola, FL	Aug 9-Aug 10	542:33	11	19	0	0	0	5
Annual Corpus Christi Builders	Port Aransas, TX	Aug 9-Aug 10	29:30	0	0	1	0	0	0
Yellow Rose Ladies	Port Isabel, TX	Aug 11-Aug 11	21:30	0	0	2	0	0	0
Empire-South Pass Fishing Rodeo	South Pass, LA	Aug 14-Aug 16	483:05	10	4	0	0	0	13
Gulf Coast Masters	Dauphin Island, AL	Aug 15-Aug 16	396:10	12	18	1	0	0	3
Golden Meadow Big Game Fishing Club Ladies Day	Grand Isle, LA	Aug 15-Aug 16	57:00	1	1	0	0	0	0
Marlin International Lonestar Showdown	Port Isabel, TX	Aug 15-Aug 15	65:00	2	1	4	0	0	0
U.S. Virgin Islands Open (Boy Scouts)	St. Thomas, VI	Aug 16-Aug 18	336:18	91	0	0	0	0	0
San Juan International Billfish	San Juan, PR	Aug 20-Aug 24	2918:39	185	2	0	0	0	0
Blue Marlin Classic	Pensacola, FL	Aug 23-Aug 24	413:27	24	23	1	0	0	18
	Drifting		7:30	0	0	0	0	0	0
District Attorney Island Moorings Professional Billfish Tournament	Port Aransas, TX	Aug 23-Aug 24	149:00	5	4	4	0	0	0
Alabama International	Orange Beach, AL	Aug 29-Aug 30	1011:18	18	56	1	0	0	24
	Drifting		12:29	0	0	0	0	0	0
New Orleans Big Game Fishing Club Labor Day	South Pass, LA	Aug 30-Aug 31	221:20	6	5	1	0	0	8
Annual August Billfish Classic	Freeport, TX	Aug 30-Aug 31	276:54	12	12	3	0	0	0
South Texas NGFC Sixth	Port Isabel, TX	Aug 30-Aug 31	131:50	11	6	1	0	0	9
Sandestin Billfish (Formerly Marlborough)	Destin, FL	Sep 12-Sep 13	662:30	25	32	1	0	0	11
New Orleans Big Game Fishing Club Last	South Pass, LA	Sep 12-Sep 13	443:30	12	5	0	0	0	6
Oregon Inlet Fishing	Oregon Inlet, NC	Sep 16-Sep 19	526:00	6 <sup>a</sup>	12 <sup>a</sup>	1 <sup>a</sup>	0	0	0
Orange Beach Invitational	Orange Beach, AL	Oct 3-Oct 4	514:05	16	15	0	0	0	1
Key West Blue Marlin	Key West, FL	Oct 14-Oct 18	2668:39	30	1	2	0	0	0
IPL Key West	Key West, FL	Oct 21-Oct 23	487:30	4	0	14	0	0	0
Annual World Class Angler Billfish Classic	Marathon, FL	Oct 26-Oct 30	274:55	5	0	8	0	0	0
Tripod-Del General of	Marathon, FL	Nov 12-Nov 15	840:44	0	0	104 <sup>a</sup>	0	0	0
Bill King One Day Billfish	Key Colony, FL	Nov 17-Nov 17	128:00	0	0	9 <sup>a</sup>	0	0	0
Key Colony Beach Sailfish <sup>b</sup>	Key Colony Bch, FL	Nov 19-Nov 23	188:52	0	0	17	0	0	0
	Livebait		611:48	0	0	44	0	0	0
Islamorada Sailfish <sup>c</sup>	Islamorada, FL	Dec 3-Dec 7	1340:30	1	0	42	0	0	0
Annual Stuart Light Tackle Sailfish	Stuart, FL	Dec 10-Dec 14	1477:00	0	0	81 <sup>a</sup>	0	0	0
Dock Sampling									
Port Aransas Docks	Trolling	Mar 2-Nov 1	673:20	25	10	21	0	0	7
	Drifting		20:28	0	0	0	1	0	0
South Pass Docks	Trolling	Apr 25-Oct 26	1226:00	49	22	1	0	0	22
Grand Isle Docks	Trolling	May 17-Sep 25	881:05	18	8	1	0	0	10
	Drifting		31:12	0	0	0	1	0	0
Panama City Docks	Trolling	May 23-Oct 7	500:15	7	29	1	0	0	1
	Drifting		5:00	0	0	0	0	0	0
Destin Docks	Trolling	May 23-Oct 19	317:55	8	18	3	0	0	3
Padre Island Docks	Trolling	Jun 2-Aug 26	432:29	37	4	3	0	0	7
Galveston Docks	Trolling	Jun 14-Jun 15	15:00	1	1	0	0	0	0
Mobile Docks	Trolling	Jun 23-Oct 11	252:45	13	7	0	1	0	11
Pensacola Docks	Trolling	Jul 4-Sep 22	57:50	0	4	1	0	0	0

<sup>a</sup>Represents number caught.<sup>b</sup>Tournament part of Bahamas Championship series.<sup>c</sup>Tournament part of Florida Keys Triple Crown series.

