INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

COMMISSION INTERNATIONALE POUR LA CONSERVATION DES THONIDES DE L'ATLANTIQUE

ICCAT CICTA CICAA

COMISIÓN INTERNACIONAL PARA LA CONSERVACIÓN DEL ATÚN ATLÁNTICO

REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)

(Madrid, Spain, September 29 to October 3, 2008)

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1. Opening of the meeting

The 2008 Meeting of the Standing Committee on Research and Statistics (SCRS) was opened on Monday, September 29, at the Hotel Velázquez in Madrid, by Dr. Gerald Scott, Chairman of the Committee. Dr. Scott welcomed all the participants to the annual meeting.

Dr. Scott introduced the Executive Secretary, Mr. Driss Meski, who indicated his pleasure to address this meeting and once again welcome all the participants to Madrid. In his opening address, Mr. Meski expressed special appreciation and recognition to the Spanish authorities for their valuable contributions to and collaboration with the Secretariat, particularly for their efforts in providing new, independent headquarters for the ICCAT Secretariat. He informed the Committee that the new headquarters will be operational in early 2009.

In reiterating the importance of the work of the SCRS, which is the basis for the Commission's conservation and management measures, the Executive Secretary noted the context of uncertainty and apprehension concerning some of the tuna stocks under ICCAT mandate. He pointed out that the Secretariat has worked hard to respond to the Committee's many requests, including the implementation of VMS, the Bluefin Tuna Catch Document scheme, and the organization of workshops and training courses. He stressed that in spite of all the efforts being made to improve statistics, in many cases the formats are not being followed and the deadlines established are still not being met, which causes many problems in carrying out the assessments on the stocks.

The Executive Secretary made special mention of the performance review recently carried out by the Panel of Experts.

Mr. Meski also expressed his appreciation to the Secretariat staff for their hard work and the efforts put forth in this past year to carry out the tasks in support of the SCRS and the Commission.

The Executive Secretary's opening address is attached as **Appendix 4**.

2. Adoption of Agenda and arrangements for the meeting

The Tentative Agenda was reviewed and adopted, with some minor changes (attached as **Appendix 1**).

The following scientists served as rapporteurs of the various species sections (Agenda Item 8) of the 2008 SCRS Report.

Tropical tunas- General	J. Pereira
YFT - Yellowfin tuna	C. Brown
BET - Bigeye tuna	N. Miyabe
SKJ - Skipjack tuna	D. Gaertner
ALB - Albacore	V. Ortiz de Zarate
BFT - Bluefin tuna	C. Porch (W), J.M. Fromentin (E)
BIL - Billfishes	D. Die
SWO- Swordfish	J. Neilson, P. Travassos (Atl.), G. Tserpes (Med.)
SBF - Southern Bluefin	
SMT - Small tunas	J. Ortiz de Urbina/ M. Idrissi (for this meeting)
SHK - Sharks	A. Domingo

The Secretariat served as rapporteur for all other Agenda items.

3. Introduction of Contracting Party delegations

The Executive Secretary introduced the 21 Contracting Parties present at the 2008 meeting: Angola, Brazil, Canada, Cape Verde, China, Côte d'Ivoire, Croatia, European Community, Ghana, Japan, Korea, Mexico, Morocco, Norway, Russian Federation, Senegal, South Africa, Turkey, United States of America, Uruguay, and Venezuela. The List of Participants at the Species Groups Meetings and the Plenary Sessions is attached as **Appendix 2**.

4. Introduction and admission of observers

Representatives from the following Cooperating Entity (Chinese Taipei), intergovernmental organizations (GFCM, CARICOM), and non-governmental organizations (Birdlife, Fundatun, Medisamak, Oceana, The Ocean Conservancy, WWF) were admitted as observers and welcomed to the 2008 SCRS meeting (see **Appendix 2)**.

5. Admission of scientific documents

The Secretariat informed the Committee that 172 scientific papers had been submitted at the various inter-sessional meetings held in 2008.

Besides the scientific documents, there are seven reports of inter-sessional meetings and Species Groups, 26 Annual Reports from the Contracting Parties, and non-Contracting Cooperating Parties, Entities and Fishing Entities, a report from CARICOM, as well as various documents by the Secretariat. The List of SCRS Documents is attached as **Appendix 3**.

6. Report of Secretariat activities in research and statistics

− *Secretariat Report on Statistics and Coordination of Research*

The Secretariat outlined the major points of the "Secretariat Report on Statistics and Coordination of Research 2008, which had been presented at the meeting of the Sub-Committee on Statistics where it was discussed at length.

The Secretariat emphasized the importance of the timely submission of data and the need to report Task II effort data. The Secretariat noted that more and more Contracting Parties are utilizing the electronic forms developed by the Secretariat, which considerably facilitates the data entry and processing work. The numerous databases developed, maintained and managed by the Secretariat were also pointed out. Form-3, used in reporting catch and effort, will be slightly modified to accommodate the possibility of reporting various gears and various efforts on the same sheet.

In thanking the Secretariat for the concise report, a suggestion was made to include on Table 1 the dates, or at least the month, when the data were submitted. Following this proposal a more detailed versions of Table 1 was developed and submitted to the Committee for review.

− *ICCAT-Japan Data Improvement Project (JDIP)*

The JDIP Coordinator presented a summary of his report of JDIP activities for the November 2007-September 2008 period, and the budget for 2009 (see Appendix 1 of the Secretariat Report on Statistics and Coordination of Research 2008. He pointed out that two important data collection programs had taken place in the past year: one in Ghana concerning the observer program and for assistance with the recovery of historical data, and another in the Republic of Guinea to reinforce the sampling scheme. He also noted the successful training course held in Madrid last week on data standardization. The JDIP Coordinator thanked Japan and the United States for providing instructors for this course. He informed that JDIP funding enabled six scientists from developing Contracting Parties to attend SCRS meetings and that a contribution was made towards publication of the *ICCAT Manual*, and tagging and seabirds posters. A training course will be held in November, 2008 in Equatorial Guinea, which is the second phase of a two-year project for the improvement of data collection in that country.

The Coordinator stated that the JDIP hoped to continue with similar data improvement activities for the next period and asked the Committee's advice for future activities.

− ICCAT funds from voluntary contributions

The Executive Secretary presented the funds available from different donors (United States, EC, Brazil) to improve capacity of scientists from developing countries. Under this Agenda item, some discussion ensued on the use of the ICCAT funds for future activities. A suggestion was to consider capacity of all funds for better coordination of these funds in the future. The need for specific recommendations on funding opportunities as well as guidelines for the most efficient use of the funds, which amount to about €500,000 annually, was also pointed out. The Executive Secretary emphasized that prior to the use of these funds, approval is sought from the Species Rapporteur involved, the SCRS Chair and the JDIP Coordinator (in the case of JDIP funds).

The Delegate from Ghana expressed appreciation to the JDIP and the Data Fund which allowed his country to participate in SCRS meetings and thus play integral part in the work of the Committee.

The Executive Secretary reiterated that scientists who receive some assistance are required to provide data and the information requested by the SCRS.

Further discussed of this matter will be carried out under Agenda item 10.

−Results of recruitment of Population Dynamics Expert

The Executive Secretary explained the process followed for the selection of the Population Dynamics Expert and the elements taken into account in the final decision. As Dr. Victor Restrepo expressed his desire to return to the Secretariat, and in view of his expertise in population dynamics and modeling for stock assessments, his eight years´ work experience at ICCAT, and his leadership qualities, he was considered to be the best person to fill this post. Further, because of such experience, he would not require any learning or transitional period, which will facilitate the Secretariat's work in rapidly responding to SCRS requests.

The Delegates were pleased about Dr. Restrepo rehiring, and expressed concern about the increasing needs of scientific support. The stock assessment requirements will be increasing and the tools for such work are becoming ever more complex, thus requiring a modern population dynamics expert at ICCAT. A query was made on the recruiting procedure followed, since the focus of the position seems to have been changed. The Executive Secretary responded that the correct procedure was followed and reiterated that Dr. Restrepo was considered the best qualified person to fill this position. Mr. Meski also indicated that short-term contracts could also be an interim solution for some specific SCRS work.

Mr. Meski indicated that Mr. Kebe will soon be retiring, which will require some restructuring of the Statistics Department, but he reassured the Committee that it will be kept well informed.

Following these discussions, Dr. Restrepo took the floor and thanked the Executive Secretary and the Commission and STACFAD Chairmen for allowing him to return to the ICCAT Secretariat. He said he hoped to give greater emphasis on research and statistics and that, in spite of the Secretariat being short handed to meet the current and future demands of the SCRS, he would work as hard as possible to complete all the tasks assigned to him.

The Chair concluded discussion of this Agenda item by stating that the Commission is quick to add responsibilities but is rather slow to add the necessary resources to complete these responsibilities. He hoped the Commission would rectify this situation for the future.

−Activities concerning ICCAT publications in 2008

The Secretariat outlined the process aimed in improving the impact of ICCAT´s scientific work and its publications, specifically the inclusion of some SCRS documents in a special section in the *Aquatic Living Resources* journal on tunas. It was explained that 17 SCRS documents presented at 2007 meetings were pre-selected by the SCRS Editorial Committee for inclusion in the ARL. However, some authors indicated that their papers will to be published elsewhere, or preferred their inclusion in the *Collective Volume of Scientific Papers*

(Red Books). As a result, only 8 papers were submitted. Of these, 3 were accepted, 2 were rejected and 3 are still undergoing the review process.

The delay in selecting the documents for submission to ARL also caused some delay in the publication of the Red Books. In order to avoid this in the future, it is recommended that the Rapporteurs be asked to pre-select documents from their respective groups, so as to streamline the process for submission and publication.

This matter will be further discussed by the Editorial Committee and the SCRS will be duly informed.

