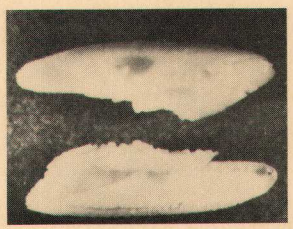
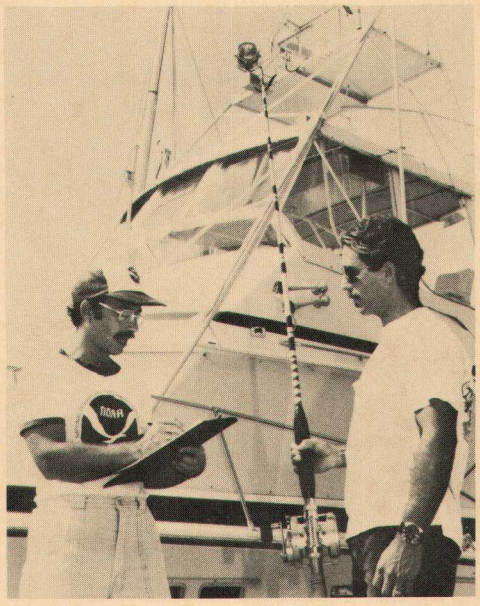
NOAA Technical Memorandum NMFS-SEFC-176

SEFC OCEANIC PELAGICS PROGRAM 1985



RESEARCH ON AGE AND GROWTH

Eric D. Prince and Dennis W. Lee



RECREATIONAL BILLFISH SURVEYS

GULF OF MEXICO
Paul J. Pristas

WESTERN NORTH ATLANTIC
Angelo R. Bertolino

COOPERATIVE GAMEFISH TAGGING

Edwin L. Scott and Joseph P. Contillo

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JUNE 1986

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June 1986

U.S. DEPARTMENT OF COMMERCE
Malcolm Baldridge, Secretary
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Anthony J. Calio, Administrator
NATIONAL MARINE FISHERIES SERVICE
William G. Gordon, Assistant Administrator for Fisheries

SEFC Oceanic Pelagics Program

1985

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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[1]. 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 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. However, we hope the information in this report will not only be useful but will encourage anglers to participate in the various parts of our oceanic pelagics activities, particularly our new SAVE IT FOR SCIENCE program. News releases about significant events will continue to be

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[1] 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 spp.; broadbill swordfish, Xiphias gladius; and yellowfin tuna, Thunnus albacares.

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.

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 1 for all Atlantic, Gulf, and Caribbean areas that were included in the 1985 billfish survey. During 1985, 85 tournaments and 10 docks were monitored and 57,638 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 Angelo R. Bertolino 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, 104,853 fish of 30 different species have been tagged and released; 5,676 recaptures have been recorded. The Cooperative Gamefish Tagging section of this summary was prepared by project leader Edwin L. Scott and Joseph P. Contillo.

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
Fishery Analysis Team Leader

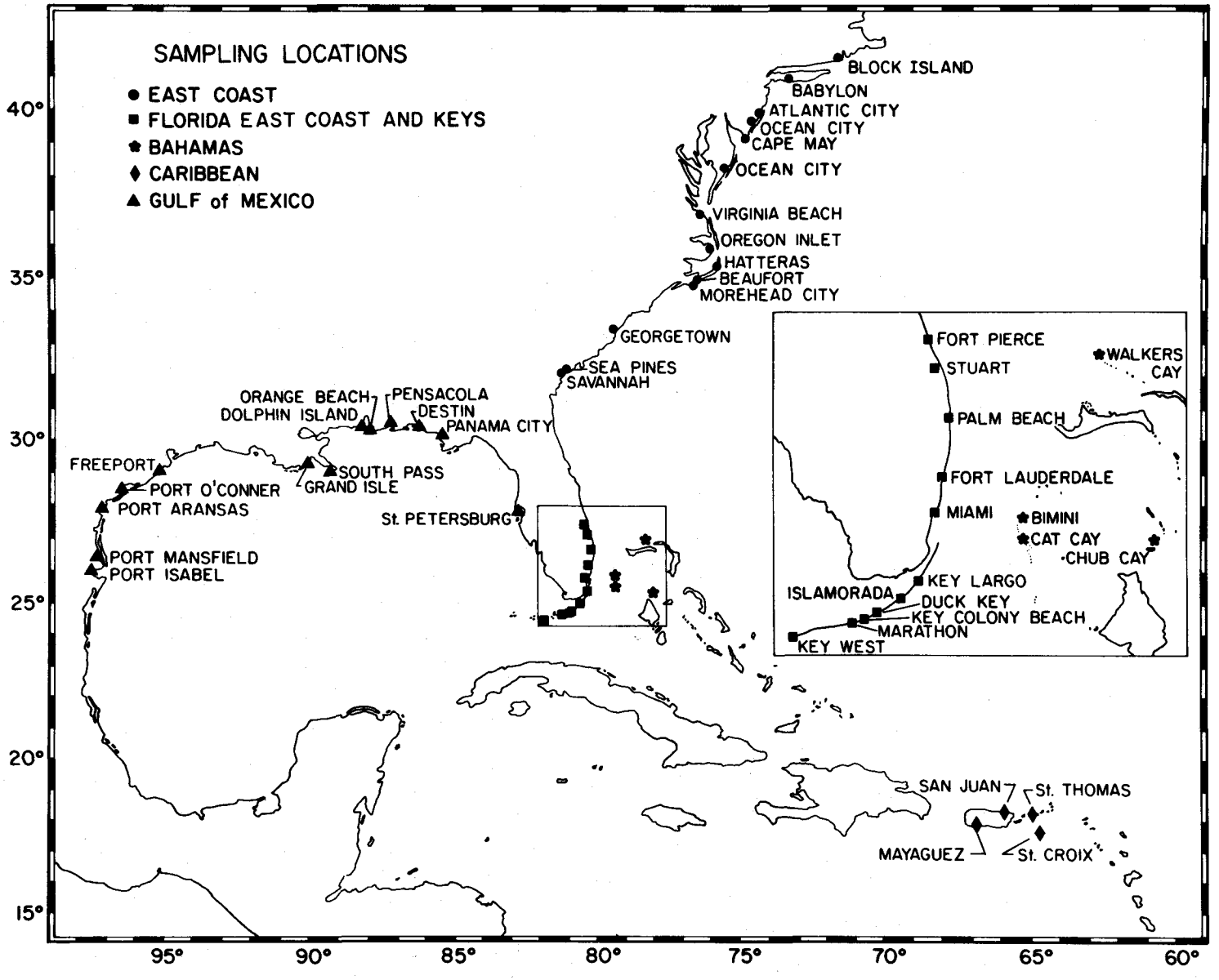


Figure 1- Sampling locations for Recreational Billfish Surveys and general area of coverage for the Cooperative Gamefish Tagging Program and Research on Age and Growth of the Oceanic Pelagics Resources Division, Miami Laboratory.

AGE AND GROWTH RESEARCH

Eric D. Prince and Dennis W. Lee

Introduction

Age and growth research is an important component of fishery science. For example, in order to assess the well-being of an entire population of fish, its 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). The spacing between these rings is proportional in size to the rate of growth for that par ticular year; the larger this spacing, the faster the rate of growth. In tem perate 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.

Billfish Conservationist Of The Year

In order to recognize participants in our SAVE IT FOR SCIENCE PROGRAM, we are happy to announce the initiation of an award for BILLFISH CONSERVATIONIST OF THE YEAR in cooperation with MARLIN magazine. The first recipients of this award were given to Captains Erin and Mike Benitez of San Juan Puerto Rico (see article in MARLIN fall 1985 vol. 4(3):47). Erin and Mike have served as the cornerstone of the SAVE IT FOR SCIENCE PROGRAM in the Caribbean for over four years. During this period they have provided our research program with 33 samples of skeletal parts from unusual size blue and white marlin. Several of these samples were very rare baby blue marlin which have been extremely valuable to our research efforts. In addition, Mike has been a strong supporter of our

tagging program (see section on tagging) and has tagged over 500 billfish since the late 1960's. Congratulations Erin and Mike and we hope your example encourages others to participate in our SAVE IT FOR SCIENCE PROGRAM.

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 accurately determined 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 on 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 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 our selves. However, when the fish can't be sampled by Miami Laboratory personnel, the following procedures should be followed for marlin and sailfish, tuna, and swordfish:

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 (items 2-7);
2. DATE, location caught;
3. LOWER JAW FORK LENGTH in inches or centimeters (Fig. 1);
4. TOTAL WEIGHT (round weight) in pounds or kilograms;
5. Determine SEX as shown in Figure 2 or cut a small 2-4 inch piece of gonad cross section and include with the sample;
6. 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. 1) are important to us;

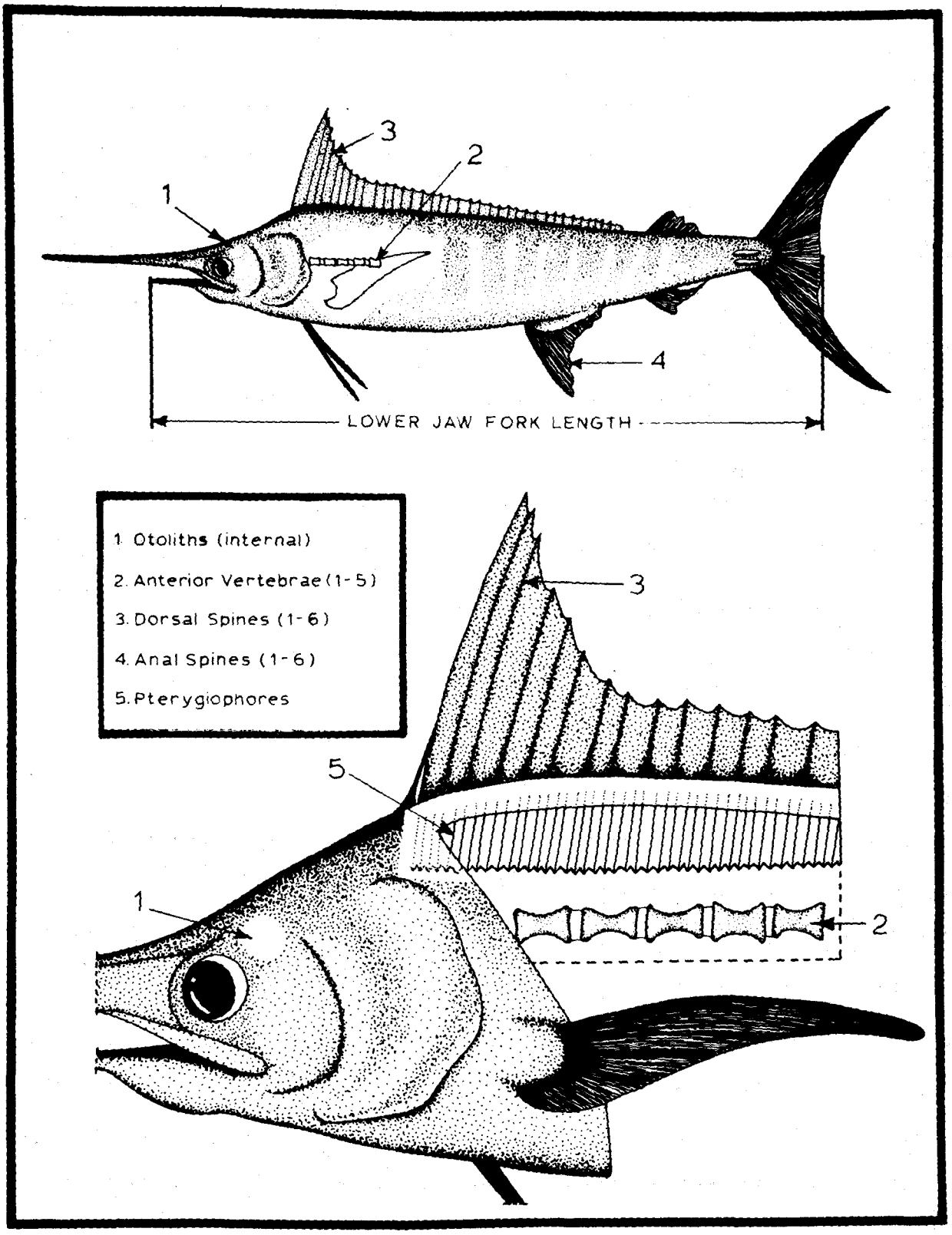


Figure 1 – Skeletal structures and measurements necessary from billfish for age and growth studies, National Marine Fisheries Service, Miami Laboratory. See text for explanation of procedures.

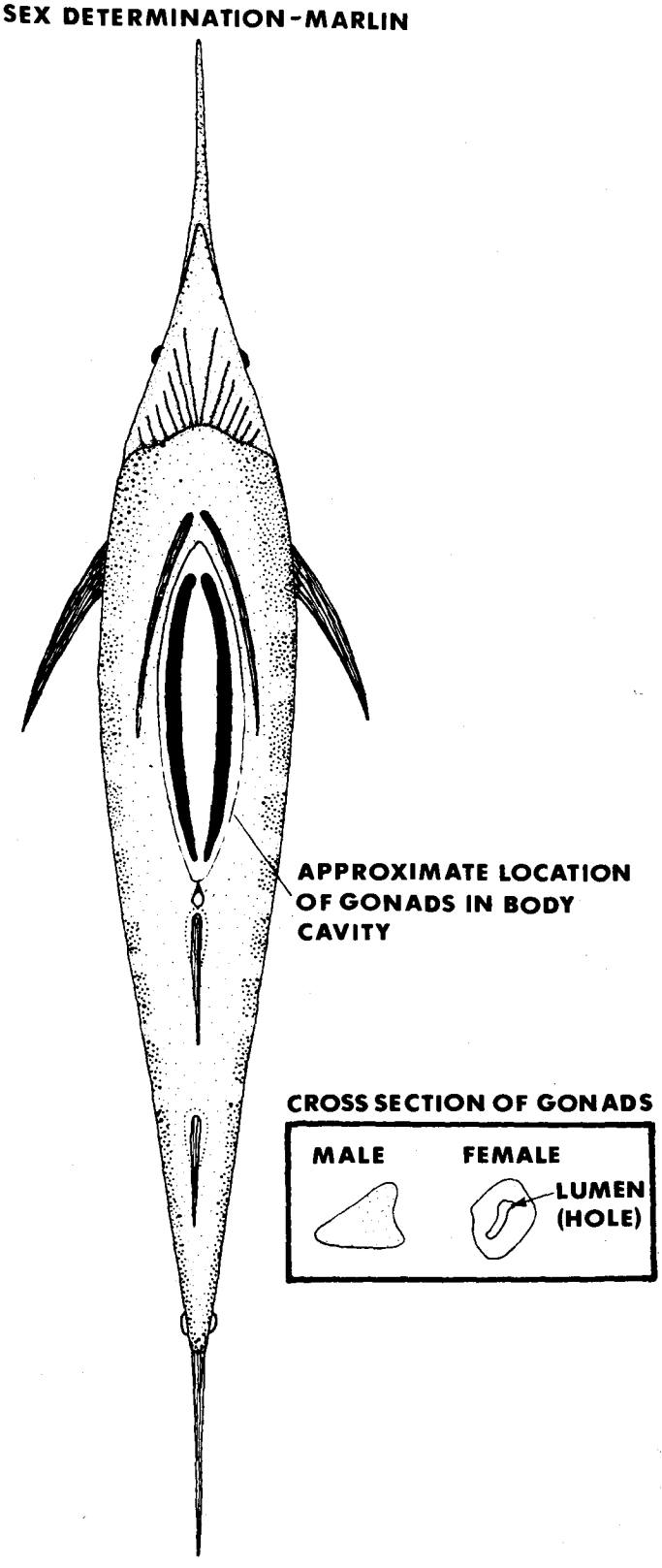


Figure 2 – Schematic showing the location of gonads and sex determination in Atlantic billfish. Sex determination in Atlantic tunas can be taken in a similar manner. If sex is in doubt, cut out a small piece of gonad and save it with the rest of the sample.

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

Sampling Tuna

1. SAVE ENTIRE FISH if it has a tag (cut out tag) and provide information below (Items 2-7);
2. DATE, location caught;
3. FORK LENGTH in inches or centimeters (Fig. 3);
4. Total WEIGHT (round weight) in pounds of kilograms;
5. Determine SEX as shown for billfish in Figure 2 or cut a small 2-4 inch piece of gonad cross section and include with the sample;
6. Cut off HEAD behind gills;
7. Cut off CAUDAL PEDUNCLE (tail) at sixth finlet as shown in Figure 3;
8. 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 (items 2-7);
2. DATE, location caught;
3. LOWER JAW FORK LENGTH in inches or centimeters (as indicated for marlin in Fig. 1);
4. TOTAL WEIGHT (round weight) in pounds or kilograms;

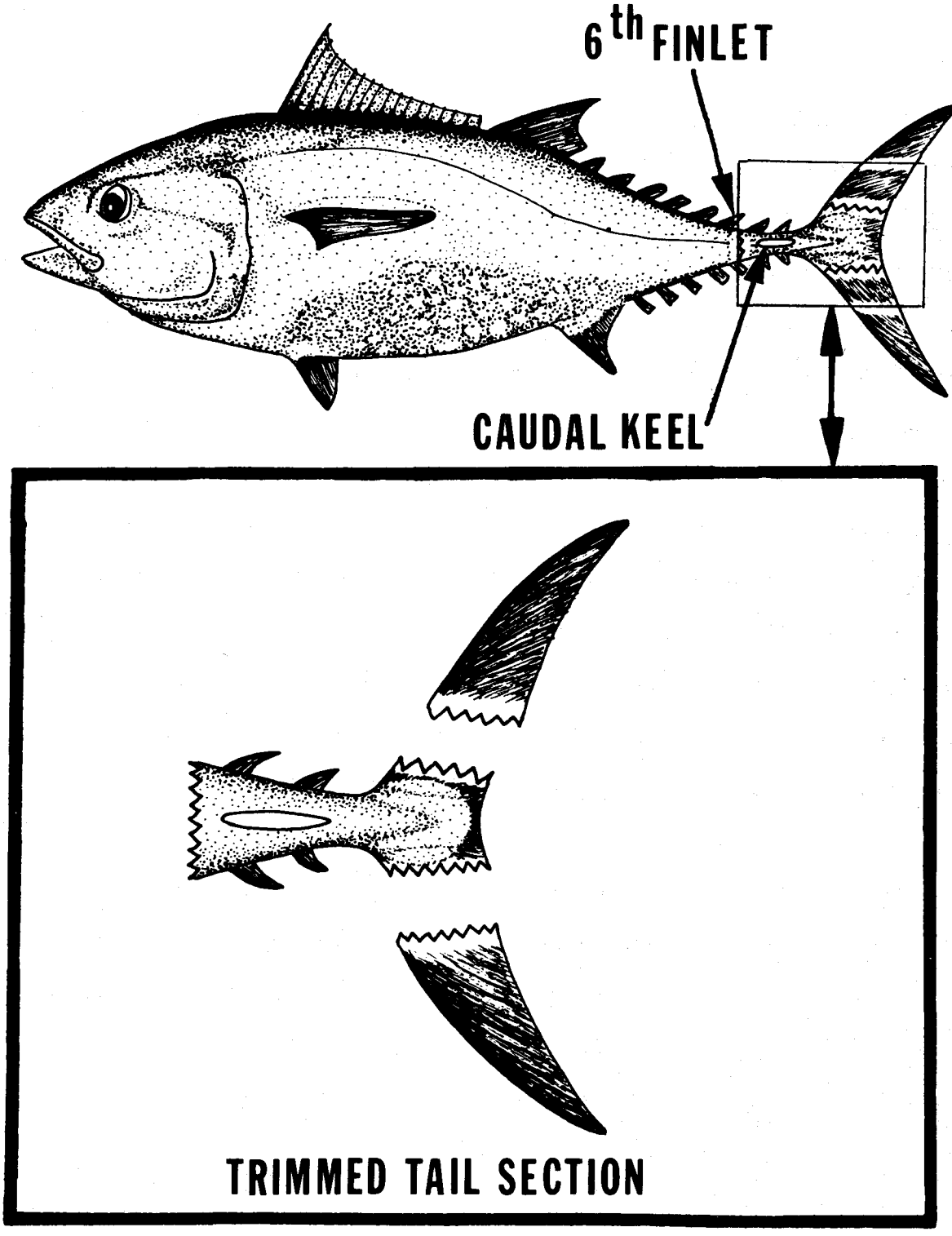


Figure 3 - Removing the caudal penduncle (containing vertebrae) from Atlantic bluefin tuna for age and growth studies. The head (containing otoliths) should also be saved by cutting behind the gill covers and fork length taken in inches or centimeters by measuring from the tip of the nose to the fork of the tail.

