INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

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INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

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* France and the United Kingdom are members in the name of their overseas territories not covered by the Treaty of Rome.

FOREWORD

The Chairman of the International Commission for the Conservation of Atlantic Tunas presents his compliments to the Contracting Parties of the International Convention for the Conservation of Atlantic Tunas (signed in Rio de Janeiro, May 14, 1966), as well as to the Delegates and Advisers that represent said Contracting Parties, and has the honor to transmit to them the ***"Report for the Biennial Period, 1996-97, Part II (1997)"***, which describes the activities of the Commission during the second half of said biennial period.

This issue of the Biennial Report contains the reports of the Fifteenth Regular Meeting of the Commission, held in Madrid, Spain, in November, 1997, and the reports of all the meetings of the Panels, Standing Committees and Sub-Committees, as well as some of the Working Groups. It also includes a summary of the activities of the Secretariat and a series of National Reports of the Contracting Parties of the Commission, relative to their activities in tuna and tuna-like fisheries in the Convention Area.

Given that the combined length of these is too great for them to be included in one volume, the Report for 1997 has been published in two volumes. ***Volume 1*** includes the Reports of the Secretariat on its activities, the Proceedings of the Commission Meetings and the reports of all the associated meetings, with the exception of the Report of the Standing Committee on Research and Statistics (SCRS). ***Volume 2*** contains the Report of the Standing Committee on Research and Statistics (SCRS) and its appendices, as well as the National Reports mentioned above.

This Report has been prepared, approved and distributed in accordance with Article III, paragraph 9, and Article IV, paragraph 2-d, of the Convention, and Rule 15 of the Rules of Procedure of the Commission. The Report is available in the three official languages of the Commission: English, French and Spanish.

R. Conde de Saro
Commission Chairman

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NATIONAL REPORTS

STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)
(Madrid, October 20-24, 1997)

1. Opening of the meeting

1.1 The 1996 meeting of the Standing Committee on Research and Statistics (SCRS) was opened by Dr. Z. Suzuki, Chairman of the Committee, Monday, October 20, at the Hotel Chamartin in Madrid. Dr. Suzuki welcomed all the participants.

1.2 Dr. A. Ribeiro Lima, the ICCAT Executive Secretary, addressed the SCRS, and welcomed all the participants. He emphasized that the work carried out by the SCRS is the most important and essential part of the Commission's activities. He referred, in particular, to the efforts by the French and Spanish fishermen, in adopting voluntary measures on the fisheries associated with floating objects. Dr. Lima wished the scientists a successful meeting.

1.3 The Chairman outlined briefly the progress made by the Committee since last year's meeting.

2. Adoption of Agenda and arrangements for the meeting

2.1 The Tentative Agenda was reviewed and, after introducing some minor modifications, it was adopted by the Committee and is attached as **Appendix 1.**

2.2 The following scientists served as rapporteurs for the species sections (Agenda item 13) of the 1996 SCRS Report:

Tropical tunas: general		P. Pallares
YFT:	yellowfin tuna	J. P. Hallier
BET:	Bigeye tuna	N. Miyabe
SKJ:	Skipjack tuna	J. Ariz
ALB:	Albacore	J. Santiago
BFT:	Bluefin tuna	G. Scott and B. Liorzou
BIL:	Billfishes	E. Prince
SWO:	Swordfish	J. Porter
SBF:	Southern bluefin tuna	Y. Takeuchi
SMT:	Small tunas	L. Gouveia

2.3 Dr. P. Miyake, ICCAT Secretariat, served as rapporteur for all the other SCRS Agenda items, except for Item 12, which was drafted by Dr. J. Majkowski (FAO).

3. Introduction of Contracting Party delegations

3.1 The Committee was informed that, with the recent incorporation of Italy and Croatia, the Commission is now comprised of 26 Contracting Parties. The following Contracting Parties participated in this year's meeting: Brazil, Canada, Croatia, Côte d'Ivoire, Equatorial Guinea, France, Italy, Japan, Korea, Libya, Morocco, Portugal, S. Tome & Principe, South Africa, Spain, United Kingdom, United States, and Uruguay. Each delegation introduced its members. The List of Participants are attached as **Appendix 2.**

4. Introduction and admission of observers

4.1 Representatives from Mexico, Senegal, Chinese Taipei, CARICOM, the European Commission and EUROSTAT of the EU, and FAO attended the meeting in an observer capacity. The observer delegations (see **Appendix 2,** List of Participants) were introduced and then admitted, as all had been invited in accordance with the current criteria for observers adopted by the Commission.

5. Admission of scientific documents

5.1 The Committee noted that 119 papers have been submitted to this year's meeting, all of which met the criteria for the admission of documents. The List of Documents are given in **Appendix 3.**

6. Review of national fisheries and research programs

6.1 BRAZIL

The national longline fleet is comprised of Brazilian and foreign flagged longliners leased by Brazilian companies. In 1996, there were 23 vessels flying Brazilian flag, which represents an increase of 43% in relation to 1995, and 21 foreign flagged leased longliners, showing a small increase in relation to 1995. The baitboat fleet consisted of 46 Brazilian vessels and 3 Portuguese flagged leased vessels. In relation to 1995, the Brazilian fleet showed a decrease of 13%.

The total catch of tuna and tuna-like species (including sharks) caught in Brazilian waters during 1996 was 40,951.4 MT. Skipjack is the main species caught by the baitboat fishery, while sharks appear as the dominant species in the longline fishery, followed by swordfish and bigeye. The predominance of sharks over other species in the longline fishery is the result of the high percentage of sharks caught by the segment of the fleet comprised of Brazilian vessels. In the catches of the leased longliners, sharks appear in a much smaller percentage. As for the baitboat fishery, the total catch in 1996 was 24,196 MT, which represents an increase of 22.1% over the 1995 catch. There was an increase of 33.6% in skipjack catches while yellowfin catches showed a decrease of 51.2%.

There has been an increasing trend in swordfish catches taken by longliners, over the period 1992-1996, especially for the Brazilian longliners, as a result that some vessels have initiated a directed swordfish fishery, since 1994. This change in target species has had a direct effect on shark catches, which have decreased over the period 1992-93. Among the shark species caught in the longline fishery blue shark is the most important species caught followed by silky shark.

In 1996, there was an increase in the number of longliners targeting swordfish, with some vessels replacing the traditional longline by the nylon monofilament longline, while others continued to use the traditional nylon multifilament longline. There was also an expansion of the swordfish fishing area, and, as a result, a seasonal pattern in the distribution of fishing is now observed: from June to October fishing concentrates in the South and Southeast regions and for the remaining months, in the Northeast region.

The collection of tuna statistics and sampling for size frequency, for the main tuna species has been continued in 1996. The compilation of Task I and Task II data on catch and catch/effort for 1996 has been finalized and submitted to ICCAT, while the processing of data on length frequency measurements is still in progress.

ICCAT recommendations of minimum weight limits for yellowfin and bigeye, and minimum size and weight limits for swordfish have been implemented in domestic legislation in 1973, 1981 and 1995, respectively. In relation with Port Inspection, although Brazil has accepted the ICCAT Port Inspection Scheme it has not been implemented as there is a domestic inspection scheme in place which is equivalent to the one adopted by ICCAT.

6.2 CANADA

In 1996, bluefin tuna and swordfish regulations, consistent with ICCAT regulatory measures, were in effect. The Canadian nominal landings of swordfish were 739 MT. taken mainly by longline. This is less than half of the

landings in 1995; this reduction is attributed to a combination of factors including the closure of fishing areas early n the season to avoid small fish and bluefin by-catch, to anomalous oceanographic conditions, and to a general paucity of swordfish. Bluefin tuna landings were 598 MT, leaving 15 MT of the 1996 quota uncaught. Other tuna and shark landings are maintained, and Task I and Task II data were submitted for 1996.

Research responsibility for both swordfish and tuna resides at the Biological Station, St. Andrews, New Brunswick. In 1996, tagging studies and biological sampling continued. Analyses of historical Canadian bluefin CPUE was completed and a standardized index of relative abundance was presented for the first time in 1996. both the age-specific and biomass indices for swordfish were updated in 1996 and 1997. In 1996 and 1997, the Canadian fishing industry has been involved both in a cooperative tagging program, and in the review of catch and CPUE data for use in stock assessment.

6.3 CÔTE D'IVOIRE

Since the 1980s, there are no tuna vessels flying the Ivorian flag which exploit tuna resources in the EEZ of Cote d'Ivoire. However, because of the importance of the port of Abidjan, and particularly due to its international relations, especially its adherence to fishing agreements with the EEC and its membership in ICCAT, Cote d'Ivoire currently plays an important role in the exploitation, management, marketing and processing of eastern equatorial Atlantic tuna.

The tuna landed daily at the port of Abidjan come from three international industrial fleets, and, to a lesser extent, from the national artisinal canoe fishery. There are 17 French purse seiners, 29 Spanish purse seiners, four other purse seiners (reported in the Not Elsewhere Included or NEI category) and 83 gill net canoes.

The industrial fleet landed 168,000 MT of tuna in 1996, of which 11,000 MT were not marketable fish.

In addition to billfish, the canoe fishery landed large quantities of tuna, which comprised about 17% of the total catch.

Three canning factories process the tuna landed at the port of Abidjan.

Research studies on tuna are carried out by the *Centre de Recherches Oceanologique* (CRO), following two major lines (statistics and biology). This research is financed by the Government of Cote d'Ivoire and by some joint agreements (EEC, ORSTOM and IEO).

6.4 CROATIA

The Republic of Croatia is participating for the first time in the activities of the SCRS as a full member country. For this meeting the following two documents have been submitted: (1) "Tuna Catch in the eastern Adriatic" (SCRS/97/93); and (2) "Reviewed fishing statistics and tuna catch records in the Republic of Croatia" (SCRS/97/94).

As can be seen from these two documents, Croatia is trying to provide the best way for the protection and sustainable exploitation of the highly migratory species, especially bluefin tuna. In the first document new information, is provided and Croatia also proposes the substitution of the prohibition of purse-seine fishing during August in the eastern part of the Adriatic sea for a prohibition during May or June, as Croatian scientists have found results which demonstrate that it would be better if the season for this fishing gear closed in May or June. The reason for such a measure is that Croatian fishermen catch more juveniles in May or June than in August, as is the case in other parts of the Mediterranean.

The second document presented completes a review of the Croatian tuna catches over the last six years. This document was written because Croatia's official statistics are incomplete, which is confirmed by the National Bureau of Statistics in its letter dated 20 July 1997. The signed letters of fishermen giving the catch quantities for each vessel were used as the source of statistics information. Croatia has no doubt that these data are correct, but if this document is not acceptable to the SCRS or ICCAT Commission, Croatia is willing to accept any advice from the Committee.

6.5 FRANCE

French catches of tunas rose in 1996 to 76,800 MT. However, the reported catches of Mediterranean bluefin (6,058 MT) that have been transmitted only correspond to the fish counted by the organization of French fish producers and fish handlers. An important of the French purse seine catches are sold directly to the Spanish fish handlers and are not thus included in the figures currently available. The 1995 and 1996 fishing seasons for large sized do not seem to have been as good as that of 1994. The Atlantic albacore catches amounted to 4,485 MT.

In spite of the increased number of fishing operations on floating objects, the catches of bigeye tuna and skipjack by tropical purse seiners have remained stable in recent years. As regards other species, the variations are moderate. Albacore catches are on the decline following the introduction of 2.5 km driftnets during the 1994 fishing season.

The catches of temperate tunas are mainly taken by 32 purse seiners (bluefin tuna and, very rarely, albacore), 78 (36 pairs) of pelagic trawlers (albacore and bluefin), 6 baitboats (bluefin), and 50 driftnets (albacore, bluefin). The catches of tropical tunas taken by 16 purse seiners amounted to 66,800 MT in 1996, comprised of 32,800 MT yellowfin, 23,300 MT skipjack, 9.600 MT bigeye and 180 MT albacore. In 1996, the seven French baitboats based at Dakar caught 5,888 MT, including equal amounts of yellowfin, skipjack, bigeye, which represented a decline of 9% as compared to 1995.

French research on tunas is carried out by IFREMER for the temperate species and by ORSTOM for the tropical species, in collaboration with Côte d'Ivoire and Senegal. The temperate species, the main objectives are: monitoring of the fisheries (statistics), improvement of the CPUE series of the French purse seiners, the state of the stocks, the distribution/environment relationship. Some of this work is carried out within the framework of ICCAT or through programs partially financed by the EU. As regards the tropical tunas, the same traditional research activities continued as well as very specific programs to study the association of baitboats and tuna schools (Dakar), the relations between tunas and the equatorial areas enriched by the Legeckis waves (Abidjan), the development of a world atlas on tuna fisheries in relation to the environment, the re-evaluation of the sampling scheme of the surface tuna fishery, analysis of the reasons for the increase in bigeye catches, and the by-catches of cetaceans (Montpelier). The results of this research work are regularly transmitted to the SCRS by the ORSTOM scientists who actively participate in ICCAT.

6.6 ITALY

The large pelagic species fishery continues to be very important in Italy, due to the ancient tradition and, at the same time, to the new market situation. The continuous changes in the patterns of various aspects in the most relevant fisheries imply some additional difficulties for the close control of the fishing activities, difficulties which also related to the artisanal character of the fleets. The high mobility of several fleets and the lack of any logbook system also creates problems for the landing data reports.

In addition to the above mentioned problems, most Italian research on large pelagic species was suspended from 1996 to July 1997, due to administrative reasons. As a result, several fishing activities have been only poorly followed, with a significant gap in the scientific monitoring system, already established in 1984 by the Directorate General of Fishery and Aquaculture (DGPA).

The bluefin tuna fishery is extremely important, with a major fishing activity by the purse-seine fleet in the Straits of Sicily and in the Adriatic, instead of the Southern Tyrrhenian Sea, the traditional spring-summer fishing ground, The development of a consistent longline fleet is also to be noted, because this fishery provides most of the product exported to Japan. It is also important to point out that the catch of juvenile bluefin tunas strongly decreased in 1996, apparently due to a minor recruitment in the typical fishing areas, which should be possibly related to changes in oceanographic conditions. As concerns the swordfish fishery, it seems that catches were decreasing due to the enforcement of the driftnet regulation and to a reduction of the longline fishing effort, due to unfavorable environmental factors. The albacore fishery seems stable, apparently with a small increase in catches.

Due to the new member status, the Ministry of Agricultural Policy, through the Direction General for Fishery and Aquaculture, decided to face the problem of the revision of the catch statistics of all the large pelagic species, particularly for the most recent years of the historical series. Possibly, an expert working group should be set up in the near future, with the participation of all the Italian scientists which carried out research in the last years together with other experts from the Administration. The Direction General for Fishery and Aquaculture would keep the ICCAT Secretariat informed about the future steps and outputs.

Several research activities were funded in the period 1994-96 by the Directorate General of Fishery and Aquaculture (DGPA), setting up ten research units which carried out studies on bluefin tuna, swordfish, albacore, small tunas, yellowtail and genetic analysis. However, due to administrative reasons, the new three year research plan has only been funded recently and activity re-started in July 1997. A new observer program on board longline vessels has been approved by the Ministry of Agricultural Policy. At the same time, several research projects have been carried out by various Institutes, in co-operation with other European partners, funded by the European Commission. Recently, the E.C. funded a research project based on pop-up tags, to be used on bluefin tunas, to study short and medium term movements.

6.7 JAPAN

The longline fishery is the only Japanese fishery operating in the Atlantic Ocean. The number of Japanese longline vessels which operated in Atlantic in 1996 was 282 (30 more than in 1995). The provisional 1996 catches of tunas and tuna-like fishes in the Atlantic Ocean and Mediterranean Sea by the Japanese fishery is estimated to be 51,780 MT (a 6.2% increase over 1995). Bigeye is the most important species, comprising about 65% of the total catch. Among the major species caught by the Japanese longline fishery in 1996, there was a relatively large decrease observed for swordfish (1038 MT, -22%), bluefin (631 MT, -12%), southern bluefin (114 MT, -8%) and bigeye (2258 MT, -6%), while the catches of white marlin, blue marlin and yellowfin increased to 52 MT (+91%), 260 MT (+19%), and 235 MT(+5%), respectively.

The collection of information on the materials used for the main and branch lines started in 1993. The use of nylon lines has become popular over the last few years. Its use was between 30-40% in 1994, but it increased to over 75% in 1996. Though accurate information on the efficiency of that material is not clear, it seems to vary depending on the area, time and target species.

The monitoring of fishing activities, including data collection, submission of fishing data, and the study on the improvement of stock assessment methodology, are important research items, for which the National Research Institute for Far Seas Fisheries (NRIFRSF) is responsible. In accordance with the 1996 SCRS recommendation, catch-at-size data for bigeye were created and submitted to ICCAT.

In accordance with the Commission's 1996 recommendation on bigeye and yellowfin tuna, Japan has carried out scientific observer trips on board five Japanese longline vessels in 1997. The main objectives of this project are the collection of fishery data, biological information on adult bigeye tuna, including size measurements and the collection of tissue, gonad and hard part samples, and some oceanographic data. The preliminary results of these observations were presented to this year's SCRS.

6.8 REPUBLIC OF KOREA

The Korean catch of tuna and tuna-like fishes in 1996 amounted to 2,738 MT, which represents a 59.7% increase compared to 1995. The increase in the catch was due to the increased number of fishing vessels which operated in this area.

The catch composition of the Korean tuna fishery was as follows: 45.7% bigeye tuna, 24.9% bluefin tuna, 13.9% yellowfin tuna, and 15.5% swordfish, billfishes and others. While bigeye (1,250 MT) and bluefin catches (683 MT) increased, yellowfin catches (381 MT) decreased, as compared to 1995.

The National Fisheries Research and Development Institute (NFRDI) is responsible for tuna research and statistics in Korea. As in past years, the NFRDI collected and processed data on tuna catches and fishing effort, and submitted those data to the ICCAT Secretariat. To implement the Recommendations adopted by ICCAT, Korea has taken the necessary measures, including the introduction of new domestic regulations.

6.9 MOROCCO

The Moroccan fishery for tunas and tuna-like species takes place in the Atlantic and the Mediterranean. This fishery is carried out by traps, by some coastal vessels using driftnets and longline, and by vessels using handline. Purse seiners also fish for tunas.

In 1996, the overall catch reached 6,200 MT, which shows a slight decrease from the previous year (6,600 MT). Small tunas are the most exploited in terms of volume.

As regards research, relative data, particularly bluefin and swordfish stock structure data, are collected.

6.10 PORTUGAL

Portuguese catches of tunas and tuna-like species amounted 18,188 MT in 1996, which represents a decline of 7,042 MT, as compared to 1995 catches. This decrease is due to the drop in Azorian and Madeiran purse seine catches.

The main fishing gear is baitboat, which is used by the baitboat fleets of the Azores and Madeira. In 1996, those baitboats caught 9,541 MT in the Azores and 6,653 MT in Madeira. The breakdown of the catches of the major species is as follows: 5,494 MT of bigeye, 8,250 MT of skipjack, 1,622 MT of albacore, and 80 MT of bluefin tuna.

In 1996, longliners targeting swordfish caught a total of 2,092 MT of this species, of which 1,702 MT were taken in the north Atlantic and 389 MT in the south Atlantic.

Another fleet comprised of three longliners caught 370 MT of bluefin tuna in 1996.

Research activities, sampling and the collection of statistical data continued satisfactorily. Research centered mainly on temperate and tropical species.

6.11 SPAIN

Spanish catches of tunas and tuna-like species in 1996 were 134,249 MT, which is 18% less than those of 1995. Skipjack catches showed the greatest reduction (25%), followed by albacore catches (22% decline). For both species, 1996 catches are the lowest of the last ten years.

Spanish Catches (in MT)

	1992	*1993*	*1994*	*1995*	*1996*
Yellowfin tuna	51,704	44,226	40,799	37,167	33,910
Skipjack tuna	51,083	57,920	49,951	51,235	38,024
Bigeye tuna	17,601	19,618	21,822	18,097	16,209
Albacore	20,089	19,510	17,936	20,890	16,604
Bluefin tuna	4,532	7,096	5,813	8,425	8,802
Swordfish	13,145	14,930	15,625	19,621	16,603
Small tunas	2,202	1,339	2,262	2,569	4,411
Total	160,356	164,639	154,208	159,004	134,249

Research and statistics: tropical tunas

Purse seine: Data coverage on purse seiners reached 87% in 1996. There were 146 thousand fish sampled. Joint Spanish-French projects were initiated to study the most adequate sampling strategy and to analyze the causes for the increase in bigeye catches by this fleet.

Baitboat: The fishing logbooks have close to a 100% coverage rate. In 1996, there were 1,166 yellowfin, 2,053 bigeye, and 1,856 skipjack sampled.

Canary Islands artisanal fishery: Monitoring of the objects fishing method continued, as did the study of skipjack stomach contents. Some 18 thousand fish were sampled.

Research and statistics: temperate tunas

Bluefin tuna: Data from the fishing logbooks and surveys were processed and the information and sampling network was strengthened. In the Bay of Biscay, 4,742 fish of ages 1 to 5 were sampled, with a coverage rate of 1.1%. Four hundred (400) samples were obtained for fin ray spine reading. In the Gulf of Cadiz area, the coverage rate was 38%. In the Canary Islands area, 1,656 fish were sampled. Recoveries were obtained from tagging cruises carried out in previous years. In the Mediterranean, studies continued on size/sex and intensive sampling at the port of Cartagena. Studies also continued on the relationship of environmental changes on the catches of juveniles.

Albacore: There were 10,323 fish sampled, with a coverage rate of 0.7% and 2.1% for the baitboat and troll fisheries, respectively. In the Canary Islands, 1,656 albacore were sampled. Studies continued on the relationship of environmental changes on catches.

Swordfish: The coverage rate of catch and effort for the Atlantic was 91%. There were 231 thousand fish sampled, which represents an overall coverage rate of 58% of the fish landed. There were 154 thousand observations for size and sex for the 1986-1996 period. Close to 300 swordfish were tagged and released by the fleet. There were 140 recoveries of various species. Mitochondrial DNA analysis was concluded on more than 500 fish from the Atlantic, Mediterranean Sea and the Indian Ocean.

Other activities: Various vessels classified under the ICCAT NEI category were monitored. Partial catches landed by EU fleets at Spanish Mediterranean ports were also monitored. The catch of juvenile bluefin tuna in the Mediterranean was discouraged, which resulted in a 15% drop in such catches. Studies continued on the application of infrared teledection in the albacore fishery. Information campaigns were carried out for the surface longline fleet in the Atlantic.

6.12 UNITED KINGDOM

The United Kingdom has conducted an albacore fishery in the Bay of Biscay since 1992, catches were down to 30 MT in 1997. The fishery complies with current EU regulations and shark by-catch is recorded.

Research is currently being conducted into the use of archival tags and sensors for tuna and tuna-like species, the relationship between catch and effort for northern albacore and assessment methodologies.

The Bermuda commercial fishing fleet remained at approximately 190 boats during 1996 with approximately one-third of these vessels actively fishing for tuna and tuna-like species. Most of this fishing is carried out in the inner 40 km of the Bermuda Exclusive Fishing Zone.

The composition of the Bermuda domestic fleet has been modified slightly to now include some purpose-built longline vessels.

During 1996, the total catch of tuna and tuna-like species was 195 MT.

Research efforts have been directed at the sampling of pelagic species for age-growth and reproductive studies with wahoo otoliths having been analyzed as part of an on-going research project. A similar study has commenced for yellowfin tuna while tissue samples have been collected from a variety of pelagic species for a regional genetics project. Bermuda continues to be involved in the ICCAT Enhanced Program for Billfish Research and is actively cooperating with CARICOM research efforts.

6.13 UNITED STATES

National Fisheries Information: The total (preliminary) reported U.S. catches of tuna and tuna-like fishes (including swordfish, but excluding billfishes) in 1996 were 27,966 MT. This represents an increase of 3,677 MT (15% increase) from 1995, due mainly to increased catches of bonito, king mackerel, Spanish mackerel, and little tunny. Estimated swordfish catch (including dead discards) decreased from 4,551 MT to 4,320 MT. Provisional landings form the U.S. fishery for yellowfin decreased from 8,131 MT in 1995 to 7,743 MT in 1996, while landings in the Gulf of Mexico increased from 1,897 to 2,172 MT, accounting for 28% of total U.S. yellowfin landings in

1996. U.S. vessels landed an estimated 1,361 MT of bluefin in 1996, a decrease of 90 MT compared to 1995. Estimated dead discards of bluefin declined by about half in 1996. Provisional skipjack landings increased from 81 MT to 84 MT, estimated bigeye landings deceased from 1,208 MT to 882 MT, and estimated albacore landings deceased from 545 MT to 472 MT in 1996.

Scientific Observer Coverage: In conformity with the 1996 ICCAT recommendations regarding scientific observer sampling of Atlantic tuna and tuna-like fisheries, the U.S. has placed scientific observers on board US fleets directing effort at tunas and tuna-like species. These data are used to characterize the composition and disposition of the total catch made by the fleets. These estimates (including estimates of fish discarded dead) have been reported to ICCAT in the form of estimates of catch and in the form of scientific working documents provided to SCRS detailing the sampling design and the results of various research projects which make use of the data collected by scientific observers. Observer sampling with a target sampling fraction of 5% of the fleet-wide effort on the US pelagic longline fleet is on-going and has been conducted since 1992. Between 1992 and 1996, a total of 2,857 fishing days throughout the range of the fleet have been observed. Realized sampling fractions have been reduced to about 2% in 1996. Higher proportions of fishing effort for driftnets and pair trawls are sampled due to concern over potential by-catch of U.S. protected species (e.g. marine mammals and sea turtles). Sampling fractions of more than 50% of the effort in these fisheries has been achieved in the recent few years. Observer sampling of the U.S. purse seine fleet directing effort at bluefin has also been conducted in the last few years.

Research Activities: In addition to monitoring the landings of large pelagic species through port and tournament sampling, logbook and dealer reporting procedures, and scientific observer sampling of the U.S. fleet, major research activities in 1996 and 1997 focused on several items. The United States pursued activities responsive to ICCAT recommended research. Ongoing research included examination of the reproductive biology of bluefin, the development of methodologies to determine the genetic discreetness of large pelagic fishes in the Atlantic and larval surveys for bluefin tuna and other large pelagics in the Gulf of Mexico. Research continued on development of new methods for estimating and indexing abundance of various large pelagic species, including the application of fishery independent methods, such as areal surveys, as well as robust estimation techniques for sequential population analyses. U.S. scientists coordinated increased efforts for the ICCAT Enhanced Research Program for Billfish. Cooperators in the Southeast Fisheries Science Center's Cooperative Tagging Program tagged and released 3,369 billfishes (swordfish, marlins and sailfish) and 2,432 tunas in 1996. This represents a decrease of 24% from 1995 levels for billfish, and an increase of 3% for tunas. NMFS programs involving non-traditional tagging (e.g. pop-up and archival satellite tags) gained momentum in 1996.

6.14 CARICOM

Twelve Caribbean countries participate in the CARICOM fisheries Resource Assessment and Management Program (CFRAMP). The fisheries in these countries are largely artisanal. Longline fisheries have developed in some countries in recent years, but are still comparatively small. Reported annual landings of tuna and tuna-like species are usually on the order of tens to hundreds of tons. Yellowfin and skipjack tunas are the most important large tuna species landed, while blackfin tuna, wahoo, king mackerel, and serra Spanish mackerel predominate the landings of small tuna species. Notable billfish landings are also reported by Grenada.

During 1996/1997, CFRAMP continued working with countries to develop their fishery data information systems. Also, Grenada and Jamaica continued to participate in the ICCAT Program for Enhanced Research for Billfish. In addition, CFRAMP continued its tagging study to determine the migration patterns of blackfin tuna, wahoo and king mackerel.

6.15 SENEGAL

Tuna activities are important to Senegal, both in terms of the landings made there (30-40,000 MT) and the scope of the research activities carried out at the Oceanographic Research Centre in Dakar-Thiaroye (CRODT).

The national industrial fishery statistics are included in those of France, and are submitted to ICCAT in one file as "FIS". In 1996, three Senegalese baitboats operated in the Guinea-Mauritania area at the same time as the French and Spanish baitboats based in Dakar, where they land their total catches, which have remained stable at around 8 to 9,000 MT for some years.

The artisinal fishery statistics for species of interest to ICCAT relate to small tunas: Atlantic black skipjack, bonito, and west African Spanish mackerel, and are collected and processed at the national level by a sampling system appropriate to these fisheries. The catches of all species combined are estimated at 7-8,000 MT per year.

A very active recreational fishery targets sailfish from June to October, with catches at about 50 MT per year.

Furthermore, Spanish and Japanese longline fisheries operate under fishery agreements, catching swordfish and bigeye, respectively. The swordfish catches of the Spanish longline fleet are not very important, while the Japanese longline catches of bigeye are relatively high (600 to 1,000 MT per year).

Research on the use of echo sounding to evaluate the local tuna biomass and to better understand the behavior of tuna in relation to the Dakar tuna fishery strategy is currently being carried out. Under the national program of intensive research on billfish, Senegal coordinates research on these species in the east Atlantic which centers on the improvement of statistical and biological data, in order to gain greater knowledge of these species and to better assess the resources.

6.16 CHINESE TAIPEI

Chinese Taipei caught about 61,000 MT of tuna and tuna-like species in 1996 by 200 longliners (SCRS/97/99). Catches by species were at a similar level to 1995, except those of bigeye and yellowfin tunas, due to the increase in the number of deep longliners.

According to the 1996 recommendation, Dr. Miyake, ICCAT Assistant Executive Secretary, visited Taipei in July 1997 and worked together with scientists of Chinese Taipei to carefully review the new data collection and compilation system, and the databases. The work was very successful and was documented in SCRS/97/17. The new system has been verified at the meeting and all the databases have been reviewed. Task I data for bigeye, yellowfin and swordfish were revised, mainly due to the application of conversion factors to convert product weights to round weights. Task II data (catch and effort data and size data) of most species were also revised and submitted to the Secretariat.

7. Review of the progress of Symposium Publication

7.1 Dr. J. Beckett, who has been contracted to serve as the general Editor for the ICCAT Tuna Symposium publication, was introduced. He presented a report on the progress made in the preparation of the publication (SCRS/97/20).

7.2 Progress at this point was considered quite satisfactory. Even though there has been some difficulties in getting responses from some authors and/or referees, collaboration ,in general, has been good. The Committee was informed that most likely the final draft of the publication will be ready by the end of 1997. The Committee congratulated Mr. Beckett for the progress made to date and thanked all the referees who reviewed the papers and submitted very useful comments.

7.3 The Secretariat explained that a grant for the Symposium publication was applied for to the European Commission of the EU. Funding may not be sufficient to meet all the costs of the publication, particularly since the number of pages is much more than had been originally estimated. In view of the importance of the Symposium, the contribution papers submitted, as well as the work involved in the reviews and editing, etc., the publication of the Symposium results in an enhanced, quality volume is fully justified. In addition, the credibility of the SCRS and the Commission is also at stake. It was pointed out to the Committee that the Commission has not actually provided any monetary support towards the Symposium. Therefore, the SCRS strongly recommended that, in the event that EU funding is insufficient, the Commission make up the shortage in funds for the enhanced publication of the Symposium results.

8. Review of the ICCAT Bluefin Year Program (BYP) - activities, progress and future plans

8.1 The Secretariat explained that the Commission decided for the first time at its 1996 meeting to partially fund some 1997 BYP activities from the Commission's regular budget (about US$ 19,000, including $5,000 from an extra-

budgetary contribution from Chinese Taipei specifically earmarked for the BYP). The SCRS Chairman, in consultation with the members of BYP, distributed a budget for 1997, showing a breakdown of amounts allotted for each activity. The budget distribution and corresponding expenditures up to now, as well as those foreseen, are given in **Appendix 4.**

8.2 Up to now, the Commission's budgetary allocation has been utilized effectively in establishing the tag-recovery network in the east Atlantic and the Mediterranean, and for biological sampling aimed at studying the factors to convert belly meat bluefin products to round weight (carried out by Spain and Japan). In addition, the feasibility study to determine the maximum age of bluefin tuna has been started and a sampling study in Morocco was carried out. On the other hand, the plankton net survey was not carried out this year. The expenditures and budget balance are also provided **Appendix 4.** It should be noted that ICCAT funded only a part of these expense, with the remainder being assumed from national sources.

8.3 A question was asked whether unused funds from this year's Program could be carried over to next year's BYP. The Executive Secretary assured the Committee that, in principle, this can be so arranged.

8.3 It was reported that a GFCM/ICCAT Joint Meeting had been held in Messina, Italy, in early 1997 to set up the bluefin tag recovery network in the Mediterranean Sea. The report of this meeting was presented by Dr. B. Liorzou, the BYP coordinator for the East Atlantic. The report (SCRS/97/11) also includes a progress report on BYP activities, as of May, 1997. A summary of the most recent progress made is attached as **Appendix 5.**

8.5 Utilizing funds allocated for the BYP, Dr. A. Srour (Morocco) visited Tunisia and Libya and developed the tag recovery network. His report was presented to the Committee as SCRS/97/114.

8.6 The Committee recognized that the seed money, which was budgeted by the Commission for 1997, activated many research activities on bluefin tuna and resulted in much more funding being made available from national sources to match the Commission's funds. As it was difficult to decide how best to use these limited funds, the actual expenditures to date are somewhat below the allotment. However, this does not, in any way, mean that the funds allocated by the Commission were in excess. Therefore, the Committee again requests that when considering the 1998 budget, due attention be given to the modest budget requested by the BYP for its Second Generation (in total $75,000).

8.7 The request for limited BYP funds from the 1998 budget is attached as **Appendix 6.** The Committee also requested that the Commission consider this as the minimum requirement, but at the same time encouraging more national contributions, in terms of materials, vessel time, and personnel time devoted to this program. The ICCAT funding can serve as a "lubricant" for the BYP to run smoothly, as has already been proven in 1997.

9. Review of the ICCAT Bigeye Year Program (BETYP), activities, progress & future plans

9.1 The Committee noted that the 1996 Commission had not approved the budget requested by the SCRS for the BETYP. On the other hand, the Commission requested, at its 1995 Meeting in the form of a Resolution, that the SCRS conduct comprehensive observer programs to determine the range, area and time of the catches of undersized fish resulting from the use of FADs. Then, in less than a year's time, the SCRS was to assemble and analyze the results for presentation to the 1997 Commission meeting. The SCRS recognized that such an extensive project required considerably more time, analysis and funding. Under the circumstances, an *Ad Hoc* Working Group on Bigeye Year Program was formed and held its first meeting in April, 1997, at the ICCAT Headquarters.

9.2 The report of the April, 1997, *Ad Hoc* Working Group meeting was submitted as COM-SCRS/97/10 by Dr. N. Miyabe, the Group's Coordinator. The report includes some minor adjustment for the Program as well as the response to the Commission on its aforementioned Resolution. The report was duly transmitted to the Commission.

9.3 It was noted that the Tropical Species Group had also drafted responses to the Commission, concerning information on the level of abundance, time and area of the concentration of juvenile bigeye associated with floating objects, as well as information concerning on-going and planned observer programs.

9.4 The Committee discussed and agreed that it would be best to include the responses by the Tropical Species Group the Agenda item 19, "General recommendations and responses to the Commission". It was also noted that observer programs have been proposed by the Sub-Committee on By-catches for all by-catches. Since several observer

programs have been discussed and some have been carried out, a general summary on this subject may also be included in Agenda item 19.

9.5 The Committee considered that the need for the BETYP remains unchanged. Fishing effort is still at a high level for this fishery and there could be a potential problem of over-fishing. Considering the high market value of bigeye products, the ambitious research program proposed by the Committee is still well justified. Recognizing the difficulty for the Commission to finance this program in its entirety, the Committee requested that at least partial funding (as seed money) be provided by the Commission.

9.6 It was noted that the BETYP Program itself, as presented in 1996, is quite simple, even though the funding requested is considerable. A meeting of the *Ad Hoc* Working Group was held during this session, to improve the Program Plan to be presented to the Commission, and to prioritize the research items, in case the Commission decides to fund the program on a partial basis only.

9.7 At a later session, the revised BETYP was presented. The Committee reviewed the Program and accepted it, with some modifications. The Program is attached as **Appendix 7**, for consideration by the Commission. The Committee drew the Commission's attention to section 2.1 of that report, "ICCAT coordinating actions and budget", in which US$ 50,000 is requested for the initial funding as well as a prioritized budget, in the event the Commission cannot fund the total budget. The Committee noted that the BETYP could be funded by an extra-ordinary budget, i.e. outside the Commissions' regular budget, and requested that any unused funds from one year be carried over to the following fiscal year.

9.8 Such funding would clearly demonstrate the Commission's interest in, and the importance of, this Program, which at the same time might encourage contributions from other sources. Once such funding has been approved by the Commission, the Executive Secretary is requested to contact various potential financial sources (e.g. the EU, industry, etc.).

10. Review of the ICCAT Program of Enhanced Research for Billfish-activities, progress & future plan

10. Dr. E. Prince, West Atlantic Coordinator, presented a progress report on the Enhanced Billfish Research Program. Documents SCRS/97/67 and 30 summarized the research on the west Atlantic; SCRS/97/105 summarized east Atlantic activities. Dr. Prince also reported on the financial aspects of the Billfish Research Program in 1997. His summary showing income and expenditures relative to the Billfish Program in 1997 is attached as **Appendix 8.**

10.2 The Billfish Program Plan for 1998 was also presented by Dr. Prince, the West Atlantic Coordinator. The Committee reviewed the plan and approved it. It was noted that the funding used of this Program is by contributions from the private sector. It was emphasized that billfishes are under the mandate of ICCAT and thus the Committee requested that the Commission and Contracting Parties give due attention to research on these species. The 1998 Program Plan is attached as **Appendix 9.**

11. Reports of scientific meetings where ICCAT participated as observers

11.1 The Coordinating Working Party on Fishery Statistics (CWP) held its 17th Session in Hobart, Australia, in March, 1997. Dr. P. Miyake, the ICCAT Assistant Executive Secretary, represented ICCAT, which is a member of the CWP, and served as Chairman for the Session. The report of the CWP is available as SCRS/97/13. Dr. Miyake reported further that a meeting will be held in February, 1998, at FAO Headquarters in Rome to clarify the discrepancies in statistics among the data bases maintained by various agencies in the Atlantic.

11.2 The ICES Study Group on Elasmobranch Species held its meeting in May in Copenhagen and as Dr. Matsunaga (Japan) was attending the meeting as an observer, he was asked to also represent ICCAT. His report on the meeting was presented to the SCRS by Dr. H. Nakano (Japan) and is available as SCRS/97/18.

11.3 Dr. Z. Suzuki, ICCAT SCRS Chairman, represented the Commission as an observer at the 58th Meeting of the Inter-American Tropical Tuna Commission (IATTC), held in costa Rica in June, 1997. His report was presented to the Committee and is available as SCRS/97/14.

11.4 The CCSBT Working Group on Ecologically Related Species held its meeting in June in Canberra, Australia. Dr. Y. Uozumi (Japan), who was participating in this meeting, was asked to represent ICCAT as an observer. This meeting was held in Canberra, in June, 1997. Dr. Uozumi's report and the meeting report were presented to the SCRS as SCRS/97/19.

11.5 The 10th Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Dr. H. Nakano represented ICCAT as an observer at this Conference held in Zimbabwe, in June, 1997. His report is presented as SCRS/97/15.

11.6 There was a Second International Pacific Swordfish Symposium in May in Oahu, Hawaii. Dr. J. Porter (Canada), the ICCAT Swordfish Rapporteur, attended at the invitation of the Symposium, and reported the results to the scientific committee. She informed the Symposium on the status of Atlantic swordfish at this session. The Committee took due note that ICCAT as an organizations had not been specifically invited to this Symposium.

11.7 ICCAT was represented in an observer capacity at the 22nd Session of the General Fisheries Council for the Mediterranean (GFCM) by Dr. A. Ribeiro Lima, the ICCAT Executive Secretary, for two days, and by Mr. C. Dominguez (Spain) for the remainder of the five-day meeting held at FAO Headquarters in Rome, in October, 1997. Dr. Lima reported to the SCRS on his participation.

11.8 It was commented that ICCAT scientists should been nominated to represent the Commission as observers at some other meetings of international fisheries organizations, such as the Indian Ocean Tuna Commission (IOTC), the IATTC Bigeye Tuna Conference, and generally any that have some direct relation to ICCAT's work, to assure that ICCAT is fully informed on the discussions and results, particularly since some decisions made at these meetings can affect ICCAT's work. The Secretariat pointed out that the invitation to the September IOTC meeting arrived at the Secretariat after the meeting was over. At any rate, since the Secretariat cannot keep track all the international meetings (unless ICCAT is specifically informed about such meeting or an invitation is received in a timely manner), scientists of ICCAT member countries who will be participating in such meetings are kindly asked to inform the Secretariat of their willingness to represent the Commission, as an observer, and prepare a report.

12. Consideration of precautionary approach

12.1 Dr. Z. Suzuki, Chairman of the SCRS, introduced Agenda Item 12, referring to the adoption of the precautionary approach in the 1995 U.N. Agreement and the Code of Conduct of Responsible Fisheries and its implications. In this context, he pointed out several heavily exploited tuna stocks in the Atlantic Ocean and the Mediterranean Sea.

12.2 Dr. J. Powers (United States) noted that little consideration has been given to the precautionary approach within ICCAT. He brought attention to the paper prepared by Dr. P. Mace (United States) on the status of ICCAT species in the context of the criteria proposed in the United States, considering the precautionary approach. Dr. Powers mentioned that the paper also reviews actions undertaken by various fisheries bodies in response to the adoption of the precautionary approach. The paper was tabled at the Meeting.

12.3 Dr. J. Majkowski (FAO) pointed out that the scope of the paper by Dr. Mace is limited to important, but only very few aspects of the precautionary approach, indicating that the approach has much broader implications. These implications are outlined in his paper tabled at the Meeting at the request of its participants. The paper emphasizes research implications.

12.4 Dr. Majkowski introduced a preliminary proposal of a global Expert Consultation on Implications of the Precautionary Approach for Tuna Fisheries Research. This Consultation is proposed to be co-sponsored by tuna bodies and international tuna programs with the assistance of FAO. Dr. Majkowski mentioned that this proposal has not been formally submitted and endorsed by these bodies and programs yet, but some informal consultation at the technical level was in reality undertaken. He indicated that FAO might assist in the finalization and implementation of the proposal if such an assistance is desired. The proposal was tabled at the meeting at the request of its participants.

12.5 Dr. P. Miyake, Assistant Executive Secretary of ICCAT, pointed out considerations on the precautionary approach, which were made at the 1996 ICCAT Tuna Symposium.

12.6 Dr. J. Mejuto (Spain) pointed out that three basic elements intervene in the exploitation of the resources: the resources themselves, structures, and markets. Up to now, at the international level these three elements are decompensated. If biological points of reference are to be established with a precautionary approach, it is absolutely essential that the resources be considered at least at the same level as the other two factors mentioned.

12.7 Dr. J. Porter (Canada) suggested to create an *ad hoc* Working Group on Precautionary Approach for the consideration of this approach within ICCAT. She also suggested that SCRS should support, in principle, the preliminary proposal of the Expert Consultation. These suggestions were endorsed by the Meeting.

12.8 Dr. Majkowski requested the proposed Working Group on the Precautionary Approach its detailed technical comments on the proposal of the Consultation. He emphasized that the present proposal constitutes only a starting point for discussion, and it may be substantially adjusted in response to these discussions.

13. Executive Summaries on species

YFT - YELLOWFIN TUNA

YFT-1. Biology

Yellowfin tuna is a cosmopolitan species distributed mainly in the tropical and subtropical oceanic waters of the three oceans, where they form large schools. The sizes exploited range from 40 cm to 170 cm FL. Smaller fish (juveniles) form mixed schools with skipjack and juvenile bigeye and are mainly limited to surface waters, while larger fish are found in surface and sub-surface waters. Since the inception of the yellowfin tagging program which has been carried out in the North American sport fishery since 1985, individuals of this species have often been recovered in the west Atlantic, but some have also been found in the east Atlantic. Taking into account this east-west transatlantic migration, as well as other information (time-area size frequency distribution, fishing grounds, etc), a single stock for the entire Atlantic is assumed (Atlantic Yellowfin Working Group, Tenerife, 1993). The main spawning ground is the Gulf of Guinea at the level of the equator, with spawning occurring from December to March. From there the juveniles move towards more coastal waters off Africa. When they reach pre-adult stage (60-80 cm: fish from age 1.5 - 2), it is supposed that they migrate towards the west, towards the American coasts, to return to the east Atlantic fishing grounds for spawning when they reach about 110 cm. Yellowfin longline catch data during the last 40 years show a continuous distribution throughout the entire tropical Atlantic ocean. Growth rates are variable with size, increasing at the time of their leaving the nursery. Males are predominant in the catches of larger sized fish.

YFT-2 Description of the fisheries

Yellowfin are caught between 45°N and 40°S by surface gears (purse seine, baitboat, troll and handline) and with sub-surface gears (longline) (**YFT-Figure 1**). Troll and handline, although used in the artisanal fisheries, have never played an important role in the yellowfin fisheries. The baitboat fishery was more important in the past than now, and has always targeted juveniles (with an average weight of 5 kg) in coastal waters, together with skipjack, young bigeye and small tunas. The baitboat fisheries are still active in Senegalese waters, Ghana (Tema), the Canary Islands, Cape Verde, Madeira, Venezuela and Brazil. The fleets which operate in the areas off Senegal, Mauritania and the Canary Islands have developed a new fishing method in which the baitboat acts as a floating object to attract bigeye, but also yellowfin and skipjack. Recently, Ghana baitboats have developed tuna fishing on floating objects.

The purse seine fishery (mainly French and Spanish) began operations in the east Atlantic in the 1960's, and developed rapidly in the 1970's. At the same time, the fishing area was extended from coastal waters to high seas, especially at the Equator, where large sized yellowfin, which gather to reproduce, are caught. In coastal areas, purse seiners catch juveniles in mixed schools. This gear is very efficient as it catches a wide range of sizes (50 to 160 cm) but includes very few intermediate sized fish (70 cm to 100 cm). Venezuelan purse seiners operating mostly in coastal areas of the west Atlantic mainly catch fish of intermediate sizes.

Since 1991, the purse seine fleets which operate in the east Atlantic have developed a fishery which targeted schools using artificial floating objects. This translates into an important increase in catches of skipjack, juvenile bigeye and, to a lesser extent, increases in catches of young yellowfin and by-catch, extending the fishing grounds westward to 30°W and south of the Equator.

Large yellowfin are caught by purse seiners and longliners. Starting about the 1980s with the deployment of deep longlines, this latter gear, however, mainly targets other species (bigeye, swordfish, bluefin) and therefore the proportion of yellowfin caught by longline in the Atlantic is becoming less important (10%). Catches taken by this gear are similar in both the east and west Atlantic.

Landings in the east Atlantic, following the record of 138,000 MT in 1981 and 1982, reached a new record in 1990 of 152,000 MT, later fluctuating between 124,000 MT and 100,000 MT and remaining stable for the last two years. An average of 80% of the total catches are taken by purse seiners. In the west Atlantic, catches have remained more or less stable since 1983, at a mean of 29,000 MT, of which an average of 40% is taken by purse seiners, although this has fluctuated quite widely (from 6,034 MT to 25,700 MT), 15% is taken by

baitboats and 30% by longliners. Yellowfin catches in the Atlantic as a whole reached an historical high in 1990 (180,042 MT) and six of the ten highest recorded catches since 1981 were within the period 1989-94 (**YFT-Figure 2** and **YFT-Table 1**). Since 1995, however, a decrease of 20% has been reported, compared with the previous year. In 1996, preliminary catches are at the same level as in 1995. Overall, for the recent period (1991-1996), yellowfin catches in the Atlantic by area and gear have remained more or less stable, or are even slightly decreasing.

Effective effort is standardized to French class 5 purse seiners, adjusted on the assumption of an annual estimated increase of 3% in fishing power since 1981. This adjustment in fishing effort is influenced by the many improvements in the purse seine fishery, including the use of floating objects, bird radar, sonar, etc., and is supported by data analysis. From 1985 to 1995, effective effort for the total Atlantic remained stable at around 38,000 fishing days for the period 1985-90, and was more variable, with an average of 49,000 fishing days for the period 1991-96.

YFT-3. State of the stock

The Committee agreed not to undertake a stock assessment for yellowfin this year. In 1994, the status of the Atlantic yellowfin stock was assessed, using various production models, and several types of VPAs. From 1995 to 1997, the production model was updated with most recent data and, in 1996, the 1994 VPA was projected forward using recent data. No particular assessment was conducted apart from an updated production model with data through 1996. Results presented in this report are based on the most recent update for each type of assessment. The results from 1994 through 1997 analyses all indicate that the stock of Atlantic yellowfin is at a level close to full exploitation. These analyses imply that any increase in effort is likely to result in a fishing mortality rate that exceeds the level corresponding to maximum sustainable yield (MSY) and a stock biomass below the minimum level that can support MSY.

The MSY estimated in the 1997 analyses from the production model adjusted to the 1969-96 data is 154,000 MT. This is higher than the 1996 landings of 136,918 MT, similar to the average landings of the 1991-94 period (152,487 MT), and higher than the average for the 1995-96 period (134,655 MT) (**YFT-Figure 3**). The current estimate of the optimum fishing effort corresponding to MSY is 61,108 standard fishing days, again somewhat higher than the number of fishing days reported in 1996 (about 52,300 days). No other production models were used during the 1997 SCRS stock assessment meeting. However, at the 1994 SCRS meetings, a non-equilibrium production model using data for the 1969-93 period resulted in an estimate of MSY of 149,000 MT, and a 1994 biomass of 105% (range 81% to 130%) of the biomass associated with MSY (see summary table). The corresponding fishing mortality rate was 0.92 times the fishing mortality rate at MSY, which was estimated in association with a corresponding standardized fishing effort of about 50,000 days. Taking into account the variability of the estimated values, the results of the various analyses applied in the SCRS assessments from 1994 through 1997 are quite similar. All production model analyses indicate that the stock is fully exploited, and that the extent of exploitation has not changed substantially in the past four years.

Results from the VPA were reconsidered, using effective effort in the production model during the 1994 SCRS meeting and updated in 1996. These analyses indicated that recruitment has fluctuated without trend, while spawning biomass decreased in the 1970s and the early 1980s due to increasing fishing mortality rates, but had recovered by 1985 because of a decreasing rate of fishing mortality associated with several high recruitment levels in the early 1980s. Fishing mortalities estimated by the alternative VPA models have fluctuated with little trend. The 1996 estimates of recent fishing mortality and stock size have been relatively stable over the last few years (**YFT-Figures 4 and 5**). The VPA analyses support the major conclusion of the production model analyses; namely, that the Atlantic yellowfin tuna stock is fully exploited.

Yield-per-recruit analyses indicate that current fishing mortality may be close to F_{max}, and that an increase in effort is likely to decrease the yield per recruit, while an increase in size at first catch would probably increase the yield per recruit (**YFT-Figure 6**).

YFT-4. Outlook

Since reported yellowfin landings appear to be close to the MSY level and effective effort is close to the optimum level, the possibility that fishing power of the purse seiners is increasing could result in effective effort

exceeding optimal levels in future years. To test the sensitivity of the results of the production model to the variability in the increase of the fishing power, an annual increase of 5 % instead of the estimated 3 % was used (**YFT-Figure 3**). With this assumption, the model gives a MSY of 145,300 MT corresponding to an optimum fishing effort of 56,700 standard fishing days. These results emphasize the necessity of properly estimating changes in fleet fishing power, a parameter difficult to assess.

YFT-5. Effects of current regulations

In 1973, the Commission recommended a minimum size of 3.2 kg for yellowfin tuna, with a tolerance level of 15% by number of fish. This recommendation has not been effectively implemented. In 1994, the proportion of the yellowfin catch less than 3.2 kg among the total Atlantic catch was relatively "low" at 31.4%, but in 1995, it increased to 49.7%, similar to the long-term average of 48% for the 1975-1994 period. However, the new catch species composition and catch at size expected from the new data treatment for the European purse seiners might change these estimates. It should be remembered that small yellowfin are mostly associated with skipjack, especially on floating objects, therefore it is difficult to avoid catching small yellowfin when catching skipjack, which is an important component of purse seine fleet catches.

In 1993, the Commission recommended "that there be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992". In 1996, overall effective fishing effort was estimated to be above the 1992 level, and the 1993-96 average is 10.5% above the 1992 recommended level.

YFT-6. Management recommendations

The average catches of yellowfin for the period 1992-1996 (approx. 144,000 MT) were the same as, or slightly lower than, the MSY estimates, according to the estimates of increases in fishing power under consideration. The uncertainties which exist about the real value of these increases makes us cautious when interpreting the estimates of MSY and corresponding effort.

For this reason, the Committee reiterates its previous recommendation that fishing mortality, or its equivalent in fishing effort, of Atlantic yellowfin tuna be maintained at levels not above those estimated for 1992.

The Committee also recommended that effective measures be found to reduce fishing mortality of small yellowfin, based on the results of the yield per recruit analysis.

YELLOWFIN SUMMARY (catches in 1,000 MT)

	Results of 1994 SCRS	Results of 1997 SCRS
Maximum Sustainable Yield (MSY)		
Equilibrium model	153.7[1]	154.0[2]
Non-equilibrium model	149.0 (123.0-164.0)[3]	not estimated
Current (1996) Yield		136.9
Current (1994) Replacement Yield	(123.0-164,0)[4]	not available
Relative Biomass (B_{1994}/B_{MSY})	1.05 (0.81-1.30)	not estimated
Relative Fishing Mortality: F_{1993}/F_{MSY}	0.92 (0.67-1.34)	not estimated
Management Measures in Effect	3.2 kg minimum size Effective fishing effort not to exceed 1992 level	3.2 kg minimum size Effective fishing effort not to exceed 1992 level

1. Equilibrium model assuming shape parameter for production function (m=1) calculated at 1994 SCRS using data from 1969-93
2. Equilibrium model assuming shape parameter (m=1) calculated at 1997 SCRS using data from 1969-1996
3. Non-equilibrium production model fit to data 1969-93 at the 1994 SCRS, assumes production function shape parameter m=2, 80% confidence bounds.

Replacement yield in 1994 estimated within the 80% confidence interval estimated MSY from the non-equilibrium production model since B_{1994}/B_{MSY} was estimated at 1.05.

YFT-Table 1. Reported catch (in MT) of yellowfin tuna by major gear category and fleet

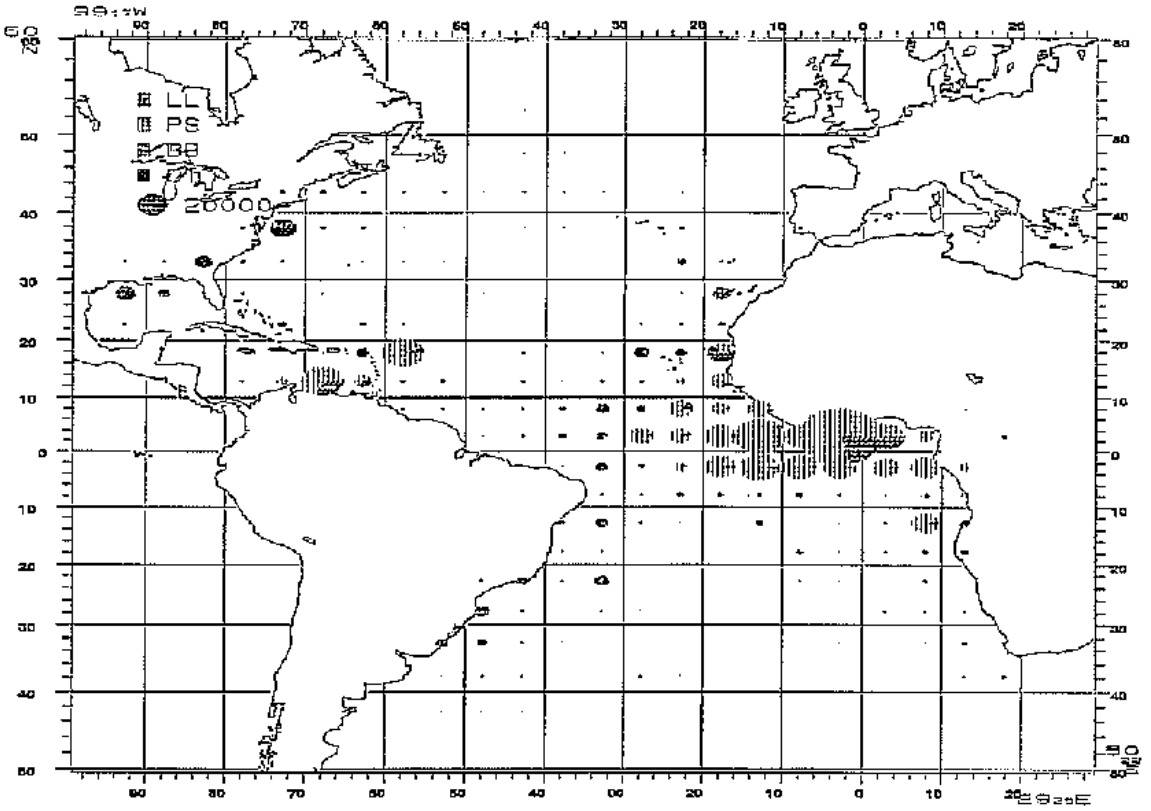
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	74331	73807	94086	95127	107141	124796	124960	131013	134044	127517	130912	154524	163653	162377	113191	150538	133813	137449	128454	155796	180042	157278	145863	150085	156723	132391	136945
BAITBOAT	9660	10576	13141	14772	20974	10066	12794	10943	9992	14320	8082	11705	16181	15110	18392	21598	17722	22218	21842	17002	20700	20950	19035	21116	21708	15339	16988
ANGOLA	346	477	601	600	833	55	1005	1883	1984	793	538	748	1370	706	199	339	59	51	190	67	292	509	441	208	137	215	77
BRAZIL	0	0	0	0	0	0	0	0	0	117	392	917	1036	1778	1298	2176	751	1560	1596	1376	953	1169	2660	3087	2744	2613	1213
CAP-VERT	346	296	455	445	410	360	115	104	470	581	864	646	801	949	862	747	1322	907	471	885	502	660	224	191	167	419	167
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	701	420	731	786	2032	1028	228	273	1223	445	77	96	385	690	2449	2824	1644	2731	2266	1182	2384	2623	1758	1498	1767	1101	3069
FRANCE	7456	7428	7411	5493	6274	2866	3682	3391	2801	2261	2142	2953	3034	2728	3460	2874	3797	3778	4408	2340	3783	4559	2899	3287	3425	2297	1749
GHANA	0	0	2	112	274	682	791	609	311	1186	1695	2534	5606	4951	5475	8873	8206	8941	8375	6855	8230	7119	7192	9166	8490	5466	6429
JAPAN	811	1955	3496	6526	8246	1456	4941	2588	1446	962	495	1701	1231	966	136	0	0	0	0	0	0	0	0	0	0	0	0
KOREA	0	0	0	711	1714	2678	999	1235	1372	3866	1413	963	387	144	233	84	0	0	0	0	0	0	0	0	0	0	0
NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	14	72
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
PANAMA	0	0	445	99	1086	840	1030	860	385	299	16	78	348	59	0	0	0	0	0	0	0	0	0	0	93	0	0
PORTUGAL	0	0	0	0	0	1	3	0	0	5	15	0	33	8	1257	33	259	277	180	181	177	77	182	125	120	204	277
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	40
SOUTH AFRI	0	0	0	0	7	4	0	0	0	3805	435	69	16	306	623	346	14	65	130	658	614	44	63	258	257	145	54
ST. HELENA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	181	151
VENEZUELA	0	0	0	0	98	96	0	0	0	0	0	1000	1912	1825	2400	3302	1670	3908	4226	3458	3765	4190	3616	3296	4350	2684	3678
PURSE SEIN	33387	32218	50358	46804	53432	84590	85894	91625	101760	93326	102161	117815	123932	129251	74063	107570	94334	92846	79151	113847	134473	115242	105163	108910	106065	86375	94991
BRAZIL	0	0	0	0	0	0	0	0	0	0	0	0	0	177	333	0	0	0	0	0	0	0	0	0	0	0	0
CANADA	191	44	0	61	0	0	161	0	318	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0
CAYMAN ILS	0	0	0	0	0	0	0	0	0	0	602	1460	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLOMBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2404	0	0	0
CONGO	0	0	0	0	0	0	0	0	0	0	140	50	0	0	0	11	20	15	15	21	22	17	18	0	0	0	0
CUBA	0	400	0	400	400	300	600	100	400	600	201	403	109	349	296	450	638	526	277	265	119	0	0	0	0	0	0
ESPANA	6386	7409	9052	13269	14045	24447	33195	35518	34442	40690	38682	51332	53779	53104	41484	65031	60230	63362	47894	60458	66201	57130	49926	42728	39032	36066	30841
FRANCE	16667	18641	26433	27871	32271	44243	47942	46557	52391	45601	52230	52132	42683	37742	4486	9430	13959	13713	16915	28467	41901	28749	28635	36208	32304	29292	31095
GHANA	0	0	0	0	0	81	154	0	0	0	488	2975	4191	2738	3491	3677	3611	1003	0	0	0	0	0	0	0	0	3295
JAPAN	1114	1960	2477	1232	777	129	0	0	0	0	0	0	810	1245	1271	2626	2332	2803	2221	2090	1702	1447	837	0	0	0	0
MAROC	0	0	0	0	290	1048	1574	2167	3440	2986	3243	4817	4540	2331	614	2270	2266	1529	0	0	0	0	0	0	0	0	0
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	3121	5388	1104	0	0	2077	3140	5436	12513	11736	13816	12543	13614	11743	16758
NORWAY	0	0	0	344	0	0	0	0	0	0	0	0	0	0	0	0	0	418	493	1787	1790	0	0	0	0	0	0
PANAMA	0	0	0	0	0	0	0	0	689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	125	180	62	208	948	1315	266	0	31	0	0	0	0	0	0	0	0	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3200	1862	2160	1503	2936	2696
SOUTH AFRI	0	0	54	37	28	7	0	76	127	39	22	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A	9029	3764	12342	3590	5621	14335	2179	7207	9737	3167	2087	1794	718	112	1080	4387	647	82	42	35	267	996	376	208	25	0	7
U.S.S.R	0	0	0	0	0	0	89	0	91	63	7	92	903	1247	1824	3447	1425	695	2162	3676	3425	0	0	0	0	0	0
VENEZUELA	0	0	0	0	0	0	0	0	0	0	4397	2500	12030	23503	17814	16241	9175	6583	5992	11612	6533	11967	9693	12659	19587	6338	10299

YFT-Table 1. Reported catch (in MT) of yellowfin tuna by major gear category and fleet.

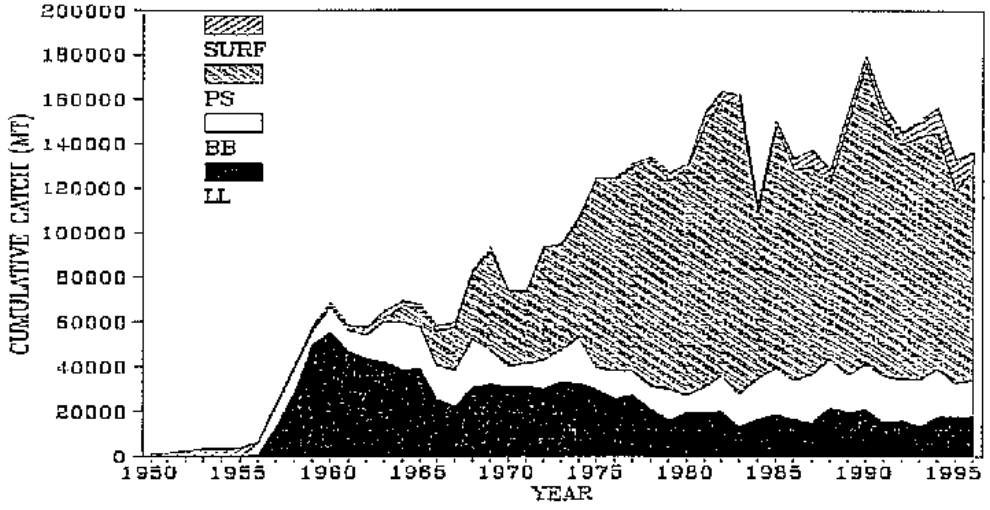
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
SURFACE	414	570	809	534	565	589	718	1452	1434	3817	1454	5705	3720	4982	4035	3094	5213	7835	5448	5352	4068	6048	5779	6769	11488	14013	7328
ANGOLA	15	21	10	3	6	0	0	202	312	111	20	211	97	82	38	11	0	0	56	0	0	1	0	3	0	1	1
ARGENTINA	0	150	400	129	112	108	57	43	4	0	0	8	7	0	0	44	23	18	66	33	23	34	1	0	0	0	0
BARBADOS	0	0	0	0	48	79	94	58	67	81	40	30	36	51	90	57	39	57	236	62	89	108	179	161	156	255	0
BENIN	0	0	0	0	0	0	0	0	0	48	95	100	113	49	65	60	19	3	2	7	1	1	1	0	0	0	0
BERMUDA	0	0	0	0	0	10	11	10	12	26	35	21	22	10	11	42	44	25	23	22	15	17	42	58	44	44	71
BRAZIL	0	0	0	0	0	0	34	374	57	160	95	8	8	2	34	256	29	53	18	31	144	87	320	526	341	97	77
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	4635	2691	3392	1958	1154	2004	1768	1997	1985	1634	1272	1202	1345	1560	1362	1724
CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	138	177	110
COLOMBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3418	7172	0
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	676	664	425	0	0	0
DOMINICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	12	23	30	31	9	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	88	218	225
GHANA	0	0	0	0	0	0	0	12	235	240	56	1	0	0	73	0	4	886	180	180	180	180	108	0	0	0	0
GRANADA	100	100	100	100	100	100	100	364	166	148	487	64	59	169	146	170	506	186	215	235	530	620	595	858	385	0	525
JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21
MEXICO	0	0	0	0	0	0	0	0	0	0	16	0	0	612	1059	562	658	33	283	345	112	433	742	855	0	0	0
NETHERLAN	151	151	151	151	151	151	151	151	173	173	173	173	173	173	173	150	150	160	170	170	170	150	160	170	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	10	4	3	5	1	8	0	2	210	13	3	5	5	3
SAO TOME &	0	0	0	0	0	25	15	45	39	28	31	97	193	194	177	180	180	178	184	198	228	223	229	140	0	0	0
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	20	52	41	0	0	0
SOUTH AFRI	0	0	0	0	22	7	6	91	154	650	23	9	33	118	12	36	2	3	7	13	10	8	6	4	7	0	7
ST. HELENA	100	100	100	100	75	52	108	34	37	69	55	59	97	59	80	72	82	93	98	100	92	100	166	0	0	0	0
ST.LUCIA	48	48	48	51	51	54	69	67	67	28	27	25	26	23	56	79	125	76	97	70	58	49	58	92	130	144	110
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	40	48	39	65	16	43	37
TRINIDAD &	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	4	219	0	0	0
U.S.A	0	0	0	0	0	0	73	1	10	15	7	29	165	38	59	218	1343	4295	1808	1897	719	1581	1175	1639	5169	4486	4417
U.S.S.R	0	0	0	0	0	0	0	0	101	229	294	235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	0	0	0	0	0
VENEZUELA	0	0	0	0	0	3	0	0	0	1811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LONGLINE	30870	30443	29778	33017	32170	29551	25554	26993	20858	16054	19215	19299	19820	13034	16701	18276	16544	14550	22013	19595	20801	15038	15886	13290	17462	16664	17638
BELIZE.SH.O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
BRAZIL	812	347	233	153	232	260	681	928	795	1076	521	1159	935	887	484	515	1057	653	898	1126	661	582	1248	1518	1084	1312	721
CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	7	7	29	25	71	52	174	155
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP.	7990	4938	5317	3000	2630	2669	1962	372	384	1038	687	867	610	539	646	926	1410	902	1848	858	7465	4172	4528	4196	6660	4698	6653
CUBA	1600	1700	3600	4500	3400	2300	3000	3800	2600	2800	5616	4539	3623	2360	3709	3041	2775	1831	1515	529	732	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	109	92	19	4	0	0	11	20	20	20	0	0	0	0
GRANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	409	0
HONDURAS-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3
JAPAN	6809	10629	6497	3803	3475	4192	3366	1467	1923	1986	2839	4145	6062	2069	3967	5308	3405	3365	5982	6970	5919	4718	3715	3096	4783	5228	5463
JAPAN-OB-S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	0
KOREA	11506	9901	11078	12844	15518	15344	11211	16347	11512	6997	5869	6650	5872	3405	2673	3239	1818	1457	1368	2535	808	260	219	180	436	453	381
MEXICO	0	0	0	0	0	0	0	0	0	0	0	42	128	0	0	0	0	0	0	0	0	0	0	165	646	0	0

YFT-Table 1. Reported catch (in MT) of yellowfin tuna by major gear category and fleet

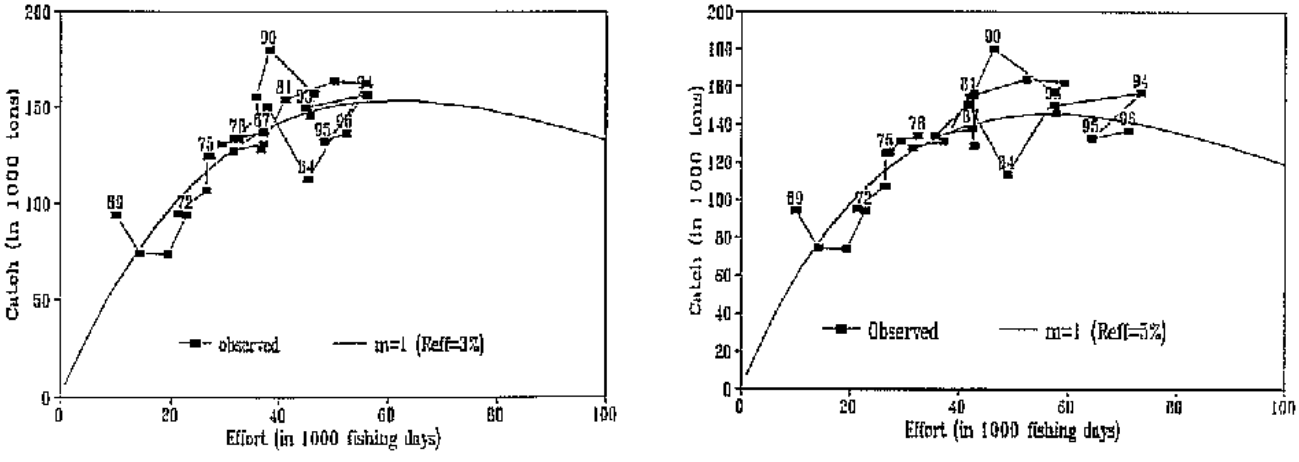
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
PANAMA	0	0	93	5588	3200	2367	3145	1458	1843	542	2452	525	1763	1685	2485	1273	646	325	0	0	0	0	0	0	0	0	0
POLAND	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	0	1	22	8
SOUTH AFRI	0	0	0	22	0	0	0	0	0	101	60	48	0	32	124	0	39	0	0	0	0	0	0	0	0	0	0
TRINIDAD &	0	0	0	0	0	0	0	0	0	0	0	0	0	232	31	0	0	0	1	10	303	540	0	0	0	0	27
U.S.A	0	0	0	0	0	0	0	0	0	0	24	43	0	76	113	1654	3784	4682	8418	6418	4420	4276	5607	3352	2899	3645	3320
U.S.S.R	529	1420	1104	1186	2505	1856	1563	1794	495	514	147	214	101	35	344	321	426	580	1045	570	190	0	0	0	0	0	0
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	67	214	357	368	354	270	109	177	64	18	62	74	20	59	53	171
VENEZUELA	1624	1508	1856	1921	1210	563	626	827	1306	1000	1000	1000	484	1248	1665	1626	910	646	731	497	258	338	450	692	816	664	736



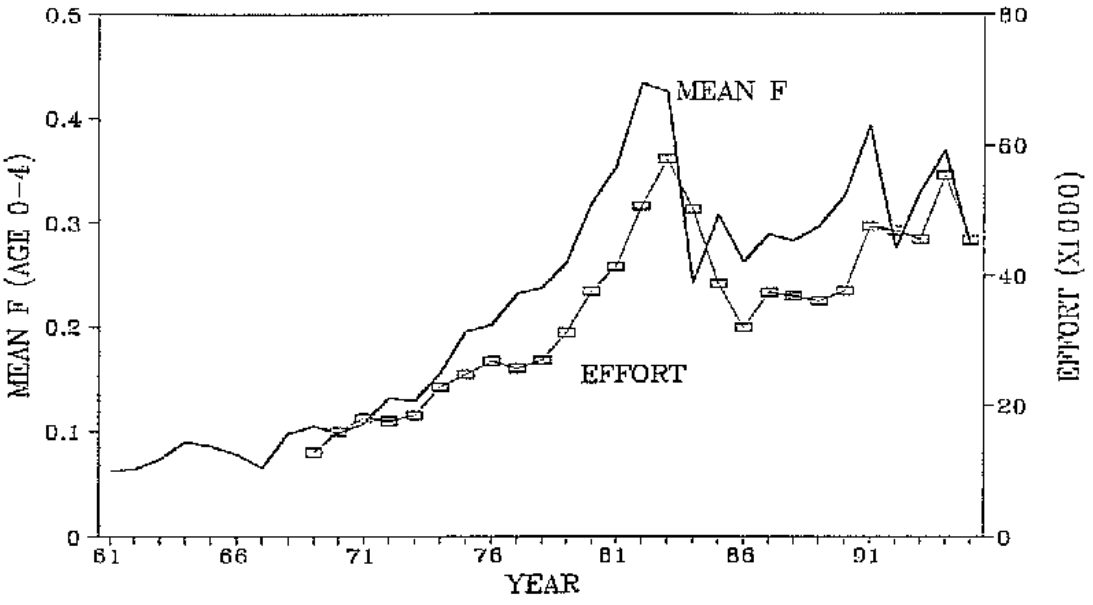
YFT-Fig. 1. Distribution of reported yellowfin catches by gear and 5x5 area, for 1990-1995.



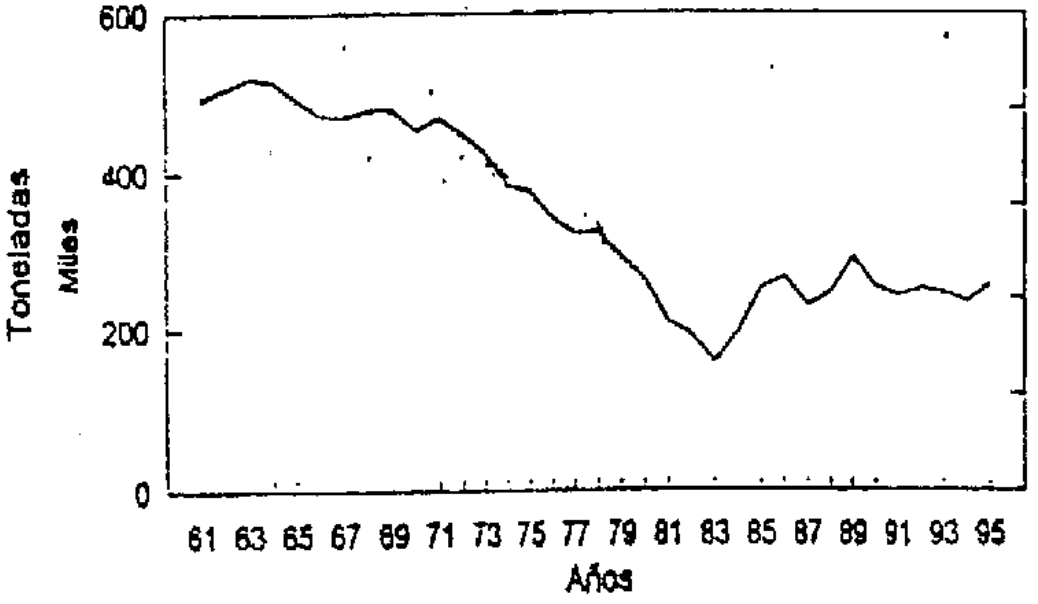
YFT-Fig. 2. Reported catches (in MT) of yellowfin tuna by gears in the Atlantic, 1950-1995.



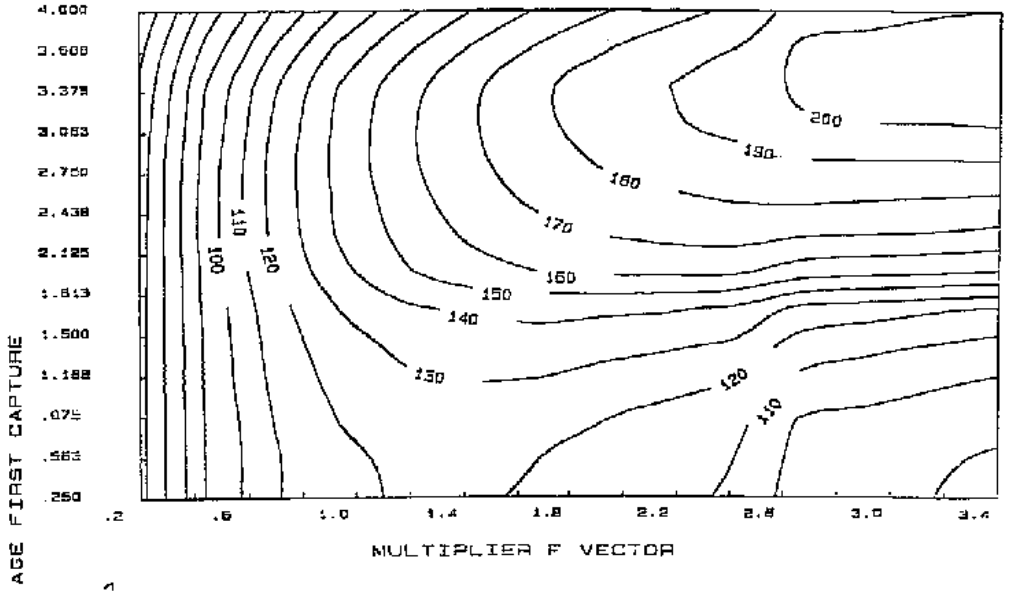
YFT-Fig. 3. Equilibrium production curve (m=1, k=4) for Atlantic yellowfin. Adjusted to catch and effort data estimated from catch rates of French and Spanish purse seine fleets, with effort in fishing days standardized to French purse seiners, category 5, and including an annual increase of 3% and 5% in purse seine fishing poser since 1981.\



YFT-Fig. 4. Mean fishing mortality rate (ages 0-4) estimated by VPA and fishing effort in fishing days standardized to French category 5 purse seiners, assuming an annual increase of 3% in purse seine fishing posers since 1981.



YFT-Fig. 5. Reproductory biomass by VPA applied in forward form, under the same suppostions considered in the previous assessment, from recruitment estimated during said assessment and supposing an average recruitement for the last two years.



YFT-Fig. 6. Yield per recruit curves obtained from fishing mortality vectors estimated by VPA, for a recuitment of 68 million, using recruitment figures estimated for the peiod of 1975-1993.

BET - BIGEYE TUNA

BET-1. Biology

Compared to many other tuna species, bigeye has received less attention with respect to research on basic biological characteristics, in spite of the importance of this species for the Atlantic fisheries that are currently exploiting it. The lack of reasonable estimates of some biological parameters considerably hindered the stock assessment process, and sometimes led to unrealistic results. Given recent changes in the fishery, more intense research should be devoted to this species.

The geographical distribution of bigeye tuna is very wide and covers almost the entire Atlantic Ocean between 50°N and 45°S. The vertical distribution also appears to be wide as this species tends to dwell in deeper water than the other tuna species. Spawning takes place in inter-tropical waters when the environment is favorable. From the spawning area fish tend to migrate into temperate waters as they grow larger. Catch information from the surface gears indicates that the Gulf of Guinea is a major nursery ground for this species. Various prey organisms such as fish, mollusks, and crustaceans are found in stomach contents. Bigeye exhibits relatively fast growth. They reach about 100 cm in fork length at the beginning of their fourth year, and this is when they become mature. Young fish form schools near the sea surface mostly mixed with other tunas such as yellowfin and skipjack tunas. These schools are often associated with drifting objects, whale shark and sea mounts. This association appears to be much less when they become larger.

Circumstantial evidence, such as the time-area distribution of fish and movements of tagged fish, suggests an Atlantic wide single stock for this species, which is currently accepted by the Committee. However, the possibility of other scenarios, such as north and south stocks, should not be disregarded.

BET-2. Description of fisheries

The stock has been exploited by three major gears (longline, baitboat and purse seine fisheries) and by many countries throughout its range of distribution (**BET-Figure 1**). Longline and baitboat fisheries have a long history that dates back before 1960. Major baitboat fisheries are located in Ghana, Senegal, the Canary Islands, Madeira and Azores. Unlike other Oceans, baitboats catch significant amounts of medium to large size bigeye tuna except in Ghana and Senegal. Japan and Taiwan are the two major longline countries whose catch accounted for about 55 % of total catch in 1996. Korea has reduced its activity in the Atlantic considerably since 1990. Tropical purse seine fleets operate in the Gulf of Guinea and off Senegal in the eastern Atlantic and off Venezuela in the western Atlantic. French and Spanish fleets are the major components in the east, and the Venezuelan fleet operates in the west. Bigeye catch by the Venezuelan fleet was very minor. Since 1990, changing flags of convenience became common for the French and Spanish purse seiners. In 1996, the bigeye catch by this fleet showed a sudden increase to 9,000 MT. While bigeye tuna is a primary target species for most of longline and baitboat fisheries, this species has been of secondary important species for purse seine fisheries.

Since about 1991, the purse seine and Ghanaian baitboat fisheries introduced a fishing technique that utilizes artificial fish aggregating devices (FADS). Similarly, baitboat fleets in Senegal and the Canary Islands are developing a new method which makes use of baitboats as floating objects. These new techniques have apparently improved fishing efficiency and contributed to the increase of bigeye catch. The size of fish caught varies among fisheries: medium to large, small to medium and small fish for longline, directed baitboat and purse seine fisheries, respectively. Corresponding average weights are 45-50 kg, 20-30 kg and 5 kg for these three types of fisheries. The economic value of fish is also different. Roughly speaking, the price of longline-caught fish at the unloading site is six times higher than those caught by other fisheries such as purse seine.

Historical Taiwanese catch statistics were revised and significantly improved in 1997. Revised total catch from all nations (**BET-Figure 2**) exhibited an increase up to the mid 1970's reaching around 60,000 MT, and fluctuating around 45,000 to 74,000 MT over the next 15 years. In 1991 it reached a record of 81,000 MT and continued to increase from 1992 to 1994. The 1994 catch was a new record of 110,000 MT for this species. The 1995 catch was slightly lower but increased again to 107,000 MT in 1996, although this is a preliminary estimate. The increase in catch after 1990 was attributable to all major fisheries (baitboat, purse seine and longline). The average catch between two periods (1986-1990 and 1991-1996) indicated an increase for these fisheries of 5,000 MT (38%), 17,000 MT (210%) and 15,000 MT (38%), respectively. It was reported that the intense use of drifting natural log and artificial

fish aggregating devices (FADs) was a primary cause of increased catch for purse seiners, although other technological advances such as extensive use of sonar, deeper nets, bird radar, etc, may have contributed as well. The increase in longline catches is primarily due to a rapid shift of target species from albacore to bigeye by the Taiwanese longline fleet, and increased fishing operations both by the Japanese and Taiwanese fleets. The baitboat fishery also introduced new fishing methods as stated above, and this as well as favorable oceanographic conditions has contributed to the increase of Spanish and Portuguese baitboat catches.

For the purse seine fisheries, since the early 1980s bigeye catch information has been calculated from estimates of species composition based on sampling, in accordance with the procedure developed by the Working Group on Juvenile Tropical Tunas (Brest, 1984). The increase of fishing on floating objects brought about an important change in this fishery which the SCRS considered could significantly affect the catch estimates of this species, especially those of small fish. Following the recommendations of the Committee, France and Spain, which have the two most important purse seine fleets in the Atlantic, initiated a program in 1996, financed by the EU, to study the sampling scheme and the processing of tropical tuna data based on the current structure of the fishery. Within this program, new sampling strategies have been developed in order to obtain more precise estimates than those currently used for species composition and size distributions of the species caught by purse seine. The application of the new scheme will result in improved statistics for the most recent period (1991-1997) and an even greater improvement of future statistics after 1998, the year in which the new scheme will be fully implemented

BET-3. State of stocks

Two indices of relative abundance were used in the analysis of stock status: a standardized age-specific index of abundance from the Japanese longline catch and effort data that targets this species and represents roughly 40 % of the total catch; and data from the US longline fishery (not age-specific). These two indices relate to medium and large sized fish (**BET-Figure 3**). Several different types of production model were run using the Japanese longline index. However, not all models produced biologically reasonable results and were therefore rejected by the Committee as was the case last year. The Committee believes, based on knowledge of the fisheries, the stock and production model estimation procedures, that the likely range of MSY is between 70,000 MT and 90,000 MT. These MSY values were somewhat higher this year than last year, largely due to the addition of high catches, which production models interpret as increased productivity (which may or may not persist in future assessments) (**BET-Figures 4**).

Several different types of Virtual Population Analyses (VPA) were also conducted using the Japanese and US longline indices of relative abundance . Catch-at-age was estimated from the catch-at-size that was newly created and improved according to the recommendation made last year. Trends in spawning stock biomass and fishing mortality rates (**BET-Figure 5**) were generally similar among different VPA analyses. Spawning stock biomass exhibited a slight decreasing trend until 1993 and then declined quickly. Fishing mortality rates increased rapidly especially after 1991. Fishing mortality rates by age for the period 1993-1995 illustrate substantial increases both for juvenile and adult fish (**BET-Figure 6**). Since longline indices alone were used to tune the VPAs and since these indices relate only to medium to large-size fish, the results of VPA should be interpreted with caution. The strength of cohorts during the most recent years is not well estimated as not all of these cohorts are represented by the indices used. The results of yield-per-recruit analysis and future projections, which are given below, were conditional on VPA results, as some of the input data for those analyses were directly taken from VPA.

The total catch has been larger than the upper boundary of the likely range of MSY since 1993, suggesting that the stock has declined considerably. Results of a production model* indicate that the estimated current biomass is below B_{MSY} by 20-40 %, and current F estimates surpass F_{MSY} by 50 to 120 %. Similarly, VPA results showed a sharp increase in estimated fishing mortality rates as well as an accelerated declining trend in spawning stock biomass after 1992. VPA results suggest a likely range of average fishing mortalities over the years 1993-95 of 0.38-0.53 for age 1 fish. Yield-per-recruit analyses (**BET-Figure 7**) indicate that this range corresponds to fishing mortality ratios of 1.09-1.52 relative to $F_{0.1}$ and 0.83-1.16 relative to F_{max}. Thus, while current F is uncertain, it probably exceeds $F_{0.1}$ and is also likely to be higher than F_{max}, indicating that the bigeye stock is already overexploited. In addition, current spawning stock biomass-per-recruit (**BET-Figure 7**) is lower than 20 % of its maximum, which corresponds to a threshold at which recruitment over-fishing may occur for other fish species. Yield-per-recruit analysis suggests that an increase of yield cannot be expected by intensifying fishing effort of any sector; however, yield-per-recruit can be

* Non-equilibrium production model.

increased by a reduction of fishing effort in the small-fish fisheries or an increase in the age at first capture (**BET-Figure 8**).

In VPA and yield-per-recruit analyses, the role of natural mortality (M), particularly for small fish, is very important; i.e., the impact of the small-fish catch on the large-fish fishery is large if M is relatively low, but it will be smaller if M is high. Without precise estimates of M, results could be misleading. Therefore, research designed to estimate M, such as tagging programs, should receive high priority.

BET-4. Outlook

The outlook for bigeye was examined by yield-per-recruit analysis, as well as preliminary projections (**BET-Figure 9**). Under the current exploitation pattern and assuming recruitment at recent average levels, yields would be expected to decline in the near future to levels below MSY.

Having obtained the above results, however, the outlook for this species cannot be clearly foreseen. If the productivity of the stock has actually increased in recent years, the stock may enter into a new equilibrium with catches higher than previously estimated MSY levels. On the other hand, if the stock has already been heavily fished as estimated by the various biological reference points presented in this assessment, continuation of catches of the current magnitude may cause not only recruitment over-fishing but also stock collapse, although the probability of stock collapse seems low because of the biological characteristics of this species (e.g. wide distribution, high fecundity and rapid growth). Even with increased productivity, the most plausible scenario is that future catch levels will decline below the current catch level.

BET-5. Effects of current regulations

The bigeye minimum size regulation of 3.2 kg was adopted in 1980 to reinforce the same regulation for yellowfin. It is clear that a large quantity of juvenile bigeye tuna smaller than 3.2 kg continue to be captured mostly from the equatorial surface fleets (baitboat and purse seine). The percentage of fish smaller than the minimum size has increased since 1991 and was 70 % in 1996. According to yield-per-recruit analysis (**BET-Figure 7**), full implementation of this regulation could result in an increase in yield-per-recruit of almost 25 % at F_{max}.

BET-6. Management recommendations

Since 1993, the total bigeye catch has been near or greater than 100,000 MT. This represents a substantial increase over the 1989-1990 level by more than 30,000 MT due to the increased catch by purse seine, longline and baitboat fisheries. Although MSY levels are not well determined, the current catch surpasses estimates from all models considered. It is highly likely that the current catch level cannot be sustained in the long term and may result in substantial declines in stock size.

Further increases in the catch of small fish will result in a decrease in catch over the long term as well as an additional reduction in the adult stock size which, as a consequence, increases the likelihood of recruitment over-fishing.

Taking all these factors into consideration, the Committee once again strongly recommends a reduction of overall catch to at least 1991-1992 levels (which was approximately 85,000 MT). Due to the multi-species nature of the surface fisheries, it may be difficult to perfectly implement the minimum size regulation; however, the Committee considers that a catch consisting of 70 % of fish less than 3.2 kg is excessive, results in substantial losses in yield-per-recruit, and may ultimately result in stock depletion. Reduction of the juvenile catch can be accomplished by limiting fishing on schools associated with floating objects by the tropical surface fisheries. Such limitation is already going to be implemented by Spanish and French purse seine fleets in the east Atlantic on voluntary basis. The Committee appreciates their effort and encourages other fishing sectors to join in. At the same time, the Committee would like the Commission to draw the highest attention to this action and reinforce the need for effective management measures for Atlantic bigeye fisheries.

ATLANTIC BIGEYE TUNA SUMMARY

Maximum Sustainable Yield (likely range)		70,000 - 90,000 MT*
Current (1996) Yield		107,300 MT
Current (1997) Replacement Yield**		60,000 - 80,000 MT
Relative Biomass (B_{1997}/B_{MSY})**		0.6 - 0.8
Relative Fishing Mortality	(F_{1996}/F_{MSY})**	1.5 - 2.2
	$F_{1993\text{-}95}/F_{0.1}$***	1.1 - 1.5
	$F_{1993\text{-}95}/F_{max}$***	0.8 - 1.2
Management Measures in Effect		3.2 kg minimum size

* This range is representative of MSY ranges predicted by ASPIC and PRODFIT models.
** Non-equilibrium production model (ASPIC).
*** Assumes a range of average fishing mortalities over the years 1993-95 of 0.38-0.53 for age 1 fish, based on VPA analyses.

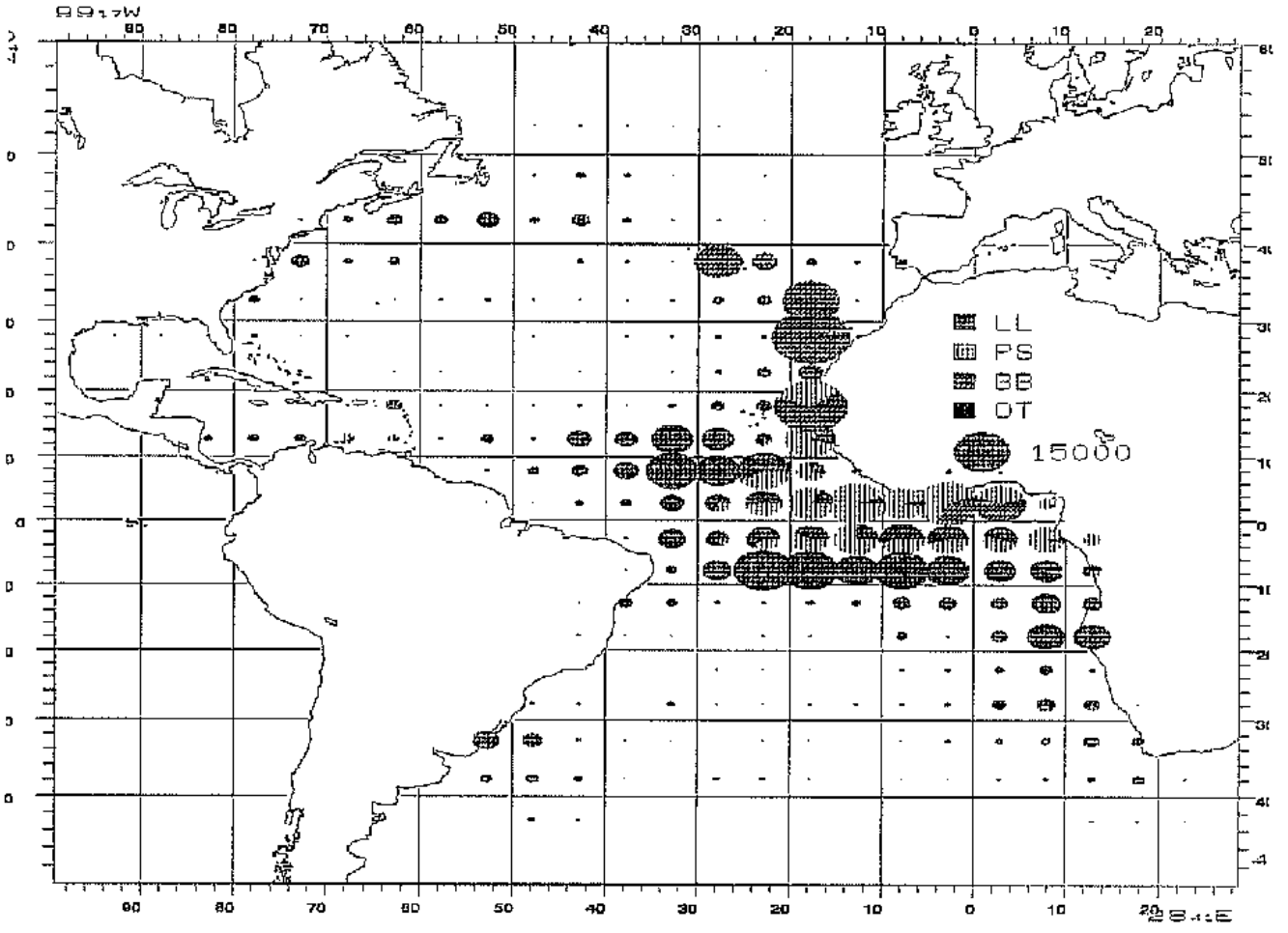
In this table, ranges of point estimates were given for replacement yields and relative ratios.

BET-Table 1. Reported catches (in MT) of bigeye tuna by country and major gears, 1970-1996.

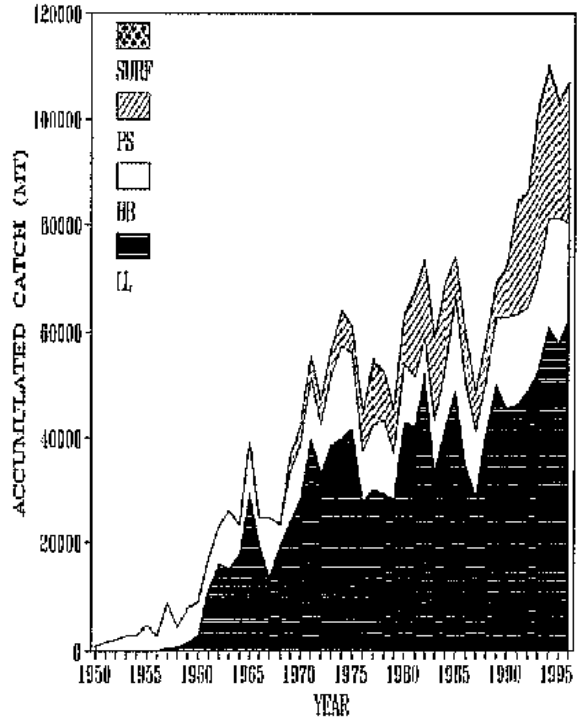
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	42297	55774	47170	56976	64069	61301	45302	54880	52693	45975	63820	68186	73711	59277	69339	74218	59758	49262	59094	69572	72378	84835	86613	101937	110368	103996	107300
BAITBOAT	10518	11846	9304	13431	17467	14320	9763	12278	14095	8874	11077	9532	6728	9796	11393	17638	15618	12631	9710	12672	17235	17153	15794	17784	20346	23505	17831
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	9	10	0	0	0	0	0	0	0	0	0	0
CAP-VERT	111	95	146	142	131	115	50	47	464	45	27	13	135	291	163	32	30	10	6	1	8	64	3	0	53	2	206
ESPANA	3600	6991	3080	4422	3170	5719	4225	3561	3850	2975	4034	2405	1534	2455	2821	4956	3469	3615	2588	2761	3814	5484	5518	4901	9848	8073	6248
FRANCE	1459	1348	1069	1224	981	1329	1365	2569	3611	2038	2450	2198	1832	2062	2146	4034	3228	2679	2507	2040	2739	2223	1700	2835	3207	3186	2393
GHANA	0	0	0	30	73	84	140	237	121	183	260	472	432	300	1330	1407	1432	1113	1214	2158	4160	3656	2804	4273	3959	2549	2998
JAPAN	215	520	929	1732	1878	141	872	1007	562	193	445	1047	616	49	27	0	0	0	0	0	0	0	0	0	0	0	0
MAROC	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	29	7
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71
PANAMA	0	0	118	26	289	104	182	335	137	36	14	48	174	0	0	0	0	0	0	0	0	0	0	71	143	0	0
PORTUGAL	5133	2892	3962	5855	10945	6813	2929	4522	5350	3385	3706	3086	1837	3774	3903	6390	7253	4920	2724	5279	6159	5598	5639	5493	3036	9629	5810
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	81
SOUTH AFRICA	0	0	0	0	0	0	0	0	0	19	141	263	132	109	59	96	113	200	553	367	296	72	43	88	76	27	7
ST. HELENA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	10	10
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	756	775	663	83	94	118	66	59	56	87	123	0	0	0
VENEZUELA-FOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169	51	0	0	0	0	0	0	0	0	0	0	0
LONGLINE	28390	39812	33176	38627	39966	41678	28023	30011	29330	28277	42950	42200	52220	33648	41645	48823	34460	28897	41111	49967	45440	46286	48886	52457	60946	57898	62378
ARGENTINA	100	44	0	25	18	95	176	84	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BELIZE.SH.OB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
BRASIL	0	37	28	70	197	181	229	472	728	647	588	455	692	515	656	410	863	756	946	512	591	350	790	1256	596	1935	1647
CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	31	10	26	67	124	111	148	144
CANADA-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	144	0	0	0	0	0	0	0	0	0
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP.	8538	6191	5639	4314	3499	4464	3701	3364	2970	2486	2561	1887	2147	1623	925	1220	1125	1488	1469	940	5744	13850	11546	13426	19680	18023	25115
CUBA	4100	3200	2000	2600	2400	1900	1300	1800	2300	2300	1385	711	521	385	447	239	167	190	151	87	62	0	0	0	0	0	0
ESPANA	0	0	0	0	0	1515	1515	1356	0	0	0	7	250	72	36	6	7	0	0	0	481	481	481	0	0	0	0
HONDURAS-OB.SH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	31
JAPAN	8993	20258	18078	19954	20862	17391	7298	9137	9301	11957	20477	21044	32867	15141	24310	31601	22800	18575	31664	39419	35024	29488	34128	35053	38503	35477	33219
KOREA	4079	7353	5730	6018	7831	10493	6923	8090	9716	8022	10235	12274	10809	9383	8989	10704	6084	4438	4919	7896	2690	802	866	377	386	423	1250
LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	308	785	400	400	0
MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0
PANAMA	0	0	64	2684	1792	1987	1953	1158	1990	477	4504	2452	2933	2732	1952	1104	631	375	0	0	0	0	0	0	0	0	0
POLAND	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	23	50	53	11	0	33	0
SOUTH AFRICA	0	0	0	1	0	0	0	0	0	0	281	118	1	77	1	6	55	0	0	0	0	0	0	0	0	0	0
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	191	41	22	0	0	1	19	57	263	0	258	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	1	1	0	200	368	348	537	755	556	557	576	857	577	763	912	982	713
U.S.S.R	2580	2729	1637	2961	3367	3652	4907	4086	2058	2041	2618	1681	635	352	1233	870	1071	1887	1077	424	95	0	0	0	0	0	0
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	86	397	605	714	597	177	204	120	55	38	20	56	48	37	80	124
VENEZUELA	0	0	0	0	0	0	21	464	244	347	300	1484	962	2372	1972	1690	918	85	7	27	49	99	14	355	317	317	135
VENEZUELA-FOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	14	0	106	0	0	0	0	0	0	0	0

BET-Table 1. Reported catches (in MT) of bigeye tuna by fleet, and major gears, 1970-1996.

