Col.Vol.Sci.Pap. ICCAT, 28 : 258-265 (1988)

PROGRESS OF THE ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH DURING 1987

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SUMMARY

A draft of the Program Plan for the ICCAT Program of Enhanced Research for Billfish was circulated to ICCAT scientists on June 23, 1987. Input from this review was incorporated into the draft and a final plan was prepared prior to the 1987 SCRS meeting (COM-SCRS/87/14). Because of the delayed acquisition of outside funds necessary to support the Program causing the late development of the Plan, the operational part of this research program has been in existence for only a short time. Considering these constraints, considerable progress has been made and this report reviews Program research activities for 1987.

The first research activity consisted of a feasibility trip to the Caribbean by Drs. P. M. Miyake and E. D. Prince to start the Program in this area. A limited amount of port sampling and use of at-sea observers were accomplished in the area of Cumaná, Venezuela, during 1987. Various approaches were examined for resolving the problems with landing statistics (i.e., carcass identification and conversion factors) inherent with modern longliners. These include development of taxonomic characteristics and use of identification kits based on amino acid finger printing techniques from a commercial company to identify dressed carcasses. A plan to test taxonomic characters and finger printing kits using billfish carcasses obtained from U.S. observers aboard Japanese longliners was developed and preliminary approval of regulating authorities for this work was obtained. The tagging part of the Program was initiated off the west coast of Africa in Senegal and at least 127 sailfish have been tagged to date. Tagging equipment for the ICCAT Program has been ordered. About one dozen biological samples for conducting studies on age and growth were obtained from at-sea and port sampling activities in Venezuela.

RESUME

Un projet de planification du Programme de Recherche intensive sur les Istiophoridés a été diffusé aux scientifiques de l'ICCAT le 23 juin 1987. Les données d'entrée destinées à cette étude ont été incorporées dans le projet, et le plan définitif a été élaboré avant la réunion de 1987 du SCRS (COM-SCRS/87/14). Le versement des apports financiers de fonds privés ayant souffert quelques délais, le plan a été lancé avec quelque retard, et sa mise en oeuvre n'est donc active que depuis peu. Malgré ces contraintes, des progrès considérables ont été réalisés; le présent rapport fait état des activités de recherche du programme en 1987.

La première action a consisté en une mission aux Antilles par les Drs. P.M. Miyake et E.D. Prince pour étudier la faisabilité du programme dans ce secteur. Une certaine quantité d'échantillonnage au port et d'observations en mer ont été effectués en 1987 dans la région de Cumana, au Vénézuéla. On a examiné diverses façons d'aborder les problèmes posés par les statistiques de débarquement (à savoir, identification des carcasses et facteurs de conversion) qui sont inhérents aux palangriers modernes. Elles comprennent la définition des caractéristiques taxonomiques et l'emploi pour l'identification des carcasses manipulées de matériel d'identification en provenance d'une entreprise commerciale, basé sur les techniques de détermination des empreintes digitales par les acides. Un plan a été dressé pour tester sur les istiophoridés obtenus par des observateurs américains à bord de palangriers japonais les caractéristiques taxonomiques et le matériel de lecture d'empreintes digitales: l'autorisation préliminaire des autorités compétentes a été obtenue pour ce travail. Le partie marquage du programme a été mise en route au large des côtes d'Afrique occidentale, au Sénégal, et 127 voiliers au moins ont été marqués jusqu'à maintenant. Du matériel de marquage destiné au programme ICCAT a été commandé. Une douzaine environ d'échantillons biologiques destinés aux études sur l'âge et la croissance ont été obtenus du fait des activités en mer et de l'échantillonnage au port au Vénézuéla.