5. Determine SEX as shown for billfish in Figure 2 or cut a small 2-4 inch piece of gonad cross section and include with the sample;
6. The FIRST 6 ANAL SPINES are one of the most important skeletal hardparts for ageing swordfish (see Fig. 1). 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 spine has been encircled. This will release the spines so they can be pulled out by hand;
7. 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;
8. 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

Some Unusual Size Billfishes Collected for Age and Growth Studies During 1985-86

1. 980.5 lb. blue marlin caught by Warren Culbertson 5-14-85 off Destin, FL.
2. 8.0 lb. white marlin caught by Capt. Bob Crofwait 9-18-85 off Oregon Inlet, NC.
3. 105.0 lb. Atlantic sailfish caught by James Fraizer 3-22-86 off Key Largo, FL.
4. 5.25 lb. Atlantic sailfish caught by Donald O'Nell 1-03-86 off West Palm Beach, FL.
5. 4 inch Atlantic sailfish (and several others) dip netted by Capt. Ted Porter 4-1-86 off Georgetown, SC.

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, 1980-85.

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. Muoid	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. Stimson	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
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 (Boynton Bch)	54 lb	R. Harrison	10 yr, 10 mo	spines, vertebrae otoliths

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, 1985.

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

Table 3. Examples of some usually small and large billfishes collected for age and growth studies, National Marine Fisheries Service, Southeast Fisheries Center's Miami Laboratory, 1980-85.

Species	Date Caught	Location	Size	
			Total Weight (pounds)	Lower Jaw Fork Length (inches)
Blue Marlin	6-24-83	Bermuda	1131.0	134.5
	5-14-85	Destin, FL	980.5	131.5
	5-06-83	Walkers Cay, Bahamas	31.0	51.0
	3-22-83	Walkers Cay, Bahamas	17.5	46.0
	12-31-81	Jupiter, FL	9.5	37.5
White Marlin	4-7-83	Chub Cay, Bahamas	148.0	99.5
	4-5-83	Chub Cay, Bahamas	118.0	79.0
	8-07-82	Montauk, NY	23.0	59.0
	10-29-83	San Juan, PR	17.0	50.0
	9-7-82	Key West, FL	10.0	41.5
	9-18-85	Oregon Inlet, NC	8.0	38.0
Sailfish	3-22-86	Key Largo, FL	105.0	-
	1-03-86	West Palm Beach, FL	5.25	36.5
	7-26-85	Panama City, FL	2.5	28.5
	7-26-85	Panama City, FL	1.0	26.0
	4-1-86	Georgetown, SC	<1.0	4.0

A New Computer-Based Visual Analysis System for Ageing Fish

One of the most common methods of determining age and growth rates of fishes involves counting and measuring the concentric rings which are formed in their skeletal tissues. The selection of a skeletal structure and ageing method can differ among species and even between workers on the same species. However, there are at least two points of general agreement among fishery scientists concerning age determination. First, the results of determining the age of fishes are important for managing fisheries. Second, the work of collecting, processing, and analyzing the data for ageing studies is time consuming, tedious, sometimes subjective, and may be imprecise between methods or even between workers using the same method. Therefore, no matter which skeletal structure, methodology, or zonal interpretation may be favored, a rapid, objective counting and measuring tool would be indispensable to the fishery scientist. The Oceanic Pelagics Resources Division of the Miami Laboratory has recently developed a new computer-based visual analyses system for ageing fish. In order to assess the value of this new system, a study was undertaken to compare the speed and precision in counting and measuring zonations on blue marlin dorsal spine sections and processing the data using the new computer-based visual analyses method and the conventional microscope method.

The conventional microscope method in our study, traditionally used by most fishery scientists, is quite tedious. The procedure for this method is as follows: a dorsal spine section is examined through a microscope and each zone is counted and measured using an ocular micrometer (measuring device) in the eyepiece. This method requires the reader to turn away from the microscope in order to record the measurement of a growth zone (made from the spine center to

the peripheral edge of each zonation) onto a data log, then regain his position of last measurement on the skeletal structure and proceed to the next zonation until all zone counts and measurements are completed. Supplemental biological data (fish length, weight, sex, and date of capture) are also recorded for each specimen. After all the samples are completed in this manner, the data logs are then submitted to computer personnel for entry into the computer. The time spent waiting for data entry to be completed can be extremely variable and depends on the work load and scheduling of computer personnel. Delays in data entry are most often beyond the control of the fishery scientist. Once data entry is completed, the printout of the data is examined for errors prior to editing and analysis. During this procedure, the time spent on each phase of data transcription was recorded.

The new computer-based visual analysis method consists of an IBM XT personal computer equipped with video digitizing and control boards to digitize and enhance video displayed images. The computer is interfaced with a video monitor which displayes the image of the dorsal spine section from the microscope through a video camera. The functional relationship of the hardware components of the system is shown in Figure 1. Software programs were developed that would allow the reader to move an intensified point of light (cursor) on the video monitor to each concentric ring of the displayed image, record the number and position of the zone by pressing special keys, and enter the supplemental biological data for each specimen. After each spine sample is processed in this manner, the data are saved onto a diskett for further analysis. For comparison with conventional methods (discussed above), the time spent on each phase of this procedure was also recorded.

Two readers (an experienced reader and the other inexperienced) analyzed 21 blue marlin dorsal spine sections using each method to compare the speed of analyzing the skeletal structures and entering data, as well as comparing results of precision (repeatability) in counting zones between methods and among readers. We found that the process of counting and measuring the growth zones, entering the biological data, and reviewing the data using the computer-based visual analysis method was 60% faster than the conventional microscope method (Fig. 2). The computer-based method proved to be much faster than the convention method, in part, because there was no need for intermediate steps to transcribe or enter the data by computer personnel. The computer-based method, based on our limited testing, also indicatd that an inexperienced reader can perform the analysis as well as a more experienced reader and there is no decrease in precision of counts between readers compared to the conventional method. In addition, the components of our computer-based method provided the best cost effective combination of video resolution, and digitizing and software capabilities of any system we examined in its price range and demonstrated better performance than some systems costing over twice as much. This system will save Miami Laboratory scientists many hours in their efforts to age oceanic pelagic fishes, as well as other species.

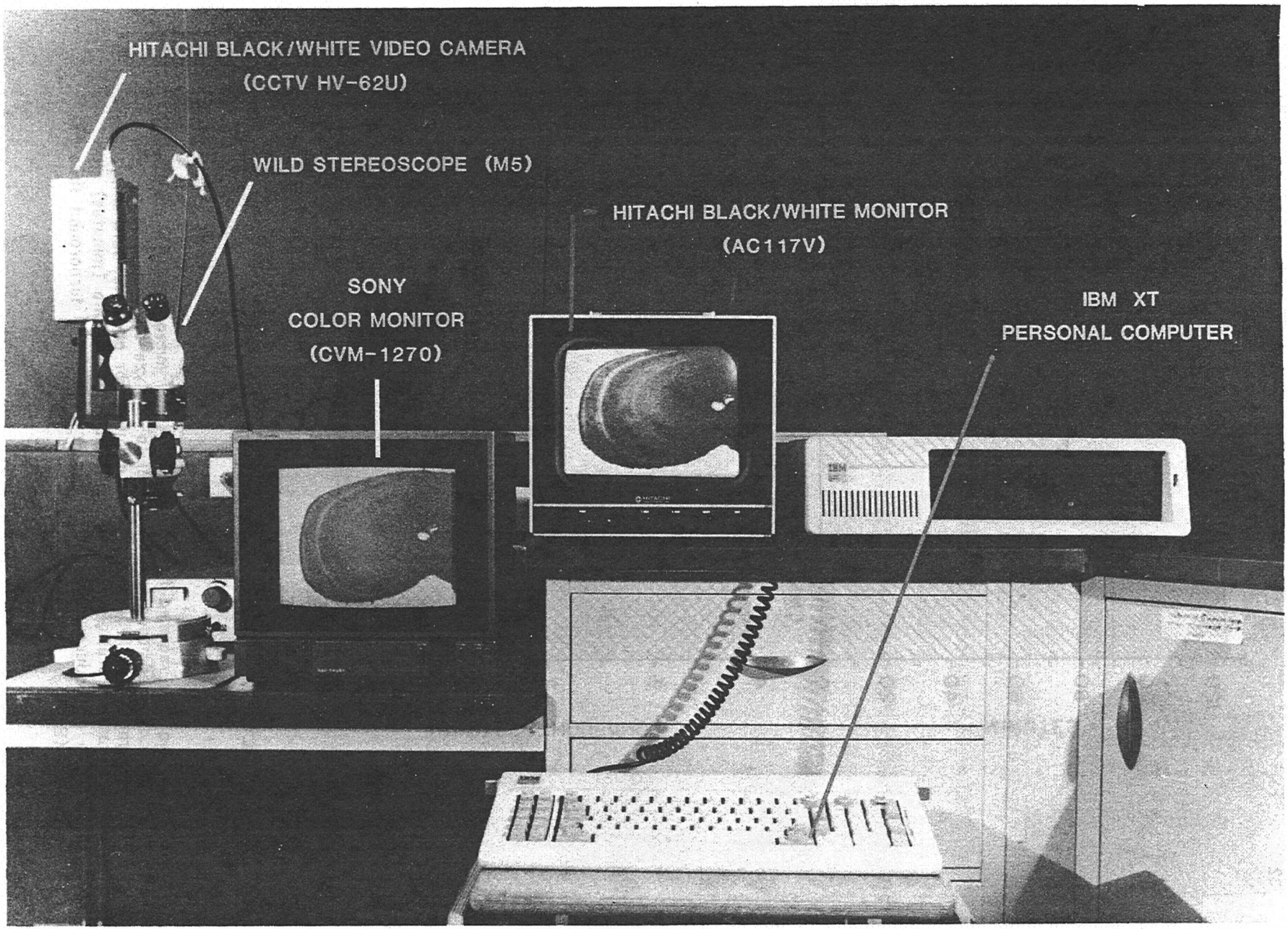


Figure 1- Hardware components of the computer-based visual analysis system (from left to right): Hitachi CCTV HV-62u video camera, Wild M5 stereoscope, Sony CVM-1270 color video monitor, Hitachi AC117V black and white TV monitor, and IBM XT personal computer.

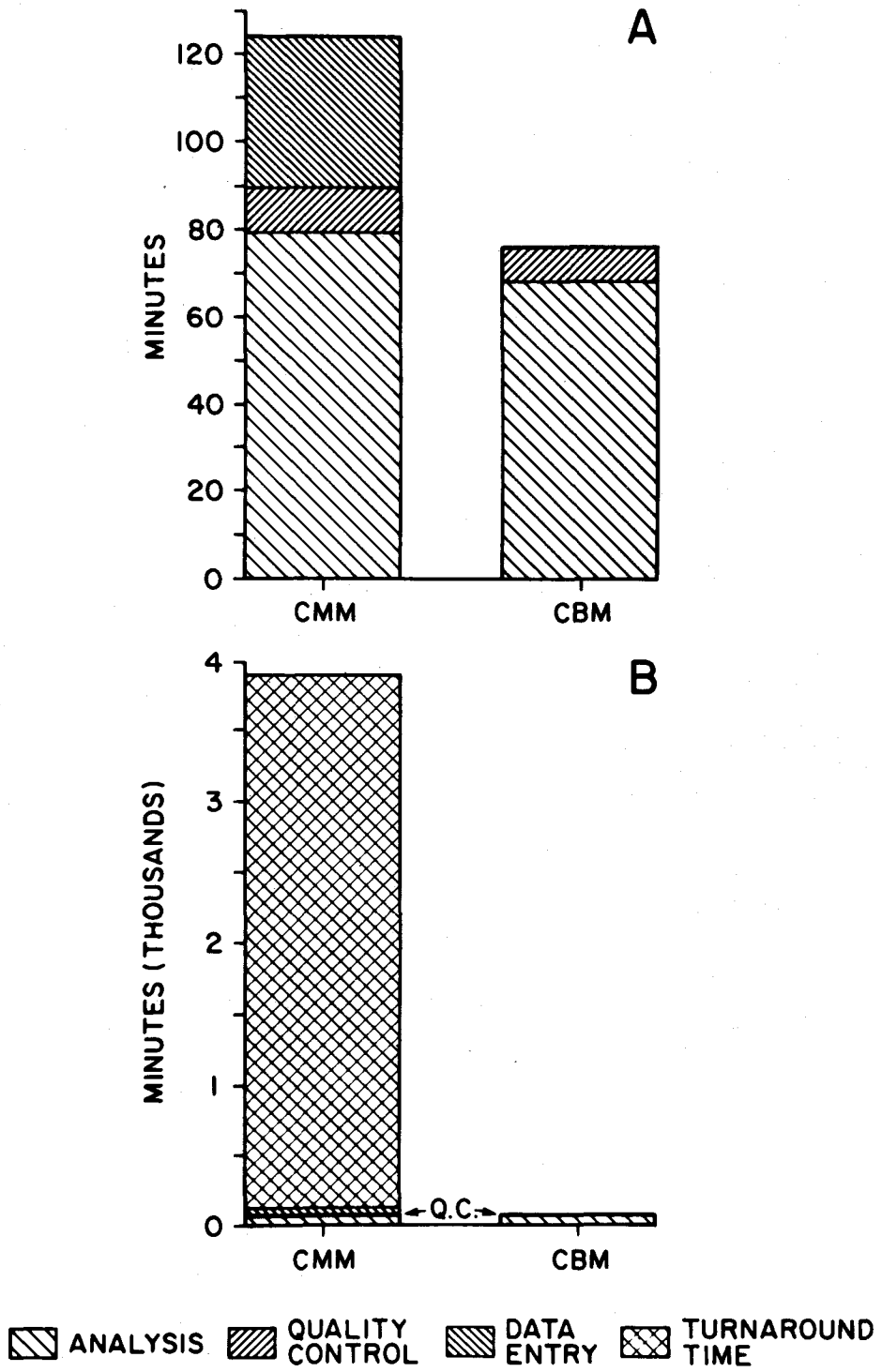


Figure 2- Processing time required for using conventional microscope method (CMM) and our computer-based method (CBM) to analyze skeletal structures for age determination. Processing time (minutes) for analysis, data entry, and quality control are given in (A); and processing time (minutes) for the same procedures as in (A) with the addition of turnaround time are given in (B)

RECREATIONAL BILLFISH SURVEY

Gulf Of Mexico

Paul J. Pristas

The end of 1985 marked the 15th consecutive year that NMFS conducted recreational billfish surveys in the Gulf of Mexico. Port samplers were hired to conduct the survey from major billfishing localities in the northern Gulf. These locations are: Port Aransas, Texas; Grand Isle and South Pass, Louisiana; Mobile, Alabama-Pensacola, Florida; and Destin and Panama City, Florida. Port samplers traveled within their respective areas collecting pertinent data from tournaments, as well as docks. In addition, NMFS personnel at Port Isabel, Texas, and recreational fishermen from San Benito, Texas, to St. Petersburg, Florida, participated in this survey by collecting and submitting billfishing data from their areas. Billfish landings from sources other than those listed here (i.e. headboats or piers) are not included in this report. Whenever possible, the data are listed by the major geographical area for the northeastern Gulf (Alabama and Florida), northcentral Gulf (Louisiana), and northwestern Gulf (Texas). In the northwestern Gulf, the ports from Freeport, Texas, north comprise East Texas; the area between Port O'Connor and Corpus Christi comprises Central Texas; and the area from Port Mansfield, Texas, south comprises South Texas.

Catch and Effort

The number of hours trolled and the numbers of billfishes raised, hooked, boated, or released during the season by fishermen we interviewed are shown in Table 1. Numerous factors can effect the amount of fishing effort from these interviews (i.e. sampling and fishing intensity, weather, etc), and these should be taken into consideration when interpreting the results of our survey. The

amount of trolling effort (29,110 hr) sampled in 1985 was 5% less than that (30,575 hr) sampled in 1984. Although there was a slight decrease in fishing effort sampled during the year, the amount of offshore fishing sampled in 1985 remained high compared to the earlier years of the survey (Figure 1) and was 29% higher than the previous 14-yr average (22,548 hr) for the entire northern Gulf. The increase in the number of hours spent big game fishing between 1971 and 1985 (Figure 1) demonstrates the growing importance and popularity of recreational billfishing activity. Of the 29,110 hr of effort sampled in 1985, the northeastern, northcentral, and northwestern areas of the Gulf accounted for 42%, 26%, and 32%, respectively.

During the 1985 season, anglers we interviewed reported catching 1,034 billfishes (including releases) in conjunction with their reported fishing effort (Table 1), and 110 billfishes for which no fishing effort was available (Table 2). The 292 releases represented 26% of their total catches, compared to 562 released fishes (32%) reported in 1984. Anglers we sampled released the same percentage (20%) of their blue marlin catchs in 1985 as they did in 1984. However, for white marlin, they reported releasing 34% (173 fish) of their catch in 1985 compared to 40% (394 fish) in 1984. In 1985, 16% (27 fish) of the sailfish catch was released compared to 25% (72 fish) reported released in 1984. For the three species combined, blue marlin comprised 41% (458 fish) of the catches (including releases), while white marlin and sailfish accounted for 44% (489 fish) and 15% (166 fish), respectively.

The index of apparent relative abundance we use in this report is based on the number of billfishes hooked-per-hour-of-trolling (HPUE) from our samples. The HPUE values are derived by dividing the number of fishes hooked by the number of hours trolled (Table 1). Although this index is subject to certain limitations (i.e., fishes not rising to or striking at trolled baits, fishes not

being hooked, etc.,) and can be affected by many different variables (i.e. weather, fishing intensity, fishermen skills, etc.) this index is presently our best estimate of resource abundance. Fishing success for billfishes were nearly equal in the northwestern Gulf (0.066 HPUE) and the northeastern Gulf (0.065 HPUE). The northwestern Gulf had the highest HPUE for blue marlin and sailfish (0.032 and 0.020, respectively), while the northeastern Gulf had the highest HPUE for white marlin (0.038). The yearly HPUEs for the marlins, sailfish, and the three species combined for the 15-yr study period are shown in Figure 2. The HPUE for blue marlin in 1985 and 1984 was the same (0.029); this was 12% above the 15-yr average HPUE (0.026). These consistent values confirmed past findings that fishing success for blue marlin has remained relatively stable in the northern Gulf. The HPUE for white marlin (0.025) in 1985 decreased sharply (40%) from the 1984, as well as the 15-yr average HPUE (0.042). Although the yearly HPUEs for white marlin have fluctuated considerably, this is the second time in 15 yr that these values have declined for 3 consecutive years. After the first 3-yr decline in HPUEs for white marlin occurred (1975-78), we found that HPUEs for this species rose to a near record level in 1981. The 1985 HPUE (0.007) rate for sailfish was the lowest during the 15 yr of this study. This is the eighth consecutive year that the yearly HPUE has remained below the cumulative yearly average HPUE (0.018) and was 61% below the cumulative average. Many anglers have expressed their opinion that artificial lures are not as effective as natural baits for catching sailfish. This could be one of the factors in the declining index of abundance of sailfish; the increased use of artificial lures started about 1977-78. However, other factors may contribute to this decline. The HPUE (0.061) for three species combined decreased 26% from the 1984 HPUE (0.082).

This sharp decline was 29% below the 15-yr average HPUE (0.086) and strongly reflected the decline in the apparent relative abundance of white marlin and sailfish.

In conjunction with the trolling effort for billfishes, we also collected data on driftfishing. These data have been collected since driftfishing became popular in 1978. This fishing is done at night and is directed at swordfish. Because this entails a different style of fishing and the target species are not marlins or sailfish, these data are not included in catch rate analyses in this paper. Driftfishing data are shown in Table 3 (driftfishing catch and effort) and Table 4 (weights) for documentation. In 1985, 315 hrs of driftfishing were sampled (Table 3). This was 41% (216 hr) below the amount of effort sampled in 1984 (531 Hr) and was 52% (342 hr) below the average number of hours spent driftfishing by fishermen we interviewed during the previous 7 yr. Seven swordfish were caught by those fishermen sampled in 1985, 74% less than the previous 7-yr average (27 fishes) since 1978.