7. Review of national fisheries and research programs

In accordance with the format established in 2005 and reviewed in 2007, only information relative to new research programs was presented to the Committee. The Committee considered the need to include information of interest for its work, separating it from the Annual Report which, with its current structure, is more geared to providing information to the Commission on compliance. The Committee reiterated the need to follow the guidelines established for the preparation of the Annual Reports and to try to clearly define the contents under the various sections (scientific or compliance). In spite of the Committee's having proposed a summary table format in 2005, with basic information on sampling coverage which should be attached to the Annual Reports, the reports presented do not include such a table.

Angola

The major scombridae caught in Angola are: yellowfin tuna (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*), bigeye tuna (*Thunnus obesus*), albacore (*Thunnus alalunga*) and small tunas, such as little tunny (*Euthynnus alleteratus)*, Atlantic bonito (*Sarda sarda*), and chub mackerel (*Scomber japonicus*).

These resources are exploited by the artisanal fishery and the semi-industrial and the industrial fleet.

Istiophoridea and xiphiidae are caught in the waters of Angola mainly by sport fishing.

In 2007, the total catch was approximately 5,796.4 t along the coast of Angola. The tuna catches by gear vary around 5,398 t by hand line, 322.4 t from traps and 76 t by purse seine, trawl and others.

During this year, 16 samples were conducted for *Auxis thazard* measuring a total of 698 fish and nine samples of *Euthynnus alleteratus* measuring 839 fish.

These catches are taken from artisanal, semi-industrial and local industrial.

The types of gear which are normally used for the targeted species are purse seine, trawl, hand line, traps and also longline for foreign vessels.

As regards to the sport and recreational fishing in Angola, the data are controlled by the association of this fishery and these are available at the sport fishing Web site of Angola (www.ipescas.nexus.ao). This association carries out international and regional competitions.

Statistical data are obtained from the National Fisheries and Protection of Resources Directorate (*Direction Nationale de Pêche et Protection de Ressources, DNPPR*), the Consultancy of Plans and Statistics (*Cabinet d'Études de Plans et Statistiques, GEPE*), the National Institute of Fishery Research (*Institut National de Recherches de Pêches, INIP*), the Fisheries Research Centre (*Centres de Recherches de Pêches, CIPs*) and the Artisanal Fisheries Institute (*Institut de Pêches Artisanale, IPA*).

Brazil

In 2007, the Brazilian tuna longline fleet consisted of 96 boats (84 national and 12 chartered), registered in seven different ports. There was an increase of about 5% in the total number of vessels from 2006, when 91 vessels were operating. The number of baitboats remained the same as in 2005 (41, all national), and were based in the same ports (Rio de Janeiro, Itajaí, and Rio Grande). In 2007, the number of purse seine boats (adapted from sardine fishing boats) was eight, showing a decrease of about 40%, from 2006. The Brazilian catch of tunas and

tuna-like species was about 47,000 t (live weight), in 2007, representing an increase of 13% from 2006, when about 41,500 t were caught. The majority of the catch again was taken by baitboats (26,410.2 t), with skipjack tuna being the most abundant species (22.750.2 t), accounting for 86% of the baitboat catches. Total catch of the tuna longline fishery (10,620 t) was about 5% smaller than 2006, with swordfish being the most abundant species (3,801.5 t), accounting for about 36% of the longline catches.

Research continued on the incidental catches of seabirds and was aimed mainly at monitoring by-catch and testing mitigation measures. In June 2006, Brazilian NPOA- Seabirds was launched by IBAMA and it is now being implemented. Experiments with tori lines in southern Brazil reduced the capture of seabirds by more than 50%, including those species with the highest catch rates such as black-browed albatrosses and white-chinned petrels.

In 2007, cooperative research on billfishes and sharks with United States scientists continued to develop, including collection of spines, vertebrae and gonads, for age and growth and reproduction studies, as well as habitat utilization, through PSAT tags, and gear selectivity, by the use of circle hooks, hook timers and TDRs. The results of the experiment on the use of circle hooks in the longline fishery indicated a higher catch rate of target species, and a significant reduction of by-catch, including turtles. Similar researches have also been conducted on tuna species, particularly on yellowfin and bigeye tunas. A new research project aimed at reducing the by-catch in the tuna fisheries, entitled *Mitigating Adverse Ecological Impacts of Open Ocean Fisheries*, *MADE*, in cooperation with the EC, will begin in 2008. Besides the catch and effort data regularly collected from Brazilian tuna fisheries, in 2007, a total of 50,293 fish were measured at sea by observers on board as well as during landing.

Canada

The catch (landings plus dead discards) of Canadian nominal landings of Atlantic bluefin tuna and swordfish in 2007 were 492 and 1409 t, respectively. Highlights of 2007 research included continued investment in PSAT tagging for both bluefin tuna and swordfish, collaborative studies of natal origin and age and growth of bluefin tuna, swordfish feeding investigations, and development of a satellite tag specifically designed to measure survival. For porbeagle sharks, Canada has initiated a fisheries-independent survey, used PSAT studies to locate birth grounds, and studied growth and maturity.

Canada has recently increased its long-term funding for large pelagics research, particularly for bluefin tuna. Enhanced research is planned for bluefin tuna movement and migrations through PSAT tagging (particularly in areas not covered by previous investigations), post-capture survival and natal origin investigations. For swordfish, PSAT tagging studies are planned to augment those already completed off Georges Bank, targeting the foraging assemblage off the Grand Banks of Newfoundland. Furthermore, funds are being made available to augment full-time staff investigating these species.

Cape Verde

The catch of tunas and tuna-like species in 2007 is estimated at 12,384 t. Tuna fishing is one of the oldest activities in Cape Verde and uses hand line gear in the artisanal fishery and pole and line in the industrial or semi-industrial fishery. This fishery has great socio-economic importance as it supplies the canneries and thereby helps reduce the trade deficit through exports, and employs a significant number of people who take part in this activity. Besides supplying the national market, tunas are exported fresh, frozen or canned.

Billfishes are caught mainly in Cape Verdean waters by sport fishing vessels. There is no directed shark fishery in Cape Verde, but often these are taken as by-catches with other species. Sport fishing was practiced very little but with the development of the tourist industry, there is an ever increasing demand for this activity. There is a need for the countries to regulate this fishing in order to better monitor this activity.

The Cape Verde artisanal fleet, based on the last general census in 2005, is comprised of 766 vessels with outboard motors and 270 vessels without motors, with an average of three fishers per boat. There is also an industrial and semi-industrial fleet of about 80 larger vessels with inboard motors which carry an average of 12 fishers per vessel.

There is a foreign fleet authorized to fish in the Cape Verde EEZ within the framework of fishing agreements (European Union and Asian vessels). Generally, the species caught by this fleet are sharks, bigeye tuna, swordfish and yellowfin tuna.

Monitoring of the fisheries is one of the priorities of Cape Verde research aimed at studying the state of the tunas and to identify alternatives for their fishing. Due to various problems, the Statistical Bulletin, which should be published annually, has been delayed.

Work to be carried out includes: (i) data improvement, with the support from the JDIP; (ii) periodic assessments of the state of the tuna stocks in the Cape Verde EEZ, with assistance from ICCAT experts; (iii) better monitoring and control of data quality of the foreign fleet; and (iv) periodic socio-economic studies on the fishery.

China

Longline is the only fishing gear used by the Chinese fishing fleet to fish tunas in the Atlantic Ocean. Thirty-six (36) Chinese tuna longliners operated in 2007, with a total catch of 10,836.3 t including tuna and tuna-like species, and sharks (in round weight), more than that of 2006 (9,906.6 t). The target species were bigeye tuna and bluefin tuna, and their catches amounted to 7,399 t and 72 t, respectively in 2007. Bigeye tuna was the major target species in Chinese catch, accounting for 68.3% of the total, however, it was 199 t (2.8%) higher than that of 2006 (7,200 t). Yellowfin tuna, swordfish, and albacore were taken as by-catch. The catch of yellowfin tuna increased from 1,085 t in 2006 to 1,124 t in 2007. The catch of swordfish was 558 t, which represent a 59.6% increase from the previous year. The catch of albacore was 94 t, which represent a 221.3% decrease from the previous year.

The data compiled, including Task I and Task II as well as number of fishing vessels, have been routinely reported to the ICCAT Secretariat by the Bureau of Fisheries (BOF), Ministry of Agriculture of the People's Republic of China. China has carried out a national scientific observer program for the tuna fishery in ICCAT waters since 2001. In 2007, one observer was dispatched on board a Chinese Atlantic tuna longline fishing vessel during December 2007 to April 2008. The observer has worked on board the fishing vessel for four months. The area covered was 05°37′N - 12°01′N, 29°00′W - 36°51′W. The observer collected the data of target species and non-target species (sharks and sea turtles especially).

In terms of implementation of the relevant ICCAT conservation and management measures, BOF requires all fishing companies operating in the Atlantic Ocean to report their fisheries data on a monthly basis to the Branch of Distant Water Fisheries of the China Fisheries Association and the Tuna Technical Working Group in order to comply with the catch limits. BOF has established a fishing vessel management system, including the issuance of licenses to all the approved Chinese fishing vessels operating on the high seas of world oceans. The Chinese high seas tuna fishing fleet has been required to be equipped with a VMS system since October 1, 2006. BOF has strictly followed the National Observer Program and the ICCAT Regional Observer Program for transshipment at sea.

Côte d'Ivoire

After 1985, Côte d'Ivoire did not have any fleets. However, Côte d'Ivoire has the responsibility to monitor the foreign fleets which go to its fishing port. Thus, in 2007 Côte d'Ivoire has observed:

- 32 tuna vessels (17 Spanish and similar, 6 French, 7 Ghanaian, 2 Equatorial Guinean)
- 110.238 t of processed tuna (landings, transshipments, canneries);
- 23,647 t of false tuna and *faux poisson* (tuna which is discarded by canneries due to bad conditions or small sizes, small tunas (little tunny, frigate tuna) and all other species landed by purse seiners.