Appendix Table II. Tagged oceanic pelagic fishes recaptured during 1986 as part of the Cooperative Gamefish Tagging Program, National Marine Fisheries Service, Miami Laboratory. Method of fishing is given as rod and reel (R/R), longline (LL), free floating (FF), harpoon (HP), purse seine (PS), handline (HL), bottomline (BL), gill net (GIL), and trap (TR). Country abbreviations are: Japan (JAP), Mexico (MX), United States (US), Dominican Republic (DR), Bahamas (BF), Cuba (CU), France (FR), and Barbados (BB).

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
Sailfish						
No Release Information	Palm Beach, FL 1-26-86	---	---		M. Kalna ---	R/R
No Release Information	Tavernier, FL 2-14-86	---	---		B. Neubauer ---	R/R
No Release Information	Key Biscayne, FL 4-13-86	---	---		L. Coleman H. Tellan	R/R
St. Lucie, FL 2-16-86	St. Lucie, FL 2-16-86	0	A. Durante N. Smith	R/R	M. Hendrickson ---	R/R
Isla Mujeres, MX 5-20-86	Isla Mujeres, MX 5-20-86	0	F. Sones, Jr. R. De La Parra	R/R	B. Simonds ---	R/R
Palm Beach, FL 1-25-86	St. Lucie, FL 1-26-86	1	R. Phillips J. Barnes	R/R	D. E. Dotterweich ---	R/R
Stuart, FL 12-9-86	Juno Beach, FL 12-11-86	2	J. Goodspeed F. C. Warren	R/R	D. Alley ---	R/R
Palm Beach, FL 1-23-86	Jupiter, FL 1-31-86	3	J. Roberts E. Herbert	R/R	L. D. Withall ---	R/R
Palm Beach, FL 1-13-86	Islamorada, FL 2-1-86	19	J. Kelly J. Richard Jeck	R/R	J. R. Hopwood ---	R/R
Jupiter, FL 12-23-85	Jupiter, FL 1-15-86	23	A. Durante A. Durante	R/R	B. Black ---	R/R
Stuart, FL 1-1-86	Islamorada, FL 2-1-86	31	T. Harrell ---	R/R	J. Durbury ---	R/R
Palm Beach, FL 1-3-86	Palm Beach, FL 2-8-86	36	H. Gray G. Richardson	R/R	A. Durante N. Smith	R/R
Jupiter, FL 1-23-86	Vero Beach, FL 3-1-86	37	C. Sabnosky J. Barnes	R/R	N. Goldman K. Phillips	R/R
Stuart, FL 12-11-85	Palm Beach, FL 1-19-86	39	K. Phillips J. Lance	R/R	R. Polackawich J. Stark	R/R

Appendix Table II. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
Palm Beach, FL 1-23-87	Jupiter, FL 3-4-86	40	D. Richardson J. Loeb sack	R/R	M. Bennett ---	FL
Palm Beach, FL 12-8-85	Boca Raton, FL 1-20-86	43	C. Sobnoski J. Barnes	R/R	M. Danley J. Bishop	R/R
Palm Beach, FL 1-5-86	Islamorada, FL 2-17-87	43	B. Martini B. Martini	R/R	M. Walker ---	R/R
Isla Mujeres, MX 5-28-85	20° 50'N 87° 00'W 7-12-86	45	P. McFadden B. Hart	R/R	E. Roberts ---	US LL
Islamorada, FL 12-7-85	Key Largo, FL 2-12-86	67	J. Purdy B. Harbaugh	R/R	C. W. Calhoun ---	R/R
Hillsboro Inlet, FL 12-15-86	Duck Key, FL 2-23-87	70	C. Mills R. C. Mills	R/R	L. D. Blackwood B. Carr	R/R
Stuart, FL 1-2-86	Boynton Beach, FL 3-20-86	77	B. Schneider R. Baker	R/R	G. Calash ---	R/R
Palm Beach, FL 1-23-86	Miami Beach, FL 4-12-86	79	M. Schackelford R. Rockoff	R/R	N. Gilbert ---	R/R
Palm Beach, FL 1-25-86	Pompano Beach, FL 4-27-86	92	D. Williams R. Rockoff	R/R	M. Guilfoyle ---	R/R
Boca Raton, FL 1-1-87	Isla Mujeres, MX 4-20-86	109	T. Ackel T. Ackel	R/R	B. Simonds ---	R/R
Ft. Pierce, FL 2-22-86	Boynton Beach, FL 6-13-86	111	J. McNeill E. Gintert	R/R	J. Kalil ---	R/R
Dakar, Senegal 7-20-86	15° 32'N 17° 14'W 11-0-86	112	J. P. Terrisse I. Ndaye	R/R	M. J. Gaf ---	R/R
Palm Beach, FL 12-21-85	Hillsboro Inlet, FL 5-13-86	143	D. Lassiter ---	R/R	J. Mott ---	US LL
Key Biscayne, FL 6-11-85	Boca Raton, FL 1-16-86	219	C. Wolitzky H. Tellan	R/R	C. Sanchez ---	R/R
La Guaira, VE 8-30-85	Trinidad, WI 1-6-86	129	S. Campbell K. Wade	R/R	K. Samuel ---	WI GIL
Palm Beach, FL 1-26-86	Jupiter, FL 10-11-86	258	A. Bracher ---	R/R	R. Killey ---	R/R