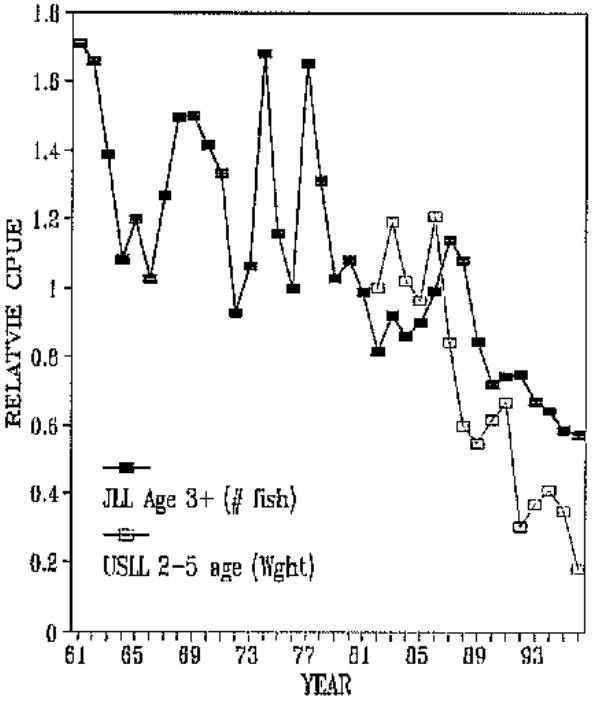
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
PURSE SEINE	3389	4116	4690	4918	6636	5303	7067	11875	9094	8343	9204	15656	14476	15654	16063	7554	9286	7148	7859	6371	9407	20979	21404	31023	27891	21861	26358
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0
CANADA	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONGO	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	8	19	10	10	14	15	12	12	14	0	0	0
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	4	0	0	0	0	0	0	36	0	0	0
ESPANA	472	427	935	1259	1345	1648	1696	4819	2999	2444	4396	7598	7496	6190	10760	5378	7408	5260	5396	4899	6060	12572	11602	14717	11974	11024	9961
FRANCE	2426	2624	2885	3218	4220	3572	5120	6401	5374	5270	3833	5822	5242	6062	2108	581	1038	1226	1654	1221	2284	4047	5519	11216	11504	7114	7165
GHANA	0	0	0	0	0	0	30	0	0	0	21	307	359	187	817	480	276	3	0	0	0	0	0	0	0	0	135
JAPAN	296	521	658	328	206	16	0	0	0	0	0	0	30	22	533	502	281	386	400	121	207	868	594	0	0	0	0
LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	300	100	0	0
MAROC	0	0	0	0	0	0	170	324	394	414	387	622	625	552	120	30	0	8	0	0	0	0	0	0	0	0	0
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	338	1141	157	0	0	85	20	93	785	3158	3307	4413	4171	3583	9023
NORWAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	301	450	67	139	0	0	1	3	1	1	1	2	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A	195	544	212	113	865	67	28	331	248	212	201	128	345	0	3	0	0	0	218	0	0	0	0	0	0	0	0
U.S.S.R	0	0	0	0	0	0	0	0	79	3	0	979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENEZUELA	0	0	0	0	0	0	0	0	0	0	361	200	37	1156	457	508	121	170	101	22	53	321	169	326	140	140	61
VENEZUELA-FOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	658	0	0	0	0	0	0	0	0	0	0	0	0
SURF	0	0	0	0	0	0	449	716	174	481	589	798	287	179	238	203	394	586	414	562	296	417	529	673	1185	732	733
ARGENTINA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	41	72	50	17	78	22	0	0	0	0	0
BENIN	0	0	0	0	0	0	0	0	0	0	0	40	45	0	0	0	15	6	7	8	10	10	9	10	0	0	0
BRASIL	0	0	0	0	0	0	449	711	84	135	110	50	48	14	0	0	0	0	0	0	0	0	0	0	0	0	0
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	59	63	2	4	80	56	50	111	99	44	87	102	85	156	64	100
CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	379	421	460
CHIN.TAIP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	56	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	52	77	0	0	0	0	0	0	0	0	0	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	87	10	0
GHANA	0	0	0	0	0	0	0	0	3	55	51	1	0	4	15	0	12	62	0	0	0	0	0	0	0	0	0
GRANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	25	20	10	10	0
LIBERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	206	16	13	42	65	53	0
PORTUGAL	0	0	0	0	0	0	0	0	0	98	224	439	24	0	0	0	36	116	94	15	48	69	103	111	61	0	0
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0
ST. HELENA	0	0	0	0	0	0	0	5	22	8	9	14	23	14	19	0	0	5	1	1	3	3	10	6	0	0	0
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	4
TOGO	0	0	0	0	0	0	0	0	0	0	0	0	0	14	52	18	24	22	7	12	12	6	2	86	23	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	23	32	54	37	5	210	253	144	204	74	105	174	219	416	227	169
U.S.S.R	0	0	0	0	0	0	0	0	65	185	195	172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0	0	5	0	0	0



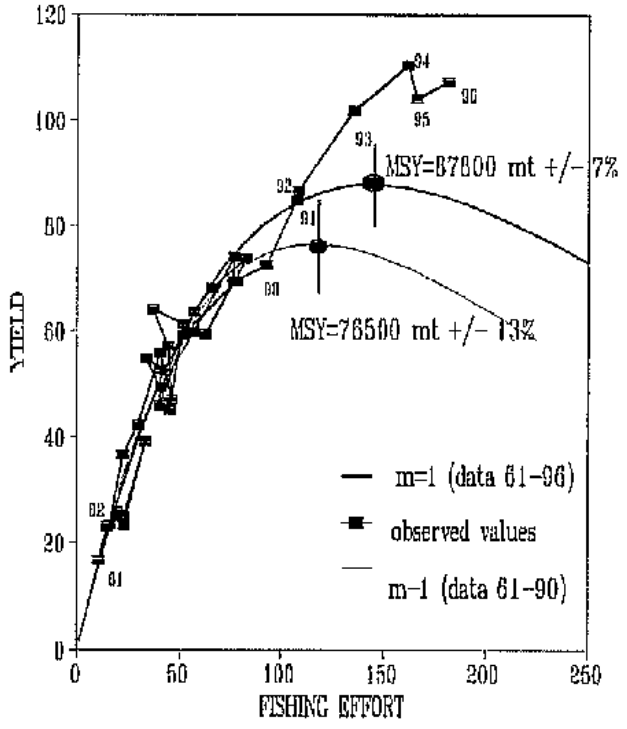
BET–Fig. 1. Geographical distribution of bigeye tuna catch by major tuna fisheries. Dark shaded, light shaded, medium shaded and black areas in circles correspond to catches by longline, purse seine, baitboat and other fisheries, respectively.



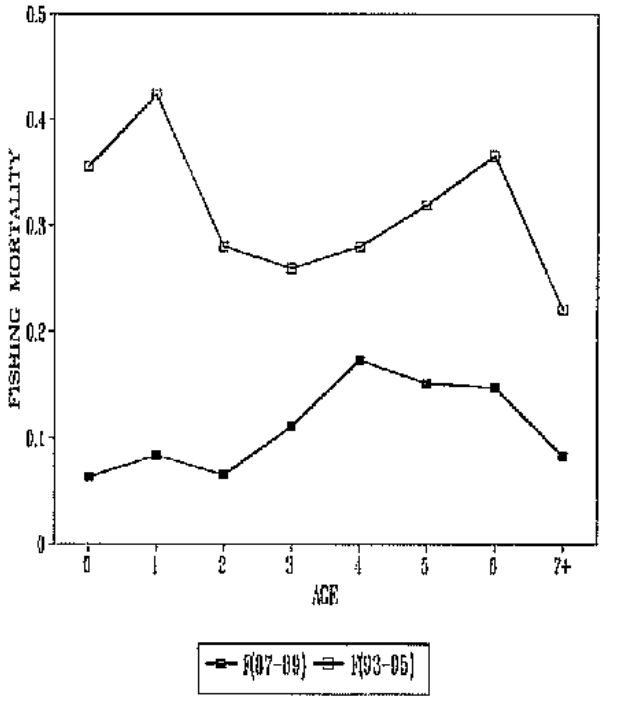
BET-Fig. 2. Accumulative catches (MT) of bigeye tuna in the entire Atlantic by gear categories.



BET-Fig. 3. Abundance indices from the Japanese (in number of fish) and US (in weight) longline fisheries.

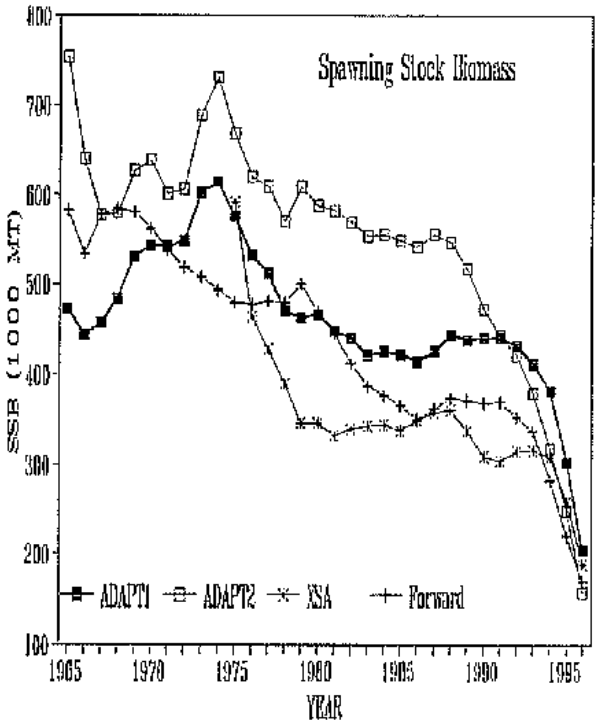


BET-Fig. 4. Production curve (shape parameter = 1.0) estimated by the equilibrium production model plotted with catch and effort series. With abundance index estimated by GM model. Heavy line represents a curve estimated using whole data points, while light line indicates a curve without data points after 1990.

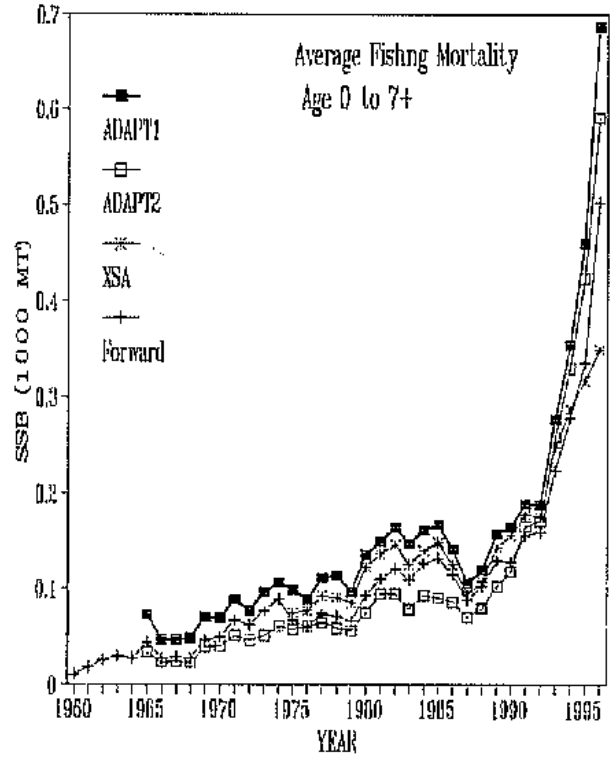


BET-Fig. 6. Fishing mortality rates at age for two periods (1987-1989 and 1993-1995) estimated by VPA.

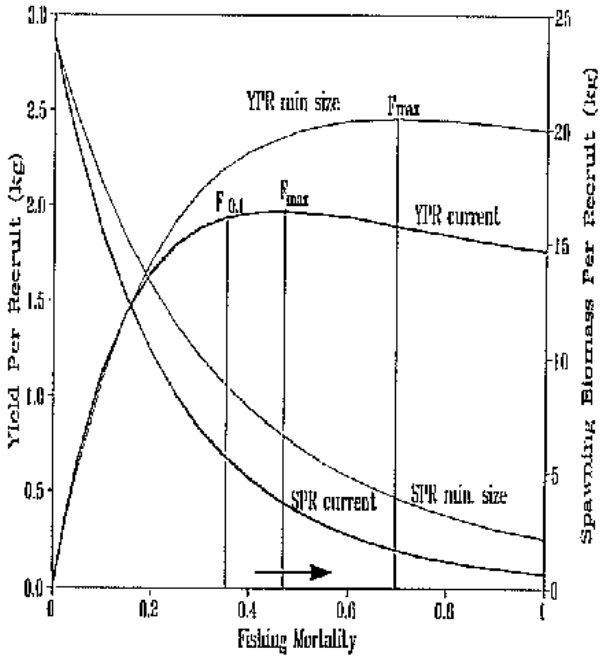
A)



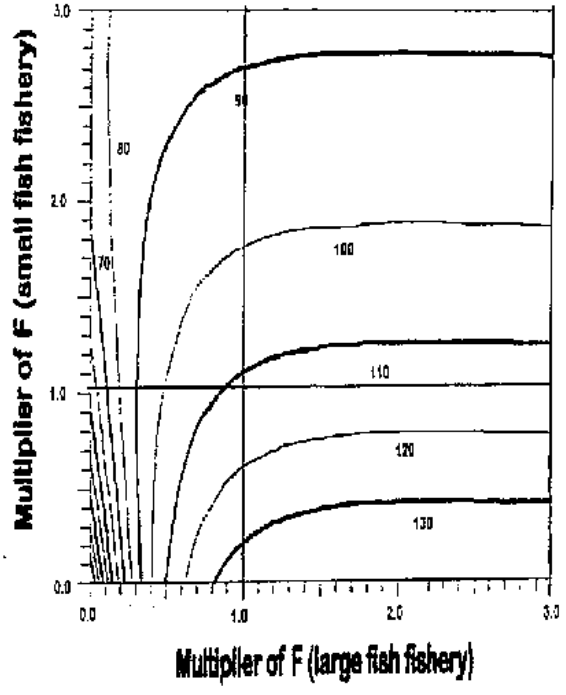
B)



BET-Fig. 5. A) Spawning biomass and B) fishing mortality rates of ages 0 to 7+ estimated from tuned VPA (ADAPT model 1 and 2, XSA) and untuned VPA (forward VPA).

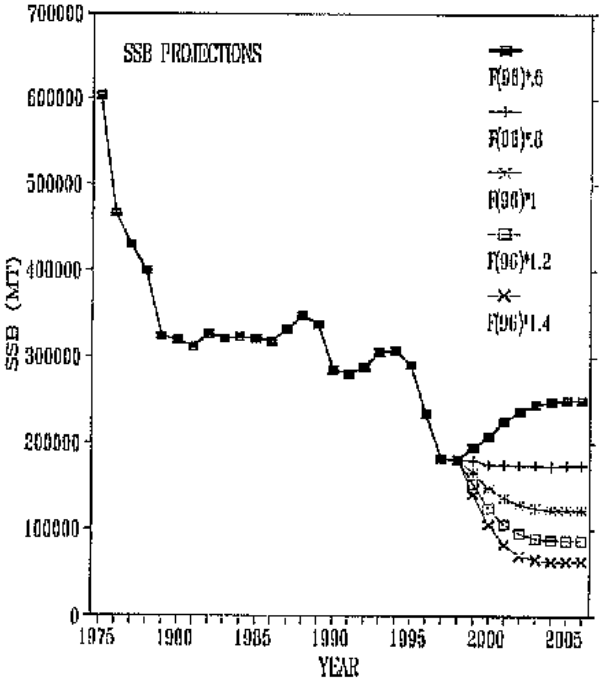


BET-Fig. 7. Yield-per-recruit (YPR) and spawning biomass-per-recruit (SPR) for bigeye tuna assuming current selectivity (heavy line) and selectivity reflective of a 3.2 kg minimum size limit (light line). The arrow indicates the approximate range of recent fishing mortalities.

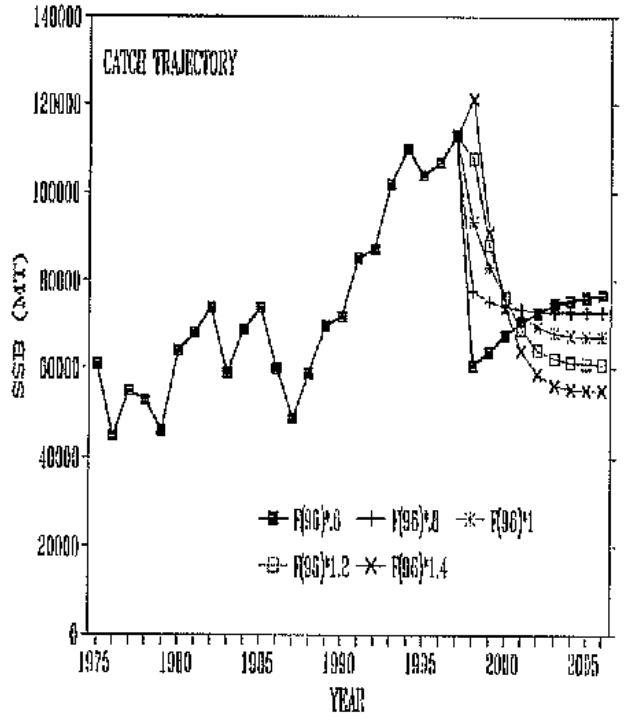


BET-Fig. 8. Results of multi-gear yield-per-recruit analysis. Large fish fishery and small fish fishery correspond to longline plus islands baitboat fisheries and the other fisheries F Vectors used in this study were obtained from VA.

A)



B)



BET-Fig. 9. Short term A) future projection of spawning stock biomass and B) catch trajectories. Starting values for projection are taken from the tuned VPA (XSA), with F in 1998, selectivity averaged for 1994-1996 and future recruitment averaged for 1991-1995. Five different levels of F were projected for 10 years.

SKJ - SKIPJACK TUNA

SKJ-1. Biology

Skipjack tuna is a cosmopolitan species forming schools in the tropical and subtropical waters of the three oceans. Skipjack spawn opportunistically throughout the year in vast areas of the Atlantic Ocean. The size at first maturity is about 45 cm for males and about 42 cm for females. Skipjack growth is variable and seasonal, and is more rapid for fish from the tropical zone than for fish from the equatorial area. That is, considerable variability is observed in the average rates of annual growth between the two areas. Skipjack are active predators that feed on numerous prey, which defines the opportunistic character of this species.

The stock structure of skipjack in the Atlantic Ocean is not known. Although there are apparently no ecological barriers preventing an exchange of fish between the fishing areas located on both sides of the Atlantic, two management units are maintained (eastern and western), due to the development of fisheries on both sides of the Atlantic Ocean and to the lack of transatlantic recoveries of tagged skipjack (**SKJ-Figure 1a and 1b**).

SKJ-2. Description of fisheries

Skipjack are caught almost exclusively by surface gears in the entire Atlantic Ocean, although minor amounts of skipjack are taken by longline as by-catch (**SKJ-Figure 2a and 2b**). Reported catches are considered to be underestimated, due to the discards of small-sized tunas, which include skipjack, by the purse seine fleets.

Catches in the Atlantic Ocean in 1996 amounted to 150,531 MT (**SKJ-Table 1**).

In the east Atlantic, the most important fisheries are the purse seine fisheries, particularly those of Spain, France and the NEI fleet (Vanuatu, Malta, Morocco, Ghana, Netherlands Antilles, Panama, and St. Vincent), followed by the baitboat fisheries of Ghana, Spain, Portugal, and the FIS fleet. Skipjack fisheries underwent important changes in 1991, with the introduction of fishing with floating objects and the expansion of the purse seine fishery towards the west, to latitudes close to the Equator, following the drift of floating objects, which has brought the eastern fishery closer to the western fishery (**SKJ-Figure 1b**). The fleet also developed a new live bait fishing method, directed mainly at bigeye tuna, in which the pole and line acts as an object, fixing and fishing a school during the entire fishing season, in waters off Senegal, Mauritania, and the Canary Islands. In 1996, skipjack catches in the eastern Atlantic amounted to 124,570 MT, which represents a slight decline with respect to the 131,370 MT taken in 1995. This declining trend has been observed since 1993 (**SKJ-Figure 2a**).

In the western Atlantic, the most important fishery is the Brazilian baitboat fishery, whose only target species is skipjack. In 1996, Venezuelan vessels also participated in the fishery. Purse seine catches are only made by the Venezuelan fleet, and catches are much lower than those of the baitboat fisheries, catches were only made by the Venezuelan fleet. The 1996 reported catches of 25,961 MT are slightly higher than those of 1995 (20,789 MT). This increase is shown in the purse seine as well as the baitboat catches (**SKJ-Figure 2b**).

There is no information available on effective fishing effort exerted on skipjack tuna, particularly since the introduction of fishing with artificial floating objects. Considering vessel carrying capacity as a measure of nominal effort in the eastern Atlantic Ocean, the same continuous decline in effort since 1991 can be observed, and In 1996 effort was 14% less than that of 1994 and the same as that of 1995 (**SKJ-Figure 2a**). In any case, the variations in vessel carrying capacity are not directly proportional to changes in fishing mortality.

The development of nominal effort of the different Brazilian baitboat fleets, expressed in fishing days, shows a declining trend since 1985, and is currently 36% below that of the aforementioned year, when the highest catches for this fishery were taken in the western Atlantic.

SKJ-3. State of the stocks

The last detailed skipjack stock assessment for the eastern Atlantic stock was carried out in 1984 by the Working Group on Juvenile Tropical Tunas. The results of that assessment showed the stock was under-exploited. In observing the development of the vessel carrying capacity (**SKJ-Figure 2a**), it can be noted that when the assessment was carried

out (1984), the highest level of this parameter was reached. Vessel carrying capacity in 1983 was 81,800 MT, while it is currently at 44,300 MT, which represents a 54% decline. However, it is not known whether this decline has been accompanied by a similar decline in effective effort or if, on the other hand, effective effort has increased, taking into account that the individual fishing power of the purse seiners has increased with the continuous introduction of technological improvements and, since 1991, the massive introduction of floating objects to aggregate tunas. This fishing strategy has not changed the size distribution of the catches, but it has changed the fishing area, which has extended towards the southwest, following the drift of floating objects, and it may have changed catchability, taking into account that skipjack is the main species in the catches taken under floating objects.

This year a series of runs were carried out (the Jones cohort analysis on size distributions considering two periods: 1980-1990 and 1991-1996), which coincide with those carried out in 1984, when the International Skipjack Year Program ended. These analyses show a similar level of recruitment to that of the earlier period, whereas the fishing mortality in the recent period (1991-1996) appears to have increased with respect to that calculated for the earlier years (1980-1990). As was the case in the previous assessment, the current situation shows that increases in the size at first capture or in fishing mortality would not result in increases in skipjack catches. In short, there are still uncertainties about the status of the eastern stock, considering that this species, in spite of its biological characteristics (short life span, rapid growth, catches predominated by mature fish, few ages present in the fishery, high natural mortality, etc.), is subjected to high rates of exploitation, in certain areas. The sizes of the individuals caught, however, have not varied widely in the most recent period (1991-1996) in relation to the period prior to the introduction of artificial floating objects (1980-1990) (**SKJ-Figure 3**). The averages size of individuals caught has changed from 47.7 cm (1980-1990) to 46.5 cm (1991-1996), and the average weight has varied from 2.25 kg to 2.08 kg in the same period. The high catches of this species taken by purse seiners in 1991 and 1993 were not maintained in the following years, which could indicate that skipjack are currently over exploited.

No stock assessment has been carried out on western Atlantic skipjack (**SKJ-Figure 2b**).

The eastern Atlantic CPUE has undergone a continuous increase, while that of the western Atlantic has remained the same without trend (**SKJ-Figures 2a and 2b**).

SKJ-4. Outlook

No definitive conclusion could be reached on the state of the eastern and western Atlantic stock. However, the Committee considered that, given the characteristics of this species*, the current level of exploitation can be maintained, but given the important changes that have occurred in the eastern Atlantic purse seine fisheries, the fishery should be carefully monitored and an assessment should be carried out as soon as possible, using adequate, specific methods for this species.

SKJ-5. Effects of current regulations

There are currently no regulations in effect for skipjack.

SKJ-6. Management recommendations

No management recommendations were proposed.

ATLANTIC SKIPJACK SUMMARY *

	East	*West*
Maximum Sustainable Yield (MSY)	East Atl. not estimated	West Atl. not estimated
Current (1996) Yield	124,570 MT	25,961 MT
Current (1995) Replacement Yield	Not estimated	not estimated
Relative Biomass (B_{1996}/B_{MSY})	Not estimated	not estimated
Relative Fishing Mortality: F_{1995}/F_{MSY}	Not estimated	not estimated
Management Measures in Effect	None	None

* The conclusions of the assessments carried out during the International Skipjack Year Program pointed out some considerations on the problems of assessing this species, which impede the application of production and analytical models:

- Since skipjack is not the main target species of the purse seine fleets, there are no good indices of skipjack abundance.
- Skipjack is a short-lived species which stays in the fishery for a short time and is subjected to high natural mortality.

SKJ-Table 1. Reported skipjack catches (in MT) by region, fleet and major fisheries.

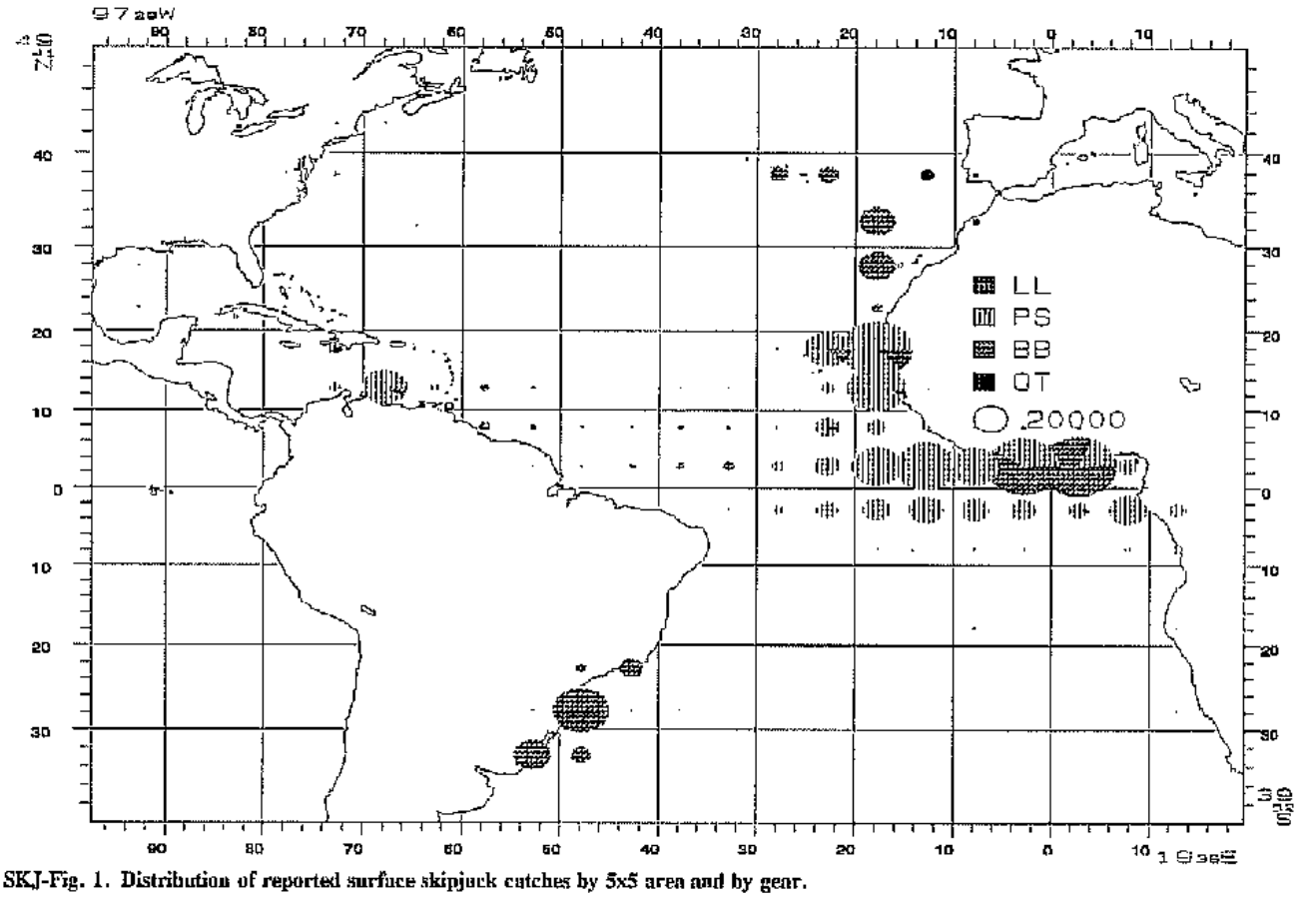
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	50255	78438	77351	78391	117297	56027	69345	110577	108115	89696	111358	130880	155528	134930	126790	118685	122061	114816	140625	116103	141010	199298	148857	181317	165221	152159	150531
BAITBOAT	19483	28846	26689	27008	41925	19284	31510	44786	44177	49010	47485	56917	66890	54930	44856	58358	55287	57230	69018	64292	61752	71044	60748	58731	63886	58107	58869
PURSE SEINE	29831	48833	50032	50216	74308	35761	33761	58283	62141	38455	59806	71127	84529	76613	79753	59539	63561	56098	69928	49726	76973	125896	85787	118364	99417	88504	91103
OTHERS	928	703	557	1070	876	768	4026	7499	1743	2219	4056	2789	4088	2857	2181	788	3213	1488	1679	2085	2285	2358	2322	4222	1918	5548	559
EAST ATLANTIC	47771	76411	74349	75460	113686	52349	65548	107218	100885	83119	98774	107941	122368	102669	91230	78441	90021	90735	116910	89738	114964	165975	118740	147538	135030	131370	124570
E.ATL. BAITBOAT	17683	27246	25289	25087	38953	16448	28710	42386	41365	44645	38134	38918	44488	34873	28085	29868	30009	38555	47961	41000	39506	47072	39896	38451	40909	41249	36240
ANGOLA	941	1927	1494	1311	3365	640	1514	3785	3239	3617	3465	2254	2247	318	45	128	55	80	30	79	69	66	41	13	7	3	15
CAP-VERT	1124	962	1477	1446	1332	1170	825	748	1284	998	2094	1581	1584	1338	1049	1961	860	2052	1350	934	767	1309	727	625	804	1215	1519
ESPANA	1844	2715	4083	2636	5357	776	604	728	558	1330	2162	4151	3366	1255	2026	5668	2514	3369	3438	5838	4645	5894	7195	3217	5270	5760	5044
FRANCE	4219	5592	3699	3227	4425	1783	2136	2642	3313	3282	3179	2608	4378	2655	3805	3293	1894	1957	2800	4176	3455	1474	1347	3377	3540	3776	1748
GHANA	0	0	0	128	701	1252	2103	3492	2866	4007	4720	4945	14250	20540	16181	16213	19180	22848	26009	22163	26600	30327	23168	25544	23531	25377	19138
JAPAN	7481	11730	10149	12980	18672	3664	15042	16845	14614	14686	12304	12935	8520	4562	402	0	0	0	0	0	0	0	0	0	0	0	0
KOREA	0	0	0	922	2123	4469	1948	3600	8132	12017	6718	7538	2827	1553	687	153	0	0	0	0	0	0	0	0	0	0	0
MAROC	1115	120	1	72	28	270	3	2188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	0
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	253
PANAMA	0	0	676	159	979	1854	2467	3970	2980	1750	1735	144	2541	1611	0	0	0	0	0	0	0	0	0	88	129	0	0
PORTUGAL	959	4200	3710	2206	1904	569	2068	4388	4379	2958	1719	2696	4751	999	3879	2396	5422	8162	14178	7715	3954	7987	7412	5582	7510	4986	8276
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	161
SOUTH AFRICA	0	0	0	0	67	1	0	0	0	0	38	66	24	42	11	56	84	87	156	95	16	15	6	5	3	2	0
ST. HELENA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	115	86
E.ATL. P. SEINE	29831	48833	48774	49855	74208	35387	33061	57683	58680	36966	56734	66473	74824	65492	61795	48348	58353	51134	67613	47260	73732	117369	77278	107644	93705	86445	87974
CANADA	585	1230	7	1189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAYMAN ILS	0	0	0	0	0	0	0	0	0	0	289	1800	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONGO	0	0	0	0	0	0	0	0	0	0	1250	200	0	5	10	8	8	8	8	11	12	9	9	10	0	0	0
CUBA	0	200	100	0	100	300	200	100	200	100	196	198	189	135	310	246	569	81	206	331	86	0	0	7	0	0	0
ESPANA	6142	11854	19533	17762	30584	16861	15561	21529	24508	17418	24222	31307	34650	27623	44627	29421	39477	29707	44202	29462	43189	65156	42768	54306	44681	45475	32980
FRANCE	7833	13103	13596	7954	22641	10540	14903	28496	22590	15320	22588	24318	26754	27072	9189	10352	11151	15157	13704	11035	13644	28714	18787	36522	31970	24736	21591
GHANA	0	0	0	160	0	174	96	0	0	0	317	2682	3915	2807	3674	2869	1677	768	0	0	0	0	0	0	0	0	5147
JAPAN	3519	6222	3386	1544	910	143	0	0	0	0	0	0	1410	1440	1102	2098	2031	1982	3200	2243	2566	4792	2378	0	0	0	0
MAROC	0	0	0	0	0	0	535	1663	1891	1863	5001	3017	3956	2348	862	1002	1220	928	0	0	84	18	78	0	0	0	288
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	1560	3383	927	590	540	1372	3732	2263	10516	17504	12148	16259	15583	14784	27580
NORWAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	581	738	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	205	116	235	129	779	114	94	0	0	3	1	0	0	1	0	0	0	0	7
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1175	1110	540	1471	1450	381
SOUTH AFRICA	0	0	0	0	0	0	0	36	87	0	10	22	13	2	0	0	1	0	0	0	0	0	0	0	0	0	0
U.S.A	11752	16224	12152	21246	19973	7369	1766	5859	6797	2073	2608	2800	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R	0	0	0	0	0	0	0	0	2402	76	18	0	1489	563	1000	1404	1679	547	1822	1915	3635	0	0	0	0	0	0
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	358	0	0	0	0	0	0	0	0	0	0	0

SKJ-Table 1. Reported skipjack catches (in MT) by region, fleet and major fisheries.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
E.ATL. OTH GEARS	257	332	286	518	525	514	3777	7149	840	1508	3906	2550	3056	2304	1350	225	1659	1046	1336	1478	1726	1534	1566	1443	416	3676	356
ANGOLA	14	69	183	132	109	13	0	251	262	11	17	278	10	0	1	3	1	0	0	6	0	0	0	0	0	0	0
BENIN	0	0	0	0	0	0	0	0	0	8	30	60	68	38	10	20	11	5	3	7	2	2	2	2	0	0	0
BULGARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	7	52	62	342	69	17	24	106	37	39	24	137	235	203	99	123
CHIN.TAIP.	0	0	0	0	0	0	0	0	0	0	0	0	2	2	7	4	0	0	1	3	0	5	3	2	10	3	3
ESPANA	0	0	0	0	0	90	90	90	0	0	0	0	0	56	6	11	1	0	3	0	0	0	0	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	11	51	26
GHANA	0	0	0	0	0	0	0	0	0	292	775	231	107	1029	842	0	1411	731	588	588	588	588	588	588	0	0	0
JAPAN	5	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	5	6	3	6	0	0	0	0	0	0	0
MAROC	0	0	0	0	0	0	0	0	0	0	0	0	0	184	23	13	2	113	428	295	753	160	313	218	173	3513	190
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13	24	7	24	10	0	71	65	53	18	10	14
RUMANIA	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	3	0	0	59	142	349	73	0	0	0	0
SAO TOME & PRINCI	0	0	0	0	0	30	35	118	100	34	33	90	78	103	18	20	20	20	21	22	25	24	25	15	0	0	0
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	5	287	343	263	0	0	0
SOUTH AFRICA	0	0	0	0	0	0	0	4	3	2	0	22	0	60	3	10	16	1	1	1	1	0	1	1	1	0	0
ST. HELENA	100	100	100	100	9	22	19	12	21	76	70	112	271	103	85	62	139	139	158	397	171	24	16	65	0	0	0
U.S.S.R	138	161	0	286	407	359	3633	6674	454	1085	2973	1750	2468	660	0	0	9	0	0	0	0	0	0	0	0	0	0
WEST ATLANTIC	2471	1971	2929	2834	3423	3464	3749	3350	7176	6565	12573	22892	33139	31731	35560	40244	32040	24081	23715	26365	26046	33323	30117	33779	30191	20789	25961
W.ATL.BAITBOAT	1800	1600	1400	1921	2972	2836	2800	2400	2812	4365	9351	17999	22402	20057	16771	28490	25278	18675	21057	23292	22246	23972	20852	20280	22977	16858	22629
BRASIL	0	0	0	0	0	0	0	0	0	1818	6070	13913	18156	15643	13086	25052	22542	16153	17227	20550	20026	20424	18273	17557	20372	16530	22077
CUBA	1800	1600	1400	1500	1800	2300	2800	2400	1800	2000	2255	1086	1134	1700	1248	1632	1277	1101	1631	1449	1443	1596	1638	1600	1600	0	0
ESPANA	0	0	0	0	0	0	0	0	981	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRANCE	0	0	0	0	0	0	0	0	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAPAN	0	0	0	421	1126	438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PANAMA	0	0	0	0	0	0	0	0	31	161	1026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENEZUELA	0	0	0	0	46	98	0	0	0	0	0	3000	3112	2714	2025	1597	992	1421	2199	1293	777	1952	941	1123	1005	328	552
VENEZUELA-FOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	412	209	467	0	0	0	0	0	0	0	0	0	0

SKJ-Table 1. Reported skipjack catches (in MT) by region, fleet and major fisheries.

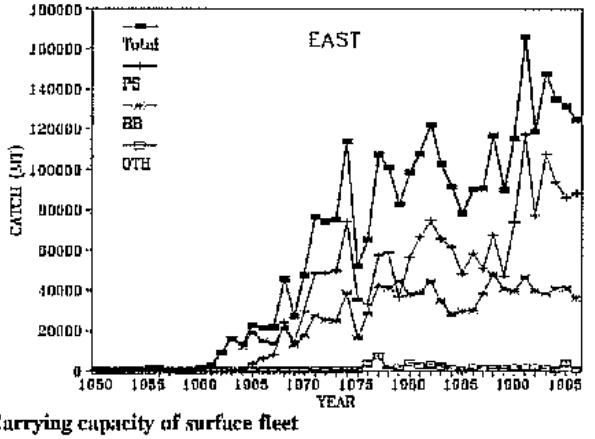
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
W.ATL P.SEINE	0	0	1258	361	100	374	700	600	3461	1489	3072	4654	9705	11121	17958	11191	5208	4964	2315	2466	3241	8527	8509	10720	5712	2059	3129
ARGENTINA	0	0	100	16	28	0	0	33	4	0	17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRAZIL	0	0	0	0	0	0	0	0	0	0	0	0	166	301	442	0	0	0	0	0	0	0	0	0	0	0	0
CANADA	0	0	0	13	0	0	181	0	86	0	0	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	0	0	120	0	0	103	0	266	1050	752	0	0	0	209	2610	500	0	0	0	0	0	1592	1120	397	0	0	0
FRANCE	0	0	900	332	72	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GHANA	0	0	0	0	0	0	0	0	0	0	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PANAMA	0	0	0	0	0	0	0	0	689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A	0	0	138	0	0	196	519	301	1632	737	980	2573	6	588	817	1785	977	635	5	36	227	749	496	274	20	0	1
VENEZUELA	0	0	0	0	0	0	0	0	0	0	1890	1900	9533	8956	9782	7485	3977	4329	2310	2430	3014	6186	6893	10049	5692	2059	3128
VEN-FOR	0	0	0	0	0	0	0	0	0	0	0	0	0	1067	4307	1421	254	0	0	0	0	0	0	0	0	0	0
W.ATL OTH GEARS	671	371	271	552	351	254	249	350	903	711	150	239	1032	553	831	563	1554	442	343	607	559	824	756	2779	1502	1872	203
ARGENTINA	0	0	0	0	0	0	0	0	0	0	0	0	137	243	505	101	138	90	7	111	106	272	123	50	1	0	0
BARBADOS	0	0	0	0	0	0	0	0	0	0	0	78	72	39	48	36	33	21	3	9	11	14	5	6	6	6	0
BRAZIL	400	100	0	0	0	0	83	190	635	247	1	0	0	1	39	49	613	133	89	200	104	124	262	214	216	30	11
CHIN.TAIP.	0	0	0	0	0	0	0	0	0	0	0	9	18	6	6	3	1	2	7	19	0	32	26	9	7	2	3
COLOMBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2074	789	1583	0
DOMINICAN REP.	200	200	200	200	234	171	78	41	64	87	59	71	80	106	68	204	600	62	63	117	170	194	176	167	300	33	0
GRANADA	0	0	0	0	0	0	0	0	1	4	8	1	1	15	12	7	9	5	22	11	23	25	30	25	11	12	11
JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21
KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	20	6	0	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	0	0	0	0	0	1	3	0	25	30	48	11	13	10	14	4	9	8	1	1	0	0
NETHERLAND.ANT	0	0	0	0	0	0	0	0	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	45	0	0	0
ST.LUCIA	71	71	71	76	76	81	88	100	100	41	40	37	38	35	64	53	76	60	53	38	37	51	39	53	86	72	37
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	28	29	27	20	66	56	53	37
TRINIDAD & TOBAG	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	1	0	0	0	0	2	0	0	0
U.S.A	0	0	0	0	0	2	0	19	63	292	1	0	646	1	0	1	27	16	31	20	13	36	27	67	29	81	83
VENEZUELA	0	0	0	276	41	0	0	0	0	0	0	0	0	41	0	0	0	0	0	0	22	0	0	0	0	0	0
AREA UNKNOWN	13	56	73	97	188	214	48	9	54	12	11	47	21	530	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP.	13	9	28	55	72	17	22	0	12	10	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAPAN	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOREA	0	47	45	0	116	196	26	9	42	2	4	47	21	530	0	0	0	0	0	0	0	0	0	0	0	0	0
PANAMA	0	0	0	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



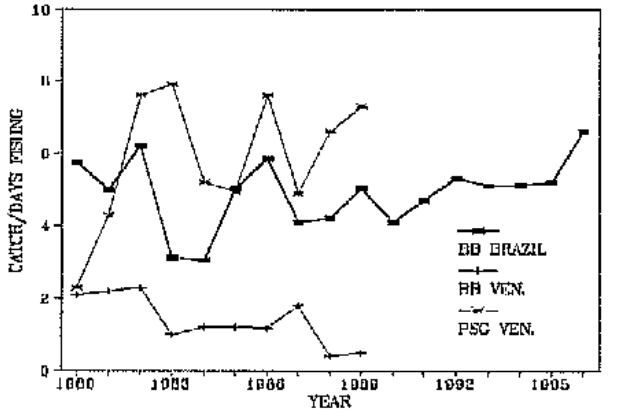
SKJ-Fig. 1. Distribution of reported surface skipjack catches by 5x5 area and by gear.

A) East Atlantic

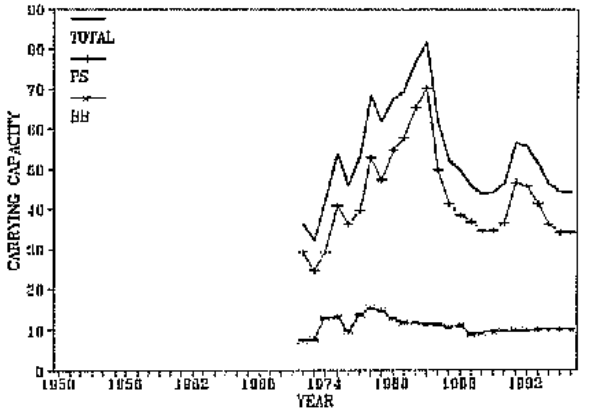
Catch (MT) by gear



Catch/carrying capacity

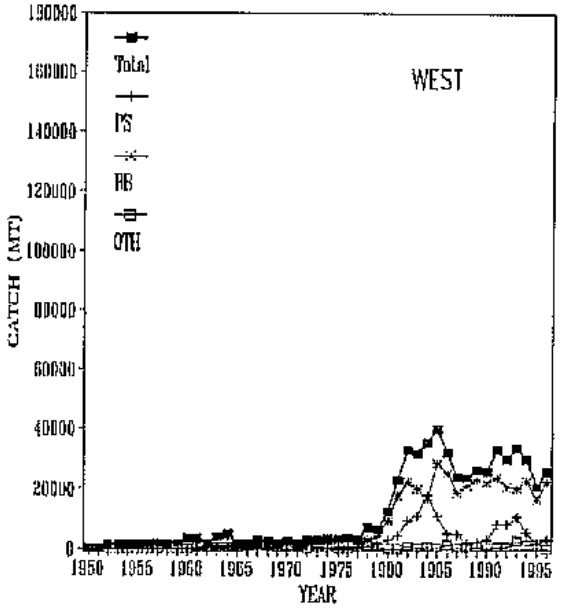


Carrying capacity of surface fleet

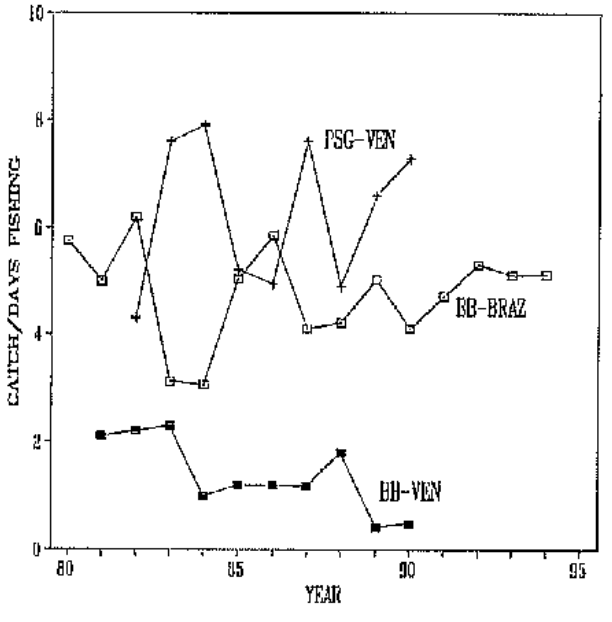


SKJ-Fig. 2 A) Landings, carrying capacity and catch per carrying capacity for the east Atlantic skipjack:

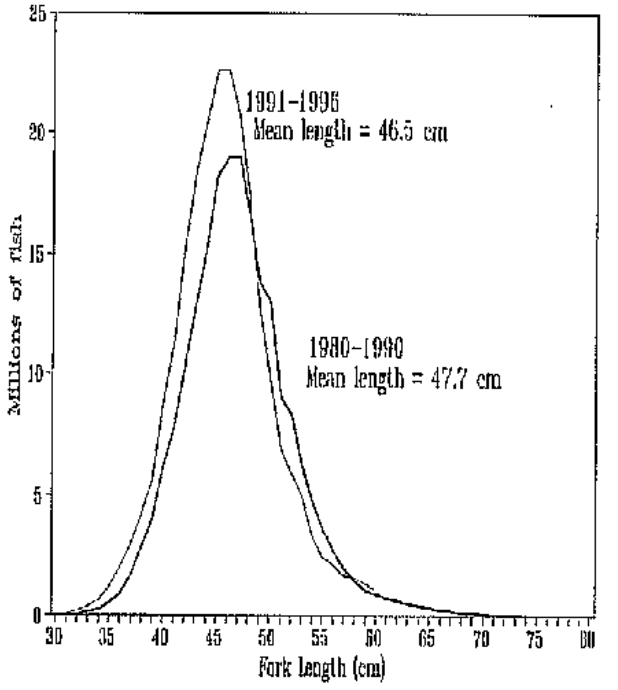
B) West Atlantic
Catch (MT) by gear



Nominal catch per fishing



SKJ-Fig. 2. B) Landings and some nominal CPUE series for the west Atlantic skipjack.



SKJ-Fig. 3. Size distribution of skipjack caught by FIS and Spanish baitboat and purse seine fisheries in the east Atlantic for before (1980-1990) and after (1991-1996) fishing on logs started.

ALB - A L B A C O R E

ALB-1. Biology

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea. On the basis of the biological information available, for assessment purposes the existence of three stocks is assumed: northern and southern Atlantic stocks (separated at 5°N) and a Mediterranean stock (**ALB-Figure 1**).

Albacore spawning areas in the Atlantic are found in subtropical western areas of both hemispheres and throughout the Mediterranean Sea. Spawning takes places during austral and boreal spring-summer. Maturity is considered to occur at about 90 cm FL (age 5) in the Atlantic, and somewhat smaller in the Mediterranean. Until this age they are mainly found in surface waters, where they are targeted by surface gears. Some adult albacore are also caught using surface gears but, as a result of their deeper distribution, they are mainly caught using longlines. Young albacore are also caught by longline in temperate waters.

ALB-2. Description of fisheries (ALB-Table 1 and Figure 2)

The northern stock is exploited by surface and longline fisheries. Traditional surface fisheries include Spanish trolling, used mainly in the Bay of Biscay and adjacent waters, Spanish and Portuguese baitboats in the same area and near the Azores. New surface fishing gears, drift-nets and pelagic paired trawls, were introduced in 1987 in the Bay of Biscay and adjacent waters by France. Ireland and the United Kingdom joined the driftnet fishery at the beginning of the 1990's. These surface fisheries mainly target juveniles (50 cm to 90 cm FL). A Taiwanese longline fishery targets sub-adult and adult albacore (60-120 cm) in the central and western North Atlantic. Other fleets make minor catches and in most of the cases albacore constitute a component of the by-catch.

The total catch in the north Atlantic has shown a downward trend since 1970, largely due to reduction of fishing effort by the traditional surface and longline fisheries. In contrast, effort and catch in the new surface fisheries have increased markedly since 1987. Market parameters seem to play a key role in the trends of the catches. In 1996 it is noted the important decrease of surface catches due to the reduction of troll catches in the Bay of Biscay area, compared to the previous year, and to the decrease of the baitboat fishery activity in the Azores.

The southern stock is exploited by a South African surface baitboat fishery off the South Africa west coast. In recent years, the South African catch has decreased, and in 1996 was half that in 1995. This decrease was related to reduced availability of albacore to the South African fishery, the causes of which are unknown. Taiwanese longliners target albacore at a fairly high level of effort. The fishing pattern of this fleet seems to have changed in recent years, being reflected by the increase of small fish in the catches. (**ALB-Figure 3**). Both Taiwan and South Africa have made efforts to implement management regulations in response to the 1994 ICCAT resolution. Japanese and Brazilian longliners make a minor contribution to the total southern albacore catch.

Reported albacore catches in the Mediterranean, mainly by Italy and Greece, are still minor.

ALB-3. State of the stocks

The Committee assessed the status of the South Atlantic albacore stock after a deep review of Task I and Task II data available. The Committee recognized the important improvement of the basic data for the southern stock although some uncertainties still remain. Assessment of North Atlantic albacore stock was conducted during the 1996 SCRS meeting and details are given in the report of last year. No attempt was made to analyze the status of the Mediterranean stock, due to insufficient information.

-- North Atlantic

The 1996 SCRS analyzed the state of the northern stock using ADAPT tuned VPA's. The relative abundance indices and other assumptions made for the base case were the same as those used in the previous assessment, based on the recommendations made during the Final Meeting of the Albacore Research Program. However, modifications to that choice were made specifically to include determination of gear-specific selectivities using partial catches by gear.

According to the results obtained (**ALB-Figure 4**), the abundance and biomass of adult fish (ages 5+) appears to have declined from the early to late 1980's, followed by an increase 1988-1990. The abundance and biomass of ages 5+ do not show any trend since 1990. Abundance of recruits (age 1) and juveniles (ages 2-3) varied from year to year with, perhaps, some declining trend from 1975-1984. The levels since then have been variable. The Committee noted that global environmental factors may significantly influence recruitment variability (**ALB-Figure 5**).

The fishing mortality rate of juveniles was high in 1990, but was reduced to a lower level since then. Fishing mortality rates on adults (ages 5+) increased to a peak in 1986, then declined. Recent rates appear to be relatively high, but not as high as the peak year. The fishing mortality rate on ages 8+ also appears to be increasing, however, the estimation of this is quite variable.

Equilibrium yield per recruit and spawning potential ratio analysis made by the 1996 SCRS indicated that the northern stock is at or near full exploitation (**ALB-Figure 6**). The analysis conducted in 1996 reflects the current F_{95} (0.702) close to F_{max} (0.880) and greater than $F_{0.1}$ (0.375); and correcting F for older ages at the level estimated for 1990-1992, the result is F (0.533) compared to F_{max} (0.878), and is greater than $F_{0.1}$ (0.494). The current level of spawning biomass for these analysis is estimated as 16.5% and 20.7% of the unexploited level respectively.

-- South Atlantic

An age structured production model was used to produce base-case assessments of albacore abundance, using CPUE indices for the main fleets exploiting this stock (**ALB-Figure 9**). Sensitivity analyses were conducted to investigate the effect of production model selection, standardization and choice of abundance indices and growth model. In addition, the sensitivity of the model to the fishing selectivities was also investigated *given* the increased occurrence of small albacore in the catch.

The base case results for 1997 were very similar to those for 1996, and to the results of the sensitivity analyses using different abundance indices and growth equations. These results indicate that MSY is 26,400 MT, and the current (1997) replacement yield is 26,500 MT. The estimate of the ratio of current biomass to that at which MSY is achieved is 0.78 (**ALB-Figure 8**). The 1996 fishing mortality rate is 116% of that needed to achieve MSY.

However, the sensitivity analyses for this year indicate that the model is very sensitive to fishing selectivity. These analyses became possible this year with the advent of preliminary catch-at-age information to compare with the model output. The catch-at-age indicates that selectivity of the various fisheries are very uncertain. Additionally, when alternative forms of selectivity were tested, this could change both the estimates of MSY and of the current biomass relative to that which could produce MSY. Therefore, while there is confidence in the trends of abundance, there is uncertainty in relative MSY.

ALB-4. Outlook

-- North Atlantic

The northern albacore stock has mainly been exploited by surface fisheries since the longline fleets shifted their targeting to bigeye tuna. A recent development in this fishery has been the introduction of drift nets and pelagic trawls, which achieve higher catch rates than trolling gear. Furthermore, the baitboat fishery targeting adult albacore has been intensified in some years. Recent VPA assessments indicate that the northern stock is at, or near, full exploitation. Attention therefore needs to be given to implementing effective controls to limit fishing effort at current levels.

-- South Atlantic

Projections under various levels of catch from 1997 forward were conducted in order to evaluate the effect of alternative future management options: constant catches of 22,000 MT, 24,000 MT, 26,000 MT, 28,000 MT, 30,000 MT and a replacement yield option (**ALB-Figure 9**). The projections assumed that the 1997 catch was equal to that actually observed in 1996.

The projections indicate that biomass could recover to that which could produce MSY within about three years, if catches are maintained below about 24 thousand MT (**ALB-Figure 7**). Conversely, catches in excess of 26,000 MT do not allow recovery to biomass at MSY levels within the projection period. Fishing mortality rates increase

substantially during the projection period for constant catches of 28 thousand MT and above. The Commission's recommendation of 22,000 MT is not inconsistent with the present results.

ALB-5. Effects of current regulations

– North Atlantic and Mediterranean

No ICCAT regulations are currently in effect for the North Atlantic or Mediterranean stocks. It was noted that a European Union regulation restricting the length of driftnets used by EU members to 2.5 km was introduced in 1992.

– South Atlantic

During the 1994 meeting, in response to continued indications of over-exploitation, ICCAT accepted a recommendation that catches of southern albacore by nations targeting this species be limited to not more than 90% of the average catches from 1989 to 1993. This recommendation became effective in October 1995. In 1996 ICCAT accepted a recommendation limiting annual catches of southern albacore to 22,000 tons, to be implemented by 1 January 1998.

Taiwan has implemented management regulations reducing the albacore directed fishing effort in response to the 1994 ICCAT resolution. The implementation by South Africa of ICCAT recommended regulatory measures has been hampered by poor reporting of past catches by her fleet. As a first step towards implementing the recommended catch limit, South Africa has restricted the off-loading of albacore to certain ports, has increased the inspection of these off-loadings and has improved logbook reporting systems for albacore landed y the South African baitboat fleet.

ALB-6. Management recommendations

– North stock

The 1994 Committee concluded that the northern albacore stock is probably not over-exploited, but that the stock appears to be at or near full exploitation. The Committee reiterated the previous recommendation that fishing mortality should not be increased above its current level.

– South stock

In 1994 ICCAT accepted a recommendation which came into effect in October, 1995, that catches of southern albacore should be limited to not more than 90% of the average catches from 1989 to 1993. In 1996 ICCAT accepted a recommendation limiting annual catches of southern albacore to 22,000 tons, to be implemented by 1 January 1998. Recognizing that many uncertainties remain in the diagnosis for the South Atlantic albacore and that various recommendations have been made to rectify these problems, it was recommended that the SCRS conduct a new stock assessment for the south stock in 1998. Meanwhile, it is reiterated that those countries involved in the southern albacore fishery make a concerted effort to implement the recommended catch limit.

– Mediterranean

There were no management recommendations for the Mediterranean stock.

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY

	North Atlantic	South Atlantic	Mediterranean
Maximum Sustainable Yield	poorly estimated	26,400	not estimated
Current (1996) Yield	28,761	24,098	unknown
Current (1997) Replacement Yield	poorly estimated	26,500	not estimated
Relative Biomass:			
B_{1996}/B_{MSY}	poorly estimated	0.78	
SPR^3	0.165	--	
R_{89-93}/R_{75-80}	0.782	--	
Relative Fishing Mortality:			
F_{1996}/F_{MSY}	poorly estimated	1.16	not estimated
F_{1995}/F_{MAX}	0.798	--	
Management measures in effect	none	Limit catches to 90% of 1989-1993 levels	none

ALB-Table 1. Reported albacore catches (mt) by region, gear category and fleet.

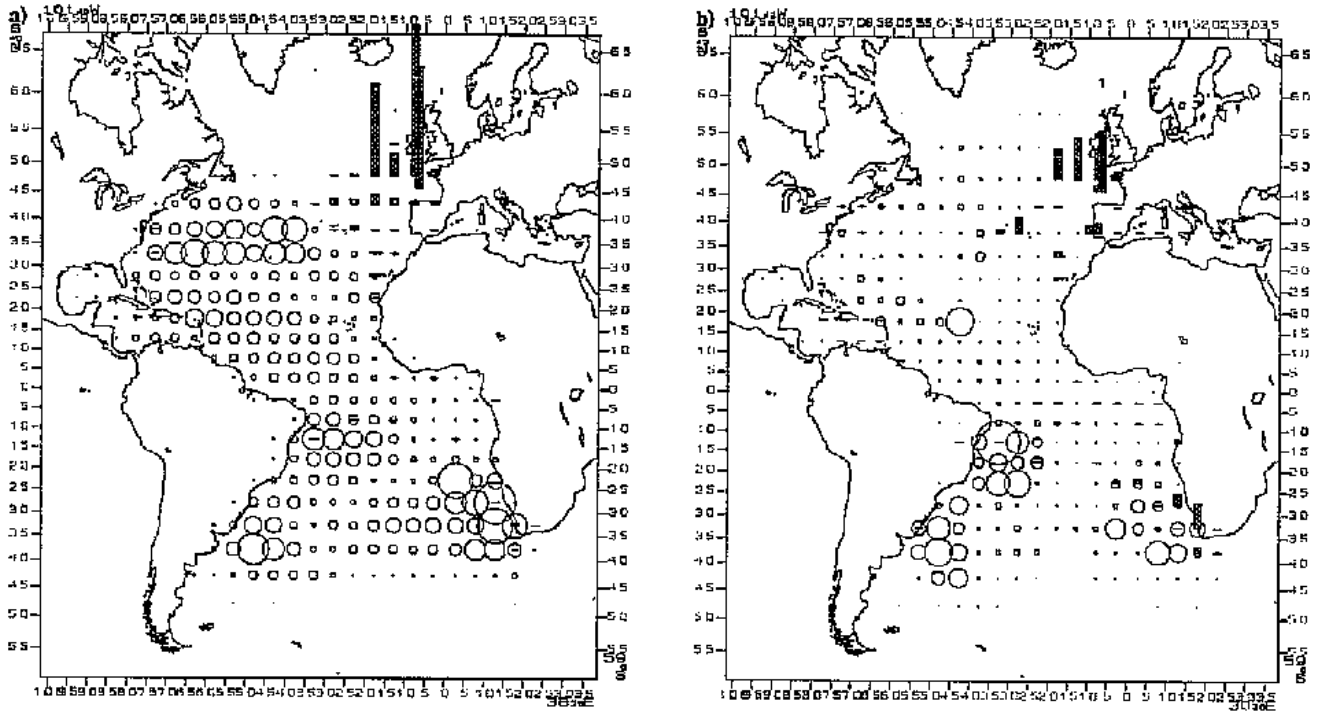
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	70308	82941	83330	75686	72489	59555	77346	76099	73806	74826	62134	59651	72942	67314	57661	75971	88465	82708	67864	63357	67199	56030	68958	72097	67881	65652	53283
NORTH ATLANTIC	46155	57556	49450	46973	52286	41448	57326	53821	50047	51365	38704	34111	41998	51161	39648	40745	47465	38085	33694	32086	36589	27935	30742	38635	35058	38302	28761
BAITBOAT	14388	15677	8196	10133	16678	19247	20402	15559	11958	15764	16170	13410	15857	21108	8305	12589	15202	18756	16752	15374	18625	8985	12449	15646	11967	16411	11261
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	12481	13894	7287	8172	14899	17629	18677	14864	11273	15398	15743	12578	15342	18958	7405	11777	14620	18196	16581	14918	15442	8267	10815	12277	11041	9953	9639
FRANCE	1707	1483	475	1074	550	707	1115	633	600	220	355	392	160	199	10	100	130	130	0	290	0	0	0	0	0	0	0
PORTUGAL	200	300	434	887	1229	911	610	62	85	146	72	440	305	1778	762	632	450	430	171	166	3182	700	1622	3369	926	6458	1622
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	50	163	118	80	2	0	0	0	1	18	12	0	0	0	0
LONGLINE	16061	17850	14727	18128	14637	12710	23006	20869	14157	12207	9447	9819	13190	16860	19704	17411	21222	7289	2993	2247	2685	5301	3125	7632	7164	4750	4654
CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	47	22	6	5	1	9	32	12	24
CHIN.TAIP.	4675	2871	4410	9501	9538	8130	14837	13723	9324	6973	7090	6584	10500	14254	14923	14899	19646	6636	2117	1294	1651	4318	2209	6300	6409	3977	4072
CUBA	0	0	36	0	0	87	85	83	89	0	31	48	82	38	69	20	31	15	4	0	2	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	0	0	0	27	8	8	8	0	0	0	0
GRANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
JAPAN	5875	6472	1319	1467	2059	1331	1345	825	531	1219	1036	1740	781	1156	576	844	470	494	723	764	737	691	466	485	505	386	431
KOREA	5011	7707	7922	4794	2823	2843	5379	5579	3048	2997	797	938	1326	478	967	390	373	18	16	53	34	1	0	8	0	0	2
PANAMA	0	0	240	2366	217	226	1227	557	768	425	193	177	494	357	2551	601	525	44	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	268	194	318	0	0	0	0	4	0	247	639	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	1	0	10	20	10	28	35	46	58	150	201	146	173	218	373	122
VENEZUELA	500	800	800	0	0	93	133	102	397	593	300	331	7	296	403	328	148	26	40	29	93	75	48	18	0	0	0
PURSE SEINE	0	0	0	0	0	0	0	2	0	0	16	0	84	364	555	59	22	0	97	12	1	221	139	228	438	313	386
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	35	32
U.S.A	0	0	0	0	0	0	0	2	0	0	16	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	80	364	555	59	22	0	97	12	1	221	139	228	278	278	354
TROLL AND OTHER SURF	15706	24029	26527	18712	20971	9491	13918	17391	23932	23394	13071	10882	12867	12829	11084	10686	11019	12040	13852	14453	15278	13428	15029	15129	15489	16828	12460
CHIN.TAIP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1354	0	0	0	0	0	0
ESPANA	11250	16302	17834	12927	13083	4532	8233	10291	14131	14232	9459	8241	10136	10596	8279	8894	9767	10010	10966	10479	10342	8955	7348	6094	5952	10225	6649
FRANCE	4456	7727	8683	5785	7875	4959	5685	7100	9800	9100	3600	2537	2695	2192	2787	1760	1070	1791	2805	3760	3300	4123	6924	6293	5934	5304	4485
IRELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	60	451	1946	2489	918	918
MEXICO	0	0	0	0	0	0	0	0	0	0	2	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	3	7	2	16	0	13	25	48	3	13	3	3	7	16	16	48	12	10
SIERRA LEONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
U.S.A	0	0	10	0	13	0	0	0	1	0	3	51	20	8	5	7	134	236	68	201	239	283	231	279	453	172	348

ALB-Table 1. Reported albacore catches (mt) by region, gear category and fleet

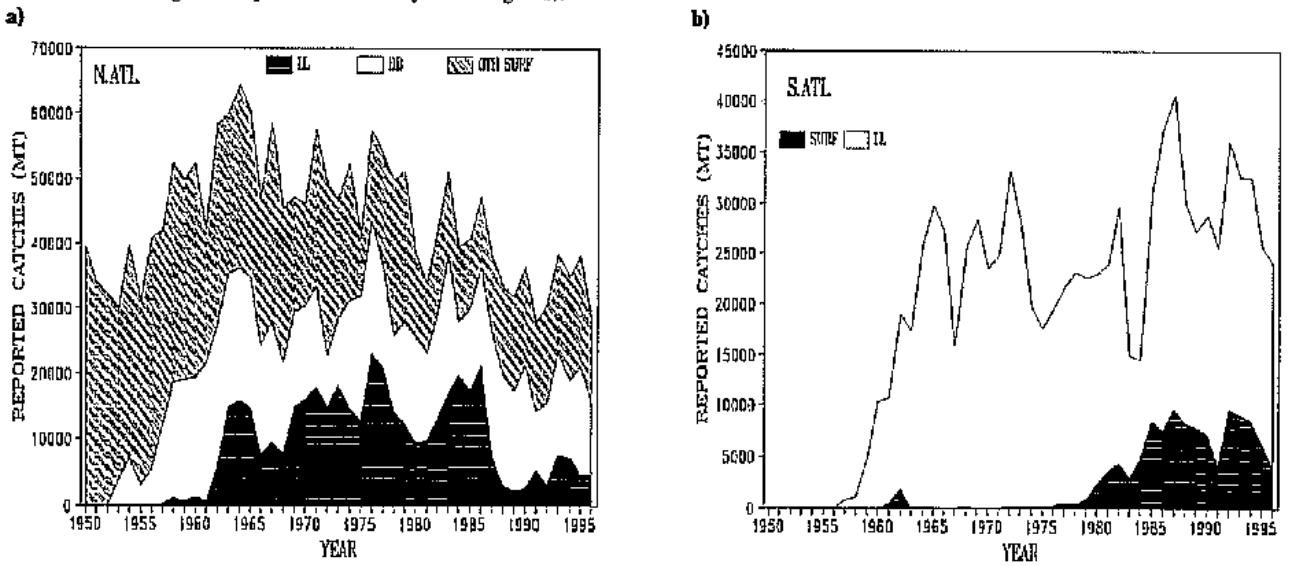
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S.S.R	0	0	0	0	0	0	0	0	0	59	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UNITED KINGDOM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	499	613	196	49
SOUTH ATLANTIC	23653	24885	33179	28213	19703	17607	19459	21665	23169	22628	22930	24040	29672	14918	14599	31097	37288	40630	30107	27211	28714	25717	36014	32606	32567	25755	24098
BAITBOAT	0	0	0	1	97	46	0	66	43	53	1346	1721	2575	1794	4166	7909	6829	8181	7696	7393	5981	3454	6490	8204	7325	6014	3637
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	52	53	258	89	13	65	17	2	29	18	0	13	0	200	17
JAPAN	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KOREA	0	0	0	0	0	0	0	63	43	0	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	915	950	982
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1000	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	724	1357	1029	899	1153	557	732	81	184	483	1185	655	494
SOUTH AFRICA	0	0	0	1	97	46	0	1	0	53	1233	1721	2523	1741	3184	6463	5787	7217	6526	6834	5220	3355	6306	6708	5220	4127	2097
ST. HELENA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	82	47
LONGLINE	23653	24885	33079	28113	19553	17456	19262	21194	22806	21843	20671	20426	25255	11941	9834	22672	29815	30964	21828	19407	21590	21697	26392	23515	24075	19516	20190
ARGENTINA	500	281	100	44	13	97	48	80	8	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BELIZE.SH.OB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
BRASIL	0	63	16	60	169	170	296	545	455	381	390	256	729	678	469	293	501	322	395	433	485	1095	2710	3600	835	723	841
CHIN.TAIP.	12225	17491	24985	22157	16686	13384	14600	16092	20467	20340	18710	18187	22800	9502	7889	19643	27592	28790	20746	18386	20442	19883	23063	19400	22573	18351	18789
CUBA	0	0	64	0	0	13	15	17	11	0	27	53	29	36	67	27	24	10	2	1	2	0	0	0	0	0	0
HONDURAS-OB.SH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
JAPAN	5898	3218	2087	277	109	306	73	105	135	105	333	558	569	162	224	623	739	357	405	450	587	654	583	467	651	389	466
KOREA	5030	3832	5655	3731	2393	3230	3376	3766	1370	878	690	682	563	599	348	511	321	383	180	54	19	31	5	20	0	0	18
PANAMA	0	0	172	1841	183	256	770	377	354	125	167	129	210	0	0	0	280	924	0	0	0	0	0	0	0	0	0
SOUTH AFRICA	0	0	0	3	0	0	0	0	0	14	350	536	120	591	311	44	96	0	0	0	0	0	0	0	0	0	0
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
U.S.S.R	0	0	0	0	0	0	84	212	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	23	235	373	526	1531	262	178	100	83	55	34	31	28	16	49	75
PURSE SEINE	0	0	0	3	0	1	47	112	51	188	464	1804	1349	699	365	182	244	948	185	0	4	429	2739	849	725	217	190
ESPANA	0	0	0	0	0	0	0	0	0	0	0	889	106	295	307	155	200	807	185	0	0	389	1691	849	725	217	14
FRANCE	0	0	0	0	0	0	47	112	40	172	457	912	947	372	7	18	35	100	0	0	0	0	0	0	0	0	176
JAPAN	0	0	0	3	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0
MAROC	0	0	0	0	0	0	0	0	2	0	0	0	113	0	0	0	0	41	0	0	0	0	0	0	0	0	0
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	40	1048	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0
SOUTH AFRICA	0	0	0	0	0	0	0	0	0	5	7	1	81	6	34	9	9	0	0	0	0	0	0	0	0	0	0
U.S.A	0	0	0	0	0	1	0	0	9	11	0	2	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TORLL AND OTHER SURF	0	0	100	96	53	104	150	293	269	544	449	89	493	484	234	334	400	537	398	411	1139	137	393	38	442	8	81

ALB-Table 1. Reported albacore catches (mt) by region, gear category and fleet

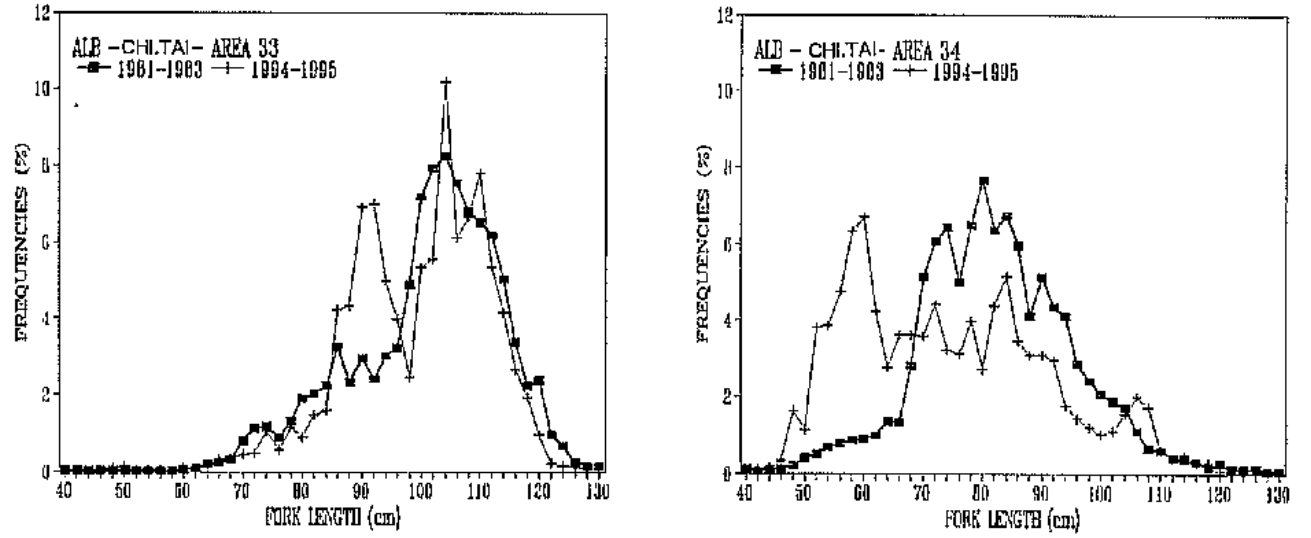
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ARGENTINA	0	0	0	0	0	0	0	0	0	0	0	0	7	55	209	153	356	469	344	354	151	60	306	0	2	0	0
BRASIL	0	0	0	0	0	0	0	143	39	134	86	20	19	0	5	0	6	8	9	0	0	0	0	0	392	0	0
CHIN.TAIP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	927	0	0	0	0	0	0
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	5	3	0	0	0
SOUTH AFRICA	0	0	100	96	53	104	150	149	150	408	260	62	456	422	11	181	38	58	44	56	60	55	54	35	48	8	81
ST. HELENA	0	0	0	0	0	0	0	1	12	2	4	7	11	7	9	0	0	2	1	1	1	5	28	0	0	0	0
U.S.S.R	0	0	0	0	0	0	0	0	68	0	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDITERRANEAN	500	500	701	500	500	500	561	613	590	833	500	1500	1272	1235	3414	4129	3712	3993	4063	4060	1896	2378	2202	856	242	1587	404
BAITBOAT	0	0	0	0	0	0	0	0	0	0	0	900	539	535	1331	243	0	0	0	0	83	499	171	231	81	163	205
ESPANA	0	0	0	0	0	0	0	0	0	0	0	900	539	535	1331	243	0	0	0	0	83	499	171	231	81	163	205
LONGLINE	0	0	1	0	0	0	41	130	150	0	0	0	0	0	226	375	150	161	168	165	624	523	442	0	3	87	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	0	3	6	0
ITALY	0	0	0	0	0	0	40	130	150	0	0	0	0	0	226	375	150	161	165	165	624	523	436	0	0	81	0
JAPAN	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PURSE SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0
NEI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0
YUGOSLAVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TROLL AND OTHER SURF	500	500	700	500	500	500	520	483	440	833	500	600	733	700	1857	3511	3562	3832	3895	3895	1189	1356	1589	125	158	1337	199
ESPANA	0	0	200	0	0	0	0	0	0	0	0	0	33	0	0	288	0	0	0	0	1	48	50	59	134	306	199
FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	141	250	20	60	31	31	121	140	11	64	23	3	0
GREECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	484	500	500	500	500	500	500	1	1	0	0
ITALY	500	500	500	500	500	500	520	483	440	833	500	600	700	700	1716	2973	3058	3272	3364	3364	567	668	1028	1	0	1028	0
AREA UNKNOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	8	20
CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	8	20



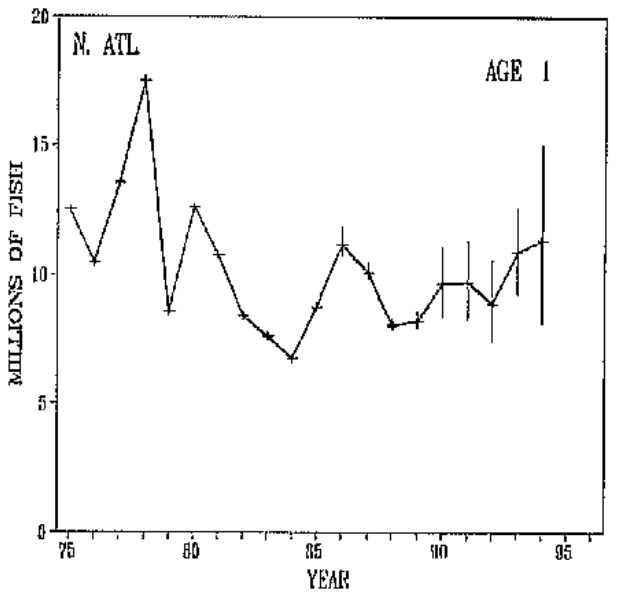
ALB-Fig. 1. Geographical distribution of annual albacore catches in a) 1970-1979 and b) 1990-1995. (Circles represent catches by longline and histograms represent catches by surface gears).

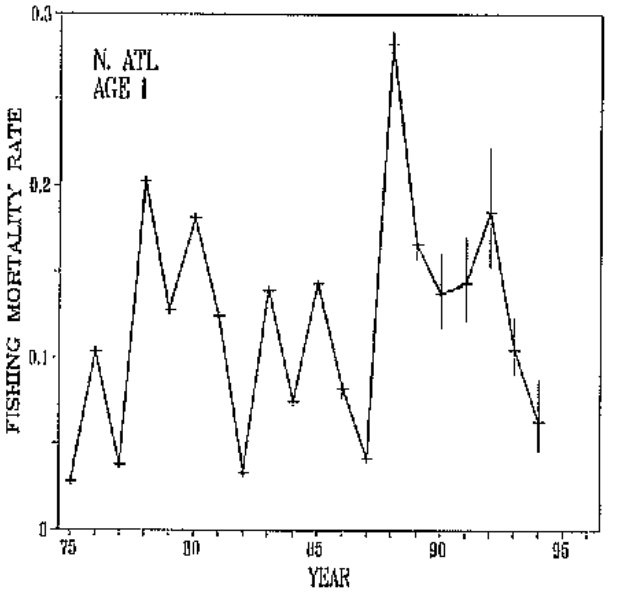


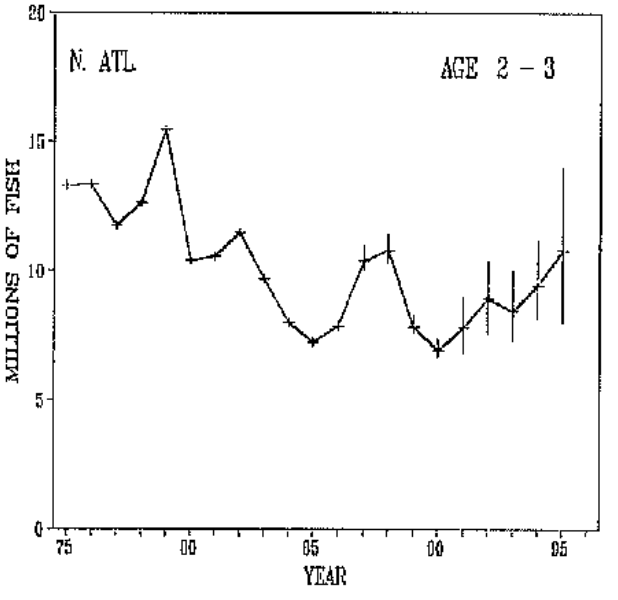
ALB-Fig. 2 Albacore catches (mt) in a) north Atlantic and b) south Atlantic by main gear type from 1950 to 1996.

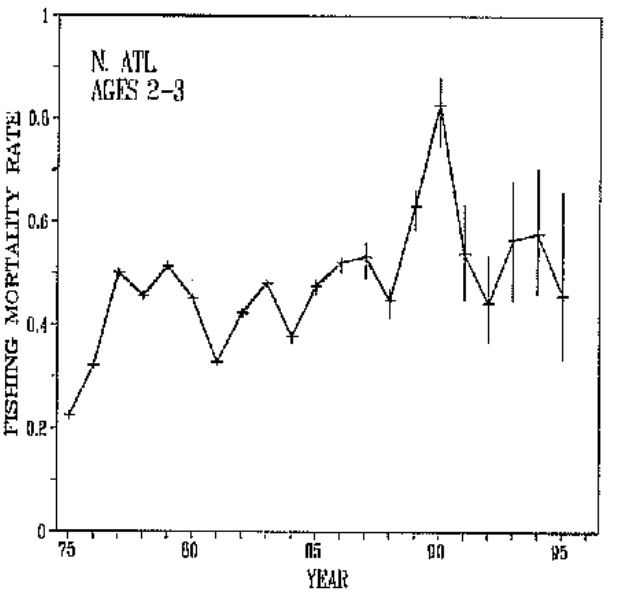


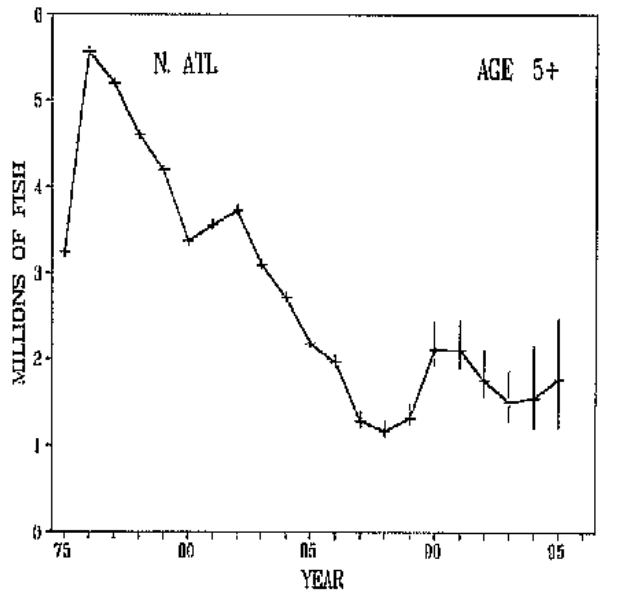
ALB-Fig. 3. Length distribution of albacore catches of Chin.Taip. fleet, by ICCAT area in South Atlantic, in 1981-1983 and 1994-1995.

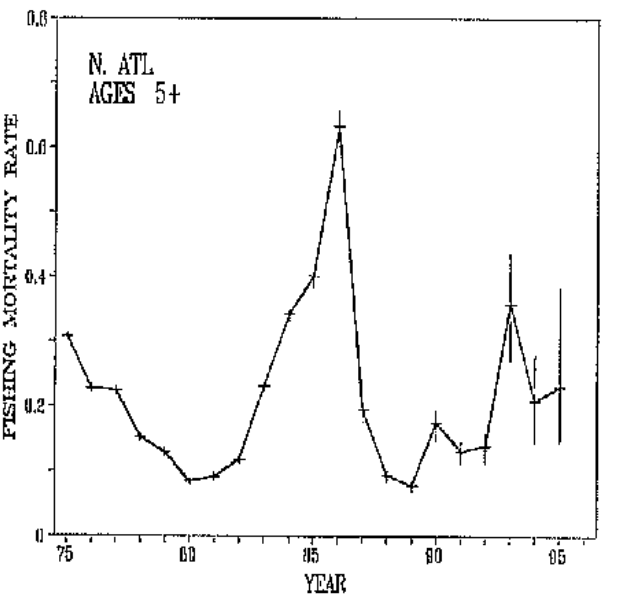




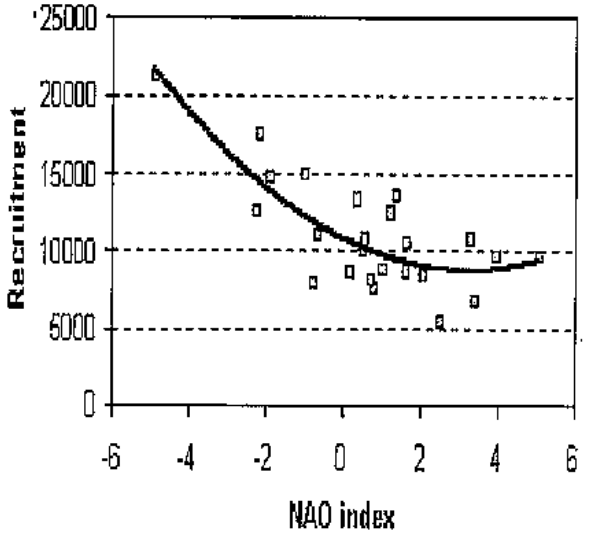




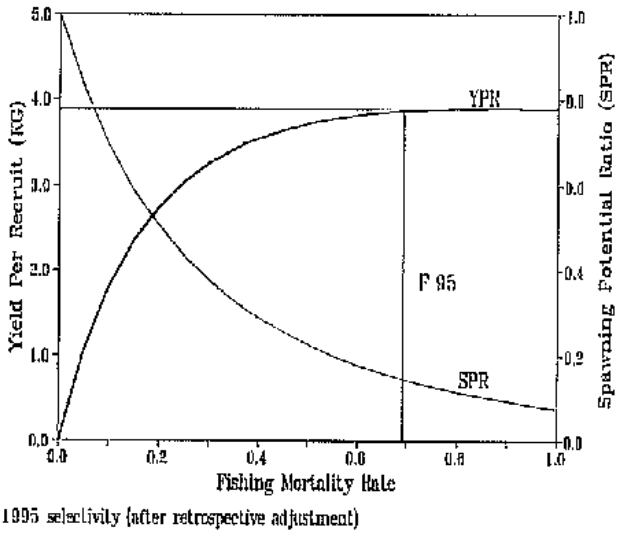




ALB-Fig. 4. Stock abundance (in number of fish) and fishing mortality rate estimated by VPA bootstrapping analysis with 80% confidence intervals, north Atlantic albacore (SCRS, 1996).

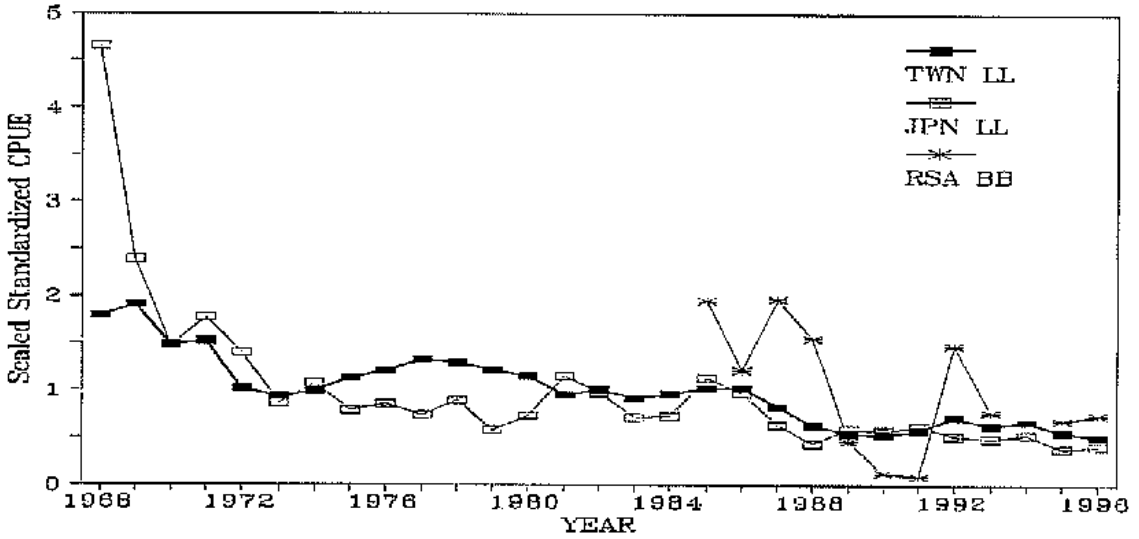


ALB-Fig. 5. Relation between a climatic index (North Atlantic Oscillation - NAO) and albacore year-class strength (SCRS/97/40).

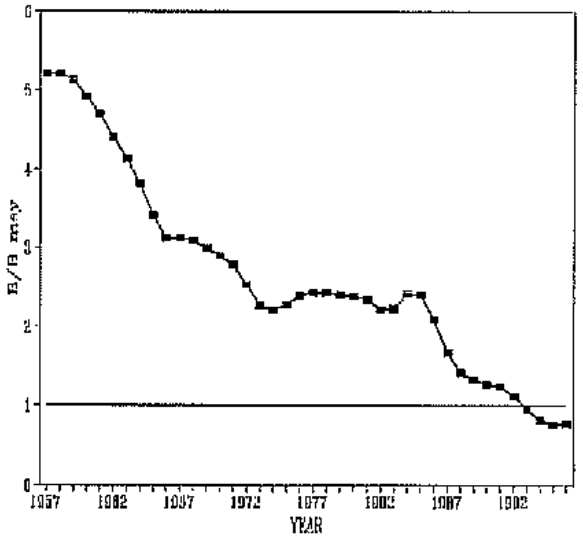


1995 selectivity (after retrospective adjustment)

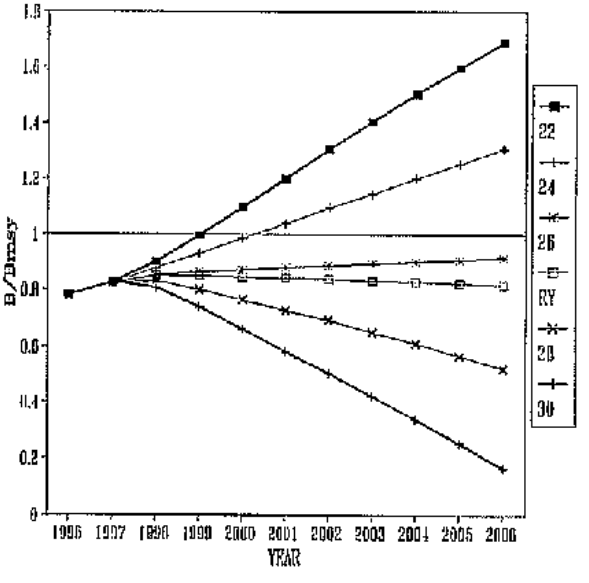
ALB-Fig. 6. Yield per recruit (YPR) and spawning potential ratio (SPR), north Atlantic albacore.



ALB-Fig. 7 Standardized CPUE series used in the base case stock assessment for the south Atlantic albacore stock.



ALB-Fig. 8. Ratio of biomass to the biomass at MSY, estimated by ASPM (base case) for the southern stock.



ALB-Fig. 9 Trajectories for rate of biomass to biomass at MSY, fishing mortality to F_{MSY} and catch levels for each options for south Atlantic albacore.

BFT - BLUEFIN TUNA

The SCRS conducts Atlantic bluefin tuna stock assessments based on the assumption of two distinct stocks, west and east Atlantic (including the Mediterranean Sea), although some mixing occurs between the two stocks (**BFT-Figure 1**). Since even minor mixing could, in principle, have a marked effect on stock assessments based on two distinct stock assumptions, due to the difference in population size between the two stocks, the SCRS also conducts sensitivity analyses based on the mixing models. However, mixing models and the available data are not yet considered sufficient to be reliable. Nevertheless, the Committee believes that assessments assuming no mixing should be reasonably robust, if adequate management approaches are applied to both the eastern and western Atlantic management units.

The reported total landings of Atlantic bluefin in 1994 reached an historical high (revised to 45,438 MT from the previously estimated 40,697 MT, based on revisions to reported catches and estimates of non-reported catches) which exceeded the previous maximum historical catch of 37,047 MT in 1955 (**BFT-Table 1, BFT-Figure 2**). The 1995 and 1996 and reported catches (41,799 MT and 42,964 MT, respectively) were slightly lower than the estimated 1994 catch, but are the third and second highest on record. As a number of countries did not report 1996 catches, the estimate for 1996 should be considered provisional and subject to revision. Catch estimates for previous years are also likely to be revised somewhat as some countries (e.g. Croatia) have instituted reviews of national fisheries statistics reported to ICCAT. The dramatic increase in total Atlantic bluefin catches in 1994, 1995, and 1996 was due to increases in the catch from the east Atlantic stock, as the west Atlantic catch has been limited, by quota, to a low level (2,000-2,700 MT) since 1982. In addition, the Committee estimates that there is a high and possibly increasing level of non-reported catch based on comparisons between national reports and Japanese import statistics as documented through the ICCAT Bluefin Tuna Statistical Documentation system (estimated as NEI catch in **BFT-Table 1**). For 1994, 1995, and 1996, the estimated levels of non-reported catch were 8,049 MT, 6,743 MT, and 9,429 MT, respectively.

BFT-1. Biology

Present fisheries for Atlantic bluefin tuna are distributed from the Gulf of Mexico to Newfoundland in the west Atlantic, from roughly the Canary Islands to south of Iceland in the east Atlantic, and throughout the Mediterranean Sea (**BFT-Figure 1b**). In 1982, the Commission established a line for separating the east and west Atlantic management units (**BFT-Figure 1**). A recent review of ICCAT tagging data, conducted in 1994, showed that a small number of fished tagged in the east have been recaptured in the west and *vice versa*.

Atlantic bluefin tuna can grow to over 300 cm and reach 650 kg. The oldest age considered reliable is 20 years, based on an estimated age at tagging of 2 years and about 18 years at liberty, although it is believed that bluefin tuna may live to older ages. Bluefin tuna in the western Atlantic grow more slowly, generally reach a larger maximum size, and mature at an older age compared to bluefin caught in the eastern Atlantic. Bluefin in the west are assumed to first successfully spawn at age 8 compared to age 5 in the east.

In the west Atlantic, bluefin tuna spawn from mid-April through mid-June in the Gulf of Mexico and in the Florida Straits. Juveniles are thought to occur in the summer over the continental shelf, primarily from about 34°N to 41°W and offshore of that area in the winter. In the east Atlantic, bluefin tuna generally spawn from late May to July according to spawning area, primarily in the Mediterranean, mainly around the Balearic Islands, Tyrrhenian Sea, and central Mediterranean where the sea-surface temperature of the water is about 24°C. Distribution expands with age; large bluefin are adapted for migration to colder waters. Bluefin tuna are opportunistic feeders, with fish and squid common in their diet.

BLUEFIN TUNA - WEST

BFTW-2. Description of fisheries

The Japanese longline fishery catches in the west Atlantic increased slightly in 1996 to 436 MT. The Canadian reported landings also increased in 1996 to 598 MT, reflecting the quota increase to 613.5 MT as a result of the 77.9 MT carry-over from 1995. Reported U.S. fisheries catches in 1996 decreased slightly to 1,283 MT exclusive of

discards. The winter-spring fishery that developed off Cape Hatteras, North Carolina, in 1994 and 1995, continued in 1996. Most fish caught in this fishery were tagged and released. Some fish were tagged with archival and/or satellite uplinked pop-up tags. To date, recoveries from almost all the latter and two of the former have been made, although the data from these have not yet been fully analyzed and are not yet available to the Committee. Catch rates were quite high relative to the summer-autumn catch rates in the northeastern U.S. rod and reel fishery.

From 1992 through 1996, west Atlantic catches (including reported discards) were 2,114, 2,309, 2,105 and 2,426 MT, and 2,394 MT respectively, compared to about 2,500 to 3,000 in the previous five years (1987-1991) **(BFT-Table 1; BFT-Figure 2)**.

BFTW-3. State of stocks

No new assessment analyses on the state of the stock were conducted, thus the text from the 1996 Committee report is repeated. The most recent (1996) assessment of western Atlantic bluefin tuna was carried out based on methodology agreed in the Bluefin Methodology Session held in April 1996 (SCRS/96/14) prior to the assessment session. In the 1996 assessment, in addition to virtual population analyses (VPA), an age-specific production model (ASPM) was also used, in particular, to estimate MSY and the associated spawning stock biomass level by incorporating historical catch and CPUE data before 1970.

Two VPA cases were considered. Also, two production model runs were set up with selectivities corresponding to those for the two VPA runs, and gave similar relative abundance trends to those obtained from the VPA (see **BFT-Figure 3**). The production model estimates of MSY for the current selectivity pattern in the fishery were in the 5,000-6,000 MT range. For reasons given in the 1996 Detailed Report, the VPA runs were considered to give the more reliable estimates of current resource status, and the first of these runs was adopted as the base case. Based on considerations of the production model results, the spawning biomass in 1975 in the VPA base case run was taken to be representative of the MSY level.

The results of this 1996 base case assessment generally show similar trends to previous assessments **(BFT-Figure 4)**. Recruitment was generally higher from 1970 to 1976 than it has been since. It was essentially stable over the 1980s, until there was a stronger 1989 year-class. Recent estimates of recruitment are lower, but are estimated less precisely for the last few years of the analysis. Related to the strong 1989 year-class, the abundance of ages 6-7 shows a corresponding increase in recent years. The abundance of ages 8+ declined steadily until 1992, the lowest level observed, with a subsequent slight increase . The assessment shows the spawning biomass (age 8+) estimated for 1995 to be 13% of that which produces MSY, while the 1996 value is expected to be slightly larger.

The fishing mortality rate on large fish increased steadily in the 1970s until the implementation of regulations in 1982 **(BFT-Figure 5)**, at which time the fishing mortality rate was reduced considerably. However, fishing mortality began increasing again in the 1980s until it peaked in 1991 at a level higher than occurred in the 1970s. The fishing mortality rate since 1993 has been somewhat lower. Fishing mortality rates for age 1 remained at a low level from the mid-1980s. Estimated rates in recent years should be judged with caution since such VPA estimates are generally imprecise.

Although no new assessment analyses were conducted by the Committee in 1997, several catch rate time series were updated for consideration by the Committee. Preliminary estimates of catch rates for large fish in the northeastern U.S. rod & reel and handline fishery in 1996 indicated increases that are consistent with the 1996 VPA predictions of a relatively strong 1989 year class entering into this fishery. The relative strength of this year class was first indicated in the Japanese longline catch rates when it entered that fishery in about 1992.

BFTW-4. Outlook

No new analyses were conducted by the Committee relative to the outlook for western Atlantic bluefin tuna, thus the text from the 1996 Committee report is repeated herein. Base case projections* for the west Atlantic **(BFT-Figures**

* All projection results discussed in the Executive Summary correspond roughly to median values (with about a 50:50 probability of better or worse outcomes) and they assume that the constant annual catch level associated with the projections is maintained, unless otherwise stated in the text.

6,7) indicate that a catch of 2500 MT is sustainable, and that the spawning stock will show a net increase over a period of about 20 years to twice the size in 1995. Transient effects, as a consequence, in particular, of the strong 1989 year-class, are evident **(BFT-Figures 6,7)**. The projections indicate that a catch of 3000 MT cannot be sustained. Furthermore, in order for the spawning stock to recover to the MSY biomass level of 1975 within about 20 years, the catch must be reduced to less than 500 MT.

When making decisions on these projections, the Commission should be aware that assessments (including those reported here) are inherently uncertain. Many sources of uncertainty are considered in the Detailed Report. The fact that the VPA projections are based on a stock-recruitment function which reflect recent low levels of recruitment is particularly important when considering long term (10-20 years) projections relative to the MSY biomass level. One of the reasons to rebuild the spawning stock is to increase the likelihood of better recruitment in the future. If this occurs, rebuilding will be more rapid and could occur at a higher catch level than indicated in the base case projections. On the other hand, low levels of recruitment in recent years may reflect factors other than spawning stock size (such as unfavorable environmental conditions). This hypothesis was not investigated, so the Committee has no basis for concluding that it applies to west Atlantic BFT. However, unless recruitment in the future increases above the levels assumed in the projections, rebuilding to the 1975 level of biomass will be difficult and the 1975 biomass level may not be appropriate to produce MSY.