Size Composition

Size data in terms of landed weights are presented in Table 4 for the various species, including the swordfish taken while driftfishing. Figure 3 shows the yearly average weights for the marlins and sailfish, along with the 15-yr average weight for each species. The second largest blue marlin (980.5 pounds) recorded caught on rod and reel in the northern Gulf was landed in Destin, Florida, during the season (Table 4). However, the catch of this exceptionally large blue marlin, along with some other blue marlin that exceeded 700 pounds, was not sufficient to increase the 1985 average weight (245.4 pound) from the 1984 average weight (267.5 pounds) for this species. In fact, the 1985

average weight of blue marlin was the lowest yearly average weight since 1974 and was 9.9 pounds below the 15-yr average weight (255.3 pounds). The average weight (53.8 pounds) of white marlin landed in 1985 increased 5% from the 1984 average weight (51.3 pounds). This was the first time since 1979 that the average weight of this species exceeded the cumulative yearly average weight, which is 53.0 pounds for the 15-yr period. Sailfish increased in average weight from 41.6 pounds in 1984 to 45.4 pounds this season. This 9% increase in one year, however, did not dramatically increase the cumulative yearly average which has been about 43 pounds for the past several years. No discernible increasing or decreasing trends have become apparent in the average weights of any of the three species during the duration of this survey.

Bait Preference

As mentioned earlier in this report, the use of artificial lures for big game fishing in the Gulf of Mexico has become increasingly popular since about 1977, when a 1,018 1/2 pound blue marlin was caught on an artificial lure. Although a fish may strike a bait or lure for reasons other than feeding, we use the HPUE rate for the various bait types as our best indicator of bait preference (Table 5). This season, anglers reported trolling with artificial lures 83% (24,772 hr) of their total fishing time. Natural baits were used 7% (6% dead bait, 1% live bait) of the total time, and a combination of natural and artificial baits were fished 10% of the total trolling time. Trolling very slowly with live baits increased in popularity this season, especially in the northeastern Gulf where it produced the highest HPUE (0.048) for blue marlin. The use of live baits also resulted in the highest HPUE (0.135) for blue marlin

in the northwestern Gulf and in all three areas combined (0.060). In the northcentral Gulf, the use of natural baits (i.e., dead or live) is so infrequent that a valid comparison is not feasible for this area. The highest HPUE (0.054) for white marlin in the northeastern Gulf was on dead baits, while in the northwestern Gulf, the highest HPUE (0.051) for this species was on live baits. When data from all three areas were combined, the highest HPUE (0.035) for white marlin was on dead baits. Sailfish appeared to have a definite preference for dead baits. In both the northeastern and northwestern areas, the highest HPUEs (0.003 and 0.047, respectively) for sailfish occurred when dead baits were used. This was also true for all three areas combined, where the highest HPUE (0.024) for sailfish was recorded for dead baits. Although the seven sailfish caught in the northcentral area were hooked on artificial baits, the overwhelming preference for using artificial baits in this area does not provide a basis for comparisons with other bait types. The high HPUEs for sailfish on dead bait reported for most Gulf areas supports the obervations by anglers that sailfish are more readily hooked on small natural bait and, thus, this factor may contribute to the observed decline in HPUEs recorded for sailfish in the Gulf over the past several years. The data for the marlins and sailfish combined show that both types of natural baits had higher HPUEs (0.083, dead bait; 0.076, live bait) than artificial baits. It is interesting to note, however, that when both natural and artificial baits were trolled at the same time, the HPUE (0.034) for artificial baits exceeded the HPUE (0.024) for natural baits.

Feeding Activity

Feeding activity, as measured by the HPUE of billfishes for hourly periods

of the day in which 50 hr or more of trolling activity occurred, is shown in Figure 4. As stated earlier, even though other factors may be involved when fishes strike at baits, we consider the HPUE rate as our best indicator of feeding response. Blue marlin and white marlin fed most actively toward evening ($\geq$1800 hr), whereas the highest HPUE (0.012) for sailfish occurred in late afternoon (1600 hr). The increase in feeding activity in midmorning (1000 hr) that has been prevalent in past years, was apparent again this season. During the 0500 hr period, comparatively few hours were fished (<1% of total time) and no hook-ups were reported.

Fishing Areas

To maintain consistency with earlier reports of this survey, the numbers of billfishes "raised" divided by the number of hours fished by anglers we interviewed within 10-minute latitude-longitude squares are shown in Charts 1-3. Fishing areas are outlined in heavy black lines, with blank squares indicating no fishes raised. Only squares in which 10 hr or more of trolling were reported are included in these analyses. Indices of low, mid, and high rates and the corresponding numbers of fishes raised-per-hour-of-trolling are shown in each of the three area charts.

In the northeastern Gulf (Chart 1), anglers fished a 3% larger area in 1985 compared to 1984. This resulted in billfishes being raised in 94% of the area fished; a rate similar to 1984. The 6% of high value squares was a considerable decrease from the 20% reported in 1984. The inshore-offshore distribution of these squares was about equal. All of the high value squares were east of 87^{o} west longitude, a result very similar to those for 1984 and 1983. Fifty four percent of the squares had low values compared to 22% low value squares in

1984. This decrease in high value squares and increase in low value squares reflects the decreased HPUE (0.065) for billfishes in the northeastern Gulf (Table 1) compard to the HPUE (0.097) for these fishes in this area in 1984.

In the northcentral Gulf (Chart 2), fishing activity in 1985 was confined to 13 squares which is 19% smaller than in 1984. A major shift in the fishing area occurred as 63% of the 1985 fishing area was west of 89° west longitude compared to 43% in 1984. In both years, all of the high value squares were, also, west of this longitude. The percent of high value squares was 6% this season compared to 9% in 1984. The low value squares increased to 67% in 1985 from 25% in 1984. In contrast to the northeastern Gulf, where this situation occurred, the HPUE (0.047) for billfishes this season (Table 1) increased 12% from the 1984 rate.

In the northwestern Gulf (Chart 3), the fishing area increased from 68 squares in 1984 to 89 squares in 1985; an increase of 31%. However, fishes were reported raised in only 89% of the area this season compared to 94% of the area in 1984. The 3% of high value squares was slightly more than the 1% in 1984, while the combination of low value and blank squares increased to 83% in 1985 from 75% in 1984. This increase in the percent of low and blank squares was reflected in the decrease in the billfish HPUE for this area (0.066 versus 0.098) between 1985 and 1984.

Related Observations

1. The earliest landing of a billfish this season was on March 3, 1985, when the crew aboard the Sea Scape, out of Destin, Florida, reported landing a white marlin.

2. A new Florida record was established on June 14, 1985, when Warren Culbertson fishing aboard the Dixie Darlin, piloted by Capt. Scott Pate, caught a 980.5 pound blue marlin.

3. There were no "Grand Slams" (i.e., catches of a blue marlin, white marlin, and sailfish in one-day trip) reported during the 1985 season. However, we documented catches of two of the three species during the same trip aboard several boats during the year. No "Grand Slams" were reported in 1984, and three were recorded in 1983.

Acknowledgments

We extend deep appreciation to the captains, mates, and recreational anglers for their cooperation during this survey. I am very grateful for the special efforts of the following people who made the survey successful: Betty Tubbs, San Benito; Randy Bright, Port O'Connor; Jim Hubbard, Freeport; Dr. Greg Savoy, western Louisiana; Maumus Claverie, Jr., South Pass; Bill Wade, Orange Beach; George Ballard, Pensacola; Bert Bookout and Dick Dutton, Fort Walton Beach; Susan Destin and Mary Mittler, Destin; Forrest Ware, Port St. Joe; and Eleanor Bonser, Juanita Millard, and Troy Caston, St. Petersburg.

The dedicated work of the port samplers resulted in about 3,396 interviews during the 1985 season. These port samplers were Kit Doncaster, Port Isabel; Mark Pattillo, Port Aransas; Brian LeBlanc, Grand Isle; Joe Yurt, South Pass; Suzanne King, Mobile/Pensacola; Richard Kersten, Destin; and Deborah Fable, Panama City.

Table 1. Hours trolled and billfishes raised (R), hooked (H), and boated/released (B/R) in the northern Gulf of Mexico, 1985.

	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	12,131	427	311	131/24	786	461	190/89	30	19	14/1	2	2	2/0	1	1	1/0	1,246	794	338/114
Panama City	1,831	47	39	15/0	148	96	45/10	9	5	3/0	0	0	0/0	1	1	1/0	205	141	64/10
Destin	4,250	182	109	52/13	329	144	78/21	11	6	5/1	2	2	2/0	0	0	0/0	524	261	137/35
Pensacola	1,639	65	57	22/1	112	86	34/17	5	4	3/0	0	0	0/0	0	0	0/0	182	147	59/18
Mobile	4,411	133	106	42/10	197	135	33/41	5	4	3/0	0	0	0/0	0	0	0/0	335	245	78/51
Northcentral Gulf	7,556	312	225	68/35	195	126	52/39	7	7	6/1	0	0	0/0	0	0	0/0	514	358	126/75
South Pass	5,981	241	157	49/29	152	93	41/29	4	4	3/1	0	0	0/0	0	0	0/0	397	254	93/59
Grand Isle	1,575	71	68	19/6	43	33	11/10	3	3	3/0	0	0	0/0	0	0	0/0	117	104	33/16
Northwestern Gulf	9,423	395	302	141/28	168	135	60/27	269	185	99/25	1	1	1/0	0	0	0/0	833	623	301/80
East Texas	466	46	32	16/2	12	11	6/5	4	1	1/0	0	0	0/0	0	0	0/0	62	44	23/7
Central Texas	4,303	216	153	65/13	96	65	36/6	185	108	70/11	0	0	0/0	0	0	0/0	497	326	171/30
South Texas	4,654	133	117	60/13	60	59	18/16	80	76	28/14	1	1	1/0	0	0	0/0	274	253	107/43
Total all areas	29,110	1,134	838	340/87	1,149	722	302/155	306	211	119/27	3	3	3/0	1	1	1/0	2,593	1,775	765/269

Table 2. Numbers of billfishes reported as boated or released (/) with no accompanying data on fishing effort in the northern Gulf of Mexico, 1985.

	Number					
	Blue marlin	White marlin	Sailfish	Swordfish	Spearfish	All species combined
Northeastern Gulf	19/3	29/18	8	0	0	56/21
St. Petersburg	9	10	8	0	0	27
Panama City	1	0/2	0	0	0	1/2
Destin	1	5	0	0	0	6
Pensacola	2/2	12/13	0	0	0	14/15
Mobile	6/1	2/3	0	0	0	8/4
Northcentral Gulf	3/1	0	1	0	0	4/1
South Pass	0/1	0	1	0	0	1/1
Grand Isle	0	0	0	0	0	0
Western Louisiana	3	0	0	0	0	3
Northwestern Gulf	9/1	7	11	0	0	27/1
East Texas	4	0	1	0	0	5
Central Texas	5	7	10	0	0	22
South Texas	0/1	0	0	0	0	0/1
Total all areas	31/5	36/18	20	0	0	87/23

Table 3. Summary of recorded driftfishing for big game fishes in the northern Gulf of Mexico, 1985.

	Hours fished	Number of recorded catches*				
		Swordfish	Blue marlin	White marlin	Sailfish	All three species
Northeastern Gulf	194	4	0	0	0	4
Panama City	22	3	0	0	0	3
Destin	31	1	0	0	0	1
Pensacola	0	0	0	0	0	0
Mobile	141	0	0	0	0	0
Northcentral Gulf	9	1	0	0	0	1
South Pass	0	0	0	0	0	0
Grand Isle	9	1	0	0	0	1
Northwestern Gulf	112	2	0	0	0	2
East Texas	0	0	0	0	0	0
Central Texas	0	0	0	0	0	0
South Texas	112	2	0	0	0	2
Total all areas	315	7	0	0	0	7

* Includes releases

Table 4. Weights (pounds) of billfishes recorded in conjunction with fishing effort in the northern Gulf of Mexico, 1985.

	Panama City	Destin	Pensacola	Mobile	South Pass	Grand Isle	East Texas	Central Texas	South Texas	Total all combined
Blue marlin										
Largest	745.0	980.5	744.7	648.8	642.0	654.0	482.0	679.3	631.5	980.5
Smallest	94.8	71.0	142.2	81.0	75.5	117.0	69.5	66.8	66.0	66.0
Average	338.0	246.8	350.2	221.1	252.3	260.0	232.0	218.4	227.8	245.4
White marlin										
Largest	101.0	78.5	84.3	79.0	82.0	76.0	70.5	91.6	56.0	101.0
Smallest	38.3	41.5	37.7	37.0	36.3	42.0	46.5	38.0	33.3	33.0
Average	53.4	55.2	55.2	51.8	54.0	53.8	59.7	54.6	45.6	53.8
Sailfish										
Largest	56.5	57.2	46.0	56.7	55.0	58.0	64.0	64.5	73.8	73.8
Smallest	5.0	40.0	39.5	35.0	42.9	42.0	64.0	28.1	33.0	5.0
Average	33.8	45.4	43.1	44.2	47.9	51.3	64.0	44.5	47.7	45.4
Swordfish										
Largest	91.0	115.0	0	0	0	14.0	0	0	243.5	243.5
Smallest	71.7	48.0	0	0	0	14.0	0	0	47.0	14.0
Average	81.4	76.5	0	0	0	14.0	0	0	169.0	101.5
Spearfish										
Largest	0	0	0	0	0	0	0	0	0	0
Smallest	0	0	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0	0	0

Table 5. Hours trolled and numbers of billfishes hooked-per-hour-of-trolling (HPUE) with various baits fished in the northern Gulf of Mexico, 1985.

	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	926		337		9,441		1,659		
Blue marlin		.028		.048		.025		.007	.014
White marlin		.054		.011		.036		.019	.020
Sailfish		.003		0		.001		.001	.001
All three species		.085		.058		.062		.027	.036
Northcentral Gulf	0		0		7,761		62		
Blue marlin		0		0		.029		0	.048
White marlin		0		0		.016		0	.016
Sailfish		0		0		.001		0	0
All three species		0		0		.046		0	.065
Northwestern Gulf	826		59		7,570		1,160		
Blue marlin		.019		.135		.033		.006	.016
White marlin		.015		.051		.015		.003	.005
Sailfish		.047		0		.016		.012	.009
All three species		.081		.186		.064		.021	.030
All three areas	1,752		437		24,772		2,881		
Blue marlin		.024		.060		.028		.007	.016
White marlin		.035		.016		.023		.007	.014
Sailfish		.024		0		.006		.005	.004
All three species		.083		.076		.057		.024	.034

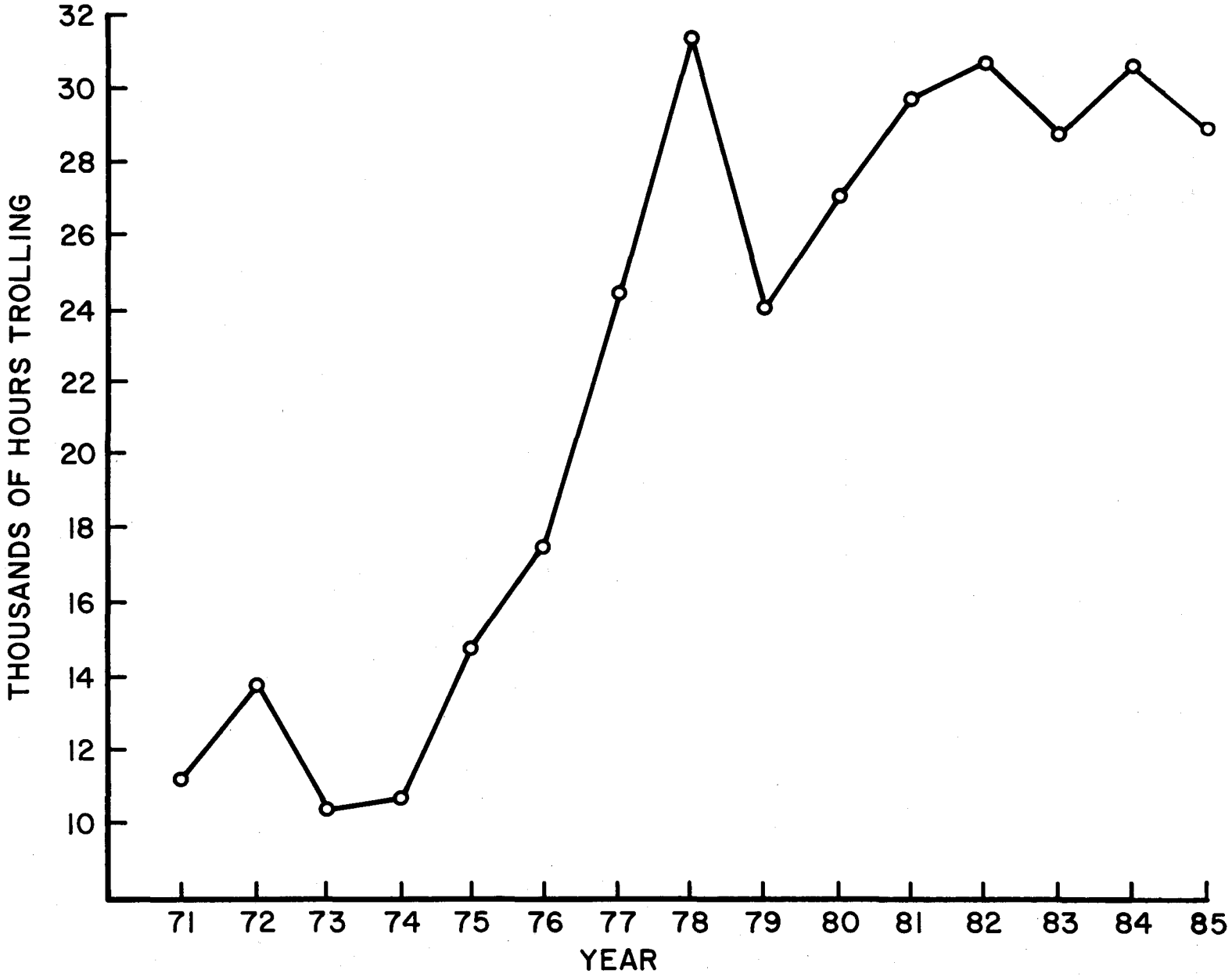


Figure 1 – Number of hours reported trolling for billfishes in the northern Gulf of Mexico, 1971-1985.

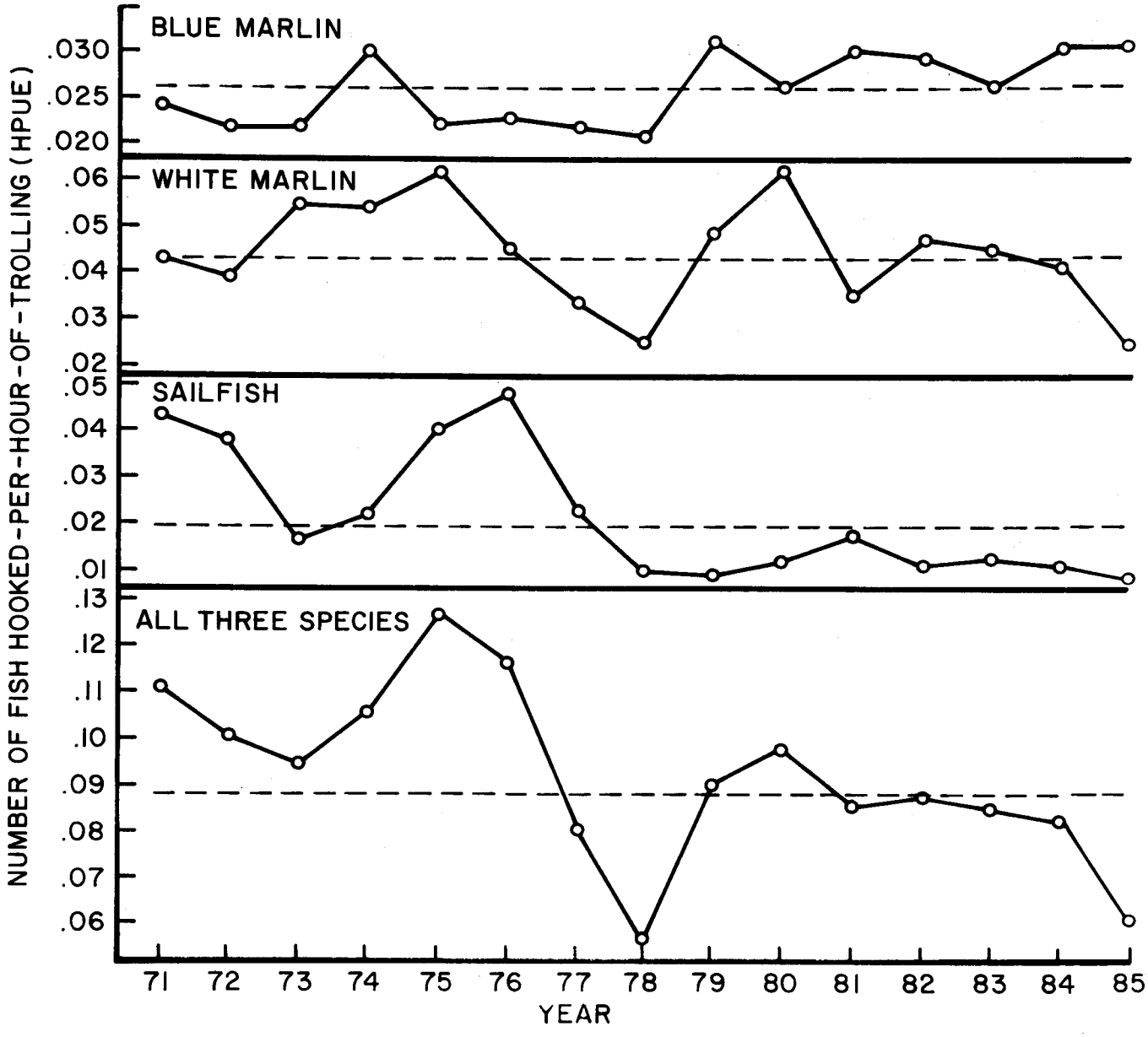


Figure 2 - Number of billfishes hooked-per-hour-of-trolling (HPUE) in the northern Gulf of Mexico, 1971-1985. Dashed line indicates 15-year average for each category.