Appendix Table II. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
Islamorada, FL 1-7-86	Key Largo, FL 12-20-86	347	M. E. Roy T. D'Esposito	R/R	R. Bayona ---	CJ HL
St. Lucie, FL 2-7-85	Stuart, FL 1-25-86	352	B. Ponsolelt J. Woodward	R/R	K. Lynch ---	R/R
Jupiter, FL 2-14-85	Key Colony Beach, FL 2-17-86	368	R. Deering Howe T. Sperling	R/R	B. Murphy ---	R/R
Jupiter, FL 1-16-85	Boca Raton, FL 1-21-86	370	B. Branden J. Lance	R/R	T. Jorgensen ---	R/R
Ft. Lauderdale, FL 2-9-85	Juno Beach, FL 3-8-86	392	S. Funkhouser D. Radis	R/R	S. Salazar ---	R/R
Stuart, FL 12-14-85	Duck Key, FL 1-12-86	394	F.A. Chandler G. Chasnar	R/R	R. Helmuth ---	R/R
St. Lucie, FL 11-15-84	Jupiter, FL 1-31-86	442	J.J. Hart C. Waring	R/R	P.C. Hewitt ---	R/R
St. Lucie, FL 2-17-85	Ft. Lauderdale, FL 12-3-86	654	D. Clark C. Waring	R/R	P. Nicole ---	R/R
Juno Beach, FL 1-27-85	Palm Beach, FL 12-31-86	703	T. Hanson J. Odell	R/R	B. King ---	R/R
Ia Guaira, VE 10-14-84	La Guaira, VE 9-28-86	714	T. Dietrich M. Aman	R/R	T. Cantwell ---	R/R
Stuart, FL 1-7-84	Boca Raton, FL 1-19-86	743	E. Duda B. Borer	R/R	R. Gunn T. Jolitz	R/R
Ft. Pierce, FL 10-20-83	Stuart, FL 4-13-86	906	E. Gintert E. Gintert	R/R	P. Richmond ---	R/R
Islamorada, FL 1-25-82	Islamorada, FL 2-8-86	1475	K. Simonds D. Kossnan	R/R	W. Dillon ---	R/R
Cozumel, MX 3-30-84	21° 30'N 77° 20'W 10-15-84	199*	A. Borvick B. Castro	R/R	N/A ---	N/A

\*Returned in 1986

Appendix Table II. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
White Marlin						
South Pass, LA 6-28-86	29° 10'N 87° 30'W 8-15-86	48	M. Hartson R. Jurisich	R/R	F. Danley ---	US LL
La Guaira, VE 9-20-85	12° 25'N 64° 35'W 5-10-86	232	S. Storer J.S. Storer	R/R	N/A ---	VE LL
29° 00'N 87° 00'W 8-24-85	28° 43'N 87° 40'W 7-1-86	311	B. Snellgrove A. Gallo	R/R	N. Patzig ---	US LL
29° 00'N 87° 00'W 8-2-85	28° 00'N 89° 00'W 7-4-86	336	J.S. Rowe ---	US LL	J. Elliot ---	R/R
La Guaira, VE 10-6-85	La Guaira, VE 9-20-86	349	R. Ratto N.F. Garcia	R/R	R. Clark ---	R/R
29° 00'N 86° 00'W 9-3-85	29° 20'N 86° 00'W 9-3-86	365	T. Niquet ---	R/R	D. Buckner ---	R/R
Walkers Cay, BF 5-2-85	29° 00'N 87° 00'W 7-15-86	439	R. Phillips F. Phillips	R/R	D. Metz ---	US LL
Orange Bch, AL 8-23-84	26° 30'N 86° 10'W 11-25-86	459	F. Tatum, Jr. C. Lahnier	R/R	N. Patzig ---	US LL
29° 00'N 86° 00'W 10-19-84	28° 05'N 88° 05'W 7-3-86	620	M. Collins B. Fairey	R/R	N. Patzig ---	US LL
29° 00'N 87° 00'W 10-4-86	26° 50'N 90° 15'W 9-17-86	713	F. Phillips J. Fox	R/R	B. Rich ---	R/R
La Guaira, VE 9-30-84	La Guaira, VE 9-17-86	717	S. Campbell B. Garnsey	R/R	J. Lopez ---	R/R
La Guaira, VE 9-25-84	La Guaira, VE 9-13-86	718	S. Campbell B. Garnsey	R/R	T. Hammond P. Kurzan	R/R
South Pass, LA 6-10-84	28° 35'N 88° 15'W 9-15-86	827	D.L. Ranson T. Guelchner	R/R	B. Toliver ---	US LL
Oregon Inlet, NC 9-4-83	Curacao, NA 1-4-86	854	C. Smith F.L.Lindner, Jr.	R/R	I. Gonzales ---	NA R/R
36° 30'N 74° 35'W 9-12-82	27° 07'N 76° 58'W 5-14-86	1340	A. Morris ---	R/R	R. Ross ---	US LL
29° 40'N 86° 50'W 9-1-80	23° 10'N 82° 40'W 10-14-86	2234	J. I. Friedman ---	R/R	A.R. Gonzales ---	N/A