RESUMEN

El 23 de junio de 1987 se distribuyó entre los científicos de ICCAT el Plan ICCAT del Programa de Investigación Intensiva sobre Marlines. Los datos resultantes de esta revisión se incorporaron al borrador y antes de la reunión del SCRS en 1987 se preparó el Plan final (COM-SCRS/87/14). Debido al retraso en la obtención de fondos privados en apoyo del Programa, lo que retrasó asimismo el desarrollo del Plan, las operaciones llevaban poco tiempo en marcha. Teniendo en cuenta las dificultades surgidas, los progresos realizados fueron notables, y el presente informe examina las actividades de investigación llevadas a cabo durante el año 1987.

La primera de estas actividades consistía en un viaje que realizaron al Caribe los Drs. P.M. Miyake y E.D. Prince para estudiar la viabilidad del programa en dicha zona. En 1987 se hizo muestreo en puerto, aunque limitado, y se enviaron observadores a bordo de barcos en la zona de Cumaná, Venezuela. Se estudiaron varios métodos para resolver los problemas de las estadísticas de desembarque (es decir, identificación de carcasas y factores de conversión) que son inherentes a los palangreros modernos. Incluyen el desarrollo de características taxonómicas y el empleo de equipos de identificación basados en técnicas de impresión dactilar con aminoácido, de una empresa comercial, para identificar las carcasas ya manipuladas. Se desarrolló un plan para comprobar los caracteres taxonómicos y los equipos de impresión dactilar, empleando carcasas de marlines facilitadas por los observadores estadounidenses embarcados en palangreros japoneses, y previamente, se obtuvo el permiso de las autoridades competentes para llevar a cabo estos trabajos. El marcado se inició frente a la costa Oeste de Africa, en Senegal, y hasta la fecha se han marcado, al menos, 127 peces vela. Ya se ha encargado el equipo necesario para el Programa ICCAT. Durante el muestreo en puerto y a bordo, realizado en Venezuela, se obtuvo una docena de muestras biológicas para estudios de edad y crecimiento.

INTRODUCTION

Research activities during the initial year of the ICCAT Enhanced Research Program for Billfish were delayed by the time required to obtain the necessary outside funds to fulfill budgetary obligations, thus the late development of the Program Plan (SCRS/87/14). Nevertheless, considerable progress was made during the first year despite the late start.

The three major objectives of the Plan are to: (1) Provide more detailed catch and effort statistics; (2) Expand the ICCAT tagging program to include billfish; and (3) Assist in collecting data for age and growth studies. Two major areas were identified as places for intensive scientific study--the west coast of Africa and the Caribbean Sea. An area off the east coast of South America, between Brazil and Uruguay was also identified but with less priority.

FEASIBILITY TRIP TO VENEZUELA

Drs. P. M. Miyake (ICCAT) and E. D. Prince (NMFS) made a joint trip to Caracas, Cumaná, and Caúpano, Venezuela, April 1 to 11, 1987, to start the ICCAT Enhanced Billfish Research Program in Caribbean waters. The major goal of this trip was to make arrangements for port sampling and at-sea observers for the Billfish Program and to develop the necessary reporting forms for these activities. However, additional discussions were also held between the ICCAT Assistant Executive Secretary and Venezuelan scientists which reviewed the ICCAT port sampling activities already in place for other species and the necessary adjustments that might be made for including the billfish species grouping with this activity.

Billfish Program

After discussing the situation with Dr. Acuna (Director de Pesca y Aquicultura) Sres. D. Sánchez, Alio, Astudillo (FONAIAP), Sra. Calderón (Pesca), Mr. Oh (of the Trio Pines Company) and Sr. Fernández (of Gaviota, which also owns a longliner), and after visiting the ports of Cumaná and Carúpano and interviewing various captains of fishing vessels, and observing the off-loading of boats, the following conclusions were reached and a plan has been agreed upon and recommended:

Billfish Catches on Large Longliners

Fourteen (14) large longliners (150 to 250 MT capacity) which had been based at Carúpano were moved to the Pacific in early 1987 since fishing conditions in the western or central Atlantic have not been favorable. These vessels used to make two to three trips (of 3 to 6 months each), mostly fishing in the northwest, north central and southwest Atlantic. In 1985 and 1986, the boats also operated in Caribbean waters.