Côte d'Ivoire and Ghana carry out offshore artisanal gill net fishing. They have taken more than 20,005 catches, of which 14,608 t have been studied. Large tunas (albacore and skipjack), small tunas (little tunny and frigate tuna), billfish (marlins, sailfish and swordfish) and sharks have been caught. These catches are divided as follows:

- Large pelagic catches amounted to 2032,77 t, 216,18 t albacore (*Thunnus albacares*) catches and 1816,59 t skipjack (*Katsuwonus pelamis*) catches.

- Small tuna catches amounted to 539,39 t, 404,31 t Atlantic black skipjack (*Euthynnus alletteratus*) catches and 135,08 t frigate tuna (*Auxis thazard*) catches.

- Billfish catches amounted to 220,6 t, 150,44 t blue marlin (*Makaira nigricans*) catches, 0,82 t white marlin (*Tetrapturus albidus*) catches, 51,93 t sailfish (*Istiophorus albicans*) catches and 17 ,41 t swordfish (*Xiphias gladius*) catches.

- Shark catches amounted to 75,81 t, 25,07 t mako (*Isurus oxyrynchus*) catches, 39,89 t hammerhead shark (*Sphyrna zygaena* and *S. lewini*) catches and 10,81 t silky sharks (*Carcharhinus falciformis*) catches.

Croatia

Total Croatian catch of tuna and tuna-like species in 2007 was 825.31 t. Bluefin tuna accounts for 100 % of the catch. Almost total catch have been caught by purse seine and transferred into floating cages for growing purposes. Only 8.45 t have been caught by handline and 0.31 t by longline. Additionally 1139,21 t of bluefin tuna have been imported to Croatia in 2007 from France, Italy and Morocco for growing purposes. The number of licensed vessels actively fishing for tuna and tuna-like species in 2007 was 39.

During 2007/2008, within framework of BYP, logistical efforts were made in order to increase probability to spot and to collect conventional and electronic tags from bluefin tuna taken into bluefin farms in the Adriatic Sea. In addition, a research on influence of tuna aquaculture facilities on wild fish population has initiated. A national sampling program targeting bluefin tuna harvested from aquaculture facilities has been carried out in accordance with [Rec. 06-07]. Within the framework of this sampling program, collection of Task II data has been done.

The national statistical data collection system has been improved and the observer program at bluefin tuna farms, has been established.

European Community

Eight EC countries fish tunas in the Atlantic and Mediterranean which are, in order of their decreasing 2007 catches: Spain (80,400 t), France (34,900 t), Portugal (17,000 t), Italy (16,000 t), Greece (4,000 t), Cyprus (764 t), Ireland (600 t) and Malta (203 t). The major species caught by EC countries in 2007 were as follows: skipjack (37,600 t), yellowfin (26,400 t), albacore (24,300 t), bluefin (23,200 t), swordfish (21,900 t) and bigeye (13,800 t). All the traditional fishing gears are in activity in the EC: purse seine, baitboat, longline, hand line, troll, driftnet, harpoon, pelagic trawl, traps and sport fishing. Catches of the EC fleet have been declining overall, after reaching their historic maximum in 1991, with more than 300,000 t to only 155,000 t in 2007, a European catch that is still important for ICCAT (34% of the total catches of tunas in the Atlantic in 2007, a percentage of total catches that has been relatively stable for 10 years).

ICCAT Task I and Task II statistics are generally well carried out and submitted annually to ICCAT by all the EC countries, in spite of some problems that remain with the bluefin tuna statistics and which are sometimes uncertain and incomplete. The regulation adopted by the EC in 2001 mandates and gives financial means to the EC countries to guarantee the perfect collection of statistical and biological data, on catches and discards, in accordance with the ICCAT requirements. In particular, there is regular financing of routine programs of observers on the various large tuna fleets of the EC. Active research is also carried out on tunas in the majority of the EC countries, in particular, in support of ICCAT and SCRS research aimed at assessments and the conservation of the tuna resources. Research of the EC countries is also carried out in varying degree on all the species and all the stocks that are under ICCAT mandate. In 2007, EC scientists participated in all the meetings organized by ICCAT.

Moreover, EC countries carry out numerous research activities of a more fundamental nature on tunas, for example, on ecosystems, the reduction in by-catches, the tunas-environment relationship, tuna behavior, FADs, etc. Participation of EC scientists is active, for example, in the scope of the CLIOTOP/GLOBEC program which has considerable objectives for tuna research, is very multi-disciplinary and worldwide, and which is aimed a carrying out improved modeling of the sustainable exploitation of the tuna resources. Also noteworthy is the MADE research project on the reduction of by-catches which was implemented in 2008 financed by the EC and which has been presented to the Sub-Committee on Ecosystems.

Ghana

Baitboats and purse seiners exploited tuna resources off the EEZ of Ghana. The total number of registered vessels currently in operation are 30, comprised of 20 baitboats and 10 purse seiners. These surface fleets use Fish Aggregating Devices (FADs) to enhance the capture of tuna species. Baitboats work in collaboration with purse seiners often sharing their catch.

Catches for the year 2007 of the main tuna species (excluding minor tunas) rose to 63,095 t from 51,510 t in 2006. This increase of approximately 22.5% can be attributed to the increase in nominal effort (*i.e.* days at sea) from 3,736 t in 2006 to 5,653 t in 2007 and also the numbers of FADs deployed during the year. Purse seiners and baitboats contributed 64.4% and 35.6% of the overall catch respectively. Skipjack landings were 68%, yellowfin 19% and bigeye 13%.

As part of the ICCAT Japan Data Improvement Project (JDIP) an observer program was conducted during the year under review sponsored by the ICCAT/JDIP Data Fund. Results from the Project indicate higher catch rates from purse seiners fishing off FADs. The majority of fish sampled in the Project were caught off FADs and were relatively small (40-65cm) with fishing often concentrated within a narrow strip off the Eastern Gulf of Guinea.

Beach sampling of the billfishes for catch effort & size composition continued off the western coastline of Ghana from small artisanal drift-gillnet operators. Virtually no white marlins were observed during the year under review.

Japan

Longline is the only tuna-fishing gear deployed by Japan at present in the Atlantic Ocean. The final coverage of the logbook from the Japanese longline fleet has been 90-95 % before 2005. The current coverages for 2006 and 2007 are estimated to be about 86% and 58%, respectively. Because of the low coverage, statistics of 2007 in this report are preliminary. In 2006 there were 26,200 fishing days and in 2007, 25,500 fishing days, which were about 80% compared to the average value in recent ten years. The catch of tunas and tuna-like fishes (excluding sharks) is estimated to be 28,596 t and 35,365 t, respectively, which is 90-110% of the average catch for the past ten years. The most important species was bigeye representing 52% of the total tuna and tuna-like fish catch in 2007. The next dominant species was yellowfin occupying 26% in weight and the third species was swordfish (9%). Observer trips on longline boats in the Atlantic were conducted and a total of 422 fishing days were monitored. The Fisheries Agency of Japan (FAJ) sets various regulations for various species and specifically requires all tuna vessels operating in the Atlantic Ocean to submit catch information every day (bluefin tuna) and in a ten-day (other tunas) period by radio or facsimile. All Japanese longline vessels operating in the Convention Area are equipped with satellite tracking devices (VMS) onboard. In accordance with ICCAT recommendations, the FAJ has taken measures to prohibit catch of several undersized tuna species and false import of Atlantic bluefin tuna, swordfish and bigeye tuna. Implementations of time and area closure at a part of the East Atlantic, the Mediterranean and the Gulf of Mexico have been regulated by the Ministerial Order. Each species statistical or catch document programs have been conducted. Records of fishing vessels larger than 24 meters in length overall (LSTLVs) have been established. FAJ dispatched patrol vessels to the North Atlantic to monitor and inspect Japanese tuna vessels and also observe fishing activities of other nations' fishing vessels, and randomly inspected landings at Japanese port to enforce the catch quotas and minimum size limit. A prior permission from the FAJ is required for any Japanese tuna longline vessels to transship tuna or tuna products to reefers at foreign ports and at sea.

Korea

Recently annual catches of tuna and tuna-like species by Korean tuna longliners and purse seiners in ICCAT areas ranged from 2,607 t to 3,437 t (averaged 2,927 t) from 2004 to 2007. The major species were composed of bigeye tuna (48%), yellowfin tuna (21%), bluefin tuna (19%) and albacore (3%). The recent changes in catch trends were mainly due to the re-entry of Korean tuna longliners and the operating of purse seiners since 2004 in the Atlantic Ocean.

In 2007, one Korean purse seiner (chartered from Malta) and 20 Korean longliners operated in the ICCAT area. The total catch was 3,437 t, which was an increase from the previous year. Almost 77% of the 2007 total was composed of two species, 2,136 t of bigeye tuna (62%) and 507 t of yellowfin tuna (15%). In particular, yellowfin tuna catches sharply increased from 283 t in 2006 to 507 t in 2007.

Korean longliners have mainly operated in the tropical area of the Atlantic Ocean and have targeted bigeye tuna and yellowfin tuna. Most tuna longliners operated from January to December in 2007 in the central Atlantic Ocean (12.5°N~7.5°S, 0°~45°W). In 2007, six observers were deployed 12 times on Korean distant-water fishing vessels by the National Fisheries Research & Development Institute (NFRDI) observer program. Of the 12 observation periods, one observer was deployed on a tuna purse seine vessel operated in the Libyan EEZ to catch bluefin tuna in the Mediterranean. The NFRDI has a database system, *Ocean and Fisheries Integrated Research Information System, OFIRIS* which compiles logbook data collected from the vessels operating in the Atlantic Ocean. The total coverage of the NFRDI database is about 68% of official catch statistics of Korea for ICCAT areas in 2007.