BFTW-5. Effects of current regulations

The Committee noted that, in 1974, the Commission recommended that fishing mortality on bluefin tuna in the entire Atlantic and Mediterranean be limited to recent levels **(BFT-Figure 5)**. This recommendation entered into effect in 1975, but has had no effect since it was not adhered to.

The total 1996 catch in the west Atlantic was 2,395 MT, of which 2,321 MT were landed (73 MT reported discarded dead). This is slightly above the recommended catch of 2,200 MT, though a portion of this overage may be accounted for by the carry over of unused 1995 quota. The recommended quotas were 2,660 MT for 1983-1992, a total of 4,788 MT for 1992-1993 combined (average of 2,394 MT per year), 1,995 MT for 1994, 2,200 MT for 1995, and 2,200 MT for 1996 (with the provision of carry over of unused 1995 quota or deduction of overage). The total landings, not including dead discards, were 2,278 MT in 1993, 2,029 MT in 1994, 2,285 MT in 1995, and 2,321 MT in 1996. Therefore, the catch limits have been followed fairly well.

A regulation prohibiting the catching and landing of bluefin tuna less than 6.4 kg in all areas went into effect in 1975, with a tolerance of 15% (by number) for incidental catches. The catch of fish less than 6.4 kg has been well below the level of 15% of the total bluefin catches in the west Atlantic. The modified regulation limiting catches of fish less than 30 kg or 115 cm to no more than 8% (by weight) of the catch went into effect in 1992. From 1992-1995 three to six percent of the total catch by weight has been below that size. As estimates of 1996 catch at size for bluefin were not made by the Committee, no information on effectiveness of this regulation in 1996 is yet available.

BFTW-6. Management recommendations

No new management recommendations for west Atlantic bluefin tuna are offered by the Committee. For completeness, the text of the 1996 Committee report is repeated herein. The most recent (1996) assessment of western bluefin showed that the 1995 age 8 and older mid-year biomass was about 13% of the 8+ biomass estimated for 1975. In 1995, the Commission requested development of recovery options aimed at achieving a 50% probability of reaching levels which would support MSY in 10, 15 and 20 years. Projections indicate that a catch of 2,500 MT is sustainable, and that the spawning stock will show a net increase over a period of about 20 years to twice the size in 1995. However, the projections indicate than an annual catch of 3000 MT cannot be sustained and that there is a 10% probability of radical reduction by 2004 (assuming it is possible to exert a high enough fishing mortality rate to maintain a constant catch of 3,000 MT as the stock declines). In order for the spawning stock to recover to the MSY biomass level of 1975 within about 20 years, the projections indicate that the catch must be reduced to about 500 MT.

When making decisions based on these projections, the Commission should be aware that there are many sources of uncertainty (which are discussed in the Detailed Report). In particular, assumptions that have to be made about the relationship between stock and recruitment make long-term projections relative to MSY particularly uncertain. In this case, for those projections that show an increase in spawning stock biomass towards the MSY level, the rate of recovery will probably be more rapid than indicated.

On the basis of the projection analyses, the Committee recommended that approximately the current catch level be maintained if the Commission is satisfied with a 50% probability of having slowly increasing 20-year trends in spawning stock size. If the Commission wants to be reasonably sure (i.e., have 90% probability) of at least maintaining the status quo, the catch should be reduced to approximately 2,000 MT. But if the goal is to move more rapidly (i.e., within 20 years) to levels that historically could have produced the MSY, the current catches should be reduced substantially.

BLUEFIN TUNA – EAST

BFTE-2. Description of the fisheries

The east Atlantic bluefin fisheries (including the Mediterranean) are characterized by a variety of vessel types and fishing gears with landing sites located in many countries. Therefore, the landing statistics are difficult to obtain, particularly for the east Atlantic and even more so for the Mediterranean. Old statistics show there were important catches since more than ten centuries ago, with catches of more than 10,000 MT in the past and an average of 30,000 MT in the 1950-65 period. Certain fisheries, such as the traps, go back to ancient times. Other fisheries, such as the Mediterranean purse seine fishery, reached full development in the mid-1970s. Based on estimates of 1996 catches, the most important catches, in descending order were from: baitboat, longline, and traps for the east Atlantic; and from purse seine and longline for the Mediterranean.

The total catch taken from the preliminary landings for the east Atlantic and the Mediterranean in 1996 amounted to 40,490 MT, which is an increase of more than 1,000 MT as compared to reported catches for 1995. The 1996 reported level is second only to the reported 1994 peak landings of 43,249 MT **(BFT-1 and BFT-Figure 2)**.

In the Mediterranean, the total reported catch amounted to 29,173 MT in 1996, as compared to 29,484 MT in 1995. The catch levels between the two years are thus comparable; however, the Committee notes that the 1996 reported catches have decreased while unreported catches (NEI, **BFT-Table 1**) have increased. The French purse seine catches in the Mediterranean have increased, from an average of 4,700 MT in the last ten years to 11,800 MT in 1994. The 1995 and 1996 reported French purse seine catches are at about 6,000 MT. Reported Mediterranean catches have declined about 44% from 1995 to 1996. Meteorological conditions, changes in fishing power, and in stock abundance may be determining factors in the success or failure of the fishing season conducted around the Balearic Islands on large fish. Longline activity seems to have increased again, in terms of the number of large longliners with or without flags, as well as in the development of small vessels. The high demand for the Japanese market is without a doubt the reason for this development.

Eastern Atlantic catches (excluding the Mediterranean) show an increasing trend since 1987, with a 30 year historical high in 1996 of 11,317 MT. Spanish baitboat landings, after the good season in 1993, returned in 1994 to the level of previous years (1,999 MT), and increased again, with 2,878 MT and 4,967 MT in 1995 and 1996, respectively. The 1996 baitboat landings are the highest reported for this fishery. The large catches of small fish aged 1 to 3 (5 to 25 kg) in the Bay of Biscay by this fleet in 1996 was in part due to a transfer of activity of a portion of the Spanish albacore fleet redirecting effort towards bluefin tuna during the months of June and July and might also relate to a relatively strong 1994 year-class observed in the Mediterranean. Since 1994, the Japanese longliners continue to exploit a new fishing zone in the north Atlantic around 60°N and 20°W, in addition to the traditional sectors.

BFTE-3 State of the stocks

No east Atlantic stock assessment has been conducted in 1997. For completeness, the text from the 1996 Committee report is repeated herein.

The status of the east Atlantic bluefin stock is based on the assumption of an eastern stock with no mixing (see 1995 SCRS Report, section BFTW-3). The VPA base case assessment adopted was developed similarly to the base case for the west Atlantic assessment. The age-specific production model application to the east could not be sufficiently refined to provide reliable results, so that an estimate of the spawning stock level associated with MSY had to be evaluated based upon the fishing mortality level (F_{max}) which provides a maximum yield per recruit under the recent pattern of selectivity in the fishery. This estimated MSY level should accordingly be considered less reliable than that for the west Atlantic.

The estimate of MSY associated with spawning stock biomass at MSY is about 40,000 MT. It may seem surprising that the stock is estimated to be below the associated MSY spawning biomass level in circumstances where catches from 1950 to 1995 have all been below this estimate of MSY. The reasons for this are two-fold: (1) The MSY estimate of about 40,000 MT is based on the average recruitment to the fishery from 1981 to 1992; earlier recruitments to the fishery over the 1970s were about 50% lower on average (and hence suggest an effective MSY over that period, given the current selectivity pattern, of only about 20,000 MT); and (2) past high catches of small fish have prevented the stock from achieving its optimum potential for productivity. Since the current spawning stock biomass is estimated to be only 19% of the MSY level, the MSY of 40,000 MT would not be currently sustainable.

The assessment portrays a declining number of 8+ fish, but also indicated generally increasing numbers of younger fish since 1985 except for the most recent years **(BFT-Figure 8)**. Fishing mortality rates are estimated to have increased considerably during the 1970-1995 period. Fishing mortality on the youngest ages (2-4) shows a lesser increase than do the mortalities for older age groups, especially in the most recent years **(BFT-Figure 9)**. Estimates in recent years should be judged with caution since such VPA estimates are generally imprecise.

The Committee reviewed several indices of stock status for the east Atlantic bluefin. The abundance index of age 2 fish (8-15 kg) in the Spanish baitboat fishery in the Bay of Biscay, returned to the average level of the last 15 years, after the drop in 1994. High catches and high catch rates of age 1 fish in 1996 in the Bay of Biscay indicate that the 1995 year-class may be the strongest observed since 1988. Low catches and catch rates, particularly from 1996 age 0 tagging cruises, indicate a weak 1996 year-class in the entire western Mediterranean basin.

BFTE-4 Outlook

No new analyses were conducted by the Committee. The text from 1996 is repeated herein.

The base case projections **(BFT-Figure 10)** for the east Atlantic indicate that a catch of 25,000 MT is sustainable, and that the spawning stock will show a gradually increasing trend over a period of 20 years to about three times the size in 1995. However, the projections indicate that an annual catch of 30,000 MT is not sustainable, and that the current catch level has a high probability (90%) of resulting in a radical reduction of the spawning stock in 10 years. In order to rebuild to the biomass level believed to be associated with MSY in about 20 years, the annual catch should be reduced to about 20,000 MT.

It should be noted that the projection results in this Report are based on recruitment levels since 1981 which, on average, are higher than in earlier years. The reason for this difference in recruitment levels is unknown, but unless these higher levels of recruitment continue, sustainable yield levels, MSY estimates, and the level of biomass that produces MSY will be lower. If future recruitment is lower than the average level since 1981, a catch of 20,000 MT may be too high to allow rebuilding of the MSY biomass level, even though the level of biomass that produces MSY will be lower.

The Committee continues to be concerned about the intensity of fishing pressure on small fish. This contributes substantially to growth over-fishing, and it seriously reduces the long term potential yield from the resource even if spawning biomass is increased to the MSY level.

BFTE-5. Effect of current regulations

In 1974, the Committee recommended limiting bluefin tuna fishing mortality in the entire Atlantic and in the Mediterranean to recent levels. This recommendation entered into force in 1975, but it has not had any impact since the measure has never been respected.

Another regulation prohibits the catch and landing of bluefin tuna of less than 6.4 kg in the entire Atlantic, with a 15% tolerance (in number) for incidental catches. The percentage of fish less than 6.4 kg remains high in the eastern Atlantic and in the Mediterranean, attaining an average of 40% and 35%, respectively, between 1986 and 1995. In the eastern Atlantic, even though the percentage is variable, a significant decline had been observed up to 1993 (15%), which was followed by an increase in the percentage to 50% in 1995. While information is not available on all the sizes of fish caught in 1996, it is likely that this proportion has remained high during this last year. In the Mediterranean, the percentage has undergone strong variations, while it seems to stabilize at about 30% for the years 1990-95. The catches of age 0 fish are always very important, clearly under-estimated, and the regulation on the landings of fish weighing less than 1.8 kg was not complied with through 1995. In 1996, however, catches of age 0 fish were likely lower than in prior years and may reflect a weak 1996 year-class. The percentage of these under-sized fish in 1995 and earlier could be even higher than that indicated by the official statistics. The market for these small tuna is flourishing, as is that for large fish, which could cause certain fishermen to not limit their catches of juveniles.

A recommendation, which entered into force on June 1, 1994, prohibited large pelagic longliners of more than 24 m in length from fishing in the Mediterranean during the months of June and July. The objective of this regulation is to limit fishing mortality. However, some large longliners have been seen carrying out fishing activities in June and July, 1994, 1995 and 1996.

The regulations concerning a 25% reduction in catches from now to the end of 1998, based on the catch levels of 1993 or 1994, entered into force on June 1, 1995. **BFT-Table 1** shows that the quotas attributed to 1998 seem currently to have been surpassed considerably for certain countries. At the same time, an increase is noted in unreported catches, especially in the Mediterranean.

In 1996, the Commission recommended regulatory measures for east Atlantic and Mediterranean bluefin tuna fisheries. These recommendations entered into force on August 4, 1997. The effectiveness of these regulations will be evaluated in future meetings. However, the Committee notes new information on the size structure from purse seine fisheries in the Adriatic; the Commission may wish to re-examine the August closure dates for this area of the Mediterranean Sea. The Committee also noted that a recent European Community regulation limits the length of longline to 60 km for EC member nations fishing in the Mediterranean.

BFTE-6. Management recommendations

No new managements recommendations for east Atlantic and Mediterranean bluefin tuna are offered by the Committee. For completeness, the text of the 1996 Committee Report is repeated herein.

The Committee expressed grave concern about the status of east Atlantic bluefin tuna resources in the light of assessment results and the historically highest catches made in 1994 and 1995 (nearly 40,000 MT). Future catch levels of 30,000 MT, or more, are not sustainable. The projections indicate that catches of 25,000 MT or less could result in stock growth. However, **BFT-Figure 10** indicates that the range of possible outcomes is quite large. If the Commission wishes to rebuild the spawning stock to the level of the MSY biomass within about 20 years, the projections indicate that the catches must be reduced to about 20,000 MT. If the time period is to be shorter, the catches must be reduced further (**BFT-Figure 10**). It should be noted that even these results may be optimistic since they assume that future recruitment continues at the average level observed since 1981. This average level is higher than the average level of recruitment before 1981.

Given the unexpectedly large increase in catches in 1994 and 1995, combined with the results of the present analyses, the Committee considers that a 35% reduction in catches from the 1994 to 1995 levels (i.e., to about 25,000 MT) is necessary to maintain the stock at the status quo or to allow slow increases in stock size with a 50% probability. If the Commissioners want to be reasonably sure (i.e., have 90% probability), of at least maintaining the status quo, the catch should be reduced to about 15,000 MT.

The Committee is concerned about the high catch of small individuals and recommended that every effort be made so that the current measures on the size limit of 6.4 kg be adhered to. The Committee reiterated that effective measures be taken to avoid catches of age 0 fish (<1.8 kg), and not allow any tolerance with respect to the percentage (in number) of age 0 fish in the landings.

It should also be noted that the grave condition of the east Atlantic stock and fishery could adversely affect recovery in the west Atlantic. Mixing models indicate that even a relatively low rate of mixing could be important, although these models are not yet reliable enough to quantify the effect.

Finally, the Committee is gravely concerned about the lack of basic catch and effort statistics for the Mediterranean Sea. In addition, the increase in NEI in 1995 is mainly due to the fact that some fleets land their catches at foreign ports (including ICCAT member country ports). This is the case for major purse seine and longline fisheries. Because, in addition, bluefin tuna catches in the east Atlantic are predominantly from the Mediterranean, it is difficult to conduct stock assessment for the east Atlantic management unit and to give clear advice to the Commission. Countries engaging in purse seine and longline fishing in the Mediterranean Sea must take immediate and effective action, including at least implementing a proper logbook system and size sampling.

ATLANTIC BLUEFIN TUNA SUMMARY

	West Atlantic	*East Atlantic*
Current (1996) Catch	2,394 MT (discards included)	40,490 MT
Current (1995) Sustainable Yield	about 2,500 MT	about 25,000 MT
Maximum Sustainable Yield (MSY)[1]	5,000-6,000 MT	40,000 MT (not well estimated)
Relative Spawning Stock Biomass (B_{1995}/B_{MSY})[2]	0.13 (ages 8+)	0.19 (ages 5+)
Relative Number (N_{1995}/N_{1975})	0.17 (ages 8+)	0.95 (ages 5+)
Management Measures in Effect	–No landing of fish <6.4 kg, with a 15% tolerance. –Fishing mortality not to exceed *circa* 1975 level. –Limit catches <115 cm (30 kg) to no more than 8% by weight. –Total catch limit of 1,995 MT in 1994 and 2,200 MT in 1995 and 1996.	--No landing of fish <6.4 kg, with a 15% tolerance. –Fishing mortality not to exceed *circa* 1975 level. –No longlining in Med. in June-July by vessels>24 m. –1995 catches <1993 or 1994. –A progressive 25% reduction over 3 years starting in 1996 on 1993 or 1994 catches. –No landing of fish <1.8 kg, with no tolerance, commencing 1995.

1 For the most recent age-specific selectivity pattern in the fishery.

2 For west $B_{MSY} = B_{1975}$; for east B_{MSY} based on F_{max}.

BFT-Tab. 1. Reported catches and discards of bluefin tuna by region, major gear categories and fleet [illegible], compared with the restrictions adopted by the Commission.

[illegible]	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Base for Quota*	1995	1996	Quota for 1998**
TOTAL	15924	17461	14634	14607	24516	26249	28168	25464	20409	18478	19904	19617	23820	24202	26716	26836	22828	20668	27280	24874	24950	27056	27298	30021	45438		41799	42964	
EAST+MED	10458	10870	10686	10736	19123	21217	22285	18770	14646	12223	14103	13846	22375	21660	24424	24151	20506	18077	24269	22007	22152	24064	25184	27712	43249		39255	40490	
LONGLNE	343	383	497	611	4630	4286	3266	2398	886	947	1231	885	4215	3575	2713	1742	1407	1630	2335	1908	2343	5572	5680	6297	8905		12675	14946	
BAITBOAT	3017	3055	3032	3142	2348	2991	1803	2881	3904	2128	1874	1653	1010	3032	4647	2644	2253	2128	2682	2683	2018	1796	1624	4048	2285		3299	5357	
PURSE SEINE	3062	4502	5045	5256	9574	11677	14830	10989	7556	6369	8978	8795	12786	10746	10302	13494	11076	8755	11365	10512	11156	12259	13235	12927	26132		15271	15594	
TRAP	3180	2211	1837	1546	2382	2027	2008	1717	1458	1350	1251	1446	3673	3274	4507	2390	1740	1953	3658	2789	3814	2385	2071	1827	3469		2072	1717	
OTHERS	856	719	275	181	189	236	378	789	842	1429	769	1067	691	1033	2255	3881	4030	3611	4229	4115	2821	2200	2732	2661	2458		4086	1866	
EAST ATLANTIC	5764	4675	4732	4685	6067	9976	5212	6977	5800	4767	4064	3331	6669	8010	7392	4759	4491	4432	6950	5323	5935	6735	7384	9076	7225		9771	11272	6649
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP. [illegible]	46	12	2	1	12	5	3	2	0	3	5	6	16	2	0	0	0	0	0	0	0	0	0	6	20	20	8	61	15
DENMARK	0	1	0	2	1	0	3	1	3	1	0	4	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	3785	2975	2542	3106	1648	2447	2002	2914	4025	3541	2335	2247	2824	4445	4804	3630	2876	2476	4567	3565	3557	2272	2367	5078	3137	5078	3819	6174	3809
FRANCE	732	680	740	551	522	692	267	592	723	275	260	153	150	400	602	490	348	533	724	460	510	565	894	1099	336	***	725	563	400
GERMANY F.R	14	1	6	2	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREECE	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	3
JAPAN	21	157	240	44	2195	2900	1973	1594	577	630	880	515	2573	2609	1514	420	739	900	1169	838	1464	2981	3350	2484	2075	2484	3971	3341	1863
KOREA	0	0	19	43	36	15	3	2	0	1	0	0	0	3	0	77	0	0	0	0	0	0	0	0	4	4	205	92	3
LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	312	0	0	0	0	0	0
MAROC	692	93	653	513	597	2624	331	884	36	206	161	177	993	365	171	86	288	356	437	451	303	795	423	276	502	502	565	650	377
NORWAY	470	653	430	420	865	988	529	764	221	60	282	161	50	1	243	0	31	0	0	0	0	0	0	0	0	0	0	0	0
POLAND	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	191	303	24	14	56	35	24	17	41	174	34	29	193	163	48	3	27	117	38	25	240	240	34	196	180
SWEDEN	4	3	0	0	0	2	8	2	2	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UNITED KINGD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
UNREPORTED CATCHES																													
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	4	0	5	6	74	4	0	0	0	0	0	0	0
NEI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	911	0	159	0	0
NEI-105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	189	71	0
NEI-71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	0	0	0	0	0
NEI-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	108	0
NEI-28	0	0	0	3	0	0	69	208	156	14	117	48	12	0	17	22	11	4	0	0	0	0	0	0	0	0	19	16	0
MEDITERRANE	4694	6195	5954	6051	13056	11241	17073	11793	8846	7456	10039	10515	15706	13650	17032	19392	16015	13645	17319	16684	16217	17329	17800	18636	36024		29484	29218	17953.25
ALGERIE	100	100	1	0	33	66	49	40	20	150	190	220	250	252	254	260	566	420	677	820	782	800	304	304	304	304	304	304	228
CHIN.TAIP. [illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	328	709	709	494	411	532
CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	538	347	176	389	389	408	1410	292

BFT-Tab. 1. Reported catches and discards of bluefin tuna by region, major gear categories and fleet , compared with the restrictions adopted by the Commission.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Base for Quota*	1995	1996	Quota for 1998**
CYPRUS	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	14	0	14	0	0	11
ESPANA	349	182	212	420	203	120	253	158	165	115	133	354	989	812	2743	1460	701	1178	1428	1645	1822	1392	2165	2018	2711	2711	4607	2588	2033
FRANCE	1100	2200	1100	1400	1800	1600	3800	3182	1597	1578	1701	2350	4878	3660	3600	5430	3490	4330	5780	4434	4713	4620	6000	4760	11843	***	6357	6058	4850
GREECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	131	99	102	131	155	123	92	92	362	362	612	355	272
ITALY	2264	2480	3718	3167	6839	7083	10369	6263	4983	4020	6272	6017	6658	5865	7140	7199	7576	4607	4201	4317	3734	3500	4651	4802	5526	5526	5195	4345	4145
JAPAN	0	0	112	246	2195	1260	968	520	61	99	119	100	961	677	1036	1006	341	280	258	127	172	85	123	793	536	793	813	765	595
KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	684	458	591	513
LIBYA	500	600	449	475	1469	780	799	336	677	424	398	271	310	270	274	300	300	300	300	84	258	290	338	546	1332	1332	1332	732	999
MALTA	0	0	0	0	21	37	25	47	26	23	24	32	40	31	21	21	41	36	26	34	66	63	94	151	344	344	293	293	258
MAROC	0	79	37	1	9	40	1	7	0	2	0	2	0	1	4	12	56	116	140	295	588	29	84	6	338	338	15	8	254
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	278	320	183	428	428	446	274	321
TUNISIE	153	206	57	52	136	83	66	131	141	262	228	218	298	293	307	369	315	456	624	661	406	1366	1195	1132	2382	2382	851	851	1787
TURKEY	138	22	68	66	34	17	181	177	127	27	391	565	825	557	869	2230	1524	910	1550	2809	2137	2436	679	1155	998	1155	999	999	866
YUGOSLAVIA	90	326	200	224	317	155	562	932	1049	756	573	376	486	1222	755	1084	796	648	1523	560	940	0	0	0	0	0	0	0	0
UNREPORTED CATCHES																													
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	19	0	168	255	700	757	415	1750	1349	1624	0	0	0	0	0
NEI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	49	49	0	0	0	0	0	0
NEI-134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145	0	398	0	0
NEI-21 ****	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5371	0	4035	1989	0
NEI-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0
NEI-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	135	0	22	76	0
NEI-81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	0	0
NEI-105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	282	0	240	1990	0
NEI-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	76	0	220	4335	0
NEI-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	513	1129	0	1274	813	0
WEST ATLANTI	5466	6591	3948	3871	5393	5032	5883	6694	5763	6255	5801	5771	1445	2542	2292	2685	2322	2591	3011	2867	2798	2992	2114	2309	2105		2426	2394	
CATCH RETAI	5466	6591	3948	3871	5393	5032	5883	6694	5763	6255	5801	5771	1445	2542	2292	2685	1808	2399	2796	2605	2665	2793	2070	2278	2029		2285	2321	
CATCH DISCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	514	192	215	262	133	199	44	31	76		141	73	
LONGLNE	268	1390	339	1127	946	1522	3066	3752	3217	3691	3972	3879	576	1184	1095	1366	803	1166	1641	1243	1143	1342	1077	980	741		728	820	
PURSE SEINE	4288	3769	2011	1656	960	2320	1582	1502	1230	1381	758	910	232	384	401	377	360	367	383	385	384	237	300	295	301		249	245	
TRAP	53	47	29	13	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
OTHERS	857	1385	1569	1075	3467	1190	1235	1440	1316	1183	1071	982	637	974	796	942	645	866	772	977	1138	1214	693	1003	987		1308	1256	
ARGENTINA	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	6	0	2	0	1	2	0	0	0	0		0	0	
BRASIL-JPN	0	0	0	0	0	0	0	0	14	10	2	3	1	1	0	1	0	2	0	2	1	0	0	0	0		0	0	
CANADA	1442	1082	477	1018	768	641	846	972	670	245	324	425	291	433	264	142	41	50	393	619	438	485	443	459	392	535.6	576	597	552.6
CANADA-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	33	0	0	0	0	0	0	0		0	0	
CHIN.TAIP.	2	13	7	2	20	1	0	1	1	49	15	7	11	2	3	3	3	0	0	0	0	0	0	0	0		0	0	
CUBA	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
JAPAN	66	1375	321	1097	905	1513	2902	3658	3144	3621	3936	3771	292	711	696	1092	584	960	1109	468	550	688	512	581	427	335.0	387	436	453.0
KOREA	0	0	11	23	20	8	7	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	

BFT-Tab. 1. Reported catches and discards of bluefin tuna by region, major gear categories and fleet[ ], compared with the restrictions adopted by the Commission.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Base for Quota*	1995	1996	Quota for 1998**
MEXICO	0	0	23	29	39	24	37	14	28	22	10	20	14	0	0	0	0	0	0	0	0	0	0	0	4		0	0	
NORWAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
PANAMA	0	0	0	2	0	0	157	92	58	10	9	14	12	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
POLAND	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	14	14	14	0	43		9	3	
TRINIDAD & T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0		0	0	
U.S.A	3756	4119	3109	1698	3638	2845	1931	1956	1848	2297	1505	1530	807	1394	1320	1424	1142	1352	1289	1483	1636	1582	1084	1237	1163	1311.4	1311	1284	1344.4
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	1	3	0	9	16	6	0	2	0	0	1	0	1	0	2.0	2	1	4.0
UNREPORTED CATCHES																													
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	14	1	0	0	0	0	0	30	24	23	17	0	0		0	0	
DISCARDED CATCHES																													
CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0		0	0	
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	514	192	215	248	133	199	44	31	76		141	73	
AREA UNKNOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84		118	80	
CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	???	118	80	???

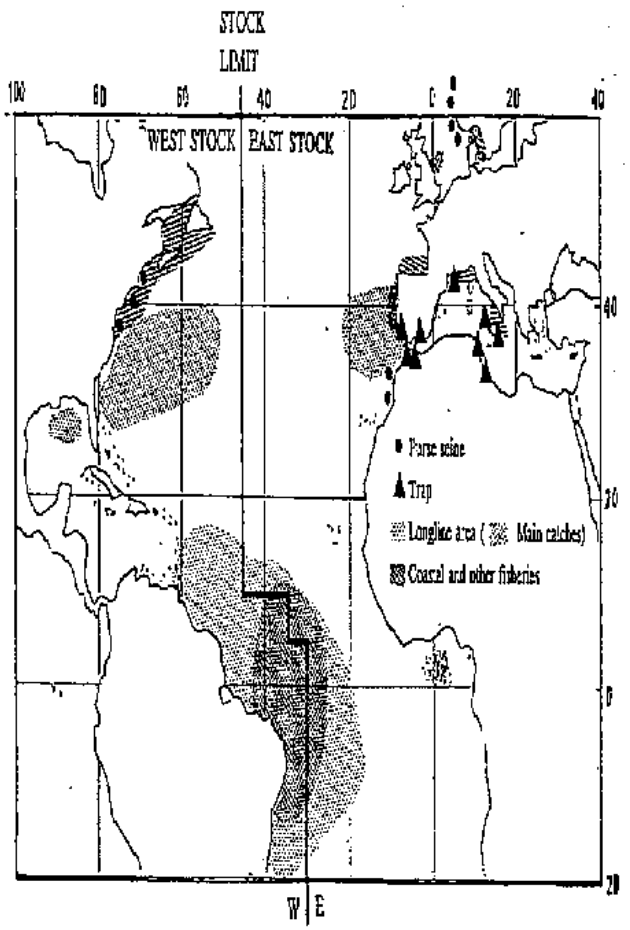
* 1993 or 1994, whichever is higher (see ICCAT Recommendation on BFT catch limits in the E. Atl. and Mediterranean).

** 25% reduction of the base for quota (see ICCAT Recommendation on BFT catch limits in the E. Atl. and Mediterranean).

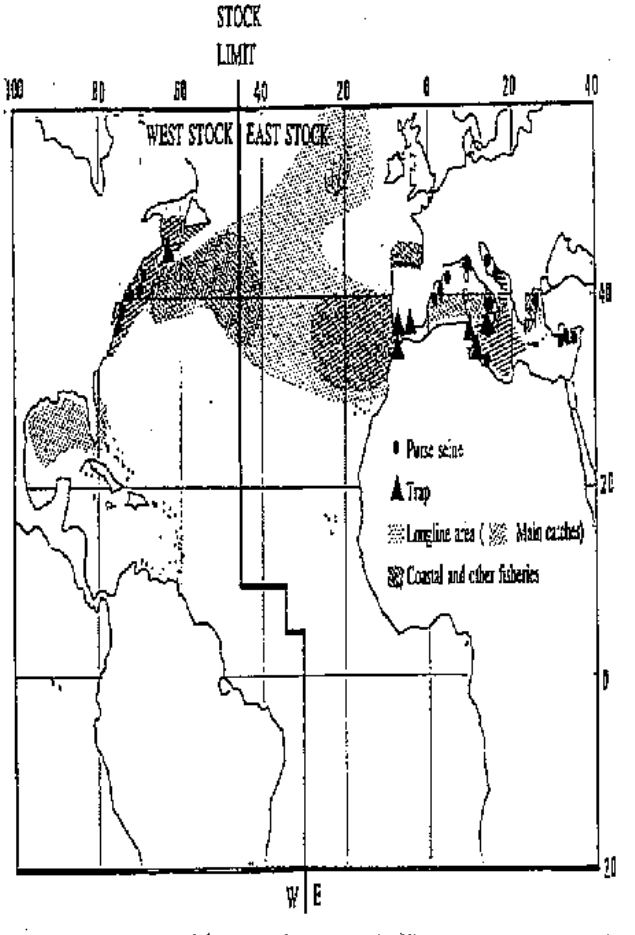
While this table shows East Atlantic and Mediterranean catches separately, to arrive at the total quotas for East Atlantic Stock, those shown for the East Atlantic and Mediterranean should be combined.

*** Because of exceptional level of French catches in 1994, ICCAT agreed to use a different scheme for that country.

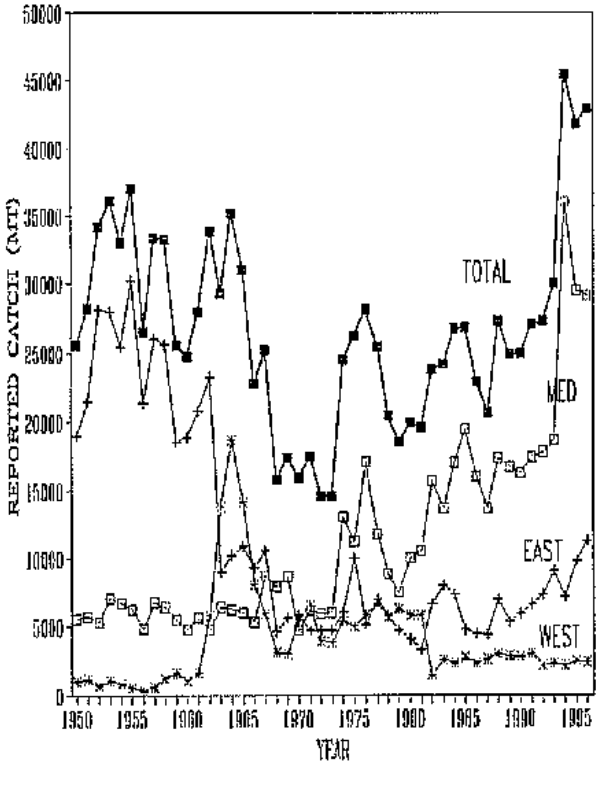
**** NEI catches can include landings from several countries



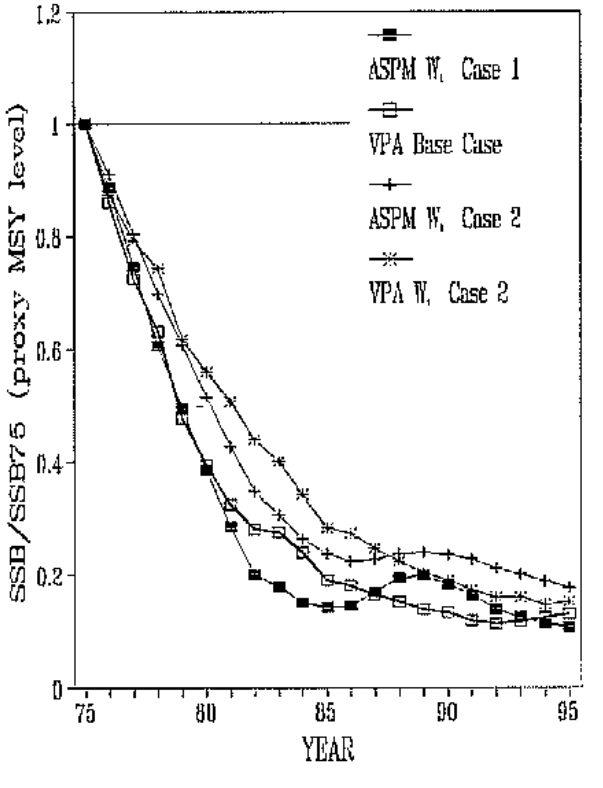
BFT-Fig. 1 a. Historical main bluefin fisheries (up to 1970) in Atlantic Ocean and Mediterranean Sea.



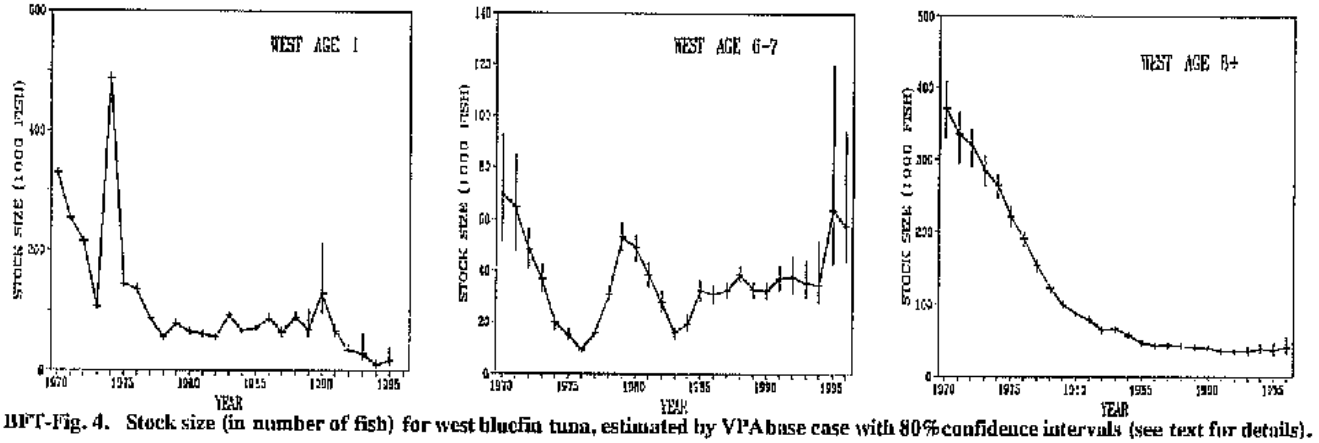
BFT-Fig. 1 b. Actual bluefin fisheries (1970-1994) in the Atlantic Ocean and Mediterranean Sea.



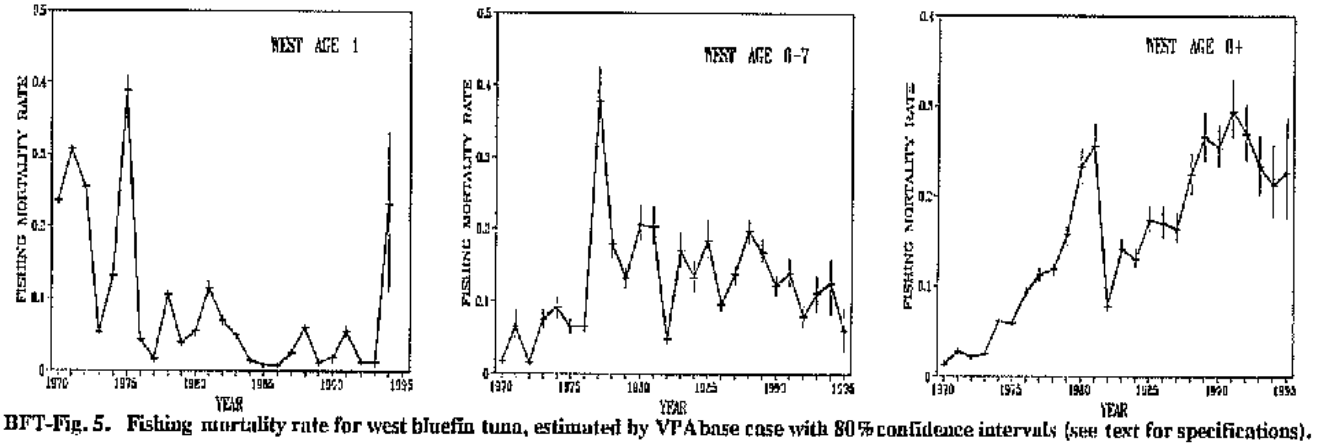
BFT-Fig. 2. Atlantic bluefin catches by total east, west Atlantic and the Mediterranean Sea, 1950-1996.



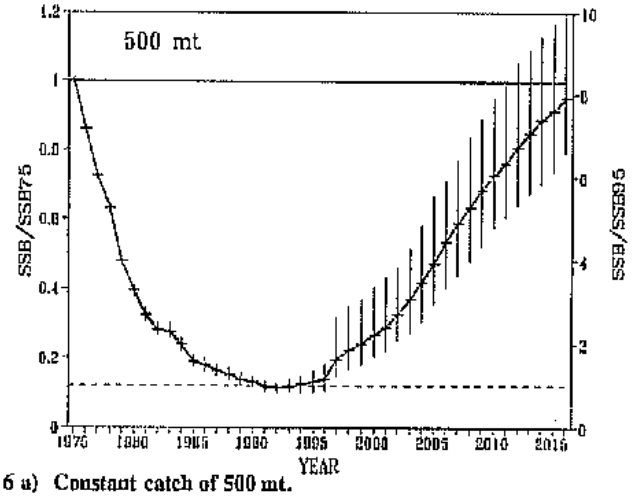
BFT-Fig. 3. Median spawning biomass relative to 1975 (proxy MSY level), for west bluefin tuna, estimated by VPA and production model runs.



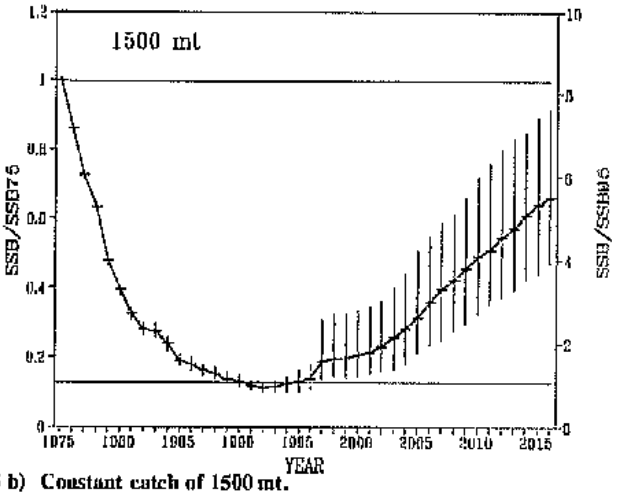
BFT-Fig. 4. Stock size (in number of fish) for west bluefin tuna, estimated by VPA base case with 80% confidence intervals (see text for details).



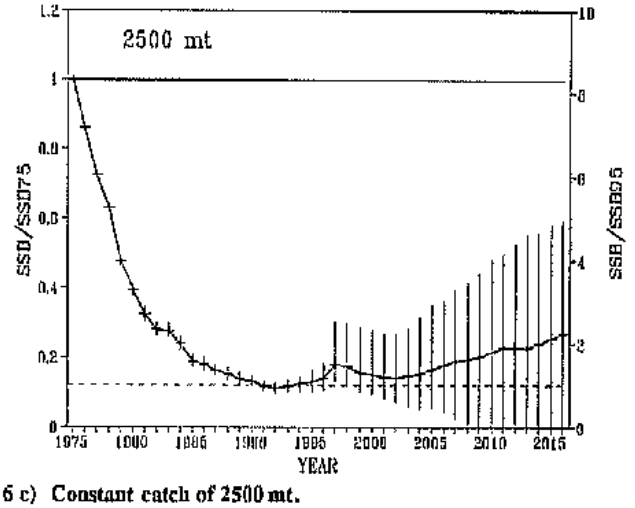
BFT-Fig. 5. Fishing mortality rate for west bluefin tuna, estimated by VPA base case with 80% confidence intervals (see text for specifications).



6 a) Constant catch of 500 mt.

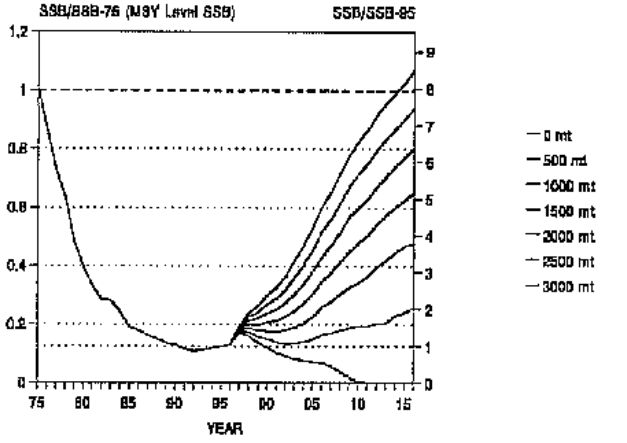


5 b) Constant catch of 1500 mt.

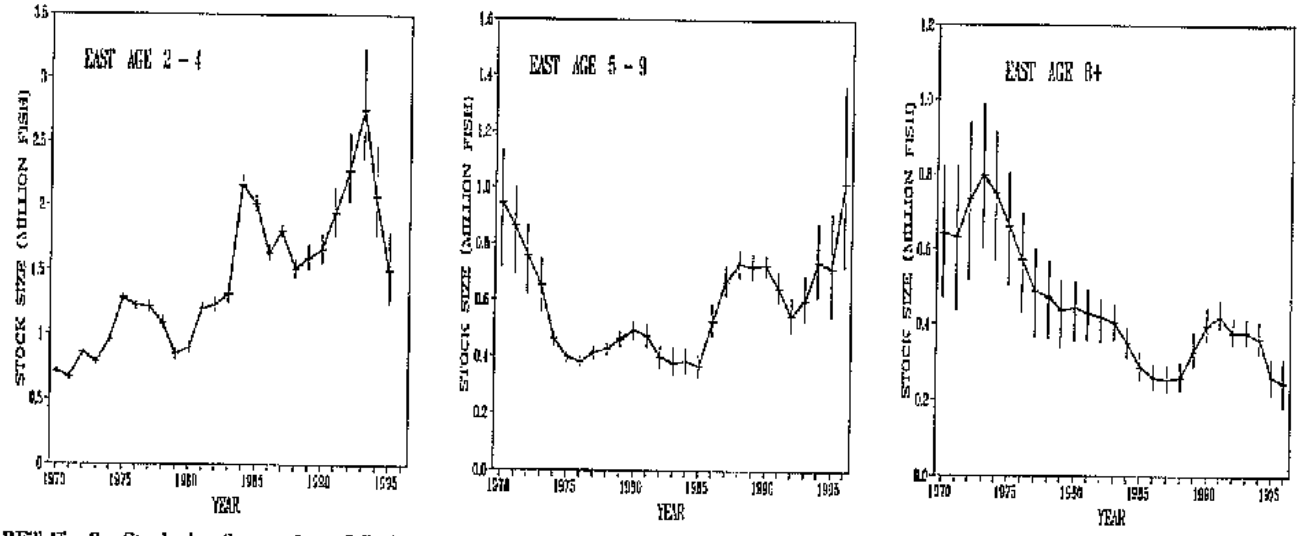


6 c) Constant catch of 2500 mt.

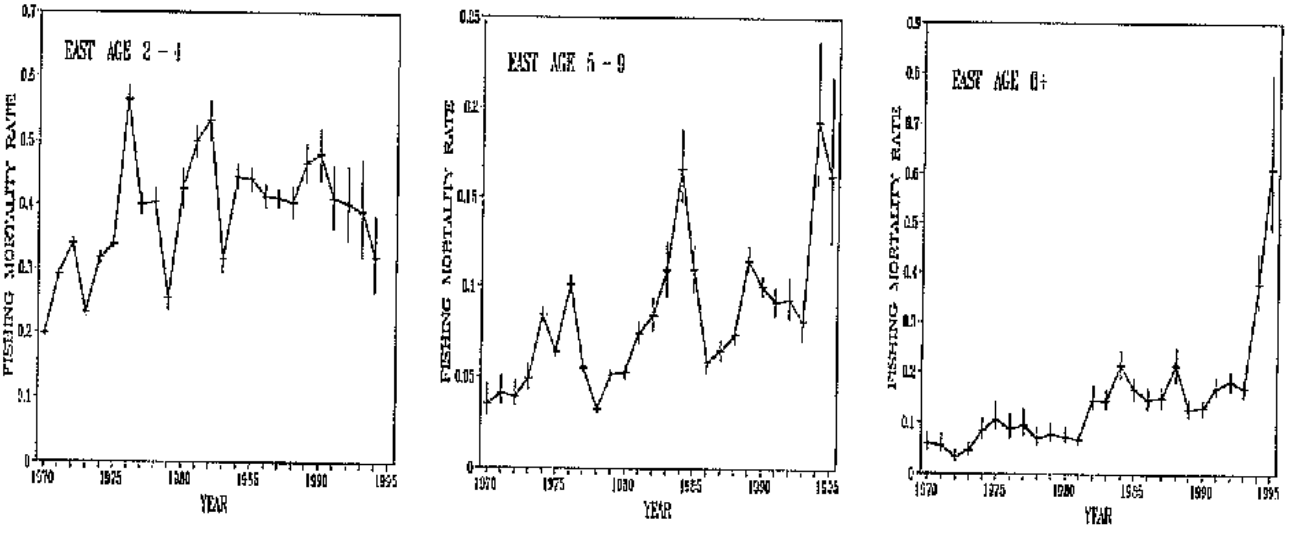
BFT-Fig. 6. Projections made for west bluefin tuna from VPA base case, under the constant catch of 500, 1500 and 2500 mt, 1997 to 2016. Lines represent median trajectories: error bars are approximate 80% confidence ranges relative to 1975.



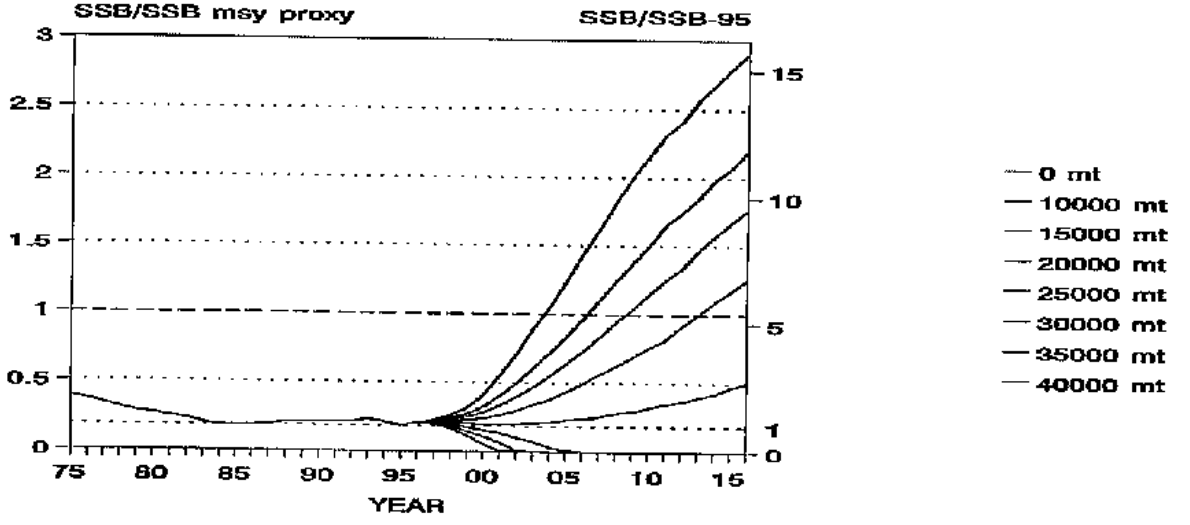
BFT-Fig. 7. Median projections made for west bluefin tuna in VPA base case, under the constant catch of 0 to 3000 mt for 1997 to 2016.



BFT-Fig. 8. Stock size (in number of fish) east bluefin tuna, e specifications).



BFT-Fig. 9. Fishing mortality rate for east bluefin tuna, estimated by VPA base case with 80% confidence intervals (see text for specifications).



BFT-Fig. 10. Median projections made for east bluefin tuna in VPA base case, under the constant catch of 0 to 40000 mt for 1997 to 2016.

BUM - BLUE MARLIN

BUM-1. Biology

Blue marlin are found throughout tropical and temperate waters of the Atlantic Ocean and adjacent seas, and range from Canada to Argentina on the western side, and from the Azores to South Africa on the eastern side (**BUM-Figure 1**). Blue marlin are large apex predators with an average weight of about 100-175 kgs. Blue marlin have an extensive geographical range, often have migratory patterns that include trans-Atlantic as well as trans-Equatorial movements, and are generally considered to be a rare and solitary species relative to the schooling scombrids. Blue marlin are considered sexually mature by ages 2-4, spawn in tropical and subtropical waters (for example off Jamaica and Puerto Rico) in the summer and fall, and are found in the colder temperate waters during the summer. Young blue marlin are one of the fastest, if not the fastest growing of all teleosts, reaching from 30-45 kgs by age 1. Females grow faster and reach a much larger maximum size than males.

Blue marlin feed on a wide variety of fish and squid, but show a dietary preference for scombrids. They are found predominately in the open ocean near the upper reaches of the water column and are typically caught most frequently as a by-catch by the offshore longline fisheries which target tropical or temperate tunas using shallow deployment of gear. However, significant by-catch landings are also made by offshore longline fisheries which target swordfish, particularly in the west Atlantic Ocean.

The stock hypotheses for assessment purposes have historically been a north Atlantic and south Atlantic stock (divided at 5°N), and a total Atlantic stock. However, the 1995 SCRS recognized the increased importance of the total Atlantic hypothesis for blue marlin. More recently (1996), the Committee reviewed and discussed new data on genetic mitochondrial DNA analysis, as well as tag release-recapture data, and concluded that these data were most consistent with a total Atlantic hypothesis. Additionally, the Committee concluded that the north/south separation is arbitrary for this tropical species (as with white marlin). The Committee did recommend that, if possible, it would be prudent to also assess the status of the stock under a separate north and south Atlantic hypothesis.*

BUM-2. Description of fisheries

The fisheries for Atlantic blue marlin are characterized by many different participants. The major landings of blue marlin are incidental to the large offshore longline fisheries of various countries which target tuna and swordfish, including Brazil, Cuba, Japan, Korea, Taiwan, and others. Other major fisheries are the directed recreational fisheries of the United States, Venezuela, Bahamas, Brazil, and many other countries in the Caribbean Sea and off the west coast of Africa. Other directed fisheries include artisanal fisheries in the Caribbean Sea and off west Africa. Development and geographical expansion of other longline fisheries which take blue marlin in the western Atlantic, Caribbean Sea, and east and south Atlantic by various countries have been reported (mainly Spain and the U.S. for eastern and western Atlantic, respectively). Purse seine fisheries also have an incidental catch of blue marlin.

Landings for the total Atlantic first developed in the early 1960's, reached a peak of over 9,000 MT in 1963, declined to the range of about 2,000 - 3,000 MT during the period 1967-1977, and have fluctuated with an increasing trend over the period 1978-1996 (**BUM-Table 1 and Figure 2**). Landings for the north Atlantic generally show trends similar to those for the total Atlantic. The general trend in catches have followed the intensity of the offshore longline fisheries.

BUM-3. State of stocks

The most current assessments for blue marlin were conducted during the Third ICCAT Billfish Workshop held in Miami, Florida, during July, 1996. These assessments included data through 1995, which represented revisions and updating from the previous assessment presented at the 1992 SCRS. The general results from these analyses using

* The production model analysis of the south Atlantic database could not be made to converge to a solution without fixing several parameters, thus making the assessment results problematic. Because of the poor model fit, benchmark values are not provided in the summary table.

a non-equilibrium production model indicated that biomass had been below B_{MSY} for about three decades for both the total and north Atlantic hypotheses (**BUM-Figures 3 and 4**). The overall pattern of catch versus fishing mortality is illustrated in **BUM-Figure 5**. The Committee considered these stocks to be over-exploited. Although the working hypothesis for a total Atlantic stock is felt to be most appropriate, data from the south Atlantic were problematic. Therefore, results from using a south Atlantic hypothesis were also problematic. Additionally, there is still uncertainty in the assessment results using the total Atlantic hypothesis due to these problems. Bias-corrected point estimates of maximum sustainable yield were estimated from production model analyses for the total Atlantic and north Atlantic to be about 4,461 and 1,963 MT, respectively. Current landings in 1996 for the total and north Atlantic were estimated at 4,439 and 1,870 MT, respectively. Biomass for the total and north Atlantic in 1996 was estimated to be about 24 and 61%, respectively, of the biomass needed to produce MSY; i.e., B_{1996}/B_{MSY} .

BUM-4. Outlook

For the total Atlantic hypothesis, reported landings from 1996 (4,439 MT) were much larger than the estimated equilibrium replacement yield of about 1,920 MT. The 1996 landings for blue marlin were the second highest landings in the more than 30 years. Landings greater than the replacement yield are expected to result in further decline in stock status. The reported landings for 1996 (1,870 MT) from the north Atlantic are also higher than the estimated equilibrium replacement yield for 1996 of about 1,694 MT. Again, landings greater than the replacement yield are expected to result in further decline in stock status. Although the 1995 SCRS previously recognized the increase in stock biomass from north Atlantic production model results (presented at the 1992 SCRS) as a sign of recovery, the slight upturn in the biomass trajectory of the current north Atlantic assessment was not characterized as a recovery by the Committee. It should be reiterated that the Committee recognized that the biology of Atlantic blue marlin was most consistent with the total Atlantic hypothesis. Although the outlook for the north Atlantic hypothesis is more optimistic relative to the total Atlantic assessment results, the Committee has concerns about the status of blue marlin stocks for both stock hypotheses when considered separately. In addition, even though assessment results for the south Atlantic are considered problematic, similar concerns about the resource status for this hypothesis also exist. Therefore, the Committee continues to regard the persistent high level of fishing mortality, which has depressed stock biomass to levels below that which could produce MSY in stock hypotheses examined here, as inconsistent with the management objective of MSY, as well as inconsistent with precautionary approach outlined in the United Nations agreement on straddling fish stocks and highly migratory fish stocks.

During the 1997 SCRS, future total Atlantic biomass and relative fishing mortality trajectories were projected assuming different catch scenarios for blue marlin. These projections were based on the 1996 SCRS results and one option tested included the effect of releasing live longline by-catch. The projections showed that if catches are maintained near the average reported catches from 1991-1995 and all live catches are released (with 100% survival), then blue marlin could recover to the B_{MSY} target level in 10 years.

BUM-5. Effect of current regulations

No ICCAT regulations are currently in effect for Atlantic blue marlin.

Two ICCAT contracting parties (the U.S. and Venezuela) and two non-contracting parties (Mexico and St. Lucia) have established domestic regulations for commercial and recreational fisheries involving blue marlin to reduce mortality. In addition, many other countries participating in the recreational fisheries for Atlantic blue marlin have had volunteer release or tag and release policies which also have the effect of reducing mortality.

BUM-6. Management recommendations

The 1996 stock assessments for Atlantic blue marlin indicate that this species is overexploited and warrants consideration for development of methods to reduce fishing mortality rates. The Committee believes that one approach to reducing mortality would be to release or tag and release those blue marlin that are caught which appear to be alive when brought alongside the boat. Such an approach would first have to be implemented on an experimental and selective basis while additional research is conducted to determine the rate of survival of billfish caught and released off fishing vessels. The projections of population response to releasing live longline marlin by-catch, submitted to the

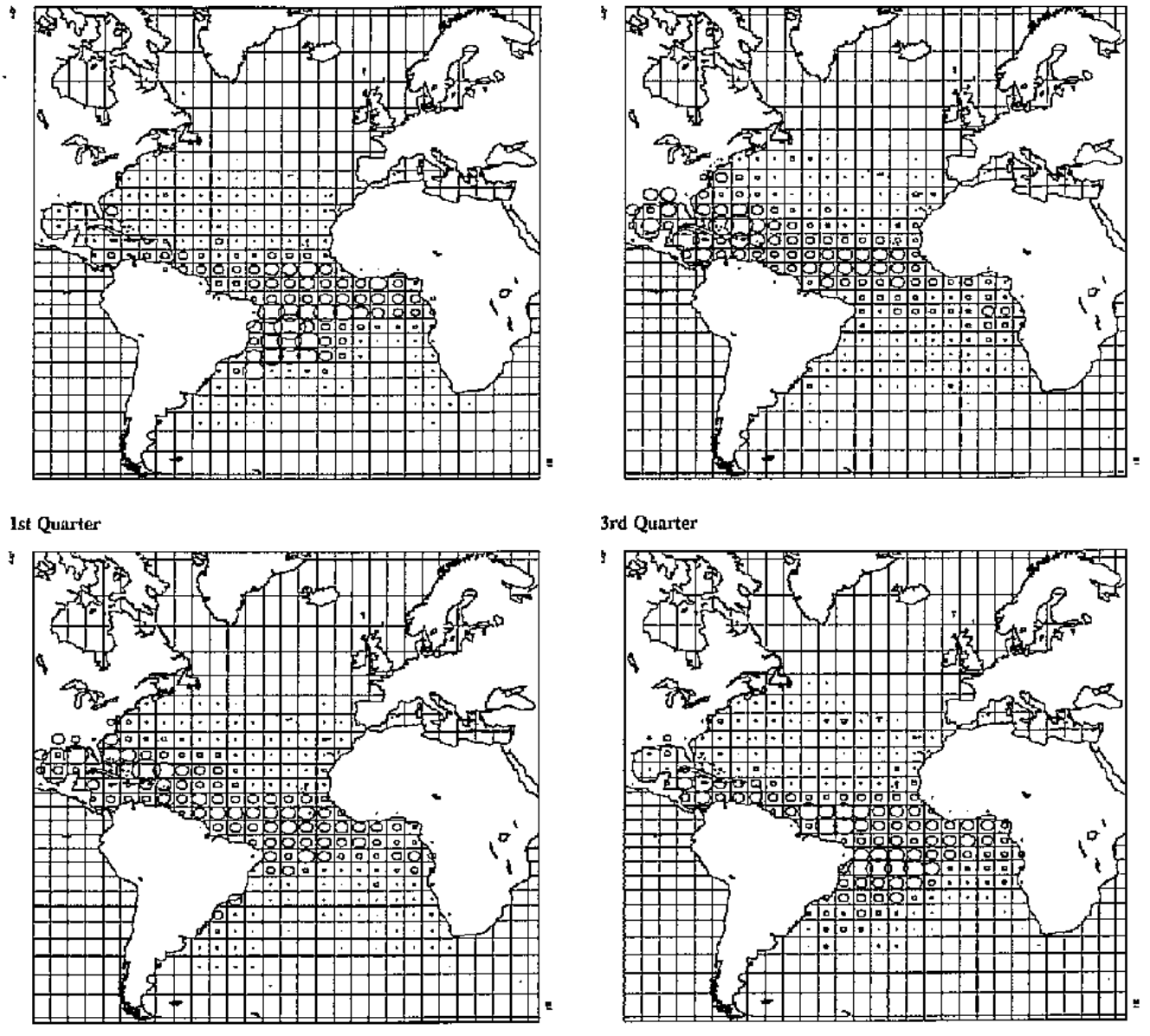
1997 SCRS, suggests that this would be an effective approach to reducing mortality to reach the management objective (MSY). This measure could be considered consistent with the precautionary approach outlined in the United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks as this measure, if perfectly implemented, is expected to reduce fishing mortality rates to below F_{MSY} for this species, provided that average effort and catchability do not increase from the 1995 level.

ATLANTIC BLUE MARLIN SUMMARY
(Bias corrected point estimates)

	Total Atlantic	*North Atlantic*	*South Atlantic*
Maximum Sustainable Yield, (MSY):	4,461 MT	1,963 MT	—
approximate 80% CI	4,096-4,787 MT	1,742-2,133 MT	—
Current (1996) Yield (observed)	4,439 MT	1,870 MT	—
Current (1996) Replacement Yield	1,920 MT	1,694 MT	—
Relative Biomass (B_{1996}/B_{MSY})	0.236	0.608	—
Relative Fishing Mortality:			—
F_{1995}/F_{MSY} (approx. 80% CI)	2.87 (1.45-3.41)	1.21 (0.96-1.56)	
Management Measures in Effect	none	none	none

BUM-Table 1. Reported catches (in MT) of Atlantic blue marlin by area and fleet .

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	9037	8010	6155	3859	2240	2515	3091	2864	3367	2366	3177	3016	3185	2310	2047	1506	1401	1584	1947	2763	1892	2664	3239	2042	2116	2744	4254	4504	4168	2987	3185	4006	3776	4439
ATLANTIC UNKNOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	213	281	145	200	200	200	200	200	200	200	200	200	200	200	200	200
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	101	45	100	100	100	100	100	100	100	100	100	100	100	100	100
FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	180	100	100	100	100	100	100	100	100	100	100	100	100	100	100
NORTH ATLANTIC	5141	4809	3682	2040	1173	1381	1601	1845	2150	1315	1616	1916	2076	1366	1255	976	897	1084	1296	1650	1214	1378	1566	1069	836	903	1556	1942	1421	1081	1234	1609	1448	1870
BARBADOS	0	0	0	0	0	0	0	0	0	0	0	183	150	120	81	72	51	73	117	99	126	126	10	14	13	46	3	18	12	18	21	19	31	25
BERMUDA	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	5	2	4	1	2	7	8	9	11	6	8	15	17	18	19	11	15	15	15
CANADA-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
CHIN.TAIP.	27	8	2	34	131	374	348	369	193	300	155	183	105	169	64	81	51	160	98	100	125	102	148	117	52	26	11	937	716	336	281	272	187	257
CUBA	123	128	144	91	223	167	122	108	149	67	223	516	594	250	220	97	156	162	178	318	273	214	246	103	68	94	74	112	127	135	38	50	50	50
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	1	0	2	23	2	4	8	0	0	0	2
GRANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	12	6	8	11	36	33	34	40	52	64	52	58	52	50	26
JAPAN	4759	4434	3330	1677	485	474	658	758	1223	335	229	267	551	260	118	54	68	193	332	637	192	351	409	174	78	206	593	250	145	193	207	532	496	794
KOREA	0	1	4	46	66	93	214	368	221	215	457	385	304	174	307	185	67	48	71	19	43	110	154	36	13	14	252	240	34	11	2	16	16	41
MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	13	13	13
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	100	100	100	
NETHERLAND.ANT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	40	40	40	40	40	40	40
PANAMA	0	0	0	0	0	0	0	0	0	10	208	62	44	47	87	42	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	8	12	8	2	1	1	4	2	15	11	10	7	
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0	5	5	5
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	2	0
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8	3	17	2	0	28	4	6	4	226	150	150	150
U.S.A	128	161	163	149	197	168	207	204	179	191	209	234	241	265	295	295	312	312	342	329	215	280	295	273	429	345	315	188	175	197	207	199	186	232
U.S.S.R	0	0	1	1	3	3	3	2	3	7	10	1	3	0	1	1	0	0	0	0	0	0	0	7	23	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
VENEZUELA	104	77	38	42	68	102	49	36	182	190	125	85	83	79	80	94	134	81	106	83	172	117	219	218	60	76	149	70	56	65	66	133	97	113
SOUTH ATLANTIC	3896	3201	2473	1819	1067	1134	1490	1019	1217	1051	1561	1100	1109	944	792	530	504	508	438	832	533	1086	1473	773	1080	1641	2498	2362	2547	1706	1751	2197	2128	2369
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	0	9	10	7	4	12	0	6	6	6	6	0	0	0
BRASIL	12	12	12	12	6	15	18	39	14	17	4	15	15	29	65	24	30	14	23	16	12	12	8	18	25	30	31	21	18	16	20	23	54	82
BRASIL-BARBA.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9
BRASIL-HOND.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	5	4
BRASIL-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	4	9	5	14	15	20	25	28	26	44	29	31	18	8	11	11	15	0
BRASIL-KOR	0	0	0	0	0	0	0	0	0	0	0	0	0	12	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	3	0
BRASIL-TAIW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	99	115	32	102	231
BRASIL-USA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
CHIN.TAIP.	21	5	2	35	160	429	1016	560	742	628	537	369	422	240	107	177	139	129	104	150	47	70	165	98	265	266	462	767	956	488	404	391	280	386
COTE D'IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	88	65	72	78	58	110	153	144	144
CUBA	22	26	32	27	221	113	43	41	17	22	75	170	195	159	100	113	180	187	108	118	123	159	205	111	137	191	77	90	62	69	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	8
GHANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAPAN	3841	3156	2421	1693	588	472	302	247	172	85	117	17	57	4	17	15	66	115	136	495	248	482	691	335	362	617	962	967	755	824	719	991	913	874
KOREA	0	1	3	47	79	93	98	120	258	251	532	449	354	392	356	140	78	46	55	31	88	234	262	60	139	361	437	84	503	13	11	40	40	103
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	100	100	100
PANAMA	0	0	0	0	0	0	0	0	0	12	244	72	51	107	103	32	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
U.S.S.R	0	1	3	5	13	12	13	12	14	36	52	8	15	1	9	4	0	0	1	0	0	0	7	16	22	32	5	0	0	0	0	0	0	0



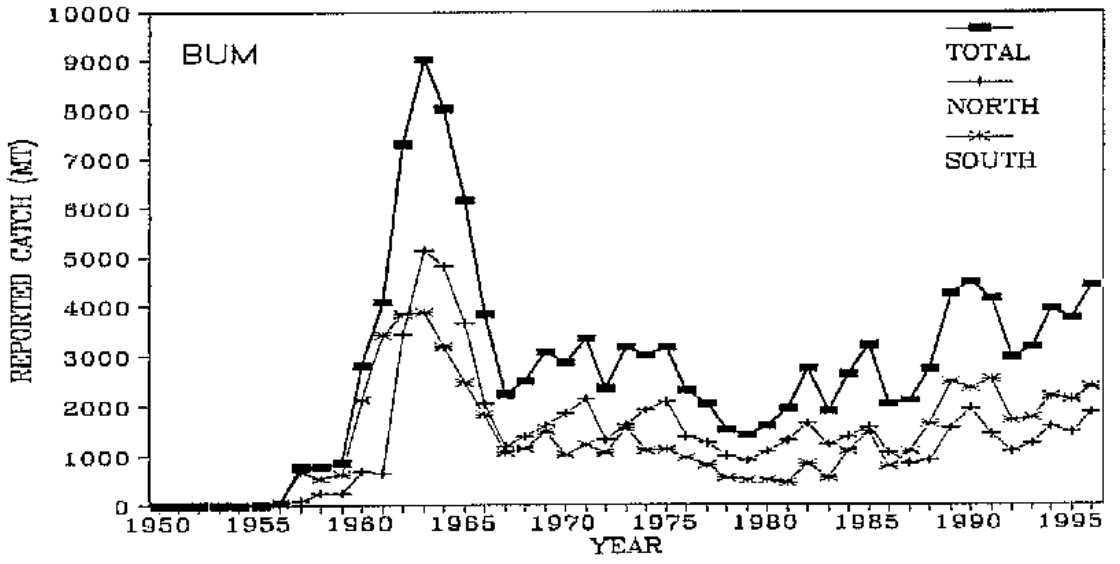
1st Quarter

3rd Quarter

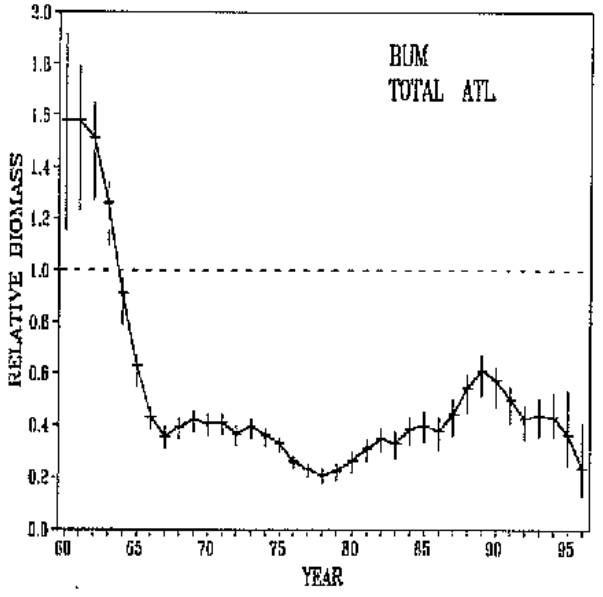
2nd Quarter

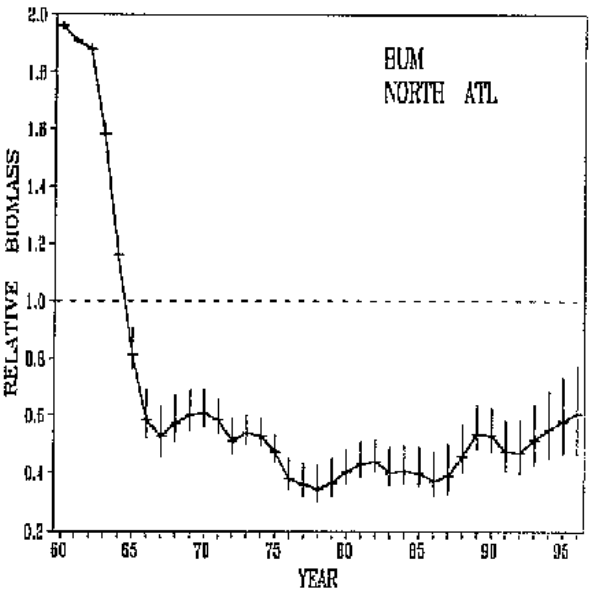
4th Quarter

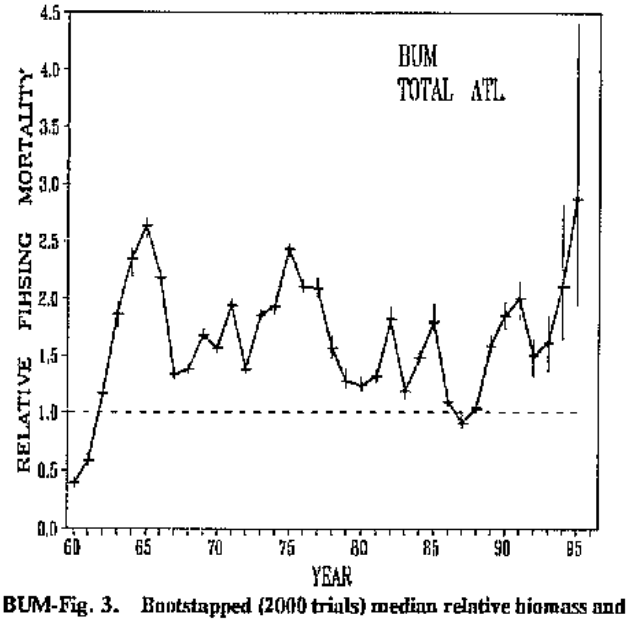
BUM-Fig. 1. Distribution of blue marlin catches throughout 1950-1994



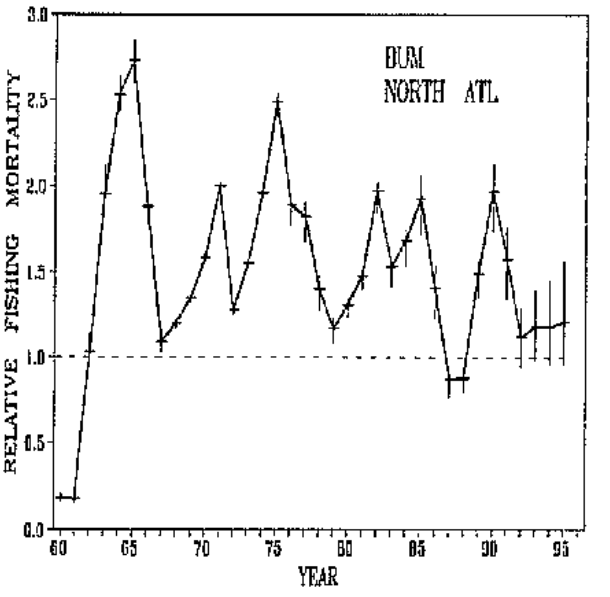
BUM-Fig. 2. Task I catches (MT) of blue marlin by regions, 1950-1995.



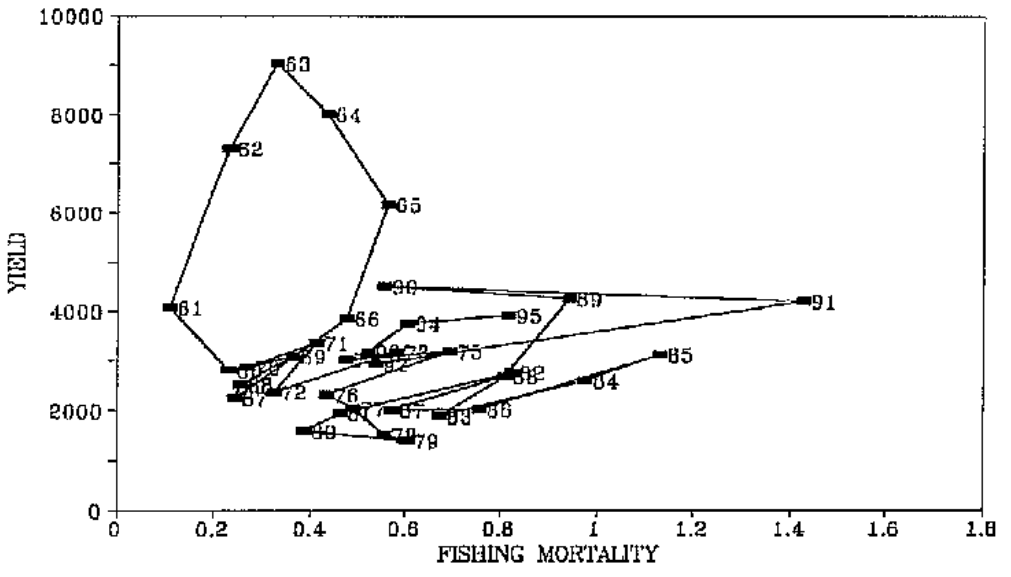




BUM-Fig. 3. Bootstapped (2000 trials) median relative biomass and relative fishing mortality for blue marlin fisheries from the total Atlantic with approximate nonparametric 80% confidence intervals.



BUM-Fig. 4. Bootstapped (2000 trials) median relative biomass and relative fishing mortality for blue marlin fisheries from the north Atlantic with approximate nonparametric 80% confidence intervals.



BUM-Fig. 5. Yearly catch vs fishing mortality for blue marlin under the total Atlantic Ocean stock hypothesis.

WHM - WHITE MARLIN

WHM-1. Biology

White marlin are found throughout tropical and temperate waters of the Atlantic Ocean and adjacent seas. Their range is almost identical to that of blue marlin (**WHM-Figure 1**), although they seem to be less abundant in the east Atlantic. Their average size is about 20-30 kg. White marlin occur only in the Atlantic Ocean, which is not the case for blue marlin and sailfish. Although white marlin are generally considered to be a rare and solitary species relative to the schooling scombrids, they are known to occur in small groups consisting of several individuals. They spawn in tropical and subtropical waters in mid- to late spring, and are found in the colder temperate waters during the summer. Very little is known about the age and growth of white marlin, although they are considered to be very fast growing, as are all the istiophoridae. Female white marlin growth faster and reach a larger maximum size than males.

White marlin are generally considered piscivorous, but also have been know to consume squid. They are found predominately in the open ocean near the upper reaches of the water column and are typically caught most frequently as a by-catch by the offshore longline fisheries which target tropical or temperate tunas using shallow deployment of gear. However, significant by-catch landings are also made by offshore longline fisheries which target swordfish, particularly in the west Atlantic Ocean.

As with blue marlin, the SCRS stock hypotheses for white marlin assessments historically has been a north and south Atlantic stock (divided at 5°N), as well as a total Atlantic stock. However, the SCRS initially recognized the increased importance of the total Atlantic hypothesis for white marlin in 1995. More recently (1996), the Committee reviewed and discussed new data on genetic mitochondrial DNA analysis, as well as tag release-recapture data, and concluded that these data were most consistent with a total Atlantic hypothesis. In addition, the Committee concluded that the north/south separation is arbitrary for this tropical species (as with blue marlin). The Committee did recommend that, if possible, it would be prudent to also assess the status of the stock under a separate north and south Atlantic hypothesis.*

WHM-2. Description of fisheries

See section on "Description of Fisheries" in the Blue Marlin Executive Summary report.

Landings for the total Atlantic first developed in the early 1960's, reached a peak of almost 5,000 MT in 1965, declined to about 1,000 MT per year during the period 1977-1982, and have fluctuated between about 940 and 1,700 MT thereafter (**WHM-Table 1 and Figure 2**). Landings for the north Atlantic generally show a trend similar to that of the total Atlantic. The general trend in catches have followed the intensity of the offshore longline fisheries.

WHM-3. State of stocks

The most current assessments for white marlin were conducted during the Third ICCAT Billfish Workshop held in Miami, Florida, during July, 1996. These assessments included data through 1995, which represented revisions and updating from the previous assessment presented at the 1992 SCRS. The general results from these analyses using a non-equilibrium production model indicated that biomass had been below B_{MSY} for three decades for the total Atlantic hypothesis (**WHM-Figure 3**) and two decades under a north Atlantic hypothesis (**WHM-Figure 4**). The overall pattern of catch versus fishing mortality is illustrated in **WHM-Figure 5**. The Committee considered these stocks to be severely over-exploited. Although the working hypothesis for a total Atlantic stock is felt to be most appropriate, data from the south Atlantic were problematic. Therefore, results from using a south Atlantic hypothesis were also problematic. Additionally, there is still uncertainty in the assessment results using the total Atlantic hypothesis due to these problems. Bias-corrected point estimates of maximum sustainable yield were estimated from production model analyses for the total Atlantic and north Atlantic to be about 2,177 and 536 MT, respectively. Current landings in 1996 for the total and north Atlantic were estimated at 1,508 and 443 MT, respectively. Biomass for the total and north

* The production model analysis of the south Atlantic database could not be made to converge to a solution without fixing several parameters, thus making the assessment results problematic. Because of the poor model fit, benchmark values are not provided in the summary table.

Atlantic in 1996 was estimated to be about 23 and 32%, respectively, of the biomass needed to produce MSY; i.e., B_{1996}/B_{MSY} .

WHM-4. Outlook

For the total Atlantic hypothesis, reported landings from 1996 (1,508 MT) were much larger than the estimated equilibrium replacement yield of about 921 MT. Landings greater than the replacement yield are expected to result in further decline in stock status. Similarly, in the north Atlantic, the reported landings from 1996 (443 MT) were larger than the estimated equilibrium replacement yield of about 300 MT. Again, landings in excess of this level are expected to result in further stock decline. The Committee has concerns about the status of white marlin stocks in both the total Atlantic and north Atlantic, when considered separately. In addition, even though assessments results for the south Atlantic are considered problematic, similar concerns of the resource status for this hypothesis also exist. Therefore, the Committee regards the continuing high level of fishing mortality, which has depressed stock biomass to levels considerably below that which could produce MSY, as inconsistent with the management objective of MSY and could also be considered inconsistent with the precautionary approach outlined in the United Nations agreement on straddling fish stocks and highly migratory fish stocks. The improving situation in the total Atlantic over the period 1977-1985 (**WHM-Figure 3**) appears to have reversed itself with a steady decline in biomass indicated over the period 1989-1996. When considering the north Atlantic separately, the relative biomass trajectory has been decreasing steadily over the entire time-series (**WHM-Figure 4**).

During the 1997 SCRS, future total Atlantic biomass and fishing mortality trajectories were projected assuming different catch scenarios for white marlin. These projections were based upon the 1996 SCRS results and one of the options tested included the effect of releasing live longline by-catch. The projections showed that if catches are maintained near the average reported catch from 1991 to 1995, and all live catches are released (with 100% survival), then white marlin could recover to the B_{MSY} target level in about 6 years.

WHM-5. Effect of current regulations

No ICCAT regulations are currently in effect for Atlantic white marlin. See the Blue Marlin Executive Summary Report.

WHM-6. Management recommendations

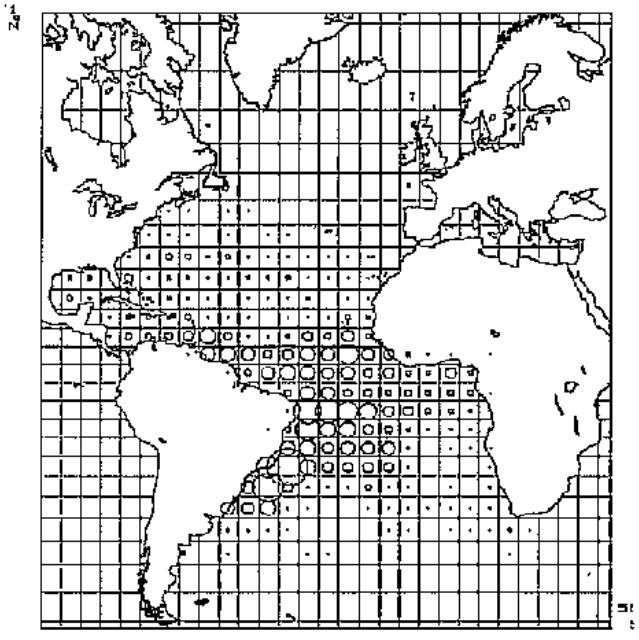
The 1996 stock assessments for Atlantic white marlin indicate that this species is severely overexploited and warrants consideration for development of methods to reduce fishing mortality rates. As with blue marlin, projections of populations response to releasing live marlin by-catch, submitted to the 1997 SCRS, suggests that this could be an effective approach to reducing mortality to reach the management objective of MSY. This approach could be viewed as a precautionary measure consistent with the United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks as this measure, if perfectly implemented, is expected to reduce fishing mortality rates to below F_{MSY} for this species, provided that average effort and catchability do not increase from the 1995 level. Also see Blue Marlin Executive Summary Report.

ATLANTIC WHITE MARLIN SUMMARY

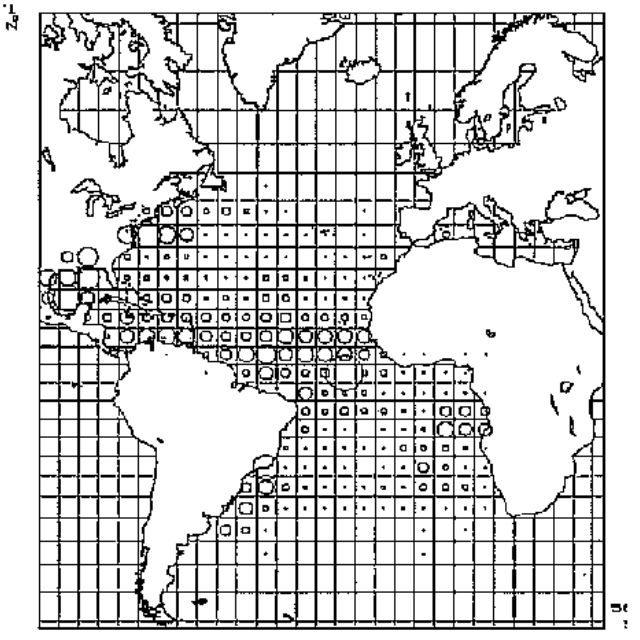
	Total Atlantic	*North Atlantic*	*South Atlantic*
Maximum Sustainable Yield(MSY)	2,177 MT	536 MT	—
Approximate 80% Confidence Interval	2,102-2,228 MT	85-771 MT	----
Current (1996) Yield (observed)	1,508 MT	443 MT	—
Current (1996) Replacement Yield	921 MT	301 MT	----
Relative Biomass (B_{1996}/B_{MSY})	0.226	0.321	—
Relative Fishing Mortality:			
F_{1995}/F_{MSY} (approx. 80% CI)	1.96 (1.33-2.91)	2.37 (1.60-8.41)	—
Management Measures in Effect	none	none	none

WHM-Table 1. Reported catches (in MT) of Atlantic white marlin by area and fleet :

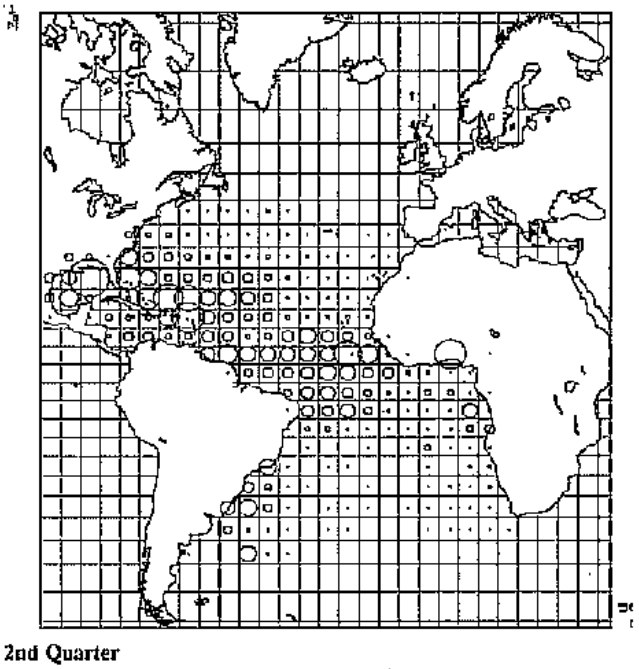
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	2614	3735	4906	3512	1426	2047	2269	2143	2260	2280	1859	1760	1745	1819	1125	950	1016	943	1204	1112	1666	1211	1795	1588	1527	1336	1783	1591	1551	1298	1372	1898	1467	1508
NORTH ATLANTIC	914	1694	2127	1798	588	692	1215	1055	1547	1208	1010	1222	1129	1052	501	428	482	521	789	670	1347	740	966	908	648	416	375	395	217	485	435	605	538	443
BARBADOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	11	39	17	24	29	26	43	15
BERMUDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1
CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
CANADA-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
CHN.TAIP.	4	3	2	32	47	58	135	104	178	244	135	252	125	142	44	79	62	105	174	134	203	96	128	319	153	0	4	85	13	92	123	270	181	113
CUBA	35	45	69	118	127	103	58	61	45	34	112	256	294	68	67	43	68	70	189	205	728	241	296	225	30	13	21	14	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	14	0	0	24	13	4	2	10	0	19	0	10
JAPAN	754	1493	1913	1417	174	273	451	419	915	339	328	381	404	540	80	27	42	99	118	84	27	52	45	56	60	68	73	34	45	180	33	41	31	81
KOREA	0	1	1	51	44	52	204	340	219	213	106	90	71	64	71	33	16	18	49	12	6	18	147	37	2	2	82	39	1	9	4	23	3	7
MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	8	0
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	50	50	50
PANAMA	0	0	0	0	0	0	0	0	0	10	48	14	10	17	20	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
U.S.A	64	70	76	76	81	87	76	104	95	99	104	108	107	109	109	109	110	116	117	122	148	168	181	119	247	149	123	100	95	96	79	55	109	70
U.S.S.R	0	0	0	0	1	1	1	0	1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENEZUELA	57	82	66	104	114	118	290	27	94	268	175	121	117	112	110	129	183	113	142	113	234	155	155	151	154	42	47	79	43	73	117	110	110	96
SOUTH ATLANTIC	1700	2041	2779	1714	838	1355	1054	1088	713	1072	849	538	616	767	624	522	534	422	415	442	319	471	829	680	879	920	1408	1196	1334	813	937	1293	929	1065
ARGENTINA	0	0	0	0	3	14	0	0	20	100	57	0	2	2	2	0	0	0	0	0	0	0	4	4	0	0	8	9	6	0	0	0	0	0
BRASIL	17	17	17	17	9	21	24	54	17	33	18	32	32	58	25	29	21	32	96	20	56	53	51	104	62	114	173	164	281	119	77	72	63	51
BRASIL-BARBA.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
BRASIL-HOND.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	7	6	4	5
BRASIL-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	227	146	112	26	4	56	25	8	36	39	31	35	31	41	22	2	10	6	0	0
BRASIL-KOR	0	0	0	0	0	0	0	0	0	0	0	0	0	10	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
BRASIL-TAI.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	82	207	6	36	12
BRASIL-USA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
CHN.TAIP.	3	2	29	134	327	448	508	260	469	464	285	382	377	119	198	155	145	136	227	87	124	172	196	613	565	979	810	790	506	493	1080	726	453
CUBA	9	17	33	23	67	15	7	8	4	6	21	48	55	38	57	127	205	212	116	45	112	153	216	192	62	24	22	6	10	10	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	406
GHANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	6	88	68	31	17	14	22	1	2	1
JAPAN	1664	2002	2718	1585	494	815	392	284	65	101	27	9	14	3	26	14	15	7	25	27	17	24	81	73	74	76	73	92	77	68	49	51	26	28
KOREA	0	2	7	58	125	157	177	230	341	332	165	139	109	220	111	5	24	0	36	57	9	44	225	34	25	17	53	42	56	1	4	20	20	52
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	50	50	50
PANAMA	0	0	0	0	0	0	0	0	0	16	75	22	16	59	31	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R	0	0	2	2	6	6	6	4	6	15	22	3	6	0	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	13	65	44	16	6	1	1	1	1	3	0	0	0	0



1st Quarter



3rd Quarter



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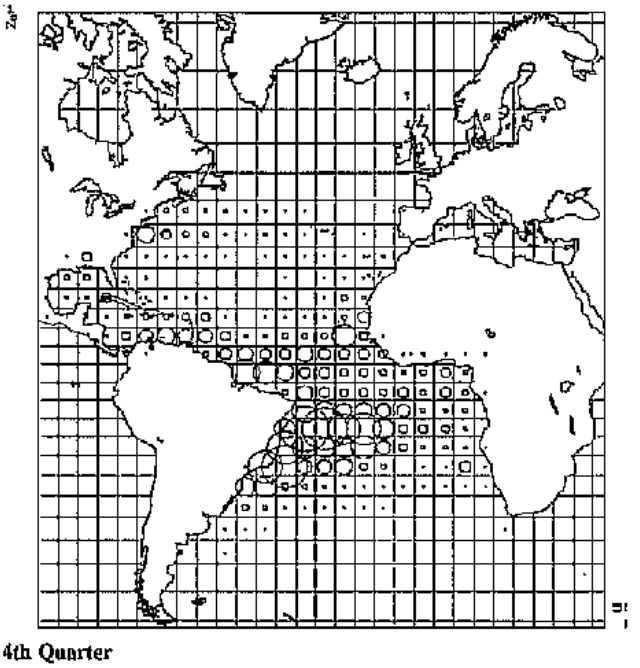
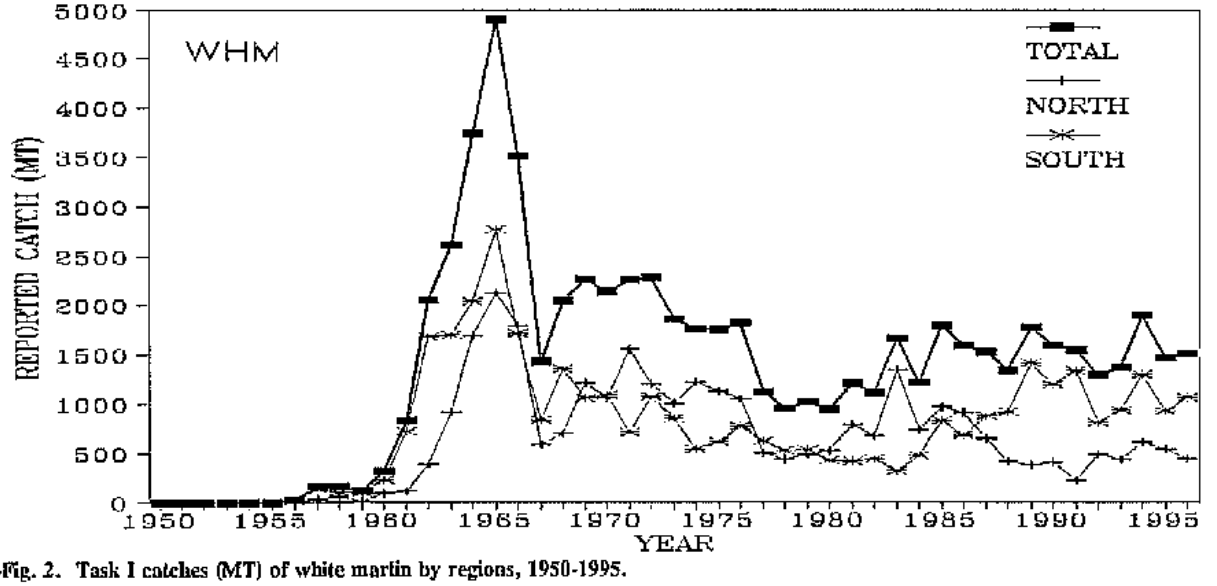
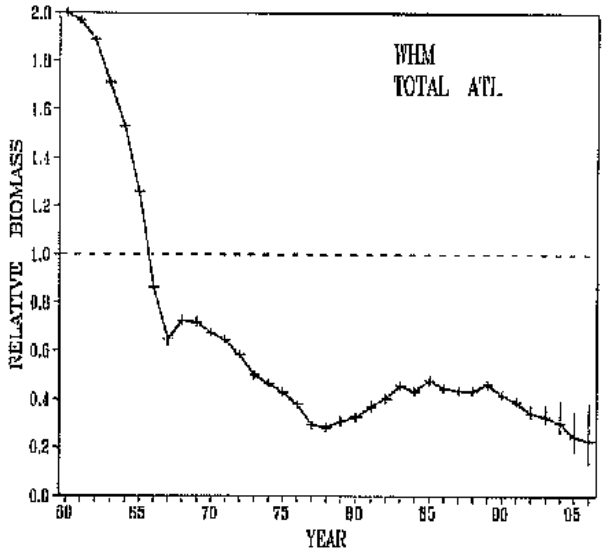


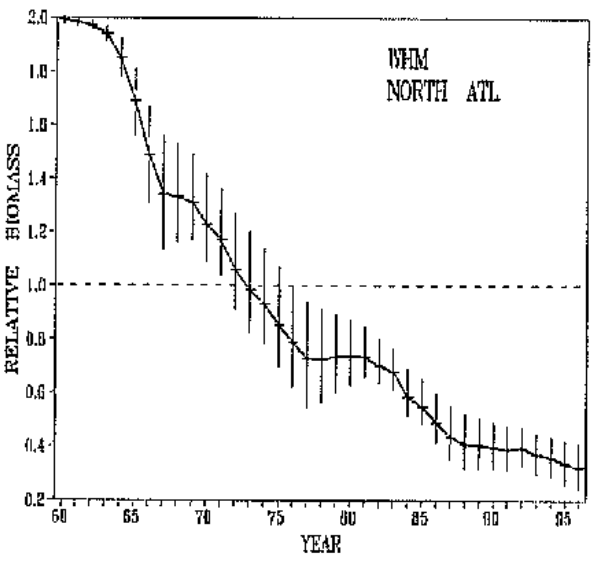
4th Quarter

WHM-Fig. 1. Distribution of white marlin catches throughout 1950-1994

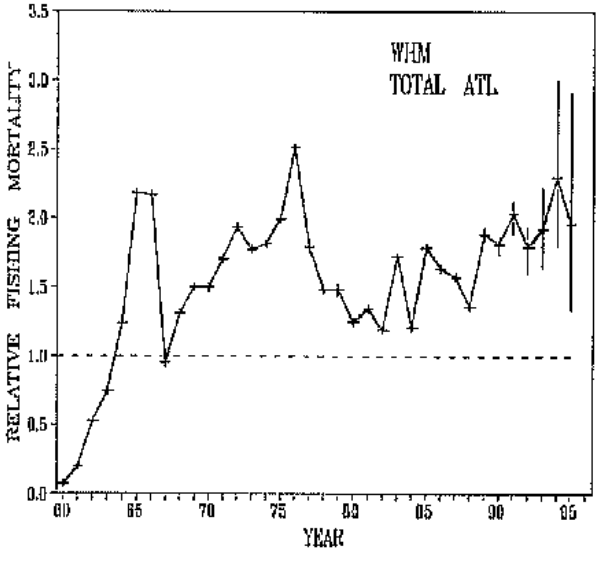


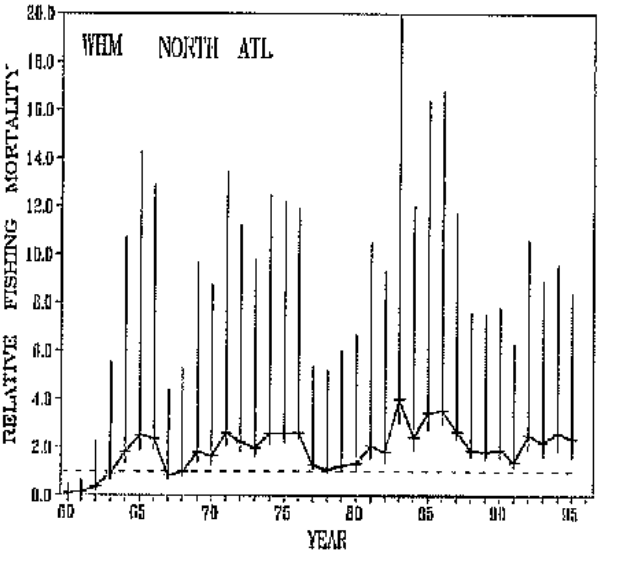
WHM-Fig. 2. Task I catches (MT) of white marlin by regions, 1950-1995.



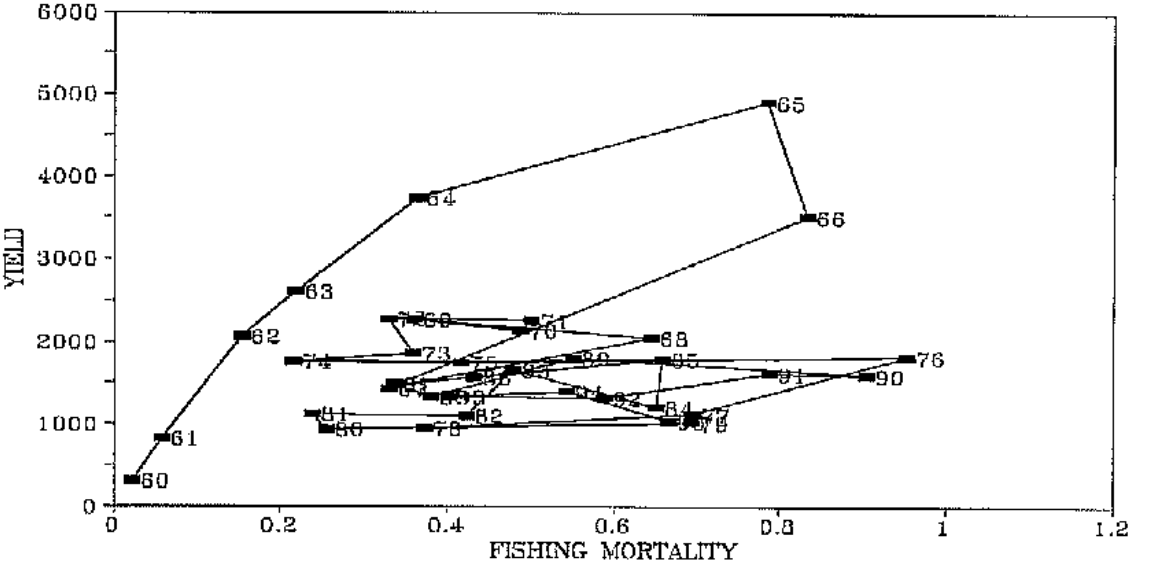


WHM-Fig. 3. Bootstapped (1000 trials) median relative biomass and relative fishing mortality for white marlin fisheries from the north Atlantic with approximate nonparametric 80% confidence intervals.