Most of these longliners used to fish for bigeye for the "sashimi" market, and are equipped with deep freezers of $-50^{o}C$. These longline vessels probably caught some billfishes as part of their by-catch. The fish

were all dressed (gilled, gutted, heads off, fins off) and species identification at the ports is a major problem. The catch and effort data from these operations are published in ICCAT's "Data Record" series.

Two shark gillnetters are active from Carúpano. It is expected that these gillnetters will catch some billfishes but the total by-catch may not be high. Therefore, substantial effort for sampling Carúpano at this time would not be appropriate. However, periodic visits to Carúpano may be appropriate at a later date or when time permits to check on gillnet catches or longline activity.

Billfish Catches on Small Longliners

Eighteen (18) small longliners (8 to 20 MT capacity) are based at Cumaná. Of these, one vessel fishes for sharks. They are fishing mostly in the Caribbean Sea or the adjacent northwest Atlantic. An average trip lasts about two weeks but no longer than three weeks. They use about 900 to 1200 hooks per day and set about 20 miles of gear. The target species is yellowfin and sets are made during daytime in relatively shallow layer.

Their catches are comprised of 5 to 10 percent (in weight) billfishes and could be as high as 15 percent. In number, billfish are more important, and probably consist of 10 to 50 percent. As the total annual catch of the small longliners is on the order of 1000 to 1200 MT, the catches of all billfish species combined would be around 80 to 100 MT.

Tunas are brought back whole, but gutted. However, billfishes are brought back with the heads removed and gutted. Fortunately all the fins, including caudal fins, are still on. These carcasses are iced and refrigerated but are not frozen. Therefore, species identification is not a problem at the port when unloading.

The present logbooks do not have columns to keep records of catches of billfishes. Consequently, they are entered as other fish. However, the fishermen know the species well. Therefore, if columns are provided, recording billfish by species could be easily accomodated.

Most of the tunas are either sold to local canning factories or exported. Billfish are sold at the local fresh fish market and the price paid for them is about 80% of what is received for tunas. In the market, the heads have to be off.

Other Boats

Purse seiners and baitboats might catch some billfishes but the quantity seems to be negligible. There have been various conflicting reports that two billfish longliners (supposedly U.S. swordfish longliners) started fishing in 1986. Whether they are still fishing or not is unknown. Since the name of one of the boats coincided with that of a U.S. sport fishing boat, it could even be a sport fishing activity.

Venezuela has some recreational fishing boats and they are definitely fishing for billfish. They are based near Caracas and the fish caught are mostly killed. The magnitude of the catches is not known and is not being investigated as of present. However, the quantity is still minor.

Conclusion

At present, practically no longliners are fishing in the Caribbean Sea except for U.S. vessels, small Venezuelan boats, and a few Mexican boats. Since Venezuelan longliners do not freeze their catches and dress by removing fins, species identification at ports should be relatively easy. Also, if an observer has to be sent aboard a longliner, the trip does not last as long as those of other modern longliners. Therefore, the first steps of port sampling and observer program have been discussed, agreed upon and established for the Venezuelan longliners as a test case.

Port Sampling for Billfish

1. All longliners arriving at the port of Cumaná for unloading will be sampled. All billfishes (blue marlin, white marlin, sailfish, swordfish, and spearfish) should be identified to species and recorded.

2. All billfish weight should be recorded in kilograms. If possible, pectoral fin to fork and first dorsal to fork length should be measured if the fish are headless. If round (whole) fish are unloaded, lower jaw to fork length should be taken (Form D of the Program Plan may be used for this purpose). The ICCAT Billfish Research Fund will provide any equipment (spring scales) needed for the sampling.

3. The ICCAT "Field Manual" will be useful to assist in species identification. However, a revised species identification illustration sheet specifically designed for this Program is included in the Program Plan (SCRS/87/14).

4. When conversion factors of one of the measurements mentioned above to the lower-jaw fork length and whole weight are established as a result of the observer program, only one value for length and weight will be needed.