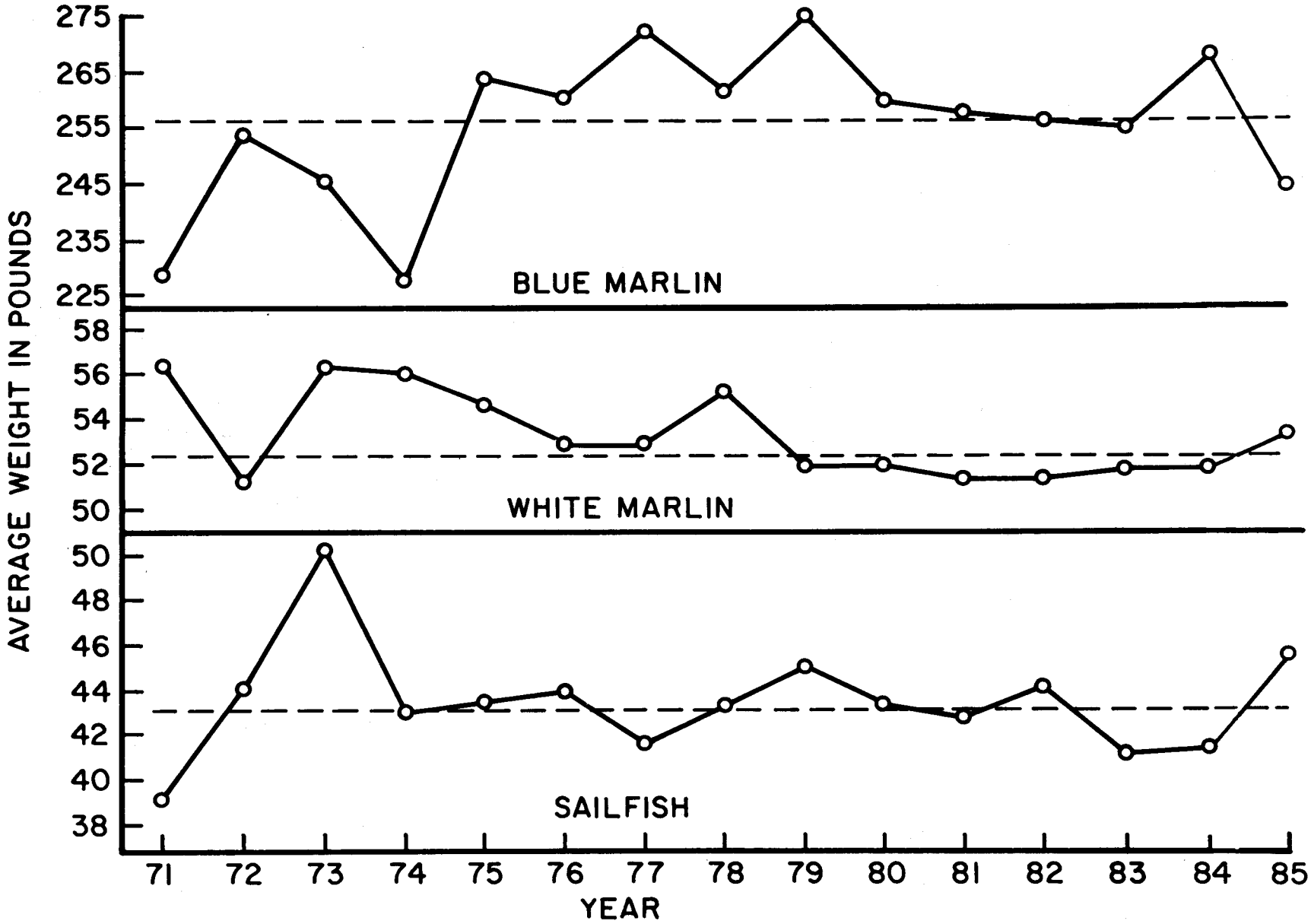


Figure 3 - Average weight (pounds) of billfishes in the northern Gulf of Mexico, 1971 - 1985. Dashed lines indicate 15-year average for each category.

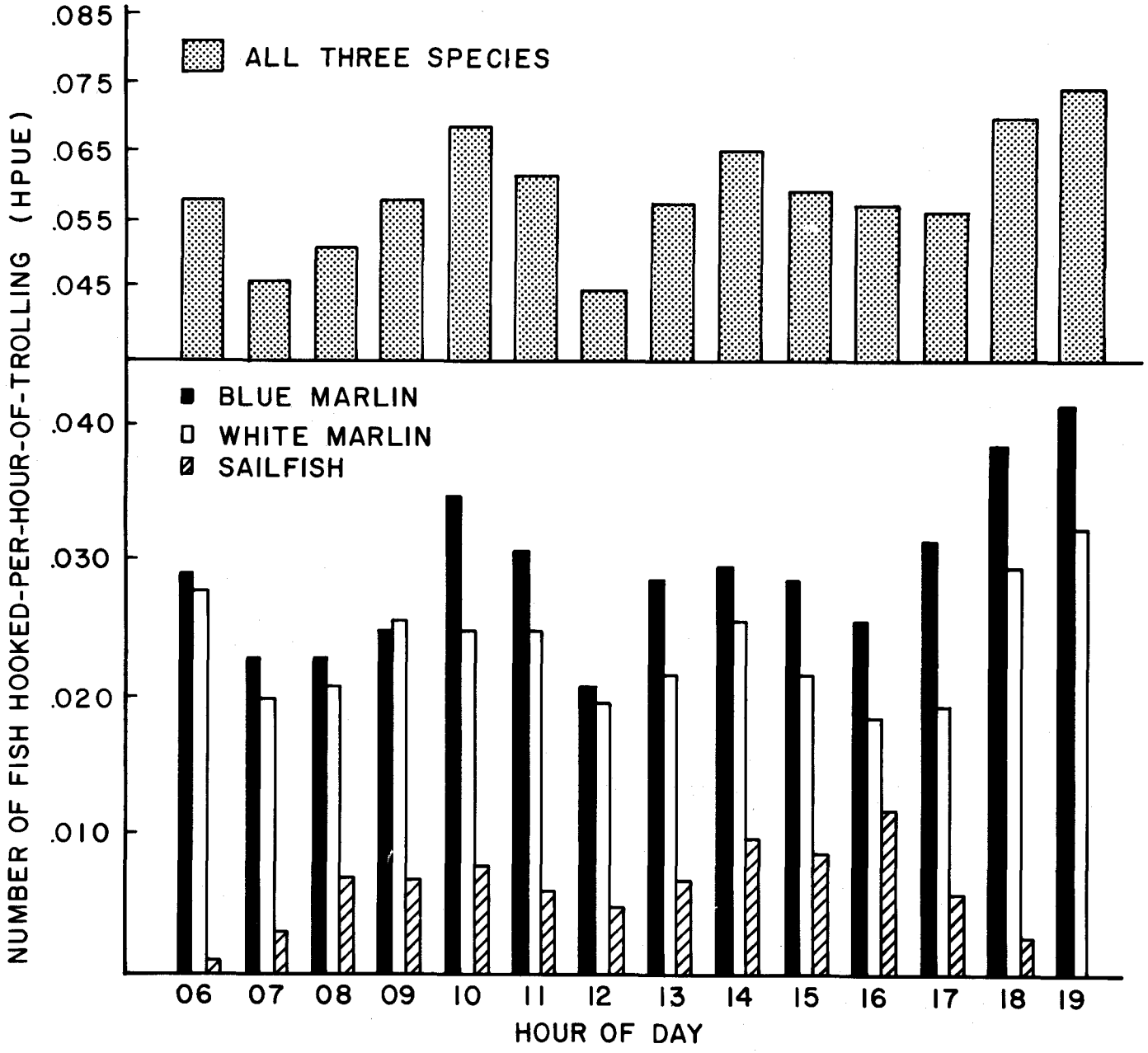
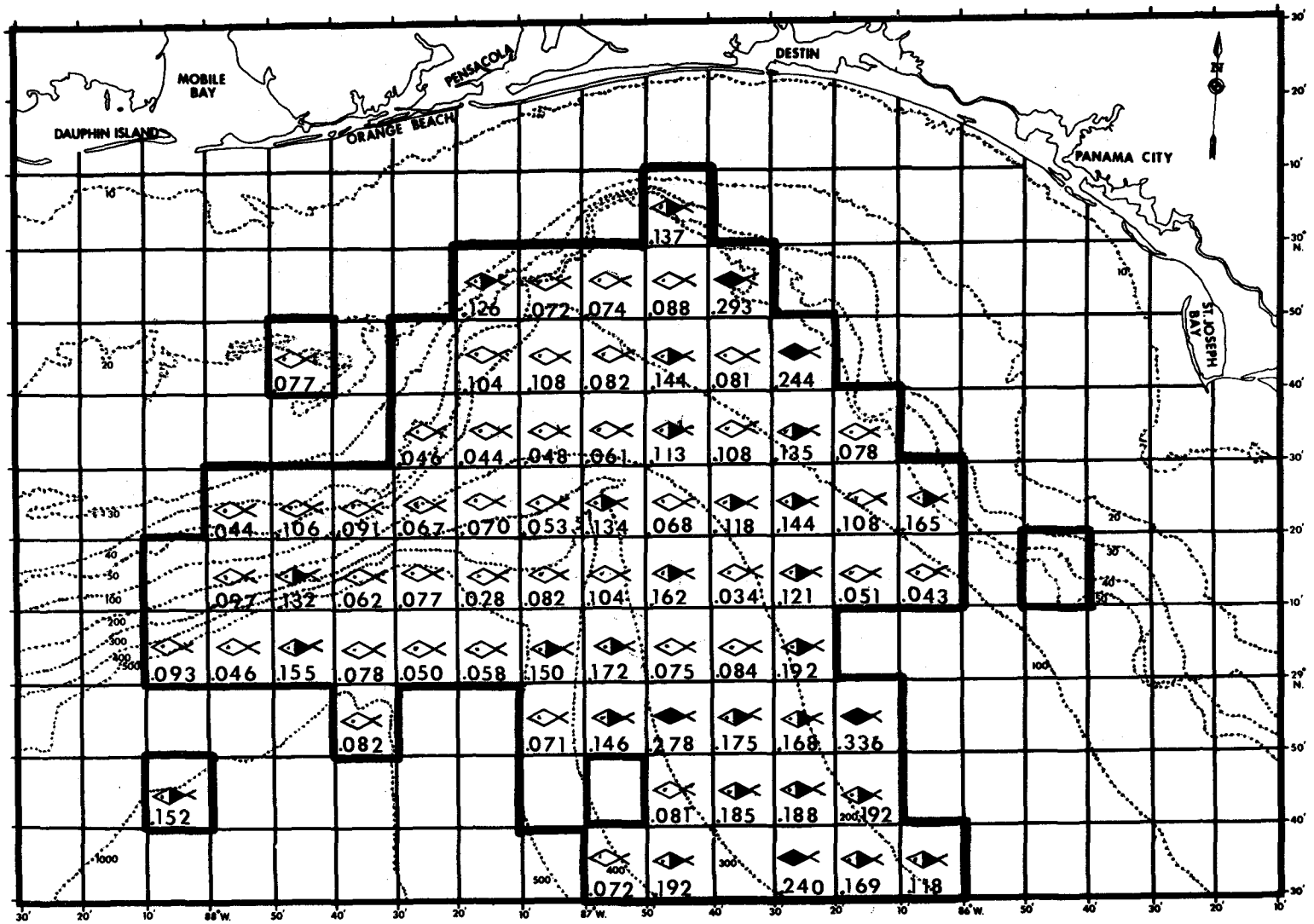


Figure 4 - Numbers of billfishes hooked-per-hour-of-trolling (HPUE) by time of day in the northern Gulf of Mexico, 1985.



LEGEND

Fishing area bound by heavy black lines. Numbers of fishes raised-per-hour-of-trolling:

.001-.112

.113-.225

≥ 226

No fishes raised in squares without symbols.

Chart 1- Numbers of billfishes raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min squares, 1985.

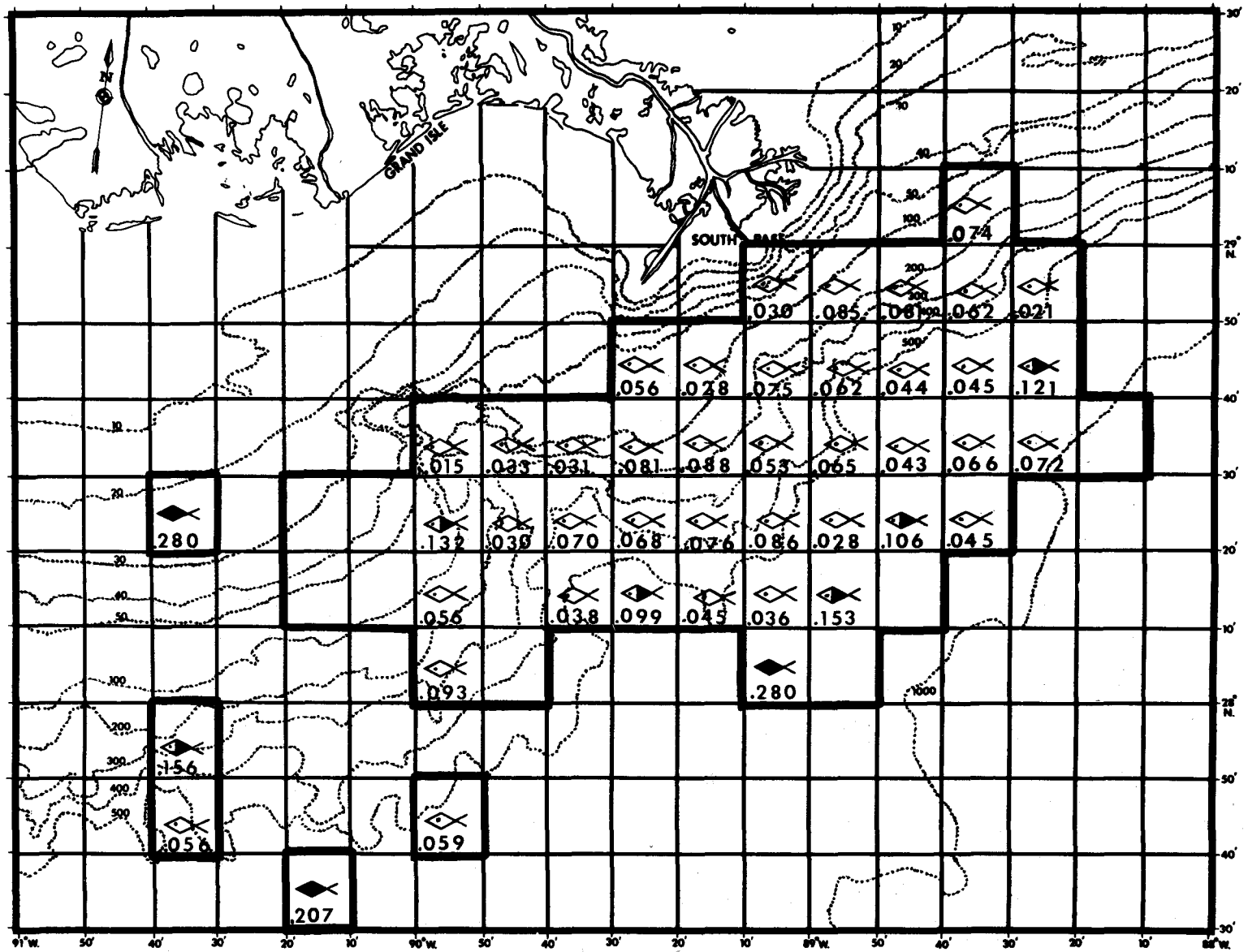
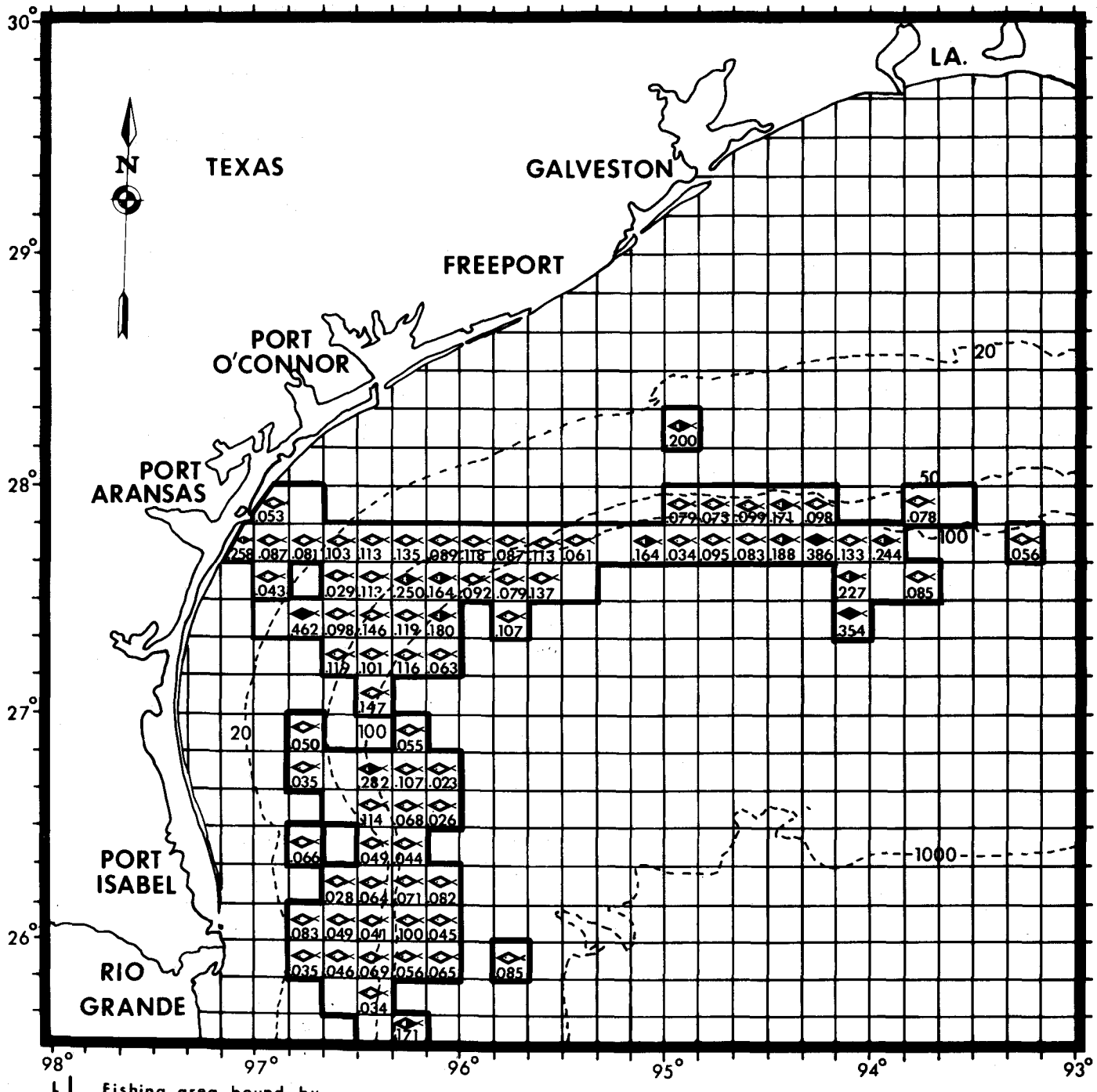


CHART 2-Numbers of billfishes raised-per-hour-of-trolling in the northcentral Gulf of Mexico by 10-min squares, 1985.