Appendix Table II. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
Blue Marlin						
28° 00'N 85° 00'W 10-17-85	Key West, FL 2-28-86	134	G. Corder ---	US LL	J. Suchocki M. Cyr	R/R
28° 00'N 89° 00'W 6-29-85	27° 38'N 78° 03'W 1-23-86	208	J. Kelly J.C. Kelly	R/R	R. Ross ---	US LL
Swordfish						
30° 26'N 76° 59'W 4-27-85	40° 40'N 70° 05'W 8-7-86	468	NMFS Observer ---	JA LL	M. Monteforte ---	US GIL
28° 00'N 80° 00'W 10-3-84	26° 10'N 80° 00'W 5-26-86	597	D. Gentry J. Stanz	US LL	J. Mott ---	US LL
36° 43'N 74° 36'W 10-29-80	24° 30'N 80° 30'W 6-30-86	2070	NMFS Observer ---	JA LL	J. Hall ---	US LL
39° 01'N 72° 25'W 10-24-80	26° 00'N 80° 00'W 6-24-86	2069	NMFS Observer ---	JA LL	V. Montella ---	US LL
39° 17'N 72° 03'W 10-2-80	42° 04'N 60° 16'W 11-2-86	2222	NMFS Observer ---	JA LL	W. Jacobi ---	CA LL
Bluefin Tuna						
Block Island, RI 9-9-85	40° 00'N 73° 00'W 9-10-86	366	E. Gillespie A. Anderson	R/R	C.H. Browne ---	R/R
Montauk Point, NY 10-3-83	Montauk Point, NY 8-15-86	1047	M. Aiken A. Anderson	R/R	P. Lahullier ---	R/R
Montauk Point, NY 9-13-83	Montauk Point, NY 7-27-86	1048	L. Makransky F. Broddick	R/R	O. Amoroso ---	R/R
Montauk Point, NY 9-13-83	40° 17'N 66° 59'W 12-28-86	1202	A. Anderson ---	R/R	T. Monotani ---	JA LL
36° 12'N 75° 14'W 6-13-81	39° 40'N 03° 20'W 5-16-86	1798	Scientific Staff ---	US PS	J.C. Rey ---	SP TR
Block Island, RI 8-22-81	40° 30'N 71° 20'W 8-21-86	1825	J. Crenshaw A. Anderson	R/R	M. Doyle ---	US HL
36° 28'N 75° 40'W 6-22-80	38° 07'N 07° 59'E 5-20-86	2158	Scientific Staff ---	US PS	Kanji Toba ---	JA LL

Appendix Table II. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
36° 46'N 75° 30'W 6-22-80	41° 00'N 71° 50'W 7-1-86	2200	Scientific Staff ---	US PS	G. Beacher ---	R/R
40° 46'N 71° 28'W 8-22-78	39° 40'N 03° 28'E 4-15-86	2793	Scientific Staff ---	US PS	A. Vera ---	SP TR
40° 00'N 71° 20'W 8-22-78	Cape Cod Bay, MA 9-6-86	2937	Scientific Staff ---	US PS	M. Miller ---	US HL
38° 03'N 74° 49'W 7-14-77	Block Island, RI 7-1-86	3274	Scientific Staff ---	US PS	G. Dimartino ---	R/R
40° 00'N 74° 00'W 7-20-74	Cape Cod Bay, MA 9-22-86	4447	S. Matthews R. Matthews	R/R	S. Saito ---	JA LL