5. If any tagged fish are recovered, the fish should be preserved in a freezer and Dr. Prince should be contacted about the possibility of obtaining hardpart samples for age and growth studies. The instructions for dealing with tag-recaptured fish and hardpart collection from these fish, as well as very small and large size categories of each species, are given in the Program Plan (SCRS/87/14).

6. When boats with scientific observers aboard arrive at ports, all the fish should be completely measured and the identification numbers on the markers which have been attached to the fish should be recorded. All length and weight measurements should obviously be taken before the fish are dressed, if this can be done without interrupting fishing operations.

Scientific Observers for the Billfish Program

1. In the past, all the captains and owners of tuna boats have been very cooperative concerning the Yellowfin Year Observer and Tagging Programs. A visit to Gaviota, S.A. (a canning factory which owns four longliners) was made and it was confirmed that this company can accept at least one Venezuelan observer aboard during a trip of one of their longliners.

2. Mr. Sánchez and Dr. Alio agreed to make arrangements so that a Venezuelan scientist/technician can be sent on the trips as an observer for the Billfish Program.

3. It was agreed that the first few trips will be a part of the feasibility study and hence will be funded by the initial ICCAT Billfish Program Fund contribution (i.e. from the Billfish Foundation). Conditions for placing an observer aboard would be similar to those for the "Yellowfin Year Program"; the cost would be between 600 to 100 dollars U.S. (depending on the duration of the trip).

4. The objective is to study feasibility of such a Program, particularly, in terms of availability of billfish during the trip. At the same time, it is hoped that the Program will establish a conversion of lower-jaw fork length and whole weight to another unit (dressed weight or pectoral to fork or first dorsal spine to fork, etc.). If this is done, port sampling will be more effective (only fish with heads removed will be available at the port).

5. The observers will record all the catches of billfishes on a per set basis (see Forms C and D in SCRS/87/14). At the same time all billfishes will be checked for sex, marked with a special marker and weight, lower-jaw fork, pectoral-fork and first dorsal-fork lengths will be measured. The markers to identify the fish later at the port will be provided and illustrations to determine sex will be supplied by the National Marine Fisheries Service, Miami, Florida.

6. The recording formats and instructions for use by the scientific observers are with the form.

7. It was agreed that, if possible, the first trip would be made around mid-May. However, delays postponed the trip until August. After evaluating the results of the first trip, adjustments will be made and two more trips are planned before the end of 1987.

Tagging by Recreational Fishermen

Since Venezuela has some recreational boats fishing for billfish, there was a discussion concerning starting the ICCAT tagging program on this fishery. It was suggested that once the Program Plan is developed, a Venezuelan scientist be sent to Puerto Rico for training to initiate the recreational fishermen's tagging program. In late August, Puerto Rico is hosting one of the largest billfish tournaments and that would be a good opportunity to obtain tagging experience. Perhaps this can be done in 1988.

ICCAT BILLFISH TAGGING

One of the major objectives of the Enhanced Research Program for Billfish is to initiate an ICCAT tagging effort specifically for billfish. Since the plastic anchor tuna tags that ICCAT now uses are inappropriate for the tough skin of billfish, stainless steel anchor tags (Floy Tag Manufacturing Co.) used on billfish in other programs were ordered with ICCAT numbering system and address. ICCAT billfish tags will have a letter/number system of BF followed by five integers (e.g. BF00001). The tags, stainless steel applicators, and tagging stick will be available for inspection at the 1987 SCRS meeting. The first shipment of tags may also be available at that time.

In order to initiate some tagging activity during the first year of the Program, 500 billfish tags from the Cooperative Tagging Program of the NMFS (with a Miami return address) were sent to the Centre de Recherches Océanographiques in Dakar, Senegal, as a temporary measure. A total of 127 sailfish were tagged off Dakar using these tags. One inquiry was received from Gabon requesting tags for billfish. A tag-recaptured blue marlin was also reported from this area but unfortunately the tag was damaged and the tag number was not legible. During the upcoming year, ICCAT tags and associated equipment will be available for this Program.