Mexico

Since 1980, Mexico has carried out longline fishing directed at yellowfin tuna (*Thunnus albacares*), mainly in oceanic waters and limited to the Mexican Exclusive Economic Zone (EEZ) in the Gulf of Mexico and the Caribbean Sea. The catches of this species have shown variations. However, since 2003, there has been a reported gradual decline in yellowfin catches from 1,362 t to 890 t in 2007. During this past year, there was a total reported catch (retained, released live and dead discards) of 1,392 t, made up of the target species (66.54%), as well as by-catch (33.46%), which was comprised mainly of lancetfishes (*Alepisaurus* spp.), blue marlin (*Makaira nigricans*), sailfish (*Isthiophorus albicans*), swordfish (*Xiphias gladius*), escolar (*Lepidocybium flavobrunneum*), wahoo (*Acanthocybium solandri*) and black marlin (*Makaira indica*). The former is due to Mexico's efforts to improve the quality and quantity of scientific information, by means of validation, editing, linking as well as a series of circumstances. In addition, Mexico has carried out training and renewing of observers on board vessels in the Gulf of Mexico. All of this is aimed at duly complying with national commitments as well as in the scope of management of the longline fishery. Furthermore, priority has been given to the scientific dissemination of these achievements by means of technical meetings, fora, and educational exchanges involving the industrial, governmental and educational sectors.

Morocco

Fishing for tunas and tuna-like species has considerable socio-economic importance. They require important investments and create considerable employment. These fisheries continue to assure an average annual production on the order of 10,000 t in recent years. Catches in 2007 amounted to 12,585 t.

The major species caught along the Moroccan coast are bluefin tuna, swordfish, swordfish, bigeye tuna, yellowfin tuna, albacore, small tunas and some shark species.

The fishing zones differ from one species or group of species to another. Multiple fishing gears are used, mainly trap, hand line, troll (sporadically), drift net (whose use is currently being discontinued, to be substituted by other gears, such as longline). A farming operation is currently being carried out on the Atlantic coast of Morocco.

As regards catches, there has been an 8% overall drop as compared to 2006, due to the decrease in the quantities landed, particularly for some species such as swordfish (-22%), bigeye tuna (-27%), where there has been a reported increase in catches of yellowfin tuna (+7%), bluefin tuna (+28%), Atlantic black skipjack, plain bonito and sharks.

For the major species (bluefin tuna, swordfish, tropical tunas and small tunas) catches are broken down by area and by gear for the 1996 and 2007 period.

The management and conservation measures on these resources and their fisheries, such as those adopted by ICCAT, are based essentially on the following aspects: minimum size limits, limit on fishing effort, monitoring of fishing activities at sea and on land at landing. These measures are strengthened by the implementation of a tracking system and satellite monitoring of the fishing vessels (DRS/GPS).

The collection of statistics on fishing and effort is carried out practically in an exhaustive manner by the fisheries administration structure (*Department of Fisheries and the National Office on Fishing*), located all along the Atlantic and Mediterranean coasts of Morocco. Monitoring is also carried out by the Office of Foreign Exchange, as concerns the exports of the fishing products.

Work to reconstruct the historical series of the statistics is currently on-going, in particular, concerning fishing effort, which will improve the Task II data in the near future.

As regards scientific work, the *Institut National de Recherche Halieutique,* INRH (National Research Institute on Fishing) through its five Regional Centers covering the entire Moroccan coast reinforced the collection of biological data on the major species (bluefin tuna and swordfish). The Regional Center of the INRH in Tangiers serves as the coordinator for the collection of all these data. In the last few years the monitoring of other species has started, in particular, the tropical tunas (bigeye tuna, among others), with an expansion of the research work towards areas located in the south of Morocco. Considerable progress has also been reported in the collection of biological data, as shown by the series of scientific documents presented by Moroccan scientists to the various SCRS meetings for the assessment of the tuna stocks.

The biological studies also cover aspects related to bluefin tuna reproduction. A scientific program has been initiated in 2008 in collaboration with the INRH and the University of Bari (Italy) and the results will be submitted to the SCRS at the next assessment sessions. The optimization of this program will depend on the funds that are allocated to it, particularly those available at ICCAT.

Norway

In light of the critical stock situation for Atlantic bluefin tuna, Norway has adopted a prohibition for Norwegian vessels to fish and land bluefin tuna in Norway's territorial waters, in the Norwegian Economic Zone and in international waters. Norway continuously works on historical data, and aims to put the data on this species into an ecosystem perspective. Comprehensive reviews of the Norwegian fishery from 1920-1980 and plausible causes related to the drastic decline of bluefin tuna in Norwegian waters in recent decades, were presented and documented at the "World Symposium for the Study into Stock Fluctuations of Northern Bluefin Tuna (*Thunnus thynnus* and *Thunnus orientalis*) including the Historic Period". Norway has participated on all major international scientific meetings concerning Atlantic bluefin tuna in 2007 and 2008.

Russia

Fishery. Specialized purse-seine fishing for tunas was carried out periodically in 2007 by two purse seiners in the Equatorial area. The catch amounted to 1,368 t (211 t of yellowfin tuna, 1,130 t of skipjack, 26 t of bigeye tuna and 1 t of frigate tuna). No fishery was carried out in 2008.

The trawl fishing vessels caught 5 t of tunas and 259 t of bonito as by-catch in 2007 in the Central-East Atlantic (CEA).

Research and statistics. In 2007 and in the first half of 2008, the observers collected the materials on board tuna seiners in the open part of the Atlantic Ocean. Besides, the work on tunas and tuna-like species occurrence in the catches of the trawlers engaged in the fishing in the Exclusive Economic Zones (EEZ) of Mauritania and Morocco were carried out. The species and length composition of tunas, their biological condition and proportion in total catches of all fish species were determined. The material obtained included mass measurements of 1,379 sp. and biological analysis of 718 sp.

Based on the retrospective data for 1973-1990, the population parameters of bullet tuna in the eastern part of the Atlantic Ocean were analyzed. Differences between reproduction period time of tunas inhabiting the Central-East and southeast parts of the Atlantic Ocean were revealed.

The morphological characteristics of 4 oceanic and neritic-oceanic shark species were researched. At least two groups (populations) exist differed in the relative length of pectoral fin, relative length of the caudal fin upper lobe and the index of vertebra water content. Oceanic shark populations were characterized with the high index of vertebra water content and larger relative length of pectoral fins or relative length of the caudal fin upper lobe. The neritic populations were distinguished in lower index of vertebra water content and relatively shorter fins.

Implementation of ICCAT conservation and management measures. During fishery in the areas, where tunas and tuna-like species occurred in catches, the ICCAT requirements and recommendations concerning restrictions in tuna fishery, and a ban imposed on fishing quoted species were observed.

Senegal

In Senegal, tunas are caught mainly by three fleet types:

- The industrial fishery that mainly targets yellowfin tuna (*Thunnus albacares*-YFT), skipjack tuna (*Katsuwonus pelamis*-SKJ) and bigeye tuna (*Thunnus obesus*-BET). Catches of the major tunas by seven Senegalese baitboats in 2007 are estimated at 3,898 t, comprised of 816 t yellowfin tuna, 2,278 t skipjack tuna, and 804 t of bigeye. The catches have decreased greatly those in 2006 (6,063 t).

- The Senegalese longline fishery is comprised of three vessels. In 2007, the total catch of billfish was assessed at 140.02 t, of which 136.70 t corresponded to the target species *Xiphias gladius*-SWO and 160.08 t of sharks.

- A part of the artisanal fleet uses hand line, troll line, and purse seine net to catch small tunas: Atlantic black skipjack (*Euthynnus alletteratus*), West African Spanish mackerel (*Scomberomus tritor*), Atlantic chub mackerel (*Scomber japonicus*), plain bonito (*Orcynopsis unicolor*), Atlantic bonito (*Sarda sarda*), wahoo (*Acanthoncybium solandri*), and frigate tuna (*Auxis thazard*). Billfishes, such as swordfish (*Xiphias gladius*), Atlantic blue marlin (*Makaira nigricans*) and sailfish (*Istiophorus albicans*) are also found in the catches.

A new catch series has been presented in 2007. In effect, the new *Système d'Information National sur la Pêche-SINAP* (National Information System on Fishing) implemented by CRODT has resulted in the revision and centralizing of all the databases into one secure system which integrates harmonized nomenclatures and codes. The total catches of all small tunas all species combined is estimated at 9,836 t in 2007 and total shark catches by driftnet and hand line amounted to 1,773 t.

The sport fishery is monitored by two large fishing centers in Dakar and in Mbour. The sport fishing targets swordfish, billfishes and sailfish (swordfish-*Xiphias gladius*, Atlantic blue marlin-*Makaira nigricans,* sailfish-*Istiophorus albicans*) during the fishing season from May to December. En 2007 were assessed at 120,84 t for sailfish and 79,66 t for Atlantic blue marlin.

The only existing cannery, *La Société Nationale des Conserveries du Sénégal,* SNCDS (The National Society of Canneries in Senegal), was supplied by foreign baitboats in 2007. A total of 4,948 t were landed.

The collection of fishery data and data on effort is carried out regularly at the port for the industrial fishery and at different landing sites for the artisanal fishery. Samples are conducted in landings at the port of Dakar. For industrial fishing 157 samples of multi-specific sizes were carried out on Senegalese baitboats in 2007. Samples of billfish (sailfish *Istiophorus albicans* and Atlantic blue marlin *Makaira nigricans*) are conducted at the major landing sites in the artisanal fishery.

As regards to the entry into force of the conservation and management measures of ICCAT, Senegal has implemented a follow up, control and surveillance system of the fishing activities: inspections are carried out at the port as well as the identification of all vessels performing illegal fishing.