WHM-Fig. 4. Bootstapped (1000 trials) median relative biomass and relative fishing mortality for white marlin fisheries from the north Atlantic with approximate nonparametric 80% confidence intervals.



WHM-Fig. 5. Yearly catch vs. fishing mortality for white marlin under the total Atlantic Ocean stock hypothesis.

SAI - SAILFISH / SPEARFISH

SAI-1. Biology

Since Atlantic longline catches of sailfish and longbill spearfish have been reported together in ICCAT landing statistics (except for Japan since 1994), these species will be summarized together for the purposes of this report. Landings of Mediterranean spearfish have not been reported to ICCAT but should be examined whenever information becomes available. Sailfish and spearfish have a circumtropical distribution (**SAI-Figure 1**). Although sailfish have high concentrations in coastal waters (more than any other istiophorid), they are still found in oceanic waters. Spearfish are most abundant in offshore waters. Tag returns for sailfish/spearfish have not demonstrated trans-Atlantic or trans-Equatorial movements. Although sailfish and spearfish are generally considered to be rare and solitary species relative to the schooling scombrids, sailfish are the most common Atlantic istiophorid and are known to occur along tropical coastal waters in small groups consisting of at least a dozen individuals. Spearfish are generally the rarest Atlantic istiophorid, even in the offshore catches. The stock hypotheses for sailfish/spearfish assessment purposes are a western Atlantic and eastern Atlantic stock (divided at 30°W).

Sailfish and spearfish are generally considered piscivorous, but also have been known to consume squid. Sailfish are found predominately in coastal waters near the upper reaches of the water column and are typically caught most frequently in artisanal and recreational fisheries. However, sailfish, as well as spearfish, are also caught as a by-catch in offshore longline fisheries.

Sailfish spawn in tropical and subtropical waters in the spring through summer. Due to their relative rare abundance in offshore waters, virtually nothing is known about spearfish reproduction. Both sailfish and spearfish are considered to be very fast growing, although sailfish and spearfish are probably the slowest growing Atlantic istiophorids. Female sailfish grow faster and reach a larger maximum size than males.

SAI-2. Description of fisheries

The fisheries in the west and east Atlantic for sailfish/spearfish are both characterized by participants from many different countries. For example, the recent major catches of sailfish in both the western and eastern Atlantic result from the artisanal fisheries. In the west Atlantic, the primary artisanal fisheries are from many countries in the Caribbean sea, whereas in the east Atlantic major artisanal fisheries are off west Africa (primarily Ghana, Senegal, Côte d'Ivoire, and others). Directed recreational fisheries for sailfish occur in the west Atlantic from the United States, Venezuela, Bahamas, Brazil, Dominican Republic, Mexico, and other countries in the Caribbean Sea. Directed recreational fisheries for sailfish in the east Atlantic also exist off west Africa in Senegal. Prior to the 1970's, the major sailfish/longbill spearfish landings were a result of the by-catch from the Atlantic offshore longline fisheries. The offshore longline fisheries in the west and east Atlantic include those from Brazil, Japan, Korea, Cuba, and Taiwan. Development and geographical expansion of other longline fisheries in the west (by the U.S.) and east (by Spain) also include a by-catch of sailfish/spearfish. Mediterranean spearfish are usually a by-catch from longline and driftnet fisheries from a number of Mediterranean countries. Some occasional catches of spearfish are also made by a direct harpoon fishery.

Landings for the total Atlantic first developed in the early 1960's, reached a peak of almost 3,000 MT in 1965, declined to about 1,600 MT by 1973, reach an historical peak of 6,100 MT in 1976, then fluctuated between 2,000 to 4,000 MT through remainder of the time series (**SAI-Table 1 and Figure 2**). Landings for the east Atlantic generally parallelled the total Atlantic increasing trend, whereas the landings in the west were steady over the last decade. It should be noted that a significant segment of the landings between 1965 and 1983 were listed as unclassified region until the data preparatory meeting at the recent workshop (Miami, Florida, July 1996) which partitioned these data to either the west or east Atlantic. However, the Committee continues to recognize that there is a clear underestimation of the catches, particularly in the east Atlantic, still persist. The overall trend in Atlantic landings are very much governed by the large landings from artisanal fisheries off west Africa. In addition, no catch statistics have been reported so far for the Mediterranean spearfish.

SAI-3. State of stocks

The most current assessments for west Atlantic sailfish/spearfish were submitted to the SCRS in 1993 and these analyses included data through 1991. The general results from these exploratory analyses using a non-equilibrium production model indicated that biomass trends had declined to fully exploited or over exploited levels, particularly near the end of the time series (**SAI-Figures 3 and 4**). Maximum sustainable yield was estimated from production model analyses for the west Atlantic to be about 700 MT, whereas current landings for 1996 are about 886 MT. Biomass in 1992 was estimated to be 62% of the biomass needed to produce MSY.

The most current assessment for east Atlantic sailfish/spearfish was conducted during the 1997 SCRS and this analysis, using a non-equilibrium production model, included data through 1995. The Working Group decided to exclude the Japanese longline CPUE from the current analysis because of the mixing of spearfish in the sailfish catch for the early part of the time series and changes in gear, deployment locations, target species, and reduced reports of sailfish landings in the most recent part of this time series. The general results from these exploratory analyses, using the artisanal fisheries as the primary index of abundance, indicated that biomass trend had declined to fully exploited levels near the end of the time series (**SAI-Figures 5 and 6**). Maximum sustainable yield was estimated from the production model analyses for the east Atlantic to be about 1,390 MT, whereas current landings for 1996 are about 1,332 MT. Biomass in 1996 was estimated to be 88% of the biomass needed to produce MSY.

SAI-4. Outlook

The Committee remains concerned about the downward trend in the indices of abundance and the biomass trajectories for western Atlantic sailfish, which indicate the stock has declined to fully exploited or over-exploited levels. The reported landings for west Atlantic sailfish since 1992 were considerably higher than the replacement yield (about 600 MT) and therefore the stock biomass are expected to have further decline.

The Committee is encouraged by the increase in information on eastern Atlantic sailfish (particularly standardized artisanal indices of abundance) but also recognizes continued improvement is still necessary. The Committee feels that the current assessment results, which indicate the stock is likely fully exploited (more optimistic than for the west Atlantic), reflect the improvements to this data base. The Committee was also unanimous in its conclusion that the west African artisanal indices of abundance best describe populations trends for this stock hypothesis. The reported landings for east Atlantic sailfish in 1996 (1,332 MT) is lower than the replacement yield (about 1,473 MT) and therefore the stock biomass are expected to increase.

SAI-5. Effect of current regulations

No ICCAT regulations are currently in effect for Atlantic sailfish/spearfish.

See section in the Blue Marlin Executive Summary Report.

SAI-6. Management recommendations

Recent stock assessments for eastern Atlantic and particularly western Atlantic sailfish indicate that this species is at least fully exploited or possibly over-exploited and warrants consideration for development of methods to reduce fishing mortality rates. See Blue Marlin Executive Summary Report.

ATLANTIC SAILFISH SUMMARY

	West Atlantic[1]	*East Atlantic*
Maximum Sustainable Yield (MSY)	~ 700 MT	1,390 MT
Current (1996) Yield	~ 886 MT	1,332 MT
Current (1992/96) Replacement Yield	~ 600 MT	1,473 MT
Relative Biomass ($B_{1992/96}/B_{MSY}$)	~ 0.62	0.88
Relative Fishing Mortality: $F_{1991/95}/F_{MSY}$	~ 1.4	1.3
Management Measures in Effect	none	none

[1] Model D4

SAI-Table 1. Reported catches (in MT) of Atlantic sailfish** and spearfish by area and fleet.

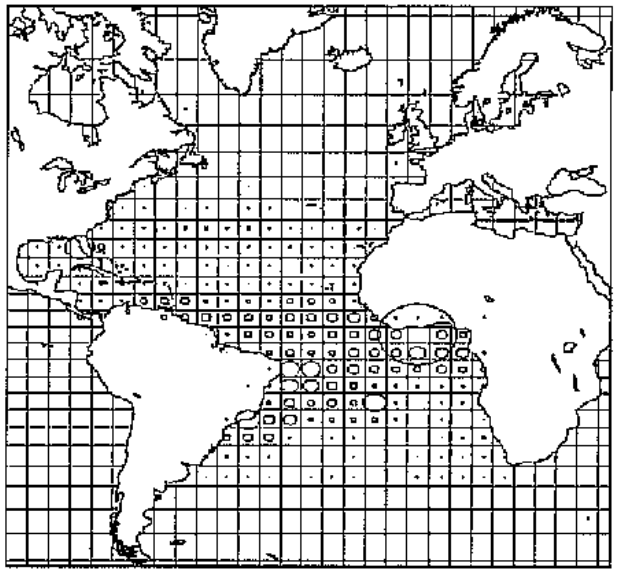
[illegible]	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
SAI** + SPF	998	1483	2919	2421	1894	2579	2289	2687	2722	2420	1638	4310	5873	6132	2076	2937	3784	2574	2421	3330	3961	3175	2972	2774	3164	2500	2012	2710	2112	2579	3372	2255	2545	2249
SAI**	998	1483	2919	2421	1894	2579	2289	2687	2722	2420	1638	4310	5873	6132	2076	2937	3784	2574	2421	3330	3961	3175	2972	2720	3089	2490	1972	2709	2112	2579	3250	2217	2510	2218
ATLANTIC UNKNOWN	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP. [illegible]	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EAST ATLANTIC	505	536	1383	1350	1167	1299	1195	857	1119	1375	859	3437	5081	5305	1144	2142	2881	1667	1590	2355	3188	2138	1964	1702	2172	1629	1229	1722	1300	1551	2183	1201	1677	1332
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	48	0	53	50	25	32	40	8	20	21	20	21	20	20	0
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP. [illegible]	0	0	1	15	71	557	423	296	526	785	491	99	25	217	59	7	19	5	12	67	20	8	9	1	0	0	7	13	0	0	420	101	155	63
COTE D'IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	40	40	67	55	62	40	71	44	60	71	196
CUBA	10	20	43	31	371	56	52	42	21	13	42	96	110	185	65	69	40	79	79	158	200	115	19	55	50	22	53	61	184	200	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	4	7	9	0	0	14	0	0	0	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	108
GHANA*	0	0	0	0	0	0	0	0	0	0	2	3040	4726	4517	764	1885	2691	1191	891	1426	2408	1658	1485	925	1392	837	462	395	463	297	693	700	700	303
JAPAN	495	515	1331	1237	404	548	230	95	125	89	66	19	38	4	24	11	19	33	50	38	47	63	84	71	37	57	57	63	16	42	58	45	52	42
KOREA	0	1	5	62	231	49	395	326	321	312	69	58	46	151	46	18	5	34	24	33	3	34	29	2	20	15	17	16	30	3	3	6	6	14
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	15	10	10
PANAMA	0	0	0	0	0	0	0	0	0	15	31	9	7	41	13	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0
SENEGAL	0	0	0	0	76	76	81	87	112	122	144	107	122	189	160	143	107	325	498	572	510	163	241	572	596	587	552	1092	546	917	931	253	663	596
U.S.S.R	0	0	3	5	14	13	14	11	14	39	14	9	7	1	13	5	0	0	0	0	0	0	0	2	5	4	4	0	0	0	0	0	0	0
WEST ATLANTIC	489	945	1536	1071	727	1280	1094	1830	1603	1045	779	873	792	827	932	795	903	907	831	975	773	1037	1008	1018	917	861	743	987	812	1028	1067	1016	833	886
ARUBA	0	0	0	0	0	0	0	0	0	0	0	10	10	20	20	30	30	30	30	30	30	30	30	30	23	20	16	13	9	5	10	10	10	10
BARBADOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	45	29	42	50	46	74	25
BRASIL	46	46	46	46	23	57	27	21	43	64	37	78	76	176	246	214	175	219	64	145	53	120	185	290	170	146	146	299	82	99	93	103	180	263
BRASIL-BARBA.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
BRASIL-ESP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
BRASIL-HOND.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	2	1	2
BRASIL-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	26	12	0	8	7	1	2	2	4	6	1	2	0	0	0	0	10	0
BRASIL-KOR	0	0	0	0	0	0	0	0	0	0	0	0	0	10	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRASIL-TAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	247	144	23	54	39
CHIN.TAIP. [illegible]	0	0	1	20	106	86	179	111	170	17	107	80	28	126	5	10	18	36	81	22	31	45	39	64	31	300	171	83	73	33	223	233	38	5
CUBA	13	29	59	44	0	258	19	58	30	17	58	133	152	0	91	51	151	119	134	181	28	169	130	50	171	78	55	126	83	70	0	0	0	0
DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	50	49	46	18	40	44	44	40	31	98	50	90	90	90
GRENADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	37	40	31	36	27	37	66	164	211	104	114	98	218	316	310	246	151	119	56
JAPAN	240	655	1140	608	274	422	228	499	321	132	78	118	112	133	23	9	20	22	44	135	22	34	38	28	6	22	22	25	73	1	2	8	2	2
KOREA	0	2	6	87	0	160	316	453	446	433	96	81	63	14	65	14	19	51	41	19	0	52	72	14	1	0	17	25	0	3	0	8	8	22
MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	19	19	0
NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	30	30	30
NETHERLAND.ANT	0	0	0	0	0	0	0	28	28	28	28	28	28	28	28	21	21	21	21	21	21	21	10	10	10	10	10	10	10	10	15	15	15	15
PANAMA	0	0	0	0	0	0	0	0	0	20	44	13	9	0	18	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	4	4	4	2	1
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	58	14	25	35	24	11	9	4	4	55	100	100
U.S.A	157	173	188	194	201	207	214	220	227	233	240	248	254	261	308	308	308	308	308	308	311	311	197	199	242	75	59	66	69	51	72	74	39	72
VENEZUELA	33	40	96	72	123	90	111	440	338	101	91	84	60	59	56	66	93	58	72	57	119	81	81	77	80	22	24	24	24	46	64	100	42	148

* Uncertainty exists with the landings for 1973 and 1974

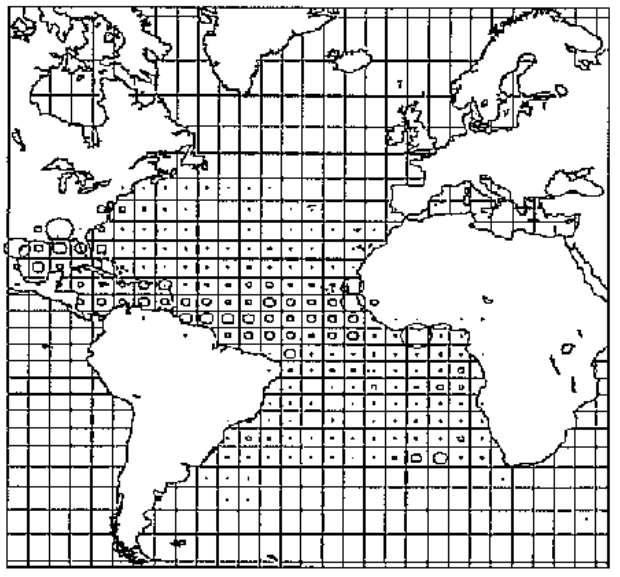
** Reported landings of sailfish by most longline fisheries include spearfish. Some countries have reported spearfish landings separately for recent years.

SAI-Table 1. CONTINUED

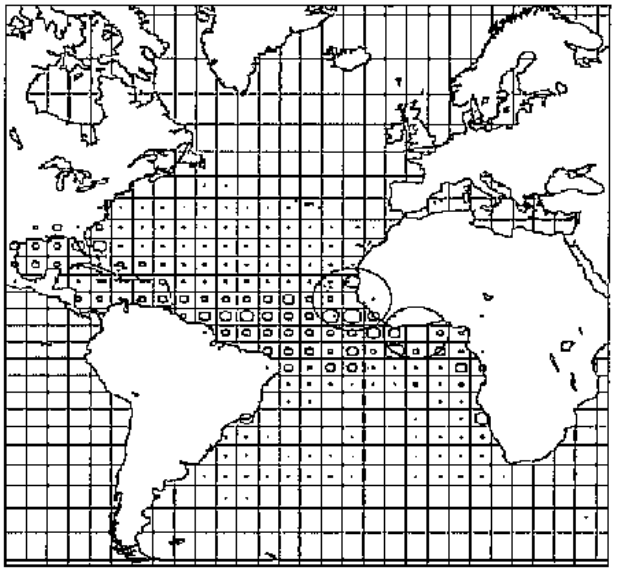
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
REPORTED SPEAR FISH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	75	10	40	1	0	0	122	38	35	31
EAST ATLANTIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	58	36	26	25
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0	0
JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	36	26	25
WEST ATLANTIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	75	10	7	1	0	0	64	2	9	6
JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	3
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	75	10	7	1	0	0	62	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3



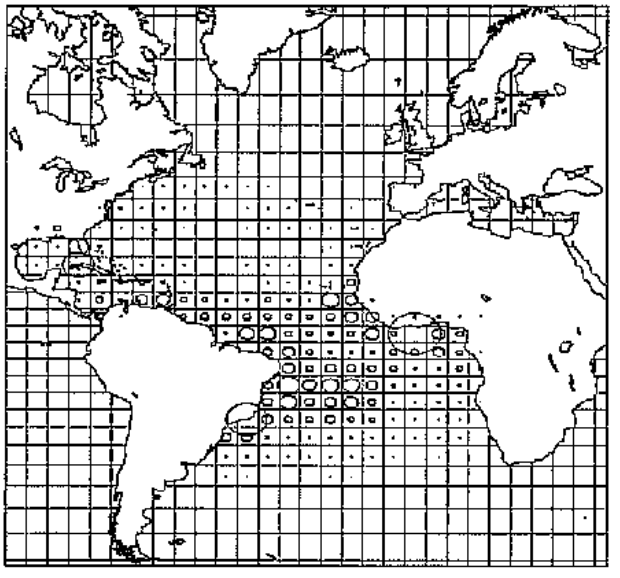
1st Quarter



3rd Quarter

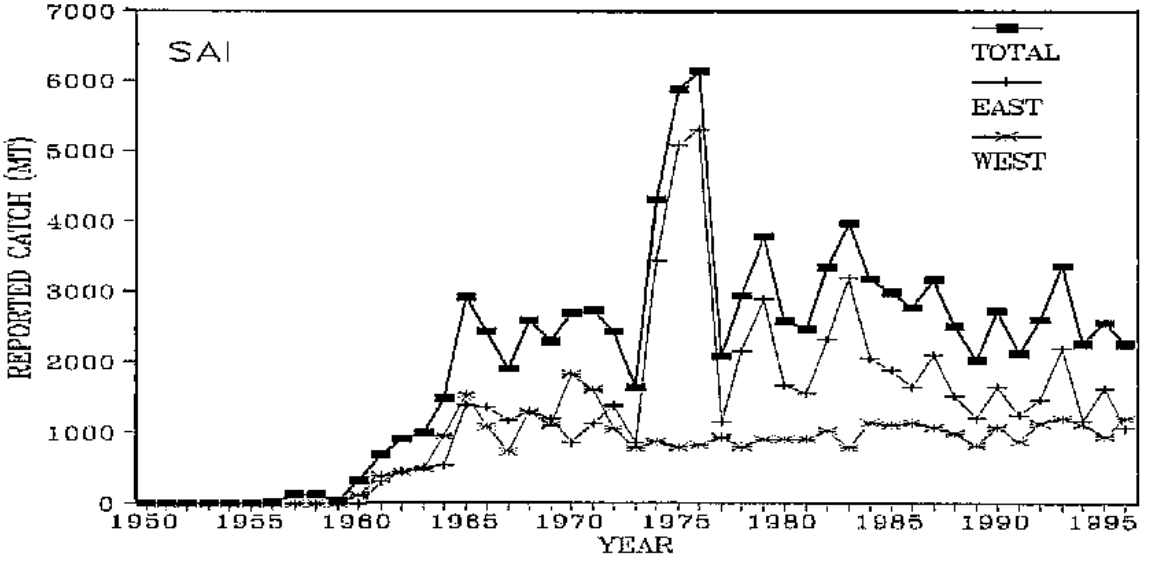


2nd Quarter

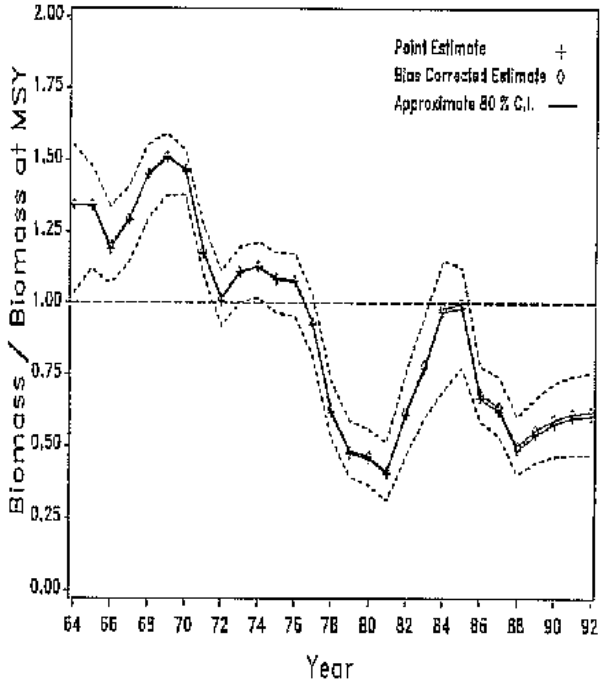


4th Quarter

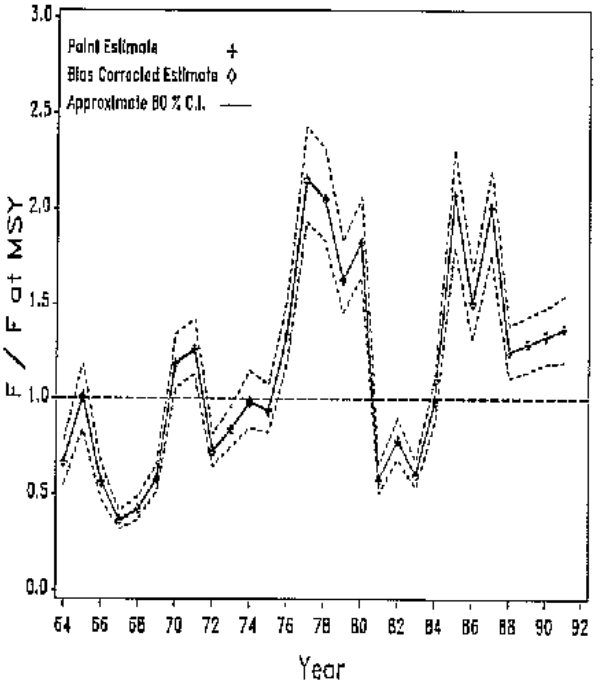
SAI-Fig. 1. Distribution of sailfish catches throughout 1950-1994



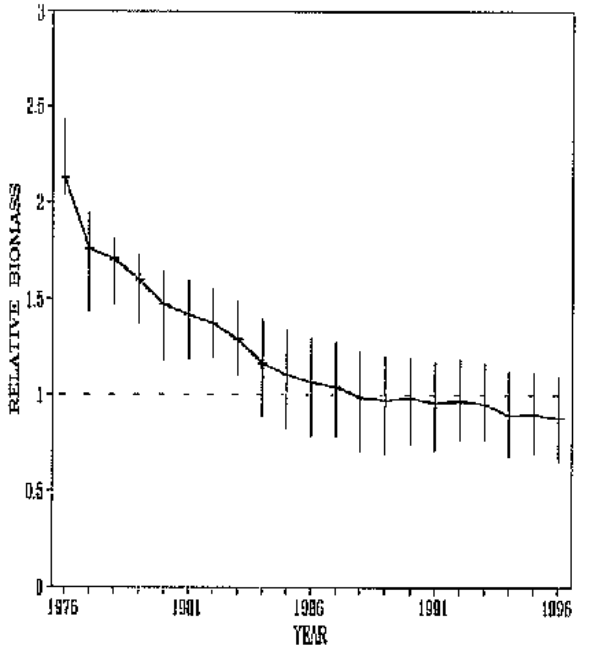
SAI-Fig. 2. Task I catches (MT) of sailfish including spearfish by regions, 1950-1995.



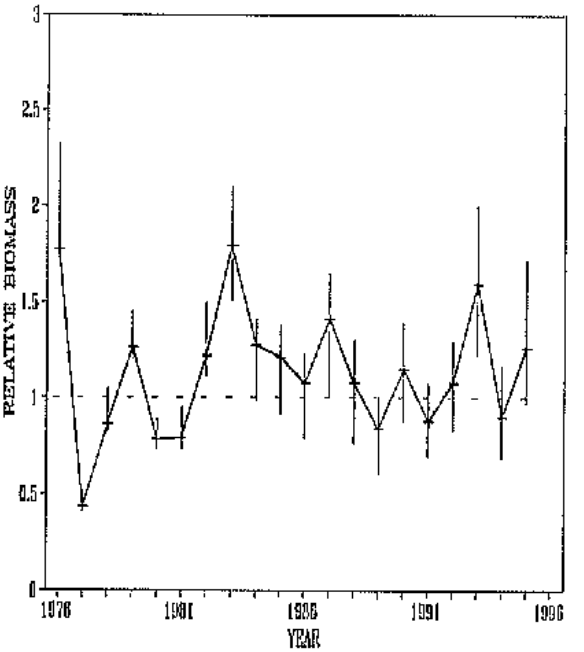
SAI-Fig. 3. Bootstrapped annual relative biomass (= B_t/B_{MSY}) from the ASPIC models fitted to west Atlantic sailfish catch and effort information. Confidence intervals are based on 1000 trials. Annual values for the first two years are omitted due to extreme imprecision. (1993 SCRS Report).



SAI-Fig. 4. Bootstrapped annual relative fishing mortality (= F_t /F_{MSY}) from the ASPIC models fitted to west Atlantic sailfish catch and effort information. Confidence intervals are based on 1000 trials. Annual values for the first two years are omitted due to extreme imprecision. (1993 SCRS Report).



SAI-Fig. 5. Bootstrapped annual relative biomass trajectory (B_t/B_{conv}) for east Atlantic sailfish from non-equilibrium production method fits. 80 % confidence limits are based on 1000 trials.



SAI-Fig. 6. Bootstrapped annual relative fishing mortality trajectory (F_t/F_{conv}) for east Atlantic sailfish from non-equilibrium production method fits. 80 % confidence limits are based on 1000 trials.

SWO-ATL - A T L A N T I C S W O R D F I S H

No new Atlantic stock assessment was conducted in 1997. This report updates the description of fisheries, current regulations, and comments on the 1996 CPUE in the state of the stocks section. Other sections, and the conclusions of the Committee, remain unchanged from the 1996 report.

SWO-ATL-1. Biology

Swordfish are distributed widely in the Atlantic Ocean and Mediterranean Sea, and range from Canada to Argentina on the western side, and from Norway to South Africa on the eastern side (**SWO-Figure 1**). The management units for assessment purposes are a separate Mediterranean group, and North and South Atlantic groups separated at 5°N. There is uncertainty as to whether the management boundaries used correspond to the biological stock boundaries.

Swordfish feed on a wide variety of prey including groundfish, pelagics, deep-water fish and invertebrates. They are believed to feed throughout the water column, following the diel migration of the deep-scattering layer by maintaining their position within a preferred level of illumination (isolume). They are typically caught on pelagic longlines at night when they feed in surface waters.

Swordfish spawn in the warm tropical and subtropical waters throughout the year. They are found in the colder northern waters during summer months. Young swordfish grow very rapidly, reaching about 140 cm LJFL (lower jaw-fork length) by age 3, but grow slowly thereafter. Females grow faster than males and reach a larger maximum size. Swordfish are difficult to age, but the females are considered mature by age 5.

SWO-ATL-2. Description of fisheries

Directed longline fisheries in Spain, the United States and Canada have operated since the late 1950s or early 1960s, and harpoon fisheries have existed since the late 1800s. The Japanese tuna longline fishery started in 1956 and has operated throughout the Atlantic since then, with substantial catches of swordfish that are produced as a by-catch in their tuna fisheries. There are other directed swordfish fisheries (i.e., Brazil, Portugal, Venezuela, Morocco and Uruguay) and by-catch or opportunistic fisheries which take swordfish (i.e. Taiwan, Korea, France and Brazil). The SCRS scientists believe that ICCAT Task I landings data provide minimum estimates because of unreported landings from vessels flying flags of convenience and from other sources including member and non-member nations.

The total Atlantic reported catch of swordfish (north and south, including discards) reached an historical high of 37,330 MT in 1995, 9% higher than the previous peak catch of 34,177 MT in 1989 (**SWO-Table 1 and SWO-Figure 2**). The 1996 reported catch was 32,719 MT. As a number of countries have not yet reported their catches, this value should be considered provisional and subject to revision.

Since 1989, the North Atlantic reported catch has averaged about 16,000 MT (**SWO-Table 1 and SWO-Figure 2**). In 1996, Spain and the U.S. have decreased their peak north Atlantic landings, by 50% since 1987 and by 44% since 1989, respectively, in response to ICCAT recommendations. If the U.S. discards are counted, the total U.S. landings and discards have declined by 35% from the peak catch level of 1989. Reduced landings have also been attributed to shifts in fleet distributions, including movement of some vessels out of the Atlantic. In addition, some fleets, including the United States, Spain and Canada, have changed operating procedures to opportunistically target tuna and/or sharks, taking advantage of market conditions and higher relative catch rates.

The South Atlantic reported catch was relatively low (generally less than 5,000 MT) until the early 1980s. Since then, landings have increased continuously through the 1980s and 1990s to a peak of 20,607 MT in 1995 and 17,983 MT in 1996, levels that match peak north Atlantic harvests. Since 1988, reported landings have exceeded 12,000 MT. The historic peak in reported landings for 1995 (20,607 MT) is 20% higher than reported landings in 1990 (17,215 MT). The increase in landings was in part the result of progressive shifts of fishing effort to the south Atlantic, primarily from the north Atlantic, as well as other waters.

SWO-ATL-3. State of stocks

In 1997, updated north and south Atlantic CPUE data (1996) were examined and show similar trends to those in recent years.

North: In 1996, the status of the North Atlantic swordfish resource was assessed using both non-equilibrium stock production models and virtual population analyses (VPA) based on catch (**SWO-Table 1**) and CPUE data through 1995. The relationship between catches and standardized fishing effort is shown in **SWO-Figure 3**. The current base case assessments indicate that the North Atlantic swordfish resource has continued to decline despite reductions in total reported landings from peak values in 1987 (**SWO-Figure 4**). Although some fleets have reduced their catch levels and partial fishing mortality by a substantial amount, it is apparent that these have not resulted in reductions in the overall fishing mortality rate because recent landings have exceeded surplus production. The decline in stock size is reflected in declining CPUE's for several fisheries. An updated estimate of maximum sustainable yield from production model analyses is 13,000 MT (with estimates ranging from 5,300 to 16,500 MT). Since 1982, only in one year (1984) have north Atlantic swordfish catches been less than 13,000 MT; preliminary estimates of catches in 1995 were about 16,900 MT.

The biomass at the beginning of 1996 was estimated to be 58% (range: 41 to 104%) of the biomass needed to produce MSY. The 1995 fishing mortality rate was estimated to be 2.05 times the fishing mortality rate at MSY (range: 1.07 to 3.82). The replacement yield for 1996 was estimated to be about 11,300 MT. Preliminary landings in 1995 and anticipated landings in 1996 are expected to exceed this level substantially; thus, it is likely that the stock will decline further.

Overall, the virtual population analyses conducted for North Atlantic swordfish in 1996 were consistent with the non-equilibrium stock production model results, particularly in terms of the trends in population trajectories. The Base Case VPA point estimates for age 1 gradually increased in the early 1980s, shifting to a higher level in 1985 to 1989. Subsequently, recruitment (age 1) shifted to a lower level between 1990 and 1993, before increasing in the last two years (1994 and 1995). However, estimates of recent recruitment are less precise. The age 2 abundance trend mimics the age 1 trend with the appropriate one year lag, but the pattern is less pronounced. Ages 3 and 4 estimated abundance trends from the VPA were variable during the initial years of the time series with a decline in the most recent years (although again these most recent estimates are less precise). Estimated abundance of older fish (ages 5+) declined to about one third from 1985 to 1995. While there has been a general decrease in fishing mortality rates for age 1 swordfish since 1988, all other fishing mortality rates (for ages 2, 3, 4, and 5+) have increased to peak levels, equal to or exceeding levels estimated for 1988. Estimated fishing mortality rates declined slightly from 1988 to 1991 for ages 2, 3, and 4, but have since continually increased. A preliminary virtual population analysis of catch from 1985-1995 aged by one set of sex-specific growth models (using an alternate growth curve from the Base Case), resulted in lower estimates of fishing mortality rates. While the assumption of sex-specific growth is, in principle, more biologically realistic than the 1:1 sex ratio assumed in the Base Case VPA, the Committee is uncertain that the 1996 sex-specific results will prove to be robust to factors the Committee has not had time to adequately investigate (including the effects of growth curve assumptions and sex-ratio estimates). Current fishing mortality rate estimates from the base case are well above common biological reference points obtained from yield per recruit analyses. Additionally, the long-term adult biomass per recruit corresponding to the current fishing mortality rate is very low. Given the fishing mortality pattern from the Base Case VPA in the north, the adult biomass per recruit would result in a level of about 2% of the maximum in equilibrium. This is well below the level which is commonly considered to result in risks of recruitment over-fishing in other stocks.

South and total: Previous Committees expressed serious concern about the stock status in the south Atlantic and total Atlantic based on the pattern of high and apparently increasing catches and declining CPUE trends in both the north and in several south Atlantic CPUE indices. The Committee is less certain if the CPUE series used are the most accurate indicators of resource abundance in the south due to factors that have not yet been investigated. However, for the first time, a quantitative assessment for the south Atlantic swordfish stock assumption was conducted, yielding preliminary results (**SWO-Figure 5**). These assessment results quantify the reason for concern. Although biomass at the beginning of 1996 was estimated to be 99% (range: 82 to 118%) of the biomass needed to produce MSY, the 1995 fishing mortality rate was estimated to be 1.24 times the fishing mortality rate at MSY (range: 0.94 to 1.93), and the surplus production (estimated replacement yield) for 1996 was estimated to be about 14,600 MT (based on preliminary analyses). Reported landings in 1995 (about 20,600 MT) and 1996 (about 18,000 MT) have exceeded this level; thus, it is likely that the stock will decline further. If a total Atlantic stock was assumed, it is unlikely that the

view of the status of the stock would be improved from that of the north or south Atlantic status. The Committee expressed concern about the uncertainty of the stock structure of Atlantic swordfish and the possibility that the assumed north Atlantic stock does not include the entire catch from the biological stock. When boundaries are uncertain, in this case because of limited or imprecise data, it is important to implement appropriate measures which encompass several possible stock assumptions.

SWO-ATL-4. Outlook

Projections of north Atlantic swordfish based upon VPA's and age-structured and age-lumped non-equilibrium production models were conducted in order to evaluate the effects of possible management scenarios. These indicate that large reductions in yield and fishing mortality rate would be required to rebuild the stock in the short and medium term. Projections also indicate that the 1995 catch (estimated at approximately 17,000 MT) and anticipated 1996 catch levels are not sustainable and there is a 90% probability of radical reduction by the year 2000 (assuming it is possible to exert a high enough fishing mortality rate to maintain a constant catch at current levels as the stock declines). Even if future catches were maintained at the MSY level, the stock would be expected to exhibit further decline, since the stock is below that which would sustain MSY. Fishing at quota levels agreed to at the 1995 Commission meeting is projected to result in further stock declines since these levels are considerably above projected replacement yield levels. If catches in 1996 have been about 17,000 MT, the replacement yield for 1997 is likely to be about 8,000-12,000 MT.

The Committee noted that total swordfish biomass corresponding to MSY levels in the North Atlantic may not be achieved in 5 or 10 years without substantial reductions in catch from current levels. Further, unless recruitment increases substantially, a constant quota for a declining stock implies ever-increasing levels of fishing mortality and, therefore, over-exploitation. A large increase in recruitment is unlikely if the spawning stock size continues to decline and is unlikely on a sustained basis from any level of spawning biomass. The Committee noted that target fishing mortality rates are less risky than constant catches for rebuilding over-fished stocks. The target F's are usually translated into corresponding quotas which require adjustment after each assessment, depending on the status of the stock.

Results of the 1996 preliminary analyses of the South Atlantic indicate that current levels of harvest are not sustainable. These analyses indicated that replacement yield was estimated to be about 14,600 MT for 1996. Estimated catches for 1996 have exceeded this level and biomass is expected to decline further.

SWO-ATL-5. Current regulations

In general, the 1994 regulatory recommendations were not effective in conserving Atlantic swordfish. Even if the 1994 regulations had been perfectly implemented, the level of catch would still have substantially exceeded replacement yield and resulted in the continued decline of the north Atlantic swordfish stock. Given that the 1994 regulations were not effective, the situation in both the north and south Atlantic is cause for concern, particularly in the north Atlantic because of the status of that stock. The Committee emphasized the need for effective management measures throughout the Atlantic, to ensure conservation of Atlantic swordfish and to account for the uncertainty associated with the swordfish stock structure assumptions. The Committee noted the substantially reduced north Atlantic catch quotas for 1997 to 1999 established by the Commission in 1996, and recommends appropriate action in the south Atlantic. The unreported catches of non-member countries and flags of convenience fleets are of considerable concern to the Committee, as these may undermine attempts at effective regulations for conservation.

SWO-ATL-6. Management recommendations

North: The Committee recommends that the Commission, if it desires to rebuild the North Atlantic swordfish stock, must immediately reduce both fishing mortality rates and catch dramatically. The recommendations for regulatory measures adopted in 1990 and 1994 were introduced to reduce both catch and effort, but these reductions, although different among countries involved, have not arrested the decline in the stock. It is important to recognize that the failure to achieve sufficient overall reductions in fishing mortality since 1991 has resulted in the need for more severe reductions now and in the future to achieve recovery. The current catch levels are not sustainable. However, the state of the north Atlantic stock is not in such a depressed state that recovery cannot be realized in a reasonable time period. Immediate and appropriate actions can improve the status, given that estimated stock sizes are below

biomass at MSY and given the resilient nature of swordfish. In order to arrest the declining trend, the analyses generally suggest that catches should not exceed about 10,000 MT. A preliminary sex-specific VPA indicated that a catch of about 12,000 MT might allow an increase to MSY levels; however the Committee reiterated the preliminary nature of this analysis. In order to allow for increase in stock biomass, the level of harvest needs to be immediately reduced below the level of replacement yield.

South: The SCRS is seriously concerned about the stock status in the south Atlantic based on the results of the preliminary south Atlantic production model and on the pattern of high catches and declining CPUE trends in some fisheries. The 1995 and 1996 catches in the south are the two highest on record, and at the level of peak catches previously observed in the north. The results of the preliminary analysis indicate that current levels of harvest are not sustainable. If the Commission intends to keep the stock in a healthy condition, it should not delay actions and harvest levels must be reduced, otherwise even more restrictive measures will be needed in the future. Provided that the preliminary results are correct, in order to allow for increase in stock biomass, the level of harvest needs to be immediately reduced below the level of estimated replacement yield.

Total: If a total Atlantic stock was assumed, it is unlikely that the view of the status of the stock would be improved from that of the north or south Atlantic status. Current catches are not sustainable and substantial reductions in harvest are required.

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	*South Atlantic*
Maximum Sustainable Yield[1]	13,000 MT (5,300-16,500 MT)[3]	14,200 MT (5,200-16,900 MT)
Current (1996) Yield (preliminary)	14,763 MT	17,983 MT
Current (1996) Replacement Yield[1]	11,360 MT (7,120-16,710 MT)	14,620 MT (8,400-17,140 MT)
Relative Biomass (B_{1996}/B_{MSY})[1]	0.58 (0.41-1.04)	0.99 (0.82-1.18)
Relative Fishing Mortality:		
F_{1995}/F_{MSY}[1]	2.05 (1.07-3.82)	1.24 (0.94-1.93)
F_{1995}/F_{max}[2]	2.4	not estimated[4]
$F_{1995}/F_{0.1}$[2]	3.5	not estimated[4]
Management Measures in Effect	25 kg minimum size; country- specific quotas	Limit catch to 1993 or 1994 levels

1 Base Case production model results based on catch data 1950-1995 (SWO-Table 1)
2 Base Case VPA results based on catch data through 1995 (SWO-Table 1)
3 80% confidence intervals are shown.
4 Production model results do not provide basis for these estimates.

SWO Table 1. Reported swordfish catches (retained and discarded in MT) by major regions and fleet

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	11582	15060	17407	18262	12407	13304	13959	14149	16202	14145	14544	20559	20778	25460	21986	26029	26825	35682	39287	41137	44567	52827	51964	44467	39656	42181	43995	47000	47684	***
NORTH - TOTAL	8688	9172	9203	9495	5266	4766	6074	6362	8839	6696	6409	11835	11937	13558	11180	13215	14527	12791	14383	18486	20236	19513	17250	15784	15019	15677	17193	15484	16723	14731
RETAINED	8688	9172	9203	9495	5266	4766	6074	6362	8839	6696	6409	11835	11937	13558	11180	13215	14527	12791	14383	18486	20236	19513	17250	15784	14804	15294	16785	14776	16197	14143
DISCARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	383	408	708	526	588
LONGLINE	8679	8985	9003	9197	5208	4469	5519	5139	7078	5234	5458	11123	11177	12831	10549	13019	14023	12664	14240	18269	20022	18927	15348	14030	14358	14667	16117	14783	16048	14001
OTHERS	428	187	200	298	58	297	555	1223	1761	1462	951	712	760	727	631	196	504	127	143	217	214	586	1902	1754	661	1010	1076	701	675	730
BERMUDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
CANADA	4794	4393	4257	4800	0	0	0	2	21	15	113	2314	2970	1885	561	554	1088	499	585	1059	939	898	1247	911	1026	1547	2234	1676	1610	739
CANADA-JPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0
CHIN.TAIP.	99	150	283	304	294	168	316	265	272	471	246	164	338	134	182	260	272	164	152	157	52	23	17	270	577	441	127	507	489	524
CUBA	336	224	97	134	160	75	248	572	280	283	398	281	128	278	227	254	410	206	162	636	910	832	87	47	23	27	16	0	0	0
ESPANA	2690	3551	3502	3160	3384	3210	3833	2893	3747	2816	3309	3622	2582	3810	4014	4554	7100	6315	7441	9719	11135	9799	6648	6386	6633	6672	6598	6185	6953	5547
FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	1	4	4	0	0	0	75	75	75	95	46	46	0
GRANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	5	1	2	3	13	0	1	1
IRELAND	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ITALY	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAPAN	280	262	130	298	914	784	518	1178	2462	1149	793	946	542	1167	1315	1755	537	665	921	807	413	621	1572	1051	992	1064	1126	933	1043	1451
KOREA	46	24	22	40	159	155	374	152	172	335	541	634	303	284	136	198	53	32	160	68	60	30	320	51	3	3	19	16	16	19
LIBERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	5	38	34	53	0	24	16	30	19	35	3	0	7	14	26	0	0
MAROC	34	43	20	17	33	43	18	15	15	12	7	11	208	136	124	91	129	81	137	181	197	196	222	203	192	352	460	335	336	505
MARTINIQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	2	4	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	14	0	0
NEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	14	3	207	302	714	43	35	111	0	0	0
NORWAY	300	200	600	400	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEI-PANAMA	0	0	0	0	0	7	171	24	25	91	22	76	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POLAND	0	0	0	0	0	0	100	0	0	0	0	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	11	12	11	8	11	21	37	92	58	32	38	17	29	15	13	11	9	14	22	468	994	617	300	475	773	542	1961	1599	1617	1703
RUMANIA	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	6	0	0	0	0
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	23	0	4	3
TRINIDAD & TO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	26	6	45	151	42	79	66	71	562	125	0	0	0
U.S.A	55	274	170	287	35	246	406	1125	1700	1429	912	3684	4619	5625	4530	5410	4820	4749	4705	5210	5247	6171	6411	5519	4310	3852	3782	3366	4026	3560
U.S.S.R	22	21	11	24	24	28	26	17	32	19	15	23	10	21	0	69	0	16	13	18	4	0	0	0	0	0	0	0	0	0
UNITED KINGD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	5
VENEZUELA	21	18	100	23	52	27	23	24	52	43	15	46	182	192	24	25	35	23	51	84	86	2	4	9	78	103	73	69	54	85
DISCARDED CATCHES																														
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	383	408	708	526	588

SWO Table 1. Reported swordfish catches (retained and discarded in MT) by major regions and fleet.....

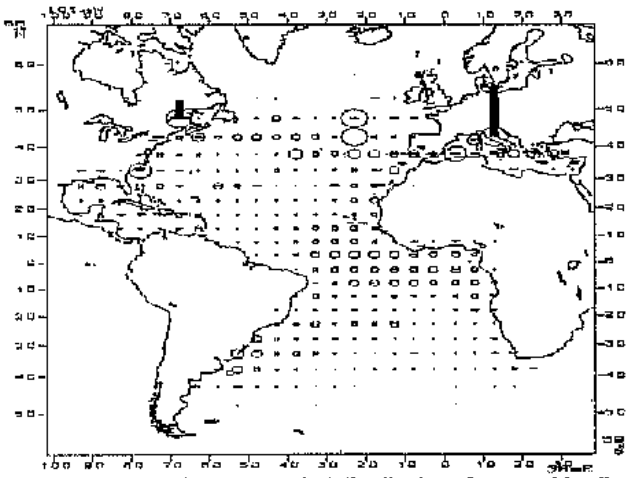
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
SOUTH	1577	2448	4481	5426	2166	2580	3078	2753	3062	2812	2855	2766	3294	5323	3993	6471	5402	9225	9676	5933	6043	12975	16953	17215	13878	13801	15779	17428	20607	17946
LONGLINE	1577	2348	4281	5426	2164	2580	3078	2753	3062	2812	2840	2749	3265	5179	3938	6344	5307	8920	8863	4951	5446	12404	16398	16705	13287	13173	15547	17366	20575	17806
OTHERS	0	100	200	0	2	0	0	0	0	0	15	17	29	144	37	103	95	219	723	943	584	552	529	510	591	628	232	62	32	140
ANGOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	228	815	84	84	84	0	0	0	0	0	0	0
ARGENTINA	79	259	500	400	63	100	48	10	10	111	132	4	0	0	0	20	0	0	361	31	351	198	175	230	88	88	14	24	NR	NR
BELIZE.SH.OB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	24	0	86	90	39	13	19	26	28	28	26	28	0	0	0
BRASIL	62	100	181	162	154	121	161	465	514	365	396	372	521	1582	673	1043	781	554	652	792	960	1181	1194	1696	1312	2609	2013	1571	1744	1926
BULGARIA	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHIN.TAIP.	166	488	828	1281	779	807	1104	802	935	745	675	625	1292	702	528	520	261	199	280	216	338	798	610	900	1453	1686	846	2829	2876	2870
COTE D'IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	12	7	10	21	15	19	24	24	NR
CUBA	559	410	170	148	74	66	221	509	248	317	302	319	272	316	147	432	818	1161	1301	95	173	159	830	448	209	246	159	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	4393	7725	6166	5760	5651	6974	7937	11290	9622
GHANA	0	100	200	0	0	0	0	0	0	0	0	0	0	110	5	55	5	15	25	13	123	235	235	235	235	235	NR	NR	NR	140
HONDURAS-OB.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4
JAPAN	474	859	2143	2877	664	1023	480	191	805	105	514	503	782	2029	2170	3287	1908	4395	4613	2913	2620	4453	4019	6708	4459	2870	5256	4699	3619	2172
KOREA	79	77	370	382	256	249	602	563	279	812	699	699	303	399	311	486	409	625	917	369	666	1012	776	50	147	147	198	164	164	7
NEI-GFCM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	856	439	0	0	0	0	0	0
NIGERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83	69	0	0	0	0	0	0	0	3	0	0	0	0
NEI-PANAMA	0	0	0	0	0	12	274	90	40	219	28	83	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	380	389
SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	28	31	9	3	7	0	8	5	5	4	0	0	5	9	4	1	4	1
TOGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	32	1	0	2	3	5	5	8	14	0	0
U.S.S.R	158	155	89	176	176	202	188	123	231	138	106	161	70	154	40	26	46	158	60	0	0	0	0	0	0	0	0	0	0	0
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	575	1084	1927	1125	537	699	427	414	302	156	210	260	165	499	644
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171
DISCARDED CATCHES																														
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

SWO Table 1. Reported swordfish catches (retained and discarded in MT) by major regions and countries.

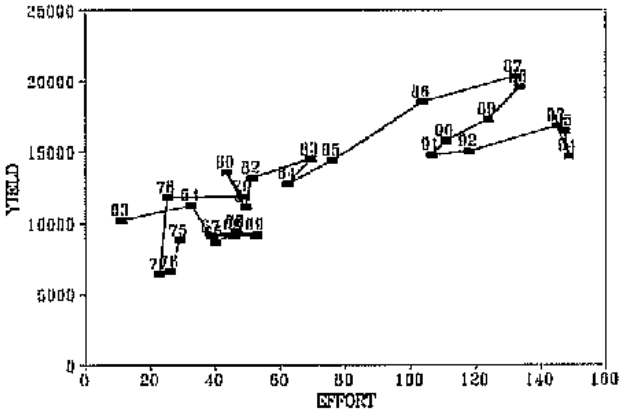
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEDITERRANE	1317	3440	3723	3341	4975	5958	4807	5034	4301	4637	5280	5958	5547	6579	6813	6343	6896	13666	15228	16718	18288	20339	17761	11468	10759	12703	10968	14023	10275	***
LONGLINE	869	1196	1350	1114	1426	1529	1388	1089	712	4138	4606	5046	4877	5115	5411	5751	6239	6640	6260	7297	7781	9163	6784	6545	6718	6683	6512	8239	5348	***
OTHERS	448	2244	2373	2227	3549	4429	3419	3945	3589	499	674	912	670	1464	1402	592	657	7026	8968	9421	10507	11176	10977	4923	4041	6020	4456	5784	4927	***
ALGERIE	0	0	0	0	0	0	100	196	500	368	370	320	521	650	760	870	877	884	890	847	1820	2621	590	712	562	395	562	600	600	NR
CYPRUS	0	0	0	0	0	0	0	0	5	59	95	82	98	72	78	103	28	63	71	154	84	121	139	173	162	73	116	159	NR	NR
ESPANA	700	1000	1100	900	1100	1300	1105	700	89	89	667	720	800	750	1120	900	1322	1245	1227	1337	1134	1762	1337	1523	1171	822	1358	1503	1379	1186
GREECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	773	772	1081	1036	1714	1303	1008	1120	1344	1904	1456	1568	2520	974	NR
ITALY	0	1568	2240	2016	3248	4144	3136	3730	3362	3747	3747	4506	3930	4143	3823	2939	3026	9360	10863	11413	12325	13010	13009	5524	4789	7595	6330	7765	6725	NR
JAPAN	0	0	0	0	0	0	0	0	0	1	0	2	3	1	0	5	6	19	14	7	3	4	1	2	1	2	4	2	4	5
LIBYA	336	560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MALTA	0	0	0	112	224	224	224	192	214	175	223	136	151	222	192	177	59	94	108	97	131	207	121	122	119	71	76	42	NR	NR
MAROC	170	197	250	214	327	230	183	196	118	186	144	172	0	0	0	0	43	39	38	92	40	62	97	289	478	683	436	733	289	509
NEI	0	0	0	0	0	0	0	0	0	0	0	0	0	728	672	517	532	771	730	767	828	875	979	1360	1292	1292	0	0	0	
TUNISIE	0	0	0	0	0	0	0	5	3	5	0	0	0	0	7	19	15	15	61	64	63	80	159	176	181	178	226	166	NR	NR
TURKEY	111	115	133	99	76	60	59	15	10	7	34	20	44	13	70	40	216	95	190	226	557	589	209	243	100	136	292	533	304	NR
AREA UNKNOWN																														
CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	65	79	100

NR = Catch not reported.

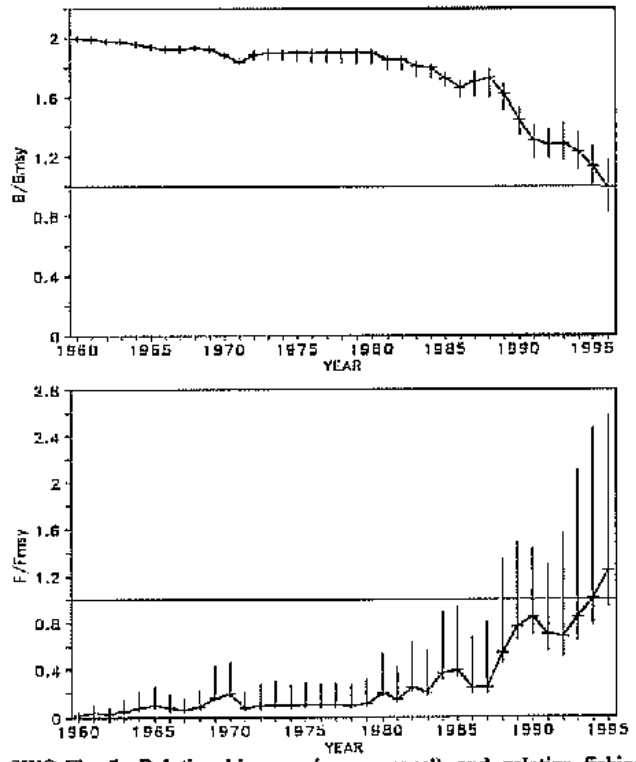
*** Total was not given as Mediterranean catch data are very incomplete.



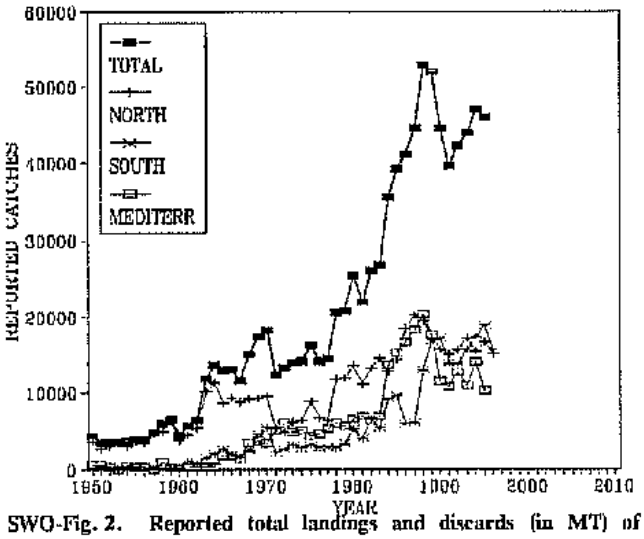
SWO-Fig. 1. Relative geographical distribution of reported landings of swordfish by longline (circle) and surface (histogram) gears, accumulated for 1990-1995.



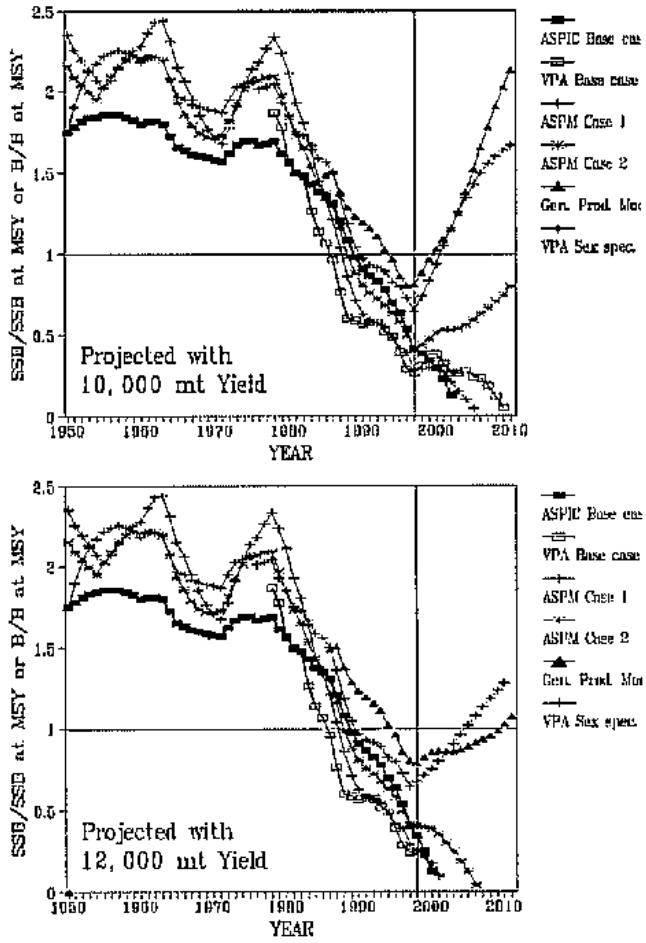
SWO-Fig. 3. Relationship between nominal catch and standardized effort for north swordfish.



SWO-Fig. 5. Relative biomass (upper panel) and relative fishing mortality rate (lower panel) estimated by the ASPIC production model for the South Atlantic. Bars indicate approximate 80% confidence intervals.



SWO-Fig. 2. Reported total landings and discards (in MT) of Atlantic swordfish, by area, 1950-1996.



SWO-Fig. 4. Stochastic stock trajectories and projections (spawning stock biomass or total biomass relative to that at MSY) from the Base Case lumped biomass production model (ASPIC), and the Base Case virtual population analysis (VPA) [dark lines]. Deterministic stock trajectories and projections from sensitivity trials and preliminary analyses [light lines]: two age-structured production model runs (ASPM Case 1–selectivities based on SCRS/94/116 and ASPM Case 2–selectivities based on Base Case VPA); generalized production model (using alternate skew parameter); and preliminary sex-specific VPA. Projections are based on 10,000 MT yield (upper figure) and 12,000 MT yield (lower figure), for 1997 and thereafter

SBF- SOUTHERN BLUEFIN TUNA

SBF-1. Biology

Southern bluefin tuna are distributed exclusively in the southern hemisphere of three oceans. The only known spawning grounds are located in an area south of Java, Indonesia and off the northwest of Australia. Juveniles migrate southward along the Australian west coast and stay in the coastal waters southwest, south, and southeast of Australia. As fish grow, they extend their distribution to cover a circumpolar area throughout the Pacific, Indian and Atlantic Oceans.

Southern bluefin tuna are considered to mature at age 8 at a length of 155 cm. Although the life span of this species was considered, from the tagging results, to be about age 20, the recent analysis revealed that a significant number of fish bigger than 160 cm were older than age 25. The maximum age obtained from otoliths was age 42. Age-specific natural mortality, high for young fish and low for old fish, is supported by tagging experiments and applied in stock assessments. The possible existence of stock not available to fisheries was suggested as one of the other explanations for the occurrence of large numbers of old fish.

Preliminary results from recaptured archival tags suggest that fish move in a much wider range than previously considered. Archival tagging is noted as a powerful tool for research on the biology and movement of fish.

SBF-2. Description of fisheries

Historically, the stock has been exploited by Australian and Japanese fishermen for more than 40 years. During the course of this period, the Japanese longline fishery taking older aged fish, recorded its peak catch of 77,927 MT in 1961 and the Australian catches of young fish by surface fishery peaked at 21,501 MT in 1982. New Zealand, Taiwan and Indonesia have also exploited southern bluefin tuna, and Korea started a fishery in 1991.

The catches of Australia, Japan and New Zealand have been controlled with quotas since 1986. The current catch limits are 5,265 MT for Australia, 6,065 MT for Japan, and 420 MT for New Zealand, which have remained at the same level since 1990. However, the catches by nations other than the aforementioned three have increased steadily and stayed at a level around 2,200 MT from 1991 to 1994, but almost doubled to 4,739 MT in 1996, partially due to the rapid expansion of the Korean Fishery (**SBF-Table 1 and SBF-Figure 3**).

The Atlantic catch has varied widely between 400 and 6,200 MT since 1978 (**SBF-Table 1 and SBF-Figure 2**), reflecting the shifts in longline effort between the Atlantic and Indian Oceans. The fishing ground in the Atlantic is located off the southern tip of South Africa.

Japanese longline vessels changed their catch retention practice to release fish of less than 25 kg in 1995 and 1996, and part of these catches were incorporated into the total estimated catch.

SBF-3. State of stocks

The Third Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) was held in Canberra, Australia, from July 28 to August 8, 1997. Although the Meeting concentrated its effort on evaluating the impact on stock recovery of additional removals by experimental fishing, and examining a range of hypotheses in CPUE interpretation, the CPUE and VPA analyses were revised using the most recent data.

The Japanese longline CPUEs are standardized, based on a range of hypotheses on fish density in cells without fishing efforts (**SBF-Figure 4**). The CPUE for parental stock (age 8 and older) continued to decline to the early 1990s and then stayed at about the same level, except under one hypothesis. The juvenile CPUE declined throughout the 1970s to the mid-1980s, and was then followed by an increase. The level of recovery of juveniles varied according to the hypothesis used. The sequential increases in the global CPUE by age for fish born in the late 1980s can be followed from 3 year-olds in 1990 to 8 year olds in 1995.

The Virtual Population Analysis (VPA) indicated stock status trends similar to those of the CPUEs (SBF-Figure 5). The parental biomass continued to decline through 1993 or 1994 and showed a slight increase in recent years in most cases. The absolute level of estimated parental biomass depended on the model structure of VPA. Significant discrepancies in estimates of recent recruitment trends (1988-1990) were noted, according to the different CPUE series used.

In summary, the current parental biomass of southern bluefin tuna remains at an historically low level. Sequential rebuilding which started in the mid 1980s at age 4 now reaches age 6 - age 10 according to the VPAs. However, it is still unclear whether the observed sequential rebuilding is sufficient to rebuild the parental biomass to the 1980 level in the near future.

SBF-4. Outlook

Future projections were performed to examine the medium to long term consequences of current and additional global catches on parental biomass as well as the probability of recovery to the 1980 level, based on a set of VPAs incorporating an agreed range of uncertainties. The probability of stock recovery to 1980 parental biomass level before 2020 ranged between 19 to 79 %, reflecting different interpretations of the plausibility of various hypotheses. This discrepancy in interpretations could not be solved and no single view on the outlook for the stock could be proposed.

SBF-5. Effects of current regulations

Southern bluefin tuna has been managed through quotas divided among Australia, Japan and New Zealand since 1985. The global quota was reduced several times from 38,650 MT in 1984 - 1985 season, and the current quota has been maintained at 11,450 MT since the 1989 -1990 season.

The sequential rebuilding observed in young age classes is considered to be the combined result of the benefits of a substantial reduction in fishing mortality, especially for small fish since 1988, and relatively good recruitment in the latter half of the 1980s. This sequential rebuilding could have reached age 9 in 1994 and started contributing to the recovery of parental biomass. Catch quotas and high catch rates in recent years causes a substantial contraction of the fishing season and area of Japanese longline operations.

The catch by nations not participating in the CCSBT has increased drastically in recent years, and are neither regulated nor adequately monitored. This results not only in an increase in uncertainties in stock assessment but might also ruin the effect of current regulations maintained under the CCSBT.

SBF-6. Management recommendations

The Committee noted that the ICCAT statistical system will continue to be important for monitoring the fishery for this species in the Atlantic Ocean. While the CCSBT established in May 1994 has competence for the management of this species as a whole in the three oceans, ICCAT is responsible for the management of southern bluefin tuna in the Atlantic Ocean. Therefore, close collaboration should be maintained between the two organizations as regards stock assessments and management measures.

No recommendation was made for the management of southern bluefin tuna in the Atlantic.

SOUTHERN BLUEFIN TUNA SUMMARY
(for the global stock)

Maximum Sustainable Yield (MSY)	not estimated
Current (1996) Yield	16,532 MT (preliminary)
Relative Biomass	
SSB (1997)/ SSB (1980)	0.29 = 0.63 (base case only)
Current Management Measures	global quota at 11,450 MT

SBF-Table 1. Atlantic and world southern bluefin catch (MT) by gear, area and fleet

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996*
ATLANTIC TOTAL	4348	2120	4345	2689	2662	637	745	3168	4677	6203	2823	2569	1138	522	1636	1493	426	1193	612	700	1257	1344	525	2095	767	1616	1330
-CATCH BY GEAR																											
Longline	4348	2120	4345	2687	2662	637	745	3168	4677	6203	2810	2563	1138	522	1636	1493	426	1189	610	694	1257	1344	525	2095	767	1616	1330
Baitboat	0	0	0	1	0	0	0	0	0	0	13	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Sport	0	0	0	1	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	5	0	0	0	0	0	0	0
-CATCH BY COUNTRY																											
Chin.-Tai	71	109	87	196	121	30	61	0	43	13	26	66	3	20	0	29	43	80	72	80	64	15	14	472	172	168	157
Japan	4287	2026	4270	2518	2558	636	692	2168	4651	6192	2788	2506	1135	505	1636	1468	389	1120	548	625	1202	1331	525	1688	595	1448	1330
South Africa	0	0	0	0	2	0	0	0	0	0	13	6	++	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	5	0	0	0	0	0	0	0
World Catches (all ocean	48026	45718	51972	41227	46860	33075	42524	42181	35942	38673	45054	45191	42764	42838	37089	33199	27875	25033	22568	17789	13819	13401	13975	14048	13275	13183	16352
Longline	40929	38149	39458	31225	34005	24134	34099	29600	23658	27890	33859	28348	21263	25143	23678	20610	15344	14212	11977	12355	9500	10528	12140	12149	10721	10277	11244
Surface Fishery	7097	6969	12397	9890	12672	8833	8383	12569	12190	10783	11195	16843	21501	17695	13411	12589	12531	10821	10591	5434	4319	2873	1835	1899	2554	2906	5108

* Preliminary

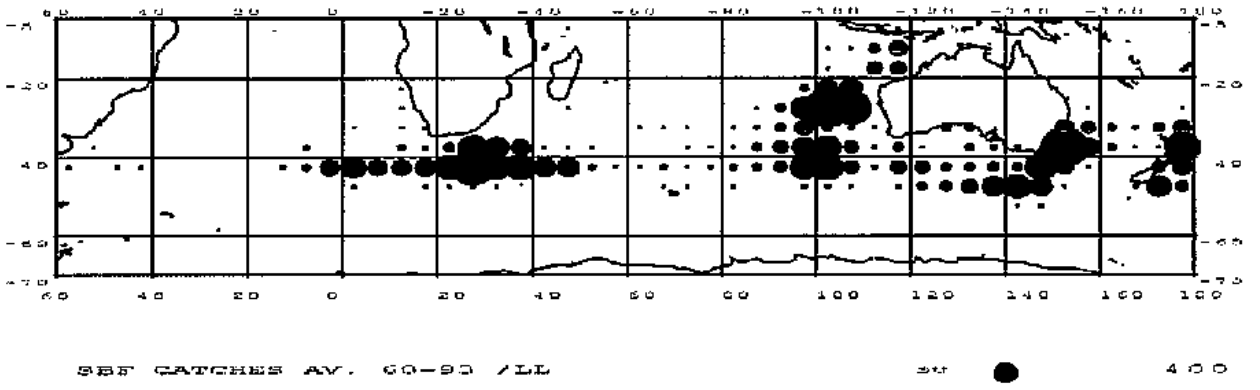
++ Catch < 0.5 MT.

Source: Catch by Chin.Taip – ICCAT/SCRS/97/99

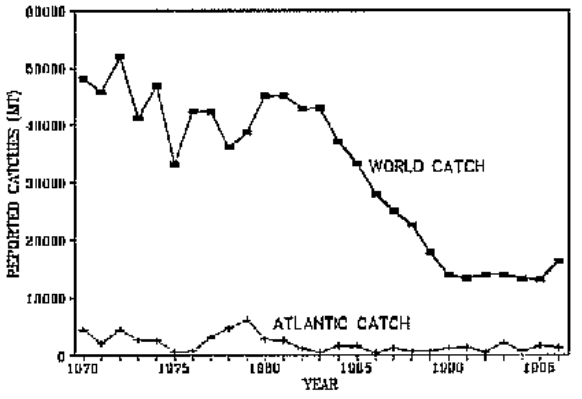
Catch by Japan – ICCAT Japanese National Report

World catches – Reports presented at the CCSBT Third Scientific Committee held in Canberra, July 28 to August 8, 1997 (CCSBT/SC/9707/6, 12, and 27).

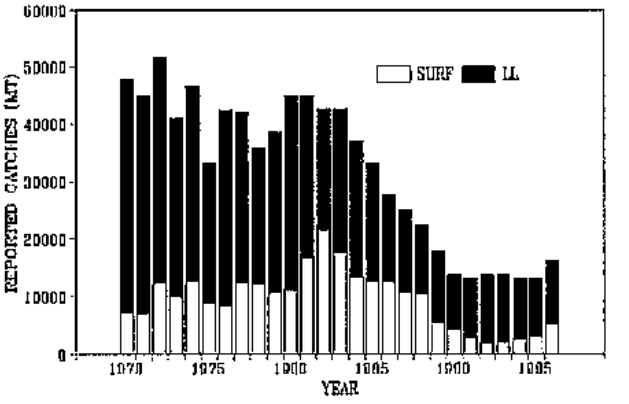
All Australian domestic catch vessels was considered to be made by surface fishery. All the other catches were assigned to longline fishery.



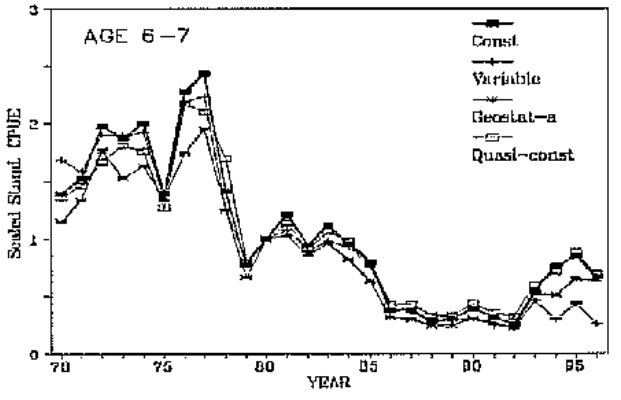
SBF-Fig. 1. Geographic distribution of southern bluefin tuna catches, 1960-1993.

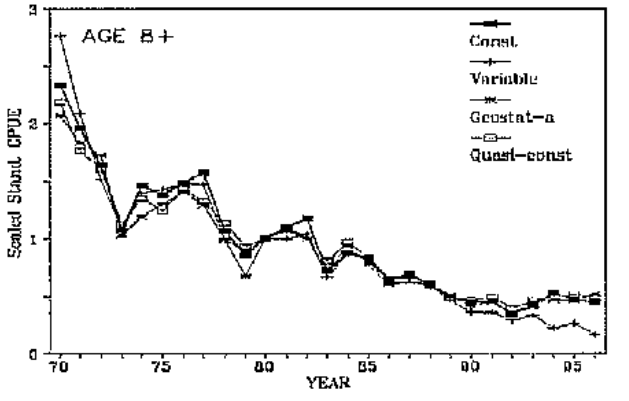


SBF-Fig. 2. Global and Atlantic catch (in MT) of southern bluefin tuna.

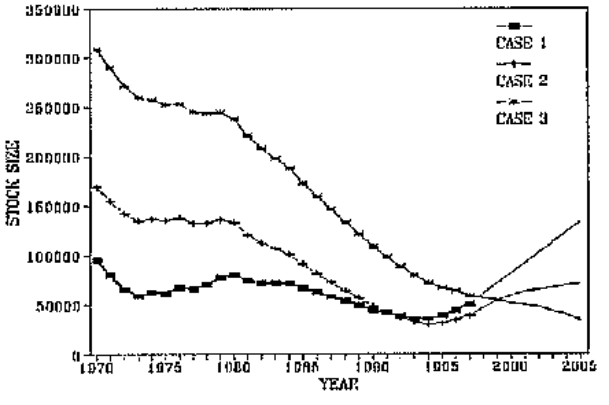


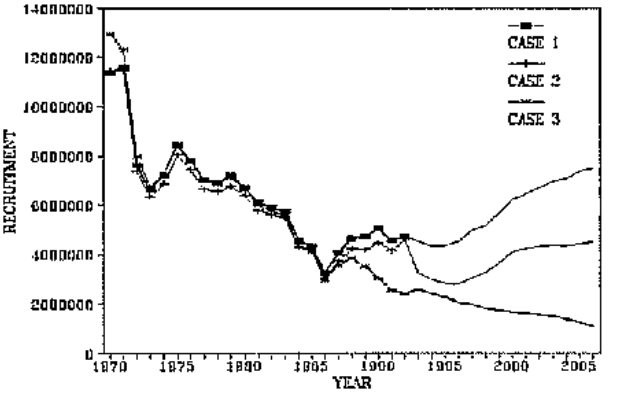
SBF-Fig. 3. World southern bluefin tuna catches by gear categories.





SBF-Fig. 4. Standardized CPUE of Japanese longline relative to 1980 for juvenile (ages 6-7) and parental (age 8+) southern bluefin tuna. Various lines correspond to various hypotheses on fish abundance within time-area strata without fishing effort. (Reference: CCSBT/SC/9707/14, 19 and 22).





SBF-Fig. 5. VPA (with marks and projection (without marks) results. Three cases with distinctive patterns were chosen for presentation. Each case corresponded to different model structures and different standardized CPUE. (Ref: CCSBT.SC/9707/17).

SMT - SMALL TUNAS

SMT-1 Biology

Very little information is currently known about the biology of small tunas. In fact, scientific studies are rarely undertaken. This is due to many of these species generally being considered as having little economic importance, and the difficulties linked to sampling landings of artisanal fisheries, which are the main fisheries exploiting small tuna resources. The exceptions comprise some stocks of Spanish and king mackerel, such as those found in U.S. and Brazilian waters. The important industrial fleets often discard these catches at sea and rarely report the amount caught in their logbooks.

These species are widely distributed in the tropical and subtropical waters of the Atlantic Ocean, the Mediterranean Sea, and the Black Sea. They are often found forming large schools with other small sized tunas or related species in coastal and offshore waters. They have a varied diet with a preference for small pelagics (clupeids, mullets, carangids and ammodytes), crustaceans, mollusks and cephalopods. The reproduction period varies according to species and spawning generally takes place near the coast, where the waters are warm.

In the eastern tropical Atlantic, the size-at-first-maturity is about 42 cm for Atlantic black skipjack (*Euthynnus alletteratus)*, 30 cm for *Auxis spp.*, 38 cm for Atlantic bonito (*Sarda sarda)*, and 45 cm for mackerel *(Scomberomorus spp.)*. The growth rate currently estimated for these species is very rapid for the first two or three years, and then slows as these species reach size at first maturity.

SMT-2. Description of fisheries

Small tunas are exploited mainly by coastal fisheries and often by artisanal fisheries, although substantial catches are also made, either as target species or as by-catch, by purse-seiners (SCRS/ 97/ 87) and mid-water trawlers (i.e. pelagic fisheries of West Africa-Mauritania). Unknown quantities of small tuna also comprise the incidental catches of some longline fisheries (SCRS/97/42, SCRS/97/77). Some U.S. sports fisheries target Spanish and king mackerels on a seasonal basis. Tropical purse seiners operating around artificial flotsam (fish aggregating devices) since 1991 may have led to an increase in fishing mortality of small tropical tuna species.

There are over ten species in this category, but only five of these account for 85% of the total catch by weight each year. These five species are: Atlantic bonito *(Sarda sarda)*, frigate tuna *(Auxis thazard)*, spotted Spanish mackerel *(Scomberomorus maculatus)*, king mackerel *(Scomberomorus cavalla)*, and Atlantic black skipjack *(Euthynnus alletteratus)* **(SMT-Figure 2)**.

SMT-Table 1 shows the historical landings of small tunas for the period 1973 to 1996. The total reported landings of all species combined generally fluctuated during the period 1973 to 1979, ranging from about 59,000 MT to over 80,000 MT. In 1980, there was a marked increase in reported landings, which continued to increase, reaching a peak at about 133,000 MT in 1982 **(SMT-Figure 1)**. After 1982, reported landings decreased steadily until 1986 (92,000 MT), followed by a subsequent increase to approximately 139,000 MT in 1988. Landings reported for the period 1989-1991 remained relatively stable at an average of 121,000 MT **(SMT-Figure 1)**. The landings then decreased to about 100,000 MT in 1992-1993, with further apparent decreases to approximately 68,000 MT in 1995. A preliminary estimate for the total nominal landings of small tunas in 1996 amounts to 64,709 MT **(SMT-Table 1)**.

Landing statistics currently available to the Committee are considered to be incomplete, making it impossible to draw conclusions regarding the evolution of the fishery in 1996. Some countries such as Brazil and a number of Caribbean islands have recently improved their collection of fishery statistics. In view of this, apparent fluctuations in landings of some species in recent years must be interpreted with caution.

The Committee noted the relative importance of small tuna fisheries in the Mediterranean Sea, which at present account for 33.5% of the total reported catch. The Committee also noted, however, that uncertainties remain regarding the accuracy of reported landings in all areas, including the Mediterranean, and that there is a general lack of information on the mortality of these species as by-catch.

SMT-3 State of the stocks

There is little information available to determine the stock structure of many small tunas species. Some size data were collected during an observer program on French and Spanish purse seine tuna fleets operating in the Atlantic and Indian Oceans during the period between January 1995 and January 1996 (SCRS/97/87). In addition, during 1996, CARICOM commenced a tagging program for blackfin tuna (*Thunnus atlanticus*), wahoo (*Acanthocybium solandri*) and king mackerel (*Scomberomorus cavalla*) (SCRS/97/44).

However, current information does not generally allow for an evaluation of stock status which is assumed for most of the coastal pelagic species. Most stocks, however, probably do not have an ocean-wide distribution. For this reason, the majority of the stocks can be managed at the regional or sub-regional level.

The information submitted in 1994 was reviewed by the Committee and is summarized as follows. Annual age-structured stock assessments of Spanish mackerel and king mackerel are carried out for the coastal areas of the southeastern United States and the Gulf of Mexico. These assessments indicated that the stocks of Atlantic Spanish mackerel and king mackerel in the Gulf of Mexico were overexploited at that time. Reductions in fishing mortality were considered necessary in order to allow the stocks to recover to levels that could provide high average long-term yields and to provide adequate safeguards against recruitment failure.

SMT-4. Outlook

Catch and effort statistics for small tunas are incomplete for many of the coastal and industrial fishing countries. There is also a general lack of biological information needed to assess the stocks of most of these species. On the other hand, many of these species are of importance to coastal fishermen, especially to some developing countries, both economically and as a source of protein. Studies should therefore be conducted to determine the state of these stocks and the best way to manage them, which is probably best carried out at the local or sub-regional level.

In 1996, ICCAT circulated a questionnaire to all small tuna fishing countries with a view to learn more about these fisheries. This questionnaire was aimed at collecting all information relative to the exploitation of these species, e.g., species caught, fishing gears, areas and seasons of the fishery, etc. Working document SCRS/97/8 summarizes the results of the questionnaire. The responses confirmed that these fisheries are very diverse , involving both artisanal and industrial fisheries using a variety of gears and different types and sizes of vessels. The results also indicated that data collection and research including size sampling, age and growth research, maturity studies and tagging, are being conducted by several countries. The Committee noted the importance of obtaining more detailed information on these country data collection and research programs for further consideration.

SMT-5. Effects of current regulations

There are no ICCAT regulations in effect for these small tuna species.

A "U.S: Fishery Management Plan (FMP) for coastal pelagic species in the Gulf of Mexico and Atlantic Ocean Region" has been in effect since 1983. Under the FMP, fisheries management procedures were established for king and Spanish mackerels through the implementation of catch quotas. It is believed that vessel landing limits, geographical quotas, and minimum size restrictions have helped to stabilize and improve overall stock conditions.

SMT-6. Management recommendations

No recommendations were presented due to the lack of data and analyses.

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TOTAL	59073	82874	66150	63594	78950	75631	80697	115299	115795	133654	127109	111485	93300	91802	108263	138835	117332	124692	120715	99928	101234	74416	68423	64709
MEDITERRANEAN	10867	13361	10068	11817	14742	15634	20091	25891	34417	40041	43378	23643	25776	23322	29047	33087	20725	32200	33687	20594	28808	20504	20314	21655
ATLANTIC	48206	69513	56082	51777	64208	59997	60606	89408	81378	93613	83731	87842	67524	68480	79216	105748	96607	92492	87028	79334	72426	53912	48109	43054
BLF:Thunnus atlanticus	936	1062	815	1026	1251	1341	1205	1175	1973	1941	1738	1908	1403	2822	3462	3322	2834	3887	4201	4352	4163	1097	1819	2583
ATLANTIC	936	1062	815	1026	1251	1341	1205	1175	1973	1941	1738	1908	1403	2822	3462	3322	2834	3887	4201	4352	4163	1097	1819	2583
BERMUDA	0	0	9	10	9	7	7	6	4	5	6	4	9	17	11	7	14	13	8	6	5	7	4	2
BRAZIL	296	194	123	56	273	195	173	181	85	89	57	203	133	172	254	229	120	335	130	49	22	37	153	988
CUBA	0	0	0	0	0	0	0	0	721	622	558	487	157	486	634	332	318	487	318	196	125	0	0	0
DOMINICAN REP.	200	136	86	90	68	78	105	125	124	144	144	106	90	123	199	5	568	539	546	124	148	258	269	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	307	46	0	0	0
FRANCE	0	21	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRANADA	100	51	100	100	71	76	95	68	84	143	102	232	193	256	141	220	134	293	195	146	253	189	123	164
GUADELOUPE	240	240	220	190	530	530	470	440	460	490	482	490	460	470	470	450	460	470	460	470	1000	0	0	0
JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	148
LIBERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	229	0	0	0	0	0	0	0	0
MARTINIQUE	100	420	270	580	300	400	300	300	301	352	327	331	295	259	199	366	395	395	750	700	700	0	0	0
NETHERLAND.ANT	0	0	0	0	0	55	55	55	55	55	55	55	55	60	60	70	70	70	60	60	65	0	0	0
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	17	14	13	16	82	47	32
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	15	38	11	7	53	19	20	18
U.S.A	0	0	0	0	0	0	0	0	139	41	7	0	11	32	44	154	87	80	111	126	508	492	582	446
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	947	1448	1240	652	1150	1598	2148	1222	13	621	785
BLT:Auxis rochei	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	357	723	3634	2171	814	70	100	100	0
ATLANTIC	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	357	723	3634	2171	814	70	100	100	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2171	814	70	100	100	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
U.S.S.R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	357	723	3634	0	0	0	0	0	0
BON:Sarda sarda	12323	21374	15609	15989	20676	17273	19971	31733	40053	43687	42837	22505	25433	21990	30229	42404	26212	28176	34104	21959	28668	19326	19712	18402
MEDITERRANEAN	6254	7695	6038	6499	8699	9419	13486	19165	29293	31518	35997	15656	18487	16098	22857	24548	12296	22059	26047	15377	25474	15661	15843	15918
ALGERIE	343	183	140	143	206	196	515	640	740	860	867	874	880	459	203	625	1528	1307	600	600	570	570	570	570
BULGARIA	0	0	0	40	44	11	1	13	191	4	24	1	1	0	13	0	0	17	17	20	8	0	0	0
CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	128	6	70	0	0
CYPRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	648
EGYPT	0	10	3	0	1	17	10	3	2	23	14	48	62	68	35	17	358	598	574	518	640	648	648	0

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ESPANA	280	290	329	397	610	711	713	480	710	990	1225	984	1045	729	51	962	609	712	686	228	200	344	632	690
FRANCE	0	0	0	0	0	0	0	0	0	0	33	16	0	0	0	10	0	1	10	5	6	0	0	0
GREECE	500	487	658	511	550	610	712	809	1251	1405	1367	1732	1321	1027	1848	1254	2534	2534	2690	2690	2690	1581	1581	1581
ITALY	715	760	959	955	1533	1378	1403	1180	1096	1102	1806	2777	1437	1437	2148	2242	1369	1244	1087	1288	1238	1828	1828	1828
LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	70	0	0	0
MALTA	0	2	5	1	2	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
MAROC	308	130	135	630	456	128	155	62	309	71	92	75	57	51	127	108	28	31	28	12	17	55	21	38
NEI-2	0	0	0	0	0	0	0	295	274	276	452	694	359	359	537	561	342	311	311	311	300	300	300	300
RUMANIA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TUNISIE	203	499	429	619	768	791	865	700	381	748	600	600	482	504	500	600	422	488	305	643	178	170	170	170
TURKEY	3901	5324	3371	3178	4503	5536	9082	14910	24300	25978	29485	7818	12809	11426	17333	18133	5008	14737	19645	8863	19548	10093	10093	10093
U.S.S.R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
YUGOSLAVIA	4	10	9	23	26	39	29	72	39	61	31	37	34	38	62	36	98	79	45	0	3	2	0	0
ATLANTIC	6069	13679	9571	9490	11977	7854	6485	12568	10760	12169	6840	6849	6946	5892	7372	17856	13916	6117	8057	6582	3194	3665	3869	2484
ANGOLA	499	351	38	831	938	531	251	377	196	253	124	225	120	101	144	180	168	128	102	4	49	20	9	39
ARGENTINA	1166	2293	200	283	2026	1746	1288	2600	846	1775	310	2058	1399	699	1607	2794	1327	1207	1794	1559	434	4	138	0
BENIN	0	0	0	0	0	0	13	19	32	36	16	25	30	6	3	4	7	0	0	0	0	0	0	0
BRASIL	0	0	0	0	0	0	0	0	0	0	0	187	179	523	345	214	273	226	71	86	142	142	137	0
BULGARIA	0	100	191	32	37	22	0	75	8	23	46	0	0	2	0	0	3	0	0	0	0	0	0	0
ESPANA	2050	6975	4819	4379	1978	1919	717	220	589	434	414	173	398	145	41	91	57	18	8	39	5	3	2	2
FRANCE	0	0	0	0	0	0	0	8	0	0	2	17	1	0	0	0	0	0	0	0	52	0	0	0
GERMANY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	0	0	0	0
GERMANY D.R	0	0	0	0	0	0	0	288	440	146	274	26	40	23	1	0	0	0	0	0	0	0	0	0
GHANA	0	33	20	0	9	9	0	77	5	71	13	8	10	0	943	0	0	0	0	0	0	0	0	0
GRANADA	200	183	200	200	136	157	53	52	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24
GREECE	0	0	0	0	0	30	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GUADELOUPE	400	390	360	340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
MAROC	160	229	322	303	131	171	196	312	477	535	561	310	268	251	241	589	566	364	576	762	879	415	492	635
MARTINIQUE	400	476	384	549	510	400	500	500	502	587	545	552	491	431	331	395	427	430	820	770	770	770	770	770
MEXICO	198	437	446	237	81	59	174	271	408	396	567	744	212	241	391	356	338	215	200	657	0	0	0	0
POLAND	0	5	30	30	177	44	32	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	6	13	31	55	86	56	50	168	371	377	80	202	315	133	145	56	78	83
RUMANIA	0	189	291	79	139	19	0	64	81	249	192	8	32	71	3	255	111	8	212	84	0	0	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	948	29	6	0	0	0
SENEGAL	0	4	40	164	614	523	159	140	1327	202	497	200	495	510	463	2066	869	558	824	378	227	227	227	227
SIERRA LEONE	0	0	0	0	0	0	0	57	30	5	5	5	10	10	10	10	10	10	4	6	0	0	0	0
SOUTH AFRICA	11	0	5	0	2	16	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	3	3	4	1	0	0
TOGO	0	0	0	0	0	0	0	0	0	0	0	0	254	138	245	400	256	177	172	107	311	254	254	254
U.S.A	261	92	117	23	268	224	502	198	333	209	253	217	110	84	130	89	278	298	468	497	170	127	116	155
U.S.S.R	24	1400	1542	1281	4164	1602	2125	6433	4559	6329	2375	1290	2073	1085	1083	8882	7363	706	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
UNITED KINGDOM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	287
URUGUAY	0	0	4	3	0	0	16	3	1	0	1	0	0	3	0	0	0	0	26	0	0	0	0	0
VENEZUELA	700	522	562	756	767	382	443	861	833	864	554	748	774	1401	1020	1153	1783	1514	1514	1443	0	1646	1646	0
BOP:Orcynopsis unicolor	105	150	84	212	456	970	492	698	1448	584	38	49	133	87	564	1482	1116	335	408	363	344	434	383	1410
MEDITERRANEAN	3	7	0	0	135	153	28	0	0	0	0	0	9	1	26	8	7	21	9	40	40	0	4	5
LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	0	0	0
MAROC	3	7	0	0	135	153	28	0	0	0	0	0	9	1	26	8	7	21	9	0	0	0	4	5
ATLANTIC	102	143	84	212	321	817	464	698	1448	584	38	49	124	86	538	1474	1109	314	399	323	304	434	379	1405
BENIN	0	0	0	0	0	0	1	1	2	2	1	1	1	3	1	2	1	1	1	1	1	0	0	0
MAROC	2	43	4	132	231	727	373	596	968	483	0	0	83	33	487	1422	1058	263	348	272	253	434	379	1405
MAURITANIE	100	100	80	80	90	90	90	101	478	99	37	40	40	50	50	50	50	50	50	50	50	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0
BRS:Scomberomorus brasiliensis	4446	6291	2664	283	986	1522	1191	2826	3466	4342	4511	6259	1504	5011	4741	7767	8791	5238	4186	3279	2972	7161	7320	7140
ATLANTIC	4446	6291	2664	283	986	1522	1191	2826	3466	4342	4511	6259	1504	5011	4741	7767	8791	5238	4186	3279	2972	7161	7320	7140
BRASIL	4446	6291	2664	283	986	1522	1191	2826	3466	4342	4511	6259	1504	5011	4741	5063	5927	2767	1437	1149	842	1149	1308	3047
GUYANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	211
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2704	2864	2471	2749	2130	2130	2130	2130	0
VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3882	3882	3882
CER:Scomberomorus regalis	780	619	620	565	629	698	586	604	628	687	677	680	574	500	392	219	234	225	375	390	360	90	90	90
ATLANTIC	780	619	620	565	629	698	586	604	628	687	677	680	574	500	392	219	234	225	375	390	360	90	90	90
DOMINICAN REP.	100	109	110	105	119	98	86	104	106	76	110	106	63	52	48	57	59	50	45	79	50	90	90	90
GUADELOUPE	280	270	250	240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTINIQUE	400	240	260	220	510	600	500	500	522	611	567	574	511	448	344	162	175	175	330	310	310	0	0	0
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
FRI:Auxis thazard	10190	13937	10530	9747	20020	8343	12575	20912	15913	25240	21690	25903	22876	20306	23406	25151	21416	22177	18830	13484	13186	15627	14590	14442
MEDITERRANEAN	3549	4355	2644	3290	3409	3567	3707	3952	3678	6043	5820	6337	5240	5057	3740	6126	6387	7514	5823	4042	2595	4251	3859	5389
CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	21	52	22	22	0
ESPANA	1706	2335	1389	1635	1184	1676	1771	2120	1700	1935	2135	2301	2047	1555	631	2669	2581	2985	2226	1210	648	1124	1472	2296
FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	4	0	0	1	0
GREECE	0	0	0	0	0	0	0	0	516	2192	1887	2060	1419	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
ITALY	1200	1300	939	912	1147	1177	1342	1376	1193	1299	1494	1610	1344	1344	906	609	509	494	432	305	379	531	531	531
MALTA	0	7	18	15	9	33	11	18	4	9	11	4	1	13	5	8	18	21	20	11	10	10	10	0
MAROC	446	408	0	357	234	69	73	10	14	77	57	52	48	175	178	811	1177	1606	715	1056	92	1160	419	1162
TUNISIE	185	283	282	353	811	589	493	409	237	517	218	294	367	538	606	588	660	985	985	35	14	4	4	0
YUGOSLAVIA	12	22	16	18	24	23	17	19	14	14	18	16	14	32	14	41	42	23	13	0	0	0	0	0
ATLANTIC	6641	9582	7886	6457	16611	4776	8868	16960	12235	19197	15870	19566	17636	15249	19666	19025	15029	14663	13007	9442	10591	11376	10731	9053
ANGOLA	1119	1536	535	27	197	357	357	256	351	515	212	256	90	21	115	20	70	28	1	0	4	6	21	29
ARGENTINA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BENIN	0	0	0	0	0	0	25	37	64	72	32	49	50	1	3	6	3	0	0	0	0	0	0	0
BRAZIL	0	0	0	0	0	0	0	0	0	72	11	634	623	941	1260	1904	700	592	746	291	608	906	558	291
BULGARIA	0	0	0	0	0	0	0	3	3	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
CAP-VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	86	105	75	135	82	115	86	13	110
ESPANA	607	246	289	418	574	1249	1211	6260	5295	3128	2691	5746	3702	3164	4538	3938	1877	2240	642	354	122	752	450	1395
F.I.S	0	0	0	0	0	0	0	0	1856	1984	2800	0	0	0	0	0	0	0	0	0	0	0	0	0
FRANCE+ESPANA	0	0	0	0	0	0	0	0	0	0	0	640	416	1904	3392	3392	3008	3872	6656	7136	8000	5520	5520	5520
GERMANY D.R	0	0	0	0	0	0	0	0	0	106	55	40	0	3	0	0	0	0	0	0	0	0	0	0
GHANA	1589	6295	6001	4311	13914	1047	4286	7566	2048	6062	5632	4530	4500	3256	4689	0	0	0	0	0	0	0	0	0
JAPAN	1453	486	20	14	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAROC	1173	116	48	272	688	770	694	968	1267	1126	1271	198	424	302	465	194	599	735	863	242	185	96	437	385
NEI-1	0	0	0	0	0	0	0	0	0	0	333	46	0	0	17	381	155	237	862	182	200	699	422	906
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	14	30	32	1	2	4	26	3	0	0	0	0	0
RUMANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	51	15	0	0	0	0	0	0	0	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1078	627	150	405	404	46
SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	79
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	810	784	1082	311	201	309	309	309	0
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R	0	0	0	162	242	803	450	694	407	5623	1655	5903	6055	3465	2905	5638	5054	2739	0	0	0	0	0	0
VENEZUELA	700	903	993	1253	907	550	1845	1176	944	509	1171	1478	1746	2109	2264	2654	2670	3037	1710	327	881	2597	2597	292

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
KGM:Scomberomorus cavalla	9717	13644	9048	8293	8732	6769	11450	15656	18513	18149	14607	13182	9964	12187	11890	13038	10835	12232	11530	12438	14461	10771	7783	5378
ATLANTIC	9717	13644	9048	8293	8732	6769	11450	15656	18513	18149	14607	13182	9964	12187	11890	13038	10835	12232	11530	12438	14461	10771	7783	5378
ANTIGUA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
ARGENTINA	0	0	0	466	988	379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRAZIL	3318	5162	2185	546	790	845	848	1598	1612	1929	2695	2588	806	2890	2173	2029	2102	2070	962	979	1380	1365	1328	2890
DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	29	33	34	47	52	0	0	0
GRANADA	0	0	0	0	162	175	73	25	30	43	40	19	0	0	0	0	0	0	0	0	0	0	0	2
MEXICO	2189	1531	1354	1497	1331	1535	2249	1946	2740	4409	2874	2164	2303	2643	3067	3100	2300	2689	2147	3014	3289	0	0	0
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	20	43	11	38	82	752	541	432	657	0	1192	0	0	0
U.S.A	2710	4747	3095	4053	3837	2507	6292	10726	12565	9863	7068	7444	6011	5683	5628	5807	4363	5939	6502	7091	7747	6922	3970	0
VENEZUELA	1500	2204	2388	1731	1624	1328	1988	1361	1566	1905	1910	924	833	933	940	1330	1500	1069	1228	1307	800	2484	2485	2484
CHINA.TAIWAN	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KGX:Scomberomorus spp.	500	508	838	502	471	424	197	214	339	283	20	485	22	11	102	159	37	80	180	305	265	386	336	619
ATLANTIC	500	508	838	502	471	424	197	214	339	283	20	485	22	11	102	159	37	80	180	305	265	386	336	619
BARBADOS	100	112	184	220	135	157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLOMBIA	200	251	412	133	108	92	54	73	160	80	20	485	22	11	102	159	37	25	7	12	21	148	111	539
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	145	79
GRANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GUADELOUPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTINIQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PUERTO RICO-TR.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	84	0	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	79	150	141	98	80	0
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
TRINIDAD & TOBAGO	200	145	242	149	228	175	143	141	179	203	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	90	0	0	0	0
LTA:Euthynnus alleteratus	2603	5500	9043	10401	8344	17633	14673	19214	13847	15839	22214	20625	12895	8789	14441	25097	24955	25908	21389	20730	11011	10581	10203	10509
MEDITERRANEAN	1061	1304	1386	2028	2499	2495	2870	2774	1446	2480	1561	1650	2040	2166	2424	2405	2035	2606	1808	1135	699	592	608	343
CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	15	15	0
CYPRUS	6	5	7	7	18	11	17	17	22	33	17	31	32	13	25	41	20	23	25	21	11	23	23	0
ESPANA	716	688	732	1134	1059	1192	993	800	6	705	0	32	12	5	0	5	0	0	0	0	0	0	15	18
ISRAEL	100	242	200	300	300	200	170	105	35	110	35	60	259	284	273	135	124	129	108	126	119	119	119	119

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

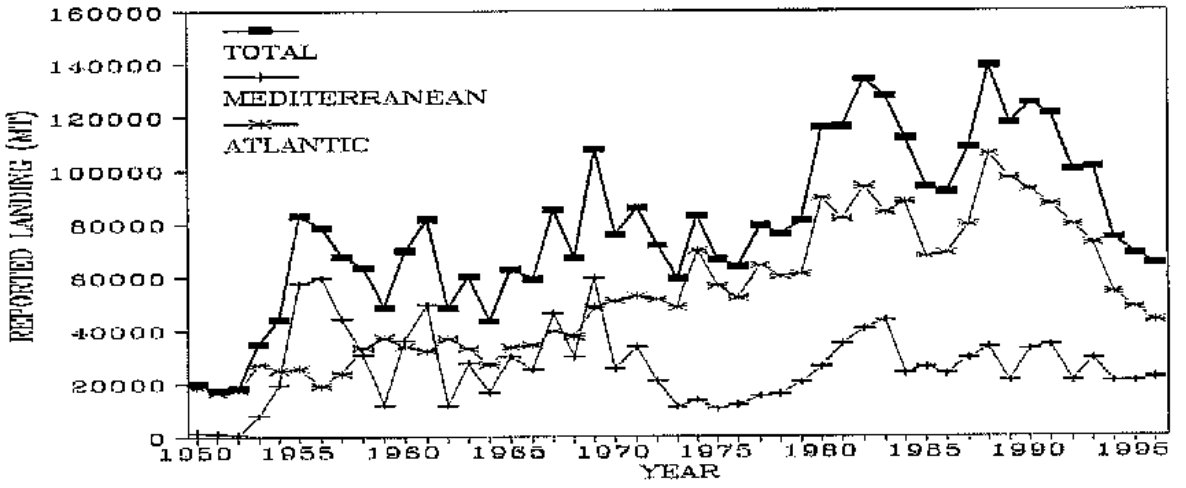
COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MALTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	8	8	8	0
MAROC	16	5	63	4	4	0	6	0	61	12	0	1	0	0	0	12	0	5	0	0	0	0	1	0
NEI-2	0	0	0	0	0	0	0	0	0	200	200	200	200	200	200	200	200	200	200	200	200	200	200	0
SYRIA	0	0	0	102	105	109	89	80	73	90	80	96	95	73	121	99	121	127	117	120	130	130	130	130
TUNISIE	214	360	364	479	1009	983	1595	1772	1249	1330	1228	1224	1441	1590	1803	1908	1566	2113	1343	664	201	76	76	76
YUGOSLAVIA	9	4	20	2	4	0	0	0	0	0	1	6	1	1	2	5	4	9	5	0	28	21	21	0
ATLANTIC	1542	4196	7657	8373	5845	15138	11803	16440	12401	13359	20653	18975	10855	6623	12017	22692	22920	23302	19581	19595	10312	9989	9595	10166
ANGOLA	970	1287	449	10	1326	826	646	1328	1171	1734	1632	1632	1433	1167	1345	1148	1225	285	306	14	175	121	117	235
ARGENTINA	0	0	0	0	0	0	0	0	0	36	0	0	11	2	2	0	1	1	0	0	0	0	0	0
BENIN	0	0	0	0	0	0	16	24	40	45	20	31	30	90	14	7	43	66	67	63	67	0	0	0
BERMUDA	0	0	7	16	9	7	7	11	11	4	5	5	7	13	13	17	14	8	10	11	5	6	6	12
BRASIL	0	0	0	0	0	0	0	0	45	10	0	765	785	479	187	108	74	685	779	935	985	1225	1059	834
BULGARIA	0	0	8	0	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CANADA	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAP-VERT	0	0	0	0	0	0	0	128	236	258	34	16	160	29	14	1	18	65	74	148	17	23	72	0
COTE D'IVOIRE	0	1583	860	400	431	38	57	177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CUBA	0	0	0	0	0	0	0	131	53	77	6	15	16	24	55	53	113	88	63	33	21	0	0	0
ESPANA	45	0	5	6	33	56	4	485	7	3	2	27	34	12	11	7	11	55	55	1	296	0	0	0
FRANCE	0	0	0	0	0	0	0	0	1098	1120	0	0	0	0	0	0	195	0	0	0	0	0	0	0
GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	182
GERMANY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0
GERMANY D.R	0	0	0	0	0	0	0	0	0	397	543	99	40	10	2	0	2	0	0	0	0	0	0	0
GHANA	26	66	4656	6044	1185	6049	5547	4134	3287	2141	5009	5966	901	649	5551	11588	12511	14795	11500	11608	359	994	513	113
ISRAEL	0	0	0	0	0	0	0	227	203	640	282	271	76	0	0	0	0	0	0	0	0	0	0	0
ITALY	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAROC	7	46	58	31	15	21	289	16	19	26	19	15	447	47	108	49	14	255	41	259	18	30	161	411
MAURITANIE	50	50	50	50	50	50	50	31	86	77	54	60	60	50	50	50	50	50	50	50	0	0	0	0
PANAMA	0	0	0	125	0	3	2	58	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POLAND	0	6	2	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	5	121	8	0	0	0	0	80	21	86	91	2	61	73	45	72	72	218
RUMANIA	100	297	46	10	86	2	17	9	12	291	216	266	126	81	7	88	0	0	0	0	0	0	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	617	306	265	189	96	49
SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0	0	0	0	0	40
SENEGAL	0	437	1092	705	1540	1446	1697	2444	1586	5017	5623	8408	4566	2392	2985	6343	6512	4775	3767	4088	4883	4072	4072	3773
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
U.S.A	20	51	67	5	53	113	12	88	97	87	107	41	73	104	118	204	129	173	228	597	1286	1142	1312	2183
U.S.S.R	0	0	0	470	690	6127	2184	6307	3615	1085	6528	613	1040	271	61	1707	543	667	0	0	0	0	0	0
VENEZUELA	300	373	357	501	426	390	1270	721	791	311	573	644	1050	1123	1467	1236	1374	1294	1963	1409	1889	2115	2115	2115

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

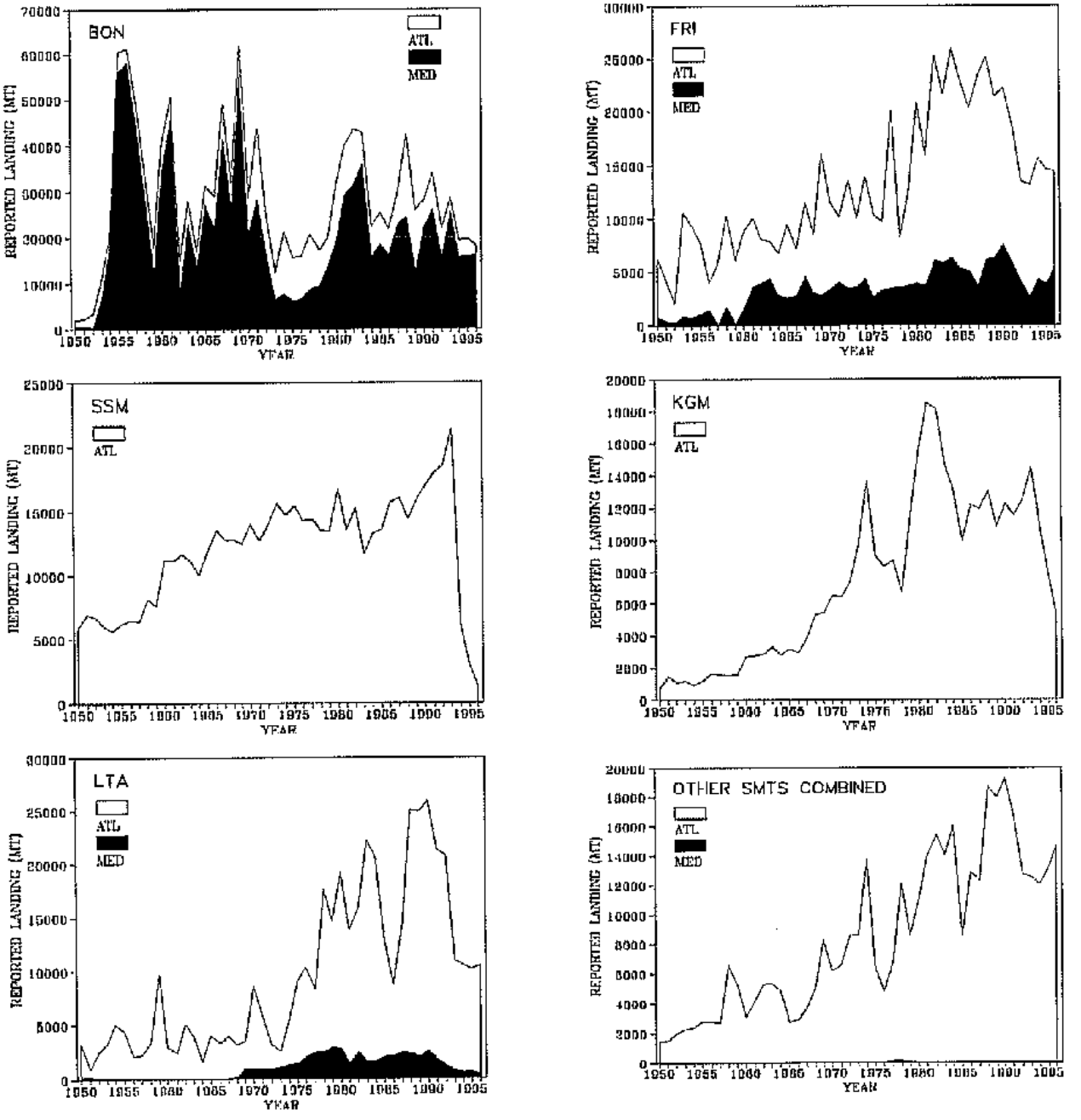
COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MAW:Scomberomorus tritor	1600	4713	1140	1901	2572	6716	4167	4921	3156	5312	4716	4498	3989	3292	1799	3772	2739	4370	3648	1433	1775	1076	1076	1084
ATLANTIC	1600	4713	1140	1901	2572	6716	4167	4921	3156	5312	4716	4498	3989	3292	1799	3772	2739	4370	3648	1433	1775	1076	1076	1084
ANGOLA	0	348	0	0	20	81	24	70	68	138	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BENIN	0	0	0	0	0	0	23	35	60	68	30	46	50	104	17	13	334	211	214	202	214	0	0	0
GERMANY D.R	0	0	0	0	0	0	0	0	0	851	537	33	1	0	0	0	0	0	0	0	0	0	0	0
GHANA	1000	3513	598	555	720	771	1569	4412	1983	2982	2225	3022	3000	1453	0	1457	1457	1500	2778	899	466	0	0	0
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0
SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
SENEGAL	0	52	314	1270	1188	1054	1112	404	1045	671	754	1174	732	1516	1754	2159	753	1419	656	332	1076	1076	1076	1076
U.S.S.R	600	800	228	76	644	4810	1439	0	0	602	1170	223	206	219	28	143	195	1240	0	0	0	0	0	0
SSM:Scomberomorus maculatus	15593	14685	15433	14296	14420	13490	13430	16736	13539	15310	11695	13232	13587	15655	16002	14455	15933	16960	18006	18576	21389	6068	2955	1330
ATLANTIC	15593	14685	15433	14296	14420	13490	13430	16736	13539	15310	11695	13232	13587	15655	16002	14455	15933	16960	18006	18576	21389	6068	2955	1330
COLOMBIA	200	310	393	245	283	228	199	213	408	8	10	77	101	81	72	151	112	76	37	95	58	69	69	0
CUBA	700	600	600	500	400	600	400	578	657	476	689	544	443	621	1606	803	746	665	538	611	391	0	0	0
DOMINICAN REP.	300	324	292	253	174	317	415	479	503	384	168	1058	1267	1271	1321	1415	1401	1290	728	735	739	1330	1330	1330
GRANADA	0	0	0	0	10	2	0	1	1	1	1	1	4	17	0	0	1	3	0	0	1	2	2	0
MEXICO	6656	5236	4794	3380	4414	5138	5751	5908	5908	7799	5922	5777	5789	6170	6461	5246	7242	8194	8360	9181	10066	0	0	0
TRINIDAD & TOBAGO	800	766	1691	1544	1484	1933	1208	1337	939	1218	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A	4437	4990	5288	6385	5453	3310	2926	5429	2748	3747	2784	3905	3986	5957	5071	5097	4444	4272	5883	5724	5057	4667	1554	0
VENEZUELA	2500	2459	2375	1989	2202	1962	2531	2791	2375	1677	2121	1870	1997	1538	1471	1743	1987	2460	2460	2230	5077	0	0	0
WAH:Acanthocybi solandri	280	391	326	379	393	452	760	610	2920	2280	2366	2159	920	1150	1235	1612	1507	1470	1687	1805	2570	1699	2056	1722
ATLANTIC	280	391	326	379	393	452	760	610	2920	2280	2366	2159	920	1150	1235	1612	1507	1470	1687	1805	2570	1699	2056	1722
ANTIGUA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
ARUBA	100	100	100	100	100	115	115	115	115	115	115	115	115	120	90	80	80	70	60	50	50	0	0	0
BARBADOS	0	0	0	0	0	0	189	116	144	219	222	219	120	138	159	332	51	51	60	51	91	82	42	35
BENIN	0	0	0	0	0	0	1	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
BERMUDA	0	0	14	20	35	23	33	46	24	40	49	46	46	65	43	61	63	74	67	80	58	50	85	115
BRASIL-TAI	2	3	3	9	3	6	69	1	1	0	0	0	21	141	133	58	92	52	64	71	33	26	1	16
CAP-VERT	0	0	0	0	0	0	0	24	2307	1464	1588	1365	142	205	306	340	631	458	351	350	326	361	408	474
DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	44	52	72	66	59	58	58
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	4	9	9	32	18	23	28	32	22	20	15	25
GRANADA	0	0	0	0	0	35	31	25	23	41	94	50	51	82	54	137	57	54	77	104	96	46	49	56
NETHERLAND.ANT	178	178	178	178	178	215	215	215	215	215	215	215	245	250	260	280	280	280	250	260	270	0	0	0
SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80
ST. HELENA	0	6	4	5	6	4	7	10	12	9	16	23	15	15	18	18	17	18	12	17	35	0	0	0

SMT-Table 1 Reported landings (MT) of small tunas in the Atlantic Ocean.

COUNTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	79	150	141	98	80	221
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	28	33	33	41	28	16	23
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118	1	0	0	0	0
U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	13	12	57	128	110	82	134	203	827	391	764	608
VENEZUELA	0	104	27	67	71	54	100	57	77	175	66	125	147	113	106	141	101	159	302	331	513	538	538	11



SMT-Fig. 1. Reported total landing (MT) of small tunas, all species combined, in the Atlantic and Mediterranean Sea, 1950-1994. (Data for 1996 are very incomplete)



SMT-Fig. 2. Total cummulative reported landing (MT) of major species of small tunas in the Atlantic and Mediterranean.

14. Report of Sub-Committee on Environment

14.1 The Report of Sub-Committee on Environment, which met earlier during this SCRS session was presented by the Convener, Dr. J. Pereira. The Committee reviewed the report and adopted with all the recommendations. The Report is attached as **Appendix 10.**

15.Report of the Sub-Committee on Statistics and review of Atlantic tuna statistics and data management system

15.1 The Report of the Sub-Committee on Statistics, which met during the SCRS session, was presented by the Sub-Committee Convener, Dr. S. Turner (U.S.A.) The Committee reviewed the report and after introducing a few modifications, the report was adopted. The recommendations were also reiterated and are included under the Agenda Item 19. The Report is attached as **Appendix 11.**

16. Report of the Sub-Committee on By-catches. Future plans for the collection of by-catch statistics

16.1 The Report of the Sub-Committee on By-Catches, which met during the SCRS session, was presented by the Convener of this Sub-Committee, Dr. G. Scott (U.S.A.). The report was reviewed and adopted and is attached as **Appendix 12.** The recommendations by that Sub-Committee were also reiterated and are listed under Agenda Item 19. It was noted that the Working Report on Sharks, which met in March, 1997, in Shimizu, Japan was already adopted by the SCRS and Commission.

17. Review of ICCAT scientific publications

17.1 It was noted that this subject has been discussed in the Sub-Committee on Statistics (see **Appendix 11**).

18. Review of future SCRS activities

– Organization of the SCRS

18.1 The Committee considered the current organizational procedures of the SCRS meeting. It was noted that each species group works according to its own criteria, and there is no peer review mechanism across the various species groups. This sometimes results in inconsistencies between the reporting by different species groups, whose reports are then submitted to the SCRS Plenary without having undergone any screening process. There tends to be little exchange of views among the experts working on the different species. If a peer review mechanism could be established, it would benefit the individual scientists working within a species group.

18.2 The Committee agreed on the benefit of establishing such a review mechanism, but also recognized the difficulties of introducing such procedures, particularly because of the limited time available at the annual SCRS meeting. A suggestion was made to establish a review committee consisting of rapporteurs and a few selected experts to review the draft reports prepared by the all the species groups, before they are submitted to the Plenary.

18.3 The Committee pointed out the decision made at the 1996 meeting to conduct major stock assessments every two or three years, rather than annually. It was further suggested that full species assessments should be distributed evenly among the years and the concentration of several assessments in the same year should be avoided. The Committee agreed that careful planning for full assessments is essential.

18.4 The Committee also considered that the requirements and style of the Executive Summaries and Detailed Reports should be different, especially if a particular species has or has not undergone a full assessment. At present the information required for both reports is the same.

18.5 Since the SCRS considered it needed more time to discuss this matter, a working group will be established, whose terms of reference are to consider procedures for more effective analysis and reporting, aimed at enhancing the credibility of the Commission's scientific work. The Group should consider an effective system of peer reviewing

of reports and develop a plausible format for drafting reports (particularly for the reporting of full assessment results and for updating previous years' work). It was recommended that the Working Group work through correspondence and reach their conclusions well before the 1998 SCRS session. If feasible, the new procedure can be adopted and tried at the 1998 SCRS session.

18.6 This Working Group can be the same as that proposed to consider the precautionary approach, or it can be an independent group, to be decided by the new SCRS Chairman, who can nominate a coordinator of each or the common working group.

– Inter-sessional scientific meetings proposed for 1998

a) SCRS Inter-sessional meetings:

18.7 The Committee reviewed all the inter-sessional meetings proposed by the various groups and recommended that the following meetings be held:

18.8 **Swordfish Working Group to consider catch-at-age by sex.** The Committee noted that an invitation has been received from the authorities of Bermuda to host a six-day meeting in January, 1998. The Committee appreciated this offer and accepted to hold the meeting in Bermuda. The Committee requested that the Secretariat be represented by the Assistant Executive Secretary and System Analyst for the duration of the meeting. Secretarial services will be provided by the host. The Committee recommended that the Secretariat circulate the preliminary announcement of the meeting soon after the SCRS, even before formal approval by the Commission.

18.9 **Working Group to Consider Abundance Indices for Tropical Surface fisheries.** The SCRS noted an invitation received from NMFS Southeast Fisheries Science Center, Miami, Florida, U.S.A. to host this Working Group meeting for 5 days in May or June, 1998. Dr. Pamela Mace (U.S.A.) is the Chairman of this Working Group. The Committee recommended that the invitation be accepted. The SCRS also requested that the Assistant Executive Secretary and the Systems Analyst participate in this Working Group from the Secretariat. Secretarial services will be provided by the host. Since the Group's work is common to the other oceans, it was recommended that the invitation be extended to other international organizations, such as the Inter-American Tropical Tuna Commission, the South Pacific Commission and the Indian Ocean Tuna Commission.

18.10 **Ad-Hoc GFCM/ICCAT Joint Working Group on Stocks of Large Pelagic Fishes in the Mediterranean Sea and Bluefin Stock Assessment Session.** The Committee recommended that the GFCM/ICCAT Joint Working Group meet for about 6 days, during the latter half of September, 1998, to update the data base for Mediterranean swordfish and bluefin (three days each). This meeting should be immediately followed by an ICCAT Bluefin Stock Assessment Session at the same venue. The meeting should be organized by the Technical Secretary of the Joint Working Group, Dr. P. Miyake, in consultation with the GFCM Secretary, in a Mediterranean city, to assure maximum participation of the GFCM scientists. This meeting should be facilitated by English-Italian simultaneous translation, inasmuch as possible, and the ICCAT should send the Assistant Executive Secretary, the Systems Analyst and a secretary.

18.11 The ICCAT Bluefin Stock Assessment Session should take place immediately after the above GFCM/ICCAT joint session at the same place, to facilitate the participation of the GFCM scientists. The Assistant Executive Secretary and a Secretary should participate from the Secretariat.

18.12 **Preparatory Meeting for Bigeye Year Program.** This meeting will be required if the BETYP is funded by the Commission, or if outside funding becomes available. It was recommended that in either case, the Secretariat should immediately arrange this meeting with all the scientists concerned and hold a few days' meeting at the ICCAT Headquarters.

b) Other inter-sessional meetings in which the ICCAT is to be represented:

18.13 **Technical Working Group (TWG).** This meeting is expected to be held in Japan in April, 1998, to consider a future international cooperative system for shark data and research, and is to be organized by FAO. ICCAT

will be invited as an international organization that is involved in shark research. The Committee recommended that the ICCAT be represented at that meeting by the Assistant Executive Secretary.

18 .14 **Regional Workshop to Review the Status of Shark Fisheries.** This meeting is scheduled to be held in Florida, in December, 1998. The Committee recommended that Dr. G. Scott (Convener of the Sub-Committee on By-Catch) represent the Commission at this meeting.

18.15 **Regional Workshop to Review the Status of Shark Fisheries.** The meeting is scheduled to be held in New Caledonia in 1998. The Committee recommended that a Japanese scientist represent the Commission at this meeting.

18.16 **ICES Ad Hoc Meeting on Precautionary Approach** is scheduled in February, 1998, in Copenhagen. The Committee recommended that ICCAT is represented by a U.S. scientist.

18.17 **Standing Committee on Research of the Indian Ocean Tuna Commission.** This Committee is holding its first meeting. The SCRS recommended that one of the ICCAT scientists attending this session represent ICCAT and report on the results.

18.18 **CWP Atlantic Inter-Agency Meeting** is scheduled in February, 1998, in Rome, possibly consecutively with the **GFCM economy/statistics Committee**. The SCRS recommended that the Assistant Executive Secretary, who is the current Chairman of the CWP, attend this meeting.

18.19 The Committee recommended that ICCAT be represented at important scientific meetings whose work is relative to the Commission's work, by an ICCAT scientist attending. This can be arranged by correspondence and between the Executive Secretary, SCRS Chairman and various concerned scientists.

19. General recommendations and responses to the Commission

19.1 Recommendations related to the efficient operation of the Secretariat

19.1.1 The Committee strongly urges that the Commission endorse the recommendations made by the Sub-Committee on Statistics regarding computer-related improvements. Almost all of the Secretariat's computer equipment and software are obsolete. This obsolescence has inhibited the work of the SCRS (and most likely the Commission).

19.2 Management recommendations

19.2.1 The management recommendations are included at the end of the Executive Summary of each species studied. The Committee requested the Commission to give due attention to these recommendations when considering the management of stocks.

19.3 Responses to specific questions and requests posed to the SCRS by the Commission

19.3.1 ***TROPICAL TUNAS:*** Since the initiation of fishing with artificial floating objects (1991) the ICCAT SCRS scientists have carried out continuous monitoring of this fishing method. As a result of this monitoring, the SCRS currently has knowledge of the impact this fishing type has on the different tuna species that are exploited (yellowfin, skipjack and bigeye). In this sense, in Working Groups as well as in various documents, analyses have been made on the different aspects relative to this fishing method since it began (Ariz *et al.* 1993, 1996; Delgado de Molina *et al.* 1996; Fonteneau, 1993; Hallier, 1996; Pallares *et al.* 1995; 1996), such as:

- Qualitative composition (species) and quantitative (proportions) of the catches taken on floating objects and free schools;
- Range of sizes and weights of the fish caught in each one of the types of associations (objects-free swimming);
- Areas and seasons in which each type of association takes place, as well as the importance of each of these.

Figure 1 shows the catches taken on floating objects, by the purse seine fleet in the eastern Atlantic before 1991, the year of the massive introduction of artificial objects. **Figures 2 and 3** show the catches on objects and on free schools for the period after 1991. Although objects fishing is carried out during the entire year, there are specific periods in which it has special incidence **(Figure 4)**.

As regards the recommendations made by the Commission at its 1996 meeting on bigeye and yellowfin, some responses were made by the scientists who participated in the *Ad Hoc* Working Group on Bigeye Tuna (April 9-11, 1997). At the present SCRS meeting, the scientists have responded regarding the level of compliance with these recommendations:

-- On observers on commercial vessels: Observer programs have been initiated on the purse seine, longline and baitboat fleets (SCRS/97/24, 41, 42, 56 and the 1997 Detailed Report on Bigeye). These programs will not be finalized before 1998 or 1999.

a) Purse seine: The fundamental objective of this project is to study the causes for the increase in the proportion of bigeye in the catches by this fleet. Seventy-six (76) observer trips are planned, 18 on-board French vessels and 58 on-board Spanish vessels. Thus, the latter fleet will have complied with 25% of the coverage recommended at the 1996 Commission meeting. These observer trips are also expected to cover part of the fleet classified under NEI (Not Else Included). Up to now, observer have been placed on 12 Spanish vessels and on the NEI fleet.

b) Longline: The objective of the longline observer trips is to collect information on vessels, such as the characteristics of the longlines, the daily sets, and biological observations. So far, five observations have been carried out on the Japanese longline fleet.

c) Baitboat: There is an on-going observer program on the French baitboats based at Dakar, with an expected 5% coverage rate.

It was also noted that information on national observer programs is also provided in the Report of the Sub-Committee on By-catch **(Appendix 12)**. The various observer programs will not be finalized before 1998 or 1999, and thus the final results will be presented after that time.

-- On the use of artificial floating objects (FADs): Current knowledge on the use of these devices is reflected in various documents presented by various SCRS scientists, and these reports are quite extensive, as pointed out in the introductory section.

The 1996 SCRS recommendations are still valid, in that current information on the state of the bigeye stock, diverse biological aspects, and behavior (growth, mortality, migrations, feeding, environmental impact, etc.) is insufficient and requires a specific research program which includes all these aspects.

-- on the moratorium on fishing with objects

In addition to the measures put into effect by the SCRS and concerned about the high number of juveniles in the catches on objects, the sector integrated in the associations of Community producers of frozen tuna (OPAGAC, ANABAC and ORTHONGEL) agreed unilaterally to establish a moratorium on fishing with floating objects (natural and artificial) during the months of November and December, 1997, and January, 1998, in an area between 5°N and 4°S, the African coast, and 20°W **(Figure 5)** (COM/97/21). All the Spanish and French vessels are participating in this agreement, as well as many of those classified under NEI. The measure would be more effective if this entire fleet (of which the average annual catches in the foreseen area and season have been 587 MT of yellowfin, 3296 MT of skipjack, and 770 MT of bigeye) complied with the agreement. As can be observed from **Figure 4**, it is during these three months and in that area where most of the catches on objects take place. Besides, it is during the last quarter of the year when the major part of juveniles are caught. In order to monitor the compliance of this agreement, all the vessels involved should have an observer on board during the period of the ban.

This is the first time that this type of measure, adopted by the boat-owners themselves has been applied to the commercial tuna fisheries in the Atlantic Ocean, in spite of the economic and logistical repercussions which such a

measure involves. This also demonstrates a clear concern from the fishing industry about the rational exploitation of the tuna resources, with a view towards attaining improvement in the state of the stocks exploited.

In order to provide some basic data on the potential effects of the moratorium on the catches of tunas associated with floating objects by the Spanish and French purse seine fleets, the scientists who participated in the Assessment Groups of the 1997 SCRS on these tropical species have prepared the following summary tables:

Table 1. Percentage (in weight), of French and Spanish catches of yellowfin (YFT), skipjack (SKJ) and bigeye (BET) taken in the area and season of the moratorium, from 1991 to 1996, showing the average percentage for the period, as well as preliminary estimates of potential decreases in catches

a) Percentage (in weight)		*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*Ave. 1991-96*
SPAIN:	YFT	3%	2%	5%	4%	4%	3%	4%
	SKJ	21%	21%	16%	17%	15%	16%	17%
	BET	21%	11%	15%	17%	15%	16%	16%
FRANCE:	YFT	21%	1%	3%	3%	3%	3%	2%
	SKJ	14%	10%	20%	15%	15%	23%	16%
	BET	12%	7%	8%	12%	11%	16%	11%

b) Average catches (in MT), 1991-1996

	YFT	*SKJ*	*BET*
SPAIN	42,029	47,561	11,975
FRANCE	31,282	27,227	7,818

c) Decline in catches (in MT), applying average percentages for period considered

	YFT	*SKJ*	*BET*	*TOTAL*
SPAIN	1,681	8,085	1,916	11,682
FRANCE	627	4,356	860	5,843
TOTAL	2,308	12,441	2,776	17,525

d) Decrease in catches (in no. of fish) resulting from converting catches in weight to catches in number of fish

	YFT	*SKJ*	*BET*
No. of individuals	769,333	7,318,235	925,333
(Ave. weight: kgs)	(3 kg)	(1.7 kg)	(3 kg)

If the moratoria is complied with and the level of effort does not increase for other fishing methods, it is foreseen that an increase in catches of the tropical tuna stocks could be obtained in the long term, especially of yellowfin and bigeye, for which fishing mortality on the juvenile component of the stock will be reduced.

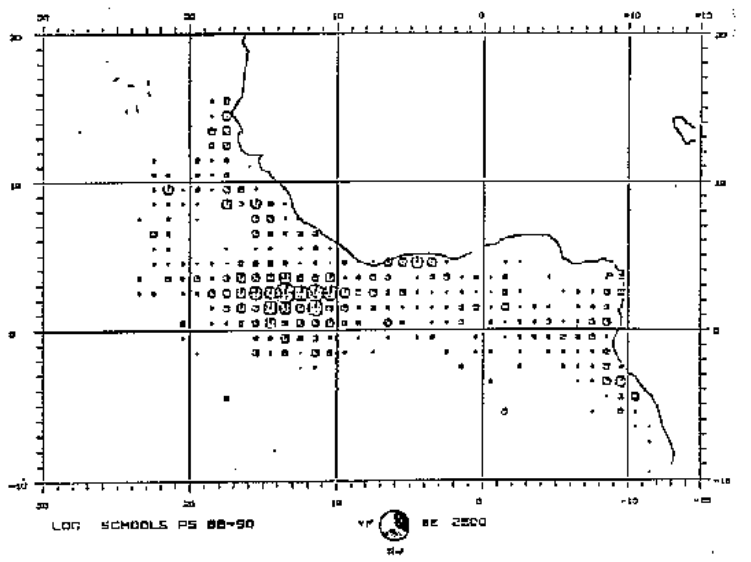


Figure 1. Yellowfin, skipjack and bigeye purse seine catches taken on floating objects, by the purse seine fleet in the eastern Atlantic prior to 1991, the year of the massive introduction of fishing with artificial objects.

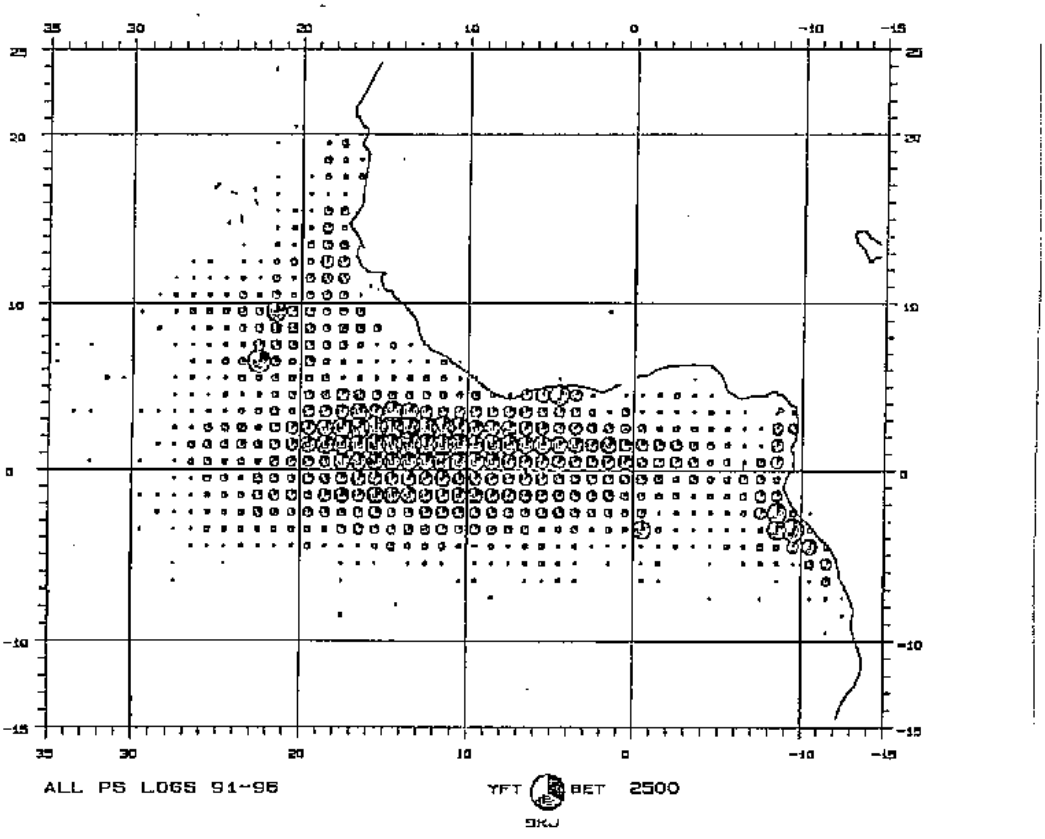


Figure 2. Yellowfin, skipjack and bigeye purse seine catches taken on floating objects after 1991.

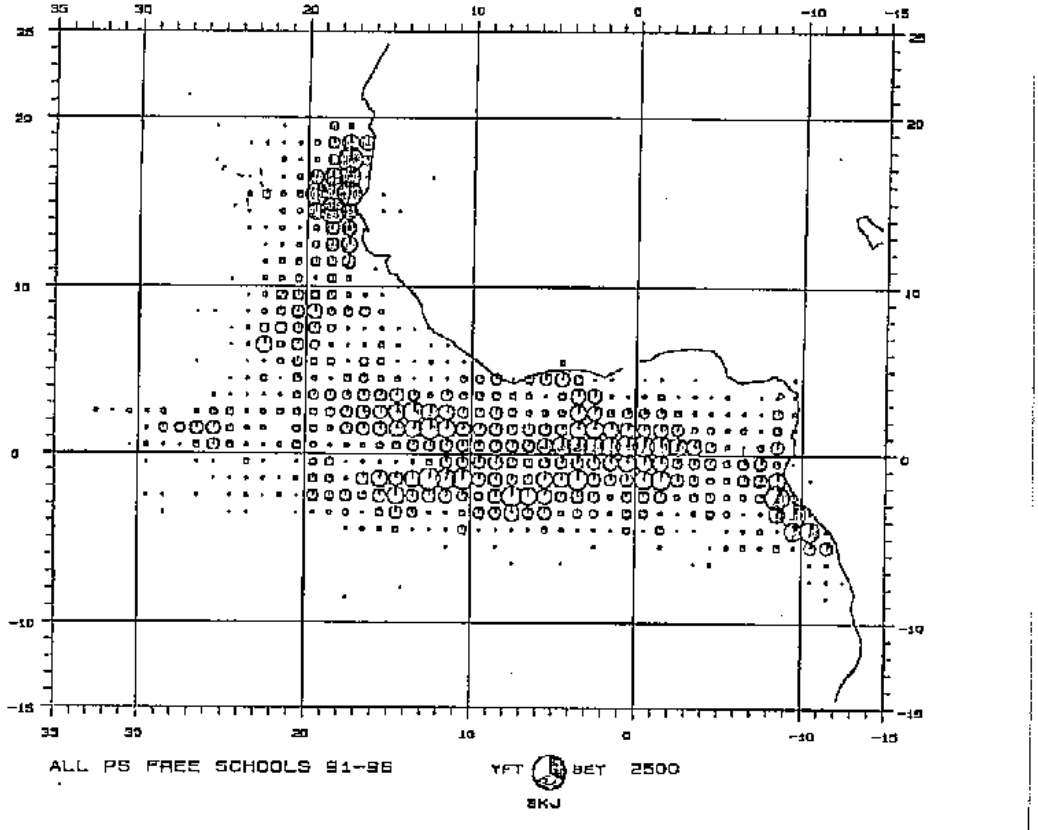


Figure 3. Yellowfin, skipjack and bigeye purse seine catches taken on free schools after 1991.

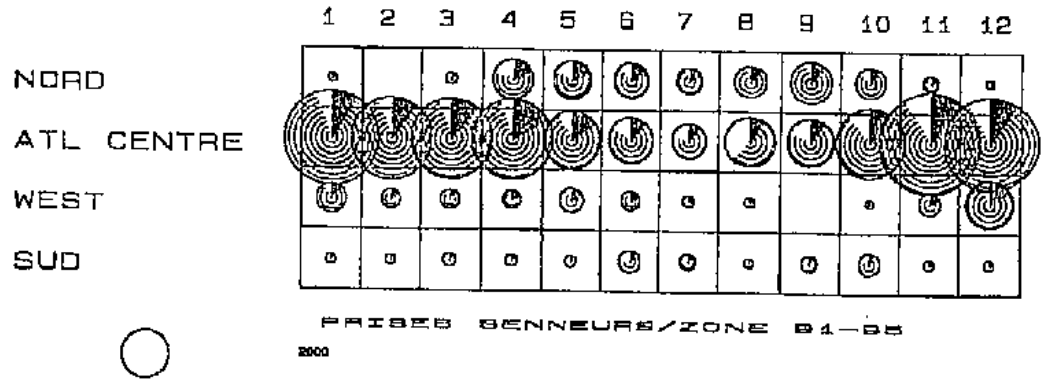


Figure 4. Incidence of objects fishing of yellowfin, skipjack and bigeye, by areas and months, after 1991.

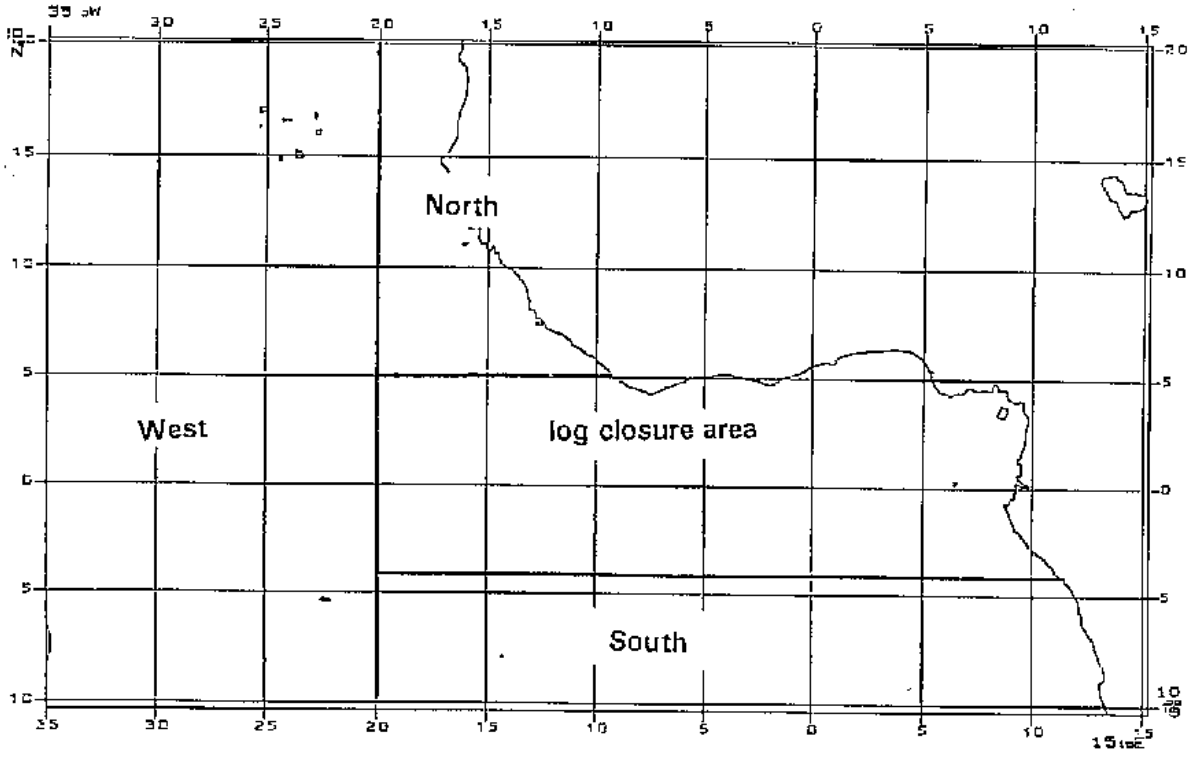


Figure 5. Area of three-month (November-December 1997, January, 1998) moratorium on objects fishing, unilaterally agreed upon by Spanish and French tuna industry.

19.3.2 ***BLUEFIN:*** At the 1996 Commission meeting, concern was expressed over the factor applied to convert bluefin belly meat weight to round weight. As the unit of measurement reported in **BFT-Table 1** and as used in stock assessment analyses conducted by the Committee is whole weight (MT), it is imperative that accurate conversion from processed to whole weights be conducted. In response to the concern expressed by the Commission and in reaction to an SCRS Bluefin Year Program research recommendation, two documents on the topic were submitted for consideration by the Committee in 1997. For these studies, bluefin were made available for examination through the cooperation of several industry groups, including the Ricardo Fuentes Co., Ltd. The joint Spanish and Japanese study (SCRS/97/80, SCRS/97/103) indicated that the appropriate conversion factor from belly meat weight to whole weight is on the order of 10 (*i.e.* belly meat weight x10.3 = whole weight). The study indicates that if information about month of capture is available, then this should to be taken into account in conversion. The Committee recommends application of monthly conversions as estimated in SCRS/97/80 be applied if month of capture information is available, elsewise application of the pooled month conversion factor (10.3) from that study should be used. These conversions were applied to estimate whole weight from belly meat weights in **BFT-Table 1**.

At its Tenth Special Meeting (San Sebastian, November 1996) the Commission resolved to request the SCRS to re-examine the boundary placed at 45° West longitude to determine if it should be changed in order to improve the accuracy of stock assessments and effectiveness of conservation measures. The Committee noted that in 1993, the SCRS provided the Commission with its advice relative to the catches of bluefin from the central Atlantic zone. That text from the ICCAT Report for the Biennial Period 1992-93, Part II (1993), is repeated below:

"It is not known if the longline catches of bluefin tuna in the central Atlantic come from the western stock, from the eastern stock or from a combination of both stocks. The possible importance of these catches on the western Atlantic stock has been assessed by assuming that all central Atlantic catches were in fact coming from the western stock.

If the central Atlantic catches are added to the assessment and the abundance indices are the same as the base case, the absolute population numbers are essentially unchanged, but the fishing mortality is estimated to be much higher. If in addition, an abundance index derived from the central Atlantic fishery is added to those of the base case, the absolute population numbers are slightly lower than the base case and the fishing mortality even higher.

From stock dynamics and fisheries management perspectives, if the catches in the central Atlantic indeed come from the western stock, they obviously cause population abundance to be lower than it would have otherwise been. Therefore, these catches could negate the beneficial effects expected from restrictive management actions in coastal waters. If the catches come from the eastern Atlantic, they would not have any effect on the western stock under the working hypothesis of the assessment of two stocks with exchanges of individuals considered too limited to affect the results of management on each side of the Atlantic.

There is continued interest in the subject of the stock structure of bluefin tuna, including further analyses of the tagging data as well as genetic analyses."

Although a number of research activities by member nations were reported to the Committee at its 1997 meeting that could, in the future, provide a basis for further evaluation of the degree of mixing and separation of catches by area of spawning, this research is not yet sufficient to provide a basis for new evaluations of this topic. Further analysis of available tagging data has resulted in no resolution of this issue. In keeping with recommendations made under the BYP, several member nations instituted and reported on progress of research underway to evaluate stock structure hypotheses for bluefin tuna. Research continues on evaluation of the genetic diversity of bluefin in the Atlantic, comparative studies of larval production in the Gulf of Mexico and in the Mediterranean Sea, evaluation of otolith micro-constituents for classification of catches from the east and west and on further development of tagging studies which could provide, in the future, means for further evaluation of the current working hypothesis about bluefin stock structure. There are two tagging studies in the west and two planned in the east which make use of satellite linked tags which register the position (and other information) for fish at the time the tag "pops-off" from the fish. Results from these tagging studies from the east and west are not yet available, but preliminary results from these studies in both the east and west could be available in 1999. The degree to which this information could provide a basis for refining the working hypothesis of two stocks is unknown, but it is nearly certain that unequivocal resolution of this issue will not result from these studies.

19.4 General recommendations which have financial implications for the Commission

19.4.1 The SCRS strongly recommended, in the event EU funding of the Symposium publication is insufficient, that the Commission make up the shortage in funds for the enhanced publication of the Symposium results.

19.4.2 The request for limited BYP funds from the 1998 is attached as **Appendix 6**. The Committee also requested the Commission to consider this as the minimum requirement for the BYP, while at the same time encouraging more national contributions, in terms of materials, vessel time, and personnel time devoted to this program. The ICCAT funding can serve as a "lubricant" for the BYP to run smoothly, as has already been proven in 1997.

19.4.3 The Committee drew the Commission's attention to section 2.1 of the Revised Program Plan for the Bigeye Year Program, "ICCAT coordinating actions and budget" **(Appendix 7)**, in which US$ 50,000 is requested for the initial funding, and includes a prioritized budget, in the event the Commission cannot fund the total budget. The Committee noted that the BETYP could be funded by an extra-ordinary budget, i.e. outside the Commissions' regular budget, and requested that any unused funds from one year be carried over to the following fiscal year. Such funding would clearly demonstrate the Commission's interest in, and the importance of, this Program, and at the same time might encourage contributions from other sources. Once such funding has been approved by the Commission, the Executive Secretary is requested to contact various potential financial sources (e.g. the EU, industry, etc.).

19.4.4 That the computer equipment listed in **Addendum 3 to Appendix 11** be purchased in 1998.

19.4.5 There have been various recommendations to hold inter-sessional meetings and some travel by the Secretariat staff (e.g. to Croatia and/or attending various meetings). These are listed under the Agenda Item 18, and in other recommendations included in this Section.

19.5 Recommendations relative to research of various tuna species

19.5.1 *TROPICAL TUNAS:* An inter-sessional workshop proposed by the Tropical Tunas Working Group to be held in May or June, 1998, to examine and further develop methods for the standardized of catch rates of purse seine fisheries for use as indices of relative abundance.

The order in which the recommendations for the tropical species are presented relates to their priority. The Bigeye Program is given first and greatest priority by the Committee.

-- **Bigeye Program** (See section 18.3)

-- **Abundance indices:** The assessments of yellowfin and bigeye carried out by the Committee have been hindered by a lack of availability of standardized catch rates of the surface fisheries, particularly the purse seine fishery. These indices are needed to calibrate models used to assess the status of fish stocks and, without them, assessment results are highly uncertain.

The development of the surface fisheries (baitboat fisheries and particularly the purse seine fisheries), which have adopted numerous technological improvements and introduced new fishing methods such as the use of floating objects, has substantially modified effective effort. These changes have compromised the utility of catch rates as indices of relative abundance.

The method of fishing using objects (both natural logs and artificial aggregating devices) has extended in recent years to the majority of the purse seine tropical tuna fisheries (east and west Pacific Ocean, Indian Ocean and east Atlantic Ocean.

For these reasons, it is recommended that the problems related to the standardization of catch rates for the purse seine fisheries, specifically those related to the interpretation and incorporation of changes in fishing power derived from fishing using floating objects, be analyzed in a workshop setting. The workshop should be organized by ICCAT, in coordination with the international commissions involved in the management of tropical tunas (IATTC, SPC, and the Indian Ocean Tuna Commission). This workshop should be open to all experts who wish to participate.

The development of abundance indices from the catch rates of surface fisheries is a matter of priority, particularly now that the *analysis of a multi-species sampling scheme for tropical tunas has been implemented (see SCRS/97/28).*

To organize the workshop, a committee will be created which should, together with the ICCAT Secretariat, carry out the work of coordination with other commissions and define the specific terms of reference for the workshop.

-- **Statistics / size frequencies of the catches:** The Committee recommended that the scientists inform the Secretariat as early as possible of the type of data and processing required by the Species Group. In accordance with such requests, the Secretariat can supply the Group with size frequency and catch-at-age statistics, appropriately raised by gear, and that a permanent data base be created containing all the data used during the assessments, for yellowfin and skipjack, as well as bigeye. This would greatly simply the assessment work and ensure that the data base in previous assessments are always available to the group.

The Committee reiterated the necessity of the Secretariat having available adequate statistical staff to carry out these tasks.

19.5.2 ***ALBACORE:*** The Committee will assess the status of the north and south Atlantic albacore stocks during 1998. It is strongly recommended to conduct the preparation of the basic data by national scientists and the Secretariat well in advance before the meeting.

The Committee is concerned about the sensibility of the base case analysis of southern albacore to the choice of the selectivity pattern. It is strongly recommended to analyze in depth the changes in selectivity produced in the fishery and the impact on stock assessment. The derivation of adequate catch-at-age estimates is urgently needed together with the derivation of age-specific indices of abundance.

The Committee noted the recent apparent change in the selectivity pattern, especially the increment of small-sized albacore catches by longliners in the high latitudes of the south Atlantic. It is recommended to compare this information with alternative sources, like the information coming from the by-catch data of the southern bluefin tuna program conducted by Japan since 1993 in similar latitudes.

According to the results obtained on the association between north Atlantic albacore dynamics and climatic change indicators, it is strongly recommended to continue this kind of analysis. The SCRS should consider analyzing global climatic and oceanographic changes on a routine basis.

19.5.3 ***BLUEFIN TUNA:*** General: (1) The Committee recommends an inter-sessional stock assessment session be held in 1998, possibly in connection with a GFCM/ICCAT Joint Working Group meeting during which Mediterranean catch and effort statistics will be updated. (2) Efforts should be made to incorporate more historical (pre-1950) catch and effort data into the assessment data bases used by SCRS. (3) The Committee endorses the research recommendations of the Bluefin Year Program (BYP). The research includes improvement in tag recovery methods, application of archival and pop-up tags, as well as further studies on bluefin genetics, micro-constituents, and studies of reproductive biology (e.g. maturity, larval production, etc.). (4) The Committee recommends that nations institute data collection systems to quantify recreational and artisanal harvests (including discards) of bluefin and other species and report these statistics annually to ICCAT.

-- **West Atlantic:** On the basis of projection analyses, the Committee recommended that approximately the current catch level be maintained if the Commission is satisfied with a 50% probability of having slowing increasing 20-year trends in spawning stock size. If the Commission wants to be reasonably sure (i.e. 90% probability) of at least maintaining the status quo, the catch should be reduced to approximately 2,000 MT. But, if the Commission's goal is to move more rapidly (i.e. within 20 years) to levels that historically could have produced MSY, current catches should be reduced substantially.

-- **East Atlantic:** (1) Given the unexpectedly large increase in catches in 1994, 1995, and 1996, combined with the results of the 1996 analysis, the Committee considers that a reduction in catches to about 25,000 MT is necessary to maintain the stock at status quo or to allow slow increases in stock size with a 50% probability. If the

Commissioners want to be reasonably sure (i.e. have 90% probability), of at least maintaining the status quo, the catch should be reduced to about 15,000 MT. (2) The Committee is concerned about the high catches of small individuals and recommended that every effort be made so that the current measures on the size limit of 6.4 kg be adhered to. The Committee reiterated that effective measures be taken to avoid catches of age 0 fish (< 1.8 kg), and not allow any tolerance with respect to the percentage (in number) of ago 0 fish in the landings. (3) Although some progress was made in 1996, the Committee is gravely concerned about the lack of basic catch and effort statistics for the Mediterranean Sea. The Committee recommends that countries engaging in purse seine and longline fishing in the Mediterranean Sea must take immediate and effective action, including at least implementing a proper logbook system and size sampling. For example, the Committee recommends that ICCAT consult with Croatian authorities about proposed revisions to Croatian catches. Should the revisions be incorporated in the ICCAT data base, the Committee notes that the Commission may wish to recalculate its recommendation with respect to purse seine fishing in the Mediterranean.

19.5.4 ***BILLFISHES:*** (1) Although much progress has been made, as illustrated in ICCAT Billfish Workshops II and III, many of the data acquisition problems for all billfish species remain. In addition, maintenance of important elements of the billfish data bases, to insure uninterrupted time series, requires the ICCAT Enhanced Research Program for Billfish (IERPB) to be continued and expanded in critical areas. (2) There is a critical need to reduce fishing mortality, particularly for marlin. The SCRS strongly recommends initiating a pilot program in 1998 to release or tag and release substantial numbers of live marlin by-catch from vessels catching billfish species. Marlin released but not tagged should be documented in log books to maintain the integrity of the CPUE indices. (3) Initiate research to determine the post-release survival of billfish released from recreational and longline fisheries. (4) The Committee recognized that development of a five-year research plan can be implemented ONLY if Commission funding becomes available to the Billfish Program. Therefore, the Committee strongly urges that a Billfish Program (IERPB) Category be established in the annual ICCAT budget. This recommendation represents a change in the financial structure of the Billfish Program and reflects the fact that billfish were initially among the species groups under ICCAT jurisdiction with regards to Commission support; (5) Validate reported billfish landings statistics and CPUE series from some west African countries (Ghana, Sao Tome & Principe, Gabon); (6) Develop estimates of billfish caught (discarded or kept) from Senegalese observer reports on longline vessels fishing off West Africa; (7) Develop estimates of billfish dead discards or landings from French and Spanish tropical purse seine fisheries. (8) Recover existing data on Mediterranean spearfish statistics and assemble all existing data on biology of this species.

19.5.5 ***SWORDFISH:*** Mechanisms to improve the reporting system for swordfish catch and effort need to be implemented by ICCAT. Under-reporting undermines the intent of conservation measures and the reliability of assessment advice. Scientists should investigate the sources of possible bias associated with under-reporting.

Following the recommendations in the 1995 report of the SCRS, the 1996 Swordfish Species Group conducted a preliminary sex-specific analysis for the north Atlantic, and a preliminary production model for the south Atlantic. It is recommended that both of these analyses be improved before the next assessment. The mechanism for this improvement follows in the form of the schedule of future meetings and their objectives. Scientists from all countries that fish for swordfish should attend species group meetings.

-- **January, 1998 (Bermuda):** A 6-day meeting to create the Atlantic swordfish catch-at-size by sex. The calculation of sex ratio-at-size will be reviewed and the resulting catch-at-size by sex examined. A full review of swordfish growth curves will be conducted in preparation for calculating the catch-at-age by sex. Two persons from the Secretariat should attend (Assistant Executive Secretary and Data Analyst). In preparation for this meeting, computational support from the Secretariat is required (from now until the January, 1998, meeting.

-- **October, 1998 (prior to SCRS):** A 3-day meeting to update the Atlantic catch, CPUE, and catch-at-size/age by sex, review stock structure; and to review improvement to the south Atlantic swordfish CPUE.

-- **September, 1999 (inter-sessional):** An 8-day Swordfish Stock Assessment Inter-sessional Meeting to conduct sex-specific VPA and production model analyses for both the north and south (or total) Atlantic.

In the interim period, scientists are encouraged to collect samples for the analyses of growth by sex, especially from the south and east Atlantic; to continue tagging and genetics studies to document the important changes in the fishing patterns of several fleets in recent years; and to collect fine-scale CPUE data in the south Atlantic.

In addition, in September, 1998, there will be 3 days of the GFCM/ICCAT Joint Working Group devoted to the update the Mediterranean swordfish catch.

19.5.6 ***SUB-COMMITTEE ON BY-CATCHES:*** (1) It is obvious that the response to the ICCAT requests for data on sharks has been poor. This likely reflects the relatively low priority nations place on monitoring shark catches compared to tuna and tuna-like species. Never the less, the Committee reiterates its previous recommendation that all member nations and Atlantic tuna fishing nations establish adequate data collection systems for collecting Task I and Task II data for sharks and provide the data in annual reports to ICCAT. (2) Participation by ICCAT in the FAO TWG meeting on conservation and management on sharks is critical to ICCAT's future activities as the meeting results may have considerable impact on Atlantic tuna fishing nations which catch sharks incidentally. The Committee also recommended that ICCAT participate in the regional preparatory workshops dealing with shark fisheries (Sarasota, FL; New Caledonia; and Monterey, California) which are being held in advance of the April, 1998, TWG meeting. The Committee also continues to recommend that ICCAT maintain communications on sharks with other interested organizations and nations, participate in regional and international meetings relating to sharks, and provide these organizations with reports of progress made by ICCAT on the issue of by-catch and sharks. (3) The Committee reaffirmed previous ICCAT recommendations that FAO should be a focal point in collection of shark data across the range of fisheries which harvest these species. The Committee also acknowledges that using information on total removals will be critical to future evaluations of shark stock status, and hence reporting discards accurately is essential. (4) Because the interaction between CCSBT fisheries and sea birds was the most important issue to be addressed by the working group, the ERS has not yet focused on sharks or other by-catch species issues, but it is recommended that ICCAT maintain contact with CCSBT and its ERS working group. (5) It was recommended that ICCAT request that CITES undertake additional actions to improve communication of its actions and needs to interested international agencies.

19.5.7 ***SUB-COMMITTEE ON STATISTICS:*** (1) That, following preparatory work by Croatian scientists, a member of the ICCAT staff visit Croatia to assist in the revision of their data base. (2) That the Italian Government be urged to make all existing data for the Adriatic purse seine fishery available to ICCAT. (3) That the Italian Government be requested to inform ICCAT of the results of the revision of tuna statistics, and if necessary involve ICCAT in the process. (4) That national reporting systems adequately account for recreational fisheries, and other fisheries and catches which are difficult to monitor, such as artisanal fisheries and discards. (5) That the ICCAT Secretariat develop a questionnaire relating to statistical collection systems of those catches which are difficult to monitor. (6) That all Contracting Parties submit, where relevant, Task I data on shark catches. (7) That TUNASTAT be updated regularly and posted on FTP. (8) That, in anticipation of an ICCAT bibliography, all scientists submit key words with their documents. (9) That funds previously destined for the leasing of the Secretariat's main frame computer now be used for the purchase of other electronic equipment. (10) That the conversion factors for belly meat products to round weight be implemented immediately. (11) That the Secretariat take steps to recover historic data for the major species from all sources possible.

19.5.8 ***BLUEFIN YEAR PROGRAM (BYP):*** (1) The Bluefin Year Program requires the collection of fish samples from several locations. Some of these samples are of age 0 and 1 fish, i.e., below the minimum size recommended by the Commission. The collection of such samples and their transport to the laboratories are essential for the subsequent research and analysis. Hence, the Committee recommends the Commission to take the necessary action so that the pertinent authorities will be able to exempt such catch and handling of these under-sized fish samples for scientific purposes, when duly certified by the Secretariat that the samples are for use in ICCAT joint international research. (2) The Committee recognized that the movement of samples between laboratories of difference countries may cause some difficulties. Thus, it was recommended that the Commission give due consideration to facilitate the transport of such samples between countries, avoiding undue delays, provided that it is duly certified by ICCAT that the samples have been collected under the auspices of the BYP and are only used for scientific purposes.

19.5.9 ***PRECAUTIONARY APPROACH:*** The SCRS recommended the creation of an *Ad Hoc* Working Group on the Precautionary Approach, supporting, in principle, a preliminary proposal of a global expert consultation on the implications of the precautionary approach for tuna fisheries research; and requesting the Working Group to consider the proposal in detail.

20. Collaboration with non-contracting parties and other fisheries organizations

20.1 The Committee expressed satisfaction with the cooperation ICCAT has maintained with non-contracting parties, particularly those of the Mediterranean area through GFCM. Such collaboration is particularly important in obtaining better statistics on the Atlantic tuna fisheries.

20.2 Mr. D. Cross of EUROSTAT requested that ICCAT participate in the Atlantic Inter-Agency meeting of the CWP. This meeting will deal with the collection of shark statistics, the updating the fishery data base, and will work to reduce the discrepancies between agencies' data bases. This subject is also included under Agenda Item 18.

20.3 The Representative of FAO thanked ICCAT for its cooperation, especially as regards the collection of shark statistics and in providing Atlantic tuna data for FAO's World Tuna Atlas program.

21. Date and place of the next meeting of the SCRS

21.1 It was reconfirmed that the 1998 SCRS should meet at least three weeks prior to the Commission meeting. At the same time, it was recognized that the data may not be available for many fisheries until mid-October. Thus, the Committee recommended that the 1998 SCRS meet, in principle, starting the week of October 19, with the species groups to start during the preceding week. It was understood that the dates for the SCRS are tentative, pending the decision on the Commission's meeting dates.

22. Other matters

22.1 The observer from Taiwan anticipated the Committee that a US$ 20,000 voluntary contribution would be forthcoming, and would be announced at the time of the November Commission meeting. He requested that this contribution be applied, in equal amounts of US$ 5,000, to the following ICCAT research programs and activities concerning tunas: Bluefin Year Program (BYP), Bigeye Year Program (BETYP), Enhanced Research Program for Billfish, and towards the publication of the results of the 1996 ICCAT Tuna Symposium.

23. Election of SCRS Chairman

23.1 Before opening the floor for nominations, the Committee congratulated Dr. Suzuki, the out-going Chairman, for his excellent work and leadership during this four-year term. Dr. Suzuki thanked all the scientists for their support during his term.

23.2 The Committee was informed of the voting procedure, as outlined in Rule 9 of the Commission's "Rules of Procedure", which indicates the requirement of a two-thirds majority of the Contracting Parties (i.e. 18) to constitute a quorum. It was noted that there were only 17 Contracting Parties to conduct the vote, i.e. 16 Contracting Parties present at the time of voting plus one vote (South Africa) left with the Secretariat prior to the departure of the South African delegate. Discussion ensued on the voting procedure to follow under these circumstances. Finally, the Committee decided to go ahead with the voting, in spite of the lack of a quorum, with the condition that the winning candidate had to receive a minimum of two votes more than those received by the opposing candidate.

23.3 There was a secret ballot vote for nominations for SCRS Chairman. As a result of that vote, the two candidates were Drs. Joao Gil Pereira (Portugal) and Joseph Powers (U.S.A.). After conducting a second, secret vote, Dr. Powers was declared winner of the election to serve as SCRS Chairman for the 1998-1999 biennial period.

23.4 Dr. Powers, the newly-elected Chairman, thanked the Committee for the confidence placed in him and assured the SCRS he would work to the best of his ability for the good of the scientific committee and the Commission.

24. Adoption of Report

24.1 The Report was adopted by the Committee, as well as all the recommendations contained therein. It was agreed that the modifications presented by the scientists at the time of adoption would be introduced by the Secretariat and the Report would be subsequently re-circulated, by mail, as soon as possible, among the SCRS participants. The

Secretariat informed the Committee that the three language versions of the 1997 SCRS Report, including all the tables and figures, would be posted on the ICCAT web page for downloading by anyone interested in the results of the Committee's work.

25. Adjournment

25.1 The 1997 meeting of the Standing Committee on Research and Statistics (SCRS) was adjourned on Friday, October 24, 1997.

Appendix 1

1997 SCRS Agenda

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of Contracting Party delegations
4. Introduction and admission of observers
5. Admission of scientific documents
6. Review of national fisheries and research programs
7. Review of the Symposium publication
8. Review of the ICCAT Bluefin Year Program (BYP) - activities, progress & future plans
9. Review of the ICCAT Bigeye Year Program (BETYP) - activities, progress & future plans
10. Review of the ICCAT Program of Enhanced Research for Billfish - activities, progress & future plans
11. Consideration of precautionary approach
12. Reports of scientific meetings where ICCAT participated as observers
13. Executive Summaries on species:

    YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack, ALB-Albacore, BFT-Bluefin, BIL-Billfishes, SWO-Swordfish, SBF-Southern Bluefin, SMT-Small Tunas

14. Report of Sub-Committee on Environment
15. Report of the Sub-Committee on Statistics and review of Atlantic tuna statistics and data management system
16. Report of the Sub-Committee on By-catches. Future plans for the collection of by-catch statistics
17. Review of ICCAT scientific publications
18. Consideration of other SCRS activities
    - Organization of the SCRS
    - Inter-sessional scientific meetings proposed for 1998
19. General recommendations and responses to the Commission
20. Collaboration with non-contracting Parties and other fisheries organizations
21. Date and place of the next meeting of the SCRS
22. Other matters
23. Election of SCRS Chairman
24. Adoption of Report
25. Adjournment

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Appendix 3

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SCRS/97/6	Procedures for creating catch-at-size for bigeye tuna - ICCAT Secretariat
SCRS/97/7	(Rev.) Procedures adopted for updating catch-at-size for north and south Atlantic albacore - ICCAT Secretariat
SCRS/97/8	Responses to the ICCAT Small Tunas Questionnaire - ICCAT Secretariat
SCRS/97/9	*(COM/97/9)* Report on Statistics and Coordination of Research in 1997 / Rapport sur les statistiques et la coordination de la recherche en 1997
SCRS/97/10	*(COM/97/10)* Report of the *Ad Hoc* Working Group on Bigeye *(Madrid, Spain, April 9-11, 1997)*
SCRS/97/11	*(COM/97/11)* Report of the Meeting of *Ad Hoc* GFCM/ICCAT Joint Working Group on Stocks of Large Pelagic Fishes in the Mediterranean Sea on the Tag Recovery Network *(Messina, Italia, June 23-24,1997)*
SCRS/97/12	*(COM/97/12)* Report of the Working Group on Sharks, ICCAT Sub-Committee on By-Catch *(Shimizu, Japan, 11-14 mars 1997)*
SCRS/97/13	*(COM/97/13)* Report of the seventeenth session of the Coordinating Working Party on Fishery Statistics *(Hobart, Tasmania, Australia, 3-7 March 1997)*
SCRS/97/14	*(COM/97/14)* Observer's Report of 58th Meeting of the Inter-American Tropical Tuna Commission *(San José, Costa Rica, June 3-4, 1997)* - Suzuki, Z.
SCRS/97/15	*(COM/97/15)* Observer Report on CITES 10th Meeting of the Conference of the Parties *(Harare, Zimbabwe, June 9-20, 1997)* - Nakano, H.
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SCRS/97/17	Critical review of data collecting and processing system adopted and revised statistics for the Chinese Taipei longline fleet *(Taipei - July 1997)*
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Appendix 4

BLUEFIN YEAR PROGRAM - REPORT OF 1997 EXPENDITURES

1. Recovery effort of tagged bluefin and billfishes

At the 1996 SCRS meeting, this matter was identified as being of the highest priority in the program. Many bluefin and billfishes have been tagged with archival tags this year, and the SCRS recommended that special efforts be made to publicize this and to train fishermen in the methods of recovering and reporting these tags, particularly in the Mediterranean area. This effort would also be effective for recovering conventional tags on bluefin and other species. Following these recommendations, it was proposed that a tag-recovery network be established in the Mediterranean area, and one scientist be selected for each fishing area along the coast who would be responsible for tag recovery in their area.

It was proposed that the following ports be visited, but this list is not exhaustive: Barbate, Cartagena, Sete, Agadir, Palermo (Messina), Genoa, Fano, Bari, Istanbul, Crete, Athens, Malta, Cyprus, and that Algiers and Tunis be visited by a contracted scientist from the area.

$6,000 was budgeted for travel expenses, **$3,000** for local contracts. **$2,000** is allocated for the purpose of preparing publicity posters (it is hoped that these will be printed in ten languages).

2. Biological sampling for conversion factors

This is another priority area for research, and was specifically requested by the Commission. At present, there is no established conversion factor for belly meat to round weight. Well structured biological sampling is essential to achieve this. Despite the efforts of scientists and the Secretariat in 1996, it has not yet been possible to establish an appropriate conversion factor. A sampling program has been developed and was put into operation in June 1997 at Cartagena, Spain. A Japanese scientist participated in this program, funded by national sources, and other sampling personnel provided and funded by the IEO Spain. A minimum of **$1,500** is proposed for this project.

3. Feasibility study of sampling in Morocco

Sampling of the newly developed handline fisheries of bluefin tuna has been proposed since 1995. The budget initially proposed for this sampling was $20,000, but due to the limited funds available, it was proposed that feasibility studies be initiated in 1997 with a minimum funding of **$1,000**. The results of these studies should be reported to the SCRS at its next meeting, to further evaluate the possibility of expanding this program.

4. Feasibility study of plankton net survey

Sampling for larvae and plankton in the eastern Mediterranean was proposed by Turkish researchers, and $20,000 was proposed for this survey in the initial budget in 1995. Due to the limited funds available, it was proposed that feasibility studies be initiated in 1997 with a minimum funding of **$1,000**. The results of these studies should be reported to the SCRS at its next meeting, to further evaluate the possibility of expanding this program.

5. Feasibility study to determine the maximum age of bluefin tuna

A new technique has been developed to trace a radioactive material in the otolith, deposited by the fall-out of nuclear tests at sea. This technique can be used to determine the maximum age of bluefin tuna. The cost of analysis remains high, at about $500 for one specimen. A budget of **$1,500** was proposed for a feasibility study of the application of this technique to bluefin otoliths.

6. Study of reproductive biology in the eastern Mediterranean Sea

Little research has been carried out on the reproductive biology (fecundity, maturity, spawning activities etc.) of bluefin tuna in the eastern Mediterranean Sea. Joint international efforts by Italy, Greece and Turkey are currently being made to initiate investigation in this field. It was proposed that ICCAT contribute a minimum of **$2,000** to this research.

7. Data exchange and methodology of genetic studies

The need to standardize the genetic methodologies and techniques and to maintain a warehouse for the exchange of materials was reflected in the initial 1995 budget. This project is progressing through national efforts, and it was proposed that an allocation of **$1,500** be made to assist progress.

Bluefin Year Program (BYP): 1997 Budget & Expenditures (to the end of 1997)

Item	*Budget (US$)*	*Budget (Pesetas)*	*Expended* (Pesetas)*		*Balance (Pesetas)*	
1 Recovery effort of tagged bluefin and billfishes						
Visits to Mediterranean fishing ports	6,000	828,000	407,736	*	420,264	
Locally-contracted staff at key locations	3,000	414,000	183,616	*	230,384	
Printing of posters in 10 languages	2,000	276,000		*		
2 Biological sampling to establish conversion factors	1,500	207,000	280,000	*	(73,000)	
3 Feasibility study of sampling in Morocco	1,000	138,000	140,000	*	(2,000)	
4 Feasibility study of plankton net surveys in Turkish waters	1,000	138,000		**	138,000	
5 Feasibility study of determining maximum age of bluefin tun	1,500	207,000	300,000	*	(93,000)	
6 Feasibility study of reproductive biology in eastern Mediterra	2,000	276,000		*	276,000	
7 Data exchange and methodology of genetic studies	1,500	207,000	0	*	207,000	
TOTAL	**19,500**	**2,691,000**	**1,311,352**		**1,379,648**	***

* Amount shown here represents ICCAT funding only. Considerable additional funding was made available from national sources.

** Turkish program was not carried out.

*** Balance of funds should be carried over to 1998.

Appendix 5

BLUEFIN YEAR PROGRAM (BYP): PROGRESS ACHIEVED & FUTURE PERSPECTIVES

I. Progress achieved

In accordance with the various points of the modified Bluefin Year Program plan prepared by ICCAT, the main progress achieved by the different member countries within the framework of the BYP are summarized in this report. The details on the activities, by country, are included in the revised Messina Report (see Appendix 3 to COM-SCRS/97/11-Rev). For this, the GFCM/ICCAT Joint Working Group meetings are extremely useful for updating the Mediterranean statistics and to learn more about the research programs on bluefin tuna of the countries in the Mediterranean area. In addition, the meeting held in Messina, Italy on June 23-24, 1997, to create the tag recovery network was one of the activities carried out within the framework of the BYP. Considerable progress achieved within the framework of the BYP in the east Atlantic and in the Mediterranean is due to the programs financed in part by the European Union.

1. Statistics

All the countries that collect data on catches, effort and size of bluefin tuna have continued such activities in recent years. Although the more specific activities in this area refer to the study of the landings data of French purse seiners in Spain (France, Spain), for better sampling coverage at the ports. In 1997, national programs were initiated to collect basic statistical data (Italy), as well as specific sampling programs of new fisheries (Morocco). The placing of observers on-board vessels (Spain, Italy) resulted in improved knowledge on the activities and fishing methods of certain fleets. Finally, the Bluefin Tuna Statistical Document has provided better information on exports to Japan.

Conversion factors have been developed by Spanish and Japanese scientists to estimate round weight from belly meat weight (SCRS/97/80, SCRS/97/103).

2. Stock structure

2.1 Tagging

2.1.1 Conventional tags

Tagging cruises using conventional tags have been organized by various countries in recent years.

Spain	1996 = 14	1997 = 500
Italy	1996 =	1997 = 548
U.S.A.	1996 = 3,376	1997 = >2,414

Recoveries from these and previous cruises continue to enhance knowledge on distribution, stock structure and mixing between the west and east Atlantic stock. Since 1994, there have been 4,410 fish tagged off North Carolina, and six of the 183 recoveries were transatlantic migrations from the west towards the east.

2.1.2 Electronic tags

Considerable progress has been made in the field of electronic tags (archival and pop-up tags). This technology has been put into practice by the United States, which tagged 227 bluefin tuna in 1997 along the American coasts (160 archival tags and 67 pop-up tags). Results from these studies in neither east and west are available yet, but preliminary results from these studies could be available in 1999. The degree to which this information could provide a basis for refining the mixing hypothesis is unknown, but it is nearly certain that an unequivocal resolution of this issue will not result from these studies.

2.1.3 Tag recovery network

A tag recovery network through the ICCAT correspondents has been created, with a view towards giving as much publicity as possible to the on-going tagging operations. Posters have been printed in various languages explaining the different types of tags inserted, and these have been widely distributed by the ICCAT correspondents. Oral and visual information has been transmitted, during trips to USA, Europe and North Africa (Morocco, Tunisia, Libya).

2.2 Genetics

Research on nuclear and mitochondrial DNA. This research has been done or is being done on both sides of the Atlantic Ocean and in Japan. Different techniques are used. The studies carried out in the Mediterranean do not show any difference between the samples obtained in the Mediterranean and in the east Atlantic. There are other on-going studies that use different approaches, which are worth looking into, particularly those based on samples of juvenile fish from the different spawning areas. There have already been 350 fish of ages 1 to 3 collected in the United States.

2.3 Micro-constituents in the otoliths

The United States has studied the feasibility of a study on stock structure based on micro-constituents in bluefin tuna otoliths. A joint U.S./European program to collect samples for these studies was noted as a high priority.

3. Abundance indices

As is the case of the catches, several countries are working to improve abundance index series by means of standardization, including variations due to geographic location, season, and the environment.

A review of the aerial surveys for medium and large-sized fish has been conducted. A preliminary aerial survey of small fish was also conducted for the purpose of studying the feasibility of developing an independent abundance index of small bluefin tuna (U.S.A.).

4. Biology

4.1 Larval distribution

A study on the data collected from the larval in the Gulf of Mexico as well as in the Mediterranean continues to be conducted by Japan, the United States and the European Union. Studies on the relationship between larval distributions and environmental factors are currently underway.

4.2 Spawning

Studies on the reproductive biology of bluefin tuna, have been proposed in the east and west Atlantic, examining, in particular, the sexual maturity of females, based on sexual hormones present in the blood and the muscular tissue. Some gonad and muscle samples have been collected for a preliminary study (U.S.-Canada).

5. Environment

A large number of countries are carrying out environmental observations during research cruises or during bluefin tuna fishing. Some ICCAT publications include information on the relationship between these observations and the data collected (catch, distribution of abundance of the juvenile and adult larvae). The use of the GIS (Geographic Information Systems) permit a better understanding of the impact of environmental factors on the distribution of this species.

II. Outlook

Several programs or activities concerning subjects of interest for the BYP should be initiated in 1998. Many of these address the problem of bluefin tuna stock structure which is considered to be a high priority

- Tagging program using pop-up tags, financed in part by the European Union. It is expected that 120 fish will be equipped with these tags at three sites (40 in the Strait of Gibraltar, 40 in the Tyrrhenian Sea and 40 in the Aegean Sea).

- Tagging experiments using pop-up tags in France are planned.

- Tagging using pop-up and archival tags will continue in the U.S.

- Program to advance knowledge on Mediterranean bluefin tuna (Germany, Spain, France, Greece, Italy), financed in part by the European Union. These studies concern the fisheries, statistics and biology. Among other matters, this program is aimed at a better understanding of the biology of spawning, and particularly to determine the degree of sexual maturity of the females based on sexual hormones present in the blood and muscular tissues. To the greatest extent possible, this program will be coordinated with a similar proposed program from the United States, and this coordination may include the exchange of samples.

- Studies on genetics and micro-constituents are continuing. Exchange of samples between both sides of the Atlantic need to be continued and involve other on-going studies on genetics or the micro-constituents of the otoliths.

- A CD ROM project on the management of the fisheries could be initiated by the Aquarium of Genoa and ICCAT collaboration could be required. Bluefin tuna could serve as an example.

- Conventional tagging cruises should be carried out in the Mediterranean in 1998.

Appendix 6

BLUEFIN YEAR PROGRAM (BYP): 1998 BUDGET

1. Biochemical Stock Structure Research

Biochemical studies of bluefin tuna in the east and the west are underway in Canada, Japan and the United States (genetics) and additional studies are proposed for Italy, Libya and the United States (otolith micro-constituents). To compare the genetic/micro-constituent composition of fish from each region it is preferable to study animals which have a low probability of having crossed the Atlantic. Larvae would be most suitable for this purpose but would not provide sufficient material for some types of analyses (electrophoresis and micro-constituents) and perhaps even for other techniques. Age 0 bluefin would provide sufficient material for the various genetic techniques, but it is not clear yet whether the otoliths from that age group would be sufficiently large for micro-constituent analyses. To ensure that otoliths of sufficient size are available for micro-constituent analysis samples also will be obtained from age 1 bluefin.

Sampling Locations: It is important to obtain samples from as broad a range of the distribution as possible so that different genetic or micro-constituent patterns can be identified if they exist. Age 0 fish are consistently available only in two locations off Italy and Spain in the Mediterranean; samples will be taken from each. Age 1 bluefin are more broadly available; samples will be collected from the eastern Mediterranean Sea (Turkey), from the central Mediterranean (Italy) and Adriatic Sea (Croatia), from the western Mediterranean (Spain) and from the east Atlantic (Bay of Biscay). The Committee is aware that researchers from the University of South Carolina working with the National Marine Fisheries Service (United States) are also planning to collect samples from the eastern and central Mediterranean. The Committee has decided to collect samples from that area as well because of the difficulties in transporting delicate samples across the Atlantic and because of the increase in the number of European laboratories interested in participating in this research (Italian, Libyan and Spanish).

Sample Size: Researchers from the United States have requested 100 fish per sample for genetic research and 50 fish per sample for micro-constituent research. The Committee has proposed to obtain 100 fish per sample from age 0 fish and at least 50 fish per sample from age 1 fish (age 1 fish cost 6 times more per fish); if the purchase price for age 1 fish is lower than budgeted than additional fish (up to 100 per sampling location) will be obtained.

Otolith Removal: It is difficult to remove bluefin tuna otoliths because they are small (and thus hard to find) and delicate. If an expert is not available to remove the otoliths at each primary sampling site, then heads (or parts of heads) will be shipped to a central location for storage. An expert (perhaps from that location or from elsewhere in Europe or the United States) will then remove the otoliths.

Multi-year Sampling: If genetic or micro-constituent markers are found which consistently differentiate eastern and western bluefin tuna, then it is necessary to collect samples from throughout the range and for several years to show that the patterns observed are stable across space and time. Therefore similar sampling will be necessary for several years.

Travel: Travel costs primarily will be used to cover costs of sending samplers to sampling locations to obtain samples and subsequently move them to initial storage locations. Unexpended funds might be used for the travel of an otolith removal expert.

Transportation: Genetic samples (some frozen, some in preservatives) will have to be transported from sampling locations to various laboratories in Europe, Japan and the United States (5 laboratories). Included in the costs are expenditures for shipping containers (coolers), dry ice, etc.

2. Reproduction sample transportation

Research projects on developing an assay to identify bluefin tuna sex and maturity status from muscle samples are proposed in both the United States and in Europe. Requested funds will be used to exchange samples of muscle, gonad and/or blood.

3. Feasibility of tagging study

This is a pilot study to evaluate the feasibility of using handline fishing boats in the Strait of Gibraltar for catching bluefin for possible tagging with archival or pop-up tags. The fishery is active nine months of the year and catches a broad range of sizes. The project will attempt to determine whether the traditional fishing method (handlines with deep deployment) can be modified for successful shallow water deployment. Costs include chartering two boats as well as for bait and supplies. Circle hooks for the study will be supplied by the United States.

4. Tag Recovery Network: Mediterranean and east Atlantic

Costs will primarily cover travel and shipping. Travel will be to ports to distribute posters and, particularly in North Africa to maintain contact with tag recovery network participants.

Proposed items for BYP Expenditures

I. Expenditures in 1997:

Biochemical Stock Structure Research

-- Purchase of 0 year-old fish (min. 40 cm) at two locations: Italy & Spain 100 fish in each sample (muscle and otoliths)	2 x $300	$ 600
-- Purchase of 1 year-old fish		$ 1,000
-- Travel	3 x $850	$ 2,550
-- Transport samples to European Japanese and USA labs		$ 3,000
-- TOTAL EXPENDITURES: 1997 *		$ 7,150

II. Expenditures in 1998:

Biochemical Stock Structure Research

-- Purchase of 0 year-old fish (two samples of 50 fish each at two locations: Italy & Spain (muscle and otoliths)	2 x $300	$ 600
-- Purchase of 1 year-old fish (four samples of 50 fish each at four locations: Croatia, Italy, Spain (Med.) and Spain (Bay of Biscay)	5 x $1 000	$ 5,000
-- Travel	7 x $850	$ 5,850
-- Transport samples to labs		$ 6,000
-- Sub-total: 1998 (Biochemical Stock Structure Research)		$ 17,450
Reproduction sample transportation		
-- Europe to U.S. / U.S. to Europe		$ 1,000
Feasibility of Tagging Study		
-- Archival/pop-up tags		$ 2,000
Tag recovery Mediterranean and east Atlantic		$ 8,000
-- TOTAL EXPENDITURES: 1998		**$ 28,000**

* Proposed 1997 expenditures are in excess of budgeted amount for Item 7 in the original Bluefin Year Program budget. This original amount from Item 7 and additional unexpended funds from that budget are still available. It is considered very unlikely that all 3 samples requested for 1997 will be obtained so late in the year. Thus, actual expenditures likely to be less than the budgeted amount, and will depend on samples obtained.

Appendix 7

BIGEYE TUNA YEAR PROGRAM (BETYP): RECOMMENDED FRAMEWORK AND BUDGET*

1. Overview

A spectacular and uncontrolled increase in bigeye tuna catches has been observed during recent years, mainly by the purse seine and longline fisheries, which may significantly endanger the management and conservation of bigeye tuna. Scientific research efforts on bigeye have always been at a very low level in ICCAT, resulting in poor knowledge on the basic biology, stock structure, migration, and dynamics of this species. The analyses carried out in 1997 by the SCRS confirm that there are serious uncertainties about the state of the stock and a danger that the stock may face a risk of recruitment over-fishing.

Given the present high level of catches, an intensive research program, coordinated by ICCAT, is necessary to determine whether the present catches are sustainable or whether they will drive the stock towards a serious decline.

Considering the present status of the stock, the high level of catches, and the value of bigeye tuna, the proposed Bigeye Tuna Year Program (BETYP) is a necessary investment in the context of responsible fishing, and requires that a large scale research program be started as soon as possible.

The costs of such a Program are fully justified by:

- the very high value of the present bigeye catches, especially those of the longline fisheries, which take large amounts destined for the lucrative sashimi market;
- the unknown, but probably serious, risks of recruitment over-fishing which currently threatens the long-term viability of the bigeye stock because of the dramatic increase in catches by purse seiners (juveniles) and by longliners (spawners); and
- the almost complete lack of baseline research on bigeye tuna (growth, stock structure, spawning, dynamics etc.).

This research program should be:

- Urgently conducted, because of the potentially critical situation of the stock.
- Very large and ambitious, given the lack of basic knowledge on most of the parameters. The high budget can be considered as a minimum investment in view of the high value of the bigeye landings (US$ 600 million in 1994).
- Primarily conducted by all those involved in the bigeye fisheries: Japan, Uruguay, Chinese Taipei, and others that have longline fisheries, EU countries (Spain, France, Portugal) for purse seine and baitboat fisheries, Ghana for the equatorial baitboat fishery, etc. Active research must be conducted simultaneously on both the longline and surface fisheries, and must cover the entire area of distribution of the species.
- The ICCAT Secretariat should play an active role in every stage of this Program (as during the International Skipjack Year Program). An *ad hoc* BETYP Coordinator should be recruited for the duration of the Program. This expert will be in charge of the various coordination aspects necessary for such a large-scale Program (data collection, data analysis, working groups, tagging and recoveries, etc.). An ICCAT BETYP Budget, to be funded by the Commission or other sources, (such as a landing tax on every Atlantic bigeye landed), should be established.

* As revised by the SCRS in 1997.

- The ICCAT Secretariat should also organize, during this Program, various working groups, as follows:
  - A Working Group should be established for the organization and planning of the BETYP, once the source of financing for the BETYP has been identified.
  - Several technical Working Groups will be responsible for specific bigeye research, such as: genetics, tagging, ageing, modeling.
  - A large scale, comprehensive Bigeye Symposium.
  - ICCAT should be responsible for the publications from the BETYP research.

2. Necessary research operations and estimated budget

Tagging is one of the major activities of the BETYP. Carried out with conventional tags with archival tags, and pop-up tags, it is in effect a high priority item within the BETYP. This is the most expensive activity, but on the results are essential to the success of the Program. If this activity is not fully supported, the BETYP will not fully achieve its objectives.

The objectives of the tagging program should also include stock structure, growth, stock size and natural mortality at different ages.

2.1 ICCAT coordinating actions and budget

The Bigeye Year Program requires special ICCAT funds of about US$ 2.2 million, over a period of four years (year 1 to year 4):

		Total Budget (US $)
1	Recruitment of a BETYP Coordinator & secretariat services during 4 years	300,000
2	Normal operating expenses of the BETYP	100,000
3	Organization of various working groups and the Symposium	200,000
4	Coordination & research expenses for which the ICCAT central office will necessarily be in charge (tags, awards, mailing, manipulation of samples	100,000
5	Costs of necessary research for the Program, whose planning depends on ICCAT financing	110,000
6	Costs of conventional tags and archival tags	500,000
7	Costs of chartering a purse seiner for 6 months for tagging	800,000
8	Editing and publication of the BETYP results	50,000
9	Other expenses	50,000
10	**Total**	**2,210,000**

Annual Budget (in US $)

	1st year	*2nd year*	*3rd year*	*4th year*	*Total*
Coordinator & Secretariat	75,000	75,000	75,000	75,000	300,000
BETYP Coordination	40,000	20,000	20,000	20,000	100,000
Working Groups	30,000	30,000		30,000	90,000
Symposium				110,000	110,000
Coordination & research by ICCAT Secretariat	25,000	25,000	25,000	25,000	100,000
Cost of research activities	90,000			20,000	110,000
Tags	500,000				500,000
Boats for tagging	600,000	200,000			800,000
Publications			20,000	30,000	50,000
Other	12,500	12,500	12,500	12,500	50,000

2.2 National research

Various research activities should be conducted at the national level; the corresponding costs (manpower and laboratory costs) to be covered by the countries participating in the Program.

For this research sources of financing should be sought at the national level.

1) Improved bigeye statistics:

Obtaining improved bigeye statistics for all the fleets (purse seine, baitboat and longline; particularly intensive size sampling covering a full year and all fisheries), with multiple trips at sea and observers on-board all fleets that catch significant amounts of bigeye, and an in-depth analysis of the data on this species (to obtain an index of bigeye abundance for juvenile bigeye). The planned activities are specifically:

– To place five permanent observers on-board the longline fleets (12 months x 5 observers in order to conduct this intensive sampling).

– To employ temporary technicians to increase the sampling of bigeye taken by the surface fleets at all the landing ports during an entire year, and observers being placed on a significant portion of the purse seine fleet. The increase in fishing power on small bigeye is clear but not well documented (the fishery on logs explains part but not all of the increase in catches). The observer program should then be developed on the purse seiners catching bigeye to carry out sampling in order to understand the basic technological or behavioral reasons explaining the increase in purse seine fishing power on this species. One of the parameters that should be measured is the current extent of the purse seine closure. The goal is to cover 40 observer trips on-board purse seiners. This action is partially being carried out on purse seiners of the European Union in 1997 and 1998.

– To employ temporary technicians to sample landings at the major ports where longline landings or transshipment occur.

2) Tagging:

– Intensive tagging of bigeye, targeting growth, stock structure and stock size, should be developed. All the sizes caught and all major fishing zones should be covered. This tagging program should use all the models of tags available: conventional, archival, and pop-up tags (for which the initial results, obtained in 1997, are very encouraging).

A significant amount of tagging should be carried out using tetracycline injections in order to validate simultaneous growth studies.

At this stage the following tagging activities should be planned:

– Conventional tagging in the nursery area: chartering of a Tema baitboat during a four-month period (November to February) to carry out intensive tagging of small bigeye (and yellowfin). (Goal: 20,000 tagged bigeye, 5% with tetracycline).

– Conventional tagging of medium and large sized bigeye taken by surface gear in the north temperate waters: chartering of a baitboat during a one-month period in the Canary Islands (Goal: 1,000 tagged bigeye), in Madeira and Azores (Goal: 1,000 tagged bigeye). (Estimated cost: US$ 300,000 for the charter of the northern baitboats (3-month period) and US$ 500,000 for the charter of a Tema baitboat).

– Opportunistic tagging of large bigeye taken by longline, using conventional tags, conducted by trained scientific observers: a significant number of large bigeye should be tagged in all the major fishing zones (feeding areas and spawning areas of the north and south Atlantic). Goal: 500 bigeye in each of the seven longline strata (i.e., a total of 3,500 large bigeye tagged).

– Archival and pop-up tags on medium and large bigeye; the goal is to tag 500 tunas, using the best tags available; those tags should be released in diverse well-selected areas (feeding and spawning strata), for a better understanding of bigeye migrations, (e.g., between nurseries and between spawning and feeding areas).

To guarantee the complete success of this fundamental activity, all the costs of chartering the baitboats, purchasing the tags, paying the recovery rewards, the organization and publicity for the recoveries should be allocated to ICCAT and included in the BETYP budget.

3) Genetics:

– Full use of the various modern genetic analytical techniques should be developed and applied to bigeye in order to evaluate the heterogeneity of the potential bigeye sub-populations in the Atlantic. Significant sampling should be carried out in all the major fishing strata and on all the sizes caught by the various fisheries (see attached map of the major bigeye fishing areas).

– The genetic samples should be analyzed in a simultaneous, independent but coordinated manner, by various laboratories using various analytical methods. The costs of analyzing the genetic samples will be covered by the countries participating in the Program (ICCAT will finance the sampling and the dissemination of the samples with an *ad hoc* limited budget of US$ 10,000).

4) Growth:

– Bigeye growth will be studied from tagging and tag recovery results, and from hard part readings. Samples of the hard parts (otoliths and vertebrae) should be collected from the various areas and on diverse sizes of bigeye. Goal: to collect 500 samples and to analyze them independently by two different laboratories. The costs of reading the samples for age determination should be assumed by the countries that participate in the program (ICCAT will finance the sampling and the dissemination of the samples with an *ad hoc* limited budget of US$ 10,000).

5) Natural mortalities and population size of juvenile:

– The natural mortality of bigeye tuna is a parameter which is essentially unknown, but is of key importance for the assessment of sustainable fishing mortality and the state of the stock, and determining the relative impact of high catches of juveniles. The potential negative consequences of increases in purse seine catches of juveniles will be relatively minor if the natural mortality of juveniles is very high. On the other hand, if juvenile mortality is low, the current over-exploitation of bigeye could have very serious consequences.

This research on the natural mortality of juveniles should simultaneously cover various fields:

– Eco-physiology of juvenile bigeye aimed at determining the fragility of juvenile physiology (according to their habitat)

– Study of predators of juvenile and adult bigeye;

– Direct (use of modern sonar techniques) and indirect study (comparative analysis of the population sizes estimated from sequential population analysis of various species and from the numbers of juvenile tunas caught at sea in the nursery) in order to better measure the population size of juveniles.

– Analysis of tagging and recovery of tags in the nursery area.

– The development of models allowing better evaluation of juvenile natural mortality (e.g., using methods similar to those used by the South Pacific Commission for the analysis of tag/recapture data).

6) Reproductive biology:

Intensive sampling should be conducted to obtain a large number of bigeye gonads from all major bigeye areas, with more intensive sampling of gonads in the spawning areas. Those samples should be analyzed in order to determine the spawning potential of bigeye as a function of its sizes and age.

– A limited sampling of 1,000 gonads should be carried out in each of the four northern and southern bigeye areas (i.e., 4,000 gonads) in order to calculate the monthly gonad index by area every year for three years.

– Intensive sampling of gonads should be conducted, every year for three years, by observers in each of the three inter-tropical areas of the central eastern Atlantic (see map): 5,000 gonads in each of the three areas (for a total of 15,000 gonads) in order to calculate the gonad index, to count and measures the eggs of the pre-spawning females, and to study the physiology of maturity and the genetics of the contents of the gonads (using standard procedures).

7) Ethology and technology

Ethological research aimed at a better understanding of the behavior of bigeye in multi-species schools associated with floating objects should be developed. Combined with technological research on purse seiners, this could eventually lead to a reduction in fishing mortality of juvenile bigeye.

8) Modeling of bigeye stock assessments: building a comprehensive bigeye model

– The management of bigeye tuna should preferably be conducted using an comprehensive model, which takes into account the biological peculiarities of the species (complexity of its stock structure and its migrations) and the major economic factors of the various fisheries (sashimi vs canning fisheries). This model should take the multi-species nature of the fishery into account. Such a complex model should be developed by a specialist in such methods contracted by ICCAT, and assisted by an expert in the development of this type of model. A working group should be established to finalize the model. A cost of US$ 20,000 should be included in the budgetary provisions for this highly technical activity.

2.3 Overall organization of the BETYP

A scientist specialized in bigeye should be designated to coordinate the BETYP. This scientist should work in close collaboration with the ICCAT Secretariat and the fishery biologist recruited to manage the Program at the ICCAT level.

A selected scientist should be designated to coordinate and promote the research activities of each activity (statistics, tagging, genetics, growth, natural mortality, reproductive biology, and modeling).

3. Conclusions

In the context of responsible fishing, it is now an obligation for ICCAT countries to develop, immediately, intensive research on the Atlantic bigeye, due to the lack of research done in the past on this highly valuable stock and because of the very serious risk of recruitment over-fishing presently faced by this stock. The high costs requested for this four-year research program are, in fact, quite reasonable, compared to the extremely high economic value of this fishery (more than US$ 500 million yearly; the US$ 2.3 million requested for four years only represents 0.5% of the annual landing value of the catches) and the critical lack of research on this stock in the past. This expensive research program is in fact an economic investment which is presently necessary for the rational management and conservation of the bigeye stock. In the absence of this intensive research program, a drastic reduction in fishing effort and catches should be implemented immediately on all fleets fishing this species. The decision to carry out this Program cannot be delayed due to the present state of the bigeye stock. ICCAT research should be coordinated with other research programs which are planned world-wide on bigeye tuna because of the increasing risk of over-exploitation now faced by this species in most oceans.

Considering the critical situation of the bigeye stock and the urgent need for a full research program, any limited research program will not be able to provide the information necessary for the management and conservation of the Atlantic bigeye tuna stock.

4. Planned activities of the Bigeye Year Program

- November, 1997: approval of the BETYP by the Commission.

  Year 1: study the financing and operational organization of the BETYP.
  - -- Technical working group to establish the details of the content and the structure of the Program;
  - -- Recruitment of a scientist at the ICCAT Secretariat to coordinate the activities of the BETYP;
  - -- Designation of the scientists responsible for the research activities.

- Year 2: Carrying out research activities

- Year 3-4: Analysis of the data and samples; various working groups by research activity.

- End of Year 4: Celebration of the BETYP Symposium

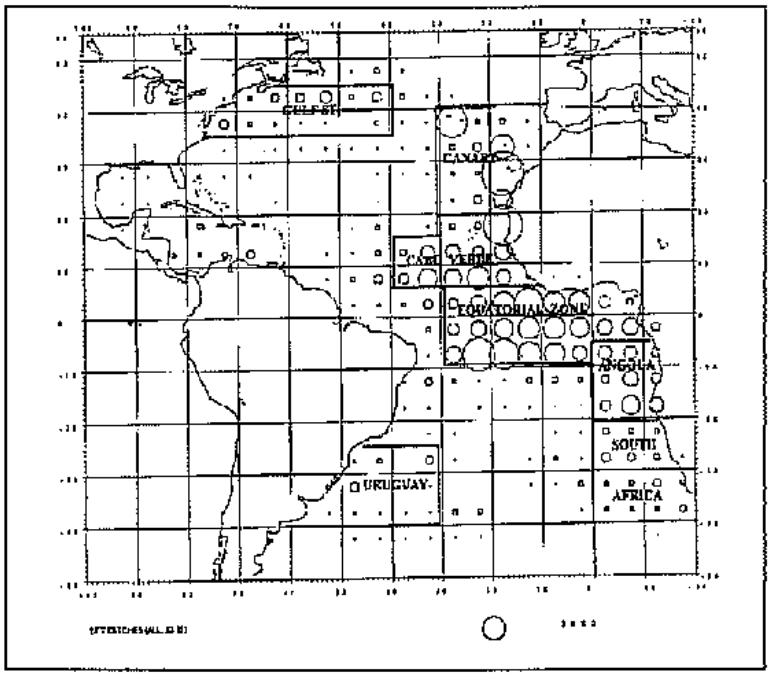
- Year 6: Publication of the results of the BETYP.

5. Budgetary requirements for 1998 and 1999

The Committee requested "seed money" for initial funding of the BETYP (i.e., US$ 50,000 in 1998 and US$ 50,000 in 1999). Such minimal funding would clearly demonstrate the Commission's interest in and stress the importance of this Program. At the same time, such seed money might encourage contributions from other sources.

These ICCAT funds are needed to initiate the BETYP program, and will be allocated to the following chapters:

1998	US$ 10,000	Activities undertaken by the Executive Secretary to seek funds for the BETYP
	US$ 15,000	Opportunistic tagging (Tema, Dakar, Canaries, Madeira, Azores)
	US$ 10,000	Essential biological studies
	US$ 10,000	Working Group on detailed planning of BETYP
	US$ 5,000	BETYP/ICCAT coordination expenses
1999	US$ 5,000	Coordination expenses
	US$ 10,000	Essential biological studies
	US$ 5,000	BETYP missions undertaken by the Secretariat
	US$ 3,000	Opportunistic tagging



Map of bigeye fisheries (all catches, for the period 1993-1995), and fishing zones used to plan the Bigeye Year Program research plan.

Appendix 8

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH: REPORT OF THE 1997 CONTRIBUTIONS/EXPENDITURES

The ICCAT Enhanced Research Program for Billfish, which began in 1987, continued in 1997. The Secretariat served as the coordinator for transferring funds and distributing tags, information, and data. The billfish data base is maintained at the NMFS Southeast Fisheries Science Center (Miami, Florida) and at the ICCAT Secretariat. This report represents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 1997.

The General Coordinator of the Program is Dr. B. Brown (USA); the East Atlantic Coordinators are Dr.T. Diouf (Senegal) and Mr. M. Mensah (Ghana), while the West Atlantic Coordinator is Dr. E. Prince (USA).

Table 1 shows the income received at the Secretariat towards the Billfish Program, expenses for 1997, and the balance of Billfish Program funds (as of October, 1997). At the start of Fiscal Year 1997, there was a balance of US$ 19,301.68 in the Billfish Program account. Income received in 1997 included a total of $25,000 from The Billfish Foundation. During 1996 and 1997, FONAIAP (Venezuela) assumed important portions of the billfish observer program by providing personnel and other resources, which reduced the fund required by this program. It should also be noted that $4,000 was contributed by The Billfish Foundation in 1996 towards the hard cover publication of the billfish report resulting from the Third ICCAT Billfish Workshop, but these funds will not actually be spent until early 1998. Overall, the Program Plan for 1997 was successfully carried out in a timely manner.

Table 2 shows the Billfish Budget and expenditures as of October, 1997. Several additional expenditures are expected to be incurred before the end of 1997. Several budgetary items show a zero expenditure and this is due to the fact that authorization of some budgetary expenditures of the 1997 Budget was dependent on the sufficiency of funds, while in other cases no request for funding was submitted to the Program Coordinator.

Progress of research carried out during 1997 is summarized in SCRS/97/67 and SCRS/97/30 for the west Atlantic and in SCRS/97/105 for the east Atlantic. Additional documents involving billfish submitted to the 1997 SCRS included SCRS/97/52, SCRS/97/53, SCRS/97/63, SCRS/97/65, SCRS/97/68, SCRS/97/70, and SCRS/97/71.