LEGEND

Fishing area bound by heavy black lines. No fishes raised in squares without symbols.

.001–.154 fishes raised-per-hour-of-trolling.

.155–.309 fishes raised-per-hour-of-trolling.

≥.310 fishes raised-per-hour-of-trolling.

CHART 3—Numbers of billfishes raised-per-hour-of-trolling in the northwestern Gulf of Mexico by 10-min squares, 1985.

RECREATIONAL BILLFISH SURVEYS

Western North Atlantic

Angelo R. Bertolino

This is the 14th consecutive year we have conducted recreational billfish surveys in the western North Atlantic. Data from this region were collected by several different agencies. National Marine Fisheries Service personnel and NMFS contractor, Monty Lopez, collected data from the Bahamas, the Caribbean, and the Florida East Coast and Keys. The U.S. East Coast was covered by fishery reporting specialists and biologists working for NMFS, and state biologists from South Carolina. Biologists from the Florida Department of Natural Resources assisted in sampling billfish tournaments along the Florida East Coast.

The data obtained from surveys of these areas include fishing effort; the number of fish hooked by species; the number of fish landed by species; largest, smallest, and average weights of fish landed by species; types of baits used and effectiveness of each bait; and various environmental data associated with each fishing trip. Hook-per-unit-of-effort (HPUE) was calculated by dividing the number of fish hooked by the number of hours spent trolling, while catch-per unit-effort (CPUE) was calculated by dividing the number of fish caught by the number of hours spent trolling. Calculations of HPUE for different baits -- natural bait (dead), artificial bait (lures), or both trolled simultaneously -- are discussed in each section. Angler success was calculated by determining the percentage of fish caught after being hooked. A fish that is recorded as caught (or landed) can be one that is boated or released. These calculations are not only expressed in overall effort but also by the type of bait used.

Changes in the amount of fishing effort recorded in the western North Atlantic can reflect different sampling intensities from year to year, can be a

direct measure of fishing activity where the sampling was conducted, or could be a combination of both factors. For example, the 29,102 hr of trolling effort documented in the western North Atlantic in 1985 is the third highest amount of billfishing effort recorded since the survey began in 1972 (Fig. 1). The large increase in fishing effort in this region during the last three years is partly due to an increase in sampling coverage and intensity, particularly the special project conducted in 1983. However, we also feel there has been a steady increase in billfishing activity since the survey was initiated, although estimates of total catch and total effort are not available. In 1985, 18% of the effort sampled was recorded from the East Coast, while 41%, 12%, and 29% of the effort was from the Bahamas, Caribbean, and the Florida East Coast and Keys, respectively.

The East Coast of the United States

The data for this area in 1985 only includes those data collected from North Carolina southward to Georgia along the U.S. East Coast. The information collected from Virginia Beach, VA, and north by NMFS personnel in the Northeast was destroyed by fire at the Northeast Fisheries Center's Sandy Hook Laboratory. These data are presently being reconstructed from field notes but will not be analyzed before this program summary is published. Therefore, the 1985 results will be presented by comparing these data (North Carolina south only) with the same information collected in 1984.

Sampling along the southern part of the U.S. East Coast in 1985 recorded 5,105 hr of fishing effort (Table 1) compared to 4,445 hr from the same localities in 1984, which was an increase of 23% over the previous year. However, there were a total of 18,212 hours of effort sampled from the East Coast in 1984 and therefore a substantial amount of data are likely missing from this area in 1985 due to the fire. The overall hook-per-unit-effort in 1985 (0.066, Table 1) showed a 36% increase from 1984. However, these values are within the range recorded during the last few years. Blue marlin HPUE decreased slightly

from 0.019 in 1984 to 0.016 in 1985; while the HPUE of white marlin increased from 0.027 in 1984 to 0.049 in 1985. Sailfish HPUE remained constant at 0.001 for both 1984 and 1985.

The overall average weight for blue marlin decreased slightly from 283.9 pounds in 1984 compared to 279.2 pounds in 1985 (Table 2, Fig. 2). Conversely, white marlin and sailfish showed increases in overall average weight of 44.8 and 30.2 pounds in 1984 compared to 46.5 and 44.3 pounds in 1985, respectively. Average weights by sex are given in Table 2. The largest blue marlin sampled in 1985 weighed 957 pounds compared to 590 pounds in 1984, even though the average weight of blue marlin dropped slightly during this period.

Anglers were more successful in landing their billfish in 1985 compared to 1984; the overall angler success (all species combined) was 65% in 1985 compared to 52% in 1984 (Table 3). Angler success for blue marlin and white marlin increased from 46% and 55% in 1984 to 50% and 70% in 1985, respectively. The small numbers (3 and 4) of sailfish hooked for 1984 and 1985, respectively, prevent any definative conclusions concerning angler success.

The 1985 HPUE using different bait types showed minimual fluctuations compared to 1984, except for HPUE for natural baits which increased from 0.093 in 1984 compared to 0.128 in 1985 (Table 4). Artificial bait HPUE decreased from 0.030 in 1984 to 0.022 in 1985; while the HPUE for both baits trolled simultaneously increased from 0.023 in 1984 to 0.036 in 1985. Also, the CPUE values for each bait type generally followed the same trend recorded for HPUE in 1984 and 1985 (Table 4).

The Bahamas

The hours of fishing effort by anglers we interviewed in the Bahamas for 1985 (12,071 hr, Table 1) decreased by 25% compared to 1984 (16,014 hr). Although effort decreased between these two years, 1985 effort in our sample

from the Bahamas has doubled compared to the first nine years of the survey. In addition, these values are slightly higher than the average fishing effort recorded from this area during the last four years of the survey.

There was a slight decrease in overall HPUE from 0.039 in 1985 compared to 0.042 in 1984 (Table 1). However, the 1985 overall HPUE was well within the normal range recorded for the Bahamas during the 14 years of study. In addition, the long term trend in overall HPUE from this area has been the most consistent (i.e., had the smallest fluctuations), from year to year, of all areas. This consistency was also reflected in the 1985 HPUEs for blue marlin, white marlin, and sailfish (Table 1), which showed very little variation from 1984 values, as well as from other years of the survey.

The overall average weight of blue marlin (both sexes combined) in 1985 (180.1 pounds, Table 2, Fig. 2) showed an increase of 3.4 pounds over 1984, which was the lowest mean value recorded from the Bahamas since 1972. Only in three other years (1980, 1983, 1984) did the overall average weight of Bahamian-caught blue marlin fall below 200 pounds. However, three consecutive years of declinging average weights is not necessarily indicative of a long-term trend. This decrease in weight was not evident with white marlin or sailfish for 1985, where modest increases of 1.8 and 4.2 pounds, respectively, were shown over 1984 average weights. Average weights by sex are given in Table 2.

Overall, angler success in the Bahamas increased slightly from 51% in 1984 and 1983 to 53% in 1985 (Table 3). Since 1981, the overall angler success has averaged 51%. There was a 5% increase in blue marlin caught after being hooked in 1985 (50%) compared to 1984 (45%); while the percentage of white marlin caught dropped substantially from 64% in 1984 to 55% in 1985. Angler success of sailfish decreased from 77% in 1984 to 72% in 1985.

Data collected from the Bahamas provided relatively complete information on the types of baits trolled in 1985. The 1985 HPUEs for natural bait and both baits trolled simultaneously showed an increase, while artificial bait HPUE's decreased (Table 4). For example, the 1985 HPUEs for natural baits, artificial baits, and both baits trolled simultaneously (Table 4) were 0.049, 0.038, and 0.039, respectively; whereas corresponding 1984 values were 0.047, 0.043, and 0.033.

For the past two years (84 and 83) the HPUE values for natural and artificial baits in the Bahamas have generally been close. In 1985, these values were also similar, as well as the percent of fish caught (Table 4). The CPUE for these bait types indicates that the catch rates for natural baits were higher than for artificials, while the CPUE for trolling both baits simultaneously are higher compared to natural and artificial baits (Table 4). Results in past years indicate that HPUE values when trolling both baits simultaneously generally have been lower than the other bait types. This was not the case for 1985; HPUE (0.039) when trolling both baits together was higher than using artificials (0.037), but smaller than natural bait (0.049, Table 4).

In 1985, the results from trolling both baits simultaneously showed that 37% of the blue marlin were hooked on natural baits and 63% were hooked on artificial baits. For white marlin, 80% were hooked on natural baits and 20% were hooked on artificial baits. All sailfish were hooked on natural baits. These results were similar to those reported in 1984, except that white marlin showed a 50-50 ratio when both baits were trolled simultaneously.

The Caribbean

Data from the Caribbean were collected during tournaments which were held during the most productive part of the 1985 fishing season (April-September).

Although the 3,516 hr of fishing effort sampled in 1985 (Table 1) was a 64% reduction from the previous year (9,675 hr), the 1985 fishing effort was still 11% higher than the average effort sampled for the last 13 years of the study, excluding the special sampling effort in 1983. The sharp decline in 1985 sampled may be due, in part, to not including the data on fishing effort from the Cayman Island Million Dollar Month Tournament. The computer tapes for Cayman Island data for 1985 were decoded too late to be included here but will appear in next year's program summary.

The 1985 total HPUE (all species combined) was 0.096, which is a considerable increase from the previous year (0.059) and is the fourth highest hook rate recorded during the past 14 years. The HPUE for blue marlin and sailfish showed the greatest increases from 0.053 and 0.002 in 1984, to 0.071 and 0.023 in 1985, respectively (Table 1). However, white marlin HPUE remained constant at 0.003 for both 1984 and 1985 (Table 1).

The overall average weight of blue and white marlin increased from 192.0 and 49.8 pounds, respectively, in 1984 to 232.7 and 59.0 pounds in 1985 (Table 2, Fig. 2). These weights fall within the normal range of average weights for these species recorded in the Caribbean since 1972. In 1985, there was no weight data available for sailfish. Average weights by sex for the Caribbean are given in Table 2.

The overall angler success (all species combined) in the Caribbean decreased from 55% in 1984 to 48% in 1985 (Table 3). Angler success for blue marlin and sailfish decreased from 54% and 71% in 1984 to 43% and 58% in 1985, respectively. White marlin angler success had the greatest increase from 51% in 1984 to 78% in 1985 (Table 3). This high success rate for white marlin is probably related to the small number (9) of white marlin hooked in the Caribbean in 1985.

As in past years, the Caribbean had the highest HPUE for both baits trolled simultaneously compared to other areas (Table 4). In addition, data on 1985 fishing success in the Caribbean indicated substantially higher rates for all bait types compared to other areas (Table 4). Fishermen in the Caribbean (particularly in St. Thomas) generally "pickle" their baits in formalin and use techniques to rig and troll baits at higher than normal speeds. Thus, the combination of both baits trolled together at speeds that are more effective for artificial baits may result in high catch rates. This is also substantiated when comparing the CPUE by bait type with other areas (Table 4). In addition, 1985 HPUE (0.200) and CPUE (0.109) values in the Caribbean are unusually high for natural baits (Table 4). This supports the evidence that natural baits are still very productive for hooking and catching billfish in the Caribbean, as well as other areas.

The Florida East Coast and Keys

Sampling coverage increased and therefore more hours of fishing effort (Table 1) were recorded from the Florida East Coast and Keys in 1985 (8,410 hr) than in 1984 (5,091 hr). The increase in 1985 effort is primarily due, in part, by including billfish tournaments along the Florida East Coast.

The annual Key West Blue Marlin Tournament (KWBMT) provides the only consistent data on marlin hook rates from the Florida Keys, since most billfishing effort in this area traditionally emphasizes sailfish. The hours of fishing effort documented for KWBMT for 1985 (2,668 hr) were about 4% more than reported in 1984 (2,556). Blue Marlin HPUE increased from 0.019 in 1984 to 0.034 in 1985 and was the highest hook rate recorded since 1982. White marlin HPUE decreased slightly from 0.002 in 1984 to 0.001 in 1985 and represents the lowest hook rate during the last 4 years of the survey (Table 1). In 1985, the data on sailfish was not sufficient from the KWBMT to calculate HPUE for sailfish. The 1985 HPUEs for both species of marlin are also very comparable to most of the average hook rates we observed from other geographical areas.

We treat data from the Islamorada Sailfish Tournament as a special case by not including it in our HPUE calculations (Table 1) because it is the only Florida Keys live bait tournament we sample. This tournament is of general interest, however, because of its popularity and large size. Fishing effort from the Islamorada sailfish tournament in 1985 (1,479 hr) increased by 22% from the previous year (1,160 hr). In 1985, 99 sailfish were hooked compared to 65 in 1984. This resulted in an increase in HPUE from 0.056 in 1984 to 0.067 in 1985 and was almost identical to 1983 results. The HPUE for sailfish from this tournament is higher than for others in this area. This high HPUE might be explained by the fact that live bait is permitted and the probable high concentration of sailfish in this area when the tournament is held (November/ December).

Other sailfish tournaments sampled in the Florida East Coast and Keys using natural (dead) baits, and to a lesser extent artificial baits, monitored 5,742 hr of fishing effort, 401 sailfish hooked, and a HPUE of 0.069 in 1985 (Table 1). The HPUE for all species combined in 1985 was 0.060, which was a 30% increase from 1984 and is probably due to the additional data resulting from expanded coverage of the East Coast of Florida.

The overall average weight of blue marlin (210.6 pounds), white marlin (62.0 pounds), and sailfish (30.3 pounds) from the Florida East Coast and Keys in 1985 (Table 2, Fig. 2) were generally within the normal range of weights observed from other areas and during previous years. The average weights by sex for each species are also given in Table 2. The largest blue marlin from the Florida Keys in 1985 weighed 467 pounds compared to 500 pounds in 1984.

The overall angler success in the Florida Keys decreased slightly from 66% in 1984 to 63% in 1985 (Table 3). Angler success for blue marlin decreased from 50% in 1984 to 42% in 1985; while white marlin angler success showed the greatest decrease from 86% in 1984 to 68% in 1985. Although the success rate of

white marlin was within the range of previous values, the small number (3) of white marlin hooked in 1985 was the lowest number recorded since 1982. Sixty-seven percent of the hooked sailfish were succesfully landed in 1985 compared to 68% in 1984.

Information on the types of baits used indicates that the highest HPUE was for artificial baits and the second highest was for natural baits (Table 4). In addition, the amount of hours trolling with artificial baits increased two fold over 1984. This trend was contrary to 1984, where the highest HPUE was for natural baits followed by artificial baits.

HPUE Data for All Areas Combined

When the data from all areas are combined, a yearly HPUE value can be generated for each species which will give a general overall indication of change in relative abundance from year to year. Figure 3 shows the yearly HPUEs for marlins and sailfish for the past 14 years of our survey. Blue marlin HPUE increased slightly from 0.025 in 1984 to 0.028 in 1985 and has shown the smallest change in HPUE of any species from the 14 year average. However, white marlin HPUE dropped below the 14 year average from 0.037 in 1984 to 0.015 in 1985, which was still within the range of HPUE values recorded for the past 14 years. Although the HPUE (0.019) for sailfish showed a slight increase over 1984 (0.013), this is the fifth consectuive year that it has remained below the 14 year average. For all three species combined, the HPUE decreased by 7% from 0.074 in 1984 compared to 0.069 in 1985 and represents a downward trend over the last three years from the 14 year average.

Feeding Activity

Many fisherman are interested in the time of day that billfishes most likely

feed. Figure 4 shows the 1985 HPUE for hourly periods of the day. The HPUE for each species was calculated by taking the number of fish hooked for a particular hourly period and dividing it by the total hours fished for that time period. The data indicates that the best feeding times for blue marlin, white marlin, and sailfish were 1600, 1300, and 1700 hr EST, respectively. However, these relatively high hook rates are influenced by the number of fish hooked and the relatively small number of hours fished during these time periods. Blue marlin appear to have an extended feeding period between 0900 and 1600 hr EST. The best feeding times for white marlin occured between 0900 and 1400 hr EST and were most active from 1300 and 1400 hr. Sailfish were most active in the late morning hours (1000 - 12000 hr) followed by a mid-afternoon peak beginning at 1500 hr. The period from 1000 to 1200 were generally active feeding times for all three species combined.

Acknowledgements

The success of this program is dependent upon the information collected from recreational fishermen. Therefore, a great deal of gratitude is extended to all of the anglers, crews, and tournament managers for their cooperation and patience in providing us with their fishing data. We particularly thank the South Carolina Wildlife and Marine Resources Department and the Florida Department of Natural Resources for their continued support. We also extend our thanks to the Bimini Big Game Fishing Club, the Cat Cay Club, the Chub Cay Club, the Walker's Cay Club, Club Nautico de San Juan, the directors of the Chuck Senff Marlin Tournament in St. Thomas, and Cayman Islands Million Dollar Month Tournament.

We recognize all of the samplers contributing to this program for working so diligently throughout the year.

Table 1. Hook-per-unit-effort (HPUE) of billfishes by species and geographical area recorded in NMFS recreational surveys of the northwest Atlantic in 1985.

Species	U.S. East Coast[4]	Bahamas	Caribbean	Florida East Coast & Keys
Blue Marlin	0.016	0.028	0.071	0.034[1]
White Marlin	0.049	0.008	0.003	0.001[1]
Sailfish	0.001	0.003	0.023	0.069[2]
Overall	0.066	0.039	0.096	0.060[3]
Hours of fishing effort	5,105	12,071	3,516	8,410[3]

[1]Data were from Key West Blue Marlin Tournamant only.

[2]Data were from all Florida East Coast and Keys billfish tournaments sampled except Key West Blue Marlin and Islamorada Live Bait Tournament.

[3]Data were from all Florida East Coast and Keys billfish tournaments sampled except Islamorada Live Bait Tournament.

[4]Data does not include information from Virginia Beach, VA, and north.

Table 2. Average weights (pounds) by species and geographical area, recorded in northwest Atlantic recreational billfish surveys, 1985.

Species	U.S. East Coast[2]	Bahamas	Caribbean	Florida East Coast & Keys	All Areas Combined[1]
Blue Marlin					
Male	228.5	133.4	144.4	143.7	140.8
Female	293.4	242.1	289.6	238.4	261.0
Overall	279.2	180.1	232.7	210.6	207.5
White Marlin					
Male	--	51.7	48.5	47.5	49.2
Female	54.3	64.5	64.3	76.5	63.3
Overall	46.5	58.1	59.0	62.0	53.7
Sailfish					
Male	--	43.3	--	36.5	42.1
Female	49.8	51.5	--	24.2	47.2
Overall	44.3	46.5	--	30.3	44.1

[1]Average weights of all fish weighed in 1985 by species.

[2]Data does not include information from Virginia Beach, VA, and north.

Table 3. Number of billfish (by species) hooked, caught, lost, and percent caught by geographical area in the northwest Atlantic, 1985.

Species	U.S. East Coast[1]	Bahamas	Caribbean	Florida East Coast & Keys
Blue Marlin				
Hooked	84	341	248	95
Caught	42	170	107	40
Lost	42	171	141	55
% caught	50	50	43	42
White Marlin				
Hooked	251	95	9	3
Caught	176	52	7	2
Lost	75	43	2	1
%caught	70	55	78	68
Sailfish				
Hooked	4	36	80	402
Caught	3	26	46	272
Lost	1	10	34	130
% caught	75	72	58	67
Overall				
Hooked	339	472	337	500
Caught	221	248	160	314
Lost	118	224	177	186
% caught	65	53	48	63

[1]Data does not include information from Virginia Beach, VA, and north.

Table 4. Hours trolled, hook-per-unit-effort (HPUE), percent fish caught, and catch-per-unit-effort (CPUE) for three types of trolling baits (natural bait, artificial bait, and both simultaneously) used in the four geographical areas of the northwest Atlantic, 1985.

Bait Type	Hours trolled	HPUE	Percent fish caught	CPUE
		East Coast[2]		
Natural	1,849	0.128	68	0.087
Artificial	501	0.022	64	0.014
Both Simultaneously	2,547	0.036	59	0.021
		Bahamas		
Natural	5,256	0.049	49	0.024
Artificial	4,215	0.037	53	0.020
Both Simultaneously	1,391	0.039	69	0.027
		Caribbean		
Natural	676	0.200	55	0.109
Artificial	1,123	0.130	43	0.056
Both Simultaneously	449	0.107	46	0.049
		Florida East Coast & Keys[1]		
Natural	91	0.011	—	—
Artificial	2,395	0.039	44	0.017
Both Simultaneously	35	—	—	—

[1]Data from Key West Blue Marlin Tournament only.

[2]Data does not include information from Virginia Beach, VA, and north.