South Africa

The two main fleets that fish for tuna in South African waters are the poling and tuna longline fleets. The total annual pole fleet catch for albacore (2,023 t in 2007) has remained consistently low in recent years, and well below the mean annual catch over the last decade (~4,900 t). Reduced catches in the previous year in the baitboat fishery were compounded by a number of vessels changing their targeting to yellowfin tuna using rod-and-reel gear, and high fuel prices. Despite the increase in the number of active longline vessels (29 in total), the fishing effort in the Atlantic remained relatively constant (608.175 hooks) compared to 2006 (603.880 hooks) This was due to most of the fishing effort being conducted in the Indian Ocean, where catch rates of the target species are higher. Pelagic shark longline and traditional linefish catch tuna and tuna-like species as by-catch and catches have remained low in 2007.

South Africa was unable to meet its data obligations on time under ICCAT this year as there was little research capacity in 2007-2008 to process the data. South Africa, with the assistance of NGOs and universities, continued to assess the impact of longline fisheries on seabirds, turtles and sharks and to investigate various mitigation and management measures, and in addition, South Africa has also embarked upon a research programme to determine the stock delineation of yellowfin in the boundary region between the Indian and Atlantic oceans.

Turkey

During the course of 2007, the total catch of tuna and tuna-like fishes (including small tunas and swordfish) amounted to 9,936 t, a 70% decrease compared to 2006. Turkey's total catch of bluefin tuna, albacore, Atlantic bonito and swordfish were 918 t, 852 t, 5,965 t, and 423 t, respectively. All bluefin catch was caught by 77 purse seiners, the majority of which had an overall length of 30-50 m and 200-300 GRT. Fishing operations for bluefin took place mostly in the southern territorial waters of Turkey and harvesting was considerably poor until early June. Recommendations and resolutions imposed by ICCAT were translated into national legislation and implemented. All conservation and management measures regarding bluefin tuna fisheries and farming are regulated by national legislation through notifications, considering ICCAT's related regulations. Pilot implementation of the Vessel Monitoring System was carried out in 2007 by the bluefin tuna fleet. The Fisheries Information System has been updated in order to meet the requirements of data exchange at national and regional level.

Specific research activities towards bluefin tuna, albacore and Atlantic bonito fishery and biology were conducted. In addition to these, a tuna larval survey in the eastern Mediterranean has been carried out in 2007. Research on tuna larval survey in this area will continue in the coming years.

United States

Total (preliminary) reported U.S. catch of tuna and swordfish, including dead discards, in 2007 was 11,991 t, a decrease of about 10% from 13,437 t in 2006. The estimated swordfish catch (including estimated dead discards) increased from 2,508 t in 2006 to 2,665 t in 2007, and provisional landings from the U.S. fishery for yellowfin decreased in 2007 to 5,529 t from 7,090 t in 2006. U.S. vessels fishing in the northwest Atlantic landed in 2007 an estimated 848 t of bluefin, an increase of 234 t compared to 2006. Provisional skipjack landings increased by 5.3 t to 66.4 t from 2006 to 2007, estimated bigeye landings decreased by 469 t compared to 2006 to an estimated 523 t in 2006, and estimated albacore landings increased from 2006 to 2007 by 132 t to 531.6 t.

As part of its commitment to the Bluefin Year Program, research supported by the United States has concentrated on ichthyoplankton sampling, growth and reproductive biology, methods to evaluate hypotheses about mixing and movement patterns, spawning area fidelity, stock structure investigations and population modeling analyses. The U.S also continues to tag swordfish with pop-up tags to better understand their behavior. Ten and three swordfish were released with these tags in 2007 and 2008, respectively. In addition, 172 swordfish have been released with conventional tags in 2007 and 2008. A cooperative shark research project between Brazil (*Universidade Federal Rural de Pernambuco*) and the U.S. (NOAA Fisheries and the University of Florida's Florida Museum of Natural History) has been initiated. The main goal of this cooperative project is to conduct simultaneous research on pelagic sharks in the North and South Atlantic Ocean. Central to conducting the research is development of fisheries research capacity in Brazil through graduate student training and of stronger scientific cooperation between Brazil and the U.S. The cooperative billfish research between U.S. and Brazilian scientists that was initiated in 2005 continued in 2006 and 2007. Additional research in Brazil will also focus on PSAT tagging of billfish and the collection of biological materials for ageing and molecular genetic analyses. Participants in the U.S. Southeast Fisheries Science Center's Cooperative Tagging Center (CTC) and the Billfish Foundation Tagging Program (TBF) tagged and released 3,647 billfishes (including swordfish) and 583 tunas in 2007. The U.S. continues to collect important information of tuna, tuna-like, and shark fisheries through its pelagic longline, shark gillnet and bottom longline observers programs.

Uruguay

In 2007, the Uruguayan tuna fleet continued fishing using surface longline, although with a lesser number of vessels than in 2006 (9). The total catch (provisional) landed and reported in 2007 by this fleet was approximately 1,000 t, which represents a decrease of 500 t with respect to the previous year.

In 2007 various activities were carried out related to statistics, research and management. Some of these activities were carried out jointly with other governmental institutions. The *Programa Nacional de Observadores-PNOFA* (National Plan of Observers) continued, which covers approximately 65% of the fleet's activities. Within this program, work was initiated aimed at teaching and informing those who work in fishing and the vessel boat owners.

Information on the fishery

Tropical tunas

As for other species, statistical monitoring of catch and effort statistics continued. This work was carried out using information from the fishing logbooks from the longline fleet and data from the Observers Program as concerns yellowfin (Documents SCRS/2008/109, SCRS/2008/110, SCRS/2008/111).

Sharks

Blue shark and shortfin mako were tagged and work was initiated in stock identification using genetic techniques. The Uruguayan National Plan for the Conservation of Sharks was finalized and the results published. Other biological research work is being carried out on pelagic shark species as was recommended by the Shark Species Group at its last inter-sessional meeting.

Sea birds

Work is currently being done to carry out the Plan and developing the Plan´s proposals. Also related with this objective and with the proposal made by the Sub-Committee on Eco-Systems, papers were presented to collaborate with the 2008 assessment.

Marine turtles

A project of satellite transmitters has been started to obtain information on the migratory routes and movements of the *Caretta caretta* turtles. Experiments have been made using circle hooks in monofiliment longline. This project is carried out in collaboration with the National Oceanographic and Atmospheric Administration (NOAA)/National Marine Fisheries Service (NMFS), Pacific Island Fisheries Science, Honolulu, USA.

ICCAT conservation and management measures

Implementation of the national Plan of Action to Reduce the Incidental Catch of Seabirds and Sharks in Uruguayan Fisheries has started. National regulations are still effect on swordfish, bigeye and yellowfin minimum size and catch. Activities have started and meetings held with other state organs (National Naval Prefecture, National Administration of Ports and the National Customs Administration, etc.), to generate more control at Uruguayan ports. A group has being established within DINARA for port monitoring.

Venezuela

The fisheries for tunas and tuna-like fisheries in Venezuela is carried out by industrial and artisanal vessels. In 2007 the industrial fleet was comprised of seven purse seiners, eight baitboats and 33 pelagic longliners. There are about 30 artisanal vessels that fish using driftnets and surface longline. Catch and effort of the various fisheries were monitored and controlled through the delivery, collection and review of the fishing logbooks, monitoring of the fleet movement, inspections of the landings at the various ports, monitoring of the destination of the catch and biological sampling, and the establishment of consultancy organs of the administration that are in charge of the review, attention to and recommendations of the measures to administer, manage and investigate the country's tuna resources.

In 2007, the industrial fleet carried out 380 trips, with an average coverage rate of 97.9%, (100% of the purse seine and baitboat fleet and 96.9% of the longline fleet). Landings by the industrial fleet amounted to 7,121.5 t, of which 61.2 % were from purse seiners, 16.1 from baitboats and 15.9% from the pelagic longline fleet. Artisanal driftnet represented 6.8% of the landings.

Among the sustainable management measures on the fishing activity adopted by Uruguay, there is monitoring of the landings of the industrial fleet through a new Fishing Law which mandates the presence of an inspector from the Institute of Fishing Administration when the catch is landed, the establishment of Local Committees for the Monitoring of the Tuna and Tuna-like Fisheries, the establishment of the Group of Tuna Experts and the Consultancy Councils in which representatives from all those involved in the fishing production circuit, to assure the participation, understanding and compliance with the administrative monitoring, surveillance and management of the fishing activity. Furthermore, through the articles of the new law concerning the Protection of the Resources, Harmonization of Criteria, and the Precautionary Approach, studies will be carried out on the

technologies and gears available or developed and the criteria applicable in fishing matters and aquiculture with the countries in the region, particularly as concerns highly migratory species such as tunas.

Research continued on the large pelagics fishery, which includes tunas, billfishes and sharks. Likewise, the Enhanced Research Program on Billfish (ERPB-VZLA), sponsored by ICCAT, envisages the observer program on board pelagic longliners and the monitoring of artisanal fleet activities on the central coast of Venezuela.

Cooperating non-Contracting Parties, Entities or Fishing Entities

Chinese Taipei

Chinese Taipei has started to fish tuna and tuna-like species in the Atlantic Ocean since early 1960s. The number of longline vessels declined from its highest 201 in 1996 to 109 in 2007, which includes 60 vessels authorized to target on bigeye tuna and 49 vessels on albacore.

The catches of all species are declining from about 52,600 t in 1997 to about 34,400 t in 2007. Among the catches, bigeye tuna, yellowfin tuna and albacore are constituted of more than 80% of the total annual catch of tunas in the recent years. In 2007, the catch of bigeye tuna, yellowfin tuna and albacore are estimated to be 12,116 t, 1,947 t and 14,443 t in provision, respectively. Moreover, catch of bigeye tuna in 2007 increases significantly with an amount of 9,151 t from the previous year (2,965 t in 2006) due to the reinstatement of fishing possibilities and the number of bigeye-targeted vessels from 15 in 2006 to 64 in 2007 by the Commission.