Table 1. Funds received in 1997 for Billfish Program (up to October 16, 1997)

Source	*Amount (in US$)*
Starting Balance (1997)	19,301.680
Contributions	25,000.000
Total funds available in 1997	44,301.680
Total expenditures in 1997 (see **Table 2**)	23,222.890
Balance in billfish funds (as of Oct. 16, 1997)	**21,078.791**

Table 2. Budget & Expenditures of the Enhanced Billfish Research Program (as of Oct. 16, 1997) (US$)

	Amount Budgeted	*Expenditures*
AGE AND GROWTH: Purchase of hard parts	500.00	0.00
TAGGING:		
Tag rewards	1,000.00	100.00
Lottery rewards	500.00	0.00
Hard part rewards	500.00	0.00
Printing posters and recapture cards in Japanese/Chinese/Portuguese	0.00	0.00
Tags and tagging equipment	2,000.00	0.00
STATISTICS & SAMPLING ENHANCEMENT		
-- *West Atlantic shore-based sampling:*		
Bermuda tournaments	0.00	0.00
Barbados	0.00	0.00
Brazil tournaments	0.00	0.00
Cumaná, Venezuela	300.00	200.00
Puerto La Cruz, Venezuela	240.00	200.00
Juangriego, Venezuela	864.00	450.00
Playa Verde, Venezuela	500.00	250.00
Playa Grande Marina, Venezuela	1,680.00	1,500.00
Venezuela tournaments in Puerto Cabello and Falcon	760.00	300.00
Grenada	1,000.00	2000.00
Jamaica	1,000.00	0.00
Martinique	1,500.00	0.00
Trinidad & tobago	1,000.00	0.00
St. Maarten Netherlands Antilles	1,500.00	0.00
U.S. Virgin Islands	2,000.00	0.00
-- *West Atlantic at-sea sampling:*		
Venezuela	22,300.00	16,000.00
Insurance for Venezuelan Observers	1,250.00	1,000.00
Telemetry/Hook timer studies (travel) 2,000.00	2,000	0.00
Brazil 4,000.00	0.00	
-- *East Atlantic shore-based sampling:*		
Dakar, Senegal	1,500.00	0.00
Côte d'Ivoire	1,500.00	0.00
Ghana 1,500.00	0.00	
Canary Islands	400.00	0.00
COORDINATION:		
Travel by Coordinators	14,000.00	0.00
Mailing & miscellaneous--East Atlantic	100.00	0.00
Secretariat support	1,000.00	1,000.00
Bank charges on Billfish account	250.00	222.89
GRAND TOTAL	**66,644.00**	**23,222.89**

Appendix 9

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH: 1998 PROGRAM PLAN *

The original plan for the Enhanced Research Program for Billfish (SCRS 1986) included the following specific objectives: (1) to provide more detailed catch and effort statistics, and particularly size frequency data; (2) to initiate the ICCAT tagging program for billfish; and (3) to assist in collecting data for age and growth studies. The plan was initially formulated with the intention of developing the data necessary to assess the status of the billfish stocks. This goal was at least partially fulfilled with the exploratory stock assessments for blue marlin (SCRS/92/69) accomplished at the Second ICCAT Billfish Workshop in July, 1992, and later with refined blue marlin and white marlin assessments submitted to the 1992 SCRS (SCRS/92/128 and SCRS/92/129). In addition, further progress was made at the 1993 SCRS meeting with the submission of the assessment for west Atlantic sailfish (SCRS/93/99) and improvements in the data base for east Atlantic sailfish reported to the 1994 SCRS (SCRS/94/150, SCRS/94/155, and SCRS/94/156). An exploratory stock assessment for east Atlantic sailfish was submitted to the 1995 SCRS (SCRS/95/105). More recently, updated assessments for blue marlin and white marlin were accomplished at the Third ICCAT Billfish Workshop (SCRS/96/19, SCRS/96/159). Estimated parameters from these recent marlin assessments were used to make future projection of relative biomass and relative fishing mortality and these projections were submitted to the 1997 SCRS (SCRS/97/71). Some progress was also made at the 1997 SCRS concerning standardization for east Atlantic sailfish CPUE (SCRS/97/53, SCRS/97/68, and SCRS/97/52), but problems with this assessment persist. Many of the data acquisition problems for all billfish species remain and maintenance of important elements of the billfish data bases, to insure uninterrupted time series, requires the Enhanced Research Program for Billfish to be continued and expanded in critical areas as recommended by the Second and Third ICCAT Billfish Workshops (SCRS/92/16, SCRS/96/19).

It was confirmed that Drs. J. Powers and E. Prince (U.S.A.) will continue to function as the General Coordinator and West Atlantic Coordinator, respectively. Drs. T. Diouf (Senegal) and M. Mensah (Ghana) will continue to be the Co-Coordinators for the east Atlantic Ocean. Research results (SCRS/97/67, SCRS/97/105, SCRS/97/30, and **Appendix 5** as well as a financial summary for 1997 (**Appendix 4**) were presented to the 1997 SCRS and Commission meetings.

The summary of the 1998 proposed budget is attached as **Table 1**. Highlight reports of research activities will be provided to interested parties annually. In addition, names and addresses of individuals receiving the reports and those involved or interested in the research program will continue to be available upon request. Projected funds for future research activities will be available in subsequent annual plans.

All agencies and/or personnel receiving funding from the special Billfish Program account ARE REQUIRED to summarize annual expenditures of funds to the Commission and research activities either in the form of a working document to the SCRS or a report to the Program Coordinators. In addition, all funded participating cooperators in this Program WILL BE REQUIRED to request the release of funds (via fax) from the General Program Coordinator and to submit data collected in previous years either to area Coordinators or directly to the ICCAT Secretariat.

1. Statistics and sampling

♦ Shore-based sampling: West Atlantic

Bermuda. Shore-based sampling of selected billfish tournaments will be conducted in Bermuda in 1998. Dr. B. Luckhurst of the Ministry of Agriculture and Fisheries of Bermuda will coordinate this activity, and no funds will be required. Bermuda has tentatively agreed to provide logistical support if preliminary pop-up satellite tagging of marlin are initiated in 1998. Some travel to Bermuda by the western Atlantic coordinator may be required.

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* Including the proposed long-term plan for billfish tagging.

Brazil. Shore-based sampling of selected billfish tournaments will be continued in Brazil for 1998. Dr. A. Amorim, Instituto de Pesca, will coordinate tournament sampling activities in the general vicinity of Santos, as well as other locations. It is not anticipated that this activity will require funds in 1998.

Cumaná, Playa Verde, Puerto La Cruz, Juangriego, Venezuela. Shore-based sampling of size frequency data for billfish carcasses off-loaded from industrialized longline boats at the port of Cumaná will be continued in 1998. Funding will be $300 since some of this activity occurs on weekends and after normal working hours. Sampling industrialized longline boats and artisanal fisheries in Puerto La Cruz, Juangriego, and Playa Verde will be conducted in 1998 and the requested funding for these segments is as follows: Puerto La Cruz $240; Juangriego $864; and Playa Verde $500. Several trips by the West Atlantic Coordinator or his designee will be necessary to organize sampling, collect data, and transport biological samples to Miami in 1998. In addition, the amount of $500 will be required for tag rewards in Venezuela for 1998 that are made by FONAIAP staff (this budget item is identified in the Section on TAGGING).

La Guaira, Venezuela. Shore-based sampling and detailed analysis of the recreational fishery (centered in La Guaira, Venezuela) will be continued in 1998. This sampling includes coverage of four recreational billfish tournaments held in Puerto Cabello and Falcon. Requested funding for this activity in 1998 is $760 since much of this sampling is conducted on weekends and some travel expenses are incurred while attending these events. Also, shore-based sampling, including documentation of the catch and effort statistics for the central Venezuelan coast, such as the important fishery at Playa Grande Marina, will be accomplished by contracting a technician on a part-time basis for 12 months. Funding for this activity in 1998 is $1,680. Shore-based sampling in all Venezuelan locations, as well as at-sea sampling (see next section) in Venezuela will be coordinated by Mr. L. Marcano of FONAIAP.

Grenada. Shore-based sampling of size frequency and total landings from the artisanal and recreational fishery for billfish will be continued by the Ministry of Agriculture, Lands, Forestry, and Fisheries (coordinated by Mr. C. Isaac and Mr. P. Phillip) in 1998. Shore-based sampling activities will start in early November, 1997, to coincide with the start of the pelagic fishery at this location. This activity will also include sampling of the Spice Island Billfish tournament. At-sea sampling on the new longline vessels are discussed in the next section. Requested funding for 1998 is $1,000.

Jamaica. Shore-based sampling of the size frequency, total landings, and catch and effort statistics from the recreational fishery will continue in 1998. Efforts will also be made to obtain these data from the artisanal canoe fishery as well. Requested funding for 1998 is $1,000.

St. Maarten, Netherlands Antilles. Shore-based sampling of size frequency data for off-loaded billfish carcasses from longline vessels will be continued in 1998 through the Nichirei Carib Corporation. Requested funding for this in 1998 is $1,500. Shore-based sampling of the annual recreational billfish tournament, initiated in 1992, may be continued in 1998 by the West Atlantic Coordinator or his designee (if time permits). Since this tournament will contribute air fare and hotel accommodations for the week of the tournament, the West Atlantic Coordinator may also assist Nichirei Carib employees in sampling during his stay on the island. Thus, funds for this latter activity will not be required from the Program.

U.S. Virgin Islands. Shore-based sampling of several recreational billfish tournaments in the U.S. Virgin Islands will be continued and this activity does not require funding.

Trinidad and Tobago. Shore-based sampling of size frequency data for off-loaded billfish carcasses from Chinese Taipei and longline vessels from Trinidad may be continued in 1998. This work is being supervised by Ms. C. Chan A Shing of the Ministry of Food Production and Marine Exploitation (Fisheries Division). At least one trip by the West Atlantic Coordinator will be necessary to review the research plan and organize field research activities. Requested funding for 1998 is $1,000.

♦ Shore-based sampling: East Atlantic

Dakar, Senegal. Shore-based sampling of the Senegalese artisanal, recreational and industrial fisheries for size frequency, sex determination, and catch and effort data will be continued in 1998 by Dr. T. Diouf, the East Atlantic Coordinator. The East Atlantic Coordinator will initiate a review of the Senegalese observer programs on Spanish and Japanese longline vessels in 1998 for the purpose of assembling a report on the by-catch of sailfish and marlin from

these fleets fishing in the general area of coastal west Africa. Requested funding for 1998 is $1,500. The East Atlantic Coordinator may also travel to Gabon, Ghana, Sao Tome & Principe, and other west African countries to verify species identification of recent reported landings.

Côte d'Ivoire. Abidjan shore-based sampling of the artisanal and recreational fisheries for billfish will be continued and directed by CRO staff in 1998. Funding for 1998 will be $1,500.

Ghana. Shore-based sampling of size frequency and sex determination, and catch and effort of the artisanal gillnet fisheries for billfish will be continued in 1998 by Mr. S. N. K. Quaatey. Funding for 1998 will be $1,500. At least one coordination trip by Dr. T. Diouf will be required to accomplish this task in 1998.

Canary Islands. Shore-based sampling of size frequency of off-loaded billfish carcasses from Chinese Taipei longline vessels may be continued in 1998. Requested funding for 1998 is $400.

Morocco. Initial inquires will be made by Mr. A. Srour, Institut National de Recherche Halieutique, to determine possible shore-based sampling of the recreational and commercial fisheries for billfish in Morocco. Funding for this activity in 1998 is not anticipated.

♦ **At-sea sampling: West Atlantic**

Venezuela. At-sea sampling out of the port of Cumaná, Puerto La Cruz, Carúpano, and Juangriego will be continued in 1998. A total of about 15 tuna trips ($9,000), 15 swordfish trips ($9,000), 2 long-range trips on large Korean-type vessels ($2,300), and 8 trips on smaller longline vessels ($2,000) will be made in 199. Therefore, the total west Atlantic at-sea sampling for 1998 will be $22,500. In addition, insurance for at-sea sampling for 1998 will be $1,250.

Brazil. At-sea sampling on Brazilian, Spanish, and U.S. longliners will be continued in 1998. Dr. A. Amorim from the Instituto de Pesca and Dr. J. H. Meneses de Lima from IBAMA will direct these research activities. Independent funding of this activity from Brazil in the amount of $4,000 is planned to cover 5 trips. Likewise, funding from the ICCAT Billfish Program is intended to match this effort, which will hopefully result in a total of 10 observer trips off Brazil in 1998. The Western Atlantic Coordinator may travel to Brazil in 1998 to train observers and assist in initiating this program. Requested funding for 1998 will be $4,000.

Bermuda. At-sea sampling of home based longline vessels targeting pelagic species will be initiated in 1998 by the Ministry of Agriculture and Fisheries. In additional to implementing ICCAT at-sea sampling activities, possible biological sampling opportunities will also be assessed. Funding of this research activity is not anticipated in 1998.

Telemetry and Hook Timing Studies. Proposals for telemetry studies to evaluate the survival of marlin caught and released off longline vessels were not received in 1998. However, a project to evaluate possible avoidance of billfish catches on longline gear, through the use of hook timing devices to document the time and depth of billfish catches, maybe funded by the U.S Government. This project will be conducted by staff at the Mote Marine Laboratory in Sarasota, Florida, during 1998. Data on the short-term survival of billfish caught on longline gear will also be obtained. To insure that this study will have a sufficient sample size of billfish in the longline catch, the Western Atlantic Coordinator has agreed to arrange for at least one longline trip to be made in 1998 from Cumaná, Venezuela, or in association with CARICOM and the Division of Fisheries in St. Vincent and Grenada. The by-catch rate of billfish in these locations is sufficiently high for sampling. Most of the funding for this project is already covered but travel costs of $2,000 for a Mote Laboratory scientist will be required for 1998 to test the hook timers on a Venezuelan or St. Vincent longline vessel.

2. Tagging

In response to the Commission's 1995 Resolution on Billfish, the SCRS directed development of a scientific program under which Contracting Parties can promote voluntary release of blue marlin, white marlin, sailfish, and spearfish taken alive and the tagging of these species. In order to respond to the billfish resolution requirements, the SCRS presented a long-term tagging plan at the 1996 SCRS, with a short-term implementation depending on the

timing and availability of funding. Also, the SCRS formed, at its 1996 meeting, a Tagging Working Group (1996 SCRS Report, Section 11.2 to 11.8) in order to develop an Atlantic-wide tag recovery network. It should be noted that the successful implementation and funding of this recovery network will go a long way towards implementing some of the tagging segments of the billfish Resolution.

The following regular tagging activities and expenditures are proposed. Tags and tagging equipment for east Atlantic billfish tagging in 1998, distributed to participants by the ICCAT Secretariat, will require $2,000. The total for tag rewards (including the $500 needed in Venezuela) will amount to $1000 for 1998. A lottery reward of $500 will also be necessary for 1998.

3. Age and growth

Requested funding for biological samples from juvenile and very large billfish, as well as tag-recaptured billfish, is $500 for 1998. The Western Atlantic Coordinator may travel to Madeira (Portugal), in order to sample very large blue marlin that are landed in this location or to initiate pop-up satellite tagging of Atlantic blue marlin. Only travel funds will be required for Madeira research activities.

4. Coordination

Coordination (on site training of samplers, collection of statistical and biological samples): Experience in the west Atlantic (SCRS/90/20, SCRS/91/18, SCRS/92/24, SCRS/93/102, SCRS/94/147, SCRS/95/107, SCRS/96/90, SCRS/97/67) continues to indicate that it will be necessary to make a series of trips to specific Caribbean island locations, and occasionally to west Africa, Madeira (Portugal), Bermuda, and Brazil, to maintain quality control of on-going research. The purpose of this travel will be to train samplers in data collection, pick up data, assist in data analysis, hand-carry frozen biological samples back to Miami, monitor the rapidly changing pelagic fisheries, and maintain contacts with project cooperatives. The travel to west Africa will be to assist the East Atlantic Coordinators in refining sampling programs, particularly to encourage tag release and recapture activities. Funding for 1998 will be $14,000. Travel may include the following areas:

West Atlantic

- Cumaná, Margarita Island, Caracas, and La Guaira, Venezuela
- Grenada
- Santos and Recife, Brazil
- St. Maarten, Netherlands Antilles
- St. Vincent
- Trinidad and Tobago
- Cancún and Cozumel, Mexico
- Bermuda
- Other Caribbean countries

East Atlantic

- Dakar, Senegal
- Abidjan, Côte d'Ivoire
- Ghana
- Madeira (Portugal)
- Other west African countries

Miscellaneous/Mailing: The requested funding for 1998 for east Atlantic miscellaneous and mailing is $100. Similar needs for the West Atlantic Coordinator are covered by the U.S. domestic budget.

Secretariat: Funding for mailing, shipment of specialized materials and samples, and for miscellaneous expenses and contingencies for 1998 is $1,000.

Bank Charges: Bank charges for maintenance of the ICCAT Billfish special account for 1998 are estimated at $250. Because of unforeseen changes in the fisheries and opportunities for sampling, it may be necessary for the General Coordinator to make adjustments in budgeted program priorities. These changes, if any, will be duly transmitted to the area Coordinators and to the ICCAT Secretariat. Also, the proposed budget for regular Program activities in 1998 (excluding the long-term tagging program) is attached as **(Table 1)**. The expansion or reduction of expenses will depend, to a large degree, on the available funds. It should be noted that the regular Program activities will be implemented based on receipt of sufficient funds.

Table 1. 1998 Budget for the regular ICCAT Enhanced Research Program for Billfish (US$)

Budget Chapters	*Amounted budgeted*
STATISTICS & SAMPLING	
— *West Atlantic shore-based sampling:*	
Bermuda tournaments	0
Brazil tournaments	0
Venezuela (Cumaná, Puerto La Cruz, Juangriego, Playa Verde, La Guaira, Venezuelan tournaments in Puerto Cabello and Falcon)	4,344
Grenada	1,000*
Jamaica	1,000*
St. Maarten, Netherlands Antilles	1,500*
U.S. Virgin Islands	2,000*
Trinidad & Tobago	1,000*
— *West Atlantic at-sea sampling:*	
Venezuela (Cumaná, Puerto La Cruz, Carúpano, Juangriego)	22,300
Brazil	4,000*
Bermuda	0
Telemetry / Hook timer studies (Travel only)	2,000
Insurance for Venezuelan Observers	1,250
-- *East Atlantic shore-based sampling:*	
Dakar, Senegal	1,500
Côte d'Ivoire	1,500
Ghana	1,500
Morocco	0
Canary Islands	400*
TAGGING:	
Tag rewards	1,000
Lottery rewards	500
Hard part rewards	500*
Printing posters and recapture cards in Japanese, Chinese, and Portuguese	0
Tags and tagging equipment	2,000
AGE AND GROWTH:	
Purchase of hard parts	500*
COORDINATION:	
Coordination (on site training of samplers, collection of statistical and biological samples)	14,000*
Mailing & miscellaneous-East Atlantic	100
Secretariat support (mailing, miscellaneous expenses, contingencies etc.)	1,000
Bank charges	250
GRAND TOTAL:	**$ 65,144**

* Authorization of these expenditures depends, in part, on additional funds being available.

Appendix 10

REPORT OF THE SUB-COMMITTEE ON ENVIRONMENT

1. Opening of the meeting

The meeting of the Sub-Committee on Environment was held on October 22, 1997, at the Hotel Chamartin, in Madrid. Dr. J. Pereira (Portugal), Coordinator of the Sub-Committee on Environment, who chaired the session, welcomed the participants.

2. Adoption of the Agenda and meeting arrangements

The Agenda was adopted. Dr. J. M. Stretta (France) served as Rapporteur.

3. Review of contribution papers

This year, four of the documents presented to the SCRS dealt with issues relative to the Sub-Committee on Environment. These were SCRS/96/40, 54, 85 and 111. Documents SCRS/96/36 and 118, dealing with shark by-catches, were reviewed at the meeting of the Sub-Committee on By-Catches.

Document SCRS/96/40 dealt with a new approach to the study of tuna-environment relations, analyzing the relationship between the North Atlantic Oscillation (NAO) and the recruitment of temperate tunas. This North Atlantic Oscillation is measured by the difference in pressure at sea level between the islands of the Azores. This study shows that there is a significant relationship between NAO and the recruitment of bluefin tuna. The North Atlantic Oscillation explains 64% of the variability in recruitment of albacore and only 29% of recruitment of eastern bluefin tuna; this latter percentage changes to 38% if the index for the year n+1 is considered instead of year n.

Document SCRS/97/54 also discussed the NAO and other environmental parameters (oceanographic parameters: the index of the Gulf Stream current, and meteorological parameters: air temperature, pressure, east-west precipitation components of winds around the Bay of Biscay) to study the relationship between the surface catches of albacore. This preliminary study shows a negative correlation between the catches of albacore and the Gulf Stream index.

Document SCRS/97/85 presents three innovations in the study of tuna-environment relationship. The authors made use of new analytical tools such as the Generalized Additive Models (GAM) and Geographical Information Systems (SIG), and environmental data from the Operational Model of the Atlantic (OPA) to analyze the yellowfin CPUE of the French purse seiners from 1980 to 1991. The results of this analysis show significant effects between local yellowfin abundance and salinity, as well as an influence of surface thermal factors (surface temperature and spatial thermal gradients).

Document SCRS/97/111 presented the major features of surface thermal anomalies in the Atlantic in 1996. All thermal data are accessible on Internet sites. Thus, it can be easily seen that there has been an important positive thermal anomaly in the surface layer of the Atlantic tropical belt during 1996. Several addresses of accessible Internet sites, where information on the evolution of thermal surface parameters can be found, are presented in this document.

4. Anomalies in oceanographic conditions

Through the Internet, which gives the surface thermal anomalies in real time, it can be noted that during the first six months of 1997 an important negative thermal anomaly took place in the tropical Atlantic. From June to September 1997, the thermal conditions tended towards normality. However, in the Pacific, from May 1997 an especially strong "El Niño" phenomenon was produced, being one of the strongest registered in the last fifty years. It should be recalled that the 1982-83 "El Niño" phenomenon produced, in 1984, a deepening of the thermocline in the Atlantic, which was accompanied by an important decrease in the catches of tuna vessels.

Thanks to the Web station of the network of oceanographic buoys anchored in the equatorial Atlantic, the depth of the thermocline can now be followed in real time.

A network of oceanographic buoys is going to be placed between the islands in the areas of the Azores and Madeira, but results will not be obtained in real time.

Italy reported the presence of a new bluefin tuna spawning area in the central Mediterranean. The question remains open as to whether this "discovery" is due to a new environmental phenomenon.

The oceanographic buoys (PIRATA Program) are of considerable interest for the SCRS assessments, since they detect the oceanographic anomalies of the "El Niño", which can be taken into account in the assessments. Thus, the Committee strongly urges the purse seiners operating in the area not to deploy their gears around these buoys, since such maneuvers can provoke irreparable damage to these apparatus.

5. Ecology of tunas

No documents relating to this Item were presented in 1997. Those documents dealing with by-catch were discussed during the meeting of the Sub-Committee on By-Catch.

6. Review of studies on the effect of the environment on tuna ecology and the conclusions of international meetings on the environment

This Item was discussed under Item 4 above. Furthermore, there were no reports on international meetings on the environment presented in 1997.

7. Working plan for the Sub-Committee

– *Short term:* A discussion took place last year on the meeting of experts dealing with environmental problems for a week before the SCRS meeting, during the species group, to later present a summarized report to the SCRS plenary session. This has not been done this year due to lack of time. It was also suggested that, as was attempted the past, a meeting of the Sub-Committee on the Environment be held in the form of a mini-symposium.

– *Long term:* The Sub-Committee encouraged the presentation of case studies concerning the relationships between tuna and the environment which are as yet unknown, for example, whether the new spawning area in the Mediterranean is linked to changes in the environment.

The Convener of the Sub-Committee pointed to the low level of participation of SCRS Scientists in the work of the Sub-Committee, while noting that access through Internet to environmental data bases opened up new possibilities for analyses.

8. Date and place of the next meeting of the Sub-Committee on Environment

The next meeting of the Sub-Committee on Environment will be held at the same time and place as the next SCRS meeting.

9. Other matters

It was proposed that Internet addresses of sites offering environmental data of interest to scientists in the field of tuna fish be made accessible through the ICCAT web page.

10. Adoption of the report

The Report was adopted.

11. Adjournment

The 1997 Meeting of the Sub-Committee on Environment was adjourned.

Appendix 11

REPORT OF THE SUB-COMMITTEE ON STATISTICS

1. Opening of the meeting, adoption of Agenda and arrangement for meeting

The 1997 meeting of the Sub-Committee on Statistics, convened by Dr. S. Turner, was held in Madrid, Spain, during the SCRS Meeting. The Agenda was adopted and is attached as **Addendum** 1. Dr. P. Miyake (ICCAT Secretariat) served as rapporteur.

2. New developments in statistics

a) Timeliness of reporting

The Assistant Executive Secretary introduced the Secretariat Report on Coordination of Research and Statistics (SCRS/97/9). Table 1 of this document reported the progress made by the Secretariat in the collection of 1996 Task I, Task II and biological data submitted by the national offices.

Once again, the late submission of data, particularly Task 1 and catch at size for bigeye, albacore, swordfish and bluefin from some of the major fishing countries made it extremely difficult for the Secretariat to create and update these files before the SCRS stock assessment sessions. The Committee reiterated the importance of the early submission of data by the national offices.

b) Major revisions of statistics in 1997

Historical data base for the Chinese Taipei longline fishery. According to the decision taken by the SCRS in 1996, Dr. P. M. Miyake visited Chinese Taipei at the invitation of the Chairman of the Council of Agriculture. A team of scientists from the Overseas Fisheries Development Council (OFDC) and various universities worked together to critically review and revise all the historical data for their longline fisheries. The new statistical collection system was also revised. The results are reported in SCRS/97/17. The Committee briefly discussed the changes, and Dr. Miyake explained the different sources of Task I and Task II data. The Committee accepted the revisions and thanked all those involved for their work.

Historical data for Croatian bluefin tuna catch data. Croatia presented a revision of Task I bluefin catch data (SCRS/97/94). The Group noted that the new series of the bluefin catch statistics had been reviewed at the bluefin species group. Although the reasons for the changes proposed are given in the Report, given that the changes are very substantial and could seriously affect past assessments, the Committee considered that a thorough review should be made on the data base, both of catch statistics and of biological data, such as that of the Chinese Taipei data base this year. Croatia expressed a willingness for their data base to be examined and reviewed by the SCRS, and it was recommended that Croatian scientists do as much preparatory work on the data as possible, and once initial compilation and processing is completed, a member of the ICCAT Secretariat staff visit Croatia to assist in the revision of statistics, and report the results to the SCRS meeting for their consideration.

Historical revision of the Italian data base. The Sub-Committee asked whether there were any data available for the Italian Adriatic purse seine fishery. Dr. A. Di Natale of Italy confirmed that research has also been carried out in the Adriatic Sea and that data had been collected for recent years for this fishery, including data on catch rates, CPUE and size frequencies. The Sub-Committee recommended that the Italian Government be urged to make all existing data available to ICCAT.

Dr. Di Natale also pointed out that the Italian scientists were asked by the Directorate General for Fisheries and Aquaculture (DGFA) to jointly review the data base, possibly for the past five years or more. It was recommended that the Italian Government be requested to inform ICCAT of the results of this review, and if necessary involve ICCAT in the revision process.

Billfish data. In response to a question from Dr. Suzuki, the Convener of the Billfish Working Group informed the group that an analytical revision of the eastern Atlantic sailfish data had been carried out by the Group, but that these revisions did not affect the ICCAT Task I data.

c) Estimation of mis-reporting or non-reporting

Non-reporting and mis-reporting of tuna catches, especially as concerns regulated species, continues to be a serious problem, and it was noted that many vessels with no flag or with flags of convenience were still being sighted in the Mediterranean Sea during the closed season. The Secretariat presented SCRS/97/16, which presented the minimum estimates of unreported catches by Contracting Parties, non-Contracting Parties and those of vessels with flag of convenience. This document had been reviewed by the swordfish and bluefin groups, and was used for estimating unreported catches for bluefin tuna. Dr. Miyake added that the Commission was taking action in relation to this problem, and had already recommended the prohibition of imports of bluefin tuna products from Honduras and Belize, and that such a prohibition take effect for Panama from 1 January 1998.

The Sub-Committee also noted apparent increases in catches by recreational fisheries and expressed concern that these catches may not be reported. This applies to many nations and various species. It was **recommended** that national reporting systems adequately account for the expansion of recreational fisheries. Further discussion led to concerns being expressed that such non-reporting may also apply to other fisheries which are difficult to monitor, such as artisanal fisheries, and to discards. Those present were asked to briefly summarize the reporting and monitoring systems in operation for these fisheries where applicable. **Addendum 2** shows a summarized table of the results. It was recommended that the Secretariat develop a questionnaire on recreational and artisanal fisheries and discards, which should include: identification of the fishery, possible level of catches and by-catches, discards and survival rate of releases, level of monitoring, area and time strata, etc.

d) Shark statistics

It was noted that the Secretariat, as recommended, had sent forms for reporting Task 1 and Task II data relating to sharks but that very few countries had responded. The recommendation of the Sub-Committee on By-Catch that all Contracting Parties which catch sharks submit at least Task I data, was reiterated by the Sub-Committee on Statistics.

e) Secretariat data management policy

There have been no changes in the data management policy of the Secretariat during the last year.

f) Dissemination and publication of data

The Secretariat reported that a web site home page for ICCAT has been created and posted, and includes general information on ICCAT, mandate, financing, structure and functions of various auxiliary bodies, publications, regulatory measures currently in effect, various research activities, summary of stock assessments, and current events. It has been posted on a trial basis and as yet is only available in English, but will later also be available in French and Spanish. The web-site address is: http://www.iccat.es/

The Secretariat asked that the scientists review the home page and make any constructive suggestions to the Secretariat.

It was recommended that TUNASTAT (Task I software package) be updated at regular intervals, preferably quarterly, and posted permanently in FTP on the web site.

The FAO representative thanked the Secretariat for the preparation and provision to FAO of the data for the Atlantic and Mediterranean which had been combined with data from other oceans, to be presented in a global digital Atlas, which would be produced on CD ROM and perhaps placed on the Internet in future.

Several scientists expressed concern over the delay of the publication of the Collective Volumes, which had hindered the work of SCRS. At the time of the SCRS meeting the detailed reports were not published, with the exception of bluefin tuna, and this was consider unacceptable by the Sub-Committee.

The Secretariat regretted the delay which was due to the amount of publications being extraordinarily high in 1997 as a results of the many inter-sessional meetings held in 1996. All these reports have had to be translated and processed for the Collective Volume. However, the Secretariat is very much aware of the importance of these publications to the scientists and undertook to make every effort to ensure that such delays would not take place in the future.

3. Special actions taken in 1997 (that are not covered under Agenda Item 2)

a) Secretariat actions in response to the 1996 SCRS recommendations

In 1996 it had been recommended that the Secretariat purchase a bibliographic software in order to produce a bibliography of scientific documents. The Secretariat reported that as there were insufficient funds to cover even the most fundamental equipment, this software had not been purchased in 1997. It was hoped that budgetary provision would be made for 1998.

The Sub-Committee recommended that, in anticipation of the bibliography, scientists submitting papers should also submit key references with their documents in order to facilitate the compilation of the bibliography in the future.

As recommended by the 1996 SCRS, the Secretariat recreated the entire catch at size for bigeye from 1975 to 1996. This new file was used by the bigeye assessment group. The procedures are presented in SCRS/97/6. The Secretariat also updated the historical south albacore catch at size, to take account of revisions in the Chinese Taipei data. This new file, after review, was used for the stock assessment of southern albacore. It was noted that the catch at size for bluefin and swordfish were not updated this year, and hence the effects of the implementation of size regulations could not be evaluated. This was largely due to the late submission of Task I and size data from many fisheries.

b) Improvement of computer facilities and software

The Secretariat reported that as funds have become available from national contributions received, the Secretariat is now in the process of purchasing some of the items recommended in 1996, as follows: a PC for the Systems Analyst, a PC for the Assistant Executive Secretary, and a FORTRAN compiler (software).

As the 1997 Commission budget for this chapter was reduced to half the amount proposed by the Sub-Committee on Statistics, the budgetary allocation is insufficient to cover all the items recommended in 1996, and therefore only some of the top priority items could be purchased. The Sub-Committee considered the present level of equipment at the Secretariat to be unacceptably outdated, and was no longer sufficient to support the work of the Commission. It was noted several times during the course of this years meeting, the work was greatly delayed by the obsolete equipment at the Secretariat which is incompatible with that of the scientists and Commissioners. The purchase of the computer equipment shown in **Addendum 3** was strongly recommended.

As the Secretariat's main frame computer (VAX) is now fully paid for, the funds allocated to this budgetary chapter will be available in 1998. The Sub-Committee recommended that these funds not be reduced but utilized for modernizing the Secretariat electronic equipment. The ICCAT Executive Secretary expressed his commitment to ensuring that this chapter would be given as much priority as possible in the forthcoming budget.

An *Ad Hoc* Working Group was formed to study the immediate electronic equipment needs of the Secretariat. The report of this Group is attached as Addendum 3.

c) Belly meat sampling program

The Assistant Executive Secretary referred to documents SCRS/97/80 and SCRS/97/103 which presented the results of belly meat sampling in order to obtain conversion factors from belly meat to round weight. This sampling finally became possible through the joint efforts of the Secretariat with the Spanish and Japanese Governments and industries, the work being carried out by Japanese and Spanish scientists.

The Sub-Committee studied the results and recommended that, given the importance to scientists of working with round weight data, the conversion factors should be implemented immediately and all belly meat products should be converted to round weight before data are used.

d) Other matters

No other matters were discussed under this Item.

4. New business

Dr. A. Fonteneau of France suggested that, given the need for long time series of tuna catches, efforts should be made to recover historic data from as many countries as possible, to expand the base to the pre-1950 years, at least for the major species. The Sub-Committee therefore recommended that the Secretariat take steps to contact the relevant authorities and scientists in various countries and institutes in order to try to expand its data base, both for nominal catch data, and more finely tuned data where possible.

The Convener of the Working Group on Tropical Tunas informed the Sub-Committee that statistics from Ghana were available, but were not in a usable, i.e. computer, format and suggested that these data should be recovered and processed. Dr. F. X. Bard (France) informed the group that in fact much of these data were already processed, and that, as he would be travelling to Ghana later in the year, he would be willing to report back to ICCAT on the status of the data and bring back any processed data available, as he believed that computer files from 1984-96 were available. The Sub-Committee thanked Dr. Bard for his cooperation and proposed that the Secretariat collaborate with Dr. Bard and provide a letter authorizing him to request the data on behalf of ICCAT.

Dr. P. Pallares (Spain) referred the Sub-Committee to document SCRS/97/28 (rev) which discussed a joint project undertaken by French and Spanish scientists and financed by the European Union. This work dealt with a new method applied to tropical tuna sampling, taking present day fishing structure, including floating objects, into account. The Sub-Committee briefly discussed the findings of this research, and congratulated Dr. Pallares for the excellent work done and progress made in this area.

5. Recommendations and future plan

The Sub-Committee summarized its recommendations in Item 19, General Recommendations and responses to the Commission.

6. Date and place of the next meeting of the Sub-Committee on Statistics

The next meeting of the Sub-Committee on Statistics will take place at the same time and place as the next SCRS meeting.

7. Other matters

There were no other matters discussed.

8. Adoption of Report

The Report was adopted.

9. Adjournment

The 1997 Meeting of the Sub-Committee on Statistics was adjourned.

Addendum 1 to Appendix 11

Agenda
of the Sub-Committee on Statistics

1. Opening of the meeting, Adoption of Agenda and arrangements for the meeting
2. New developments in statistics

    a) Timeliness of reporting
    b) Major revisions of statistics in 1997
    c) Estimation of mis-reporting or non-reporting
    d) Shark statistics
    e) Secretariat data management policy
    f) Dissemination and publication of data

3. Special actions taken in 1997 (which are not covered under Item 2)

    a) Secretariat actions in response to 1996 SCRS recommendations
    b) Improvement of computer facilities and software
    c) Belly meat sampling program
    d) Other matters

4. New business
5. Recommendations and future plans
6. Date and place of the next meeting of the Sub-Committee on Statistics
7. Other matters
8. Adoption of Report
9. Adjournment

Addendum 1 to Appendix 11

Agenda
of the Sub-Committee on Statistics

1. Opening of the meeting, Adoption of Agenda and arrangements for the meeting
2. New developments in statistics

    a) Timeliness of reporting
    b) Major revisions of statistics in 1997
    c) Estimation of mis-reporting or non-reporting
    d) Shark statistics
    e) Secretariat data management policy
    f) Dissemination and publication of data

3. Special actions taken in 1997 (which are not covered under Item 2)

    a) Secretariat actions in response to 1996 SCRS recommendations
    b) Improvement of computer facilities and software
    c) Belly meat sampling program
    d) Other matters

4. New business
5. Recommendations and future plans
6. Date and place of the next meeting of the Sub-Committee on Statistics
7. Other matters
8. Adoption of Report
9. Adjournment

Addendum 2 to Appendix 11

RESULTS OF SURVEY ON RECREATIONAL AND ARTISANAL FISHERIES

Country	Gear	Artisanal or Sport	Species	Catch	CPUE	Size	Remarks
Brazil	GILL	Artisanal	KGM	X	X		Coverage rate of catches from artisanal fisheries has increased up to 100% in 1996.
	HL		BRS	X	X		
	TROLL		BIL	X			
	TRAP		BLF	X			
			BON	X			
Brazil	RR	Sport	BIL	x			Partially monitored.
Canada	RR	Sport	BFT, BET Sharks	100%	Partial	Partial	
Cote d'Ivoire	RR	Artisanal	SAI	X	Partial	Partial	
			BIL	X	Partial	Partial	
			SWO	X	Partial	Partial	
			Tunas	X	Partial	Partial	
			Sharks	X	Partial	Partial	
Croatia	HL	Artisanal	BFT	No data	No data	No data	
	HL		SWO				
	HL		Sharks				
	LL		BFT				
	LL		SWO				
	LL		Sharks				
France	RR	Sport	BFT	Opportunis-tic evalua-tions.	Could be ob-tained from fishing tour-naments.		
	TROL		BFT				
	UNCL	Artisanal	BFT (bycatch)	Estimates	None	None	
Japan							None in the Atlantic Ocean.
Korea							None.
Italy	LL	Artisanal	BFT	X	x	x	Artisanal fishery.
	LL		SWO	X	x	x	Is included in the Italian catch statistics because this fishery is the most important part of the Italian fishery.
	LL		ALB	X	x	x	
	GILL		SWO	X	x	x	
	GILL		BFT	X	x	x	
	GILL		ALB	X	x	x	
	GILL		SMT	Partial	Partial	Poor	
	HARP		SWO	X	X	X	
	HARP		BFT	X	X	X	
	HL		BFT	Partial	Partial	Partial	
	HL		SMT	Poor	None	None	
	OTH		MIX	Occasional	None	Poor	
	LL	Sport	SWO	Partial	Poor	Poor	
	GILL		SMT	Partial	Poor	Poor	
	HL		BFT	Partial	None	Poor	
	HL		SMT	Occasional	None	Poor	

	RR		BFT	Partial	Occasional	Partial	
Maroc	RR	Sport	BIL				
	HL	Artisanal	BFT			X	
S. Tome	LL	Artisanal	BIL	X		X	
	PS		SMT	X			
UK-Bermuda	RR	Sport	BUM	X	X	Estimates	Occasional survey of recreational fishery
			WHM	X	X		catches of pelagic species WAH, YFT, BLF and dolphinfish.
USA	RR	Sport	YFT	X	X	X	Various degrees of precision, but all species monitored.
			BFT	X	X	X	
			ALB	X	X	X	
			BLM	X	X	X	
			WHM	X	X	X	
			SAI	X	X	X	
			BET	X	X	X	
			KGM	X	X	X	
			SSM	X	X	X	
			SWO	X	X	X	
			WAH	X	X	X	
			SKJ	X	X	X	
			BON	X	X	X	
			BLT	X	X	X	
			SMT	X	X	X	
			Sharks	X	X	X	
Other fisheries CARICOM							
Antigua	HL, TR	Artisanal	Tunas+BIL	X	X	X	For many CARICOM countries, only some commercial species are sampled for size data. Catches of sport catches are taken from tournament records.
	TR, RR	Sport	Tunas+BIL	X	X	X	
Barbados	HL, TR	Artisanal	Tunas+BIL	X	X	X	
	TR, RR	Sport	Tunas+Bil	X	X	X	
Belize	TR, RR	Sport	Tunas				
Dominica	HL, TR	Artisanal	Tunas+Bil	X	X	X	
	TR, RR	Sport	Tunas+BIL				
Grenada	HL, TR, PS	Artisanal	Tunas+BIL	X	X	X	
	TR, RR	Sport	Tunas+BIL	X		X (BIL)	
Guyana	HL, TR, GILL	Artisanal	Tunas	X	X	X	
Jamaica	HL, TR	Artisanal	Tunas+BIL	X			
	TR, RR	Sport	Tunas+BIL	X		X (BIL)	
Montserrat	HL, TR	Artisanal	Tunas	X			
St Kitts	HL, TR	Artisanal	Tunas+BIL	X			
	TR, RR	Sport	Tunas+BIL				
St Lucia	HL, TR	Artisanal	Tunas+BIL	X	X	X	
	TR, RR	Sport	Tunas+BIL	X			
Trinidad	HL, TR, GILL	Artisanal	Tunas	X	X	X	
	HL, TR, RR	Sport	Tunas+BIL	X			
Chinese Taipei							None.
Senegal	RR	Sport	SAI, BON	X	X	X	
			LTA, BON				

Addendum 3 to Appendix 11

WORKING GROUP ON COMPUTER NEEDS OF SECRETARIAT

Following the recommendations of the SCRS in 1996, and given the budgetary provision made in the 1997 Budget, only the following equipment could be purchased in 1997: two laser printers (Systems Analyst and French department), and the "HOT METAL PRO" program.

It is hoped that the following additional equipment can be purchased before the end of 1997: two PCs (Systems Analyst and Assistant Executive Secretary), and a new version of FORTRAN.

Many of the items recommended by the 1996 SCRS could not be purchased, as insufficient budgetary provision had been made. Therefore, these items are included in the recommendations for 1998.

Given the lack of up-to-date computer equipment and software, the Sub-Committee on Statistics strongly recommended the purchase of the following equipment in 1998:

EQUIPMENT	*Unit price (in pesetas)*	*TOTAL PRICE*
Maintenance contract for 6 laser printers	20,000	120,000
Maintenance contract for main frame computer (VAX)		550,000
Bibliographic Software	663,000	663,000
4 PENTIUM PCs	430,000	1,680,000
5 licensed WORD PERFECT	50,000	250,000
2 licensed QUATTRO PRO	36,000	72,000
1 licensed VISUAL BASIC	58,000	58,000
8 licensed anti-virus programs	14,000	112,000
1 E-mail modem	21,000	21,000
4 licensed MICROSOFT OFFICE	75,000	300,000
1 17" color monitor	120,000	120,000
1 color scanner	60,000	60,000
1 color inkjet printer	60,000	60,000
2 Jaz drives	74,000	148,000
10 cartridges for Jaz drives	13,400	134,000
Connectors for Jaz drive	67,000	133,000
PMCIA net card for PCs	30,000	30,000
Portable inkjet printer	50,000	50,000
Print cartridges for portable printer	30,000	30,000
Total		**4,591,000**

Appendix 12

REPORT OF THE SUB-COMMITTEE ON BY-CATCH

1. Opening of the meeting, adoption of Agenda, and arrangements for the meeting

At the request of the Chairman of the SCRS, the Convener of the Sub-Committee on By-Catch, Dr. G. Scott (U.S.A.) opened the meeting. The Agenda, which was circulated before the meeting, was reviewed and adopted and is as **Addendum 1** to this Report. Dr. H. Nakano kindly agreed to serve as Rapporteur.

2. Review of list of tuna fishery by-catch species

The list of species taken incidentally in the Atlantic and Mediterranean fisheries for tunas and tuna-like species was reviewed and updated by participants in the Shark Working Group. The species list was updated based on additional information presented to the Working Group in several documents submitted for consideration at the 1997 SCRS meeting. **Table 1** is a revision of that provided in COM-SCRS/97/12, based on the documents newly submitted to the SCRS. Document SCRS/97/36 provided additional information on species caught in the Spanish and French purse seine fishery in the east Atlantic from scientific observer data collected in 1996. Document SCRS/97/56 provided some additional information on species caught in the Japanese Atlantic longline fishery based on scientific observer samples from the Japanese fleet. Document SCRS/97/118 reported information on elasmobranch species caught by Italian longline, gillnet, purse seine and harpoon fisheries mainly from scientific observer programs conducted in the Mediterranean Sea. The author of SCRS/97/118 also introduced a list of all species observed caught by the Italian gillnet fishery from an earlier document (SCRS/94/81). Based on this information, a number of additional species were included in **Table 1** for purse seine, longline and gillnet fisheries. In addition, harpoon gear was added to the table based on this report.

The Working Group reaffirmed that the species list (**Table 1**) gave no indication of the frequency, amount, or disposition of the catch of these species, but merely served as a listing of species observed or believed to comprise some component of the catches made by the Atlantic tuna and tuna-like fisheries. Until sufficient observer sampling of the Atlantic tuna fisheries (such as is called for under the 1996 Commission Resolution for observer sampling), is carried out, it will not be possible to quantify the total catch composition and disposition of these fisheries.

3. Report of the Working Group on Sharks (Shimizu - March, 1997)

A report on the progress made by the Shark Working Group was presented (**SCRS/97/12**). The working group on sharks met in Shimizu, Japan, in March 1997 in advance of the CITES 10th Conference of Parties (COP held in Harare, Zimbabwe, June 1997). Participation in the Shark Working Group meeting included representatives from the CITES Animals Committee (Dr. H. Jenkins) and from FAO (Dr. R. Grainger), in addition to scientists from France, Japan, the United States, Chinese Taipei, and the ICCAT Secretariat. The working group focused its efforts on: 1) updating information on species caught by tuna fisheries, 2) review of additional data submitted to ICCAT on the catches of sharks in the Atlantic fisheries for tuna and tuna-like species, 3) review of CPUE data for Atlantic sharks, and 4) review of the activities of other international bodies which relate to sharks and preparing a response to a request from CITES for collaboration in the collection of scientific and trade data on sharks.

It was reported that the Shark Working Group was very pleased that the Chairman of the CITES Animals Committee participated in the session. His participation greatly increased ICCAT's understanding of CITES activities and, at the same time, ICCAT's position on issues relating to sharks was also relayed to CITES. It was recognized, however, that few other regional fisheries agencies have enjoyed the same degree of communication and collaboration with CITES as has ICCAT to date. It was recommended that ICCAT communicate this deficiency to CITES and request that CITES undertake actions to improve communication of its actions and needs to interested international agencies. The Secretariat communicated this to the CITES Secretariat when the Report of the Shark Working Group was transmitted to CITES.

The report of Working Group on Sharks was reviewed and accepted by ICCAT member nations through correspondence and was officially submitted to the CITES Secretariat in April 1997 to provide information on ICCAT's shark activities to CITES member nations participating in the CITES 10th Conference of Parties. ICCAT was invited to participate as an observer in the 10th Conference of Parties and the report of the ICCAT Shark Working Group was presented to CITES member nations by the ICCAT observer (Dr. H. Nakano, Japan) at that meeting.

4. Report of the 1997 Conference of the Parties to the Convention on International Trade in Endangered Species

An observer from ICCAT (Dr. H. Nakano, Japan) attended the 10th meeting of the Conference of the Parties (COP 10) of CITES, which was held from 9-20 June in Harare, Zimbabwe. Document SCRS/97/15 reviewed discussions held at the meeting which related to the workings of ICCAT. There were three agenda items for COP 10 relating to ICCAT: 1) discussion regarding the progress made in implementation of CITES Resolution Conf. 9.17 on the status of international trade in shark species; 2) establishment of a CITES working group on marine fish species, and 3) consideration of a proposal for inclusion of all species of the order Pristisformes (sawfish) in Appendix I of the CITES.

Regarding CITES Resolution Conf. 9.17 on the status of international trade in shark species, the discussion at COP 10 related to 1) the report prepared by the CITES Animals Committee on the biological and trade status of sharks subject to international trade (see SCRS/97/15, Ref.1, Ref.4, and Ref.10) and 2) the progress of FAO and other international fisheries organizations on programs established to collect and assemble biological and trade data on sharks (see Ref.10). This report of the Animals Committee was reviewed by the Shark Working Group during the Shimizu Meeting and copies of the report are available for reference from the ICCAT Secretariat (Ref 1, Ref 3). At COP 10, the discussion paper prepared by the CITES Animals Committee was accepted and the COP decided among other items (see Ref.9 and Ref.10) to 1) request FAO to initiate a work program involving consultation of shark experts and 2) request member nations and international/regional bodies to co-ordinate management of shark fisheries. In response to the request 1) above, FAO will conduct a Technical Working Group (TWG) meeting in April 1998 in Japan with budgetary support from the United States and Japanese Governments.

The other two proposals considered at COP 10 relating to ICCAT activities were for the establishment of a CITES working group on marine fish species (see Ref.11), and a proposal to include all species of the order Pristisformes (sawfish) on the CITES Appendix I list (see Ref.12). Both of these proposals were rejected after voting by participants at COP 10.

5. Review of the ICCAT responsibility on shark statistics and follow-up of the recommendations made by the Working Group on Sharks

At the 1997 Shark Working Group meeting in Shimizu, the ICCAT responsibility for collection of shark statistics was reviewed. Article IV of the International Convention for the Conservation of Atlantic Tunas states "the Commission shall be responsible for the study of the population of tuna and tuna-like fishes (the Scombriformes with the exception of Trichiuridae and Gempylidae and the genus *Scomber*) and such other fishes exploited in tuna fishing in the Convention area as are not under investigation by another international fishery organization." The Commission interpreted this language to indicate that ICCAT has responsibility for collecting information on catches of sharks and other fishes which are coincidental to fishing effort directed toward tunas and tuna-like species. Thus, in 1996 after ICCAT nations approved the recommendations for data collection made at the first meeting of the Shark Working Group (Miami, January, 1996) the ICCAT Secretariat instituted a data collection form sent to over 80 Atlantic tuna-fishing nations to report the by-catch of sharks, and requested that this information be reported annually to ICCAT.

At its 1995 meeting, the SCRS discussed the difficulties of assessing the effect of by-catches of sharks in the Atlantic tuna fisheries on the status of shark stocks in the Atlantic. It was noted that without information on the fishing mortality levels resulting from effort directed at sharks as well as fishing mortality resulting from by-catch in fisheries directed at other species (including Atlantic tuna fisheries), such assessments could not be completed. The Committee recommended that, should sufficient data become available to support shark stock assessments in the future, ICCAT focus attention on the pelagic shark species (e.g. blue mako, thresher, silky, etc.), since these are likely to be more frequently caught by effort directed at Atlantic tunas. At the Shimizu Shark Working Group meeting (March 1997), the Working Group reaffirmed the mandate given to the Commission and the Working Group and reiterated previous recommendations on the working schedule.

Catch information submitted to ICCAT in response to ICCAT's request for Task I and Task II reports was reviewed by the Shark Working Group meeting in Madrid (October 1997). The ICCAT Secretariat provided an updated summary of the available Task I reports. **Table 2** is a revision to that provided in SCRS/97/12 for Task I data. More than 80 tuna fishing nations were requested to submit Task I catch data on sharks to the Secretariat. Only eighteen nations have responded, of which 10 are ICCAT members. Four nations, Gabon, Guyana, Japan and St. Vincent were added to the list of nations providing information since March 1997. It is obvious that the response to the ICCAT requests for data on sharks has been poor. This likely reflects the relatively low priority nations place on monitoring shark catches compared to tuna and tuna-like species. Never the less, the Committee reiterates its previous recommendation that all member nations and Atlantic tuna fishing nations establish adequate data collection systems for collecting Task I and Task II data for sharks and provide the data in annual reports to ICCAT.

At the Shark Working Group meeting in Shimizu (March 1997), it was recommended that ICCAT also request Task II data from Atlantic tuna fishing nations. To date, 3 nations (Brazil, Canada, UK and UK Bermuda) have submitted Task II data on sharks for 1996 to the Secretariat. The working group noted that estimates of 1996 shark catch and dead discards from US Atlantic tuna and tuna-like fisheries as well as size frequency observations for sharks taken in these fisheries were summarized in document SCRS/97/58. Also, some shark landing data for Italian gillnet and longline fisheries by species were presented in document SCRS/97/118. These data from the above two studies have not yet been submitted to the Secretariat on Task I and Task II forms, but the reported catches are included in **Table 2.**

Also indicated in **Table 2** are the reported 1995 catches from the FAO data base for comparable fishing areas of national shark catches (retained catches) for those countries which also report by-catches of sharks in Atlantic tuna fisheries to ICCAT. Although the ICCAT catch statistics are still very incomplete, as only a low proportion of the Atlantic tuna fishing nations have reported their catches to ICCAT, it is apparent in examining Table 2 that the reports submitted to ICCAT represent less than 10% of the catches reported to FAO. Based on this comparison, it is likely that the ICCAT statistics, once they become more complete, will represent only a fraction of the total shark catches from the Atlantic. It is unclear if this conclusion will hold for species which are predominantly pelagic in distribution.

This result is not surprising, since shark catches reported to ICCAT are generally only those resulting from effort directed toward tuna and tuna-like species. As indicated above, any meaningful stock assessments cannot be conducted using such a small fraction of the total catch. The Committee reaffirmed previous ICCAT recommendations that FAO should be a focal point in collection of shark data across the range of fisheries which harvest these species. The Committee also acknowledges that using information on total removals will be critical to future evaluations of shark stock status, and hence reporting discards accurately is essential.

6. Review of CPUE data for Atlantic sharks (particularly for tuna fishery by-catch)

The historical CPUE trends of Atlantic sharks were reviewed and compared for some species during the Shark Working Group meeting held in Shimizu (March 1997). As little new information on this topic was provided to the Working Group for consideration at the meeting in October 1997, no extensive discussions on shark CPUE trends were held. However, the Working Group noted that several additional observations of shark CPUE based on observer program sampling were presented in working documents. Document SCRS/97/36 introduced CPUE of the French and Spanish purse seine fleet in the tropical eastern Atlantic. Document SCRS/97/56 described shark CPUE recorded by observers on board Japanese longline vessels in the central and northwest Atlantic and SCRS/97/77 described shark (and other species) CPUE from observer data collected on board Mexican and US longline vessels operating in the Gulf of Mexico. CPUE of elasmobranchs caught by Italian gillnet and longline fisheries in the Mediterranean Sea were also provided in document SCRS/97/118.

7. Review of the ICES Study Group on Elasmobranchs

The Third Meeting of the ICES Study Group on Elasmobranch Fishes was held May 26 to 30, 1997, at the ICES Headquarters in Copenhagen, Denmark (see Ref. 8 for the meeting report). Four participants from ICES member countries and two observers, one from IUCN (S. Fowler, IUCN shark specialist group), and one from ICCAT (Mr. Matsunaga, National Research Institute of Far Seas Fisheries, Japan) attended the meeting. The ICCAT observer report on the meeting (SCRS/97/18) was reviewed by the Working Group. The ICES Study Group has decided, since its 2nd meeting held in 1995, that in order to move forward in evaluating the status of elasmobranch stocks it should

study those species for which there are the most data, preferably covering a range of habitats and life histories. For this reason, the group chose to focus on deep-water sharks, blue shark, spurdog and skates and rays.

Although the ICES working group compiled published information and suggested needed future work and precautionary measures for the conservation of these species, the general conclusion reached by the group pointed out the lack of sufficient data for assessment purposes due to lower priority placed on research for these species. In addition, the ICES Study Group also suggested the need for improvement in statistical data collecting systems which include species identification guides for ray and skate species (including keys for identification of landed products like skate wings) and inclusion of new ICES species codes to avoid combining species caught and landed into general categories. The ICES working group proposed to maintain working relationships with other international organizations involved in shark data collections and research including FAO, ICCAT, IUCN, and other environmental non-governmental organizations.

8. Review of other international meetings relative to the Sub-Committee on By-catch

Following the resolution of CITES Conf. 9.17 and the decision made by the 10th Conference of the Parties of CITES, the FAO Technical Working Group (TWG) meeting for conservation and management of sharks will be held during April 1998, in Japan. This meeting is one of three TWG meetings which will be held during the next year. An additional TWG meeting which has bearing on by-catch issues is the meeting on sea bird - fishery interactions (including by-catch). Reports from the TWG meetings will be submitted to a FAO consultation in December 1998, at which interested governmental and other representatives will be in attendance. After the consultation, a report will be submitted to the COFI of FAO in 1999 after review by the FAO Consultation in December 1998.

A planning meeting for the forthcoming FAO TWG meeting on sharks (April 1998) was held at FAO headquarters in Rome, 25-26 September 1997. Participants from the United States, Japan, Mexico, EU and FAO attended the meeting. For the TWG meeting on sharks which will be held in April 1998, it was decided that FAO will prepare seven documents for discussion. These include: 1) Case studies on the exploitation, management and conservation of sharks, 2) Species catalogue on sharks, 3) Revision of a FAO monograph on "*Shark Utilization and Marketing*", 4) Review of data needs for management of shark fisheries, 5) Reviews of regional shark fisheries (both directed and by-catch), 6) Draft guidelines on the conservation and management of shark fisheries, and 7) a Draft plan of action. It was also decided that the number of invited experts to the April 1998, TWG meeting will be limited to twenty representatives from United Nations member nations and ten representatives from international fisheries management organizations. ICCAT is one of the organizations nominated and thus ICCAT will be invited to send a representative to the TWG meeting on sharks.

Following the activity of FAO, the United States indicated its intention to participate in and partially support several regional workshops for reviewing the status of shark fisheries prior to the April 1998 TWG meeting on sharks. Three such workshops were proposed and will probably be held in New Caledonia in November 1997 for the Indian Ocean and western Pacific regions; in Sarasota, Florida, USA, in December 1997 for the western Atlantic region; and in Monterey, California, USA (date not yet determined) for the eastern Pacific region. ICCAT has been invited to participate in the western Atlantic regional meeting to be held in December 1997 in Florida.

An ICCAT observer (Y. Uozumi, Japan) attended the Second Meeting of Ecologically Related Species (ERS) working group of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). Document SCRS/97/19 is the observer's report from this meeting. Because the interaction between CCSBT fisheries and sea birds was the most important issue to be addressed by the working group, the ERS has not yet focused on sharks or other by-catch species issues, but it is recommended that ICCAT maintain contact with CCSBT and its ERS working group.

9. Review of new biological information on Atlantic sharks

Document SCRS/97/58 presented conversion equations for fork length to whole weight for fourteen species of Atlantic sharks caught in the US longline fishery. Document SCRS/97/36 also described conversion equations of fork length to whole weight and total length to fork length for three species caught by the French and Spanish tuna purse seine fishery. Since sharks were landed frequently in dressed or processed form, the need for conversion factors of processed weight to whole weight was pointed out.

10. Reports on national observer programs

In order to provide updated information on progress made with respect to the Commission's recommendation on the implementation of national observer programs for longliners, purse seiners, and baitboats, which became binding on ICCAT Contracting Parties in 1997, all those attending the Sub-Committee discussions were asked to provide brief reports on the status of national observer programs. These reports are provided below.

Brazil: It was reported that a national observer program had been started, but at a low level. The observer sampling is conducted on vessels using gillnets and longlines. In the case of longliners, the data collected are used mainly to quantify shark catch and discards.

Canada: A national observer program of the Canadian swordfish longline fleet is in place in which about 5% of trips are monitored. The offshore longline vessels, which target for tuna other than bluefin in the northwest Atlantic has 100% observer coverage. Observer sampling of the bluefin tuna tended line and rod&reel, and directed shark fisheries is also required. In addition, there is mandatory, 100% observer coverage of Japanese longline vessels operating in Canadian waters.

Côte d'Ivoire: It was reported that as there are no national industrial fleets, no observer sampling programs are in place.

Croatia: It was reported that no observer program is in place. It was noted that new fishing effort is limited via a permitting system in Croatia.

France: It was reported that observers had been placed on the driftnet fleet targeting albacore, although no observers have been placed on these French vessels for the last 3 years. Observers were placed on purse seine vessels in the tropical Atlantic in 1995. In coordination with Spain and with funding support from the EC, observers were again placed, as part of the bigeye year program, on these vessels in 1997 and are planned for 1998.

Italy: It was reported that an observer program of Italian gillnets was in operation until 1992. Results from this program have been reported to ICCAT. It was also reported that an observer program for Italian longline vessels was planned for 1998-1999 during which 120 trips will be observed, according to the availability of funding for this project.

Japan: It was reported that Japan instituted an observer program of Atlantic fishing vessels in 1995. It is reported that sampling of the Japanese fleet at the 5% sampling fraction agreed by the Commission will require about 1,250 operations observed per year. An outline of the Japanese longline sampling plan to achieve this level of sampling is provided in SCRS/97/42 and SCRS/97/56 for 1995 and 1996, respectively.

Korea: It was reported that no observer program is in place for monitoring the Korean fishery.

Libya: It was reported that a logbook system is in place in Libya, but no scientific observers for collecting data for use in quantifying the total catch, its disposition and condition are used in monitoring the fisheries.

Morocco: It was reported that no observers are placed on the national artisanal fleet vessels.

Portugal: It was reported that no national observer program had yet been implemented. It is anticipated that observers will be placed on baitboats in 1997 or 1998.

Sao Tome & Principe: It was reported that as Sao Tome e Principe has no national industrial fleet and no observer programs have been implemented for the artisanal fleet.

Spain: It was reported that for the Spanish distant water longline fleet is observed at about a 2% level of coverage, although for sampling, the highest priority is given to swordfish, thus quantification of the composition and disposition of the total catch by this fleet would not be possible using these data. SCRS/97/87 provided a description of the catch composition of French and Spanish purse seine catches based on 22 trips sampled in 1996. As part of the Bigeye Year Program, sampling forms, formats, and plans for ongoing observer sampling on these purse seine vessels are described in SCRS/97/41 and SCRS/97/24.

United Kingdom: It was reported that observers were placed on the driftnet vessels fishing for albacore, but there are no plans for continuing this program. It was also reported that longline vessels fishing from Bermuda will carry observers in the future.

United States: It was reported that a scientific observer program of the U.S. longline fleet has been in place since 1992. The target sampling level is 5% of the annual effort, although the realized level of sampling was on the order of 2% in 1996. It was reported that due to uncertainties about national funding for this program, it was not clear if 5% sampling will be achieved in the future. Observers are also placed on US Atlantic driftnet and purse seine vessels. Target sampling levels for these fleets are high (>25%).

Venezuela: Although no representative from Venezuela was in attendance, it was reported that scientific observer sampling of the Venezuelan longline fleet is ongoing and has been supported through the ICCAT billfish program. The sampling fraction for this program is unknown.

CARICOM: It was reported that of the CARICOM countries, Trinidad and Tobago and Guyana are considering implementation of observer programs for their semi-industrial fisheries. However, there are no observer programs in operation at present.

Mexico: It was reported that an observer program for Mexican longline vessels in the Gulf of Mexico has been operating since 1993. Sampling is of a very high (>90%) proportion of the fleet effort. The objective of the program is know in detail the characteristics of fishing effort as well as the catches of yellowfin and other species taken as by-catch. A document describing this program and a preliminary comparison with results of US longline observer data collections from the Gulf of Mexico are presented in SCRS/97/77.

Senegal: Observers are placed on board industrial vessels operating in Senegalese waters. However, the observers are used mainly for monitoring the activities of the vessels on which they are placed and do not collect scientific information on the catch. It may be possible to improve the scientific quality of the data collected by selecting a few observers for additional training in identification and biological sampling of the catch, as would be required to quantify the total catch, its disposition, and condition. It is planned that some improvements in these data will become available in 1998, which could permit quantification of the total catch, its disposition, and condition.

Chinese Taipei: An observer program to characterize the composition, disposition, and condition of the by-catch made by Chinese Taipei vessels was put in place in 1995. Manuals for data collection have been developed and in 1996, 2-3 observers will be on Chinese Taipei vessels operating in the Atlantic. It is anticipated that results from this observer activity will be available for reporting to ICCAT next year.

11. Future plans

As reported above, there are many ongoing international activities regarding conservation and management of sharks. It is likely that further collaboration and cooperation between ICCAT and other international organizations (CITES, FAO, ICES, NAFO, GFCM) as well as a range of non-member nations will be needed to develop sufficient data sets for the possibility in the future of conducting shark stock assessments. Participation by ICCAT in the FAO TWG meeting on conservation and management on sharks is critical to ICCAT's future activities as the meeting results may have considerable impact on Atlantic tuna fishing nations which catch sharks incidentally. The Committee also recommended that ICCAT participate in the regional preparatory workshops dealing with shark fisheries (Sarasota, FL; New Caledonia; and Monterey, CA) which are being held in advance of the April, 1998, TWG meeting. The Committee also continues to recommend that ICCAT maintain communications on sharks with other interested organizations and nations, participate in regional and international meetings relating to sharks, and provide these organizations with reports of progress made by ICCAT on the issue of by-catch and sharks.

12. Other matters

Some concerns were raised about including assessment of pelagic sharks in the ICCAT mandate, given the already heavy work load dealing with the Atlantic tunas and tuna-like species. ICCAT has previously indicated that should sufficient stock assessment data become available, focus should be made on sharks most frequently taken in the Atlantic tuna fisheries (e.g. mako, thresher, blue, silky, etc.).

It was recognized by the Committee that qualitative assessments of stock trends based on catch rate data may be possible before more quantitative assessments, which incorporate estimates of total catch can be conducted. It is likely that inference about stock shark stock status will be drawn by other organizations on the basis of catch rate observations.

12. Date and place of the next meeting of the Sub-Committee on By-catches

It is anticipated that the Sub-Committee on By-catches will reconvene at the 1998 SCRS meeting. It is also anticipated that the Shark Working Group will meet for 3 days during the 1998 species group meetings.

13. Adoption of report

After review, the report was adopted by the Committee.

14. Adjournment

The 1997 Meeting of the Sub-Committee on By-catches was adjourned.

Addendum 1 to Appendix 12

Agenda of the Sub-Committee on By-catches

1. Opening of the meeting, adoption of Agenda and arrangements for the meeting
2. Review of list of tuna fishery by-catches
3. Report of the Working Group of Sharks (Shimizu - March, 1997)
4. Report of the 1997 Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)
5. Review of the ICCAT responsibility on shark statistics and follow-up of the recommendations made by the Working Group on Sharks
6. Review of CPUE data for Atlantic sharks (particularly for tuna fishery by-catches)
7. Report of the ICES Study Group on Elasmobranchs
8. Review of other international meetings relative to the Sub-Committee on By-catch
9. Review of new biological information on Atlantic sharks
10. Reports on national observer programs
11. Future plans
12. Other matters
13. Date and place of the next meeting of the Sub-Committee on By-catches
14. Adoption of Report
15. Adjournment

Table 1. **By-catch species list in the ICCAT area by major fisheries collected from ICCAT questionnaire on by-catch and documents submitted 1994-1997**

LONGLINE FISHERY:

Elasmobranches

Skates and rays

Dasyatis centroura	Roughtail stingray
Dasyatis violacea	Pelagic stingray
Manta birostris	Manta ray
Mobula hypostoma	
Mobula mobular	Manta ray
Myliobatis aquila	Common eagle ray
Pteuromylaeus bovinus	Bull ray
Raja fullonica	Shagreen ray
**Raja straeleni*	
**Torpedo nobiliana*	Torpedo ray

Coastal sharks

Carcharias taurus	Sand tiger shark
Carcharhinus altimus	Bignose shark
Carcharhinus brachyurus	Copper shark
Carcharhinus brevipinna	Spinner shark
***Carcharhinus galapagensis*	Galapagos shark
Carcharhinus limbatus	Blacktip shark
Carcharhinus leucas	Bull shark
Carcharhinus obscurus	Dusky shark
Carcharhinus perezi	Caribbean reef shark
Carcharhinus plumbeus	Sandbar shark
Carcharhinus porosus	Smalltail shark
Carcharhinus signatus	Night shark
Carcharodon carcharias	White shark
Cetorhinus maximus	Basking shark
Centrophorus granulosus	Gulper shark
Centrophorus uyato	Little Gulper shark
Centroscymnus crepidater	Longnose velvet dogfish
Deania calcea	Birdbeak dogfish
Etmopterus spinax	Velvet belly
Heptranchias perlo	Sharpnose sevengill shark
Hexanchus griseus	Bluntnose sixgill shark
Galeocerdo cuvieri	Tiger shark
Galeorhinus galeus	Tope shark
Megachasma pelagios	Megamouth shark
Mustelus asterias	Starry smoothhound
Mustelus mustelus	Smoothhound
Negaprion brevirostris	Lemon shark
Odontaspis ferox	Smalltooth sand shark
Odontaspis noronhai	
Rhincodon typus	Whale shark
Rhizoprionodon terraenovae	Atlantic sharpnose shark
Sphyrna lewini	Scalloped hammerhead
Sphyrna mokarran	Great hammerhead
Sphyrna zygaena	Smooth hammerhead
Squaliolus laticaudus	
Squalus acanthias	Spurdog fish
Squalus blainvielli	Longnose spurdog
Squatina aculeata	Sawback angelshark
Squatina oculata	Smoothback angelshark
Squatina squatina	Angelshark

Pelagic sharks

Alopias superciliosus	Bigeye thresher
Alopias vulpinus	Thresher
Carcharhinus falciformis	Silky shark
Carcharhinus longimanus	Oceanic whitetip shark
Isurus oxyrinchus	Shortfin mako
Isurus paucus	Longfin mako
Lamna nasus	Porbeagle
Prionace glauca	Blue shark
Pseudocarcharias kamoharai	Crocodile shark
Zameus squamulosus	Velvet dogfish

Teleosts (Scombridae and billfishes)

Acanthocybium solandri	Wahoo
Gempylus serpens	Snake mackerel
Istiophorus albicans	Sailfish
Makaira nigricans	Blue marlin
Sarda sarda	Bonito
Scomberomorus cavalla	King mackerel
Tetrapturus albidus	White marlin
Tetrapterus pfluegeri	Spearfish
Thunnus alalunga	Albacore
Tunnus albacares	Yellowfin tuna
Thunnus atlanticus	Blackfin tuna
Thunnus thynnus	Bluefin tuna
Xiphias gladius	Swordfish

Teleosts (excluding Scombridae and billfishes)

Alephisauridae	Lancet fish
Alepisaurus brevirostris	Shortnose lancetfish
Alepisaurus ferox	Longnose lancetfish
Brama brama	Atlantic pomfret
Coryphaena equisells	Pompano dolphin
Coryphaena hippurus	Dolphin fish
Cubiceps spp.	Bigeye cigarfish
Elagatis bipinnulata	Rainbow runner
Epinephalus sp.	Grouper
Lampris guttatus	Opah
Lepidocybium flavobruneum	Escolar
Macrouridae	Rat-tail
Mola mola	Ocean sunfish
Mola sp.	Sunfish
Nesiarchus nasutus	
Ophichthidae	Eel
Polyprion americanus	Stone bass
Ranzania laevis	Slender mora
Rechycentron canadum	Cobia
Ruvettus pretiosus	Oilfish
Scienops ocellatus	Red drum
Seriola dumerili	Greater amberjack
Seriola sp.	Amberjack
Sparnus pagrus	Common sea bream
Sphyraena barracuda	Barracuda
Taractes asper	Rough pomfret
Taratichtys longipi	Big scale pomphret
Taractichthys steindachneri	Sickle pomfret
Tetraodontidae	Puffer
Trichiuridae	Snake mackeral

Sea Turtles

Chelonia mydas	Green turtle
Caretta caretta	Loggerhead turtle
Dermochelys coriacea	Leatherback turtle

Sea Birds

Diomedea chlorlychos	
Diomedea exulans	Wandering albatross
Diomedea melanophris	Black-browed albatross
Fulmarus glacioloides	Southern fulmar
Larus sp.	Gull
Procelaria aequinoctialis	
aequinoctialis	White chinned petrel
Procelaria aequinoctialis conspicillata	Petrel
Puffinus grabis	Greater shearwater

Marine Mammals

Globicephala melaena	Pilot whale
Grampus griseus	Grampus
Tursiops truncatus	Bottlenose dolphin

GILLNET FISHERY

Elasmobranches

Skates and rays

Dasyatis violacea	Pelagic stingray
Manta birostris	Manta ray
Mobula mobular	Devil ray
Myliobatis aquila	Common eagle ray
Myliobatis sp	Eagle ray
Pteuromylaeus bovinus	Bull ray
Torpedo nobiliana	Torpedo ray

Coastal sharks

Carcharhinus brachyurus	Copper shark
Carcharhinus brevipinna	Spinner shark
Carcharhinus limbatus	Blacktip shark
Carcharhinus obscurus	Dusky shark
Carcharhinus plumbeus	Snadbar shark
Carcharias taurus	Sand tiger shark
Carcharodon carcharias	White shark
Cetorhinus maximus	Basking shark
Galeocerdo cuvieri	Tiger shark
Galeorhinus galeus	Tope shark
Galeus melastomus	Blackmouth catshark
Heptranchias perlo	Sharpnose sevengill shark
Hexanchus griseus	Bluntnose sixgill shark
Mustelus asterias	Starry smooth hound
Mustelus mustelus	Smooth hound
Odontaspis ferox	Smalltooth sand shark
Sphyrna lewini	Scalloped hammerhead
Sphyrna zygaena	Smooth hammerhead
Sphyrna sp.	Hammerhead

Pelagic sharks

Alopias vulpinus	Thresher shark
Alopias superciliuosus	Bigeye thresher
Carcharhinus falciformis	Silky shark
Isurus oxyrinchus	Shortfin mako
Isurus paucus	Longfin mako
Lamna nasus	Porbeagle
Prionace glauca	Blue shark

Teleosts (Scombridae and billfishes)

Auxis rochei	Bullet tuna
Auxis thazard	Frigate tuna
Euthynnus alletteratus	Atlantic little tuna
Istiophorus albicans	Sailfish
Katsuwonus pelamis	Skipjack tuna
Makaira nigricans	Blue marlin
Sarda sarda	Bonito
Scomber japonicus	Chub mackerel
Scomber scobrus	Atlantic mackerel
Tetrapturus albidus	Atlantic white marlin
Thunnus alalunga	Albacore
Thunnus albacares	Yellowfin tuna
Thunnus obesus	Bigeye tuna
Thunnus thynnus	Bluefin tuna
Xiphias gladius	Swordfish

Teleosts (excluding Scombridae and billfishes)

Brama brama	Pomfret
Brama rail	Pomfret
Balistes carolinensis	Grey triggerfish
Balistes sp.	Triggerfish
Belone belone	Needlefish
Caranx hippos	Crevalle jack
Centrolophus niger	Black ruff
Coryphaena equiselis	Pompano dolphin fish
Coryphaena hippurus	Dolphin fish
Echeneidae	Remora
Engraulis encrasiolus	European anchovy
Hippocampus guttulatus	Common seahorse
Hirundichthys rondeleti	Blackwing flyingfish
Lampris guttatus	Opah
Lepidocybium flavobruneum	Escolar
Lichia amia	Learfish
Mola mola	Ocean sunfish
Mola sp.	Sunfish
Naucrates ductor	Pilotfish
Polyprion americanus	Wreckfish
Pomatomus saltatrix	Bluefish
Pseudocaranx dentex	Guelly jack
Pseudotolithis sp.	Cassava fish
Ranzania laevis	Slender sunfish
Regalecus glesne	Oarfish
Remora osteochir	Marlin sucker
Remora remora	Remora
Remora sp.	
Ruvettus pretiosus	Oilfish
Schedophilus medusophagus	
Schedophilus ovalis	Imperial blackfish
Seriola dumerili	Great amberjack
Sphyrax niger	Velvet belly
Trachurus mediterraneus	Mediter. horse mackerel

Sea Turtles

Caretta caretta	Loggerhead turtle
Chelonia mydas	Green sea turtle
Dermochelys coriacea	Leatherback turtle
Eremochelys imbrica	Hawksbill turtle

Sea Birds

Calonectris diomedea	
Fulmarus glacialis	

Marine Mammals

Balaenoptera acutorostrata	Minke whale
Balaenoptera physalus	Fin whale
Delphinus delphis	Common dolphin
Eubalaena glacialis	Northern right whale
Globicephala melaena	Pilot whale
Grampus griseus	Grampus
Kogia breviceps	Pygmy sperm whale
Lagenorhynchus acutus	Atlantic whiteside dolphin
Megaptera novaeangliae	Humpback whale
Mesoplodon sp.	Beaked whale
Physeter macrocephalus	Sperm whale
Phocoena phocoena	Harber porpoise
Stenella coeruleoalba	Striped dolphin
Stenella plagiodon	Atlantic spotted dolphin
Tursiops truncatus	Bottlenose dolphin

Ziphius cavirostris	Goosebeaked whale

PURSE SEINE FISHERY

Elasmobranches

Skates and rays

Dasyatis violacea	Pelagic stingray
Manta birostris	Manta ray
Mobula coilloti	
Mobula mobular	Devilfish
Myliobatis aquila	Eagle ray
Myliobatis sp.	
Rhinoptera sp.	Cownose ray
**Torpedo nobiliana*	Torpedo ray

Coastal sharks

Carcharodon carcharias	White shark
Rhincodon typus	Whale shark
Sphyrna lewini	Scalloped hammerhead
Sphyrna mokarran	Great hammerhead
Sphyrna zygaena	Smooth hammerhead
Sphyrna sp.	Hammerhead shark

Pelagic sharks

Carcharhinus falciformis	Silky shark
Carcharhinus longimanus	Oceanic whitetip shark
Isurus oxyrinchus	Shortfin mako
Prionace glauca	Blue shark
Isistius brasiliensis	Cookiecutter shark

Teleosts (Scombridae and billfishes)

Acanthocybium solandri	Wahoo
Auxis rochei	Bullet tuna
Auxis thazard	Frigate tuna
Euthynnus alletteratus	Atlantic little tuna
Istiophorus albicans	Sailfish
Makaira indica	Black marlin
Makaira nigricans	Blue marlin
Scomber scombrus	Atlantic mackerel
Scomberomorus tritor	West African spanish mackerel
Tetrapturus albidus	White marlin
Tetrapturus audax	Striped marlin
Xiphias gladius	Swordfish

Teleosts (excluding Scombridae and billfishes)

Abalistes stellatus	
Aluaera punctata	
Balistes carolinensis	Grey triggerfish
Balistes punctatus	
Belonidae	Needlefish
Belonidae	Needlefish
Caranx crysos	Blue runner
Canthidermis maculatus	Rough triggerfish
Coryphaena equiselis	Pompano dolphin
Coryphaena hippurus	Dolphin fish
Diodon hystr ix	Porcupinefish
Elagatis bipinnulata	Rainbow runner
Euleptorhamphus velox	Flying halfbeak
Exocoetidae	Flying fish
Kyphosus sectator	Bermuda chub
Lampris guttatus	Opah
Lobotes surinamensis	Tripletail
Masturus lanceolatus	Sharp-tail sunfish
Mola mola	Ocean sunfish
Naucrates ductor	Pilotfish
Phtheirichthys lineatus	Slender suckerfish
Remora remora	Remora
Ruvettus pretiosus	Oilfish
Seriola rivoliana	
Sphyraena barracuda	Great barracuda
Uraspis secunda	

Sea Turtles

Caretta caretta	Loggerhead turtle
Chelonia mydas mydas	Green turtle
Eretmochelys imbricata	Hawksbill turtle
Lepidochelys olivacea	Olive lidley turtle
Dermochelys coriacea	Leatherback turtle

Marine Mammals

Balaenoptera acutorostrata	Minke whale
Balaenoptera borealis	Sei whale
Balaenoptera edeni	Bryde's whale
Balaenoptera physalus	Fin whale
Globicephala macrorhynchus	Shortfin pilot whale

Delphinus delphis	Common dolphin
Stenella attenuata	
Stenella clymene	
Stenella coeruleoalba	Striped dolphin
Stenella frontalis	
Stenella longirostris	Spinner dolphin
Steno bredanensis	
Tursiops truncatus	Bottlenose dolphin
Orcinus orca	Killer whale
Physeter catodon	Sperm whale
Pseudorca crassidens	False killer whale

BAITBOAT FISHERY

Elasmobranches

Teleosts (Scombridae and billfishes)

Auxis thazard	Frigate tuna
Euthynnus alletteratus	Atlantic little tuna
Katsuwonus pelamis	Skipjack tuna
Sarda sarda	Bonito
Seriola lalandii	Yellowtail
Thunnus atlanticus	Blackfin tuna

HARPOON FISHERY

Elasmobranches

Skates and rays

Dasyatis violacea	Pelagic stingray
Mobula mobular	Devil ray

Coastal sharks

Carcharodon carcharias	Great white shark
Cetorhinus maximus	Basking shark
Mustelus mustelus	Smooth hound
Sphyrna zygaena	Smooth hammerhead

Pelagic sharks

Alopias vulpinus	Thresher shark
Carcharias taurus	Sand tiger shark
Isurus oxyrinchus	Shortfin mako
Lamna nasus	Porbeagle
Odontaspis ferox	Smalltooth sand shark
Prionace glauca	Blue shark

* Benthic species, unlikely to be common in the by-catch of the longline fishery.
** It is recorded as by-catch of the rod and reel fishery, however, it is possibly caught by the longline fishery.

Note: This table does not provide information about the frequency or disposition of the catch. It is only a listing of species observed.

Shark classifications based on those adopted by the ICES Study Group on Elasmobranchs (distributed as addendum to SCRS/95/11) except that silky sharks (*Carcharhinus falciformis*) are classified as pelagic rather than coastal sharks In this Table. The species list is likely incomplete since detailed responses are not yet available from a full range of the Atlantic and Mediterranean tuna and tuna-like fisheries.

Table 2. **Comparison of reported total catches between the ICCAT and FAO data bases, 1995. Shark catches reported to ICCAT in numbers of fish (NO.) and round weight (MT RDWT) are compared to the reports of FAO. The percentage of the FAO report represented by the ICCAT report is indicated in the last column (ICCAT/FAO%).**

Country	*Year*	*No.*	*ICCAT RDWT*	*FAO RDWT*	*ICCAT/FAO %*
Brazil	1992	46616	2002		
	1993	61067	2312		
	1994				
	1995		4390	20280	21.65
	1996		499		
C. Ivoire	1991	1028	55		
	1992	2247	101		
	1993	1300	66		
	1994	1840	96		
	1995	1747	99	258	38.31
Canada	1995		138	2474	5.57
	1996		1107		
Cap Vert	1994		372		
	1995		1	0	
Chinese Taipei	1994		852		
Columbia	1986		51	51	100.00
	1987		83	83	100.00
	1988		150	150	100.00
	1989		143	143	100.00
	1990		36	36	100.00
	1991		23	23	100.00
	1992		286	286	100.00
	1993		307	307	100.00
	1994		102	102	100.00
	1995		46	46	100.00
Gabon	1996		1267		
Grenada	1995		14	8	
	1996		4		
Guyana	1996		765		
Japan	1995		2200		
	1996		1108		
Korea	1995	35		0	
Mexico	1995	2341	102	11903	0.85
St. Lucia	1995		1	6	18.10
St. Vincent	1996		3		
USA	1995	25447	1031	27893	3.70
	1996	29112	1140		
UK	1995		12	12770	0.08
	1996		18		
UK-Bermuda	1995		15	17	88.24
	1996	835	8		
Uruguay	1995		491	3332	14.74
	1996		301		
Discards:					
Korea	1995	58			
Mexico	1995	41	2		
USA	1995	16043	891		
	1996	27835	1042		

NATIONAL REPORTS

NATIONAL REPORT OF BRAZIL *

by

J. H. Meneses de Lima and J. Dias-Neto **

1. Fisheries information

1.1 Fleet development

The national longline fleet is comprised of Brazilian and foreign flagged longliners leased by Brazilian companies. In 1996, there were 23 vessels flying Brazilian flag operating in the fishery: 15 were based at Santos (S. Paulo), seven at Natal (Rio G. do Norte), and one in Itajai (Sta. Catarina), showing an increase of 43% in relation to 1995. The number of foreign flagged leased longliners operating in Brazilian waters in 1996 was 21, which represents a small increase in relation to the number of boats which operated in 1995. This segment of the Brazilian fleet was comprised of Taiwanese, Spanish, US, Barbadian, Honduran and Panamanian flagged vessels, which were based mainly at the Northeast region of Brazil.

The baitboat fleet in 1996 consisted of 46 Brazilian vessels and three Portuguese flagged leased vessels. In relation to 1995, the Brazilian fleet showed a decrease of 13% in the number of vessels. The majority of the baitboats are based at the port of Itajai (State of Santa Catarina). The annual number of tuna vessels (longliners and baitboats) operating in Brazilian waters for the period 1992-1996 is shown in **Table 1**.

1.2 Catches

Table 2 shows Brazilian catches of tuna and tuna-like fishes, by fishing gear, in 1996. The total catch of tuna and tuna-like species(including sharks) caught in Brazilian waters during 1996 was 40,951.4 MT, with 59.1% of this total being caught by baitboats. Skipjack is the main species caught by the baitboat fishery (91.2%), while sharks are the dominant species in the longline fishery, with a percentage composition of 28.1%, in weight, followed by swordfish (24.8%) and bigeye (22%). The dominance of sharks over the other species in the longline fishery is the result of the high percentage of sharks (53.8%) caught by the segment of the fleet comprised of Brazilian vessels. In the catches of the leased longliners, sharks appear in a much smaller percentage. This difference in species composition probably results from the fact that some of the Brazilian longliners target sharks, while the leased longliners target tuna or swordfish and discard the majority of the sharks caught. From **Table 3**, which presents catches by species for each group of the longline fleet, it can be seen that bigeye and swordfish are the main species in the fishery of leased longliners, while sharks appear as the dominant species in the Brazilian longline fishery.

Table 3 also shows that there has been an increasing trend in swordfish catches for both the national and leased longliners during the 1992-1996 period. This increase in catches is more evident for the Brazilian longliners, as a consequence of changes which have occurred in this fishery since 1994, when some vessels initiated a directed swordfish fishery. This change in target species has had a direct effect on shark catches, which decreased from 60% in weight (in 1992-93) to 44% and 54%, respectively, in 1995 and 1996.

Table 4 shows catches by the baitboat fishery for the period 1992-1996. The total catch in 1996 was 24,196 MT, which represents an increase of 22.1% over the 1995 catch. While skipjack, the main species caught, showed an increase of 33.6% in relation to 1995, yellowfin catches showed a marked decrease of 51.2%.

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* Original report in English.

** Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis - IBAMA.

Shark catches taken by the longline fishery, which were previously reported as combined catches of all shark species, are now recorded by species (blue shark, hammerhead shark, bigeye shark, shortfin mako and silky shark) in the new logbook format, which was implemented in 1996. **Table 5** shows shark catches by species for each group of longline vessel. Blue shark is the most important species caught (36.1%) followed by silky shark (23.1%). As for the remaining species of sharks, which are not identified by species, it can be seen that the leased vessels show a higher proportion of sharks in this group than the Brazilian vessels, with 57.3 and 22.1%, respectively.

Preliminary landing estimates of the main tuna species taken by the artisanal fishery, in the Northeast region of Brazil, are shown in **Table 6**, for the period 1992 through 1996. Total landings for 1996 were 7,613.3 MT, representing an increase of 131% over the estimated landing recorded for 1995. This is explained by the fact that the data collection system for the artisanal fishery has now been fully implemented, covering all the states of the Northeast region of Brazil.

1.3 New developments in the fishery

In 1996, a change which occurred in the Brazilian longline fishery was the increase in the number of longliners targeting swordfish. Some vessels replaced the traditional longline by the nylon monofilament longline, while others continued to use the traditional nylon multifilament longline, which was modified to operate closer to the sea surface. In both cases, the longline was set late in the afternoon and squid was used as bait together with one way light sticks attached to each branch line.

This change was, in part, the result of a more efficient use of the monofilament longline, by some of the leased longliners, which started fishing operations targeting for swordfish. As some of these vessels were equipped with freezer facilities and could remain longer at sea, they started to fish to the North of the traditional area fished by the Brazilian longliners. As a result, there was an expansion of the fishing area which now covers the Northeast region of Brazil. Following these developments in the fishery, a seasonal pattern in the distribution of fishing is now observed: from June to October fishing concentrates in the South and Southeast regions and for the remaining months, in the Northeast region.

Another development worthy of mention was the initiation of some experimental purse seine fishing for skipjack by one vessel engaged in the sardine fishery. These fishing operations were carried out during the summer months, on concentrations of skipjack occurring closer to the coast.

2. Research and statistics activities

The "Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA)", through its regional fishery research units, CEPENE and CEPSUL, located in the Northeast and South regions of Brazil, respectively, has been in charge of the collection and compilation of Brazilian fishery data, with the exception of the State of S. Paulo, where this activity is carried out by the "Instituto de Pesca".

All vessels licensed to fish in Brazilian waters are required to accept on-board observers when requested by the governmental agency responsible for the conservation and management of fishery resources. In 1996, one observer was placed on a longline trip targeting swordfish. Data collected included measurements of length and weight, which have allowed the estimation of length/weight relationships to be used for the conversion of the landing data on individual fish weight into fish length.

The collection of tuna statistics and sampling for size frequency, for the main tuna species (skipjack, yellowfin and swordfish), has been continued in 1996. The compilation of Task I and Task II data on catch and catch/effort for 1996 has been finalized and submitted to ICCAT, while the processing of data on length frequency measurements is still in progress.

2.1 Statistical collection systems

Statistics on catch and effort are collected through logbooks, whose submission is mandatory by all masters of fishing vessels over 20 GRT, licensed to fish in Brazilian waters. Submitted logbooks must be completed in full on a daily basis, at the end of each trip. This requirement also applies to foreign flagged leased vessels authorized to fish in Brazilian waters.

In 1996, with the full implementation of the data collection system for the artisanal fishery, statistics on landings of the main tuna species taken by the artisanal fishery are now available for all the States of the Northeast region of Brazil.

3. Implementation of ICCAT conservation and management measures

ICCAT recommendations of minimum weight limits for yellowfin and bigeye have been implemented in domestic legislation in 1973 and 1981, respectively. Up to now, there have not been any observed landings of undersized fish beyond the limits of tolerance established by the regulations.

As for the minimum size and weight limits for swordfish, this recommendation was incorporated into domestic legislation in 1995. However, due to some operational difficulties which have arisen when this measure was implemented, the regulation is now being amended to overcome this problem.

As regards, port inspection, although Brazil has accepted the ICCAT Port Inspection Scheme, it has not been implemented as there is a domestic inspection scheme in place which is equivalent to the one adopted by ICCAT.

With reference to inspections of foreign fishing vessels, there have been no landings in Brazilian ports as the national legislation on fisheries does not grant access to foreign fishing vessels into Brazilian ports, except in cases of *force majeure*. Taking into account that in the past it has been confirmed that some vessels made excessive use of this right under false allegation of *force majeure*, to have access to Brazilian ports, nowadays all vessels in this situation are subject to a rigorous process of inspection, which also includes the inspection of catches retained on board.

Table 1. Distribution of tuna vessels that operated in Brazilian waters, by type of fishery and vessel flag, 1992-1996[1]

Fleet	*1992*		*1993*		*1994*		*1995*		*1996*	
	BB	LL	BB	LL	BB	LL	BB	LL	BB	LL
Brazilian	57	17	57	19	54	16	53	16	46	23
Spanish [2]	--	--	--	--	--	--	--	--	--	3
American [2]	--	--	--	--	--	--	--	--	--	1
Barbadian [2]	--	--	--	--	--	--	--	2	--	2
Honduran [2]	--	1	--	1	--	2	--	1	--	2
Japanese [2]	--	1	--	2	--	2	--	2	--	--
Portuguese [2]	--	2	--	--	--	--	3	--	3	--
Panamanian [2]	--	--	--	1	--	1	--	--	--	1
Chinese Taipei [2,3]	--	26	--	32	--	20	--	14	--	14
Korean [2]	--	--	--	--	--	2	--	2	--	--
TOTAL	**57**	**47**	**57**	**55**	**54**	**43**	**56**	**37**	**49**	**46**

1 Does not include vessels from artisanal and small-scale fisheries.
2 Foreign vessels leased by Brazilian companies and licensed to fish in Brazilian waters, in accordance with Brazilian law, have the same status as Brazilian vessels.
3 Includes some vessels that flew flags of Chinese Taipei in the past and are now flying Belizian flag.

Table 2. Preliminary estimates of Brazilian catches (MT round weight) of tuna and tuna-like fishes, by fishing gear, in 1996

Species	*Longline*	*Baitboat*	*Gill net*	*Hand line*	*Surface*	*TOTAL*
Yellowfin (YFT)	732.3	1274.5	7.9	69.2	984.5	3068.4
Albacore (ALB)	807.4	16.9			185.5	1009.8
Bigeye (BET)	1709.0					1709.0
Skipjack (SKJ)	3.0	22076.5				22079.5
Swordfish (SWO)	1933.0		1.6	0.2		1934.8
Sailfish (SAI)	74.2		10.2		252.4	336.8
White marlin (WHM)	70.8		0.5		2.5	73.8
Blue marlin (BUM)	132.7		21.1	0.1	15.5	169.4
Blackfin tuna (BLF)	1.0	534.4			451.7	987.1
Frigate tuna (FRI)	0	288.7	2.3		52.5	343.5
Atlantic black skipjack (LTA)	0.6				833.9	834.5
Serra Spanish mackerel (BRS)	0				3047.0	3047.0
King mackerel (KGM)	0				2927.1	2927.1
Unspecified sharks (SHARKS)	2186.2		39.8	4.7		2230.7
Other fishes	133.5	5.0	7.0	54.4		200.0
TOTAL	**7783.7**	**24196.0**	**90.4**	**128.6**	**8752.6**	**40951.4**

Table 3. Catches (MT) of tuna and tuna-like fishes taken by the Brazilian and foreign leased[1] longline fleet, 1992-1996

Species	*Fleet*	*1992*	*1993*	*1994*	*1995*	*1995* [2]
	Brazilian	227	418	165	98	107
Yellowfin	Leased	970	1100	919	1214	559
	Brazilian	95	55	68	91	78
Albacore	Leased	2615	3545	767	633	729
	Brazilian	29	54	39	94	61
Bigeye	Leased	760	1202	557	1841	1648
	Brazilian	608	674	969	1168	776
Swordfish	Leased	1979	1339	602	572	1156
	Brazilian	30	51	34	32	29
Sailfish	Leased	252	150	26	65	45
	Brazilian	117	79	73	60	46
White marlin	Leased	92	224	17	43	24
	Brazilian	14	19	21	43	59
Blue marlin	Leased	109	127	49	126	74
	Brazilian	40	4	5	4	6
Other [3]	Leased	227	204	32	69	4
	Brazilian	2000	2137	1892	1461	1430
Sharks	Leased	575	1439	720	692	756
	Brazilian	**3160**	**3491**	**3266**	**3051**	**2592**
TOTAL	**Leased**	**7579**	**9330**	**6989**	**5255**	**4995**

1 In accordance with Brazilian law, these vessels have the same status as Brazilian vessels.

2 Preliminary estimates.

3 Includes *Acanthocybium solandri*, but not dolphin fish and others.

Table 4. Catches (MT) of tuna and tuna-like fishes taken by the Brazilian and Portuguese flagged leased[1] baitboat fleets, 1992-1996

Species	*Fleet*	*1992*	*1993*	*1994*	*1995*	*1996*
Skipjack	Brazilian	18,273	17,611	20,555	15,675	21,124
	Leased	---	---	---	---	953
	Total	18,273	17,611	20,555	15,675	22,077
Yellowfin	Brazilian	2,661	3,088	2,744	2.581	1,230
	Leased	---	---	---	32	44
	Total	2,661	3,088	2,744	2,613	1,274
Others	Brazilian	287	414	258	659	838
	Leased	---	---	---	---	7
	Total	287	414	258	659	845
TOTAL	**Brazilian**	**21,221**	**21,113**	**23,757**	**18,915**	**23,192**
	Leased	**---**	**---**	**---**	**894**	**1,004**
	Total	**21,221**	**21,113**	**23,757**	**19,809**	**24,196**

[1] Portuguese flagged baitboats leased by Brazilian companies and licensed to fish in Brazilian waters. In accordance with Brazilian law, these vessels have the same status as Brazilian vessels.

Table 5. Catches of shark species (MT round weight) taken by Brazilian and foreign flagged leased longliners in 1996

Species	*Brazilian fleet*	*Leased fleet*	*Total*
Blue shark	581	209	790
Scalloped hammerhead	20	17	37
Bigeye thresher	9	2	11
Shortfin mako	38	57	96
Silky shark	467	38	504
Unspecified sharks	315	433	748
TOTAL	**1430**	**757**	**2186**

Table 6. Preliminary landing estimates (MT) of the main tuna species taken by the artisanal fishery in the Northeast region of Brazil, 1992-1996

Year	*King mackerel*	*Spotted Spanish mackerel*	*Blackfin tuna*	*Others*	*Total*
1992	933	1114	139	795	2981
1993	1136	629	--	607	2372
1994	1327	1124	347	716	3514
1995	1249	1311	280	454	3294
1996	2887	3047	452	1228	7613

NATIONAL REPORT OF CANADA*

by

J. M. Porter** and C. J. Allen***

1. National fisheries Information

The Canadian Atlantic statistical systems provide real time monitoring of catch and effort (see section 2 below) for all fishing trips.

1.1 Bluefin tuna

Bluefin occur in Canadian waters from July to October over the Scotian Shelf, in the Gulf of St. Lawrence, in the Bay of Fundy, and off Newfoundland. In adherence to the ICCAT agreement, the Canadian quota for the 1996 calendar year was 613.5 MT. This Canadian quota is comprised of 535.6 MT allocation from ICCAT for the calendar year 1996 plus a carry-over of 77.9 MT. The carry-over is the difference between what Canada caught in 1995 (576.1 MT) and the level at which Canada could have set her quota (654 MT) in 1995. The Canadian nominal landings of Atlantic bluefin tuna in 1996 were 598.0 MT, leaving 15.5 MT uncaught (**Table 1**).

The major fishery since 1988 has been in the tended line fishery in the Hell Hole between Browns and Georges banks (off southwestern Nova Scotia), though in 1996 its importance had decreased substantially to about 24% of the Canadian landings (from 70% in the early 1990s). Further, the fishery in the Hell Hole is much more spatially dispersed than in past years. Fish captured in this fishery weigh about 200 kg (round), on average. Nominal CPUE has been fairly stable in recent years, though at a lower level than at the inception of this fishery in 1988 (SCRS/96/68). In 1996, 19% of the Canadian catch came from the Gulf of St. Lawrence. This was lower than 1995, and represents the level of harvest generally seen during the 1990s. The nominal CPUE levels presently observed are much lower than the CPUE observed in the early 1980s (SCRS/96/68). The Gulf of St. Lawrence fish weigh about 400 kg (round), on average. A substantial catch was also taken from the St. Margaret's Bay traps (90 MT), from the rod and reel fishery off northeastern Nova Scotia (41 MT), and from a new fishing area off Halifax (60 MT). In the Bay of Fundy, 32 MT were taken by electric harpoon. In 1996, 95 MT were taken in the tended line fishery on the Tail of the Grand Banks of Newfoundland; this fishery has shown marked fluctuations in recent years due primarily to decreased effort in the groundfish fishery and irregular presence in the off-shore fishing grounds. The off-shore longline vessel, which directs for tuna other than bluefin in the northwest Atlantic, now under new ownership, caught 2 MT over their 20 MT by-catch limit in 1995.

In 1996, 530 licensed fishermen actually participated in the directed bluefin fishery, one offshore longline license was issued with a bluefin by-catch provision, and four fish-trap license holders in St. Margaret's Bay used 24 bluefin tuna trapnet licenses throughout the season (**Table 2**).

1.2 Swordfish

Swordfish occur in Canadian waters from May to November, primarily on the edge of Georges Bank, the Scotian Shelf and the Grand Banks of Newfoundland. The ICCAT recommendation for the Canadian swordfish quota for 1996 was 1,400 MT. The Canadian nominal landings of swordfish in 1996 were 739.1 MT (round; **Table 1**). This is less than half of the landings in 1995; this reduction is attributed to a combination of factors including the closure of prime fishing areas early in the season to avoid small fish and bluefin by-catch, to anomalous oceanographic conditions, and to a general paucity of swordfish.

In 1996, 646 MT were taken by longline (or 87% of the catch), while the tonnage taken by harpoon was 93 MT (**Table 3**). The mean weight (round) of longlined and harpooned swordfish was 69 kg and 161 kg, respectively

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* Original report in English.

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*** Fisheries and Oceans Canada, Resource Management Branch, 200 Kent Street, Ottawa, Ontario K1A 0E6.

(Table 3). There were no reported landings of small swordfish as defined by the new ICCAT swordfish recommendations for regulatory measures (< 119 cm LJFL). The Canadian longline CPUE for mature fish continues to show a declining trend, consistent with the conclusions of the SCRS.

All 77 licensed longline fishermen were active in the 1996 fishery (**Tables 2, 3**). Although a total of 1,400 fishermen are eligible for harpoon licenses, only about 112 actually landed fish in 1996. For many, harpooning swordfish is an opportunistic activity conducted during other fisheries, though in recent years several fisherman fish early in the season solely by swordfish harpoon. Generally, in recent years, with the decline of groundfish stocks, more fishermen direct for swordfish (**Table 3**). In addition, one offshore longline license was issued for tunas other than bluefin with a swordfish by-catch provision.

1.3 Other tunas

The other tunas (albacore, bigeye and yellowfin) are at the northern edge of their range in Canada, hence catches are small. They are found on Georges Bank, the Scotian Shelf and the Grand Banks during summer months. One Canadian offshore longline vessel, has been designated to direct for other tuna species and the 77-vessel swordfish longline fleet has a dual license capability enabling them to direct for other tunas during the swordfish fishery. The fishing activity (catch and nominal CPUE) for other tunas in 1996 was about the same as in 1995, with swordfish longline vessels directing for yellowfin (154.5 MT) and bigeye (144.0 MT) early in the season.