PORT SAMPLING BILLFISH FROM MODERN LONGLINERS

The major problems with billfish data are to obtain accuate landings statistics of billfishes by species and to determine accurate size (age) composition of the catch. In order to achieve this goal, some of the data requirements include obtaining meaningful measurements of the size of fish and identifying the landings to species. Landings identified as unclassified billfish and dressed weights/lengths that are not converted to live weight/length are not very useful in assessment analyses. These problems have persisted with billfish landings for many years and generally involve only the large modern longliners that dress billfish by taking off heads, fins, viscera and then flash freezing the carcasses. Species identification is particularly difficult under these circumstances and carcass measurements must be converted to whole sizes with a loss in accuracy.

We are currently pursuing two tasks to resolve these problems: (1) investigating taxonomic criteria and chemical techniques for identification of dressed carcasses; and (2) developing conversion factors from alternative whole weight/length. We feel that part of the solution to these problems can be addressed by utilizing observers aboard Japanese longliners fishing in the U.S. fishery conservation zone for a special study. We also intend to include other possible sources of data from billfish tournaments, taxidermy facilities, and other longline operations to resolve carcass identification and conversion factor problems. Our proposed use of U.S. observers on Japanese vessels is as follows:

(1) Billfish caught by Japanese longliners could be allowed to be brought abroad under the supervision of the observers. This would be limited only to dead fish;

(2) These fish will be subject to biological studies (sex, measurements of various parts, weight, etc.) by observers aboard;

(3) A marker with an identification number will be attached to selected fish that are designated for further on-shore examination (i.e., species identification). Those specimens not retained could be returned to the water;

(4) The retained fish will then be dressed and frozen in exactly the same manner as all billfish on the longliners;

(5) When observers leave the vessel (usually in New York or Massachusetts), these billfish carcasses will also be delivered to U.S. authorities as scientific specimens and trucked (frozen) to freezer facilities in Massachusetts (Gloucester Tech Lab, NMFS);

(6) Species identification of retained carcasses will be confirmed by isoelectric focusing procedures (amino acid finger printing). A private company (Applied Biogenetics International, Inc., West Palm Beach, Florida) has agreed to develop identification kits for billfishes and test their accuracy on the numbered carcasses. These kits could become available by the next SCRS meeting for about $15.00 each U.S., are reportedly easy to use, require only a small piece of muscle tissue, and take only minutes to complete. In addition, the identification criteria (Table 1) we have assembled from taxidermy shops and taxonomic experts will be tested on these carcasses in order to establish practical field identification guidelines for port samplers.

(7) fish measured but not retained for shore-based examination will be returned to the water.

There are obvious logistical considerations involved in such a plan. We propose that captains and observers participating in this program will carry authorization letters at sea which are signed by appropriate authorities. We have already contacted U.S. and Japanese authorities concerning this matter and have received preliminary approval to proceed with the plan.

The plan is to initially target biological sampling (sex determination, body measurements, etc.) of all dead billfish but only one dozen blue and white marlin and sailfish would be retained and off-loaded as biological specimens. Because of the area of fishing, sailfish may not be involved. Since the identification problem involves only blue marlin less than 150 pounds dressed weight, we estimate that less than a total of 1500 pounds of marlin (12 blue and 12 white marlin) would be involved in the retention part of this study. Observers would be supplied with specific instructions on data acquisition and size-species categories of interest. We anticipate that the duration of the retention part of this study will last only as long as it takes to obtain the specified number of carcasses for each species. However, we intend to continue the conversion factor part of the study for the foreseeable future. This approach would maximize the use of these observers for collecting meaningful data and at the same time, contribute to the ICCAT Enhanced Research Program for Billfish.