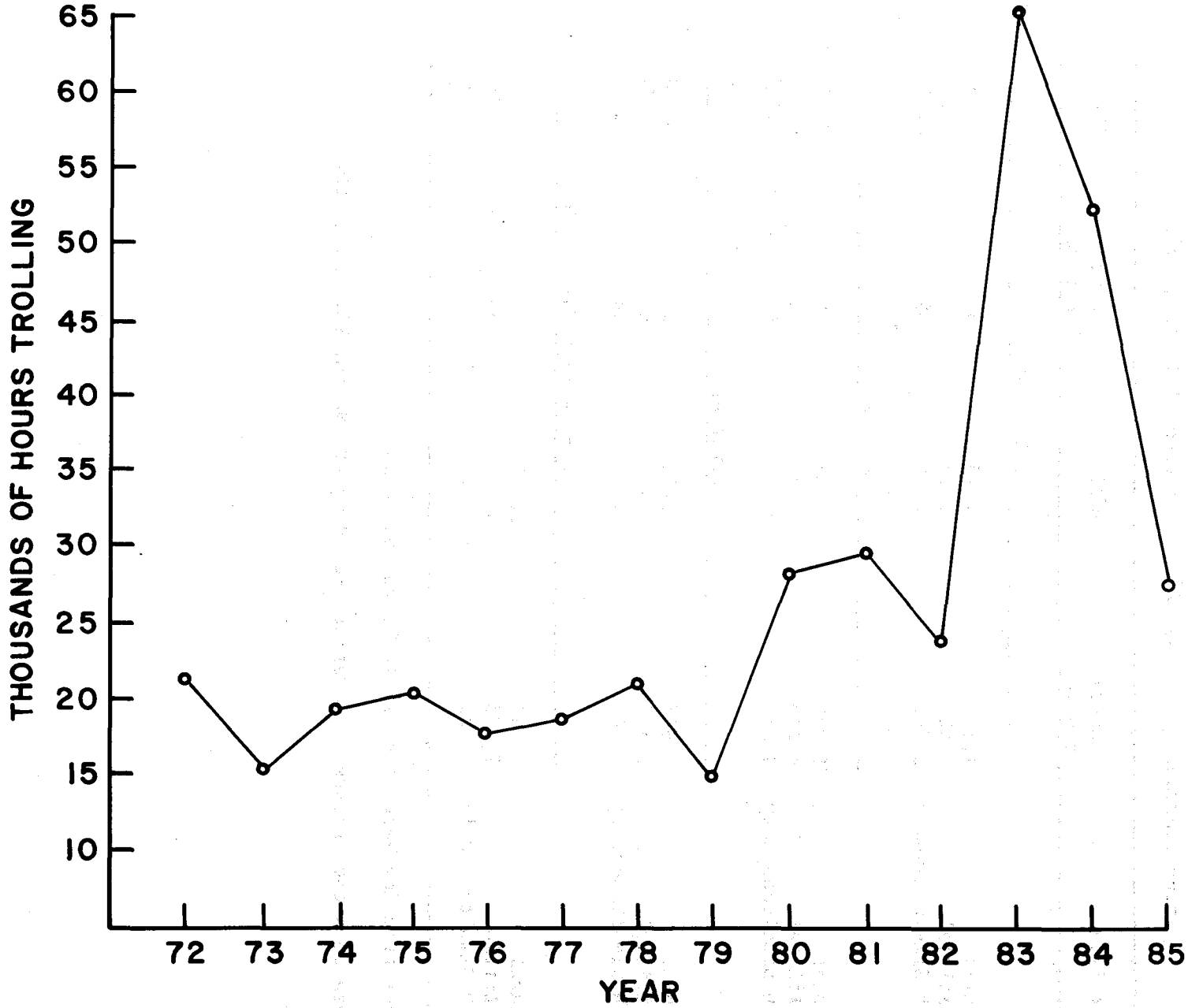


Figure 1 - Number of hours reported trolling for billfishes in the four geographical areas in western Atlantic, 1972-1985.

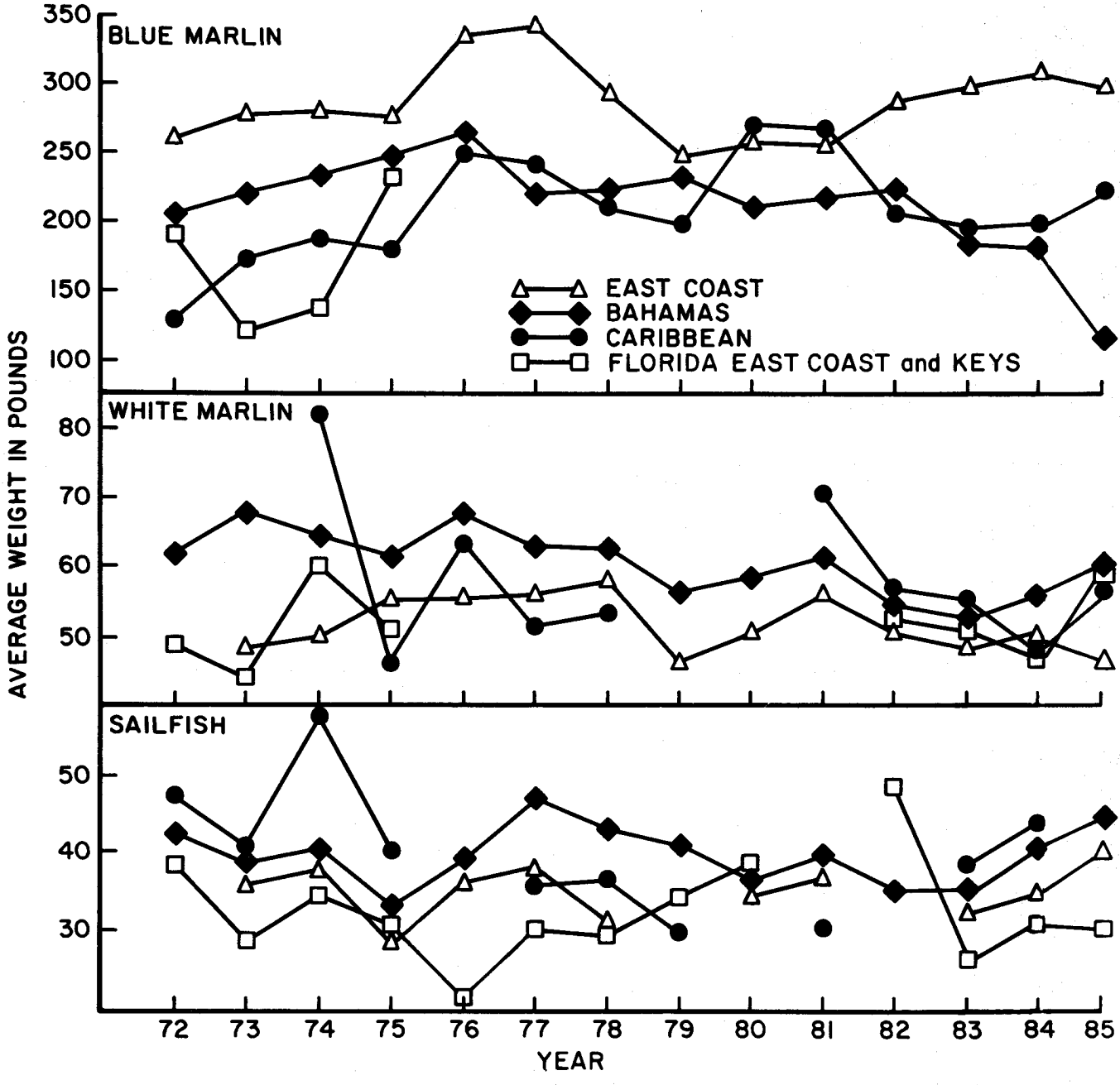


Figure 2- Average weights (pounds) of billfishes (both sexes combined) from the U.S. east coast (Δ), Bahamas (◇), Caribbean (●), and Florida east coast and Keys (□), 1972-1985.

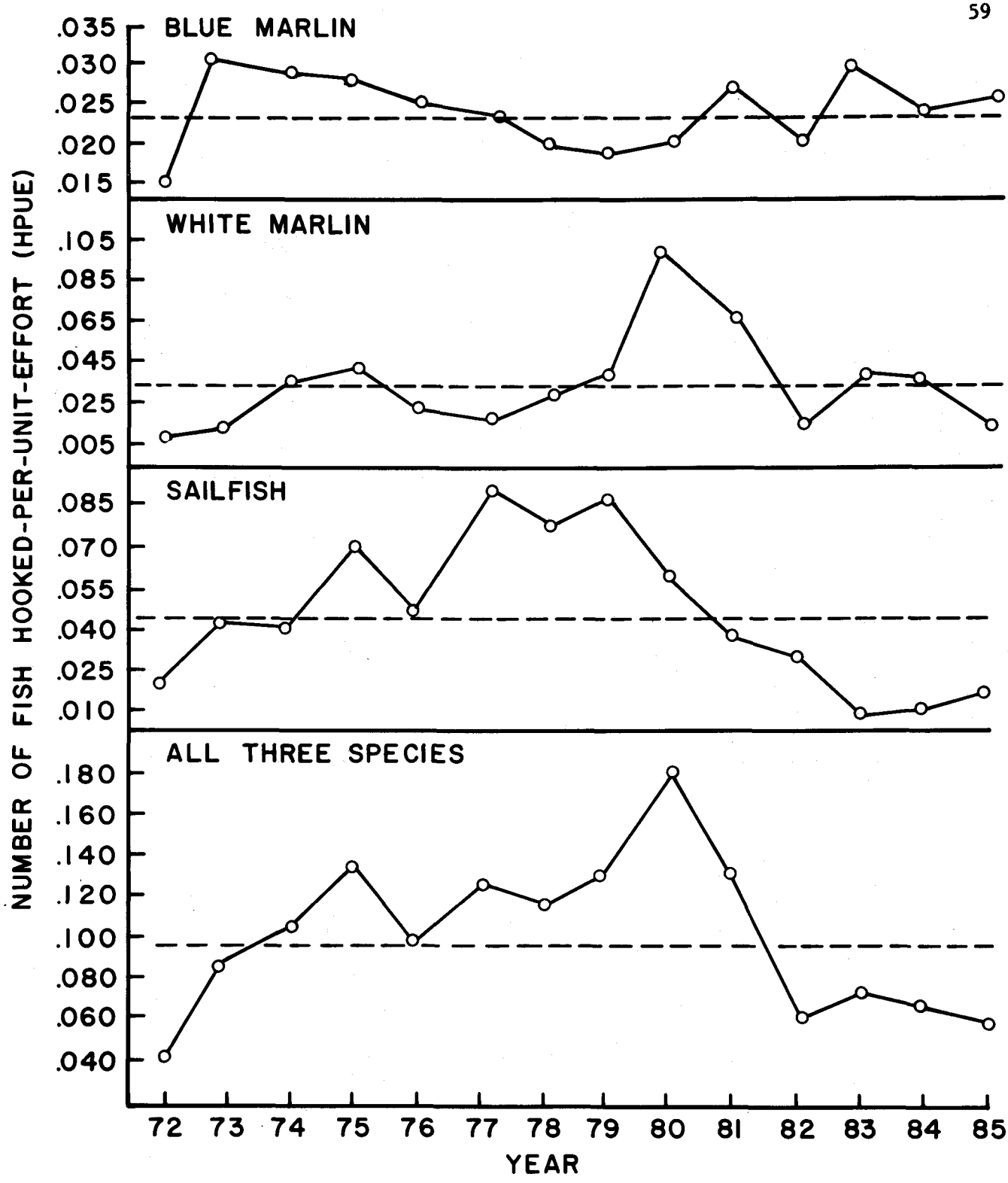


Figure 3- Number of billfishes hooked-per-unit-effort (HPUE) in the four geographical areas of the western Atlantic, 1972-1985. Dashed line indicates 14 year average for each category.

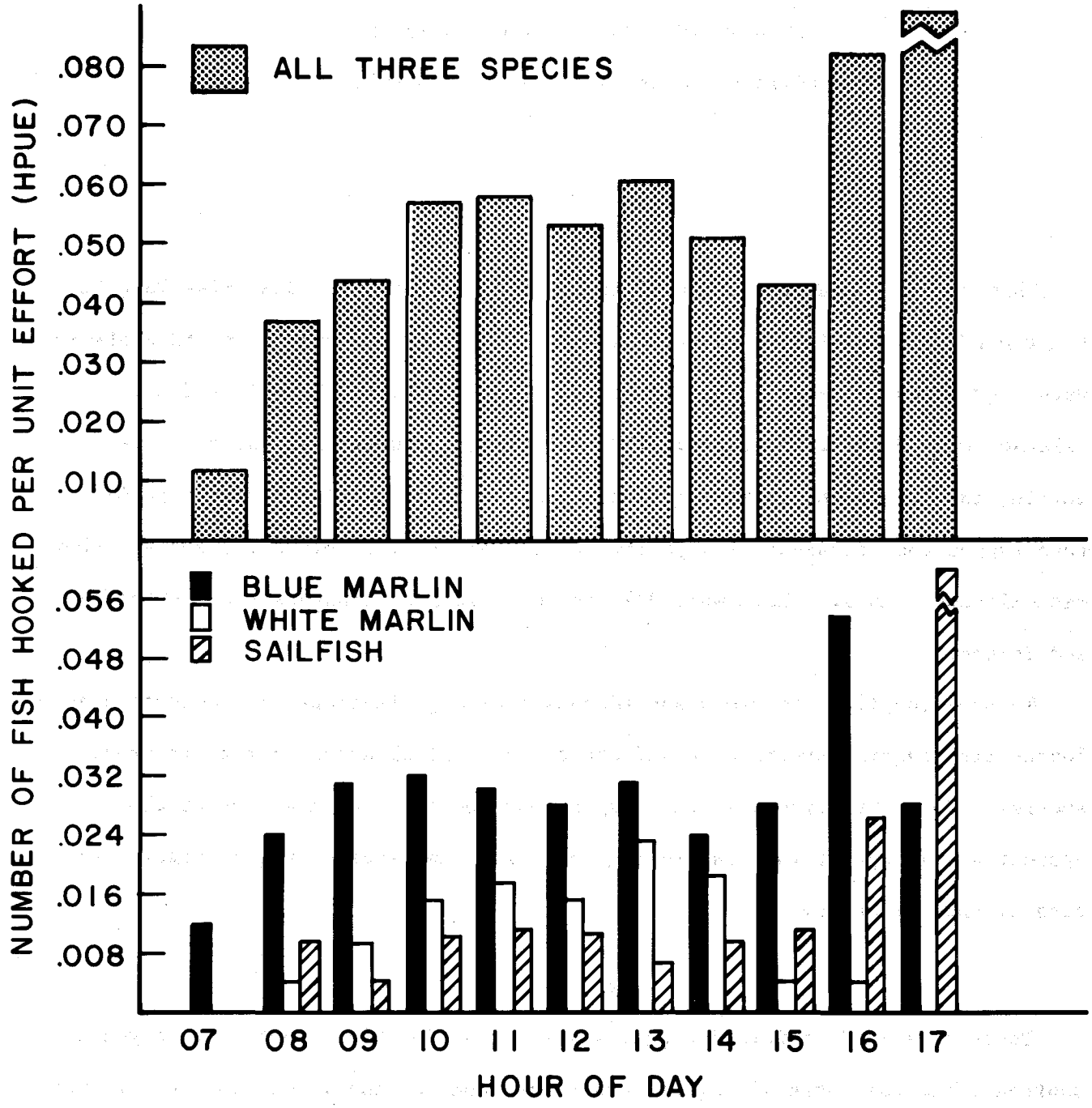


Figure 4 - Number of billfishes hooked-per-unit-effort (HPUE) by time of day in the four geographical areas in the western Atlantic, 1985.

COOPERATIVE GAME FISH TAGGING PROGRAM

Edwin L. Scott and Joseph P. Contillo

This report summarizes the activities of the Cooperative Game Fish Tagging Program (CGFTP) for 1985. Sportfishermen, commercial fishermen, and NMFS observers tagged and released 4,238 fish of 34 species. Billfish dominated the releases with 3,447 fish tagged: 1870 sailfish, 835 white marlin, 584 blue marlin, 137 swordfish, 15 striped marlin, and 6 black marlin. There were 414 tuna tagged and released: 169 yellowfin, 126 bluefin, 71 blackfin, and 48 other miscellaneous tunas. There were 377 fishes of 18 miscellaneous species tagged and released.

We have compiled the names and addresses of organizations that conduct analogous fish tagging programs in different geographical areas or for different species. These are listed in the tagging box section. Please contact the appropriate groups if you plan to tag in a different area or tag a target species of another agency.

Sailfish

There were 1,870 sailfish tagged and released in 1985. Most were tagged in southeast Florida where 971 sails were tagged and released. Cancun, Mexico, was second with 371 taggings; 217 were released off Venezuela, 189 off Cozumel, Mexico, 56 in the Gulf of Mexico, 18 in the Bahamas, 17 off the northeast Florida coast, 5 off the Virgin Islands, 4 off the mid-Atlantic Bight (Cape Cod,

Massachusetts, to Hatteras, North Carolina), 3 off Vitoria, Brazil, and 1 off the northwestern coast of Cuba. There were 18 sailfish tagged and released in the Pacific Ocean.

There were 34 sailfish recaptured in 1985 (Table 1), 31 by sportfishermen and 3 by commercial fishermen. There were 20 sailfish recaptured from Palm Beach, Florida, releases; 10 were recaptured in the same general area of release (1 was found floating on the surface), 5 were recaptured off the Florida Keys, 4 were recaptured off Miami, Florida, and 1 was recaptured off the northern Bahamas. There were 6 recaptures of sailfish released off the Florida Keys; all were recaptured in the same general area of release. There were 4 sailfish recaptured from Miami, Florida, releases; 3 were recaptured off Palm Beach, Florida (1 was found floating on the surface), and 1 off the Florida Keys. There were 2 sailfish recaptured from Cancun, Mexico, releases; both were recaptured in the same area of release. There was 1 recapture from a Cozumel, Mexico, release; it was recaptured off the northeastern coast of Cuba.

Twenty-two sailfish were at liberty for less than 1 year (this includes the 2 found floating); 6 were at liberty for 1-2 years, 1 for 2-3 years, 3 for 3-4 years, and 1 for 4 years and 1 month. A new time at liberty record for sailfish was set in 1984; the fish was at liberty for 10 years and 10 months. There was one sailfish recaptured without release information.

White Marlin

In 1985, 835 white marlin were tagged and released. Sportfishermen tagged 618, commercial fishermen tagged 197, and NMFS observers aboard Japanese longline vessels tagged 20 white marlin. La Guaira, Venezuela, was the leading tagging area with 270 releases, the northern Gulf of Mexico (Texas to northeastern Florida) had 253 taggings, and 81 were tagged off the mid-Atlantic Bight. Incidentially, the 1985 season in the mid-Atlantic Bight was one of the

worst white marlin seasons in years. For example, in 1984 there were 190 whites tagged and released compared to 81 from this area in 1985. There were 40 white marlin tagged and released off Cozumel and Cancun, Mexico, 34 in the southern Gulf of Mexico, 27 off northeastern United States, 22 in the Bahamas, 17 off the southeast Florida Coast, 13 off the U.S. Virgin Islands, 12 off northeast Florida, 8 off Vitoria, Brazil, and 3 each off Bermuda and the Dominican Republic. There were 52 whites tagged and released in the northwest Atlantic.

In 1985, 23 white marlin were recaptured. Twenty-one recaptured white marlin were released by sports fishermen; 8 were by rod and reel, and 13 were by commercial vessels. There were 2 commercial recaptures of commercial releases.

There were 11 recaptures of white marlin released in the Gulf of Mexico: 10 were recaptured in the Gulf of Mexico, and 1 in the Straits of Florida. There were 8 recaptures of white marlin released off the mid-Atlantic Bight: 4 were recaptured off the mid-Atlantic Bight, 1 in the Straits of Florida, 1 off northeastern United States, 1 in the Bahamas, and 1 in the northeast Gulf of Mexico. There were 2 recaptures of white marlin released in the Bahamas: 1 was recaptured off the northeastern United States, and 1 off La Guaira, Venezuela. There were 2 recaptures of white marlin tagged off La Guaira, Venezuela, both were recaptured in the same area of release. There were 7 white marlin at liberty for less than 1 year, 7 for 1-2 years, 3 for 2-3 years, 4 for 3-4 years, 1 for 4-5 years, and 1 for 6.4 years.