1.4 Sharks

Historically, blue shark, porbeagle and shortfin mako have been a by-catch of the Canadian swordfish and groundfish longline fisheries although small amounts are also landed from other fisheries. It is believed that the by-catch is larger than reported because of discarding, though regulatory amendments are addressing this problem. A directed longline fishery has been developing in recent years and a Management Plan for these species was implemented in 1995-96. This plan was further developed in 1996 (and approved for 1997-99). The intent of this plan is to provide the basis for a Scientific Monitoring fishery by enabling a minimum number of Canadian exploratory shark fishing licenses to direct for shark while providing detailed scientific data on stock abundance and distribution. This information will be used to determine whether or not a commercial shark fishery is sustainable after 1999, and, if so, under what conditions.

In 1996, 55 licenses were authorized to fish for porbeagle and/or blue shark, with all other sharks, including shortfin mako regulated to a by-catch. The new plan has put a freeze on any new license authorizations. Total reported landings in 1996 were 1015 MT of porbeagle, 12 MT of blue shark and 67 MT of shortfin mako (**Table 1**). The recreational fishery is restricted to hook and release only.

2. Research and statistics

In 1994, a Dockside Monitoring Program was established in Atlantic Canada for some of the swordfish and bluefin fleets. This statistical system allows a real time monitoring of catch and effort. At the completion of each fishing trip, log record data must be submitted by each fisherman to a monitoring company which inputs the data into a central computer system. Data must be received from fishermen before they can proceed with their next fishing trip. This ensures 100% coverage of properly completed log records and individual fish weights. Log records have information on catch, effort, environmental conditions and by-catch. In 1996, this industry-funded system applied to all fleets (including sharks), and included monitoring of all trips even when no fish were caught. Prior to the implementation of the Dockside Monitoring Program, even though the submission of logbooks was compulsory, less than 50% of trips were represented by useable log records and information on individual sizes of fish (see **Table 3** for swordfish). Problems such as by-catch and highgrading are assessed through Observer Programs and at-sea surveillance on the domestic fleet. License holders that do not comply with the fisheries regulations and conditions of license are sanctioned under the Fisheries Act of Canada, and subject to fines and/or loss of fishing privileges.

2.1 Bluefin research

The scientific research program at the Biological Station St. Andrews is as follows:

1) Data entry of all bluefin CPUE from log records from 1984-94 completed, and preliminary analyses initiated. Consultation with Industry and completion of analyses in 1996.

2) Dockside Monitoring for all bluefin tuna landed in Canada, and data entry by Regional Statistics offices. In 1996 there was monitoring and data entry for all trips even when no fish were landed.

3) Developed Canadian standardized CPUE indices of relative abundance for the Hell Hole and Gulf of St. Lawrence fisheries and updated the nominal index for the Gulf.

2.2 Swordfish research

The scientific research program at the Biological Station St. Andrews is as follows:

1) Updated 1961-95 biomass index and 1988-95 age-specific index for swordfish caught by longline.

2) Calculation of the Canadian catch-at-size by sex from 1988 to 1995.

3) Hail and dockside monitoring implemented for all longline swordfish landed in Canada and data entry conducted by regional Statistical offices. In 1996, there was dockside monitoring for all swordfish landings including harpoon, and the system improved the monitoring of late season catches while vessels were still at sea in order to prevent overrun of the quota.

4) Continuation of the juvenile swordfish cooperative tagging study with the Nova Scotia Swordfishermen's Association. In 1996, 19 fish were tagged and two recaptured.

2.3 Other tunas

Biological sampling of other tunas (albacore, bigeye, yellowfin) has been conducted on the Canadian offshore and Japanese fisheries within the 200-mile fisheries zone. There was limited sampling of the domestic fleet (submission of tally sheets, logs, and some observer coverage).

2.4 Sharks

Prior to 1994, DFO did not have an active program of research on sharks. Increasing interest by industry to exploit sharks - particularly porbeagle, blue and mako - stimulated a modest research and assessment effort on sharks. The focus of the research program has been to establish the collection of basic fisheries information from this fishery. This will include detailed catch and effort data on a set-by-set basis, and species, size and sex composition of all catches. In the spring of 1996, the needs for the program were reviewed and outlined in four, broad areas:

1) The collection and processing of information from the historical and current fishery.

2) The analyses of existing data to elucidate the trends in abundance.

3) Studies on shark life history, including a tagging program, operating on a co-operative basis with commercial and sport fishermen, to help delimit the stock areas.

4) Clarification of the official landings statistics.

Specific projects within each area have been defined and will be undertaken within available resources.

3. Implementation of ICCAT conservation and management measures

For bluefin, swordfish, and sharks, Canada issues an annual management plan prior to the opening of the respective fishing seasons. The shark plan is now multi-year (1997-99). Details of management measures and their enforcement are provided in Appendix A. These plans are compiled in consultation with the fishing industry and incorporate all relevant ICCAT regulatory recommendations. They are implemented under the Fisheries Act of Canada. In 1996 the Bluefin Tuna Management Plan was announced on 31 May, 1996, and the Swordfish Management Plan was announced on 4 June, 1996. The necessary ICCAT regulatory recommendations are either specified in the Atlantic Fishery Regulations (1985) (made under the Fisheries Act) or are handled as written conditions of license, both of which are legally binding on fishermen.

3.1 Bluefin tuna

Canada has implemented the ICCAT regulatory recommendations that apply to bluefin tuna in the Canadian Atlantic Bluefin Management Plan (Appendix A). The 1996 quota was set at 613.5 t, (see 1.1 above), and no person shall have in their possession any bluefin weighing less that 30 kg. In addition, Canada has limited entry into the fishery; and restrictions on the amount and type of gear used, vessel replacement, management fishing areas, and license transfer requirements.

In 1996, Canada had a computerized system to record the implementation of the ICCAT Bluefin Tuna Statistical Document Program. Prior to the ICCAT program, Canada already had a system of uniquely numbered tags to be attached to all bluefin tuna landed in Canada.

3.2 Swordfish

Canada has implemented the ICCAT regulatory recommendations that apply to swordfish in the Canadian Atlantic Swordfish Management Plan (Appendix A). The 1996 quota was set to 1400 MT, and there is a prohibition on the taking and landing of swordfish less than 119 cm LJFL (no tolerance). In addition to the ICCAT regulatory recommendations, Canada has limited entry into the fishery, strict by-catch provisions, time-area closures to protect small fish and minimize by-catch, and gear restrictions.

3.3 Other tunas

The 3.2 kg minimum size restriction for bigeye and yellowfin is not relevant in Canada as these small fish do not enter the cold waters of Canada. These other tunas are managed under the Fisheries Act and the effort is restricted by limiting entry into the fishery to vessels having a swordfish longline license and to one offshore longline license specifically allowed to direct for these other tunas.

3.4 Sharks

ICCAT has no regulatory recommendations for sharks. However, Canada has a domestic management plan which includes provisions for a limited entry exploratory fishery, catch levels, by-catch restrictions, restrictions on processing of the landed/caught fish (including a prohibition on finning), gear restrictions, time-area closures, and the collection of fishing and biological data (Appendix A).

4. Inspection schemes and activities

Canada is not a signatory to the ICCAT Scheme of Port Inspection, and uses a more comprehensive enforcement protocol which involves a combination of the Dockside Monitoring Program, and shore and sea-based patrols of Department of Fisheries and Oceans Fisheries Officers to ensure compliance with domestic regulations (which include ICCAT regulatory recommendations; see 3 above). No foreign vessels land tuna in Canadian ports and efforts are concentrated on the Canadian fleet. The Japanese vessels fishing in the Canadian 200-mile fishing zone are required to have 100% observer coverage while in Canadian waters. As well, their activities are also monitored by aerial surveillance and at-sea inspections.

In addition to the Dockside Monitoring Program to ensure complete coverage of the catch and effort of the Canadian fleet (see 2 above), aerial and vessel surveillance is used to monitor the fleets at-sea. Shore-based patrols monitor routine landings, watch for illegal landings and conduct airport and border surveillance. Observer coverage is used periodically to monitor the commercial fishery. Details of enforcement activity are outlined in Appendix B.

NOTE: Appendices A and B are available at the Secretariat for consultation.

Table 1. Summary of 1991-96 Canadian landings (MT round weight) of large pelagic fish species

	Landings					
Species	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Swordfish	1026.5	1546.5	2233.7	1675.7	1609.2	739.1
Bluefin tuna	481.7	443.5	458.6	391.6	576.1	598.0
Albacore	5.7	1.0	8.7	32.2	11.5	23.9
Bigeye tuna	27.1	67.5	124.1	110.5	148.6	144.0
Yellowfin tuna	28.0	25.5	71.5	52.3	174.4	154.5
Unspecified tuna	2.0	3.2	9.1	0.2	0.0	0.0
Blue shark	32.0	101.1	20.8	133.0	123.0	11.8
Shortfin mako		119.0	152.2	157.2	107.0	67.4
Porbeagle	346.0*	741.0	919.0	1549.0	1305.0	1015.4
Unspecified sharks	61.4	49.0	22.7	107.1	38.4	12.7

* Mackerel sharks.

Table 2. Distribution of bluefin tuna and swordfish fishing licenses, by region and species* in 1996

	Number of licenses					
	Bluefin		*Swordfish LL*		*Other tunas******	
Region	*Total*	*Active*	*Total*	*Active*	*Total*	*Active*
Gulf	606	424	0	0	0	0
Newfoundland	55	*** 30	10	10	10	10
Scotia-fundy	42	41	67	67	67	67
St. Margaret's Bay**	4	4	--	--	--	--
Quebec	54	31	0	0	0	0
Total	**761**	**530**	77	77	77	77

* Bluefin tuna, swordfish and other tunas are regulated by limited entry.
** Four fish trap license holders with six bluefin trapnet licenses each.
*** 38 of these licenses are subject to a reduced level of fishing activity and restricted to NAFO Divisions 3LNO.
**** Restricted to tunas other than bluefin (albacore, bigeye, yellowfin).

Note: Active fishermen are those that picked up their licenses, license conditions and tags, and may or may not have actually fished.

Table 3. Summary of 1988-96 active licences, swordfish landings (MT round weight), average weight of fish (kg round) and percentage of small fish *

	1988	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Number of vessels landing fish									
Longline	39	52	50	53	46	75	74	77	77
Harpoon	+	+	+	61	72	72	32	97	112
Landings (MT)									
Longline	887	1097	819	953	1486	2206	1654	1421	646
Harpoon	24	146	92	73	60	28	22	188	93
Total	911	1243	911	1026	1546	2234	1676	1609	739
Avg. wt (kg)									
Longline	50	52	61	61	57	56	63	68	69
(# sampled)	(1315)	(3902)	(10280)	(8111)	(5904)	(19469)	(26279)	(20247)	(9077)
Harpoon	–	129	138	78	67	129	120	122	161
(# sampled)	(0)	(637)	(164)	(146)	(136)	(151)	(83)	(1131)	(561)
% of catch small fish* (by #)	16	16	11	11	16	15	11	9	0
% of catch sampled	7	23	71	49	23	50	99	94	97

* <25 kg round weight until 1995, and <119 cm LJFL in 1996.
\+ undetermined number, but <100.

NATIONAL REPORT OF THE PEOPLE'S REPUBLIC OF CHINA *

by

Bureau of Fisheries, Ministry of Agriculture

1. Introduction

The People's Republic of China deposited an Instrument of Adherence to ICCAT with the Director General of the Food and Agriculture Organization of the United Nations (FAO), and became a Contracting Party to ICCAT on October 24, 1996. It is a great pleasure for China to become a member of the ICCAT family. In accordance with the ICCAT objectives, China would like to cooperate with other members in achieving the long-term goals of conservation and sustainable development of the tuna resources in the Atlantic Ocean.

2. The fisheries

Longline fishing vessels from China's Mainland started their tuna fisheries in the Atlantic Ocean in 1993. The fleet is presently comprised of four longliners, but in 1996, only two longliners actively engaged in tuna fishing in the Atlantic Ocean.

The main target species include bigeye, yellowfin and bluefin tunas, and some swordfish and other billfishes **(Table 1)**.

The principal fishing areas are the tropical Atlantic Ocean and the Mediterranean Sea; there are no canned tuna products.

3. Research and management

Since the tuna fishery in the Atlantic Ocean is a relatively new industry in China's Mainland, there is no research work and domestic management measures are being carried out at present. However, since China became a Contracting Party to ICCAT, the fisheries authorities have ordered the Chinese fishing fleet to closely monitor the fishery and to operate in a manner which is consistent with the management measures adopted by ICCAT.

Table 1. Tuna catches (MT) by China in the Atlantic Ocean and Mediterranean Sea, 1993-1996

Species	*1993*	*1994*	*1995*	*1996*
Bigeye tuna	62	379	421	460
Yellowfin tuna	123	138	177	110
Albacore	--	14	8	20
Bluefin tuna	--	84	118	80
Swordfish	55	65	79	100
Others	41	68	76	80
Total	**281**	**748**	**879**	**850**

* Original report in English.

NATIONAL REPORT OF CôTE D'IVOIRE *

by

N'Goran Ya Nestor **

1. Introduction

Since the 1980s, there have not been any tuna vessels flying Ivorian flag fishing for tuna resources in the Côte d'Ivoire EEZ. However, due to the importance of the port of Abidjan and especially because of its international relations, mainly its adherence to fishing agreements with the EC and its membership in ICCAT, Côte d'Ivoire currently plays an important role in the exploitation, management, commercialization and transformation of tunas from the eastern tropical Atlantic.

This report, which presents an overall view of activities carried out in 1996 and 1997, shows the degree of Côte d'Ivoire's contribution to ICCAT's work relative to the management of central eastern Atlantic tunas. It also presents some problems that should be resolved.

2. Tuna fisheries landing at the port of Abidjan

The tunas that are landed daily at the port of Abidjan are from three international industrial fleets and, to a lesser degree, from a national artisanal canoe fishery. These fisheries that continued their activities in 1996 and 1997 were comprised of 17 French purse seiners, 29 Spanish purse seiners, 4 NEI purse seiners and 83 canoes for driftnet fishing.

The industrial fleets landed 168,000 MT of tunas in 1996, including 11,000 MT of false fish. These false fish correspond to the part of the catches which are not accepted by the canning factories or by the freezer cargo vessels. These false fish are highly useful, since they constitute the component of the industrial fishing that is local consumption and they are inexpensive, and thus easily assessable to the populations with low economic means.

As regards the canoe fishery, these land billfishes as well as and large quantities of tunas. Of the 4,278 large fish landed and reported during the first quarter of 1997, 17% were tunas (238 skipjack, 473 yellowfin, 46 large frigate tunas, as well as 487 cases of 40 kg of small yellowfin.

3. Tuna processing

Three factories (SCODI, PECHE-FROID and CIDCI) process the tuna landed at the port of Abidjan for canning. SCODI and PECHE-FROID are located within the dock area of the port. The SCODI factory alone processed 46,092 MT of tuna in 1996 and 45,263 MT during the first nine months of 1997.

With the increase in the market value of tunas, these processing plants play an important part in the reducing unemployment since they create thousands of jobs.

4. Research studies

Scientific research on tunas is carried out by the Center for Oceanographic Research (CRO), and concentrate on two main areas: statistics and biology.

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* Original report in French.

** Centre de Recherches Océanologiques, B.P. V-18, Abidjan.

4.1 Statistics

There are five persons employed full time (temporary staff from the public sector) and two contracted staff who work under the supervision of two technical exports, one from ORSTOM and the other from the IEO. This team's work is to monitor and survey the landings of the tuna vessels and the canoes. These survey activities and measurements are carried out in accordance with the procedures proposed by ICCAT. Activities in 1996 and 1997 are summarized in **Tables 1 and 2.**

4.2 Biology

Two scientists and a graduate student carry out the scientific work on the biology, populations dynamics and environment of tunas, within the framework of an important program entitled "PICOLO".

5. Financing sources

The research work conducted in 1996 and 1997 at the CRO by national scientists and technicians, ORSTOM researchers and the IEO technician is financed by various sources, such as the Government of Côte d'Ivoire, ORSTOM, IEO, and the EC.

6. Conclusion and perspectives

The numerous activities relative to the tuna resources that take place in Côte d'Ivoire, by the CRO and at the port of Abidjan, indicate the important role of Côte d'Ivoire in ICCAT work for the management of these resources. These activities include the exploitation, statistical monitoring and biological studies, tuna processing, and providing products for local consumption. Currently, the data collected and analyzed and submitted regularly to ICCAT are mostly from the CRO in Abidjan, as well as data relative to the processing and cold conservation of tunas mainly from Abidjan.

The importance of Côte d'Ivoire's role within ICCAT requires maintaining all the activities described in this report. Unfortunately, staffing problems at the end of 1997 may jeopardize the continuation of this work if appropriate solutions are not found soon. This problem has been caused by a decision of the Government of Côte d'Ivoire to rescind all temporary staff by the end of 1997. This measure affects all the staff that conduct the tuna surveys. However, the Director of the CRO, aware of the situation, is trying to find solutions to this problem. For this research, the cooperation of all the parties involved (ORSTOM, IEO, ICCAT) is essential.

Another problem which should be addressed refers to the relationship between the CRO and the IEO as concerns data communication. Since the CRO and the IEO decided to work in collaboration, it would be convenient, if not obligatory, that the data from surveys conducted by the technicians working of both organizations be made available to the scientists of both organizations. It is inadmissible, and even frustrating, that the national scientists have to wait a year or more for the Spanish fisheries data, after having been processed by ICCAT. The fishing agreements signed by these two countries stipulate that the data should be transmitted to the authorities of the country whose waters have been exploited. The Ivorian scientists urge the Spanish authorities to authorize the technician responsible for conducting the surveys of the Spanish tuna vessels at the port of Abidjan, starting from now on, to facilitate all the data collected from now on.

Table 1. Surveys of French and NEI tuna vessels at the port of Abidjan

Year	*Number of fishing activities*	*Number of samples taken*	*Avg. number of surveys/month*
1996	191	962	5.04
Jan to Sept., 1997	108	496	4.59

Table 2. Surveys of canoes at the port of Abidjan

Year	*Number of canoes in activity*	*Number of trips sampled*
1996	83	7,794
Jan to Sept., 1997	80	5,244

NATIONAL REPORT OF CROATIA *

1. Introduction

In 1997, the Republic of Croatia participated for the first time as a full member in the activities of the SCRS and the Commission. Two documents, entitled "Tuna catches in the eastern part of the Adriatic" (SCRS/97/93) and "Reviewed fishing statistics and tuna catch records in the Republic of Croatia" (SCRS/97/94) were submitted to the 1997 SCRS, and represented Croatia's initial work within ICCAT. Both documents are expected to be published in the Commission's *"Collective Volume"* series.

2. Croatian fishery in the eastern Adriatic

Croatia is trying to implement conservation and sustainable fishing of the highly migratory species, in particular, bluefin tuna *(Thunnus thynnus thynnus* L.). New information was presented in document SCRS/97/93 and a proposal has been made to substitute the August closure of purse seine fishing in the eastern Adriatic for a prohibition of purse seine fishing in May or June. The reason for this proposed change is that Croatian fishermen catch more juveniles during the months of May or June, rather than in August, as is the case for other parts of the Mediterranean.

Document SCRS/97/94 presents a complete review of the Croatian tuna catches in the last six years. This work had been carried out since the Croatian official statistics were incomplete, as confirmed by a letter to ICCAT (dated July 30, 1997) from the National Bureau of Statistics. The statistical information was collected directly from the fishermen in letters signed by them, and which include the catch quantities for each vessel (**Table 1**). While Croatia has no doubts about these data, if such information is not acceptable to the SCRS or the Commission, it is willing to accept any type of review of Croatian statistics.

3. Conservation measures

As new members attending for the first time, Croatia is very interested in cooperating with ICCAT. As is known, the Republic of Croatia is a newly independent state, but one which two years ago celebrated its first thousand years of a national fishery. Because of the short time since its independence, the Croatian administrative system is still in the developing stages. Thus, it was not until early in 1997 that the Directorate of Fisheries was established within the Ministry of Agriculture and Forestry, as the body responsible for all national and international affairs relative to fishing. Since its establishment, the Directorate has carried out a wide array of work in the area of cooperation with ICCAT, including:

- An overall review of Croatian tuna fishing statistics, starting from the time of its declaration of independence, as explained at the 1997 SCRS Meeting in October and in document SCRS/97/94. This statistical revision was unanimously supported by the SCRS. The ICCAT scientific committee recommended sending an expert to Croatia to check the revision, and this was wholeheartedly accepted by Croatia.

- A halt in any further increase in fishing effort with any new fishing gears or new fishing vessels.

- A review was undertaken by Croatian experts on purse seine catches during the summer season and this was also discussed at the 1997 SCRS, and interesting information was presented in SCRS/97/93.

- A notable achievement of Croatian efforts, in conjunction with ICCAT cooperation, has been Croatia's full membership in a prestigious organization such as ICCAT, for which the administrative procedures were completed in record time.

* Original report in English.

In view of the confidence placed in ICCAT and the efforts made so far, Croatia recommends:

- That no final quota be imposed on Croatia, pending final revision of statistics. On its part, Croatia is committed to curbing and reducing further catch increases until the final revision of its statistics has been completed.

- That the August prohibition of purse seine fishing in the eastern part of the Adriatic (eastern epicontinental belt) be changed to the period of May 15-June 15. This would represent a more realistic conservation of under-sized bluefin tuna.

It was also noted that age 0 bluefin tuna are not found in this part of the Mediterranean, whereas in late spring, age 1 bluefin tuna are present. However, the month of August is the period of the most favorable catches, from the point of view of average weight of the fish. All this information has been presented to the SCRS in document SCRS/97/93 and the same recommendation was made by the Committee.

Finally, it is worth mentioning that there is an image of a bluefin tuna *(Thunnus thynnus thynnus* L.) on the two-kuna coin, the official currency of Croatia. Perhaps this information is not significant for the ICCAT management measures or ICCAT's work, but it does give an indication of the importance of bluefin tuna to Croatia.

Table 1. Total bluefin tuna catches (in MT), for the period 1991-1996

Source of data	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Directly from fishermen	1,370	1,026	1,090	1,420	1,210	1,310
Estimated for about 20 small vessels	100	100	100	100	100	100
Total	1,470	1,126	1,190	1,520	1,310	1,410

NATIONAL REPORT OF FRANCE *

1. National fisheries

1.1 General overview

French catches of tunas reached 76,600 MT in 1996, which is similar to the level of recent years.

1.2 Temperate tunas

-- Bluefin tuna

Since the 1970s, bluefin tuna have been caught mainly by purse seiners in the Mediterranean. During the 1996 fishing season, this fishery was carried out by 32 purse seiners that caught at least 6,100 MT, as compared to 6,300 MT and 11,800 MT in 1995 and 1994, respectively, with effort that was comparable in terms of number of vessels. Old vessels have been replaced by more efficient ones. The 1997 catch estimates are not yet known, but they seem to be somewhat less than those of previous years.

It seems that environmental factors are the reason for the important landings, particularly those during the summer season around the Balearic Islands, for large fish. The development of trade with Japan is the reason that this large-fish fishery increased effort on this species during its spawning season. Due to this initiation of trade with Japan, professional bluefin tuna fishermen have utilized more means (aerial detection, vessels-pools which transship fish at sea, Spanish fish dealer infrastructures, etc.) to fish and land catches in which the majority of the fish measure between 190 and 230 cm (140 and 250 kg). This situation is disquieting since information on fish sold directly to the Spanish fish dealers is incomplete and is only included in the data on bluefin tuna imports to Japan.

During the remainder of the fishing season, fishing centered on individuals with an average weight of 20 kg. The importance of the autumn fishery depends on the abundance of small and medium-sized bluefin at large off the coasts of France and Catalonia.

New vessels, because of their profitability, fish bluefin tuna further from their home ports, as far as the central Mediterranean, but fishing effort has, nonetheless, concentrated in the western part of the western Mediterranean basin, but with more and more marked extension towards north Africa.

Atlantic catches of bluefin tuna in 1996 were 563 MT, or 162 MT less than in 1995. However, the fish seem more accessible in the Bay of Biscay, where vessels change their gear directed mainly at albacore to bluefin fishing close to the coasts. These gears are pelagic pair trawls (36 pairs in 1996) and driftnets (50 vessels). However, some vessels that carried out this activity continued to exert their effort on bluefin tuna and each vessel caught 20 MT in 1995. An increase is noted in the landings of the baitboats that operated in the Bay of Biscay (310 MT in 1996), although a declining trend is evident between 1991 and 1994 (448 and 66 MT, respectively), with a progressive decline in the number of vessels (from 10 to 6).

-- Albacore

In the Atlantic, albacore fishing was carried out in the summer of 1996 by 51 driftnet vessels, and 78 pelagic trawl vessels (36 pairs), which landed 4,400 MT in 1996, i.e., a decline of 20% as compared to 1995. Fishing effort (in number of driftnet vessels) has been maintained, after a declining trend which started in 1994, following good fishing years in 1992 and 1993. The length of the driftnets used by the French fleet continues to be closely regulated, and has gone from 5 km to 2.5 km per vessel since July 27, 1994. The number of vessels equipped with pelagic trawls has fluctuated, according to the years, with an increase of 18 boats between 1995 and 1996.

* Original report in French.

In the Mediterranean, albacore are caught very incidentally by purse seiners (less than 1 MT in 1995 and 1996) and in a active manner by the sport fishermen, from mid-August until late October. Catches by the sport fishermen are not subject to statistical monitoring, but these are estimated at about 3 MT. The annual fluctuations in the albacore catches in the Mediterranean clearly show the sporadic character of the abundance of this species along the French Mediterranean coast.

It is noted that 180 MT of albacore were caught in 1996 by French inter-tropical purse seiners.

1.3 Tropical tunas

-- The purse seine fleet

Catches of tropical tunas by French tuna vessels (16 purse seiners) in 1996 reached 66,000 MT, and was comprised of 31,100 MT yellowfin, 21,600 MT skipjack, and 7,200 MT bigeye. The important increase in the catches and in the proportion of bigeye, which has been noted since 1993, was confirmed in 1996. Nevertheless, up to the present, the statistical method used to correct species composition of the catch did not take school type (associated or not associated to floating objects) into account as a stratification parameter. Considering the recent importance of fishing under floating objects in the eastern Atlantic purse seine fishery, statistical studies are under way to take the "type of school" parameter into account in future methods to correct species composition. These new results will be presented to the 1998 SCRS for the 1991-1997 period.

The changes in the purse seine fishing areas, together with the frequent use of artificial floating objects, are two elements to be taken into account in explaining the importance of the bigeye catches, whose increase is notable in all the areas where the fleet operates. Evidently, these high bigeye catches, associated with almost constant effort, reflect the increased nominal catches of this species. Finally, it should be noted that in 1996 the average weight of yellowfin was 18 kg, which is comparable to that for the historical period (20 kg).

-- The baitboat fleet

As concerns baitboat vessels, there were seven French flag vessels based in Dakar in 1996, the same number as reported in the previous year. The French baitboats caught 5,900 MT. The 1996 catch is at the average of the decade for this fishery, both in terms of catches as well as species composition.

2. Research and statistics

French tuna research is carried out on temperate species of the Atlantic and Mediterranean (IFREMER), and on tropical species of the Atlantic (ORSTOM).

2.1 Temperate tunas

-- Bluefin tuna

The collection of bluefin landing statistics from purse seiners operating in the Mediterranean has continued. In 1996, this work, carried out from trade data obtained from fish dealers, had a coverage rate varying according to the month of the year from 30 to 100% of the total catch. The months for which the data are incomplete correspond to the fishing period around the Balearic Islands, for which the catches could be directly sold in Spain. A program sponsored by the EU permits a more precise assessment of the French purse seine landings in Spain, which are not included in the French statistics. This comparison is currently continuing, in order to compile the most reliable statistics on this sector. Grouping together the four member countries of the European Union that have Mediterranean coasts (Spain, France, Greece and Italy), another program started in 1998 to monitor efforts undertaken in the collection and improvement of basic Mediterranean statistical data. The objective of this program is to improve information on the biology and reproduction of this species. The study of environmental conditions affecting bluefin tuna catches, at different geographic scales is currently underway within the framework of the FIGIS program, which is an application of the geographic information systems to the data available on large pelagic species. Lastly, in 1998 France will be involved in tagging operations using "pop up" tags. These programs will contribute to the objectives of the ICCAT Bluefin Year Program (BYP).

– Albacore

For the north Atlantic, albacore research in recent years has centered on the development of ageing methods for large albacore, with a view towards improving the analytical stock assessments. The program to monitor the by-catches of the driftnet fishery ended in 1993. Since that time, there is no research directed at Atlantic albacore.

In the Mediterranean, the IFREMER has participated in the preparation of the final report on the "Large Pelagics Program" mentioned above. Recovery data from 3,000 fish tagged during five years of tagging cruises between 1986 and 1991, continues arriving at the rate of 2 to 3 recoveries per year, thus confirming that Mediterranean albacore do not seem to cross the Strait of Gibraltar. No genetic heterogeneity has been found in the overall Mediterranean.

2.2 Tropical tunas

As concerns tropical tunas, the collection of fishery statistics and research programs are carried out in close collaboration with the research institutes of Côte d'Ivoire and Senegal. These statistics cover 100% of the fishing logbooks of this fleet and are based on the 170,000 tropical tunas measured in 1996.

Detailed fishery statistics of the French intertropical fleets have been submitted on a timely basis to ICCAT. Research carried out on tropical tunas has covered the following areas:

– Analysis of the ethology and dynamics of the association of schools-baitboats developed by the Decker fleet (in collaboration with the CRODT of Decker; MAC Program).

– Analysis of the sampling scheme and correction of logbooks. This project, financed by the European Union and carried out in collaboration with the IEO, is to improve fishing data by time-area strata, and particularly to better take into account the typology of the fishing methods (free schools, floating objects, etc.). This study will provide ICCAT, from 1998, a series of statistical data that is revised and stratified by fishing method (free school/objects) in relation to purse seiners (1991-1997).

– A comparative analysis of the yellowfin, skipjack, and bigeye tuna fisheries and environmental conditions at the world level. The results of this work will be published in October, 1997, in the form of a world atlas of tuna catches.

– Analysis of the causes for the increase in bigeye catches by European purse seiners. The objective of this research program, financed by the EU and carried out in cooperation with the IEO, is to study the factors responsible for this increase in the historical development of the fishery (use of artificial floating objects, changes in areas, modification of the fishing gears, etc.) and will be supported by a program of observers on-board purse seiners to collect data at a finer scale.

– Analysis of Legeckis waves in the northern Equatorial area (10° to 20°W) and the rich food chain which these generate and which induces important tuna catches in this area. This is the international PICOLO program, carried out from 1994 to 1998, which includes several multi-disciplinary cruises on-board the new ORSTOM research vessel "Antea".

– Analysis of the project to create a European laboratory to conduct research on tunas (ORDET).

– Placing of oceanographic buoys in 1997 (PIRATA program) to monitor, in real time, the environmental conditions of the sub-surface of the Gulf of Guinea (these observations which are interesting for the tropical purse seiners, are accessible in real time on the WWW).

These research programs are the subject of various papers that have been submitted to the 1997 SCRS by French scientists.

Table 1. French catches (1,000 MT) of tunas from 1986 to 1996

Year	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Yellowfin	16.6	16.6	21.6	30.6	43.8	34.2	31.5	31.1	34.6	29.1	32.8
Skipjack	11.7	15.1	16.3	15.6	16.4	31.4	20.1	32.2	31.2	25.5	23.3
Bigeye	4.6	3.4	3.8	2.8	4.9	6.6	7.2	9.9	12.9	8.5	9.6
Albacore	1.2	2.0	2.8	3.7	3.4	4.2	6.1	7.0	6.0	5.3	4.6
Bluefin	3.8	4.9	6.5	4.9	5.2	5.2	6.9	5.8	12.2	7.1*	6.5*
Total	**30.8**	**37.9**	**42.0**	**51.0**	**57.6**	**73.7**	**81.6**	**71.8**	**86.0**	**75.5**	**76.6**

* Amount under-estimated which does not take into account certain landings effected in Spain; this catch will be corrected as soon as possible.

NATIONAL REPORT OF GABON *

1. Introduction

Gabon has a 750 km maritime coastline. The length of the continental shelf is 60 km, with a surface of approximately 40,600 km^2 of coast to an isobath of 200 m. The Exclusive Economic Zone (EEZ) is 213,000 km^2. The Gabonese coast abounds in numerous marine resources, including tunas. The tuna fishery in 1996 mainly caught small tunas, yellowfin, skipjack, bigeye, blue marlin, white marlin and sailfish. These different species are caught from the tip of Cape Lopez to Mayunba. Important concentrations are formed from June to September.

2. Description of the fisheries

Tuna fishing is carried out as a secondary activity by gears targeted at other species, both in the commercial fishery as well as in the artisanal fishery. These gears are troll, purse seine, beach seine, driftnet, trawl, and hand-line.

a) Trawl

This fishery consists of the towing a number of lines by a boat which is moving at a speed which permits catching a large quantity of sailfish during a good season. These trawls are used by fishers aboard the trawlers, trollers and canoes, navigating over long distances. These vessels can be equipped with hooks but generally they have a type of buckle pin with artificial bait.

b) Purse seine

Purse seine fishing is carried out to catch surface species, which requires good detection of fish concentrations. Atlantic black skipjack and other tunas are caught incidentally, because of the artisanal character of this fishery, which is carried out in Gabon by artisanal canoes.

c) Driftnets

Driftnets are used in the artisanal fishery only to catch coastal pelagic species, during which time some small tunas are also caught.

d) Hand-line

Hand-line fishing is used by the industrial and artisanal fisheries to catch yellowfin, while searching for benthic species (*sparidae, serranidae, sciaenidae*).

e) Trawl

The trawl fishery catches some quantities of small tunas (Scomberomorus unclassified) during certain periods.

3. The catches

3.1 The industrial fishery

The statistical scheme is based on reports of fishing companies located in Gabon. The catches amounted to 396.272 MT, broken down as follows: yellowfin (226.837 MT); skipjack (26.406 MT); Scomberomorus unclassified (41.114 MT) and sailfish (101.915 MT) **(Table 1, Figure 1)**.

* Original report in French.

3.2 The artisanal fishery

From the point of view of methodology, statistical surveys are based on time and area sampling. Three types of statistical surveys are carried out regularly by the statistical office:

- Sampling survey of landings: In this type of survey, data on landings are collected from sites selected during a period covering a calendar month, according to the gear/canoe combination.

- Sampling survey of fishing effort: This survey is carried out together with the landings survey of catches, in order to collect sampling data on the degree of activity for each type of gear/canoe combination at the sampling sites. Effort in this case is expressed in number of trips.

- Vessel/gear survey: This is a survey of the landing sites and the gears, according to the gear/canoe combination to develop an extrapolation factor in order to estimate total fishing effort.

The catches by the artisanal fishery amounted to 641.11 MT (**Table 2, Figure 2**), broken down as follows: Scomberomorus unclassified (38.0 MT); Atlantic black skipjack (182.11 MT); blue marlin (8.4 MT); white marlin (406.23 MT); and sailfish (6.37 MT).

3.3 Total catches

The total catches by the industrial and artisanal fisheries (**Table 3, Figure 3**) amounted to 1,038.3 MT, broken down as follows: yellowfin (268.837 MT); skipjack (26.406 MT); Scomberomorus unclassified (80.069 MT); Atlantic black skipjack (182.11 MT); blue marlin (8.3 MT); white marlin (406.23 MT); and sailfish (108.285 MT).

3.4 Shark catches

The following shark species were caught: common tiger shark, longnose dogfish shark, blacktip shark, bignose shark, bull shark, spinner shark, dusky shark, smooth hammerhead shark, lemon shark, sandbar shark, great white shark, dogfish shark, and sawback angelshark. The fishing methods are the same as those described above. Total shark catches amounted to 1,267.0 MT (**Table 3, Figure 3**).

Table 1. Catches (in MT) of tuna and tuna-like species taken by the industrial fishery, 1996

	Yellowfin	*Skipjack*	*Scomberomorus unclass.*	*Sailfish*	*Sharks*	*Total*
January	10.762	1.3	2.725	0	0	14.787
February	9.831	1.04	1.365	0	0	12.236
March	10.319	4.44	0.74	0	0	15.499
April	27.678	1.378	4.446	88.7	0	122.202
May	27.047	3.811	1.58	12.6	0	45.038
June	8.731	4.792	2.973	0.045	0	16.541
July	23.948	4.363	6.734	0.35	450.0	485.395
August	7.132	0.945	5.735	0	0	13.812
September	32.846	0.34	4.783	0	0	37.969
October	24.729	1.281	2.146	0	0	28.156
November	32.372	1.846	4.071	0.22	0	38.509
December	11.442	0.87	3.816	0	374.0	390.128
TOTAL	**226.837**	**26.406**	**41.114**	**101.915**	**824.0**	**1,220.272**

Table 2. Catches (in MT) of tuna and tuna-like species taken by the artisanal fishery, 1996

	Yellowfin	*Skipjack*	*Sharks*	*Scomberomor us unclass.*	*Blue marlin*	*White marlin*	*Atl. black skipjack*	*Sailfish*	*Total*
January	0	0	15.6	4.5	0.6	12.27	10.2	0.1	43.27
February	0	0	17.1	3.1	0.2	0.16	20.4	0.65	41.61
March	0	0	19.2	3.2	0.4	14.9	12.75	0.04	50.49
April	0	0	47.7	2.8	0	40.75	26.88	0.21	118.34
May	0	0	54.0	3.5	0.8	60.3	20.22	0.02	138.84
June	0	0	13.4	2.5	1.2	18.7	12.18	2.0	49.98
July	0	0	46.9	4.0	1.0	180.0	30.2	0.88	262.98
August	0	0	19.2	2.4	1.4	60.8	30.5	2.1	116.4
September	0	0	40.4	2.5	0.9	17.0	8.6	0.15	69.55
October	0	0	42.3	5.0	0.5	0.4	4.7	0.22	53.12
November	0	0	72.2	1.7	1.0	0.2	0.88	0	75.98
December	0	0	55.0	2.8	0.4	0.75	4.6	0	63.55
Total	**0**	**0**	**453.0**	**38.0**	**8.4**	**406.23**	**182.11**	**6.37**	**1094.11**

Table 3. Total catches (in MT) of tuna and sharks taken by the industrial land artisanal fisheries, 1996

	Yellowfin	*Skipjack*	*Scomberomorus unclass.*	*Blue marlin*	*White marlin*	*Atl. black skipjack*	*Sailfish*	*Sharks*	*Total*
January	10.762	1.3	7.225	0.6	12.27	10.2	0.1	15.6	57.877
February	9.831	1.04	4.465	0.2	0.16	20.4	0.65	17.1	53.846
March	10.319	4.44	3.94	0.4	14.9	12.75	0.04	19.2	65.989
April	27.678	1.378	7.246	0	40.75	26.88	88.91	47.7	240.544
May	27.047	3.811	5.08	0.8	60.3	20.22	12.62	54.0	183.811
June	8.731	4.792	6.473	1.1	18.7	12.18	2.045	13.4	67.421
July	23.948	4.363	10.734	1.0	180.0	30.2	1.23	496.9	748.375
August	7.132	0.945	8.135	1.4	60.8	30.5	2.1	19.2	130.212
September	32.846	0.34	7.283	0.9	17.0	8.6	0.15	40.4	107.519
October	24.729	1.281	7.146	0.5	0.4	4.7	0.22	42.3	81.276
November	32.372	1.846	5.771	1.0	0.2	0.88	0.22	72.2	114.489
December	11.442	0.87	6.616	0.4	0.75	4.6	0	429.0	453.678
Total	**226.837**	**26.406**	**80.069**	**8.3**	**406.23**	**182.11**	**108.285**	**1267.0**	**2305.238**

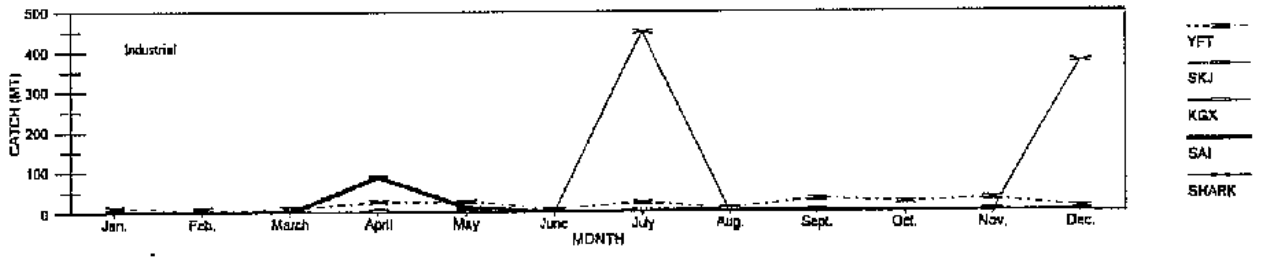

Figure 1. Monthly tuna catches (MT) by the industrial fisheries of Gabon, 1996.

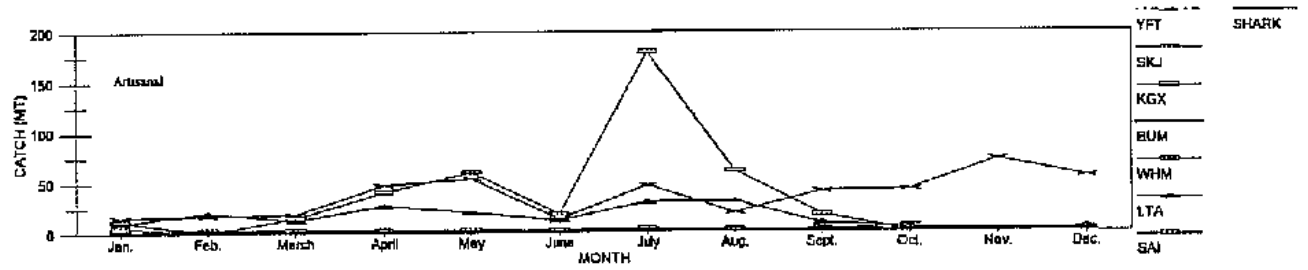

Figure 2. Monthly tuna catches (MT) by the artisanal fisheries of Gabon, 1996.

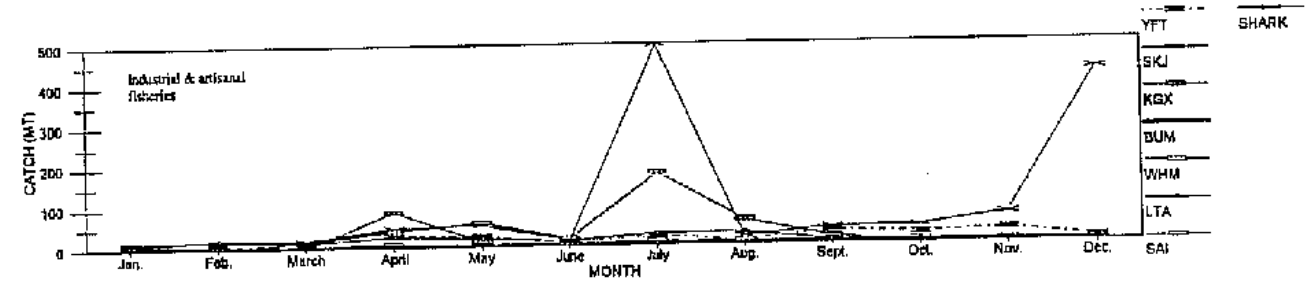

Figure 3. Monthly tuna catches (MT) by both the industrial and artisanal fisheries of Gabon, 1996.

NATIONAL REPORT OF ITALY *

1. Introduction

The large pelagic species fishery continues to be very important in Italy, due to ancient tradition and, at the same time, to the new market situation.

The continuous changes in the patterns of various aspects in the most relevant fisheries imply some additional difficulties for the close control of fishing activities, difficulties which are also related to the artisanal character of the fleets.

The high mobility of several fleets and the lack of any logbook system also create problems for the landing data reports.

2. Information on the fisheries

In addition to the above-mentioned problems, most Italian research on large pelagic species was suspended from 1996 to July, 1997, due to administrative reasons. As a result, several fishing activities have been poorly monitored, with a significant gap in the scientific monitoring system, established in 1994 by the Directorate General of Fisheries and Aquaculture. Generally, it seems that the presence of juvenile fish even in unusual seasons could indicate a broader and longer spawning season, particularly for bluefin tuna and swordfish.

As regards catches, it is difficult to add further information on the official statistics due to the lack of national coverage by the scientific groups. In any case, the bluefin tuna fishery is extremely important, with major fishing activity by the purse seine fleet in the Straits of Sicily and in the Adriatic, rather than in the southern Tyrrhenian Sea, the traditional spring-summer fishing ground. The development of a consistent longline fleet is also to be noted, because this fishery provides most of the product exported to Japan. It is also important to point out that the catch of juvenile bluefin tunas strongly decreased in 1996, apparently due to minor recruitment in the traditional fishing areas, which may possibly be related to changes in oceanographic conditions. As concerns the swordfish fishery, it seems that catches are decreasing due to the enforcement of the driftnet regulation and to a reduction in longline fishing effort, due to unfavorable environmental factors. The albacore fishery seems stable, apparently with a minor increase in catches.

3. Statistics

Due to Italy's new member status, the Ministry of Agricultural Policy, through the Directorate General for Fisheries and Aquaculture, decided to study the problem of the revision of the catch statistics of all the large pelagic species, particularly for the most recent years of the historical series. Possibly, an expert working group may be set up in the near future, with the participation of all the Italian scientists who have carried out research in recent years, together with other experts from the Administration. The Directorate General for Fisheries and Aquaculture will keep the ICCAT Secretariat informed about future steps and follow-ups.

4. Research

Several research activities were funded in the 1994-96 period by the Directorate General of Fisheries and Aquaculture, which set up ten research units to carry out studies on bluefin tuna, swordfish, albacore, small tunas, and yellowtail, as well as genetic analyses.

* Original report in English.

However, due to administrative reasons, the new three-year research plan has only been funded recently and activity was re-initiated in July, 1997.

A new observer program on-board longline vessels has been approved by the Ministry of Agricultural Policy. At the same time, several research projects have been carried out by various institutes, in cooperation with other European partners, and funded by the European Commission.

Recently, the EC funded a research project based on pop-up tags, to be used on bluefin tunas, to study short- and medium-term movements, which could provide totally new information about Mediterranean migration routes and the possible movements through the Strait of Gibraltar.

NATIONAL REPORT OF JAPAN *

by

Fisheries Agency of Japan
and
National Research Institute of Far Seas Fisheries

1. Fisheries Information

1.1. Type of fisheries

Longline is the only fishing gear deployed by Japan in the Atlantic Ocean since 1993. Two other fishery types (baitboat and purse seine) ceased fishing and withdrew from the Atlantic in 1984 and 1992, respectively.

1.2 Trends in fishing effort

The number of the Japanese longliners which operated in the Atlantic in 1996 was 282 (**Table 1**). This is an increase of 30 boats compared to 1995, and the second highest in the past six years. Fishing days recorded the highest during the same period, reaching 47,000 days (an 18% increase over 1995). The increasing trend in fishing effort has been attributed to slow fishing of bigeye tuna in the eastern Pacific Ocean, which is the main fishing ground for the Japanese longline fleet, as well as to stringent management measures imposed on southern bluefin tuna fishing in recent years.

1.3 Statistical coverage

Logbook coverage of the Japanese longline fleet in the Atlantic has been very good (90-95%). The coverage rate for 1996 preliminary data is estimated to be about 80%. All statistics on catch in this report are raised so that they represent total statistics.

1.4 Catch trends

The provisional 1996 catch of tunas and tuna-like fishes in the Atlantic Ocean and the Mediterranean Sea by the Japanese fishery is estimated to be 51,780 MT (**Table 2**). This is a slight decline of 3,400 MT (6.2%) from 1995, but catches are still at a high level, as compared to the 1994 catch of 55,930 MT, the highest since the mid-1960s. **Tables 3 and 4** show catches, by species, in the Atlantic and the Mediterranean or the total for both areas for 1991-1996. Bigeye tuna, which is the most important species, accounted for about 65% of the total catch of tuna and tuna-like species. In terms of weight, yellowfin tuna, bluefin tuna and swordfish are the most important species, in this order. Among the major species, a relatively large decrease was observed in 1996 for swordfish (1038 MT, 22%), bluefin (631 MT, 12%), southern bluefin tuna (114 MT, 8%) and bigeye tuna (2258 MT, 6%). On the other hand, white marlin, blue marlin, and yellowfin increased their share by 52 MT (91%), 260 MT (19%), and 235 MT (5%), respectively.

The catch-by-area breakdown (either north/south or east/west) in **Table 4** indicates increased catches in the north Atlantic as well as the west Atlantic (near the border of the south Atlantic and eastern Atlantic).

1.5 New developments or shifts in the fishery

Two major changes have been observed in the most recent years. One is the introduction of new materials for longline gear: nylon monofilament for the main line, branch line and leader, and braided nylon and new synthetic material (known as "thinner line" among fishermen, since it is thinner than the conventional Kuralon line) for the main line. Among these materials, braided nylon has been extensively introduced, followed by high-tech new materials.

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* Original report in English.

In general, 70 to 80% of the total distant water fleet has introduced one of these. Although not enough information was obtained, the efficiency of these new gears seems to be better than that for conventional materials, but it tends to vary depending on area, time and target species. It is reportedly said that the introduction of these materials was aimed at improving the catches as well as reducing the workload of the crew members, since the new materials are lighter than conventional ones. However, the number of hooks per set (equal to day) decreased by about 20% since the hauling speed is slower. This means that the new materials are cost-effective to some extent. On the other hand, there are drawbacks, for example, they are not as durable as conventional materials.

The collection of information on the materials for main and branch lines started in 1993. Since there were many kinds of materials, it was thought impractical to cover all those materials. Thus, it was decided to separate only nylon, which is the most popular material, from the others. Annual deployment rates by materials (nylon or others) are given in **Table 5** for 1994-1996. It is clear from this that the use of nylon became popular during those years. The use of nylon was between 30-40% in 1994, but it increased to over 60% in 1995. In 1996, the percentage of nylon use for both lines was over 75%, while the use of conventional and other materials declined to 15%.

Another change occurring in the recent years has been the development of new fishing grounds (**Figure 1**) for bluefin tuna in waters South of Iceland (50°-60°N, 15°-30°W) starting in the fall of 1994. Geographical bluefin catch distribution in 1996 is given in **Figure 2**. The size of fish in the catch was similar to that caught in the so-called central area (34°-50°N, 30°-45°W). The average weight was also reported at around 100-150 kg in (gilled and gutted).

The geographical distribution of longline fishing effort in 1996 is given in **Figure 1**. It shows that considerable fishing effort was exerted in the northeastern Atlantic, tropical eastern Atlantic, and in waters off South Africa. This tendency well reflects the fishermen's interest in the target species (bigeye, northern bluefin and southern bluefin tunas).

Except for the above two points, the operational pattern of the longline fleet was similar to the recent past.

2. Research and statistics

The National Research Institute of Far Seas Fisheries (NRIFSF) is in charge of the collection and compilation of Atlantic fishery data necessary for scientific research on Atlantic tuna and billfish stocks. All the statistical data have been routinely reported to the ICCAT Secretariat and the results of scientific research have also been presented at the regular meetings and inter-sessional workshops of the Standing Committee on Research and Statistics (SCRS).

2.1 Fishery data

The NRIFSF submitted final 1995 catch, catch/effort and part of size frequency data (Task I, II and biological sampling) for the longline fishery to the ICCAT Secretariat. The compilation of the same data for 1996 is in process as usual. The preliminary 1996 catch estimates are given in this report. Catch-at-size data for albacore, bigeye, bluefin tunas and swordfish were presented or updated to the latest year.

In Accordance with the Commission's recommendation on the bigeye tuna observer program, adopted at the 1996 annual meeting, five observer trips on longline vessels were conducted from January to July, 1997. Two of these trips were carried out in the tropical Atlantic, one in the waters off Dakar and the other around the Ascension Islands. The remainder were made in the northwestern Atlantic off Canada and the United States. The total number of operations observed was 88 and 207, respectively, for the former and latter waters. A summary report of the Japanese observer program, such as data collection, size measurements and biological sampling on tunas and other fishes (including sharks) was presented to the 1997 SCRS.

2.2 Tuna biology and stock assessment

Biological and stock assessment studies carried out by the NRIFSF on Atlantic tunas and billfishes have continued. Among them, research related to the Bluefin Year Program was one of the major activities. A Japanese scientist spent some time at Cartagena, Spain, in late June to collect measurement data, which is necessary for the conversion of belly meat of bluefin tuna to whole weight. Such data collection was successfully carried out through cooperation with the Spanish scientists. Genetic analysis on stock structure has been continued, and the results will be presented in the near future.

This year the NRIFSF participated in the following ICCAT-related meetings: the Working Group on Sharks (ICCAT Sub-Committee on By-Catch, March 11-14 in Shimizu, Japan), and the Ad Hoc Working Group Meeting on Bigeye (April 9 to 11 in Madrid). A staff member of the NRIFSF also visited China Taipei in July to assist ICCAT in the review of their data collection and processing system and to revise the statistics on the China Taipei longline fleet.

3. Implementation of ICCAT conservation and management measures

3.1 Catch quota management systems

a) Reporting by radio: The Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries of the Government of Japan (FAJ) orders all tuna vessels operating in the Atlantic Ocean to submit the following information every ten-day period (early, middle and late period of a month) by radio or facsimile to the FAJ:

i) The position (longitude and latitude) of each vessel, so that the FAJ is aware of the movement of all vessels operating in the Atlantic Ocean.

ii) Catch weight of bluefin tuna and swordfish (in accordance with a Ministerial order on April 2, 1975, and supplemented on December 13, 1991, for swordfish).

b) Introduction of vessel position and catch data report via satellite: The Fisheries Agency of Japan is developing a GPS/Inmarsat-A system which enables the FAJ to monitor the operation of each fishing vessel on a real-time basis. In the system, vessel-specific data on position and catch are transmitted from a data terminal, data processing equipment combined with GPS receiver and personal computer on board a fishing vessel. The data are compiled and analyzed by the FAJ in Japan.

Development of the system was initiated in 1992, and the operation has been conducted on a trial basis with an increased number of the vessels being installed with a data terminal. About 130 Japanese longline vessels fishing for bluefin tuna in the Convention area have installed the data terminal. The FAJ is improving the system to conduct real-time monitoring on position and catch data, instead of reporting by facsimile, for all Japanese longline vessels fishing for bluefin tuna and swordfish in the northern Atlantic ocean.

c) Catch quota management:

i) Catch quotas: The FAJ sets catch quotas for western and eastern Atlantic bluefin as well as for northern and southern Atlantic swordfish, respectively, in accordance with relevant ICCAT recommendations, by Ministerial order.

Furthermore, the FAJ encourages its fishermen not to conduct direct fishing for swordfish in the north Atlantic Ocean.

ii) Fishing year: The FAJ establishes the "Fishing Year (August to July)" for the purpose of proper quota management for bluefin tuna and swordfish. That means, for example, that the 1996 quotas for these tunas are applied to the 1996 Fishing Year which starts in August, 1996, and ends in July, 1997. Because ICCAT recommendations come into effect six months after the date of official transmission (generally, ICCAT meetings take place in November, so, for example, recommendations which were adopted in November, 1995, entered into force in May, 1996). The FAJ needs a certain period to legislate the ICCAT recommendations domestically.

3.2 Minimum size limits

In accordance with the ICCAT recommendations, the FAJ prohibits the catch of undersized fish, with the exemption of a certain percentage of tolerance, by Ministerial order. The prohibition of undersized catches of bluefin and yellowfin catch was established by Ministerial order on April 2, 1975, and the FAJ amended this Ministerial order several times to cover undersized bigeye, swordfish, etc. The latest amendment of this Ministerial order was in the spring of 1997 to implement the 1996 ICCAT recommendation on bluefin weighing less than 1.8 kg.

It is noted that all Japanese pole and line vessels reluctantly ended their operations in the Convention area to

observe the 1972 recommendation which prohibits any taking and landing of yellowfin tuna weighing less than 3.2 kg because of their high by-catch rate.

3.3 Time and area closure

Since 1975, the FAJ, as a domestic measure, prohibited Japanese longline vessels from operating in the Mediterranean from May 21 to June 30, by Ministerial order. Then, in 1994, the FAJ amended this order to adjust for the change in the closed season, i.e. from June 1 to July 31, in accordance with the 1993 ICCAT recommendation.

In addition, the FAJ prohibited Japanese longline vessels from operating in the Gulf of Mexico.

3.4 Results of the implementation of the ICCAT Bluefin Tuna Statistical Document (BTSD) Program

From January 1 to June 30, 1997, Japan collected 6,552 BTSDs (6,468 BTSDs for fresh/chilled product and 84 BTSDs for frozen products). Of these, 5,957 BTSDs (91% of the total), were validated by non-contracting parties. In terms of product weight, 2,157 MT of the 3,457 MT (or 62% of the total) were imported from non-contracting parties. The converted live weight of tuna products that were imported from non-contracting parties is 2,577 MT, an increase of about 500 MT as compared to imports (2,049 MT) during the corresponding period last year. Tunisia and China Taipei are the main exporting non-contracting parties/fishing entities, and they accounted for 1,413 MT and 373 MT of exports, respectively, in live weight. Japan imported 96 MT (live weight) from Panama. Japan has not imported any bluefin tuna products validated by Belize (since 1996) and Honduras (since 1994).

4. Inspection schemes and activities

4.1 Assignment of patrol vessels

Since 1976, Japan has dispatched patrol vessels to the north Atlantic and the Mediterranean every year for a certain period of time to monitor and inspect Japanese tuna vessels. The FAJ dispatched a patrol vessel to the northern Atlantic and the Mediterranean in 1997. This vessel also collected information on activities of non-contracting parties/entities/fishing entities. Collected information was recorded on the Sighting Information Sheets and submitted to the ICCAT Secretariat in August, 1997, in accordance with the 1994 ICCAT resolution.

4.2 Random inspection of landings at Japanese ports

All Japanese tuna fishing vessels which land their catches at any Japanese port must report their plan of landing in advance. The FAJ randomly inspects landings of those Japanese longline vessels to enforce the minimum size limits and catch quotas on bluefin tuna and swordfish.

4.3 Management of transshipment at foreign ports

A permit issued by the FAJ is required for any Japanese tuna vessel to transship tuna or tuna products to reefers at foreign ports. The FAJ monitors the weight by species, the time and place of each transshipment, and if necessary, conducts inspections of landings at Japanese ports when reefers return to Japanese ports.

4.4 FAJ official resident at Shimizu port

Since 1996, an FAJ official has been stationed at Shimizu fishery port, which is one of the largest tuna landing ports in Japan, to collect information on the tuna fishery, to inspect landings of Japanese longline vessels at the port of Shimizu, etc.

5. Other Activities

5.1 Annual catch statistics

Each longline vessel flying the Japanese flag and licensed to engage in tuna fisheries by the Minister of Agriculture, Forestry and Fisheries is legally required to submit a catch report to the Minister within 30 days after the end of cruise or after the vessel has entered a Japanese port. Submission of this report was established by Ministerial order on January 22, 1963. The above-mentioned catch report includes daily information on the vessel's

noon position, the number and weight of the catch by species, the quantities of gear used, surface water temperature, etc. Information contained on the catch report submitted is examined and compiled into the database by the National Research Institute of Far Seas Fisheries.

5.2 Collection of biological data gathered on board longline vessels

Information necessary for stock analyses such as length, weight and sex of fish caught, is collected by fishermen as a voluntary measure.

5.3 Collection of trade data

The Ministry of Finance collects such trade data as quantity, value, export country, etc. of imported products. Japan improved its HS code in 1993 in response to the 1992 ICCAT resolution to collect all the data of various types of bluefin tuna products, e.g. fillet, meat (round, dressed) etc. and status of products, e.g. frozen, fresh or chilled. Japan also improved its HS code in 1997 regarding swordfish to collect more accurate import data on this species.

5.4 Effort limitation

The number of longline vessels which can operate in the western Atlantic North of 35°N and the Mediterranean has been limited. Furthermore, the FAJ requires the longline vessels operating in the northern part of eastern Atlantic Ocean to submit an advance notice of their planned operations to the FAJ so that it is aware of the fishing activities for bluefin tuna.

5.5. Restrictions on re-flagging of vessels

No Japanese tuna longline vessels are authorized to operate on the high seas unless a license has been issued by the Government of Japan. Such licenses are not given to vessels flying flags of States other than Japan. Japanese tuna vessels could not elude the FAJ's control even when such vessels are conducting fishing operations in waters far distant from Japan, since a Japanese port is designated as the operational base and all the products are brought into Japan. (The export and leasing of Japanese fishing vessels are closely controlled by the FAJ to avoid their use for operations which may diminish the effectiveness of international conservation measures.)

5.6 Legislation for the enhancement of the conservation and management of tuna stocks

A new law was enacted in June, 1996, with the objective of implementing measures necessary to enhance the conservation and management of tuna stocks and to develop international cooperation for the conservation and management of tuna stocks. This law establishes that the Government of Japan may restrict the imports of tuna and tuna products from a foreign country which is recognized by the relevant international organization as not rectifying its fishermen's activities that diminish the effectiveness of the conservation and management measures which have been adopted by the international organization.

The objective of this law is to encourage the ICCAT activities, ensuring the strength of tuna resource conservation and the stability of tuna supply.

5.7 Prohibition of import of Atlantic bluefin tuna from Honduras and Belize

According to a 1996 ICCAT recommendation, Japan prohibited the import of Atlantic bluefin tuna and its products in any form from Honduras and Belize on September 3, 1997, in accordance with the necessary domestic procedures.

Japan also started DNA examination against other kinds of imported tuna from Honduras and Belize to prevent false imports of Atlantic bluefin tuna.

5.8 Scientific observers

According to a 1996 ICCAT recommendation concerning bigeye and yellowfin tunas, the FAJ dispatched scientific observers on board five Japanese longline vessels. The result of these observations has been analyzed by the NRIFSF were reported to the 1997 ICCAT meeting.

Table 1. Annual number of Japanese tuna boats that operated in the Atlantic Ocean and Mediterranean Sea, 1991-1996

	1991	*1992*	*1993*	*1994*	*1995*	*1996**
Longline fishery						
Fishing effort:						
Number of boats	242	248	307	240	252	282
Fishing days (sets in 100)	339	292	399	380	399	470
Purse seine fishery						
Fishing effort:						
Number of boats	2	2	0	0	0	0
Fishing days	407	230	0	0	0	0

*Preliminary.

Table 2. Japanese catches (MT) of tunas and tuna-like fishes, by type of fisheries, in the Atlantic Ocean and Mediterranean Sea, 1991-1996

Type of fishery	*1991*	*1992*	*1993*	*1994*	*1995*	*1996**
Longline (Home-based)	46,883	48,515	52,917	55,930	55,161	51,780
Purse seine	7,516	2,794	—	—	—	—
Total	**54,399**	**51,309**	**52,917**	**55,930**	**55,161**	**51,780**

*Preliminary.

Table 3. Catches (MT) of tunas and tuna-like fishes taken by the Japanese longline fishery, 1991-1996

	1991	*1992*	*1993*	*1994*	*1995*	*1996**
Atlantic						
Albacore	1,346	1,048	951	1,156	775	896
Bigeye tuna	29,487	34,128	35,053	38,502	35,477	33,219
Bluefin tuna	3,669	3,862	3,065	2,502	4,358	3,777
Southern bluefin	1,331	525	1,688	595	1,444	1,330
Yellowfin tuna	4,718	3,715	3,096	4,782	5,228	5,463
Swordfish	4,687	3,539	6,382	5,628	4,662	3,623
Blue marlin**	905	1,017	928	1,524	1,409	1,669
Black marlin	--	--	--	6	1	2
White marlin	121	248	82	92	57	109
Sailfish***	88	43	60	53	54	46
Spearfish	--	--	--	38	29	28
Others	443	265	815	513	850	848
Atlantic Sub-total	46,795	48,390	52,120	55,391	54,344	51,010
Sharks	--	--	--	3,216	2,192	1,106
Mediterranean						
Bluefin tuna	85	123	793	536	813	765
Swordfish	1	2	4	3	4	5
Bigeye tuna	2	--	--	--	--	--
Others	--	--	--	--	--	--
Mediterranean Sub-total	88	125	797	539	817	770
Sharks	--	--	--	5	8	2
Grand Total	**46,883**	**48,515**	**52,917**	**55,930**	**55,161**	**51,780**
GRAND TOTAL (incl. Sharks)	--	--	--	**59,151**	**57,361**	**52,888**

* Preliminary.
** Includes a minor amount of black marlin up to 1993, but separated since 1994.
*** Includes shortbill spearfish up to 1993, but separated since 1994.

Table 4. **Area breakdown of Task I catches (MT) taken by the Japanese longline fishery. The ICCAT area definition is used for tunas and billfishes. For other species, north and south, east and west, are separated at 5°N and 30°W, respectively.**

Species	*West*	*East*	*North*	*South*	*Medit.*	*Total*
1995						
Bluefin	387	3,971	4,358	0	813	5,172
Southern bluefin	0	1,444	0	1,444	0	1,444
Albacore	215	559	386	389	0	775
Bigeye	2,870	32,607	13,993	21,484	0	35,477
Yellowfin	457	4,770	2,650	2,578	0	5,228
Swordfish	–	–	1,043	3,619	4	4,666
White marlin	10	47	31	26	0	57
Blue marlin	99	1,310	496	913	0	1,409
Black marlin	0	1	0	1	0	1
Sailfish	2	52	23	31	0	54
Spearfish	3	26	8	20	0	29
Skipjack	0	0	0	0	0	0
Blue shark	456	1,126	1,145	437	7	1,589
Other sharks	176	435	388	222	1	611
Other fishes	26	824	52	797	0	850
Total 1995						**57,361**

Species	*West*	*East*	*North*	*South*	*Medit.*	*Total*
1996 *						
Bluefin	436	3,341	–	–	765	4,541
Southern bluefin	0	1,330	0	1,330	0	1,330
Albacore	364	533	431	466	0	896
Bigeye	4,830	28,389	15,699	17,520	0	33,219
Yellowfin	1,062	4,401	3,542	1,922	0	5,463
Swordfish	–	–	1,451	2,172	5	3,628
White marlin	41	68	81	28	-	109
Blue marlin	312	1,356	794	874	-	1,669
Black marlin	1	2	1	1	-	2
Sailfish	4	42	27	19	-	
Spearfish	3	25	9	19	0	28
Skipjack	0	0	0	0	0	0
Blue shark	240	560	542	258	0	801
Other sharks	88	219	199	107	2	307
Other fishes	10	839	27	821	0	848
Total 1996						**52,888**

* Preliminary.

Table 5. Annual deployment rate of longline materials for the main and branch lines in the Atlantic, 1994-1996

Year	*Main line: Nylon*	*Branch lines: Nylon*	*Main and branch lines:*	
			Nylon	*Other*
1994	34%	41%	29%	54%
1995	61%	63%	51%	27%
1996*	76%	77%	68%	15%

* Preliminary.

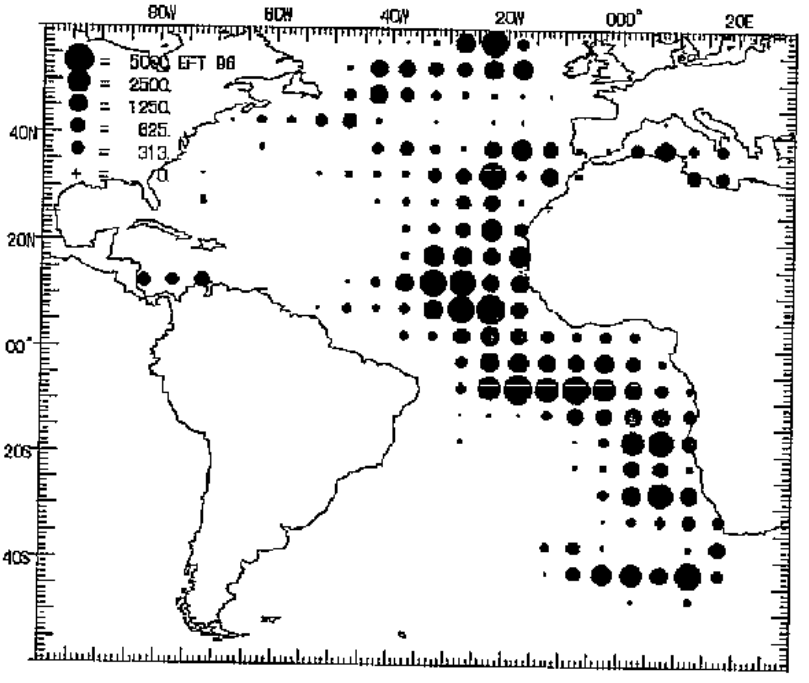

Fig. 1. Geographic distribution of longline effort (number of hooks) in the Atlantic, 1996.

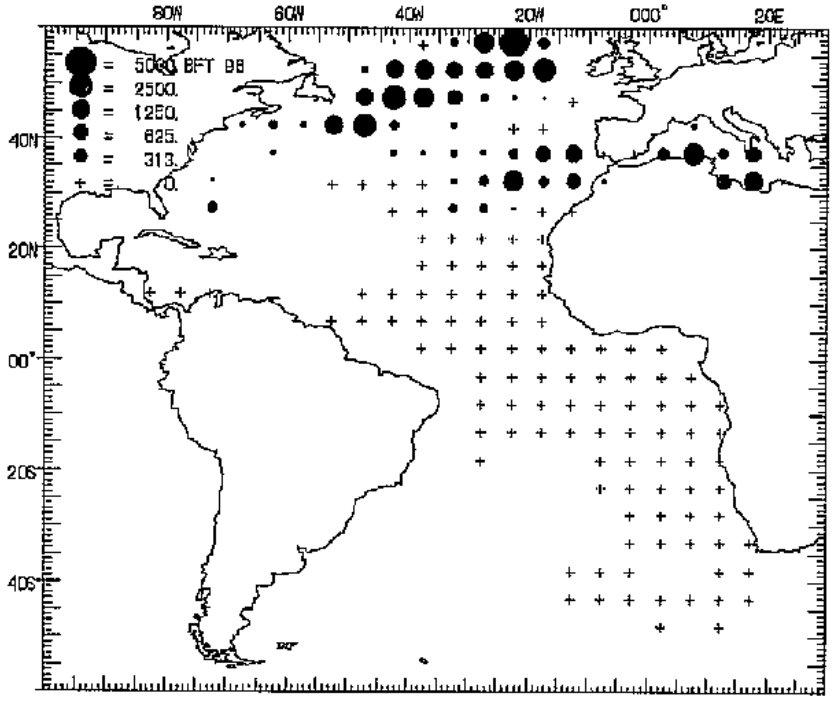

Fig. 2. Geographic distribution of bluefin catch in number in the Atlantic, 1996. (+ = no catch).

NATIONAL REPORT OF KOREA *

by

National Fisheries Research & Development Institute (NFRDI)

1. Fisheries information

Since 1977, there has been a decreasing trend in the annual catches of tuna and tuna-like fishes by the Korean fisheries in the Atlantic Ocean (**Table 1**). The decline was attributed to the decrease in the number of vessels engaged in fishing activities. During the 1993 to 1995 period, only four longiners of the Korean fishery operated in this ocean, the lowest recorded, in terms of the number of vessels as well as the total catches. In 1996, the Korean catch of tuna and tuna-like species amounted to 2,738 MT, which represents a 59.7% increase compared to the previous year's figure. The increase in catches was due to the increased number of fishing vessels in operation. The species caught by the Korean longliners were: bigeye, bluefin, yellowfin, swordfish and other billfishes; bigeye tuna comprised the major component of the catch. Korean tuna longliners operated close to the same fishing grounds as in the past.

1.1 Bigeye tuna

Bigeye tuna has been the dominant species in the Korean tuna longline fishery since the yearly 1980s when the deep-longlining fishing technique was introduced. In the 1996 catch, bigeye tuna accounted for about 45.7% of the total catch. The catch of this species increased about three times that of the previous year.

1.2 Bluefin tuna

Bluefin tuna, one of the target species of the Korean tuna longline fishery in recent years, comprised about 24.9% (683 MT) of the 1996 catch. The catch of this species increased slightly as compared to 1995.

1.3 Yellowfin tuna

Yellowfin tuna is one of the target species of the Korean Longline fishery. However, unlike bigeye and bluefin tunas, yellowfin catches decreased from 453 MT in 1995 to 381 MT in 1996.

1.4 Swordfish, billfishes, and other species

The remaining 15.5% of the total Korean catch includes swordfish, other billfishes, and other tuna species. As in 1995, the 1996 catch of each billfish species was estimated from the catch of other billfishes (as shown in the Korean Task I table) based on the Task II data of each species. "Other species" may include albacore since the Task II data show a few metric tons of this species in 1996.

2. Research and statistics

The National Fisheries Research and Development Institute (NFRDI) is responsible for tuna research and statistics in Korea. As in past years, the NFRDI collected and processed tuna catch and fishing effort statistics from fishing vessels operating in the Atlantic. Those data (Task I and Task II) were submitted to the ICCAT Secretariat.

3. Implementation of ICCAT tuna management measures

To implement the recommendations adopted by ICCAT, the Republic of Korea has introduced, in its domestic regulations, the minimum size limits on bigeye, yellowfin and bluefin tunas, and swordfish. A new domestic regulation has been in effect since 1995, with a view to protecting the spawning stock of bluefin tuna from June 1 to July 31 in the Mediterranean Sea.

* Original report in English.

Table 1. Nominal catches (MT) of tunas and tuna-like fishes taken by Korean fisheries in the Atlantic Ocean, 1980-1996

Year	*No. of vessels*	*BFT*	*YFT*	*ALB*	*BET*	*SKJ*	*SWO*	*BUM*	*WHM*	*SAI*	*Others*	*Total*
1980	54	--	5,869	1,487	8,963	4	683	94	18	85	1,749	18,952
1981	56	--	6,650	1,620	11,682	47	447	126	85	65	1,584	22,306
1982	52	--	5,872	1,889	10,615	21	684	50	69	52	1,781	21,033
1983	53	3	3,405	1,077	9,383	530	462	131	15	3	1,215	16,224
1984	51	--	2,673	1,315	8,943	29	406	344	62	86	927	14,785
1985	45	77	3,239	901	10,691	20	344	416	372	101	1,293	17,454
1986	28	(156)	1,818	694	6,084	11	82	96	71	16	1,093	9,965
1987	29	(1)	1,457	401	4,438	6	75	152	27	21	1,048	7,625
1988	29	(12)	1,368	197	4,919	3	123	375	19	15	782	7,801
1989	33	(45)	2,535	107	7,896	6	162	689	135	33	944	12,507
1990	17	(20)	808	53	2,690	--	101	324	81	41	240	4,338
1991	9	(229)	260	32	801	--	150	537	57	30	267	2,134
1992	8	(101)	219	--	866	--	17	38	1	1	321	1,463
1993	4	(573)	180	--	377	--	--	19	2	1	308	887
1994	4	684	436	--	386	--	--	--	91	1	27	1,625
1995	4	663	453	--	423	--	--	61	1	--	114	1,715
1996	16	683	381	--	1,250	--	26	199	37	6	156	2,738

( ) = Estimated by the ICCAT Secretariat (ICCAT Report, 1994, Vol. 2).

NATIONAL REPORT OF MOROCCO *

by

Abdellah Srour **

I. Information on the fisheries

Fishing for tunas in Moroccan waters takes place out off the Atlantic and Mediterranean coasts. This activity is limited however to the traps set in the migration routes of this species and to the artisanal fleet which uses various gears in a passive manner (driftnet, handline, longline and purse seine).

The usual fishing zones for tunas are located between Al Hoceima and Saidia, in the area around the Strait of Gibraltar, and in the areas between Essaouira and Tangier. The major Atlantic landing ports are Mohammedia, Larache and Tangier, whereas the main Mediterranean ports are Al Hoceima, Nador and Ras Kebdana. The handline fishery targets large bluefin tuna and is carried out by these vessels in the area of Ksar Sghir (northern Morocco).

The main species caught by Moroccan fishermen are bluefin tuna, swordfish and small tunas such as frigate tuna, Atlantic bonito and skipjack. The development of the catches of these major species for the 1986-1996 period are given in **Table 1.**

The reported total catches of tunas and tuna-like species in 1996 amounted to 6,200 MT, as compared to 6,600 MT in 1995, thus showing a slight decline. The coastal fishery contributed 5,772 MT, or 93% of the total catches. The trap catches amounted to 418 MT, or 7% of the total.

By geographic area, the level of Atlantic catches (4,467 MT) is considerably more important than that of the Mediterranean (1,723 MT).

– Bluefin tuna fishery

The analysis of the bluefin catch series shows an increase in catches from 1986 to 1991, followed by a notable decline in 1992 and 1993, then an increase from 1994 (840 MT) to 1996 (656 MT). It should be noted that in 1996, almost all the catches of bluefin tuna were taken in the Atlantic. The Mediterranean trap catches were null.

The activity of the coastal fleet based at the ports of Casablanca, El Jadida and Agadir encompasses almost all the landings made at Moroccan ports.

– Swordfish fishery

A review of the Moroccan swordfish catch series for the 1986-1996 period has revealed the following: Atlantic catches did not vary widely between 1986 and 1989, and have remained almost stable at the level of 250 MT. Between 1990 and 1996, these catches increased to an average of 800 MT for this period. Almost all the catches (99%) are taken by longliners using driftnets and longline.

– Small tunas fishery

This group of species is comprised of small sized tunas. While these species comprise an important part of the total tuna catches, their commercial value is notably less than that of large tunas. The main species of this group are Atlantic bonito, frigate tuna and skipjack.

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* Original report in French.

** National Institute of Fishery Research, Casablanca.

Catches of these species showed an increase between 1986 and 1990, from 1,300 MT to 4,100 MT, followed by a decline in 1991 and 1992, when catches amounted to 3,000 MT. In 1993 and 1994, the catches were less, on the order of 1,600 MT and 2,000 MT, respectively, for the two years. The year 1995 was a record year, with catches of 5,400 MT and a clear predominance of skipjack in the catch. In 1996, catches amounted to 4,500 MT.

II. Research activities

- Within the framework of normal activities of the National Institute for Fishery Research (INRH), surveys and biological sampling were carried out on the bluefin and swordfish fisheries. The results of these surveys will be analyzed and transmitted to ICCAT.

- Within the framework of promoting the ICCAT tuna tagging program, particularly the use of the new archival tags, Mr. A. Srour has conducted a special mission in Tunisia and Libya.

- On July 14, 1997, Morocco organized a Workshop on Bluefin Tuna, with the participation of experts in the monitoring of tunas and numerous interesting subjects relative to this species were discussed.

- The program to monitor the Moroccan giant bluefin tuna fishery, which was approved during the meeting which took place in Genoa in 1995, has not yet been started, due to the limited BYP funding. It is noted that the budget to initiate this program was initially estimated at $40,000, with 50% to be financed by the BYP.

- The National Institute for Fishery Research (INRH) and the Spanish Institute of Oceanography (IEO) cooperate in matters of scientific research, and a joint study on the biology and exploitation of tunas in the Strait of Gibraltar will be carried out in 1998. This study will be coordinated by the FAO-COPEMED project.

Table 1. Catches (in MT) of tunas and tuna-like fishes caught along the coasts of Morocco, 1986-96

	Bluefin tuna (BFT)		*Atl. bonito (BON)*		*Frigate tuna (FRI)*		*Swordfish (SWO)*		*Black skipjack (LTA)*		*Skipjack tuna (SKJ)*		*Plain bonito (BOP)*		*TOTAL*	
Year	*Trap*	*Coastal*	*Trap*	*Coastal*	*Trap*	*Coastal*	*Trap*	*Coastal*	*Trap*	*Coastal*	*Trap*	*Coastal*	*Trap*	*Coastal*	*Trap*	*Coastal*
I. Atlantic:																
1986	166	122	5	246	10	292	3	178	0	47	0	425	0	33	184	1343
1987	101	255	18	223	11	303	5	192	5	103	0	105	0	487	140	1688
1988	235	202	2	587	3	191	1	195	1	48	0	128	0	1422	242	3073
1989	304	147	3	563	113	486	3	219	3	11	0	295	0	1058	426	2779
1990	228	75	8	356	238	497	26	177	53	202	0	837	0	263	553	2407
1991	759	36	1	575	347	516	10	182	0	41	0	178	0	348	1117	1876
1992	84	328	1	761	91	150	13	339	0	259	0	391	0	272	189	2500
1993	254	22	1	878	76	109	3	454	0	18	0	217	0	253	334	1951
1994	339	163	4	411	58	38	8	327	0	30	0	173	0	434	409	1576
1995	188	377	8	484	92	345	12	324	0	161	0	3483	0	379	300	5553
1996	400	250	3	633	11	374	4	501	0	411	0	475	0	1405	418	4049
II. Mediterranean:																
1986	38	18	4	47	25	150	0	92	0	0	0	2	0	1	67	310
1987	110	6	5	122	27	151	0	40	0	0	0	13	0	26	142	358
1988	96	44	1	107	0	811	0	62	0	12	0	0	0	8	97	1044
1989	286	9	0	28	70	1107	0	97	0	0	0	0	0	7	356	1248
1990	580	7	0	27	185	1421	0	289	0	4	0	0	0	21	765	1769
1991	22	7	0	27	118	597	0	478	0	0	0	0	0	9	140	1118
1992	82	2	0	6	250	806	0	683	0	0	0	0	0	0	332	1497
1993	4	2	1	8	60	32	0	436	0	01	0	0	0	0	66	478
1994	332	6	4	51	91	1069	8	725	0	0	0	0	0	0	435	1851
1995	1	14	0	21	27	392	0	289	0	1	0	30	0	4	28	751
1996	0	6	0	38	0	1162	0	509	0	0	0	3	0	5	0	1723
III. TOTAL:																
1986	204	140	9	293	35	442	3	270	0	47	0	427	0	34	251	1653
1987	211	261	23	345	38	454	5	232	5	103	0	118	0	513	282	2026
1988	331	246	3	694	3	1002	1	257	1	60	0	428	0	1430	339	4117
1989	590	156	3	591	183	1593	3	316	3	11	0	295	0	1065	782	4027
1990	808	82	8	383	423	1918	26	466	53	206	0	837	0	284	1318	4176
1991	781	43	1	602	465	1113	10	660	0	41	0	178	0	357	1257	2994
1992	166	330	1	767	341	956	13	1022	0	259	0	391	0	272	521	3997
1993	258	24	2	886	136	141	3	890	0	18	1	217	0	253	400	2429
1994	671	169	8	462	149	1107	16	1052	0	30	0	173	0	434	844	3427
1995	189	391	8	505	119	737	12	613	0	162	0	3513	0	383	328	6304
1996	400	256	3	671	11	1536	4	1010	0	411	0	478	0	1410	418	5772

NATIONAL REPORT OF THE RUSSIAN FEDERATION *

by

G. A. Budylenko & V. Z. Gaikov **

1. The fishery

In 1996, six purse seiners fished tunas in the Sierra Leone area and in the adjacent area of the open sea during the first half of the year. The total catch amounted to 3,185 MT, comprised of 2,696 MT (84.6%) yellowfin tuna, 381 MT (12.0%) skipjack tuna, 49 MT (1.5%) Atlantic black skipjack, 46 MT (1.4%) frigate tuna, and 13 MT (0.5%) bigeye tuna.

The tuna catches were distributed by fishing grounds, as follows: (1) the Sierra Leone area, where a total of 2,367 MT were caught (81.8% yellowfin tuna, 13.9% skipjack tuna, 2.1% Atlantic black skipjack, 1.7% frigate tuna, 0.5% bigeye tuna); and (2) the open central eastern Atlantic area, where a total of 818 MT were caught (93.0% yellowfin tuna, 6.4% skipjack tuna, 0.6% frigate tuna).

The results of the tuna fishery in 1996 are shown in **Table 1**, and a preliminary summary of the fishery in the first half of 1997 is shown in **Table 2**.

2. Research

The data on the tuna fishery and biology for 1996-1997 were analyzed. Compilation of the data base on commercial and biological data from the longline and purse seine fisheries for tuna, swordfish, sharks and other associated species, was continued. The data collected from research and from commercial cruises were included in the above-mentioned data base.

The results of the Russian fishery for tunas in the Sierra Leone area during the 1982 to 1996 period were analyzed. An increase in the proportion of yellowfin tuna in the catch and a decrease skipjack tuna and other species in the catch has been observed in recent years.

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* Original report in English.

** Atlantic Scientific Research Institute of Marine Fisheries & Oceanography (AtlantNIRO).

Table 1. Species composition of the tuna catches and fishing effort in the Atlantic Ocean in 1996, by fishing grounds and fishing periods

	Sierra Leone area	*Open central east Atlantic area*	*Total*
No. of vessels	6	6	
Fishing Period	February-May	February-May	
Effort (days at sea)	322	91	413
Catches (MT)			
Yellowfin tuna	1,935	761	2,696
Skipjack tuna	329	52	381
Atlantic black skipjack	49	0	49
Frigate tuna	41	5	46
Bigeye tuna	13	0	13
Total	**2,367**	**818**	**3,185**

Table 2. Tuna catches (MT) taken by Russian purse seiners during the first half of 1997

Species	*Catch (MT)*
Yellowfin tuna	3,975
Skipjack tuna	239
Bigeye tuna	+
Total	**4,214**

NATIONAL REPORT OF SÃO TOMÉ & PRINCIPE *

by

Fisheries Directorate, Ministry of Agriculture & Fisheries

1. Introduction

São Tomé and Principe are two islands of volcanic origin forming an archipelago, with a total surface area of 1,000 km^2, located 150 nautical miles off the coast of Gabon, and which has an EEZ of 160 nautical miles.

The population is 127,000 inhabitants. The official language is Portuguese, but there are also two national languages, "Fôlô", spoken on the island of São Tomé, and "Lunguí", spoken on the island of Principe.

2. Fisheries resources - potential

Studies aimed at updating the estimates of fishing potential have not yet been carried out. Up to now, these estimates are based on old data collected by ORSTOM-SGTE between April and October, 1982, and from Soviet oceanographic vessels in May of 1983 and in March of 1986, during their oceanographic cruises in the São Tomé EEZ. **Table 1** shows the results obtained from these studies.

3. Research and statistical monitoring of commercial species

Fisheries research at the national level was initiated in 1993 by a project to assess fisheries resources, financed by the Canadian government.

The initial work has been dedicated to setting up national frameworks, the identification of commercial species and biological studies on some target species (*Euthynnus alletteratus*, *Auxis thazard*, *Cypselurus melanurus*, *Dactylopterus volitans*, and *Holocentrus ascensionus*). Sampling has also been conducted of the catches of the artisanal canoes, to obtain information on the composition of the biodiversity of the catch and the size/weight relationship for certain species.

As concerns statistical monitoring, such work was begun in June, 1996, with the FAO TCP/STP/6611 project, financed by FAO. This system of computerized statistical monitoring of the catches uses "ARTFISH" software. Results are already available, with a confidence limit of 95%, and these have been presented.

These results and practical experience show that in São Tomé certain species of tunas are caught during the entire year by the artisanal fleet, and these represent an important source of nourishment of the population, and contribute towards employment and an income source for the fishermen and fish mongers of São Tomé and Principe.

3. Catches

Total catches in the São Tomé EEZ from 1982 to 1997 are shown in **Table 2.** These are catches from the artisanal fishery, from fishing in the area of the territorial waters located between 0 and 12 nautical miles; the catches are comprised of several pelagic and demersal species.

It is important to note the some pelagic species having commercial interest are found during the entire year in the catches, based on the results of the project to evaluate the fishing resources (**Table 3**).

* Original report in French.

4. Difficulties

Difficulties concerning the collection of statistics from the artisanal fishery are being resolved. However, there are still some problems to be solved concerning the industrial fishery, such as:

- The lack of data on the catches of EU vessels that fish in the São Tomé EEZ, according to the terms of the fishing license provided by the government.
- The lack of oceanographic cruises in the EEZ and also in the area of the Gulf of Guinea.
- The number of vessels that collect catch data is less than the number of licenses granted to the boat owners and even less than the number of licensed vessels fishing.
- The lack of observers on board EU vessels, etc.

Table 1. Fisheries Resources - Potential

	Pelagic species	*Demersal species*	*Total*
São Tomé	1,500	1,500	3,000
Principe	7,000	2,000	9,000
Total	8,500	3,500	12,000

Table 2. Total catches (in MT) taken in the São Tomé EEZ, 1982-1997

	National fleet			*Foreign fleet*		
Year	*Artisanal*	*Industrial*	*Sub-total*	*EU*	*ex-USSR*	*Sub-total*
1982	1288	1460	2748	0	0	0
1983	1501	2549	4050	0	0	0
1984	1722	2544	4266	3000	312	3312
1985	2226	1526	3751	2700	764	3464
1986	2238	394	2632	3000	454	3454
1987	2610	*	2610	3494	190	3684
1988	2918	*	2918	2992	1684	4676
1989	3116	*	3116	1511	408	1919
1990	3572	*	3572	1919	666	2585
1991	2221	*	2221	2647	1278	3925
1992	2094	*	2094	3593	0	3593
1993	2334	*	2334	1931	0	1931
1994	3391	*	3391	**	0	0
1995	**	*	0	54	0	54
1996	1293[a]	*	1293	190	0	190
1997	1551[b]	*	1551	**	0	0

* The national industrial fleet terminated its activities.
** Not available.
a Data estimated from the last four months of 1996.
b Provisional data of 1 September 1997.

Table 3. São Tomé catches of pelagic species (in kg)

Species	*Scientific name*	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*Jun.*	*Total*
YFT	*Thunnus albacares*	0	0	27	0	390	485	902
SKJ	*Katsuwonus pelamis*	118	0	0	0	630	16	764
FRI	*Auxis thazard*	9780	7260	29910	30679	38902	30279	146810
LTA	*Euthynnus alletteratus*	6246	8130	40485	25901	13147	10991	104900
SAI	*Istiophorus albicans*	28777	11518	13604	15168	12813	11901	93781
WAH	*Acanthocybium solandri*	7622	4190	4844	4573	10106	4343	35678

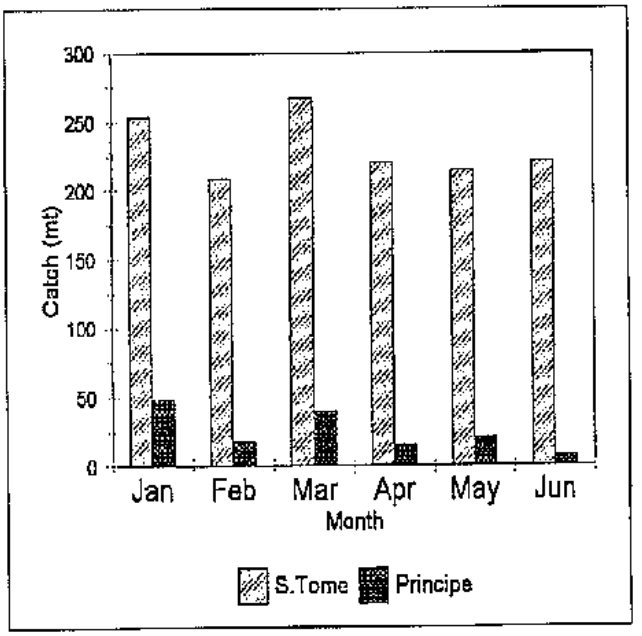

Fig. 1. Estimated catch by artisanal fisheries of S. Tome and Principe during the first half of 1997.

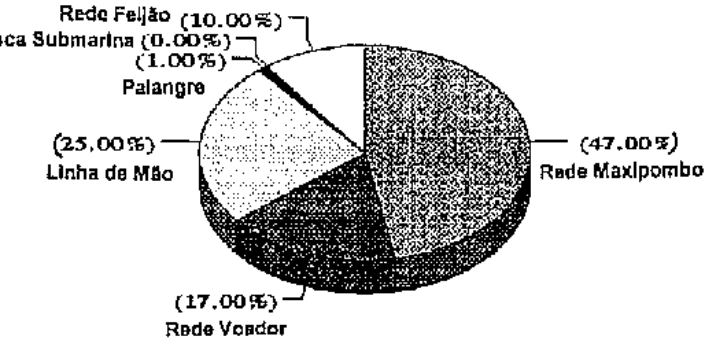

Fig. 2. Catch composition by gear, 4th quarter of 1996

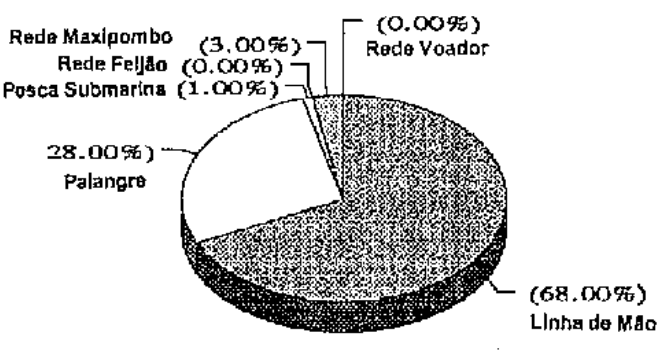

Fig. 3. Catch composition by gear, 4th quarter of 1996.

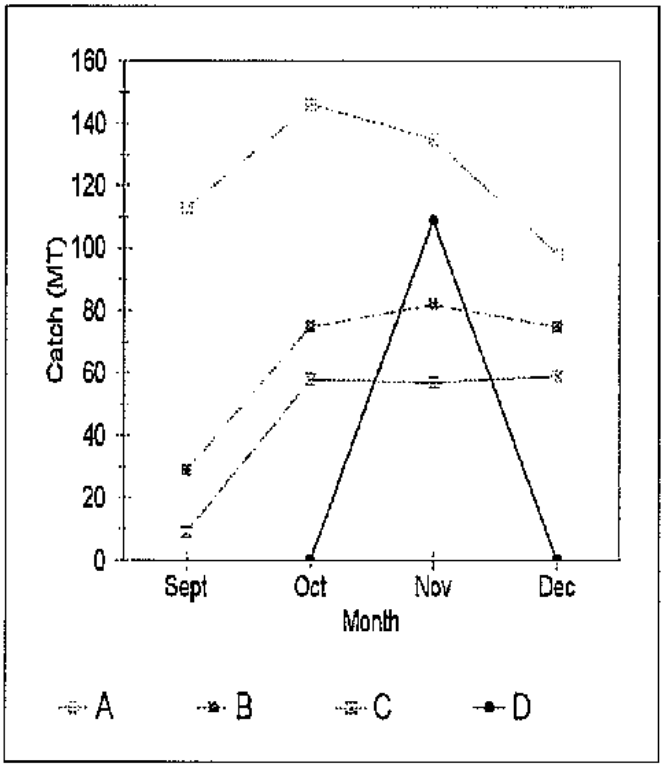

Fig. 4. Catch trends by gear of artisanal fisheries in 1996.

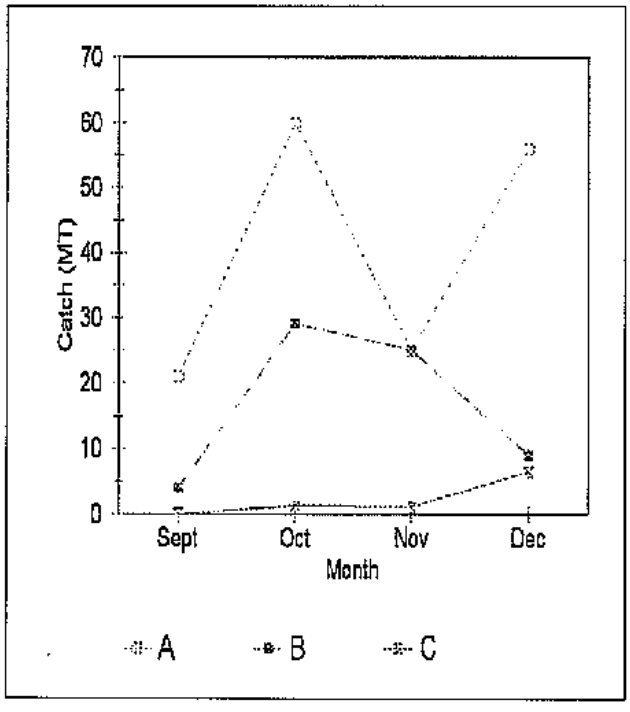

Fig. 5. Catch trends by gear of artisanal fisheries in 1996.

NATIONAL REPORT OF SOUTH AFRICA *

by

A. J. Penney and C. L. Moloney **

1. National fisheries information

During 1996, the South African tuna fishery continued to target southern albacore *(Thunnus alalunga)* off the west coasts of South Africa and Namibia, using pole and line. As a result of reduced catches (see **Table 1**), the number of vessels active in the fishery declined from 150 in 1995 to about 100 in 1996, including six vessels issued with permits to fish in Namibian waters. In addition, numerous small (5m - 8m) sport craft fished for albacore and other tunas with rod and reel in the vicinity of Cape Point in the southwestern Cape.

The recent trend in declining albacore catches in this fishery continued with a 47% decrease in reported catch in 1996, following the 22% annual decreases in reported catches in 1994 and 1995 (see **Table 1**). This decrease resulted from continued reduction in availability of albacore on the fishing grounds exploited by this fleet, and not from exclusion from fishing grounds (as happened in 1991), or switched targeting to other species. The total albacore catch of about 2,250 MT is the lowest reported in the history of this fishery, being substantially lower than the previous record low catch of 3,355 MT in 1991 (during which year South Africa was excluded from Namibian waters). The reported South African albacore catch has now declined to only 30% of the catch of 7,270 MT reported in 1987.

An overview of South African albacore catches shows a number of interesting trends (see **Figure 1**). Apart from the low catch in 1991 (when South African vessels were excluded from fishing on Tripp Seamount), estimated annual total South African albacore catches remained fairly stable between 1985 (when catch logs were introduced) and 1993. However, whereas almost half of the catch was originally taken off Namibia, restricted access after Namibian independence in 1991 has resulted in an increasing proportion of the South African catch being taken in the southwest Cape region. Originally an area mainly exploited by sport fishermen, this region now produces most of the South African albacore catch.

In view of her dependence on albacore, South Africa has been concerned at the state of the southern albacore resource for some years, and the continued decline in catches of albacore since 1993 serves to heighten this concern. It is unclear to what extent recent declines have resulted from reduced albacore availability in the near-shore area exploited by South African vessels, or from a general reduction in abundance of albacore in the South Atlantic Ocean. However, this decline is consistent with the results of stock assessments conducted over the past five years, confirming that the southern albacore resource appears to be markedly over-exploited, and that annual catches continue to exceed replacement yield (RY) levels.

During 1996 there was increased interest in the use of longlines to fish for tuna by South African fishermen. Tuna longline permits were available to South African tuna fishermen from 1960 until about 1982, when abuse of "tuna" longlines to target on hake *(Merluccius sp.)* resulted in the withdrawal of the tuna longline permits. In response to renewed applications from the fishing industry, proposals were developed for the re-issue of tuna longlines, subject to restrictions preventing their use to target non-tuna species. It was decided to issue 30 longline permits, some to existing tuna fishermen and some to new entrants into the fishery, during early 1997. As a result of successful catches of swordfish by an experimental longline permit issued during 1995, proposals were also forwarded for the issue of four South African experimental swordfish longline permits, subject to strict scientific monitoring. As yet, no progress has been made with the issue of these swordfish permits.

South Africa continued to issue permits to Japanese and Chinese Taipei vessels to fish for tunas and associated species in her waters during 1996. A total of 120 permits were made available, 90 to Japan and 30 to Chinese Taipei. Conditions associated with these permits were revised to provide for improved reporting of monthly catch and effort

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* Original report in English.

** Sea Fisheries Research Institute, Private Bag Xs, Rogge Bay 8012, South Africa.

data by species by each vessel, and to provide for future implementation of satellite vessel monitoring systems and scientific observer programs.

2. Research and statistics

The Linefish Section of the Sea Fisheries Research Institute continued to collect monthly catch and effort returns from South African tuna fishermen, as part of the National Marine Linefish System. In response to the implementation of an international catch limit on southern albacore, efforts to improve the coverage and accuracy of these catch returns continued, with the result that catches reported by tuna fishermen corresponded well with total catch estimated provided by tuna dealers. Catch and effort data for South African albacore vessels were again used to update the CPUE index for the fishery, in preparation for the re-assessment of the southern albacore stock by the Albacore Species Group during the 1997 meetings.

Length-frequency sampling of South African catches of southern albacore continued. Despite the reduction in catches in 1996, the number of fish measured from South African waters increased by 43% to 3,742 fish as a result of increased sampling effort. Cooperation with Namibia continued and Namibian researchers measured a further 2,579 fish from South African vessels fishing in Namibian waters. This brought the total length-frequency sampling coverage of South African albacore catches to 3.3% of estimated total number of albacore caught, the best coverage yet attained.