Once the taxonomic criteria and finger printing kits have been successfully field tested on off-loaded billfish from this study and other sources of data, we intend to develop a procedure and/or manual that can be used easily by all ICCAT port samplers for identification of billfish carcasses and billfish sampling in general. This procedure may consist of a combination of taxonomic criteria supplemented by use of identification kits. Once we have assembled the necessary data to develop strong regression relationships between live and dressed weight and length for the billfish species, only the most convenient measurements from dressed fish will be required. ICCAT billfish research funds will be available for this research. At this time we anticipate that funds will be necessary for renting freezer trucks to transport frozen carcasses to the Gloucester Tech freezer facility and for possibly purchasing an unknown number of finger printing kits at a later date. Additional ICCAT funds for U.S. observers participating in this work will not be required.

RESULTS OF THE FIRST OBSERVER TRIP AND PORT SAMPLING IN CUMANA, VENEZUELA

Observer Trip

The first observer trip took place on a small longliner out of the port of Cumaná, Venezuela. The vessel (Enriqueta) has a capacity of about 20 MT and the trip duration lasted 22 days, although breakdowns limited fishing to 10 days between August 25 to September 5, 1987. A total of 205 fish (7 major species) weighing about 7,646 kg were caught (Table 2). About 60 kilometers of mainline and almost 1,200 hooks were set each fishing day to target yellowfin tuna. Sardines were used as bait and the gear were set in the morning hours (04:00 to 08:00 AM) and retrieved in the afternoon and evening (15:00 to 24:00 PM). Several pieces of information might be added to the observer forms (formally forms A and B but now C and D) include: (1) Unit of measurement for gear description; (2) Tonnage capacity of the vessel; (3) Length of the vessel; (4) Total length of the mainline.

The billfish bycatch (blue and white marlin, sailfish, spearfish, and swordfish) from this trip consisted of 63 billfish which amounts to 31 percent by number and 20 percent by weight of the entire catch (Table 2). Forty percent of the billfish were males and 60 percent were females. In addition, 56 percent of the billfish were dead when brought along side the vessel while 44 percent were alive.

Initial Port Sampling

Because of problems in scheduling sampling when longliners off-load in the port of Cumaná, only two boats were sampled at this port prior to the SCRS meeting (El Guanche on 6/23/87 and Gaviota XV on 6/06/87, Table 3). It is apparent from these data that the billfish are being off-loaded headless and gutless since lower jaw fork length and sex were not obtained. Dressed length measurements (pectoral fin to fork and first dorsal fin to fork of tail) from a total of 12 white marlin, 5 blue marlin, and 2 swordfish were recorded (Table 3). During the off-loading of 6/23/87, dressed weights were not recorded but on 6/06/87 these data were taken. Also, the port sampling landing form (A) for the 6/23/87 trip did not break down billfishes by species but recorded 500 kg of aguijas (28 by number).

Further examination of these data (Table 3) reveal a possible problem with species identification because 3 fish sampled 6/06/87 were listed as white marlin with dressed weights of 436, 116, and 73 kg (959, 255, and 160 lbs, respectively). White marlin are not known to grow much over 72 kg (160 lbs) and dressed weights over 69 kg are probably blue marlin, assuming the carcasses had two caudal keels (one caudal keel would indicate a swordfish). Because of these obvious problems, the other dressed weights for white marlin on 6/06/87 over 62 kg (7 out of 9 are over 62 kg) are also suspect since these weights are near the maximum attained by this species. Apparently, species identification of carcasses, even when fins are left on, are a problem. These problems, in addition to scheduling samplers to coincide with off-loading, need to be addressed in order for these data to be meaningful.

OBSERVERS ON U.S. LONGLINERS IN THE CARIBBEAN SEA

As a contribution to the ICCAT Program of Enhanced Research for Billfish, the Southeast Fisheries Center of the U.S. National Marine Fisheries Service awarded a contract in Puerto Rico for observer coverage aboard U.S. vessels in the fall and winter fishery. To date, one trip has been completed but the results have not yet been submitted. In addition, the Southeast Fisheries Center has completed, with its own staff, seven observer trips on U.S. longline vessels fishing in the Gulf of Mexico. These 54 days at sea resulted in observations on the billfish bycatch of 21 white marlin, 7 blue marlin, and 2 sailfish (Table 4). A number of the billfish were tagged and released alive. A report of these activities will be presented at the next ICCAT SCRS meeting.