The longest distance traveled by a white marlin in 1985 was from a release off the mid-Atlantic Bight (Norfolk Canyon). This fish was recaptured in the northeastern Gulf of Mexico after being at liberty for almost 4 years and constitutes what must be one of the most unusual recaptures in the history of

the CGFTP. A commercial US longliner was retrieving his longline when 2 consecutive hooks had only the heads of white marlins attached. On the next hook was a mako shark which, when it was gutted, contained the torso of a white marlin that had a tag embedded in the flesh. This was the white that had been tagged and released off Norfolk Canyon four years earlier.

Blue Marlin

There were 584 blue marlin tagged and released in 1985. Sportfishermen tagged 493, commercial fishermen 63, and NMFS observers aboard Japanese longline vessels tagged 28. As in past years, St. Thomas, Virgin Islands, was the leading area for tagging blue marlin with 177 releases. The Gulf of Mexico was second with 115 taggings, 110 were tagged in the Bahamas, 66 off the Florida east coast, 28 off the Cayman Islands, 22 off Bermuda, 16 in the southern Gulf of Mexico, 18 off La Guaira, Venezuela, 14 in the western north Atlantic, 10 off the mid-Atlantic Bight, 5 off Cozumel, Mexico, 1 each off Cancun, Mexico, Cuba, Puerto Rico, Columbia, and the northeastern United States. There were 7 Pacific blue marlin tagged off the southern tip of Baja, California, Mexico.

There were 4 blue marlin recaptured in 1985. The third occurrence of a transatlantic migration occurred when a blue marlin was recaptured by a Japanese longliner on November 21, 1985 at 16°42'N - 18°29'W northeast of Dakar, Senegal, west Africa. Unfortunately, we did not have a record of the release, but by contacting the individual who was issued the tags and examining his tagging data, we were able to determine that the blue marlin may have been tagged and released off La Guaria, Venezuela, in mid-September of 1984. The blue was at large for 432 days. The previous 2 transatlantic migration recaptures differ from this one because they were recaptured in the Gulf of Guinea off the Ivory

Coast and the times-at-liberty were 122 and 187 days, respectively. We cannot stress enough the importance of promptly sending in the release information after tagging, for without it, the recapture information has very limited value. We had 2 blue marlin recaptures off the northeastern coast of Cuba; a blue tagged and released off Chub Cay, Bahamas, was recaptured 684 days later, and a blue tagged and released off Brownsville, Texas, was recaptured 118 days later. The last recapture was off the Hydrographer canyon (northeastern United States) and we were unable to track down the release information. We have NEVER been able to sample a blue marlin tag recapture for skeletal structures for our ageing studies. If we could accomplish this task, it would mean a significant breakthrough.

Swordfish

In 1985, 137 swordfish were tagged and released. Commercial fishermen tagged 92, NMFS observers aboard Japanese longliners tagged 41, and sport-fishermen tagged 4.

There were 37 swordfish tagged and released in the Gulf of Mexico, 31 in the western Atlantic, 30 off the northeastern United States, 28 off the Florida coast, 6 in the Bahamas, 3 off the coast of Venezula, and 1 each off the coast of Puerto Rico and Cuba.

There was 1 swordfish recapture in 1985; it was released August 8, 1981, at 40°26'N - 62°08'W, about 180 miles southeast of Nantucket island by a NMFS observer aboard a Japanese longliner. This fish was recaptured July 9, 1985, at 42°33'N - 65°58'W, Southeast of Nova Scotia, which is about 120 miles northeast of the release point by a Canadian Harpoon boat.

Bluefin Tuna

In 1985, 126 bluefin tuna were tagged and released; sportfishermen tagged 114 and commercial fishermen tagged 12. There were 113 bluefin tagged off northeastern United States, 9 in the Gulf of Mexico, 2 in the Bahamas, and 1 each off the Florida Coast and the western Atlantic.

There were 15 bluefin tuna recaptures reported in 1985. Commercial fishermen recaptured 8 and sportfishermen recaptured 7. All of the recaptures were from bluefin tagged and released off the northeastern United States and were recaptured near the area of release with the exception of one recapture in the northeastern Gulf of Mexico.

There were 2 bluefin at liberty for less than 1 year, 3 for 1-2 years, 1 for 2-3 years, 2 for 3-4 years, 1 for 4-5 years, 2 for 5-6 years, 2 for 6-7 years, 1 for 10 years and 3 months, and a new time-at-liberty record of almost 18 years for a tagged bluefin tuna was established. The recapture was made on August 19, 1985, when Anton D. Graf of Newbury Park, Massachusetts, caught a bluefin tuna that was tagged southeast of Montauk Point, New York, on September 7, 1967. The tuna was 31" long (about 30 pounds) at release and weighed 600 pounds dressed weight (head and tail cut off) or about 700-750 pounds whole weight at recapture. By estimating the age at release (2 years old) and adding this to the 18 years at large, we estimate the total age of this fish to be at least 20 years old. The time-at-liberty record was formerly held by a bluefin tagged August 5, 1965, off New Jersey and recaptured in the Bahamas on May 28, 1981, 15.8 years later.

This recapture could have enabled scientists at the Southeast Fisheries Center in Miami to add valuable information to their work on age and growth. Unfortunately, the skeletal hardparts were not saved. Many anglers are aware of

the importance to the Cooperative Game Fish Tagging Program of saving tags but few realize the importance of obtaining skeletal hardparts from tag recaptured tunas and marlins 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 D. Prince
NMFS, SEFC, Miami Laboratory
75 Virginia Beach Drive
Miami, Florida 33149

305 361-4248 (work) or 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 169 yellowfin tunas tagged released in 1985. Sportfishermen tagged and released 162 and commercial fishermen tagged 7. The leading tagging area was the Gulf of Mexico with 67 taggings, 60 off the mid-Atlantic Bight, 14 off Bermuda, 10 off northeastern United States, 9 in the Bahamas, and 9 off the Florida coast.

There were 8 yellowfin recaptures in 1985, 5 from Bermuda; all Bermuda releases had been at liberty from 18 to 343 days. There were 2 recaptures from the northeastern Gulf of Mexico, both near the area of release, one had been at liberty for 1 year and the other for 3 years. The remaining recapture was from a yellowfin that had been tagged off Virginia and recaptured in the same general

area a year and five months later.

There were 71 blackfin tuna tagged and released in 1985. As in past years, the majority (62) were tagged and released off Bermuda, 5 were tagged in the northeastern Gulf of Mexico, 2 in the Bahamas, and 1 each off the mid-Atlantic Bight and southeast Florida. All were released by sportfishermen. There were 7 blackfin recaptures, all were recaptured by sportfishermen near their release points off Bermuda. Times-at-liberty ranged from 30 to 622 days.

The yellowfin and blackfin recaptures follow the same general pattern observed in 1984; they appear to return to the same area each year from May thru September. The one exception was a yellowfin that was recaptured off Bermuda in October.

Bait Box

In our 1984 newsletter, we analyzed the release/recapture data for sailfish using both live bait and dead bait to see if we could determine if there was a significant difference in recapture rates between bait types. In 1984, there were 1,632 sailfish tagged and released using dead bait and 11 were recaptured for a recapture rate of .007. There were 462 sailfish tagged and released using live bait; 11 were recaptured for a recapture rate of .024. It was pointed out to us, however, that since almost all live bait releases are along the east coast of Florida, our comparisons of live bait versus dead bait should be made only for that area. We recalculated our recapture rates by year from 1981 through 1985 using only releases from the east coast of Florida. These data are as follows:

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

* DB = dead bait, LB = live bait

A steady increase in the use of live bait seems evident over the five year time span, from 75 releases in 1981 to 624 in 1985, while the number of releases using dead bait has remained about the same. This is somewhat misleading however, since we only began requesting bait information in 1981. In that year, we had 1,034 sailfish releases with no information on bait. In 1985, this number had decreased to 82 with no bait information. The recapture rates also undergo an interesting change, from heavily favoring dead bait in 1981 and 1982, to even in 1983, to favoring live bait in 1984 and 1985. We are unable to explain this shift nor the sudden drop in recapture rates of sailfish released with dead bait from the relatively high levels in 1981 and 1982 to the apparently more normal levels of 1983 through 1985. Irregardless, we see no evidence to dispute our contention that based on tagging data, there does not appear to be increased mortality of sailfish tagged and released using live bait.

Tagging Awards

We are very happy to announce that four leading national conservation organizations have agreed to sponsor tagging trophies beginning this year. These trophies will be awarded to the Captains who are responsible for tagging and releasing the greatest number of blue marlin, white marlin, sailfish, and

bluefin tuna during the year. The organizations and the species they have chosen to sponsor are:

International Game Fish Association 3000 E. Las Olas Blvd Ft. Lauderdale, FL 33316-1616	BLUEFIN TUNA
Sport Fishing Institute 1010 Massachusetts Ave., N.W Suite 100 Washington, DC 20001	SAILFISH
National Coalition for Marine Conservation P.O. Box 23298 Savannah, GA 31402	BLUE MARLIN
American Fishing Tackle Manufacturing Assn. 2625 Clearbrook Dr. Arlington Heights, IL 60005	WHITE MARLIN

We are proud and honored to have these prestigious groups supporting our Cooperative Tagging Program. We urge you to reciprocate by becoming members and supporters of these organizations. They are striving to work for improved recreational fisheries for all of us.

Tagging Box

In 1976, we began to acknowledge the effort by CGFTP program participants. Program participants are included again this year in Tables 2 and 3. 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 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

We 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 1986 will bring you good fishing and good tagging.

Table 1. Tagged oceanic pelagic fishes recaptured during 1985 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), and mackerel trap (MT). Country abbreviations are: Japan (JAP), Mexico (MX), United States (US), Dominican Republic (DR), Bahamas (BF), Cuba (CU), France (FR), and Barbados (BB). Estimated days at-large are in brackets.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
			Sailfish			
No Release Information	Triumph Reef, FL 4-13-85		--- ---		J. Dudas ---	R/R
Jupiter, FL 12-1-85	Jupiter, FL 12-1-85	0	G. Poveromo G. Poveromo	R/R	M. Blaney ---	FF
Ft. Lauderdale, FL 3-10-85	Jupiter, FL 3-10-85	0	M. Leech ---	R/R	N. McDonald ---	FF
Isla Mujeres, MX 5-10-85	Isla Mujeres, MX 5-20-85	10	J.R. Bingham B. Simonds	R/R	W.B. McCarter B. Brown	R/R
Islamorada, FL 1-3-85	Islamorada, FL 1-19-85	16	B. Melbirry D. Purdo	R/R	B. Neubauer ---	R/R
Jupiter, FL 1-5-85	Islamorada, FL 1-27-85	22	J. Motta J. Motta	R/R	B. Taute ---	R/R
Islamorada, FL 12-15-84	Islamorada, FL 1-9-85	25	R. Ruiz B. Covin	R/R	L. Dukehart ---	R/R
Stuart, FL 1-16-85	Juno Beach, FL 2-16-85	31	B. Tuppen B. Kintz	R/R	I. Fox F. Pitale	R/R
Jupiter, FL 1-24-85	Jupiter, FL 2-26-85	33	M. Cellura G. Poveromo	R/R	N. Turene T. Mechlin	R/R
Jupiter, FL 4-28-85	25° 20'N 80° 00'W 6-6-85	39	A. Durante A. Durante	R/R	C. Coffin ---	US LL
Jupiter, FL 11-16-85	Ft. Pierce, FL 12-27-85	41	A. Durante N. Smith	R/R	W.L. Youngblood K. Moore	R/R
Islamorada, FL 12-15-84	Islamorada, FL 2-12-85	59	O. Keagy ---	R/R	D. Gurgiolo ---	R/R
Jupiter, FL 1-25-85	27° 5°'N 79° 20"W 4-3-85	68	C. Boomhower B. Standeven	R/R	J. Cornett ---	R/R
Palm Beach, FL 1-7-85	Miami Beach, FL 3-31-85	83	E. Svozil V. Genduso	R/R	Capt. Marino ---	R/R

Table 1. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
			Sailfish (cont.)			
Singer Island, FL 2-15-85	Key Largo, FL 5-11-85	85	N. Smith A. Durante	R/R	D. Metrione ---	R/R
Jupiter, Fl 2-1-85	Boca Raton, FL 5-26-85	114	P.R. Tyson R. Jedersee	R/R	D. Allebach ---	R/R
Ft. Lauderdale, FL 9-21-85	Boca Raton, FL 1-26-85	127	S.R. Newton D. Campbell	R/R	M. Pinkus ---	R/R
Cozumel, MX 4-13-85	21° 15'N 76° 00'W 10-27-85	197	S. Libbey ---	R/R	J.R. Feles ---	CU HL
Islamorada, FL 2-26-85	Islamorada, FL 11-28-85	275	J. Spadofora R. Helmuth	R/R	C. Brewer R. Albury	R/R
Islamorada, FL 2-17-84	Islamorada, Fl 1-5-85	323	R. McSpadden R. Helmuth	R/R	B. Reihl ---	R/R
St. Lucie, FL 1-11-85	Islamorada, FL 12-26-85	349	K. Scheimrief G. Chasmar	R/R	J. Spears S. Bradeen	R/R
Deerfield Bch., FL 1-5-85	Boynton Bch., FL 12-23-85	352	P. Limperas P.J. Motta	R/R	B. Rowles C.W. Rowles	R/R
Islamorada, FL 1-14-84	Islamorada, FL 1-5-85	356	R. Long R. Harbaugh	R/R	T. Pueslo ---	R/R
Jupiter, FL 1-29-84	Jupiter, FL 1-29-85	366	N. Smith --	R/R	I. Weigert ---	R/R
Elliott Key, FL 12-20-84	Hillsboro Inlet, FL 12-25-85	371	Dr. E. Schultz J.N. Schultz	R/R	P. Lynch S. Brighton	R/R
Jupiter, FL 12-24-84	Boca Raton, FL 12-29-85	371	D. Hawthorn J. Hawthorn	R/R	N. Study ---	R/R
Juno, FL 1-9-84	Ft. Lauderdale, FL 1-23-85	380	G.S. Weir, Jr. C.E. Bouchard	R/R	R. Mann L. Forde	R/R
Boca Raton, FL 5-31-83	Key Largo, FL 4-27-85	698	R. Gunn T. Jolitz	R/R	J. Tellam H. Tellam	R/R
Jupiter, FL 1-29-83	Ft. Lauderdale, FL 1-7-85	709	M. James T. Sperling	R/R	R. Gott ---	R/R

Table 1. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
			Sailfish (cont.)			
St. Lucie, FL 12-29-82	Palm Beach, FL 2-15-85	779	K. Young J. Young	R/R	M. Shackelford R. Rockoff	R/R
Elliott Key, FL 1-19-82	Key Largo, FL 2-1-85	1109	A. Jones G. Reede	R/R	J. Gossweiler ---	R/R
Cancun, Mexico 7-13-82	Isla Mujeres, Mexico 7-30-85	1112	G. Armor K.P. Crawford	R/R	N. Peon --	R/R
Jupiter, FL 12-21-81	Islamorada, FL 1-10-85	1116	C. Coffee D. Rayne	R/R	K. Filbrun ---	R/R
Stuart, FL 12-19-80	Palm Beach, FL 1-11-85	1485	J.C. Simes ---	R/R	V. Kinsey J. Arbree	R/R
			White Marlin			
37° 20'N 74° 20'W 7-21-85	36° 58'N 72° 18'W 9-2-85	43	K. Riffe F. Riffe	R/R	NMFS Observer ---	Jap LL
28° 44'N 87° 25'W 5-22-85	29° 20'N 86° 20'W 7-13-85	52	W. Bailey ---	US LL	S. Templeton ---	US LL
29° 25'N 86° 40'W 5-25-85	28° 58'N 87° 35'W 8-12-85	79	D. Miller S. Gottlieb	R/R	M. Alexander ---	US LL
Chub Cay, Bahamas 4-20-85	40° 00'N 69° 00'W 9-10-85	143	T. Robertson M. Pagano	R/R	L. Puskas ---	US LL
38° 00'N 74° 00'W 8-8-84	40° 41'N 71° 10'W 7-4-85	330	D. Merritt F. Riffe	R/R	R. Porter ---	R/R
20° 28'N 86° 52'W 7-13-84	28° 10'N 88° 37'W 8-27-85	348	S. Smith ---	R/R	L. Varley ---	US LL
La Guaira, Venezuela 10-15-84	Caracas, Venezuela 10-8-85	358	T. Johnston A. Johnston, IV	R/R	K. Riffe F. Riffe	R/R
29° 30'N 86° 50'W 8-17-84	29° 00'N 86° 00'W 8-23-85	371	B.A. Thomasson A. Anderson	R/R	J. Stanely ---	US LL
29° 28'N 86° 53'W 8-14-84	29° 00'N 86° 00'W 8-23-85	374	R.H. Hepler J. Lamorgne	R/R	J. Stanley ---	US LL
29° 15'N 87° 30'W 6-23-84	28° 45'N 88° 19'W 11-16-85	511	H.M. Bush P. Allen	R/R	M. Irwin Capt. Crockett	US LL

Table 1. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
			White Marlin (cont.)			
37° 42'N 65° 50'W 9-21-83	28° 27'N 78° 45'W 4-18-85	 574	NMFS Observer ---	JAP LL	C. Schaefer ---	US LL
29° 00'N 87° 00'W 9-16-83	28° 31'N 87° 06'W 4-20-85	 581	L. Willis F. Difilippo	 R/R	W. Bailey ---	US LL
Port Eads, LA 8-24-83	27° 50'N 90° 45'W 5-5-85	 619	S. Sanders, III B. Sanders	 R/R	G. Davis ---	US LL
Oregon Inlet, NC 9-5-83	Baltimore Canyon 7-11-85	 675	B.T. Cunningham S. Stokes	 R/R	A.J.Faraco ---	 R/R
29° 15'N 86° 45'W 9-16-83	27° 45'N 85° 00'W 9-27-85	 742	J.Y. Oneal, Jr. J.J. Ward	 R/R	G. Corder ---	US LL
La Guaira, Venzuela 9-15-83	La Guaira, Venzuela 10-4-85	 750	B. Mason R. Hamlin	 R/R	B. Garnsey ---	 R/R
29° 00'N 87° 00'W 8-21-82	24° 40'N 79° 45'W 6-5-85	 1019	M. Knight T. Hannah	 R/R	H. Baum, Jr. J. Hardee	 R/R
Hatteras, NC 6-30-82	24° 40'N 79° 45'W 8-7-85	 1134	R. Siegel J. Loebsack	 R/R	J. Hardee ---	US LL
Virginia Bch., VA 9-15-82	38° 55'N 74° 51'W 11-14-85	 1156	B. Burton J.M. Vech, Jr.	 R/R	E. Hansen ---	 R/R
29° 25'N 87° 00'W 5-18-82	28° 36'N 88° 21'W 11-12-85	 1274	C. Griffith C. Griffith	 R/R	M. Irwin Capt. Crockett	US LL
37° 00'N 74° 40'W 7-17-81	27° 50'N 87° 40'W 6-1-85	 1415	C. Jones C. Jones	 R/R	F. Carden ---	US LL
38° 20'N 74° 15'W 7-24-81	38° 20'N 74° 15'W 7-27-85	 1464	S. Morris B. Wadkins	 R/R	F. Hodous ---	 R/R
Bimini, Bahamas 6-1-78	La Guaira, Venzuela 4-4-85	 2499	G. Applegate N. Applegate	 R/R	H. Martinez V. Marcano	 R/R

Table 1. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
			Blue Marlin			
24° 00'N 93° 00'W 7-10-85	24° 43'N 85° 57'W 11-5-85	 118	W. G. Wheeler, Ill ---	 R/R	G. Salazar ---	CU LL
La Guaira, Venzuela 9-15-84	16° 41'N 18° 29'W 11-21-85	 432	M. Aman ---	 R/R	I. Murakami ---	JAP LL
Chub Cay, Bahamas 6-6-83	21o 50'N 78o 40'W 4-20-85	 684	--- ---	 R/R	C. Bayle W.B. Kitchen	CU LL
No Release Information	39° 37'N 68° 23'W 8-11-85		--- ---		NMFS Observer ---	JAP LL
			Bluefin Tuna			
41° 00'N 71° 00'W 9-3-84	39° 57'N 67° 59'W 2-6-85	 156	J. R. Koehler, Jr. O. Amoroso	 R/R	NMFS Observer ---	JAP LL
40° 50'N 71° 50'W 9-24-84	37° 00'N 75° 00'W 6-10-85	 259	E. Makransky F.J. Braddick	 R/R	H. Lindner ---	 R/R
40° 00'N 72° 00'W 10-16-83	39° 54'N 66° 28'W 2-17-85	 489	J. Koehler, Sr. O. Amoroso	 R/R	NMFS Observer ---	JAP LL
40° 50'N 72° 00'W 10-5-83	40° 50'N 71° 50'W 8-18-85	 683	F.J. Mather, III A.H. Anderson	 R/R	P. Jakits ---	 R/R
40° 50'N 71° 50'W 10-3-83	40° 55'N 71° 30'W 8-27-85	 694	D. Wells A.H. Anderson	 R/R	C. Gladding D. Dangelo	 R/R
40° 55'N 71° 30'W 8-6-83	40° 50'N 71° 50'W 8-6-85	 731	P. Kovacs A.H. Anderson	 R/R	J.R. Jeck ---	 R/R
36° 36'N 75° 28'W 7-5-82	40° 55'N 71° 30'W 7-31-85	 1122	--- A. Morris	 R/R	B. Gadman, Jr. F. Gallagher	 R/R
36° 36'N 75° 28'W 7-5-82	41° 05'N 70° 40'W 8-2-85	 1124	--- A. Morris	 R/R	C. R. Dufton ---	 R/R
36° 31'N 75° 23'W 6-24-80	39° 31'N 75° 23'W 1-30-85	 1682	Scientific Staff ---	US PS	K. Tamakai ---	JAP LL
36° 31'N 75° 23'W 6-24-80	41° 05'N 71° 22'W 8-21-85	 1885	Scientific Staff ---	US PS	L. Farias ---	 R/R

Table 1. Continued.