In 2007, Chinese Taipei continually took several measures to improve data collection. Some of those were the port sampling, a daily logbook reporting through the satellite for bigeye-directed vessels, and dispatching on-board observers. There were 20 observers placed on fishing vessels in the Atlantic Ocean, in which 14 observers are on bigeye-directed vessels for full compliance of 10% coverage under ICCAT Recommendation [Rec. 06-01]. With the implementation of those measures, more data and samples may continually become available. Furthermore, a number of researches have been conducted by scientists, including the topics on sharks by-catch estimation, incidental catch rate of seabirds and sea turtles, and an experimental Automatic Imaging System (AIS) program. And those papers have contributed to various inter-sessional scientific meetings opened by ICCAT.

8. Executive Summaries on species

Up to 2004, the main purpose of the Species Executive Summaries was to provide a succinct overview of each species to the Commission. These were summaries of the biology and fisheries affecting stocks of concern, the status and outlooks for these stocks, evaluations of the effectiveness of management measures agreed by the Commission, and recommendations for additional management measures that the Committee felt would improve the odds of meeting the Commission's objective of attaining maximum sustainable yield levels from the stocks.

At the 2004 Commission Meeting, the structure of the SCRS Report was discussed and it was suggested that too much time was being spent on stocks which were not scheduled for assessment. The SCRS Chairman explained to the Commission that the format of the Report could be changed if the Commission so wished, but stressed that it was important to review stocks even if no assessment was conducted in order to keep statistical information up-to-date and in order to monitor the status of fisheries and stocks. During the inter-sessional period, the SCRS Chairman developed a proposal for a revised, shorter format which was distributed to Species Group Rapporteurs for comment.

The structure of the Executive Summaries that follow reflects a diversity of ways in which the different Species Groups have implemented changes intended to streamline the SCRS Report. For example, some members of the SCRS felt that the tradition of providing an overview of the biology of the stock should be retained, whereas others favored the approach of providing a brief overview of new knowledge only. The Committee considers that it would be useful to seek more consistent formats in the future, after the Commission provides further guidance on the contents and structure of the Report.

The Committee reiterates that, in order to obtain a more rigorous scientific understanding of these Executive Summaries, readers consult previous Executive Summaries as well as the corresponding Detailed Reports, which are published in the Collective Volume series.

The Committee also notes that the texts and tables in these summaries generally reflect the information that was available to ICCAT immediately before the plenary sessions of the SCRS, as they were drafted by the Species Group meetings. Therefore, catches reported to ICCAT during or after the SCRS meeting may not be included in the Summaries.

8.1 YFT – YELLOWFIN TUNA

A stock assessment for yellowfin tuna was conducted in 2008, at which time catch and effort data through 2006 were available. The catch table presented in this Executive Summary **(YFT-Table 1)** has been updated to include 2007 catches. Readers interested in a more complete summary of the state of knowledge on yellowfin tuna should consult the detailed report of the 2008 ICCAT Joint Stock Assessment of Atlantic Skipjack and Yellowfin Tuna (SCRS/2008/016).

Other information relevant to yellowfin tuna is presented elsewhere in this SCRS Report:

- The Tropical Tunas Work Plan **(Appendix 5)** includes plans to address research and assessment needs for yellowfin tuna.

YFT-1. Biology

Yellowfin tuna is a cosmopolitan species distributed mainly in the tropical and subtropical oceanic waters of the three oceans. The sizes exploited range from 30 cm to 170 cm FL; maturity occurs at about 100 cm FL. Smaller fish (juveniles) form mixed schools with skipjack and juvenile bigeye, and are mainly limited to surface waters, while larger fish form schools in surface and sub-surface waters. Reproductive output among females has been shown to be highly variable. The main spawning ground is the equatorial zone of the Gulf of Guinea, with spawning primarily occurring from January to April. Juveniles are generally found in coastal waters off Africa. In addition, spawning occurs in the Gulf of Mexico, in the southeastern Caribbean Sea, and off Cape Verde, although the relative importance of these spawning grounds is unknown. Although such separate spawning areas might imply separate stocks or substantial heterogeneity in the distribution of yellowfin tuna, a single stock for the entire Atlantic is assumed as a working hypothesis, taking into account the transatlantic migration (from west to east) indicated by tagging, a 40-year time series of longline catch data that indicates yellowfin are distributed continuously throughout the entire tropical Atlantic Ocean, and other information (e.g., time-area size frequency distributions and locations of fishing grounds). Males are predominant in the catches of larger sized fish. Natural mortality is assumed to be higher for juveniles than for adults; this is supported by tagging studies for Pacific yellowfin.

Growth rates have been described as relatively slow initially, increasing at the time the fish leave the nursery grounds. Nevertheless, questions remain concerning the most appropriate growth model for Atlantic yellowfin tuna. A recent study (SCRS/2006/146) developed a new growth curve using daily growth increment counts from otoliths. The results of this study, as well as other recent hard part analyses, do not support the concept of the two-stanza growth model (initial slow growth) which is currently used for ICCAT (as well as other management bodies) yellowfin tuna stock assessments and was developed from length frequency and tagging data. This discrepancy in growth models could have implications for stock assessments and is being investigated.

The younger age classes of yellowfin tuna exhibit a strong association with FADs (fish aggregating devices/floating objects, which can be natural or artificial). The Committee noted that this association with FADs, which increases the vulnerability of these smaller fish to surface fishing gears, may also have a negative impact on the biology and on the ecology of yellowfin due to changes in feeding and migratory behaviors.

YFT-2. Fishery indicators

In contrast to the increasing catches of yellowfin tuna in other oceans worldwide, there has been a steady decline in overall Atlantic catches, declining 34% since 2001 (the last year of data available for the prior assessment) with an overall decline of 44% since the peak catches of 1990. Atlantic surface fishery catches have shown a declining trend from 2001 to 2006, whereas longline catches increased within that period until 2004, then began to decline as well In the eastern Atlantic, purse seine catches declined from 95,648 t in 2001 to 58,319 t in 2006, a 39% reduction **(YFT-Table 1; YFT-Figure 2)**. Baitboat catches declined by 45%, from 19,071 t to 10,434 t. This decrease is largely due to reduced catches by Ghana baitboats, which resulted from a combination of reduced days fishing, a lower number of operational vessels, and the observance of the moratorium on fishing using floating objects. Longline catches which were 7,570 t in 2001, have fluctuated since between 5,790 t and 11,501 t and were 7,433 t in 2006 (a 2% decrease from 2001). In the western Atlantic, purse seine catches have declined by 66%, from 13,072 t to 4,442 t. Baitboat catches declined by 49%, from 5,315 t to 2,695 t. Longline catches, which were 14,872 t in 2001, have fluctuated since between 10,136 t and 15,953 t and were 14,337 t in 2006 (a 4% decline from 2001). The increase in South African catches in the eastern Atlantic during 2005-2007 may be the result of a spillover of Indian Ocean fish caught just inside the Atlantic boundary. The most recent

available catch distribution is given in **YFT-Figure 1.** The provisional catches for 2007 (96,580 t) are nearly complete, and suggest a slight decrease from 2006.

The nominal effort in the purse seine fishery has been declining. As an indicator, the number of purse seiners from the European and associated fleet operating in the Atlantic declined from 44 vessels in 2001 to 24 vessels in 2006, with an average age of about 25 years. The number of fishing days also declined by nearly 50%. At the same time, the efficiencies of these fleets have been increasing. On the other hand, the European and associated baitboat fleet, based in Dakar, increased from 15 to 17 vessels during the same period.

Several scientific documents were presented which were descriptive of the catches by country fleets. Examination of nominal catch rate trends from purse seine data suggest that catch-per-unit effort was stable or increasing in the East Atlantic (the catch rate trends of individual country fleets differ somewhat), and was clearly declining in the West Atlantic **(YFT-Figure 3)**. If effort efficiency is estimated to have continued to increase as has been assumed in the past, adjustments for such efficiency change would be expected to result in a steeper declining trend. However, the decrease in western Atlantic purse seine catch rates could be linked to specific environmental conditions (e.g. high surface temperatures, reduced availability of prey, etc.), especially considering that decreases are also seen in skipjack catch rates, and it is therefore difficult to conclude that these rates reflect abundance trends. Baitboat catch rate trends **(YFT-Figure 4)** exhibit large fluctuations, with a somewhat declining overall trend. Such large fluctuations reflect changes in local availability, which (although of great import to the respective fisheries) do not necessarily reflect stock abundance trends (*i.e.* localized environmental changes as well as changes in migratory patterns may produce such results). Standardized catch rates for the longline fisheries **(YFT-Figure 5)** generally show a declining trend until the mid-1990s, and have fluctuated without clear trend since.

The average weight trends by fleet (1970-2006) are shown in **YFT-Figure 6.** The recent average weight in European purse seine catches, which represent the majority of the landings, has declined to less than half of the average weight of 1990. This decline is at least in part due to changes in selectivity associated with fishing on floating objects, although there have been recent indications that the mean weight of large fish caught in free schools has been declining. A declining trend is also reflected in the average weight of eastern tropical baitboat catches. Longline mean weights have also followed a generally declining trend, although estimates have been highly variable in recent years.

Apparent changes in selectivity can also be seen in the overall trends in catch at age shown in **YFT-Figure 7**. The variability in overall catch at age is primarily due to variability in catches of ages 0 and 1 (note that the catches in numbers of ages 0 and especially 1 were particularly high during the period 1999-2001). These ages are generally taken by the surface fisheries around FADs.

YFT-3. State of the stock

Since the relatively high catch levels of 2001 (164,650 t), catches have declined each year to a level of 108,160 t, a reduction of 34%. Catches in 2005 and 2006 represented the lowest level of catches since 1974. The catch in 2007 (96,580 t) is preliminary, but may be even lower. A potential explanation for this decline is the reduction in eastern Atlantic purse seine effort, but that alone does not explain the reduction of baitboat and purse seine catches in the western Atlantic, nor the more recent declines of longline catches in both the western and eastern Atlantic. A full stock assessment was conducted for yellowfin tuna in 2008, applying both an age-structured model and a non-equilibrium production model to the available catch data through 2006.