Table 1. Preliminary taxonomic characteristics for blue marlin, white marlin, and sailfish that may assist in identification of frozen dressed carcasses (headless, finless, gutted) which are off-loaded from modern longliners.

Blue Marlin:

(1) Blue marlin are the largest of the billfishes (Istiophoridae) and all dressed carcasses over 69 kg (150 lbs) with two caudal keels (Xiphiidae have only one caudal keel) are likely blue marlin.

(2) Blue marlin have a highly reticulated lateral line that is different from all other istiophorids and xphiids. This structure might be examined by pouring a little water in the area of the lateral line of a frozen dressed carcass and then removing the scales in this area. The lateral line on a frozen carcass is not easily seen.

White Marlin:

(1) White marlin have a lateral line that can be easily seen, even on frozen carcasses.

(2) The connective tissue on the belly of white marlin is thin compared to sailfish. A sampler should be able to determine this by running his finger, starting at the anus, and moving toward the head. The texture of the skin will be relatively rough and the sharp scales can be felt easily.

Sailfish:

(1) Sailfish have a lateral line that can be easily seen, even on frozen carcasses.

(2) The connective tissue on the belly of sailfish is thick compared to white marlin. A sampler should be able to determine this by running his finger, starting at the anus, and moving toward the head. The texture of the skin will be relatively smooth and the sharp scales cannot be felt easily.

Table 2. Summary of data from the first observer trip on a small Venezuelan longliner, Enhanced Research Program for Billfish, August 25 through September 5, 1987.

Species	Weight (kg)	Number	Male/Female	Dead/Alive
White marlin	785	39	14/24	21/17
Sailfish	478	21	10/11	11/10
Blue marlin	230	2	1/1	2/0
Swordfish	--	1	--	1/0
Subtotal	1493 (20%)	63(31%)	25/36	35/27
Yellowfin tuna	4430	111		
Shark (unidentified)	1330	21		
Big eye tuna	393	10		
Total	7646	205		

Table 3. Summary of data from the first port sampling in Cumana, Venezuela, Enhanced Research Program for Billfish, June 6 and 23, 1987.

Species	Pectoral fin fork length (cm)	First Dorsal fin fork length (cm)	Weight (kg)
June 6, 1987			
White marlin	-----	273	436+
	146	157	64
	165	175	73+
	146	157	64
	157	163	68
	153	157	62
	193	205	116+
	119	126	18
	122	130	20
Swordfish			
	112	117	34
	129	135	48
June 23, 1987			
Blue marlin	127	136	--
	132	140	--
	132	139	--
	132	142	--
	132	140	--
White marlin	146	150	--
	137	146	--
	170	176+	--

+ Dressed weights and lengths for these white marlin are larger than would normally be expected and may indicate an error in species identification. Dressed weights for white marlin would not normally be over 69 kg (or 150 lbs).

Table 4. Observations of species composition in the catch from U.S. longliners fishing in the Gulf of Mexico, July-September, 1987. Observer program of the U.S. National Marine Fisheries Service, Southeast Fisheries Center.

Species	No. Alive	No. Dead	Total	% of Total
Yellowfin tuna	220	189	409	55.2
Bigeye tuna	1	0	1	0.1
Blackfin tuna	8	11	19	2.7
Little tunny	1	5	6	0.8
Skipjack tuna	0	6	6	0.8
Swordfish	14	7	21	2.8
White Marlin	11	10	21	2.8
Blue Marlin	2	5	7	0.9
Sailfish	0	2	2	0.3
Other fish +	69	78	147	19.9
Sharks++	76	22	98	13.2
Leatherback turtles	3	1	4	0.5
Totals	405	336	741	100.0

+ Other fish includes at least 14 species of teleosts.

++ Sharks includes at least 10 species of elasmobranchs.