As was first noted in 1996, the improved length-frequency data show a number of clear modes, with evidence of modes of small (recruiting) fish, as well as larger adults (see **Figure 2**). The first four modes are clearly distinguishable, with cohorts of juvenile recruits centered on 51 cm and 65 cm fork length (particularly in 1988, 1990 and 1995) and dominant cohorts contributing the bulk of the South African catch at 75 cm and 84 cm in all years. There is also a small, but distinct, mode of large adults in catches in certain years, centered on 109 cm, in 1985 to 1998 and 1995. Inspection of the respective annual length-frequency distributions indicates other, less distinct, modes at 92 cm, 99 cm and 105 cm, accounting for the shape of the length-frequency distribution of albacore larger than 90 cm (see **Figure 2**).

If an age of 2 years is assigned to the first mode apparent in the length-frequency data (see **Figure 2**), the fork length modes evident in South African albacore catches correspond fairly closely with lengths-at-age estimated in a number of albacore growth studies (see **Figure 3**). In particular, there appears to be a fairly close correspondence with the growth curve derived by Lee and Yeh (1993) for the southern albacore stock.

The fork length modes in **Figure 3** may be modeled by the von Bertalanffy growth formula:

$$\text{Fork Length (cm)} = 119.9506\,(1 - e^{-0.2509(t+0.0361)})$$

These encouraging results from a simplistic visual analysis of the South African albacore length-frequency data suggest that the data are suitable for more rigorous analysis using length-frequency distribution analysis packages such as MULTIFAN. It is therefore recommended that the Albacore Species Group investigate the use of MULTIFAN to develop growth curves and estimates of catch-at-age from south Atlantic albacore catch-at-size data, for use in VPA stock assessments for this resource.

3. Implementation of ICCAT conservation and management measures

At its 1996 Meeting, ICCAT accepted a recommendation limiting annual catches of albacore by those nations actively fishing for albacore in the Atlantic Ocean south of 5°N to 22,000 MT, to be implemented by 1 January 1998. This measure replaced the 1985 catch limit set at 90% of average catches between 1989 and 1994, as revision of catch data had resulted in the calculated 90% of average catch levels exceeding replacement yield (RY) of the stock. In terms of the ICCAT recommendation, South Africa undertook to initiate negotiations with Namibia and Chinese Taipei (the other major fishers targeting southern albacore) regarding practical measures to implement the overall catch limit. A proposal was developed for the establishment of national southern albacore quotas based on past performance, and this proposal has been forwarded to the Namibian and Chinese Taipei authorities for consideration.

4. Inspection schemes and activities

As a signatory to the ICCAT Port Inspection Scheme, South Africa continued to conduct inspections of tuna vessels operating out of South African harbors. Only 16 inspections were conducted between January, 1996, and April, 1997 (15 in Cape Town harbor and one in Kalk Bay harbor). No foreign vessels were inspected and all vessels were South African poling vessels, offloading predominately albacore, with a few yellowfin and bigeye tuna. All the yellowfin and bigeye tuna caught were large adults, and no under-sized fish were observed.

During 1996, the ICCAT inspection procedures were modified to include the measurement of albacore, to provide additional length-frequency information. These measurements were used to supplement the scientific length-frequency data, in order to provide better representation of modal progressions in the data.

Table 1. Updated estimated total South African catches (MT) of tuna species within the ICCAT Convention area (including South African and Namibian waters) during 1995 and 1996

Catch	*Albacore*		*Yellowfin*		*Bigeye*		*Skipjack*		*Swordfish*		*Total*	
Method	*1995*	*1996*	*1995*	*1996*	*1995*	*1996*	*1995*	*1996*	*1995*	*1996*	*1995*	*1996*
Pole	4127	2097	145	54	27	7	2	-	-	-	4301	2158
Longline	-	-	-	-	-	-	-	-	1	-	1	-
Purse seine	-	-	-	-	-	-	-	-	-	-	-	-
Rod & reel	8	81	-	7	-	-	-	-	1	-	8	88
Trawl	-	-	-	-	-	-	-	-	2	1	2	1
Total	**5135**	**2178**	**145**	**61**	**27**	**7**	**2**	**-**	**4**	**1**	**4312**	**2247**

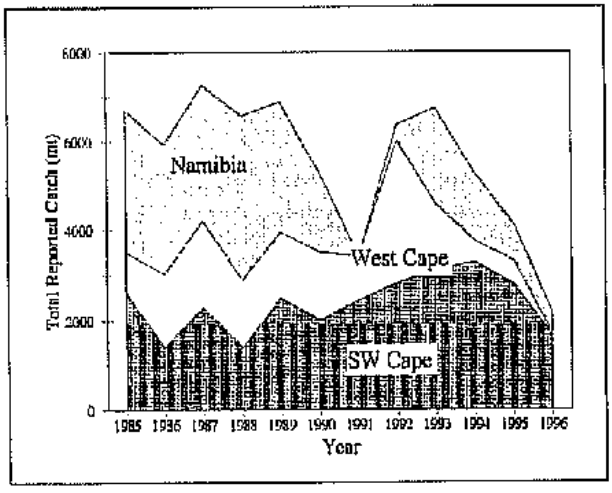

Fig. 1. Annual reported catch of albacore by South African pole boats fishing off Namibia, the West Cape and the Southwest Cape from 1985 to 1996.

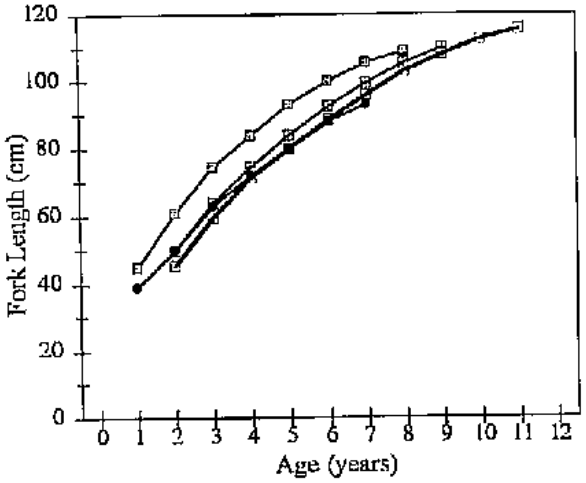

Fig. 3. Comparison between published albacore growth curves and fork length modes evident in length frequency distribution of albacore measured from South Africa catches between 1985 and 1996.

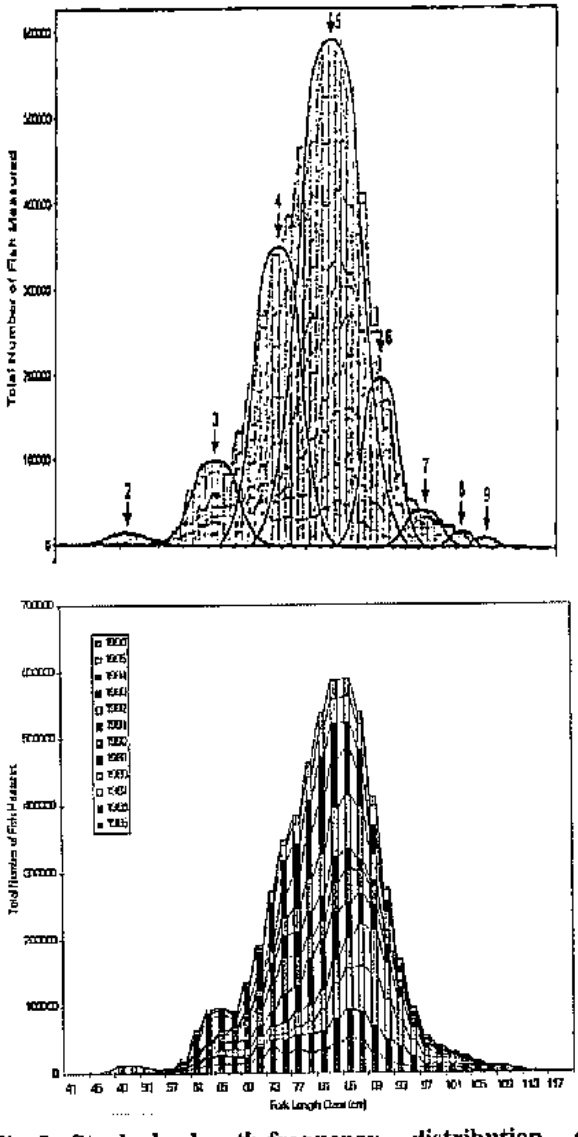

Fig. 2. Stacked length-frequency distribution of albacore measured annually from South African tuna catches between 1985 and 1996, together with proposed age-length modes fitted to the combined data by eye (see text for details).

NATIONAL REPORT OF SPAIN *

by

Spanish Institute of Oceanography

1. General information

Spanish catches of tuna and tuna-like species amounted to 134,249 MT in 1996, which is 18% less than the 1995 catches. The catch levels attained in 1996 are the lowest of the 1990s. This important decrease is due to the reduction in the catches of five of the six major species.

Skipjack catches showed the largest decrease (25%), followed by albacore catches (22% decrease). For both species, the 1996 catches are among the lowest of the last 10 years. Yellowfin catches maintained the continuous decrease which started in the early 1990s; catches of bigeye tuna declined by 15%. There was a similar decrease in swordfish catches. Bluefin catches remained at the 1995 level. Small tunas were the only species for which catches showed an important increase (71%).

2. The fisheries

2.1 Tropical tunas and small tunas

-- The purse seine fishery

There was no variation in the number of vessels in 1996 as compared to 1995 (24 vessels). However, the vessel carrying capacity (calculated taking into account the time which each boat remained at the fishing grounds) decreased by 10% (from 14,487 MT to 13,019 MT). Effort, expressed in days fishing, was 6,402 days (6,617 days in 1995) and in days searching went from 5,506 in 1995 to 5,517 days in 1996.

Catches by the purse seine fleet rose to 75,175 MT (93,217 MT in 1995). The breakdown, by species, was as follows: Yellowfin 30,841 MT (36,066 MT in 1995), skipjack 32,980 MT (45,475 MT in 1995), bigeye 9,961 MT (11,024 MT in 1995), and small tunas (frigate tuna and Atlantic black skipjack) 1,393 MT (652 MT in 1995). The average weights of the fish caught were: Yellowfin (19.4 kg), bigeye (3.3 kg), and skipjack (1.8 kg).

CPUE, in MT/days searching, was: yellowfin 5.60 MT (6.55 MT in 1995), skipjack 5.98 MT (8.26 MT in 1995), and 13.39 MT for the combined species (16.82 in 1995).

-- The baitboat fishery

This fishery is carried out by four baitboats based at Dakar (Republic of Senegal). The target species are yellowfin, bigeye and skipjack. In recent years, the major part of the catches are caught under tuna objects ("spots").

The number of vessels decreased by one boat, as compared to 1995. The catches taken were: yellowfin 448 MT (300 MT in 1995), skipjack 572 MT (617 MT in 1995), and bigeye 995 (802 MT in 1995), for a total of 2,015 MT (1,719 MT in 1995). The average weights were: yellowfin (13 kg), bigeye (11 kg), and skipjack (3 kg).

Effort, in days fishing, increased to 450 days (367 days in 1995).

-- The Canary Islands artisanal fishery

This fishery takes place in waters off the Canary Islands and the African coast close to the islands, and is carried out using live bait. The number of vessels fishing in 1996 rose to 343, which carried out 7,171 trips with an estimated duration of 10,811 days at sea.

* Original report in Spanish.

The tropical tuna catches reached 12,378 MT in 1996 (13,235 MT in 1995). The breakdown by species is as follows, with 1995 values shown in parentheses: yellowfin 2,621 MT (801 MT), bigeye 5,253 MT (7,271 MT), skipjack 4,472 MT (5,143 MT) and others 32 MT (20 MT).

– The Mediterranean and sub-Atlantic region

Catches of Auxis spp. by surface gears and traps in the Mediterranean area, increased considerably in 1996 (2,296 MT), and considerably surpassed the average of previous years. This increase in catches is due, in part, to the change in fishing strategy of the artisanal fleet from juvenile bluefin tuna to small tunas. Catches of Atlantic bonito *(Sarda sarda)* amounted to 690 MT, maintaining the level of earlier years.

In the sub-Atlantic region, catches of small tunas were very low, continuing the trend of recent years.

2.2 Temperate tunas

– Bluefin tuna (Atlantic)

Bluefin tuna catches in 1996 in the Bay of Biscay fishery reached 4,711 MT, which represents a 70% increase as compared to the previous year and a 1.2% increase, with respect to the 1993 catch (3,940 MT). Nominal fishing effort, in days fishing, increased by 14% as compared to 1995 and by 1.1% with respect to 1993 (1,840 days fishing). The CPUE of age class 2 (fish between 8-15 kg), used an index of abundance in the assessments, was 64 fish/day at sea, which is close to the average value of the last five years (70 fish/day), following the important decline which occurred in 1994 (32 fish/day).

During the fall, part of the baitboat fleet of northern Spain shifted to the Gulf of Cadiz area (ICCAT area 58) where they caught 256 MT of bluefin tuna. The major part of the fish caught were juveniles of ages 2-5 (10 to 70 kgs). Effort was 128 days at sea and the CPUE was 2 MT/day at sea.

Bluefin catches by the trap fishery of the Sub-Atlantic region increased 20% in 1996 (1,206 MT), as compared to the previous year (941 MT), but remained within the range of recent years. The same number of traps (4) operated.

– Bluefin tuna (Mediterranean)

The total catch of bluefin tuna in the Mediterranean by the Spanish fisheries amounted to 2,589 MT in 1996, which represents a 43% decrease as compared to the previous year. The trap fishery (2 units in operation) continued with its practically null catches as has been the case in recent years. The purse seine fishery remained stable, in terms of the fleet and fishing effort (in number of days at sea), but catches declined by 40% to only 1,657 MT, compared to 2,895 MT the year before. Surface longline directed at swordfish caught 37 MT of bluefin tuna, while catches of this species by Japanese-type longline increased to 332 MT.

– Bluefin tuna (Canary Islands)

Catches of bluefin tuna in the Canary Islands area showed an important increase in 1996, with 157 MT, as compared to 4 MT caught in 1995. The average weight of the fish caught was 256 kg.

– Albacore (Atlantic)

The total catch obtained by the Spanish surface fleets in the fisheries of the Cantabrian Sea and adjacent waters of the eastern Atlantic North of 35°N amounted to 15,546 MT.

In the Cantabrian Sea area, the baitboat fishery caught 8,344 MT, with a nominal effort of 5,677 days fishing, maintaining stable catches and effort, in relation to the values reported in 1995. In the same area and also in the Atlantic, the troll fishery caught 6,650 MT, exerting a nominal effort of 12,287 days fishing, which represents a 35% and 25% decrease, respectively, as compared to catches and effort reported in 1995 for this fleet.

The baitboat and troll fleets carried out their activities during the summer months and in early autumn (June-October). The major part of the catch is comprised of juveniles and sub-adults (55-90 cm) from the north stock of the Atlantic. These fleets are comprised of 220 and 440 vessels, respectively. The number of vessels in this fishery has remained constant since 1994.

During the fall months of 1996, part of the Cantabrian baitboat fleet shifted to the area southwest of the Iberian Peninsula, in the Atlantic. Catches amounted to 553 MT, with a nominal effort of 826 days fishing. In this fishery the fish caught are sub-adults measuring 70-90 cm. In 1996, the baitboat fleet in the Cantabrian Sea did not shift to the area of the Azores Islands during the autumn months, as occurred in previous years.

In the Canary islands area, 743 MT were caught (with an average weight of 19 kgs).

– Albacore (Mediterranean)

During the fall, some troll and baitboat vessels from Cantabrian ports fish in the western Mediterranean. The catches obtained in 1996 amounted to 195 MT by baitboat and 119 MT by troll, exerting a nominal effort of 374 and 129 days fishing, respectively. Baitboat catches were similar to those in 1995, whereas troll catch and effort decreased by almost one-third (250%) with respect to the 1995 level, although they remained at levels similar to previous years. The catch is comprised of albacore measuring 60-80 cm from the Mediterranean stock.

2.3 Swordfish

– The surface longline fishery (Atlantic)

Swordfish are caught by the Spanish surface longline fleet in the north and south Atlantic and in the Mediterranean. The basic data relative to the activity by this fleet in 1996 (catch, nominal effort, size) are shown in the following table:

Area	*Catch (no. of fish)*	*Catch (live weight kg)*	*Nominal effort (1,000 hooks)*	*No. of fish sampled*	*Coverage (%)*
BIL94A	21,839	885,668	6,074.128	15,195	69.6
BIL94B	126,180	4,632,779	28,438.481	91,306	72.4
BIL96	66,337	3,919,124	6,796.733	21,231	32.0
BIL97	115,200	5,951,282	12,531.088	83,467	72.4
BIL95	70,721	1,034,637	10,230.423	19,914	28.1
TOTAL	**400,277**	**16,423,637**	**64,070.853**	**231,113**	**57.7**

ICCAT areas: BIL94A + BIL94B = North stock; BIL96 + BIL97 = South stock; BIL95 = Mediterranean.

Thus, 5,518 MT were caught from the north stock, 9,870 MT from the south stock, and 1,035 MT from the Mediterranean stock.

The fishing areas of the Spanish fleet in 1996 did not change significantly in relation to those in 1995. Only some additional activity has been detected in 1996 in the area close to the African coast in the southeastern Atlantic.

The traditional, surface longline fleet that fishes the north stock continued with the fishing strategy initiated in recent years (based on the economic maximization of the fishing activity without clearly defining the target species), including changing the target species several times during the same trip. This will have effects on the representativeness of CPUE as an index of abundance, comparatively to previous periods in which the fishing strategy was clearly directed at swordfish.

The surface longline fishery for swordfish in the Mediterranean maintained the same number of vessels as in recent years. However, the catch of this species in 1996 (1,185 MT) decreased by 20%, with respect to the previous year, due to the change in fishing strategy of the fleet during some part of the year.

3. Research and statistics

3.1 Tropical tunas

-- The purse seine fishery

The main source of information is from the fishing logbooks which the vessel captains complete daily and/or when sets are made. The coverage rate in 1996 was 87% of the catches. Sampling of the catches is carried out at the major landing and/or transshipment ports: Abidjan (Côte d'Ivoire), Dakar (Republic of Senegal), and at La Puebla del Caramiñal (Galicia, Spain). Basic statistics corresponding to 1996 were presented in SCRS/97/47.

As concerns the size composition of the catches, 3,486 samples were taken throughout 1996 and 146,246 bluefin, 47,318 yellowfin, 70,141 skipjack, 17,227 bigeye and 11,560 fish of other species were measured.

Since 1990, this fishery has undergone a change in the exploitation scheme, with the massive introduction of artificial floating objects. Because of this change, research in recent years has centered on the monitoring and analysis of the development of this new fishing method.

To gain knowledge on the impact which the purse seine fisheries have on other species, especially fishing on objects, a study that was financed by the EU and finalized in 1996, in which the data obtained by observers on 22 trips carried out in 1995 and early 1996 (11 in the Atlantic Ocean) on French and Spanish vessels, were collected and analyzed. Some of the results obtained were presented in SCRS/97 25 and SCRS/97/87.

In 1996, another joint Spanish-French project, financed by the EU, was initiated to study the sampling strategy of the catches of this fishery, to obtain more precise data on the species composition of the catches and their size distribution, considering various time-area strata and different school types (free schools, objects, decayed meat, etc.) from where these catches are taken. A working group which met in Tenerife in June, 1996, designed a new sampling strategy to be applied starting in January, 1998. The analysis carried out and the sampling scheme that was defined were presented in SCRS/97/28. The project finalized in December, 1997.

Lastly, in 1997 a Spanish-French project was started, financed jointly by the EU and the Spanish administration, to study the causes of the increase in bigeye catches by this fleet. Among the different activities being carried out is an observer program on board tuna purse seiners. In the case of the Spanish fleet, it is expected that observers will cover 58 trips during the year, with sample directly proportional to the catches of bigeye and to the importance of fishing with floating objects. From June, when the observer program started, to September, the fleet completed a total of 50 trips, and 12 of these had on-board observers. This represents a 25% coverage rate of the trips. Document SCRS/97/24 presented the major results obtained; SCRS/97/11 and 41 showed some of the most important aspects of the methodology used.

A comparative analysis of the fishing strategies of the French and Spanish fleets in the last two years was presented in SCRS/97/10.

-- The baitboat fishery

The fishing logbooks which are completed by the vessel captains is the source of information on this fishery. Coverage is estimated to be very close to 100%. To collection information on size distribution of the different species caught, an interviewer-sampler is available at the port of Dakar (Senegal).

In 1996, a total of 52 samples were made in which 1,166 yellowfin, 2,053 bigeye and 1,856 skipjack were measured. The average weights obtained were: 13 kg for yellowfin, 11 kg for bigeye and 3 kg for skipjack.

-- The Canary Islands artisanal fishery

An extensive information and sampling network covers the major tuna landing points in the Canary Islands. This network is comprised of 10 interviewers-samplers at the ports of La Restinga (El Hierro), Playa Santiago and Valle Gran Rey (La Gomera), Santa Cruz de La Palma and Tazacorte (La Palma), Playa de San Juan and Santa Cruz de Tenerife (Tenerife), Arguineguin and Mogán (Gran Canary Island), Arrecife de Lanzarote (Lanzarote). There is also a interviewer-sampler located at the port of Algeciras (Peninsula). The data coverage rate is 100%.

In 1996, monitoring continued on the objects ("spots") fishing technique, by means of periodic sampling at the port of Arrecife de Lanzarote and the introduction of fishing logbooks, aimed at obtaining precise data on this activity, such as species composition, catches by time intervals, etc. The data collected up to now are being processed.

Analysis of skipjack stomach contents continued, through periodic trips, that are carried out according to the availability of this resource and adequate vessels.

The number of samples reached 217, with 18,191 fish measured (23,645 in 1995). These figures include all the tropical and temperate tuna species. The number of fish, by species, was as follows: yellowfin 5,236 fish, bigeye 6,224, and skipjack 5,053. The average weights of the fish caught were: yellowfin 14, kg, bigeye 17 kg, and skipjack 3 kg.

The basic data on this fishery were presented in SCRS/97/91.

3.2 Temperate tunas

-- Bluefin tuna

Data corresponding to ICCAT Task I and Task II were compiled for the Bay of Biscay, sub-Atlantic region and the Mediterranean for the following gears, by time-area strata: baitboat, surface longline, trap, purse seine, Japanese-type longline, hand line, and other surface gears.

The collection of catch and effort data by time-area strata and size sampling of the baitboat fleet of northern Spain is carried out by interviewer-samplers located at five ports along the Cantabrian and Atlantic coast where landings are effected. In addition, the monitoring of fishing effort is done by means of fishing logbooks maintained by some baitboats in the Cantabrian Sea and in the Atlantic in the fall.

The sampling and information network of the sub-Atlantic and Mediterranean area was strengthened, with systematic coverage at the ports of Huelva, Barbate, Tarifa, Algeciras, Motril, Aguilas, Cartagena, Alicante, Palma, Castellon, San Carlos de la Rapita and Tarragona. Of note is the recent incorporation of the port of Cartagena in this network, given its importance as a bluefin tuna landing site. A total of 13,542 bluefin and other tuna were sampled in the Mediterranean.

In the Bay of Biscay, 80 biological samples were taken, stratified by commercial category of the landings made by the baitboat fleet. A total of 4,742 fish of ages 1-5 were measured, with represents a 1.1% coverage rate. The coverage rate for fishing effort was more than 80%. A sample of 400 fin ray spines was also taken, to determine the age of the fish caught in the area by means of direct reading of the rings in these radial sections.

In the Gulf of Cadiz during the fall months, some 5,837 fish from the baitboat landings in the Cantabrian Sea were measured; the coverage rate was 38%.

In the Canary Islands area, 1,656 albacore samples were taken, with an average weight of 19 kg. Twenty-two (22) bluefin samples were also taken, with an average weight of 256 kg.

In recent years, bluefin recoveries were obtained from tagging cruises carried out in the Cantabrian Sea and the Mediterranean, which supports the existence of interactions between the eastern Atlantic and Mediterranean fisheries. These data were presented in SCRS/97/55.

In the Mediterranean, the Spanish Institute of Oceanography's Project 408 ("Mediterranean Tunas") continued. The objective of this project are related to the development of ICCAT data bases by time-area strata and improved knowledge on the biological parameters of this specie. Studies also continued on sex-ratio and sex by size of bluefin tuna caught by traps.

In 1997, intensive sampling was carried out on bluefin tuna at the port of Cartagena. The objective, among others, was to obtain a live weight/belly meat weight relationship, as recommended by the ICCAT SCRS within the Commission's Bluefin Year Program (BYP).

In addition, two EU projects of the DG-XIV are currently under way on juvenile bluefin and small tunas. The objectives of these projects are relative to gaining knowledge on the oceanographic and environmental characteristics of the recruitment areas and to study biological parameters such as growth, feeding, stock structure and abundance indices. The bluefin tagging cruise has been postponed due to the low abundance of the recruitments, but work continued on providing information on this tagging-recovery activity. The campaign will be carried out this year. The EU's DG XIV approved a project this year for bluefin tagging using "pop up"tags.

The DG XIV project of the EU concerning observers on-board tuna purse seiners in the Mediterranean finalized in 1997. This project represents an important advancement in the knowledge of the fishery, and has resulted in the development of a data base on catch, effort and size distribution by time-1°x1° area, and which provides data on the behavior of this species in relation to the environment.

– Albacore (Atlantic)

In accordance with ICCAT recommendations on statistics, Task I and Task II data on the baitboat and troll fisheries were collected through the information and sampling network established at the major ports of sale along the Cantabrian coast and the sub-Atlantic region (a total of 13 ports). The estimates of catch and effort by gear, month and ICCAT statistical area, are obtained from interviews carried out at these ports, which represent a coverage of 80-90% of the total landings.

The size distribution of the catches is obtained from sampling, stratified by commercial category, from the landings of the baitboat and troll catches at the ports monitored. In 1996, 10,323 fish were sampled, from baitboat catches in the Cantabrian Sea, which represents a coverage of 0.7%; there were 28,811 fish sampled from the troll fleet, which represents a 2.1% coverage. These catches are comprised of albacore ranging in size from 40 to 116 cm.

In the Canary Islands area, 1,656 albacore were sampled, with an average weight of 19 kg.

Studies continued on the relationship between environmental changes and yields of the surface (baitboat and troll) fisheries in the Cantabrian Sea.

– Swordfish

In 1996, the collection of data ICCAT Task I and II data continued. These sources of information are based on interviews-sampling at ports, voluntary and specific IEO fishing logbooks, and observers on board long-distance longliners.

The combination of these sources of information has resulted in the collection of ICCAT Task I and II data by 5°x5°, month and fleet type. The catch-effort coverage for the Atlantic fleet was 91%, for the traditional fleet as well as for the long-distance freezer vessel fleet. The coverage for the Mediterranean fleet was 35%.

Intensive size sampling (or individual weights) also continued in 1996 through port sampling, fishing logbooks and on-board observers. A total of 231,113 fish were sampled, which represents an overall coverage of size sampling of 58% of the fish caught. This sampling coverage varied in the range of 28 to 72%, depending on the ICCAT area considered.

Intensive sampling of swordfish continued to obtain size-sex variables. In 1996, 14,042 fish were sexed (5,573 males and 8,469 females). Thus, information is available on a total of 154,712 observations of fish sexed during the 1986-1996 period.

In 1996, efforts continued to encourage voluntary tagging by the Atlantic commercial fleet. Close to 800 fish have been released by the fleet in the Atlantic, of which 300 were swordfish (less than 125 cm LJFL). A trip has also been carried out this year to try to assess the viability of conducting scientific tagging aimed at swordfish and associated species. The results have been positive and warranted carrying out a scientific tagging cruise in the spring of 1997.

Contacts with the fleet have continued and intensified, with a view towards achieving a quantitative and qualitative improvement in the recovery of tagged fish. In 1996, some 140 recoveries were made by Atlantic longliners (164 more in 1997, up to September). All the tags and their accompanying information have been transmitted to the respective tagging laboratories, basically those of the United States, Ireland and Spain. In recent years, a considerable, progressive improvement has been noted in the quantity and quality of the tagging information provided by the fleet.

In 1996, the European project initiated in 1994 (EU DG XIV-MED93/013), which was aimed at studying the stock structure of Atlantic and Mediterranean swordfish using mitochondrial DNA (mtDNA). The geographic heterogeneity of the mitochondrial DNA lineage was examined from a wide sample of 509 fish. Approximately 330 pairs of bases from the control region of the mtDNA were sequenced in each individual. The data were then analyzed in areas of the north and south Atlantic, Indian Ocean, and Mediterranean Sea. The philogeographic evaluation of the distribution of the genotypes reveal considerable levels of structurization of the stocks, rejecting the null hypothesis of panmixing. As concerns the Atlantic, the null hypothesis of a single unit was rejected, since the comparison between the samples from the north Atlantic (North of 5°N) and the south Atlantic (South of 5° North) indicate that these two regions are distinct.

All the binary comparisons with the Mediterranean Sea samples consistently suggest very limited movement in and out of this Sea. The results suggest that the levels of genetic flow between the Mediterranean and the north Atlantic are much less than previously assumed. In the same way, the Indian Ocean samples were significantly different from those of the Atlantic and Mediterranean.

4. Other activities

4.1 Tropical tunas

– The purse seine fishery

The catches of the purse seine fleet that operates in the Atlantic Ocean are monitored and are presented to ICCAT under the NEI category. This fleet includes vessels of different countries that do not usually provide official statistics to ICCAT. In 1996, seven of these vessels were monitored, for an estimated coverage rate of 100% of the catches. In the same way, periodic size sampling is carried out to determine the species composition and size distribution of each of the species caught. There were 42,412 fish sampled in 1996, which corresponded to 13,336 yellowfin, 20,022 skipjack, 5,408 bigeye and 3,646 fish of other species.

– The baitboat fishery

As is the case purse seine fishery data, in 1996 catch and effort and size distribution data were processed for a baitboat included under the NEI category. The catches amounted to 516 MT. Of these, 106 MT were yellowfin, 206 MT were bigeye, 204 MT of skipjack, and 0.2 MT of other species. Seventeen samples were made and 1,046 fish were measured.

4.2 Temperate tunas

– Albacore

In 1996, logbooks were completed for the baitboat fishery of the Cantabrian Sea and the southwestern area of the Iberian Peninsula. The objective is to collect the information necessary to carry out studies within the framework of the CTYMAR/95 Project (coordinated by AZTI) entitled "Application of Infrared Teledetection to the Albacore Fishery". This project ended in December, 1997. In addition, information collected from the fishing logbooks is used to create the data bases to study the various procedures used to estimate abundance indices of this fishery. These activities are carried out within the CEE/DG XIV/C1/95/011 project, financed by the EU and coordinated by AZTI, and which finalizes in December, 1997.

4.3 Swordfish

In 1996, a report was distributed to the Spanish surface longline fleet in the Atlantic to explain various areas of interest concerning this species, information on new studies carried out, conclusions of the assessments carried out within the framework of ICCAT, management recommendations, etc. This report also included summaries on tag-recovery data.

5. Application of ICCAT conservation and management measures

5.1 Swordfish

The data indicate that in the north Atlantic the catch quota corresponding to 1996 (5,457 MT) has been complied with, and that in the south Atlantic, while the catch limit corresponding to 1996 has been surpassed, according to a 1994 ICCAT Recommendation, a 14.77% reduction has been realized.

5.2 Bluefin tuna

The bluefin tuna fishery in the Mediterranean has shown significant achievements. One is the reduction in fishing effort which has resulted in a 44% reduction in catches. Another, equally important, is that for the first time the 15% tolerance limit for fish less than 6.4 kgs has not been exceeded.

5.3 Tropical tunas

In relation to the ICCAT Recommendation to maintain fishing effort and catches of yellowfin tuna at 1992 levels, Spain has not only complied with this Recommendation, but has reduced effort and consequently catches, which in 1996 amounted to 33,910 MT, representing a 34.4% reduction.

As concerns the ICCAT Recommendation to limit bigeye catches to previous levels (1992 and 1993; the year was not determined by the SCRS), Spain has reduced its catches in the following way:

1) Taking into account the average catches for 1992 and 1993, which are 18.610 MT, catches were reduced by 2,401 MT in 1996.

2) Taking the average of the catches in 1994 and 1995, which were 20,460 MT, the catch reduction in 1996 amounted to 4,251 MT.

NATIONAL REPORT OF THE UNITED KINGDOM *

1. The albacore fishery

Since 1992, a seasonal driftnet fishery for albacore has been conducted in the Atlantic to the southwest of the British Isles during the months of July, August and September. The number of vessels reached a peak of 25 in 1994 and total catches reached a peak of 507 MT in 1994, down to about 30 MT in 1997. Incidental by-catches are also taken.

2. Research

The Centre for Environment, Fisheries and Aquacultural Science (CEFAS), an agency of the UK's Government's Ministry of Agriculture, Fisheries and Food, is responsible for providing reliable scientific assessments and objective advice for managing marine and freshwater fisheries, combining comprehensive methods of stock assessment and monitoring with expert data analysis and interpretation. Whilst no research is being conducted primarily into tuna and tuna-like species, there are a variety of research programs which are complementary to the work of ICCAT.

A programming framework has been developed to allow the evaluation of management strategies. This framework contains a set of generic tools including age, length and biomass-based assessment models with which it is hoped that management strategies for a wide variety of fish species can be investigated.

Work has also been conducted on the modelling of fisheries data sets, in particular, the use of diagnostics for assessing the goodness of fit for generalized linear models of catch and effort data. Collaboration with scientists from Spain and the Azores on albacore catch and effort data has been started to develop a set of diagnostics for use when presenting standardized catch and effort series.

The CEFAS has also been involved with research on fish migration for the whole of its 90 year existence and for the last 25 years has been developing techniques for following individually identified free-ranging fish in the open sea. Originally relying on transponding acoustic tags and sector-scanning sonar, the program is now mainly based on archival tags, which record the depth of the fish and the temperature of the sea at frequent intervals for long periods. These data are used to identify consistent patterns of behavior which can, in turn, be used to reconstruct geographical movements of fish during spawning and other migrations.

At present, archival tags are recovered through the commercial fisheries and are deployed with species (e.g. plaice and cod in European waters) on which there is high fishing effort. Recovery of data via satellite would allow this technique to be extended to those species for which the technique is not cost effective because tag return rates are too low and this is an objective for a future development program. The CEFAS has an on-going program of electronic tag development and has just finished the development of a versatile archival tag with eight separate data channels and 12 Mbit of non-volatile flash memory, which gives a recording life of 4-5 years. The tag includes a light sensor (for geolocation) as well as temperature and pressure sensors; compass and tilt sensors are at an advanced stage of development. With an air-filled case (56 x 8 mm) the tag weighs 16 g in air.

The CEFAS is keen to apply its engineering skills to the development of archival tags and sensors for large far-ranging oceanic fish, such as tuna and billfish. To this end, Dr. Geoff Arnold, who leads CEFAS's migration program, has been building up contacts with colleagues in institutes in other ICCAT countries and has attended a variety of conferences where the application of archival tags to tuna has been discussed. These included the 45th Annual Tuna Conference at Lake Arrowhead, California, in May, 1994, the TAB Atlantic Bluefin Tuna Tagging Workshop in Miami in August, 1995, and the 15th "Semana das Pescas dos Açores" in Horta in March, 1996.

3. Catch sampling

Catches of albacore at present do not have to be entered in EU logbooks, but total weight, value and catch composition are recorded at landing. No biological samples are taken from the fish and sharks are not recorded down to species.

* Original report in English.

4. Regulations

Although there are currently no ICCAT regulations in effect for north Atlantic albacore, there is a European Union regulation restricting the length of driftnets to 2.5 km with which the UK fleet complies. Nets are measured and photographed before leaving UK ports to ensure compliance with this regulation, and checked on return. Some nets also include "dolphin doors" in an attempt to reduce catches of marine mammals and so total length might 2.k km but the actual fishing length is in accordance with the regulation.

Table 1. UK catches of albacore, including by-catches of tuna-like species (MT)

	1993	*1994*	*1995*	*1996*	*1997*
Tuna	447	570	196	49.2	29.5
By-catch	n/a	n/a	14	n/a	7.1

NATIONAL REPORT OF UK-BERMUDA *

The Bermuda Commercial fishing fleet remained at approximately 190 boats during 1996 with approximately one-third of these vessels actively fishing for tuna and tuna-like species. Most of this fishing is carried out in the inner 40 km of the Bermuda Exclusive Fishing Zone.

The composition of the Bermuda domestic fleet has been modified to now include some purpose-built longline vessels.

During 1996, the total catch of tuna and tuna-like species was 195 MT. Details are presented in **Table 1**.

Research efforts have been directed at the sampling of pelagic species for age-growth and reproductive studies with wahoo otoliths having been analyzed as part of an on-going research project. A similar study has commenced for yellowfin tuna while tissue samples have been collected from a variety of pelagic species for a regional genetics project. Bermuda continues to be involved in the ICCAT Enhanced Program for Billfish Research and is actively cooperating with CARICOM research efforts.

Table 1. Summary of Bermuda catches of tuna and tuna-like species, 1996

Species	*Weight (MT)*
Yellowfin tuna	67.2
Blackfin tuna	4.6
Albacore	1.0
Atlantic black skipjack	6.7
Skipjack tuna	>1.0
Wahoo	98.7
Blue marlin	13.4
White marlin	1.3
Swordfish	1.0
TOTAL	195.0

* Original report in English.

NATIONAL REPORT OF THE UNITED STATES *

by

U.S Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Introduction

The following sections comprise the U.S. National Report to the International Commission for the Conservation of Atlantic Tunas. Section I of this report presents 1996 landings statistics for species covered under ICCAT. U.S. statistics, monitoring and research initiatives that focus on ICCAT species are described in Section II. Section III addresses implementation of ICCAT conservation and management measures and 1997 modifications to U.S. domestic regulations. Inspection schemes and activities are described in Section IV, and Section V covers other activities, including observer programs.

I. National fisheries information

Total (preliminary) reported U.S. catches of tuna and tuna-like fishes (including swordfish, but excluding billfishes) in 1996 were 27,966 MT. This represents an increase of 3,677 MT (15% increase) from 1995, due mainly to increased catches of bonito, king mackerel, Spanish mackerel, and little tunny. Estimated swordfish catch (including dead discards) decreased from 4,551 MT to 4,320 MT. Provisional landings from the U.S. fishery for yellowfin decreased from 8,131 MT in 1995 to 7,743 MT in 1996, while landings in the Gulf of Mexico increased from 1,897 MT to 2,172 MT, accounting for 28% of total U.S. yellowfin landings in 1996. U.S. vessels landed an estimated 1,361 MT of bluefin in 1996, a decrease of 90 MT compared to 1995. Dead discards of bluefin declined by about half in 1996. Provisional skipjack landings increased from 81 MT to 84 MT, estimated bigeye landings decreased from 1208 MT to 882 MT, and estimated albacore landings decreased from 545 MT to 472 MT in 1996.

The U.S. fisheries for Atlantic tuna and tuna-like species are managed through regulations issued under the authority of the Atlantic Tunas Convention Act (ATCA), which authorizes the Secretary of Commerce to implement regulations as may be necessary to carry out the recommendations of ICCAT. This authority has been delegated from the Secretary to the Assistant Administrator for Fisheries of the U.S. Department of Commerce. The Magnuson-Stevens Fishery Conservation and Management Act of 1996 also guides the management of large pelagic species in the United States. (See Section III for a description of domestic management measures pursuant to the Magnuson-Stevens Act).

A. Atlantic tunas

-- Background

Atlantic tunas are targeted by recreational and commercial fishers along the Atlantic coast from Maine to Texas. Handgear includes rod and reel, harpoon (bluefin only), kegline, bandit gear, and handline. Atlantic tunas are also landed by longline gear (by-catch only in the case of bluefin), drift gillnets, and purse seines. All vessels and ex-vessel buyers are subject to permitting and reporting requirements, including the majority of recreational vessels. The NMFS has reissued approximately 14,000 Atlantic tuna vessel permits under a new permitting system in 1997. Employment associated with bluefin tuna alone is estimated to be 1,200 full-time equivalent jobs. The majority of U.S. commercial landings of Atlantic bluefin tuna are exported to Japan. Ex-vessel revenues from bluefin tuna generally range between U.S. $20-25 million. High quality bigeye and yellowfin tuna are also marketed fresh in Japan, with the balance sold on the U.S. domestic market.

* Original report in English.

The recreational fishing industry primarily targets yellowfin and albacore, as well as bluefin in the 6.4 kg - 107 kg category. These fisheries are an important source of direct income to charter and headboat vessels, and an indirect source of income to U.S. firms that supply recreational fishery participants with associated goods and services. For bluefin tuna alone, charter/headboat fees collected in 1994 are estimated to be $3.19 million while fishing expenditures by private anglers are estimated at $3.3 million. Angler consumer surplus estimates for bluefin and yellowfin tunas, while dated relative to changes in the regulations, indicate that net economic benefits from the recreational fishery are significant.

Estimates of U.S. recreational harvests for tuna and tuna-like species are currently under active review which may result in revisions to these provisional estimates. These revisions are not expected to result in landings in excess of ICCAT recommendations. Also under active review are methods for characterizing the total catch and disposition of this catch for U.S. fisheries directed at Atlantic tunas and tuna-like fishes. Collection and use of scientific observer data, logbooks, and sampling survey interview data for characterization of catch and disposition is underway for several components of the U.S. fisheries.

1. Tropical tunas

1.1 Yellowfin tuna

Yellowfin is the principal species of tropical tuna landed by U.S. fisheries in the western north Atlantic. Total estimated landings decreased to 7,743 MT in 1996, from the 1995 landings of 8,131 MT. The 1996 value is considered provisional and may change due to late reports of commercial catch and possible revisions in estimates of rod & reel catch by recreational anglers. Active review of prior year commercial and recreational landings data is also underway. Results of this review could indicate a need for revising landings estimates for this species. More than half of the 1996 total is attributed to rod and reel landings in the NW Atlantic (4,021 MT). Longline catch decreased by 642 MT in the northwestern Atlantic, but increased by 264 MT in the Gulf of Mexico. Nonetheless, the proportion of harvest in the Gulf of Mexico is lower than in past years. In 1996, 28% of the estimated U.S. yellowfin catch was landed in the Gulf of Mexico; whereas between 1991 and 1993 longline catches from the Gulf represented 47-64% of the estimated U.S. total. Overall, catch per unit effort for yellowfin declined in 1996.

1.2 Skipjack tuna

Skipjack tuna are caught by U.S. vessels off the Atlantic coast primarily between Cape Hatteras, North Carolina, and Long Island, New York. Total reported skipjack landings (preliminary) increased slightly from 81 MT in 1995 to 84 MT in 1996. As with yellowfin, estimates of recreational and commercial harvests of skipjack continue to be reviewed and may be revised in the future.

1.3 Bigeye tuna

The U.S. catch of bigeye tuna, which was nearly equal to U.S. catch of bluefin tuna in 1995, declined by 27% in 1996, from 1207 MT to 882 MT. Longline vessels accounted for 62% of the annual U.S. bigeye catch in 1996. The majority of U.S. bigeye landings comes from the Atlantic coast between Cape Hatteras, NC and Massachusetts. Note that the 1996 estimates of rod & reel catch are considered provisional. As with yellowfin, estimates of recreational and commercial harvests of bigeye continue to be reviewed and may be revised in the future.

2. Temperate tunas

2.1 Bluefin tuna

In 1996, U.S. vessels fishing in the western Atlantic (including the Gulf of Mexico) landed an estimated 1,281 MT of bluefin tuna and discarded dead an estimated 77 MT. Those landings represented a decrease of 29 MT from 1995 landings, and the estimated dead discards were 65 MT lower. The 1996 U.S. bluefin tuna quota was 1311.4 MT. Of the total dead discards, an estimated 570 bluefin (about 73 MT) were discarded dead by U.S. longline vessels and an estimated 32 fish (about 4 MT) were discarded dead by vessels fishing with gillnets. Overall, dead discards of bluefin tuna declined by almost half this year.

The first estimates of bluefin tuna discards for 1986 from the pelagic longline fishery were based on dockside interviews expanded to landings for time-area strata for which data were available (primarily the southeastern United States). From 1987 through 1991, estimates for the U.S. pelagic longline fishery were made by multiplying (1) logbook information on the ratio of bluefin tuna total catch (landings + discards) to the logbook reported landings of large pelagic species by (2) the dockside information of landings of those same species. Subsequently, it was observed that the former estimation procedure resulted in estimates that were virtually identical to tallies of dead discards in the logbook reports, so NMFS is now using a simple tabulation of reported dead discards, using average weights from observer data.

The Large Pelagic Survey has collected data on live and dead discards from the rod and reel fishery for several years, but very few reports of dead discards have been made (with none reported in 1996). Mandatory logbooks from the shark fishery and grouper-snapper fishery were also reviewed in 1996 and no bluefin tuna discards were reported. Observers on purse seine vessels did report bluefin tuna discards, but it generally could not be determined whether the fish were alive or dead. Discards data are generally unavailable for several other fisheries, including the harpoon fishery.

In response to the 1996 ICCAT recommendation that calls for the United States to adopt measures designed to reduce dead discards of bluefin tuna during 1997-98, NMFS has performed preliminary analyses to examine the viability of different options for reducing discards. A variety of options are being considered, including changing the current target weight requirement, limiting the number of days per trip, and implementing time/area closures. Logbook and dealer weigh out slips from 1991 through 1995 were collected, and initial results indicate significant differences between the number of bluefin tuna caught and discarded per trip by season and region. Limiting days per trip, perhaps by quarter and location, may be an effective means of controlling levels of dead discards. NMFS plans to expand these analyses to develop more conclusive results. In the meantime, restrictive management measures on the target fisheries in which bluefin are taken as a by-catch appear to be having an effect on bluefin discards, which declined by approximately 50% in 1996. Swordfish and shark quotas have been reduced (50% for large coastal sharks) and limited entry will be implemented in both of these fisheries.

Pursuant to an ICCAT recommendation, the United States promulgated regulations in 1992 limiting the allowable catch of small fish. Enhanced monitoring of the rod and reel fishery was implemented in 1993 for the purpose of providing near real-time advice on catch levels by this fishery. This monitoring activity has continued for 1994 - 1997 and includes estimation of catches by finer size categories than reported above. The preliminary estimates for the 1996 rod and reel fishery off the northeast United States (including the North Carolina winter fishery) for landings in several size categories were: 8,105 fish <115 cm (of which 281 fish, about 1 MT, were <66 cm), 3,402 fish 115-144 cm and 737 fish 145-177 cm (106, 144, and 103 MT respectively). Note that additional rod and reel landings of bluefin >177 cm SFL (standard fork length), monitored through a sales reporting system, are included in.

In 1994, a catch and release fishery for large bluefin developed off the coast of North Carolina during the winter months, and the number of vessels participating in the fishery has been increasing. Many bluefin tuna have been tagged by cooperative anglers from this fishery, using the latest technology, such as pop-up and archival satellite tags. Catch rates (primarily of medium and/or large bluefin) were extremely high (often in the tens of fish per trip) when compared to catch rates off the New England coast (about one fish per nine trips). Landings of fish >178 cm SFL are restricted to one fish for each permitted vessel per year. In 1996, a monitoring program was initiated to determine the catch, catch rates and landings from this fishery. This component of the 1996 rod and reel fishery (included in the totals reported in the previous paragraph) was estimated to have landings of less than 1 MT of fish <115 cm, about 4 MT of fish 115-144 cm, about 44 MT of fish 145-177 cm, and 4 MT >177 cm.

2.2 Albacore

Historically, albacore has not been a target of U.S. tuna fisheries operating in the north Atlantic, with reported catches prior to 1985 averaging only 22 MT. However, U.S. catch has increased in recent years, with the reported catch in 1996 totaling 472 MT. Albacore are often sought by U.S. recreational fishers along the near shore U.S. coast; an estimated 308 MT, or 65% of the total U.S. catch of albacore were landed by rod and reel in 1996. Incidental catch of albacore comes principally from the commercial longline fishery (targeting swordfish, yellowfin and bigeye), with some additional by-catch from the gillnet fishery (targeting swordfish) and the handline fishery (targeting bluefin). In 1996 the harvest by longline, handline, and gillnet boats in the NW Atlantic was only 24% of the total U.S. albacore harvest, a substantial decrease from 44% in 1995. Catch per unit effort data from U.S. longline logbook reports are presented below.

2.3 Swordfish

Swordfish are targeted almost exclusively by commercial fishing vessels in the United States. The New England fleet has dominated the fishery, with longline vessels covering the Atlantic coast from New England to Florida and into the Gulf of Mexico. There is also a small traditional harpoon fishery and a drift gillnet fishery in the northeastern United States. The swordfish drift gillnet fishery has been under emergency closure since November 1996, due to concern with marine mammal interactions. Time-area closures have been proposed by NMFS to limit the by-catch of threatened and endangered species. A Florida fleet, which evolved from techniques and gear used by Cuban-American longliners, is a more recent development. Pelagic pair trawls were excluded from allowable gears in 1996. There are currently 950 U.S. vessels permitted for the commercial Atlantic swordfish fishery, although only about 300 vessels are active in the fishery. The NMFS plans to issue a final rule establishing a two-tiered limited access permit system by December 1, 1997.

Atlantic swordfish are marketed primarily on the domestic market as fresh fillets and steaks. Ex-vessel prices generally vary between $2.50 and $6.00 per pound, depending upon the quality of the product, as well as current market supply and demand conditions. Prices have also been affected by closures, which can result in a temporal or localized gluts. The domestic production of Atlantic swordfish competes not only with domestic Pacific production, but also with considerable imports. Swordfish imports in 1996 totaled 5,140 MT and came from 29 countries. Swordfish import data are included in Appendix IV of this report.

The U.S. has implemented a split-year fishing season of June 1-May 31, divided into two six-month seasons, to facilitate management in response to changing quotas. For the fishing year 1996 (VI-1-96/V-31-97), north Atlantic swordfish yield was 2,890 MT. The 1996 U.S. swordfish quota was 3,500 MT. During the 1996 calendar year, the provisional estimate of U.S. vessel landings was 3,732 MT and dead discards of swordfish were 589 MT. The total estimate is 5% lower than the 4,551 MT landed in the calendar year 1995. The observer sampling data, in combination with logbook reported effort levels, support estimates of approximately 40,000 fish discarded dead in 1996, representing an estimated 589 MT of swordfish. This reflects an increase in estimated discarded swordfish from the 1995 level. As additional data on discards become available through the observer program, alternative stratification schemes for estimating dead discards may result in revisions to the estimated yield.

A split-year season has also been implemented in the south Atlantic, in combination with other management measures comparable to those in the north Atlantic (permitting, reporting, observers, etc.) The 1996 fishing year landings for the south Atlantic reached 386 MT for the period June 1, 1996, through May 31, 1997, while the 1996 calendar year landings were 171 MT. Future analyses of logbook and observer data in the south Atlantic can be used to estimate by-catch, discards and other parameters from the south Atlantic fishery.

B. Billfishes

Atlantic billfishes, including blue marlin, white marlin and sailfish, are exclusively recreational fisheries under current U.S. regulations. Prime areas for these fisheries include the Atlantic coast of Florida, the Mid-Atlantic coast, the Gulf of Mexico, and the Caribbean, depending upon the species and the season. Over the past ten years, a "catch and release" approach has been widely adopted in the recreational rod and reel fishery for billfish, resulting in an estimated release rate of over 90%. Although a permit is not required for recreational billfish fishing, anglers must observe minimum size requirements, and tournaments are subject to reporting requirements. An estimated 100,000 anglers participate in this fishery each year for at least one angling day. The recreational billfish fisheries of the United States are an important source of direct income to charter and headboat vessels, and an indirect source of income to firms that supply recreational fishery participants with associated goods and services. Angler consumer surplus estimates for billfish vary from $550 to $1,200 per trip, indicating that net economic benefits from the recreational fishery are significant.

The preliminary estimates of 1996 U.S. recreational landings for these billfish species, combining the geographical areas of the Gulf of Mexico (Area 91), the northwestern Atlantic Ocean west of the 60°W longitude (Area 92), and the Caribbean Sea (Area 93) are: 34.9 MT for blue marlin, 3.3 MT for white marlin, and 1.2 MT for sailfish. The recreational landings estimates for 1995 were 43.0 MT, 9.0 MT, and 10.0 MT, respectively, for the three species. These figures assume that there is no mortality of fish that are released (or tagged and released) by the recreational fishery. Additionally, tournament data do not constitute a census of all tournaments, and catch estimates do not take into account non-tournament billfish mortality. For these reasons, the recreational catch figures are considered to be minimum estimates.

Although the commercial landing of billfish is prohibited in the United States, by-catch on pelagic longline vessels contributes to fishing mortality. By-catch in the U.S. longline fleet has been estimated using data from mandatory pelagic logbooks. A new procedure which also incorporates observer data was developed to re-estimate this by-catch for blue marlin, white marlin, and sailfish for 1987-1995. This procedure is described in SCRS/96/97-Revised. Revisions to historical landings of billfish were also reported to ICCAT based on review of the estimates conducted at the 1996 ICCAT Billfish Workshop held in Miami. Estimates of the billfish by-catch discarded dead in the U.S. commercial longline fishery for 1996 were 196.6 MT for blue marlin, 67.6 MT for white marlin, and 71.6 MT for sailfish. Revised estimates of 1995 dead discards were 143.3 MT, 99.8 MT, and 28.7 MT, respectively for the three species. The total of estimated catches and landings of billfish in the United States has declined 47% over the past decade.

2.5 Mackerels

Because these species are found throughout federal and state territorial waters of the United States, successful management has required participation by both federal and state agencies. A rebuilding plan has been in place since 1985 for several federally-designated management groups in the Atlantic Ocean and Gulf of Mexico. The Gulf of Mexico stock of king mackerel is considered over-fished. Fisheries for the Gulf of Mexico Spanish mackerel and king mackerel stocks are subject to federal quotas on commercial landings, minimum size restrictions, commercial trip limits, and recreational personal bag limits. King mackerel yields increased from 3,970 MT in 1995 to 7,020 MT in 1996, while catches of Spanish mackerel increased from 1,554 MT in 1995 to 2,558 MT in 1996.

Substantial commercial and recreational fisheries exist throughout the range of both king mackerel and Spanish mackerel. Commercial gillnets, commercial rod and reel, and recreational rod and reel fisheries have targeted both species intensely since the early 1960s, throughout their range. For the past fishing year, NMFS implemented a commercial quota for the Gulf of Mexico migratory group of king mackerel in the Florida west coast sub-zone of 392 MT, to be divided equally between the gillnet and the hook and line fisheries.

2.6 Sharks

The U.S. Atlantic shark fishery is concentrated along the southeastern coast between Virginia and Texas. In 1995, there were 2,748 permit holders, although mandatory logbook data indicate that only 757 permitees reported catching any sharks. This potential for increased harvesting capacity could substantially intensify the "derby" fishing conditions that already exist in the shark fisheries. In response, the NMFS has proposed a two-tiered limited access system that would reduce the number of permitted vessels in the fishery based on historical participation, distinguishing between the directed fishery and the incidental catch, and limit the transferability of those permits.

The Fishery Management Plan for Sharks of the Atlantic Ocean divides sharks species into "large coastal", "small coastal", and "pelagic" species, and sets total allowable catches for all three species groups. A Shark Stock Assessment Workshop was held in Miami in June, 1996. This Workshop indicated that recovery of the U.S. Atlantic large coastal shark resource would be more likely to occur with reductions in effective fishing mortality rate of 50% or more. On April 2, 1997, the NMFS implemented the following actions under the shark FMP: 1) reduced the annual commercial quota for large coastal sharks by 50% from 2,570 MT dressed weight (MT DW) to 1,285 MT DW; 2) established a commercial quota of 1,760 MT DW for the small coastal sharks; 3) reduced the recreational bag limit to two sharks per vessel per trip for all Atlantic sharks, with the additional allowance of two Atlantic sharpnose sharks per person per trip; 4) prohibited all direct (commercial and recreational) fishing for five species of sharks (whale, basking, white, sand tiger, and bigeye sand tiger); 5) established a catch-and-release only recreational fishing allowance for white sharks; 6) prohibited filleting of sharks at sea; and 7) reemphasized the requirement for the species-specific identification of all sharks landed by vessel owners or operators, dealers, and tournament operators.

The 1996 U.S. commercial landings for large coastal sharks decreased to about 117,500 fish as compared to 160,400 fish in 1995. This significant decrease in commercial landings is due in part to restrictions imposed. 1996 recreational landings of large coastal sharks were estimated at 184,000 fish. Shark landings are monitored through a system of logbooks, dealer reports, and statistical surveys of the recreational catch. Landings data by species are currently being collected for 24 species of sharks; however, some of the reported landings remain unidentified. Estimates of recreational harvests are under active review and revised estimates may be reported in the future.

U.S. catches and landings of Atlantic tunas and tuna-like fishes, excluding billfishes, from 1967 to 1996 (preliminary) are shown in **Table 1.**

II. Statistics, monitoring and research

While data collection is carried out primarily by the NMFS, monitoring and research on large pelagics is conducted by a combination of government, academic, and to a lesser extent, private annual research entities. Research priorities are gleaned from the SCRS annual reports, recommendations from the Advisory Committee to the U.S. Section of ICCAT, and from interaction among researchers, fishery managers and constituents. The primary objective of the research and statistics program is to improve the knowledge base necessary to design, implement, and monitor domestic and international management measures.

A. Statistics

1. Commercial fisheries

Atlantic tunas, sharks, and swordfish landings are monitored through a combination of vessel logbooks, port sampling, and scientific observer coverage. Logbooks contain information on fishing vessel activity, including dates of trips, number of sets, area fished, number of fish and other marine species caught, released and retained. In some cases, socio-economic data such as volume and cost of fishing inputs are provided. Monitoring of U.S. high seas commercial fisheries for large pelagics will be further enhanced by a pilot Vessel Monitoring System (VMS), which is described in Section IV. Observer coverage for the pelagic longline and drift gillnet fisheries is described in Section V.

Monitoring of the commercial bluefin tuna fishery is augmented by a dealer reporting system. Dealers are required to record each purchase of Atlantic bluefin tuna and report to NMFS within 24 hours from the purchase or receipt of the fish. The Dealer Report Form includes the following information: dealer number, dealer name, date the fish was landed, harvest gear, fork length, weight (round or dressed), identification tag number, area where fish was caught, port where landed, federal fisheries permit number of fisherman, vessel name, name of vessel's master, signature of vessel's master, date of signature. A biweekly dealer report provides additional socio-economic data.

2. Recreational fisheries

The United States conducts two statistical sampling surveys of the recreational fishing sector: the Large Pelagic Survey (LPS) and the Marine Recreational Fishing Statistics Survey (MRFSS). These two surveys provide catch per unit effort data as well as catch data for the recreational fisheries for large pelagics, including Atlantic tunas, swordfish, billfish, and sharks. The LPS was designed specifically to track fishing effort and catch of large pelagic species from Maine to Virginia, while the MRFSS is a general sampling survey. LPS estimates are used for areas and times where LPS sampling took place while MRFSS estimates are used for areas and times where no LPS sampling was available. In addition, recreational catch data from the State of Texas (where the MRFSS is not conducted) and from a southeast region NMFS charter boat survey are also used.

Recreational landings of billfish species are estimated using: a) the NMFS Recreational Billfish Survey which provides the number of billfish caught during tournaments held along the southeastern U.S. coast (South of 35°N latitude), in the Gulf of Mexico, and U.S. Caribbean Sea regions (i.e., U.S. Virgin Islands and Puerto Rico) and b) the LPS that provides estimates of billfish catch from May through October for waters along the northeastern U.S. (North of 35°N latitude). As indicated above, estimates of billfish harvests compiled from these sources are considered underestimates of the total recreational harvest. However, suitable survey data from which to estimate coast-wide recreational harvests of these species are not yet available.

B. Research activities

In addition to monitoring the landings of large pelagic species through port and tournament sampling, logbook and dealer reporting procedures, and scientific observer sampling of the U.S. fleet, major research activities in 1996 and 1997 focused on several items. The United States pursued activities responsive to ICCAT recommended research, primarily directed at determining the reproductive biology of Atlantic bluefin tuna. Ongoing research also includes the development of methodologies to determine the genetic discreetness of large pelagic fishes in the Atlantic and larval surveys for bluefin tuna and other large pelagics in the Gulf of Mexico. Research continued on development of new methods for estimating and indexing abundance of various large pelagic species, including the application of fishery independent methods, such as aerial surveys, as well as robust estimation techniques for sequential population

analyses. U.S. scientists coordinated increased efforts for the ICCAT Enhanced Research Program for Billfish. Cooperators in the Southeast Fisheries Science Center's Cooperative Tagging Program tagged and released 3,369 billfishes (swordfish, marlins and sailfish) and 2,432 tunas in 1996. This represents a decrease of 24% from 1995 levels for billfish, and an increase of 3% for tunas. NMFS programs involving non-traditional tagging (e.g. pop-up and archival satellite tags) gained momentum in 1996. For a more complete description of 1996 research activities, see Appendix II.

III. Implementation of ICCAT conservation and management measures

The 1997 Regulatory Amendments as published in the "Federal Register" are attached in Appendix I. For the complete text of the U.S. Code of Federal Regulations relating to Atlantic tunas, swordfish and billfish, please refer to the 1996 National Report of the United States. A summary of current regulations is provided below.

A. Atlantic tunas

1. Bluefin tuna

ICCAT Measures: The United States has restricted total annual catches of bluefin tuna to the U.S. quota as recommended by ICCAT (1,344.4 MT in 1997). In addition, the ICCAT-recommended minimum sizes and 8 percent limit on the catch of bluefin between 6.4 kg and 30 kg have been implemented. U.S. regulations prohibit directed fishing for bluefin tuna in the Gulf of Mexico. Imports from Honduras and Belize are prohibited effective August 20, 1997, and imports from Panama will also be prohibited effective January 1, 1998, unless ICCAT determines otherwise.

The NMFS is conducting the analyses necessary to amend regulations concerning bluefin tuna dead discards by the incidental longline bluefin tuna fishery. The 1996 ICCAT recommendation calls on the United States to implement measures designed to reduce dead discards of bluefin tuna during 1997-98. NMFS has received comments from the public that the target catch requirements for landing a bluefin tuna, in combination with shark trip limits, may lead to continued dead discards even though the incidental quota is unused. The NMFS published an Advance Notice of Proposed Rulemaking (ANPR) in 1996, announcing that it was considering rulemaking on this issue (61 FR 48876; September 17, 1996) and an analysis of landings is currently underway to determine if rulemaking is appropriate, including changes to target catch requirements and/or time area closures.

Restrictive management measures on the target fisheries in which bluefin are taken as a by-catch appear to be having an impact on dead discards. Swordfish and shark quotas have been reduced (50% for large coastal sharks) and limited entry will be implemented in both of these fisheries. Dead discards of bluefin tuna did decline by approximately 50% in 1996.

Domestic Measures: Regulations governing the U.S. fishery were updated in 1992 to conform with ICCAT conservation measures for bluefin regulations prohibit landing of bluefin in excess of ICCAT recommendations, limit incidentally caught bluefin, prohibit the sale of bluefin less than 178 cm (70 inches), and prohibit retention of bluefin tuna less than 66 cm (26 inches). U.S. regulations have also established fishing seasons, quotas and sub-quotas, commercial trip limits and recreational bag limits, recreational and commercial permits, and reporting requirements. These measures facilitate management, address social concerns, and improve the economic performance of the fishery.

In 1997, the NMFS amended its Atlantic tunas regulations to divide the Angling category quota for large school/small medium and large medium/giant bluefin into north and south regional sub-quotas, prohibit the retention of bluefin less than the large medium size class by vessels permitted in the General category (effective January 1, 1998) and prohibit fishing for bluefin by persons aboard general category vessels on designated restricted fishing days (62 FR 30741; 5 June 1997). The NMFS also amended the regulations governing the Atlantic tuna fisheries to: set bluefin fishing categories for the 1997 fishing year (62 FR 35107; June 30, 1997); establish effort controls and time period sub-quotas for the General category fishery (62 FR 38939; 21 July 1997); and prohibit the use of aircraft to assist fishing vessel operators in the location and capture of bluefin tuna, with the exception of vessels permitted in the purse seine and harpoon categories (62 FR 38485; 18 July 1997).

Bluefin Statistical Document: Completion of the Bluefin Statistical Document (BTSD) is a requirement for lawful entry of bluefin tuna into the customs territory of the United States. In addition, bluefin tagging and information retrieval systems are designed to track the import and export of bluefin tuna. Together, these data collection and

reporting systems comply with ICCAT recommendations regarding the BTSD program. U.S. importers and exporters of bluefin tuna must abide by U.S. as well as Japanese requirements. Complementary systems are in place for bluefin in the Atlantic and the Pacific, and information on both subspecies is reported to ICCAT on a semi-annual basis. A compilation of U.S. import-export statistics collected through the BTSD Program is provided in Appendix III.

2. Other Atlantic tunas

ICCAT Measures: In response to the ICCAT recommendations regarding the level of fishing effort for yellowfin tuna, the United States has implemented limited access in the purse seine fishery, banned the introduction of new gear types such as pair trawls, and conducted workshops with the fishing industry to consider limited access for other gear types. Yellowfin and bigeye tuna catches in the United States are subject to a minimum size of 27 inches, equivalent to that of bluefin tuna and more stringent than the minimum required by ICCAT. There is a zero tolerance provision for fish under the minimum size of 27 inches.

Domestic Measures: All U.S. tuna fishing vessels and ex-vessel processors are subject to reporting requirements. In addition, fishing vessels may be required to accept scientific observers. An Atlantic tunas permit is required for both recreational and commercial fishing for yellowfin, bigeye, skipjack and albacore, and for commercial fishing for bonito. In 1997, the NMFS established a new permit program to provide for category changes, annual renewals and collection of fees.

B. Swordfish

ICCAT Measures: The United States is restricting total annual catches of swordfish in the north and south Atlantic to the U.S. quota as recommended by ICCAT. A 1997 final rule has implemented the same management measures for the south Atlantic that are currently in place for the north Atlantic, including the minimum size limit and split year fishing season. The ICCAT-recommended alternative minimum size of 119 cm from the tip of the lower jaw to the fork of the tail (with zero tolerance) was implemented in 1996. The NMFS has also published an advanced notice of proposed rulemaking to impose a ban on the sale of all undersize Atlantic swordfish, regardless of origin.

Domestic Measures: The United States uses a fishing year (June 1 - May 31) that is split into two six-month seasons. Management measures for swordfish include permitting and reporting requirements for vessels as well as ex-vessel buyers, a commercial trip limit, and sub-quotas for drift gillnet and harpoon fisheries. To improve the quality of data collected from the swordfish fishery, U.S. vessels are required to maintain logbooks and to accept on-board observers if selected. The directed fishery quota for the first half of 1997 was reduced to 749.7 MT due to updated estimates of dead discards.

The NMFS has published a proposed rule that would implement limited entry in the U.S. Atlantic swordfish fishery. Depending upon the thresholds for permit eligibility that are adopted in the final rule, the number of permit holders in the directed swordfish fishery could fall from 950 to as few as 300. This reduction in harvesting capacity should not only improve the economic performance of the directed fishery, it could also reduce interactions with undersized swordfish as well as protected and/or endangered species that are subject to longline by-catch, such as billfish and sea turtles.

The proposed rule to set 1997 swordfish quotas in the United States will implement the same management measures for the south Atlantic swordfish stock that are currently in place for the north Atlantic swordfish stock, such as vessel permitting, logbook reporting, and observer requirements.

C. Billfish

ICCAT Measures: ICCAT has adopted non-binding Resolutions which call for the voluntary release and tagging of all billfish caught alive by commercial fishing vessels, reporting on the costs and benefits of the use of

monofilament leaders, and improved catch statistics and information about post-release mortality of billfish released live.

Domestic Measures: The most significant domestic regulation for billfish is the prohibition on retaining or selling Atlantic billfish by commercial vessel operators. Longline fishers are required to release billfish, dead or alive, by cutting the line near the hook without removing the fish from the water. Recreational fishermen are subject to minimum size requirements as well as reporting requirements. Minimum sizes in lower jaw fork length are as follows: blue marlin 244 cm, white marlin 157 cm, sailfish 145 cm. A Billfish Advisory Panel (AP) has been formed in the United States with representatives from commercial and recreational fishing interests, the conservation community, academia, fishery management councils, ICCAT Advisory Committee members and the affected states. The AP will provide NMFS with recommendations on amending the billfish Fishery Management Plan (FMP) (see below, HMS Management Process).

D. Other domestic measures

National standards: The Magnuson-Stevens Fishery Conservation and Management Act of 1997 revised the National Standards which serve as guiding principles for the bodies responsible for fishery management in the United States. The new guidelines reflect requirements to rebuild over-fished stocks to levels consistent with maximum sustainable yield (MSY), specify criteria for identifying over-fishing, and develop criteria for stock rebuilding programs. The new definition of optimum yield (OY) requires that protection of marine ecosystems be considered and that the OY for an over-fished fishery must provide for rebuilding the fishery to a level that can support MSY. Fishery managers are required to use the best scientific information available, including information on marine ecosystems, by-catch, and fishing communities.

Advisory panels: The Highly Migratory Species (HMS) Management Division of the Office of Sustainable Fisheries at the NMFS has formed three advisory panels to assist in identifying and evaluating options for future management in the fisheries for Atlantic tunas, swordfish, sharks and billfish. Two of the panels, the Billfish Advisory Panel and the HMS Advisory Panel, will assist the NMFS in preparing fishery management plans and plan amendments for Atlantic highly migratory species. The third panel, the Pelagic Longline Advisory Panel will help NMFS prepare a report to Congress on the feasibility of implementing a comprehensive management system for the pelagic longline fishery.

The HMS Advisory Panel was recently formed to assist the NMFS in developing a fishery management plan for Atlantic tunas, swordfish and sharks. Currently, sharks and swordfish are managed under their own fishery management plans (FMP); there is no FMP for Atlantic tunas. The new FMP will build on the existing FMPs for sharks and swordfish and will add a new management framework for tunas. The fisheries for Atlantic tunas, swordfish and sharks share many issues, participants and concerns. Management under a single FMP will integrate common issues, ease the regulatory burden on fishery participants, and promote more holistic management of Atlantic HMS. However, each of these species groups has unique biological and management issues that will be carefully considered by those Advisory Panel members who have expertise on a particular species. All meetings of the APs are open to the public.

Highly Migratory Species management process: In accordance with new requirements of the Magnuson-Stevens Fishery Conservation and Management Act, including the requirement to work with advisory panels, NMFS has revised its published management process. The HMS process outlines steps that NMFS takes in development of Secretarial fishery management plans for Atlantic HMS. The first step in development of an FMP for Atlantic HMS and an amendment to the Billfish Fishery Management Plan is to get input from the public on important issues in the fishery and management options to address those issues. The NMFS will hold a series of public scoping meetings in nineteen cities in October and November, 1997, to gather public input on issues and options for HMS management.

Essential fish habitat: The NMFS has published a proposed rule containing guidelines for the description and identification of essential fish habitat (EFH), minimization of adverse impacts to EFH, and identification of possible actions to conserve and enhance EFH. NMFS will develop a process to coordinate and consult with federal and state

agencies on activities that may affect EFH. These EFH guidelines will then be integrated into the process of developing fishery management plans for highly migratory species.

IV. Inspection schemes and activities

A. NMFS enforcement

The enforcement of U.S. regulations is carried out by the NMFS Enforcement Office in conjunction with the U.S. Coast Guard, and in some areas, state fishery agencies. In addition to enforcement in federal waters within the 200 mile Exclusive Economic Zone (EEZ), NMFS Enforcement conducts compliance and monitoring activities of HMS fisheries beyond the EEZ. The authority to enforce regulations implemented under ICCAT is provided by several laws, including the Magnuson-Stevens Act and ATCA. Each year, the United States submits an enforcement report to the ICCAT Secretariat which is held on file for review by Contracting Parties. The 1997 report is attached in Appendix V.

Fishing on ICCAT species is monitored and enforced by over 50 NMFS enforcement agents and uniformed fishery patrol officers working from Maine to the Gulf of Mexico and the Caribbean. NMFS Enforcement Agents conduct investigations and inspections both dockside and offshore, including monitoring fishing and landing activities, enforcing regulations, and apprehending violators of federal law. NMFS agents conduct some at-sea enforcement activities on board Coast Guard vessels, state boats, and in some cases, unmarked vessels. However, due to the difficulty of conducting effective at-sea enforcement, the bulk of NMFS enforcement activities occur in ports when vessels are landing their catch. The Coast Guard conducts enforcement at sea using vessels and aircraft. A toll free NMFS Enforcement "Hotline" is available to encourage fishery participants to report violations.

B. Vessel monitoring systems (VMS) and electronic logbooks

The Western Pacific Fishery Management Council is in the final year of a three year pilot VMS program. Over 110 fishing vessels are currently participating in the program. Most vessels operate in the pelagic (swordfish and tuna) longline fisheries and NMFS monitors their location to verify compliance with closed areas. Up to 12 vessels operate with VMS in the Hawaii lobster fishery and submit real-time catch data using the on-board VMS transceivers. At the end of this year, the program will be evaluated to determine the utility of VMS.

As proposed at the ICCAT Inter-sessional meeting on Monitoring and Compliance, NMFS will implement a VMS pilot project on 10 vessels. 10 Inmarsat-C units will be placed on longline vessels and drift gillnet vessels. In conjunction with this pilot program, the NMFS will install electronic logbook software on selected vessels in order to test real-time data reporting via satellite. The electronic logbook is in phase two of development, and NMFS should be able to place the Inmarsat-C units on board and test data transmission by early 1998.

V. Other activities

– Fishery Observer Deployments

Pelagic Longline Fishery Observer Coverage: Scientific observer coverage of the U.S. pelagic longline fleet was initiated by the NMFS Southeast Fisheries Science Center (SEFSC) in early 1992. In conjunction with the Northeast Fisheries Science Center (NEFSC), Woods Hole Laboratory, the SEFSC uses contracted and NMFS observers to collect catch data aboard longline vessels fishing in the waters of the northwest Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Selection of vessels is based on a random, 5% sampling of the number of sets reported by the longline fleet. A total of 2,857 sets was observed by personnel from the SEFSC and NEFSC programs from May 1992 to December 1996. Observers from the SEFSC region have recorded over 50,000 fish (primarily swordfish, tunas, and sharks), marine mammals, turtles, and seabirds during this time period.

Drift Gillnet Fishery Observer Coverage: Higher proportions of the fishing effort for driftnets and gillnets are sampled due to concern over potential by-catch of protected species (marine mammals and sea turtles). The NEFSC placed observers aboard 6 different domestic drift gillnet vessels targeting swordfish, tuna and sharks in calendar year 1996. Observers made 13 trips (totaling 140 days) on these vessels in 1996, representing 81% of the total 16 trips made in the fishery in 1996. Swordfish, bigeye tuna, yellowfin tuna, albacore, blackfin tuna, mako sharks and thresher sharks were caught and marketed. By-catch from this fishery included bluefin tuna, little tunny, skipjack tuna, sharks, rays and ocean sunfish which were mostly discarded. By-catch of marine mammals and turtle species including True's beaked whales, Sowerby's beaked whale, spotted dolphin, striped dolphin, long-finned pilot whales, short-finned pilot whales, loggerhead turtles and leatherback turtles were released according to federal law. The maximum allowable length of a drift gillnet is two and a half kilometers.

Cooperative Agreement with U.S. Customs: A Memorandum of Understanding has been developed between U.S. Customs and the NMFS to facilitate the transmission of customs data on a monthly basis. The NMFS has requested import data on fresh, chilled, or frozen bluefin tuna and swordfish (excluding fillets and other fish meat). Bluefin and swordfish products in other forms (e.g. chunks, steaks, fillets) listed under separate item numbers from the Harmonized Tariff Schedule are also subject to the ICCAT import monitoring requirements. Depending on the need for compliance monitoring and the actual level of imports for these product types, NMFS may request additional data that includes bluefin or swordfish products. In addition, the NMFS is working with U.S. Customs to finalize procedures for handling bluefin tuna imports from Belize and Honduras. U.S. Customs is also assisting the NMFS in identifying major importers and points of entry for swordfish, in order to facilitate implementation of a prohibition on the sale of Atlantic swordfish below the minimum size.

Table 1. Catches and landings, rounded to the nearest metric ton, of Atlantic tunas and tuna-like fishes, excluding billfishes, by U.S. fishermen, 1967-1995 [1]

Year	BFT [2]	YFT [3,4]	ALB	BET [3]	LTA	SKJ [3]	BON	SWO [5]	SSM [6]	KGM [6]	OTH [7]	TOTAL
1967	2320	1136	0	0	7	493	22	474	3577	2767	10	10806
1968	807	5941	0	18	6	3314	43	274	5342	2813	2	18560
1969	1226	18791	0	148	7	4849	98	171	4952	2814	1	33057
1970	3327	9029	0	195	158	11752	83	287	5506	3050	0	33387
1971	3169	3764	0	544	5	16224	90	35	4713	2571	50	31165
1972	2138	12342	10	212	212	12290	24	246	4863	2213	0	34550
1973	1294	3590	0	113	20	21246	261	406	4437	2710	0	34077
1974	3638	5621	13	865	51	19973	92	1125	4990	4747	1	41116
1975	2823	14335	1	67	67	7567	117	1700	5288	3095	19	35079
1976	1931	2252	0	28	5	2285	23	1429	6385	4053	30	18421
1977	1956	7208	2	331	53	6179	268	912	5453	3837	71	26270
1978	1848	9747	9	248	113	8492	224	3684	3310	2507	31	30213
1979	2297	3182	11	212	12	3102	502	4618	2926	6293	11	23166
1980	1505	2118	21	202	88	3589	195	5624	5429	10726	513	30010
1981	1530	1866	54	152	97	5373	333	4529	2748	12565	200	29447
1982	812	883	126	377	87	731	209	5410	3747	9863	962	23207
1983	1394	226	18	255	107	589	253	4820	2784	7069	453	17968
1984	1317	1252	25	408	41	817	217	4749	3904	7445	883	21058
1985	1423	6259	17	353	74	1786	109	4705	3984	6010	247	24967
1986	1655	5775	162	747	103	1004	83	5210	5957	5682	336	26714
1987	1543	9056	269	1008	118	650	130	5247	5071	5628	385	29105
1988	1505	10268	115	919	204	36	88	6171	5097	5810	410	30623
1989	1732	8350	260	762	128	56	278	6411	4444	4365	335	27121
1990	1769	5406	386	650	173	240	298	5519	4272	5940	390	25043
1991	1781	6856	485	962	227	787	468	4525	5884	6502	367	28844
1992	1128	7158	377	752	595	524	497	4236	5724	7091	545	28627
1993	1268	5199	452	982	1286	342	171	4191	5058	7746	1517	28212
1994	1238	8094	672	1328	1142	49	129	4074	4632	6186	886	28430
1995	1451	8131	545	1207	1312	81	116	4551	1554	3970	1371	24289
1996	1361	7743	472	882	2230	84	156	4320	2558	7020	1141	27966

1. Estimates of recreational catches off the northeast U.S. are included for all years for bluefin tuna and for all other tunas since 1986.
2. Includes estimated bluefin dead discards since 1986. (The 1986 estimate covered only some times and areas.).
3. Prior to 1981, figures include some catches of purse seiners flying other flags (Bermuda, Netherlands Antilles, Nicaragua, and Panama.
4. Includes small quantities of bigeye tuna prior to 1975.
5. Does not include recreational landings of Spanish (1967-83) or king (1967-78) mackerel. 1996 landings preliminary.
6. This category includes blackfin and wahoo as well as the Task I category other tunas.
7. 1996 data are preliminary.

NATIONAL REPORT OF URUGUAY *

by

O. Mora **

1. The fishery

In 1996, the Uruguayan tuna fleet continued operating with six longline vessels based at Uruguayan ports. This is a fishery which is generally carried out in Uruguayan territorial waters and its main target species is swordfish. Besides this species, the catches of bigeye, yellowfin, albacore, and by-catches of billfishes, sharks, oil fish and other pelagic fish are also included in the catch A part of the by-catches are discarded. The shark species landed in 1996 were as follows: *Prionace glauca, Isurus oxyrinchus, Lamna nasus, Sphyrna spp., Carcharhinus spp.*

While the number of active vessels in the fleet has not increased in recent years, in 1996 the reported catches retained were higher than in 1995 (1,046 MT and 1,450 MT, live weight, respectively), as can be observed in Tables **1 and 2**. The total annual catches of tunas and tuna-like species increased from 684 MT to 1,016 MT, due to increased effort of some vessels and to the improvement in the information provided. In comparing these last two years, in relative values based on the total catch retained in product weight (**Table 3**), a 42 to 38% decline can be observed in swordfish catches, whereas for tunas this percentage increased from 18 to 27%. On the other hand, the decline in shark catches (39 to 24%) is due to part of these catches having been reported as "others".

2. Research and statistics

The National Institute of Fishing (INAPE) is the only organism in Uruguay responsible for statistical monitoring of and research on these resources. The activities carried out in the 1996 and during the first quarter of 1997 were primarily aimed at improving statistics.

2.1 The national fleet

The quality of information provided by the national fleet improved in 1996. however, since data omissions in the logbooks were still detected, and taking into account that these only report the catch retained, it was use to process the annual landings data for ICCAT Task I. In order to improve the information, both qualitatively and quantitatively, the logbooks were modified. It is hoped that by doing this, more information on by-catches can be obtained.

In early 1996, two documents were presented, one to the SCRS on sharks and another to the ICCAT Tuna Symposium.

The catches by the national fleet are generally landed without heads, which prevents our being able to reinitiate size sampling at port, and it has become ever more necessary to obtain the data on board vessels. In this regard, modifications to the observer system are being made, in order to implement this work.

2.2 Foreign flag vessels based at Uruguayan ports

The Uruguayan ports of Montevideo and La Paloma continued to serve as the base ports for the landing of the tuna vessels flying foreign flags, for both ICCAT Contracting and non-contracting Parties. Changes to flags of convenience are also still observed.

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* Original report in Spanish.

** National Institute of Fishing.

3. Implementation of ICCAT management and conservation measures

The Government of Uruguay approved, on May 7, 1997, a Decree to update the Law of Fishing, which also includes: the regulations current in effect on minimum sizes for swordfish, bigeye and yellowfin, a new regulation in which swordfish is declared fully exploited, and which prohibits, since its entry into force in July, 1997, approval of any new programs whose objective is the fishing of this species (Decree 149, Art. 36).

4. Inspection

The INAPE is the official organism with competence in all matters of monitoring and control of activities relative to fishing. Staff of the Institute carry out port inspections in order to monitor compliance of the national management measures currently in effect.

In order to increase and improve information on the foreign flag tuna vessels based at Uruguayan ports, work has continued on a program to monitor at ports and in Uruguayan territorial waters, with the collaboration of the Port Prefectures, Naval Aviation and the Directorate for Maritime Traffic of the Uruguayan National Navy.

Table 1. Number of Uruguayan tuna vessels in operation, by GRT, 1995-1997

GRT	*1995*	*1996*	*1997*
< 200	3	4	4
201-300	3	2	2
Total	6	6	6

Table 2. Catches retained and landed by the Uruguayan tuna fleet, 1995-1996 (MT, live weight)

Species	*1995*	*1996*
Swordfish	499	644
Bigeye tuna	80	124
Yellowfin tuna	53	171
Albacore	49	75
Bluefin tuna	2	0
Billfishes	1	2
Sub-total	*684*	*1016*
Sharks *	353	301
Others	9	133
Total	**1046**	**1450**

* product weight (DWT).

Table 3. Percentage of catch, by species, based on the total catch retained (%, product weight), for 1995 and 1996

Species	*1995*	*1996*
Swordfish	42	38
Bigeye tuna	8	9
Yellowfin tuna	5	12
Albacore	5	6
Bluefin tuna	+	0
Billfishes	+	+
Sharks	39	24
Others	1	11

+ <1 MT.

NATIONAL REPORT OF VENEZUELA *

by

Jesus S. Marcano M. and Y. Hebel Salazar P. **

1. Introduction

In Venezuela, the Foundation for Agricultural Research (FONAIAP) is the official organism in charge of carry out research programs in agriculture and the fishing sector. The Autonomous Service for Fishery and Aquacultural Resources (SARPA) is the organism responsible for the management and administration of fishery resources.

The research programs on tunas and billfishes are carried out at the Center for Agricultural Research of the States of Sucre and Nueva Esparta (CIAE-Sucre/N. Esparta), with headquarters in the city of Cumana, through cooperation with the various national and international institutes such as the University of Oriente, SARPA, ICCAT and ORSTOM.

2. The fisheries

2.1 Purse seine

The Venezuelan purse seine fleet is comprised of 26 vessels, of which 15 operate in the western Atlantic Ocean and the remainder in the eastern Pacific Ocean (**Table 1**). The fishing area of the Venezuelan purse seiners is located between 5° and 15°N latitude and 51° and 73°W longitude.

Catches obtained by the purse seine fleet in 1996 amounted to 15,887 MT, which represents a 72.8% increase as compared to 1995. Yellowfin tuna *(Thunnus albacares)* comprised 70.02% of the catches by this fleet and skipjack catches *(Katsuwonus pelamis)* represented 21.27%. The other species caught by the fleet were: blackfin tuna *(Thunnus atlanticus)*, frigate tuna *(Auxis thazard)*, albacore *(Thunnus alalunga)* and bigeye tuna *(Thunnus obesus)*; these species represented 8.71% of the catch (**Table 2**).

Effort exerted by these vessels in 1996 was 1,350 days at sea, with the highest levels corresponding to the third and fourth quarters and for vessels from 301 to 650 GRT. In addition, yellowfin catches were between 1.94 and 25.49 MT/days at sea and the highest catches corresponded to the second and third quarters. Skipjack catches amounted to 9.08 MT/day at sea during the fourth quarter of the year (**Table 4**).

2.3 Baitboat

The Venezuelan baitboat fleet is comprised of 16 fishing vessels which operate in the same areas as the purse seiners. Catches taken by these vessels amounted 3,572 MT, which represented a 13.6% increase, as compared to 1995. The most important species in the catches by this fleet were yellowfin tuna *(Thunnus albacares)* with 89.4%, and skipjack *(Katsuwonus pelamis)* with 8.3% (**Table 3**).

Effort exerted by the baitboat fleet for this year was 2,220 days at sea. The catches of yellowfin tuna were between 0.27 and 1.97 MT/day at sea, with the highest catches during the second and third quarters. Skipjack catches were between 0.09 and 0.62 MT/day at sea, with the highest catches corresponding to the second and third quarters (**Table 4**).

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* Original report in Spanish.

** National Fund for Agricultural Research, Center of Agricultural Research of Sucre and Nueva Esparta, Cumana, State of Sucre.

2.4 Longline

Forty-two (42) Venezuelan longliners operated in the Atlantic Ocean in 1996. Of these, 11 vessels targeted swordfish *(Xiphias gladius)*.

The catch of the tuna longline fleet was 576.6 MT. Yellowfin tuna *(T. albacares)* was the most important species in the catch, representing 57.2%, whereas the percentage of other tunas in the catches, such as albacore *(T. alalunga)* and bigeye tuna *(T. obesus)* was 12.7%. Billfishes of the Istiophoridae family represented 12.4% of the catch. The effort exerted by the fleet was 2,020,500 hooks **(Table 5)**.

As regards the longliners targeting swordfish, this species contributed 34.57% of the catch **(Table 6)**.

2.5 Artisanal

– Playa Verde (Central coast of Venezuela)

Fishing activities in this region for billfishes are carried out all year round. The artisanal fleet is comprised of 33 vessels whose draft is between 7 and 10 m and these vessels use drift gillnets as the fishing gear.

Catches by this fishery are mainly comprised of fish of the Istiophoridae family, notably: sailfish *(Istiophorus albicans)* and blue marlin *(Makaira nigricans)*, representing 37.91% and 30.46% of the catches, respectively; tuna catches represented 15.47% of the landings. Other species present were various sharks and dolphinfish *(Coryphaena hippurus)* **(Table 7)**.

– Juangriego (Eastern area of Venezuela)

In this region, which is the base port for 76 artisanal longline vessels which target king mackerel *(Scomberomorus cavalla)* and billfishes in the northeastern area of Venezuela. These vessels artisanal vessels (9 to 14 m) which use surface drift longline.

In this fishery, the Istiophorids represent the most important component of the catch, with white marlin *(Tetrapturus albidus)* and sailfish *(Istiophorus albicans)* the most abundant (27.80% and 24.27%, respectively). The tunas landed represented 11.21% of the catch. Dolphinfish *(Coryphaena hippurus)* has gained in importance in recent years due to its market value, and landings of this species amounted to 64 MT in 1996 (31.7%) **(Table 8)**.

3. Research activities

Research in Venezuela is carried out on the fishery for large pelagics, which includes tunas and billfishes. Biological sampling continued on the different species landed at the ports of Anzoategui and Nueva Esparta (State of Sucre). In 1996, sampling was conducted on 18,902 tuna and billfishes landed by the industrial fishery and 4,261 fish landed by the artisanal fishery **(Tables 9 and 10)**. Monitoring of catch and effort was conducted on the industrial vessels (baitboat, purse seine and longline) that operate fisheries in the eastern Atlantic. The off-loading of 544 industrial tuna vessel trips was also monitored **(Table 11)**.

An assessment was made of catch and fishing effort of the longline fishery for king mackerel *(Scomberomorus cavalla)* in eastern Venezuela. This program is carried out by the Nueva Esparta local laboratory of FONAIAP. In 1996, catches of this species amounted to 610,316 kg, with an effort of 41,360 longlines/day and an average annual CPUE of 12.46 kg/lineline-day. The species shows marked stability and the major catches were taken during the months of June, July and August.

The Enhanced Research Program on Billfish, sponsored and coordinated by the International Commission for the Conservation of Atlantic Tunas (ICCAT) continued, with sampling of billfishes at the ports of Playa Verde and Juangriego, off the central and eastern coasts of Venezuela, respectively. In addition, tuna longline trips were carried out directed at swordfish. In 1996, there were 35 trips carried out with on-board scientific observers.

Small tuna catches in 1996 by the Venezuelan artisanal fishery amounted to 12,173 MT. These species are caught by driftnet and longline in coastal areas. The most abundant species were: spotted Spanish mackerel *(Scomberomorus brasiliensis)*, king mackerel *(Scomberomorus cavalla)*, and bullet tuna *(Auxis thazard)* **(Table 12)**.

In 1996, within the Assessment Project and comparison of national tuna canned products with those of other countries, a study was carried out on the canned tuna processed by five factories located in the eastern part of the country. The results of these analyses showed that Venezuelan canned products comply with the standards required by the Venezuelan National Commission on Standards (COVENIN) and are compatible with the international food CODEX. In late 1996, a study was initiated on the bromatological and contaminant characteristics of *Thunnus albacares* and *Katsuwonus pelamis*.

Table 1. Composition of the Venezuelan industrial fleet that operated in the Atlantic Ocean, based on vessel capacity, 1989-1996

Capacity (MT)	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
				Purse seine				
201-400	2	2	2	2	3	2	1	1
401-600	3	3	4	7	8	8	9	9
601-800			1	1		1	1	1
801-1000	7	7	9	6	4	8	3	4
1001-1200	1							
> 1200	2	2	1	1	1	1		
Total	15	14	17	17	16	20	14	15
				Baitboat				
10-30	3	4	4	6	7	5	4	4
31-50	1	1	1	1	1	1	1	1
51-70	1	1	1	1	1	1	1	1
71-90	2	1	1	1	1	1	1	1
91-110	1	1	1	1	1	1	1	1
> 110	7	7	7	7	8	8	8	8
Total	15	15	15	17	19	17	16	16
				Longline				
0-50	20	21	19	27	24	29	33	33
51-100	2	2	2	2	3	5	4	3
101-150		2	2	3	3	4	6	6
151-200					1			
201-250								
251-300	1	2						
301-350				1				
351-400			1	1	1			
Total	23	27	24	34	32	38	43	42

Table 2. Venezuelan purse seine catches (MT) in the Atlantic Ocean in 1996

	Quarter					
Species	*I*	*II*	*III*	*IV*	*Total*	*%*
Yellowfin tuna (YFT)	1,946	1,221	2,707	5,251	11,124	70.02
Skipjack tuna (SKJ)	776	284	488	1,830	3,379	21.27
Frigate tuna (FRI)	149	43	32	66	289	1.82
Albacore (ALB)	111	0	139	11	260	1.64
Bigeye tuna (BET)	53	19	30	29	131	0.82
Blackfin tuna (BLF)	164	72	154	314	705	4.43
Total	**3,198**	**1,639**	**3,549**	**7,501**	**15,887**	**100.00**

Table 3. Venezuelan baitboat catches (MT) in the Atlantic Ocean in 1996

	Quarter					
Species	*I*	*II*	*III*	*IV*	*Total*	*%*
Yellowfin tuna (YFT)	687	215	1,011	1,281	3,194	89.41
Skipjack tuna (SKJ)	82	107	15	93	297	8.32
Frigate tuna (FRI)						
Albacore (ALB)						
Bigeye tuna (BET)		1			1	0.04
Blackfin tuna (BLF)	24	4	14	38	80	2.23
Total	**793**	**327**	**1,040**	**1,412**	**3,572**	**100.00**

Table 4. Effort (days at sea) and catch per unit of effort (MT/days at sea) for the industrial tuna fisheries (baitboat and purse seine) in the western Atlantic Ocean, 1996

Quarter	*Gear*	*Days at sea*	*Capacity*	*YFT*	*SKJ*	*Others*
		48	<301	3.07	3.58	
I	PS	229	301-650	5.50	5.68	0.32
		0	>650			
		16	<301	3.67	4.70	
II	PS	147	301-650	1.94	0.62	0.88
		43	>650	21.84		
		24	<301	8.90	1.93	
III	PS	327	301-650	4.72	2.43	0.02
		37	>650	25.49		
		57	<301	5.58	7.94	
IV	PS	309	301-650	6.09	7.13	0.37
		113	>650	12.53	9.08	0.22
		115	<60	0.25	0.16	0.03
I	BB	143	60-150	0.90	0.14	0.01
		364	>150	0.82	0.46	0.21
		43	<60	0.27	0.09	
II	BB	50	60-150	0.73	0.07	
		216	>150	0.31	0.62	0.01
		111	<60	1.03	0.01	
III	BB	128	60-150	1.00	0.02	
		340	>150	1.95	0.01	0.01
		73	<60	0.78	0.15	0.07
IV	BB	177	60-150	1.09	0.07	0.02
		460	>150	1.97	0.14	

Table 5. Catches (MT) by the Venezuelan industrial longline fleet, 1996

Species	Quarter				
	I	*II*	*III*	*IV*	*Total*
Yellowfin tuna (YFT)	23.4	60.2	132.6	113.5	329.7
Albacore (ALB)	5.3	4.0	24.5	9.7	43.5
Bigeye tuna (BET)	13.9	8.9	2.0	4.9	29.7
Blue marlin (BUM)	5.2	3.5	5.8	11.0	25.5
White marlin (WHM)	6.2	5.9	8.4	15.4	35.9
Sailfish (SAI)	1.5	0.9	3.3	4.5	10.2
Swordfish (SWO)	3.8	3.1	3.1	6.4	16.4
Wahoo (WAH)	0.5	0.4	1.4	0.7	3.0
Dolphinfish (DOL)	1.1	5.3	6.9	6.7	20.0
Sharks (SHK)	15.3	16.6	16.9	13.9	62.7
Total	**76.2**	**108.8**	**204.9**	**186.7**	**576.6**

Table 6. Catches (MT) by the Venezuelan industrial longline fleet targeting swordfish, 1996

Species	Quarter				
	I	*II*	*III*	*IV*	*Total*
Yellowfin tuna (YFT)	6.9	9.5	10.2	8.9	36.5
Albacore (ALB)	0.8	1.0	0.2	0.3	2.3
Bigeye tuna (BET)	6.0	6.8	6.8	7.1	26.7
Blue marlin (BUM)	1.1	0.6	1.0	1.1	3.8
White marlin (WHM)	0.9		0.1	0.5	1.5
Sailfish (SAI)	0.5		0.3	0.2	1.0
Swordfish (SWO)	14.9	22.1	9.4	11.3	57.7
Dolphinfish (DOL)	0.3	0.7	0.1		1.1
Sharks (SHK)	6.2	10.1	14.6	6.4	37.3
Total	**37.6**	**50.8**	**42.7**	**35.8**	**166.9**

Table 7. Catches (MT) of the artisanal driftnet fleet for billfish, off the central Venezuelan coast, 1996

Species	Quarter				
	I	*II*	*III*	*IV*	*Total*
Yellowfin tuna (YFT)	0.6	1.8	0.6	1.1	4.1
Albacore (ALB)				0.1	0.1
Blue marlin (BUM)	21.7	15.2	6.1	27.7	70.7
White marlin (WHM)	0.6	0.3	1.1	0.6	2.6
Sailfish (SAI)	7.6	25.2	28.4	26.8	88.0
Swordfish (SWO)	2.2	6.4	1.1	1.2	10.9
Wahoo (WAH)	0.5	0.4	0.1	0.1	1.1
Frigate tuna (FRI)	1.9	0.2		1.1	3.2
Atlantic bonito (BON)	12.4	0.7	0.1	13.3	26.5
Dolphinfish (DOL)	1.0	5.2	0.9	1.5	8.6
Sharks (SHK)	4.5	6.6	2.1	3.1	16.3
Total	53.0	62.0	40.5	76.6	232.1
No. of trips	494	618	621	791	2,524
No. of vessels	58	67	65	83	273

Table 8. Catches (MT) by the artisanal longline fleet for billfishes, off eastern Venezuela, 1996

Species	*Quarter*				
	I	*II*	*III*	*IV*	*Total*
Yellowfin tuna (YFT)	0.7	1.3	3.8	7.1	12.9
Albacore (ALB)	0.8		1.0	0.8	2.6
Blue marlin (BUM)	1.6	0.4	0.4	2.4	4.8
White marlin (WHM)	10.4	0.8	2.8	41.8	55.8
Sailfish (SAI)	12.6	1.8	6.0	28.1	48.5
Wahoo (WAH)	2.9	1.3	2.2	0.9	7.3
Blackfin tuna (BLF)					
Dolphinfish (DOL)	10.4	14.9	25.1	13.2	63.6
Sharks (SHK)	1.0	0.5	2.4	1.3	5.2
Total	**40.4**	**21.0**	**43.7**	**95.6**	**200.7**

Table 9. Biological sampling of tunas, billfishes and associated species in the industrial tuna fishery in the western central Atlantic, 1996

Species	*Gear*			
	Purse seine (PS)	*Baitboat (BB)*	*Longline (LL)*	*Total*
Yellowfin tuna (YFT)	2,945	2,083	1,985	7,013
Skipjack tuna (FRI)	3,686	697		4,383
Frigate tuna (FRI)	724			724
Albacore (ALB)	49		2,242	2,291
Bigeye tuna (BET)	159	3	1,189	1,351
Blackfin tuna (BLF)	740	239	14	993
White marlin (WHM)			206	206
Sailfish (SAI)			112	112
Spearfish (SPF)			41	41
Blue marlin (BUM)			162	162
Swordfish (SWO)			677	677
Sharks (SHK)			839	839
Dolphinfish (DOL)			61	61
Wahoo (WAH)			49	49
TOTAL	**8,303**	**3,022**	**7,577**	**18,902**

Table 10. Biological sampling of tunas, billfishes and associated species in the artisanal billfish fishery off eastern and central Venezuela, 1996

Species	*Port*	
	Juangriego	*Playa Verde*
White marlin (WHM)	380	130
Sailfish (SAI)	360	1,969
Blue marlin (BUM)	12	454
Swordfish (SWO)		216
Dolphinfish (DOL)	13	723
Wahoo (WAH)	4	
Total	**769**	**3,492**

Table 11. Trips by Venezuelan industrial tuna vessels in the western Atlantic, 1996

Month	*Purse seine*	*Baitboat*	*Longline*	*Total*
January	2	13	4	19
February	4	21	22	47
March	5	23	33	61
April	4	15	16	35
May	3	4	19	26
June	2	10	24	36
July	4	17	33	54
August	4	21	32	57
September	6	23	29	58
October	5	29	20	54
November	7	23	20	50
December	6	21	20	47
Total	**52**	**220**	**272**	**544**

Table 12. Venezuelan catches of small tunas in the western Atlantic, 1996

Species	*Catch (MT)*
Atlantic bonito (BON)	1,348
Frigate tuna (FRI)	2,758
Atlantic black skipjack (LTA)	1,840
King mackerel (KGM)	2,139
Spotted Spanish mackerel (SSM)	3,609
Wahoo (WAH)	479
Total	**12,173**