An age-structured virtual population analysis (VPA) was conducted using fifteen indices of abundance. The VPA, using results from the base case runs, estimates that the levels of fishing mortality and spawning biomass in recent years have been very close to MSY levels. The estimate of MSY derived from these analyses was 130,600 t. This estimate may be below what was achieved in past decades because overall selectivity has shifted to smaller fish (**YFT-Figure 7**); the impact of this change in selectivity on estimates of MSY is clearly seen in the results from VPA (**YFT-Figure 8**). The estimate of relative fishing mortality ($F_{2006}/F_{MSY)}$ was 0.84, and for relative biomass (B_{2006}/B_{MSY}) was 1.09.

The stock was also assessed with a production model (ASPIC). Analyses were conducted using either nine separate indices or using a combined index created from all available abundance indices by fleet and gear, and weighting each index by the area covered by that fishery. The estimate of MSY derived using the basic case runs of ASPIC was 146,600 t. Although the estimate of MSY was somewhat higher than that from the age structured

model, the stock status results are slightly more pessimistic. The estimate of relative fishing mortality ($F_{2006}/F_{MSY)}$ was 0.89, and for relative biomass (B_{2006}/B_{MSY}) was 0.83.

Trajectories of B/B_{MSY} and F/F_{MSY} from both age structured (VPA) and the production model (ASPIC) analyses are shown in **YFT-Figure 9**. The trend estimated from VPA indicates that overfishing ($F>F_{MSY}$) has occurred in recent years, but that the current status is neither overfished ($B<B_{MSY}$) nor is there over fishing. The more pessimistic ASPIC estimates indicate that there has been both overfishing and an overfished status in recent years, but that overfishing was not occurring in 2006. Bootstrapped estimates of the current status of yellowfin tuna based on each model, which reflect the variability of the point estimates given assumptions about uncertainty in the inputs, are shown in **YFT-Figure 10**. Examination of the distribution of these estimates from both models shows that about 40% indicate a sustainable situation, in which the stock is not overfished and overfishing is not occurring (**YFT-Figure 11)**.

In summary, 2006 catches are estimated to be well below MSY levels, stock biomass is estimated to be near the Convention Objective and recent fishing mortality rates somewhat below F_{MSY}. The recent trends indicate declining effective effort and some recovery of stock levels. However, when the uncertainty around the point estimates from both models is taken into account, there is still about a 60% chance that stock status is not consistent with Convention objectives.

YFT-4. Outlook

Projections were made considering a number of constant catch scenarios (see **YFT-Figure 12** for the results from the age-structured model). These indicate that catches of 130,000 t or less are sustainable during the projection interval, while catches in excess of 130,000 t can lead to overfishing. Maintaining current catch levels (110,000 t) is expected to lead to a biomass somewhat above B_{MSY}.

In terms of equilibrium conditions, the various assessment model results show that increasing fishing mortality in the long term by up to 10% (depending on the model) to reach F_{MSY} would only result in equilibrium yield gains of 1% to 4% (**YFT-Figure 13**) over the expected yields at current fishing mortality levels.

Yearly catches of small (less than 3.2 kg) yellowfin tuna in numbers have ranged around 60-75% of purse seine catches and about 40-80% of baitboat catches since 2000, occurring primarily in the equatorial fisheries. The generally declining trends in average weight may still be a cause for concern. Minimum size limits for yellowfin tuna have been shown to be ineffective by themselves, due to difficulties related to the multi-species nature of the fishery. Previously conducted yield-per-recruit analyses have indicated that reductions in fishing mortality on fish less than 3.2 kg could result in gains in yield-per-recruit and modest gains in spawning biomass-per-recruit. The protection of juvenile tunas may therefore be important and alternative approaches to minimum size regulations to accomplish this should be studied. In accordance with concerns expressed in the report of Panel 1 of the Commission stating that alternatives be examined, a limited evaluation was conducted on the relative impact of effective effort restrictions on individual fisheries in terms of yield per recruit and spawning biomass per recruit. This evaluation is presented in a separate report.

YFT-5. Effects of current regulations

Recommendation 04-01 implemented a small closure for the surface fishing in the area 0º-5ºN, 10ºW-20ºW during November in the Gulf of Guinea. Although this regulation is intended to reduce small bigeye catches, the Committee recognizes that its implementation and the change from the previous moratorium to the current regulation will potentially impact yellowfin catches. Given the relatively small time-area coverage of the closure, any reduction in juvenile mortality is expected to be minimal. Although there are as yet insufficient data to conduct a thorough evaluation of the impact of Rec. 04-01, an analysis of 1994-2007 purse seine catches presented to the Committee confirms that the new closure has been less effective than previous moratoria in reducing small fish harvests and avoiding growth overfishing.

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”. As measured by fishing mortality estimates from VPA, during the 2008 assessment, effective effort in 2006 appeared to be well below (about 25-30% below) the 1992 levels, and there has been a declining trend in recent years.

YFT-6. Management Recommendations

The status of yellowfin has shown some improvement since the last assessment, which is not surprising in that catches and fishing effort have generally declined and there have been small increases in catch rates observed for some longline fisheries over the past few years. Currently, stock biomass is estimated to be near the Convention Objective and recent fishing mortality rates somewhat below F_{MSY}. Continuation of current catch levels is expected to lead to a healthy biomass, somewhat above B_{MSY}, which should provide adequate safeguard against biomass falling below the Convention objective as long as fishing effort does not substantially increase. Effort increases on the order of about 10% above current levels (in order to achieve MSY) would be expected in the long run to increase yield by only about 1-4% over what could be achieved at current effective effort levels, but with substantially increased risk of biomass falling below the Convention objective. In addition, the Commission should be aware that increased harvest of yellowfin could have negative consequences for bigeye tuna in particular, and other species caught together with yellowfin in fishing operations taking more than one species. The Committee also continues to recommend that effective measures be found to reduce fishing mortality of small yellowfin, if the Commission wishes to increase long-term sustainable yield.

ATLANTIC YELLOWFIN TUNA SUMMARY

Maximum Sustainable Yield (MSY)	~130,600 t [1] (124,100-136,500) ~146,600 t [2] (128,200-152,500)
Current Yield [3] (2006)	108,160 t
Replacement Yield (2006)	~ 130,000 t
Relative Biomass B_{2006}/ B_{MSY} [4]	0.96 (0.72-1.22)
Relative Fishing Mortality: $F_{current}/F_{MSY}$ [4]	0.86 (0.71-1.05)
$F_{current}/F_{0.1}$ [5]	1.26 (1.11-1.44)
$F_{current}/F_{20\%SPR}$ [5]	0.81 (0.73-0.93)
$F_{current}/F_{30\%SPR}$ [5]	1.12 (1.01-1.29)
$F_{current}/F_{40\%SPR}$ [5]	1.52 (1.35-1.73)

Management measures in effect:

- Effective fishing effort not to exceed 1992 level [Rec. 93-04].
- Rec. 04-01, effective 2005. Season/area closure. Although this measure was intended to reduce the catches of juvenile bigeye tuna, as this is a complete closure, impacts are expected on all tropical tunas.

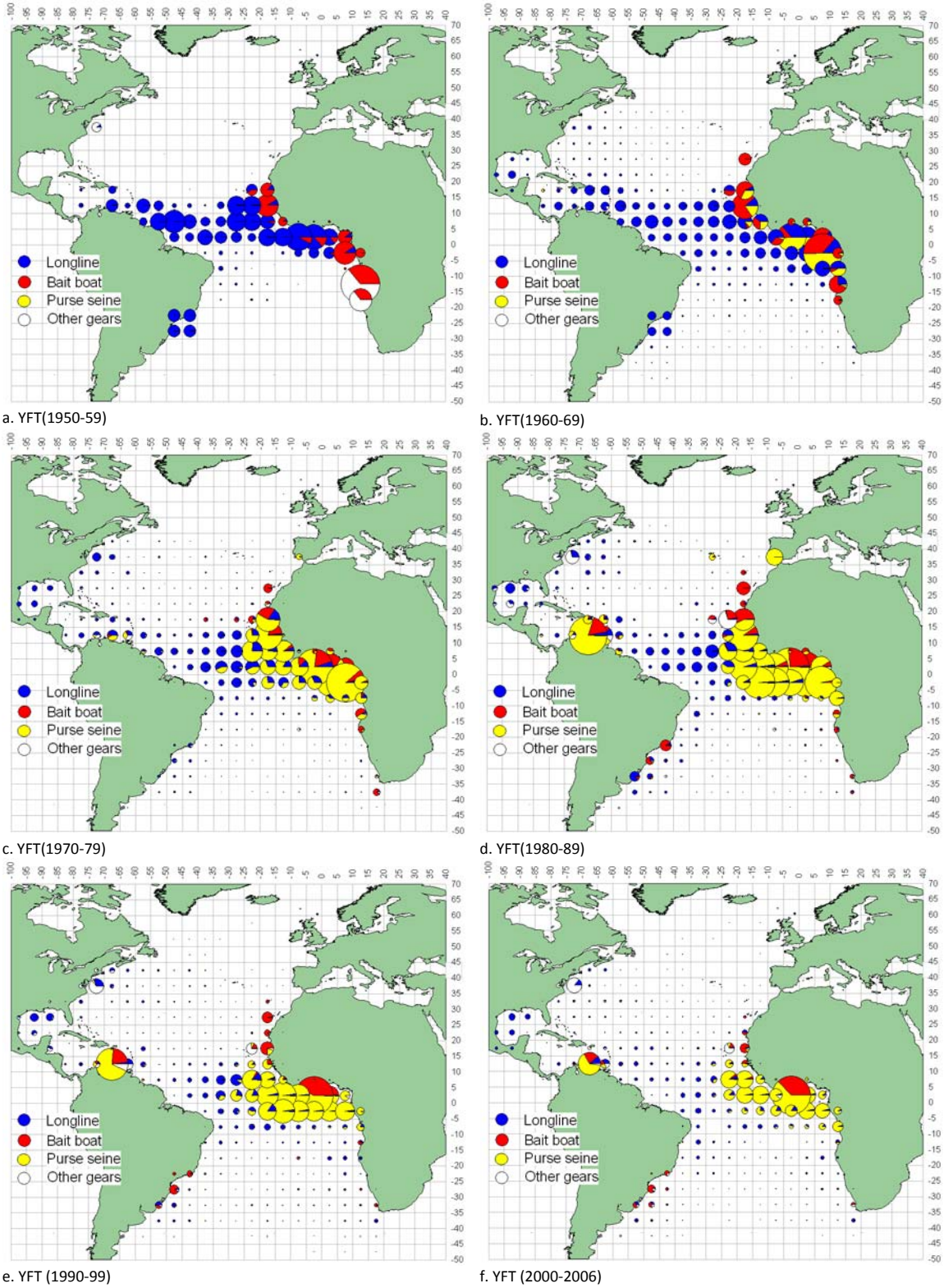
NOTE: $F_{current}$ refers to F_{2006} in the case of ASPIC, and the geometric mean of F across 2003-2006 in the case of VPA. As a result of the constant trend in recruitment estimated by the VPA model, F_{MAX} is used as a proxy for F_{MSY} for VPA results.