Release Date	Recapture Date	Days at Large	Tagger Captain	Method	Finder Captain	Method
			Bluefin Tuna			
41° 53'N 70° 20'W	41° 50'N 70° 25'W		Scientific Staff	US	W. Chaprales	US
9-24-79	9-21-85	2189	---	PS	---	HAR
40° 51'N 71° 10'W	41° 05'N 71° 22'W		Scientific Staff	US	A. Gelfuso	
8-22-78	7-17-85	2521	---	PS	---	R/R
37° 20'N 75° 22'W	42° 15'N 70° 10'W		Scientific Staff	US	R. Silva	US
7-3-77	8-11-85	2916	---	PS	---	HAR
39° 46'N 73° 07'W	28° 25'N 88° 40'W		Scientific Staff	US	D. Burris	US
7-21-74	4-24-85	3930	---	PS	---	LL
40° 38'N 72° 00'W	42° 25'N 70° 30'W		Scientific Staff	US	A.D. Graf	US
9-7-67	8-19-85	6556	---	PS	---	HL

Table 2. Captains who made outstanding contributions to CGFTP in 1985 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		
Bark Garnsey	11	124	92			227	12
William S. Hart		1	90			91	2
Harry Hall	4	34	45			83	
Charles E. Bouchard	1		74			75	28
Nick Smith		1	67			68	30
Bobby Kolb			58			58	3
Brad Simonds		2	52		2	56	3
David Meyer	2	26	24			52	6
Andy Potter			52			52	
Bob Brown		1	46			47	1
Glenn Helton	3	41	3			47	
Joe Lopez	14	14	19			47	2
Wade Bailey	5	29	2	4	6	46	
Tim Sperling	6	2	38			46	
Jimmy Gates	1	4	35			40	
Frank Smith	11	3	26			40	12
Stephen W. Gates	9	6	11	13		39	
Frank J. Braddick					38	38	13
Tommy Sealy		4	34			38	
Jeffrey Scott Rowe	1	18		17		36	
Glen Corder	7	8	12	7		34	
Skip Libbey	1		31			32	
Butch Standeven			32			32	1
Al Johnston, IV	6	15	10			31	
Paul Johnson		5	25			30	2
Bubba Carter	1	21	7			29	4
Alan J. Card	13		1		14	28	4
Rick Ross	6	11	3	6	2	28	
Mike Benitez	27					27	2
Jim Hawthorn			26			26	5
Barry Covin		10	15			25	
Charles Ladnier	7	5			13	25	2
Skeet Warren	17	5	3			25	
Albert E. Wadsworth	5	3	16			24	1
Tom Fortado		23				23	
Bob Kintz	10	8	5			23	2
Arthur Gurr					20	20	
Randy Jendersee		1	19			20	
Marty Snow	7	8	5			20	
J. Scott Storer	6	11	3			20	2
Bill Borer	2	7	10			19	
John Sabonis	19					19	
Darrll Weigelt	1	3	15			19	2

Table 2. Continued.

Captains	BM	WM	SF	SW	TN	Total	Tagged as Angler
Alan H. Anderson					18	18	
Sherwood Michel	7	7	4			18	3
George Poveromo			17		1	18	6
Jimbo Barnes		1	16			17	5
Chip Coffin	3	1	2	11		17	
George Dickson			17			17	
O. B. O'Bryan	16	1				17	
Fred Rushin		2	1		14	17	
Tom Buckner		3	13			16	
Harry H. Bush		2	14			16	
Oscar Young	1	2	13			16	
Billy Black	11	4				15	
Shaler Carrington					15	15	
Ed Gintert			15			15	7
Joel Greene	2	2			11	15	
Jim Hardee	8	4		3		15	
Tim J. Hyde		3	12			15	5
Tim Jolitz			15			15	
Keith R. Winter					15	15	3
Dick Deason			14			14	2
Larry Lambrecht			1		13	14	1
Pete Bilderback		3		5	5	13	
Mike Everly	1	4	8			13	5
Pete Knopp	5	6		2		13	
Chuck Reed			13			13	
James Roberts	2		11			13	4
Roger Greene	2	5	1		4	12	
Dan Lassiter			12			12	4
Frank J. Mather, III		1			11	12	4
John E. Daigle	2	6	1		2	11	
John Errante	5	3		3		11	
Armando Gasse			11			11	
Bob Pelosi	2	2	5		2	11	2
Brent Shaver	4	1			6	11	
Charles E. Waring	1		10			11	1
Mike Ardito		1	9			10	
Victor Genduso			10			10	
Ron Hamlin		6	1	3		10	
Joseph Herbert	8	2				10	
Joe Motta			10			10	2
Ray Parker			10			10	
Chip Shafer			10			10	
Harry S. Tellam			10			10	4
Wooda G. Wheeler III	9	1				10	3

Table 3. Anglers who made outstanding contributions to CGFTP in 1985 by assisting in the tagging of 10 or more blue marlin (BM), white marlin (WM), sailfish (SF), tunas (TN), and swordfish (SW). Captains column signifies fish tagged by anglers while fishing as captains and is included in the total.

Anglers	Species					Total	Tagged as Captains
	BM	WM	SF	SW	TN		
Stewart Campbell	9	53	58			120	
Angelo Durante, Jr.	0	1	77		2	80	24
Edward Gayton	4	27	45			76	
R. Deering Howe	4	5	51			60	
Joseph Munson			49			49	
J. Richard Jeck			17		29	46	1
Edward Feret		1			35	36	4
Mark Shackelford		3	24			27	
Dan A. Hughes, Jr		2	20			22	
Jerry Dunaway	19	2				21	
Kelly Wade		13	6			19	3
Aquiles Garcia		6	12			18	
Bill Fazzano			12		4	16	
Zachary Wilson	2	3	11			16	
Wally Adams	1				14	15	
Floyd Carrington					15	15	
Robert E. Gunn			15			15	
Billy Bush			14			14	
Roland Dixon	1	2	10			13	
Dodie Hawthorn			13			13	
Penny McFadden			13			13	
Phillip J. Benezech	2				10	12	
Ken Hulsey			12			12	5
Robin Lehman					12	12	5
Frank Tatum, Jr.	4	2			6	12	
Harvey M. Weil	1	1	10			12	2
Mike Darby		10	1			11	3
Reed McFadden			11			11	
Watson K. Blair			10			10	
Mike Levitt		6	4			10	

Appendix I. Tournaments and docks sampled by oceanic gamefish personnel or by personnel from cooperating agencies, 1985.

Tournaments/Docks	Location	Dates	Hours Fished	Number Hooked					
				Blue Marlin	White Marlin	Sail Fish	Sword Fish	Bluefin Tuna	Yellowfin Tuna
Masters Invitational Sailfish	Palm Beach, FL	Jan 8–Jan 12	814:17	0	1	99	0	0	0
Invitational Gold Cup	Palm Beach, FL	Jan 16–Jan 19	1638:00	0	0	87	0	0	0
International Womens Fishing Association	Palm Beach, FL	Jan 23–Jan 25	235:30	0	0	54	0	0	0
IBL Cozumel Series	Cozumel, Mexico	Mar 7–Mar 9	227:30	7	0	12	0	0	0
Annual Bacardi Billfish	Bimini, Bahamas	Mar 19–Mar 22	1320:20	19	11	0	0	0	0
Ernest Hemingway Billfish	Bimini, Bahamas	Apr 1–Apr 5	1665:50	22	11	0	0	0	0
Annual His and Hers Billfish	Chub Cay, Bahamas	Apr 15–Apr 19	589:03	38	15	3	0	0	0
Members Only Billfish	Chub Cay, Bahamas	Apr 22–Apr 26	665:01	50	27	10	0	0	0
Bertram–Hatteras Billfish	Bimini, Bahamas	Apr 25–Apr 27	1341:00	77	5	0	0	0	0
Hilton Head Island	Sea Pines, SC	May 2–May 5	299:05	5	0	0	0	0	0
South Texas BGFC First	Port Isabel, TX	May 4–May 4	140:45	2	0	0	0	1	1
Walkers Cay Annual Billfish	Walkers Cay, Bahamas	May 6–May 10	2688:00	61	10	2	0	0	0
Bohicket–Seabrook Billfish	Charleston, SC	May 10–May 12	712:26	11	2	2	0	0	0
New Orleans Big Game Fishing Club First	South Pass, LA	May 10–May 12	297:50	6	0	0	0	0	6
Cat Cay Blue Marlin	Cat Cay, Bahamas	May 14–May 18	1366:15	28	11	3	0	0	0
Georgetown Blue Marlin	Georgetown, SC	May 25–May 26	639:00	11	3	0	0	0	0
Mobile Big Game Fishing Club Memorial Day	Orange Beach, AL	May 25–May 26	717:20	17	16	0	0	0	0
	Drifting		50:57	0	0	0	1	0	0
South Pass Memorial Day	South Pass, LA	May 25–May 27	707:20	22	1	0	0	0	17
South Texas BGFC Third	Port Isabel, TX	May 25–May 26	189:00	4	2	1	0	0	0
Bimini Blue Marlin	Bimini, Bahamas	Jun 3–Jun 7	1095:00	16	4	4	0	0	0
Cajun Classic (Formerly Golden Meadow Invit.)	Grand Isle, LA	June 7–June 8	493:15	20	1	0	0	0	25
New Orleans Big Game Fishing Club Tag & Release	South Pass, LA	Jun 7–Jun 9	390:20	11	2	0	0	0	16
Hatteras Blue Marlin	Hatteras, NC	Jun 10–Jun 15	1372:01	14	11	0	0	0	0
Baton Rouge Big Game Fishing Club Invitational	South Pass, LA	Jun 13–Jun 16	40:15	1	0	0	0	0	3
Liollio's Warmup Tournament	Destin, FL	Jun 14–Jun 15	218:30	5	5	1	0	0	11
	Drifting		15:29	0	0	0	0	0	0
Port Aransas Masters Billfish	Port Aransas, TX	Jun 15–Jun 16	377:00	18	5	6	0	0	0
South Texas BGFC Third	Port Isabel, TX	Jun 16–Jul 6	387:01	5	1	9	0	0	4
New Orleans Big Game Fishing Club Invitational	South Pass, LA	Jun 20–Jun 22	1765:09	24	45	1	0	0	98
Liollio's Summer Open (Formerly Destin)	Destin, FL	Jun 21–Jun 22	823:25	18	38	0	1	0	27

Appendix I. (continued)

Tournaments/Docks	Location	Dates	Hours Fished	Number Hooked: Blue Marlin	White Marlin	Sail Fish	Sword Fish	Bluefin Tuna	Yellowfin Tuna
Texas Championship Billfish	Port Aransas, TX	Jun 28-Jun 29	661:16	17	10	15	0	0	0
Capt. Fanny Blue Marlin	Beaufort, NC	Jul 1 -Jul 5	1454:30	29	30	2	0	0	0
Harms July 4 Open	St. Thomas, VI	Jul 4 -Jul 6	591:41	36	6	0	0	0	2
Golden Meadow Tarpon Rodeo	Grand Isle, LA	Jul 4 -Jul 4	44:15	1	2	0	0	0	1
General Ray Huff Billfish	South Pass, LA	Jul 4 -Jul 6	222:25	7	1	0	0	0	9
Pensacola International Billfish	Destin, FL	Jul 5 -Jul 7	63:04	2	2	0	0	0	1
Pensacola International Billfish	Pensacola, FL	Jul 5 -Jul 7	417:18	21	21	1	0	0	12
July Fourth Billfish Jamboree	Freeport, TX	Jul 6 -Jul 7	184:30	18	5	1	0	0	0
Pensacola International Billfish	Orange Beach, AL	Jul 5 -Jul 7	142:55	0	4	0	0	0	1
Chub Cay Blue Marlin	Chub Cay, Bahamas	Jul 8 -Jul 12	953:35	25	1	3	0	0	0
Deep Sea Roundup	Port Aransas, TX	Jul 9 -Jul 11	424:10	8	1	19	0	0	0
Bay Point Invitational	Panama City, FL	Jul 12-Jul 13	811:26	21	26	2	0	0	10
Golden Meadow Big Game Fishing Club Ladies Day	Grand Isle, LA	Jul 12-Jul 13	140:30	9	7	0	0	0	6
New Orleans Big Game Fishing Club Ladies Day	South Pass, LA	Jul 12-Jul 13	492:20	9	13	0	0	0	12
Dauphin Island Deep Sea Rodeo	Dauphin Island, AL	Jul 19-Jul 21	526:06	14	14	0	0	0	16
	Drifting		15:39	0	0	0	0	0	0
Pirate Cove Blue Marlin	Grand Isle, LA	Jul 19-Jul 20	130:00	5	0	0	0	0	9
Poco Bueno	Port O'Connor, TX	Jul 19-Jul 20	677:39	32	20	5	0	0	32
Port Aransas Outboard	Port Aransas, TX	Jul 20-Jul 21	175:00	0	0	2	0	0	0
South Texas BGFC Fourth	Port Isabel, TX	Jul 20-Jul 21	181:50	1	3	2	0	0	0
Bimini Summer Billfish Tournament	Bimini, Bahamas	Jul 22-Jul 26	386:30	5	0	11	0	0	0
Grand Isle Tarpon Rodeo	Grand Isle, LA	Jul 25-Jul 27	339:30	13	10	0	0	0	0
	Drifting		9:30	0	0	0	1	0	0
Grand Island Tarpon Rodeo	South Pass, LA	Jul 25-Jul 27	688:58	17	15	0	0	0	20
Port Mansfield Fishing	Port Mansfield, TX	Jul 25-Jul 27	529:05	6	6	13	0	0	1
Dean Hawn Memorial Billfish	Port Aransas, TX	Jul 26-Jul 27	449:10	15	8	15	0	0	0
Oyster Bar Small Boat Billfish	Pensacola, FL	Jul 27-Jul 28	265:25	2	18	0	0	0	5
Annual Fort Walton-Destin Billfish	Destin, FL	Aug 2-Aug 3	971:51	21	28	0	0	0	4
	Drifting		5:00	0	0	0	1	0	0
Texas International Fishing	Port Isabel, TX	Aug 2-Aug 3	826:55	14	16	10	0	0	5
Mobile Big Game Fishing Club Ladies	Orange Beach, AL	Aug 3-Aug 4	434:10	7	11	0	0	0	6
Yellow Rose Ladies	Port Isabel, TX	Aug 6-Aug 6	117:25	5	1	2	0	0	0
Panama City Captains Day Billfish	Panama City, FL	Aug 9-Aug 10	586:50	11	47	2	0	0	12
	Drifting		13:25	0	0	0	2	0	0
South Padre Island Invitational	Port Isabel, TX	Aug 9-Aug 10	1074:20	44	16	5	1	0	7
	Drifting		113:50	0	0	0	3	0	0
Pensacola Ladies	Pensacola, FL	Aug 10-Aug 11	405:13	15	18	3	0	0	11

Appendix I. (continued)

Tournaments/Docks	Location	Dates	Hours Fished	Number Hooked: Blue Marlin	White Marlin	Sail Fish	Sword Fish	Bluefin Tuna	Yellowfin Tuna
Annual Corpus Christi Builders	Port Aransas, TX	Aug 10-Aug 11	153:30	1	1	3	0	0	0
Marlin International Lonestar Showdown	Port Isabel, TX	Aug 16-Aug 17	329:40	17	9	3	0	0	4
Blue Marlin Classic	Pensacola, FL	Aug 17-Aug 18	431:25	13	20	0	0	0	50
Empire-South Pass Fishing Rodeo	South Pass, LA	Aug 22-Aug 24	361:04	22	9	2	0	0	10
Gulf Coast Masters	Dauphin Island, AL	Aug 23-Aug 24	670:27	14	38	0	0	0	13
Bertram-Hatteras Shootout	Grand Isle, La	Aug 23-Aug 24	242:00	13	10	1	0	0	4
Galveston Blue Marlin Open	Freeport, TX	Aug 23-Aug 24	97:16	5	2	0	0	0	0
St. Thomas Invitational Blue Marlin	St. Thomas, VI	Aug 27-Aug 29	336:00	42	1	0	0	0	0
San Juan International Billfish	San Juan, PR	Aug 28-Sep 1	2269:12	163	1	0	0	0	0
New Orleans Big Game Fishing Club Labor Day	South Pass, LA	Aug 31-Sep 1	84:00	1	1	0	0	0	8
Annual August Billfish Classic	Freeport, TX	Aug 31-Sep 1	104:05	4	3	0	0	0	0
Teal Harbor Ladies Billfish	Port Aransas, TX	Aug 31-Sep 1	212:35	9	6	6	0	0	0
Annual Destin Billfish	Destin, FL	Sep 13-Sep 14	387:30	4	9	1	0	0	5
New Orleans Big Game Fishing Club Last	South Pass, LA	Sep 13-Sep 15	141:50	4	2	0	0	0	7
Oregon Inlet Fishing	Oregon Inlet, NC	Sep 17-Sep 20	627:41	14	205	0	0	0	0
Alabama International	Orange Beach, AL	Sep 19-Sep 28	1270:47	27	31	4	0	0	21
	Drifting		74:40	0	0	0	1	0	0
Orange Beach Invitational	Orange Beach, AL	Oct 4-Oct 6	458:44	18	3	0	0	0	7
Baton Rouge Big Game Fishing Club	South Pass, LA	Oct 10-Oct 12	132:55	3	1	0	0	0	2
Key West Blue Marlin	Key West, FL	Oct 15-Oct 19	2668:03	92	2	1	0	0	0
IBL Key West	Key West, FL	Oct 22-Oct 24	585:00	3	0	1	0	0	0
Tripod-Marathon	Marathon, FL	Nov 13-Nov 16	350:00	0	0	12	0	0	0
	Livebait		588:00	0	0	48	0	0	0
Bill King One Day Billfish	Key Colony, FL	Nov 18-Nov 18	75:00	0	0	12	0	0	0
Key Colony Beach Sailfish	Key Colony, Bch, FL	Nov 22-Nov 24	476:00	0	0	7	0	0	0
Islamorada Sailfish (Live Bait)	Islamorada, Fl	Dec 4-Dec 8	1479:00	0	1	99	0	0	0
Dock Sampling	Location/Method								
Cozumel Docks	Cozumel, MX	Apr 4-Apr 6	91:39	0	1	68	0	0	0
	Livebait		17:45	1	0	1	0	0	0
Mobile Docks	Trolling	Apr 10-Sep 26	275:40	9	18	0	0	0	4
South Pass Docks	Trolling	Apr 14-Oct 13	868:40	30	3	1	0	0	41
Grand Isle Docks	Trolling	Apr 20-Sep 1	239:55	7	3	2	0	0	8
Port Aransas Docks	Trolling	May 2-Sep 22	1288:41	53	14	37	0	0	0
Destin Docks	Trolling	May 3-Nov 17	1881:38	59	62	4	1	0	49
	Drifting		11:00	0	0	0	1	0	0
Panama City Docks	Trolling	May 25-Oct 7	462:30	7	23	1	0	0	13

Appendix I. (continued)

Tournaments/Docks	Location	Dates	Hours Fished	Number Hooked					
				Blue Marlin	White Marlin	Sail Fish	Sword Fish	Bluefin Tuna	Yellowfin Tuna
	Drifting		9:29	0	0	0	1	0	1
Padre Island Docks	Trolling	May 27-Aug 30	943:16	19	5	31	0	0	3
Pensacola Docks	Trolling	Jun 21-Nov 11	180:50	6	9	0	0	0	3
Galveston Docks	Trolling	Jul 4-Sep 1	91:10	5	1	0	0	0	0

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