1 Estimates (with 80% confidence limits) based upon results of the age-structured model (VPA).
2 Estimates (with 80% confidence limits) based upon results of the non-equilibrium production model (ASPIC).
3 The assessment was conducted using the available catch data through 2006. Reports for 2007 should be considered provisional and in this case includes carryovers from previous years. The preliminary value for 2007 is 96,580 t.
4 Median (25th-75th percentiles) from joint distribution of age-structured and production model bootstrap outcomes considered.
5 Result exclusively from VPA and yield-per-recruit analyses.

YFT-Table 1. Estimated catches (t) of yellowfin tuna *(Thunnus albacares)* by major area, gear and flag.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL			165857	114050	156619	146673	145361	136265	162247	193448	166901	163760	162753	172551	153246	153040	137211	148564	140366	136235	164650	140279	125515	119936	107256	108160	96580
ATE			125540	76217	113803	108839	113379	101671	125345	160717	130004	126048	124009	124336	117973	119984	104871	117644	109656	101725	124363	110619	100595	88794	81295	79801	73932
ATW			40318	37833	42815	37834	31982	34594	36902	32731	36897	37712	38745	48215	35274	33056	32341	30919	30710	34510	40287	29660	24920	31143	25961	28359	22648
Landings	ATE	Bait boat	11507	14694	16120	15301	16750	16020	12168	19560	17772	15095	18471	15652	13496	13804	12907	17330	19256	13267	19071	13432	11513	15354	12012	10434	7879
		Longline	6143	8146	9520	5779	6624	8956	7566	10253	9082	6516	8537	14605	13718	14233	10488	13869	13561	11364	7570	5790	9075	11501	7446	7433	13183
		Other surf.	3904	2407	1516	2296	2932	2646	2586	2175	3748	2450	2122	2030	1989	2065	2136	1674	1580	2424	2074	1826	2540	2928	3062	3615	2726
		Purse seine	103986	50970	86648	85464	87074	74049	103025	128729	99402	101987	94880	92050	88770	89882	79339	84771	75260	74670	95648	89572	77468	59011	58776	58319	50144
	ATW	Bait boat	3603	3698	5478	2421	5468	5822	4834	4718	5359	6276	6383	7094	5297	4560	4275	5511	5349	5649	5315	6009	3764	4868	3867	2695	2304
		Longline	7620	8855	10193	18490	14291	19046	17128	18851	13667	16594	11439	11343	10059	11111	11554	11671	13326	15760	14872	11921	10136	15953	14392	14337	12031
		Other surf.	3345	2077	6150	7101	5557	3692	3293	2362	3457	3483	4842	10166	13580	6601	4801	4581	5345	5231	7027	3763	6413	7104	5069	6880	5965
		Purse seine	25749	23203	20994	9822	6665	6034	11647	6800	14414	11359	16081	19612	6338	10784	11710	9157	6523	7870	13072	7966	4607	3217	2634	4442	2341
Discards	ATW	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	5	6
Landings	ATE	Angola	788	237	350	59	51	246	67	292	510	441	211	137	216	78	70	115	170	35	34	34	34	34	111	0	405
		Benin	49	65	60	19	3	2	7	1	1	1	1	1	1	1	3	1	1	1	1	0	0	0	0	0	
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	
		Cape Verde	4341	2820	1901	3326	2675	2468	2870	2136	1932	1426	1536	1727	1781	1448	1721	1418	1663	1851	1684	1802	1855	3236	7154	8112	4057
		China P.R.	0	0	0	0	0	0	0	0	0	0	139	156	200	124	84	71	1535	1652	586	262	1033	1030	1112	1017	1000
		Chinese Taipei	452	87	146	254	193	207	96	2244	2163	1554	1301	3851	2681	3985	2993	3643	3389	4014	2787	3363	4946	4145	2327	830	1791
		Congo	0	0	11	20	15	15	21	22	17	18	17	14	13	12	0	0	0	0	0	0	0	0	0	0	
		Cuba	1916	1467	1585	1332	1295	1694	703	798	658	653	541	238	212	257	269	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	673	213	99	302	565	175	482	216
		EC.España	51946	40049	66874	61878	66093	50167	61649	68603	53464	49902	40403	40612	38278	34879	24550	31337	19947	24681	31105	31469	24884	21414	11795	11606	13584
		EC.Estonia	0	0	0	0	0	0	0	0	234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.France	40470	7946	12304	17756	17491	21323	30807	45684	34840	33964	36064	35468	29567	33819	29966	30739	31246	29789	32211	32753	32429	23949	22672	18940	12514
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	
		EC.Latvia	0	0	0	0	0	0	0	0	255	54	16	0	55	151	223	97	25	36	72	334	334	334	334	334	
		EC.Lithuania	0	0	0	0	0	0	0	0	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	1333	1527	36	295	278	188	182	179	328	195	128	126	231	288	176	267	177	194	4	6	4	5	16	274	865
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
		Gabon	0	0	0	0	0	0	0	0	0	0	12	88	218	225	225	295	225	162	270	245	44	44	44	44	
		Gambia	0	0	0	0	0	0	0	2	16	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Georgia	0	0	0	0	0	0	0	0	25	22	10	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	7689	9039	12550	11821	10830	8555	7035	11988	9254	9331	13283	9984	9268	11720	15437	17657	25268	17662	33546	23674	18457	15054	17493	11931	12954
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2906	6560	3461
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		Japan	3062	4344	5765	3634	4521	5808	5882	5887	4467	2961	2627	4194	4770	4246	2733	4092	2101	2286	1550	1534	1999	5066	3088	4416	9031
		Korea Rep.	1629	1917	1668	965	1221	1248	1480	324	259	174	169	436	453	297	101	23	94	142	3	8	209	984	95	4	
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	73	73	73	73	73	
		Maroc	2331	614	2270	2266	1529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	108	95	183	95	102
		Mixed flags (FR+ES)	484	110	72	138	933	932	825	1056	2220	2455	2750	1898	1172	1166	981	1124	1369	1892	1427	599	992	1052	933	1063	655
		NEI (ETRO)	5388	1104	0	0	2077	3140	5436	12513	4856	10921	9875	8544	8970	9567	6706	7225	5418	5448	10205	8209	5396	4294	1781	219	
		NEI (Flag related)	103	54	76	150	285	206	280	1115	2310	1315	1157	2524	2975	3588	3368	5464	5679	3072	2090	133	466	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	0	0	2	14	72	69	3	147	59	165	89	139	85	135	59	26
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	3183	6082	6110	3962	5441	4793	4035	6185	4161	0	1939	1429
		Norway	0	0	0	813	418	493	1787	1790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	1568	1653	3100	1944	1858	1239	901	1498	7976	8338	10973	12066	13442	7713	4293	2111	1315	1103	574	1022	0	1887	6170	8557	9363
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	126	173	86	0	50	9	68	69	30	
		Russian Federation	0	0	0	0	0	0	0	0	3200	1862	2160	1503	2936	2696	4275	4931	4359	737	0	0	0	0	4	42	211
		S. Tomé e Príncipe	194	177	180	180	178	298	299	164	187	170	181	125	135	120	109	124	114	122	122	122	122	134	145	137	
		Senegal	0	0	0	0	0	0	2	90	132	40	19	6	20	41	208	251	834	252	295	447	279	681	1301	1262	819
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	
		Seychelles (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	
		South Africa	456	759	382	55	68	137	671	624	52	69	266	486	183	157	116	240	320	191	342	152	298	402	1156	1187	1063
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	101	209
		U.S.S.R.	1282	2168	3768	1851	1275	3207	4246	3615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	59	80	72	82	93	98	100	92	100	166	171	150	181	151	109	181	116	136	72	9	0	0	0	344	177

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Ukraine	0	0	0	0	0	0	0	0	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	145	
		Venezuela	0	0	634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	0	0	44	23	18	66	33	23	34	1	0	0	0	0	0	0	0	0	0	0	0	327	327	0	
		Barbados	51	90	57	39	57	236	62	89	108	179	161	156	255	160	149	150	155	155	142	115	116	116	116	197	154
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	143	1164
		Brasil	2844	2149	2947	1837	2266	2512	2533	1758	1838	4228	5131	4169	4021	2767	2705	2514	4127	6145	6239	6172	3503	6985	7223	3790	5468
		Canada	0	0	0	2	40	30	7	7	29	25	71	52	174	155	100	57	22	105	125	70	73	304	240	293	276
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	628	655	22	470	435	17	275	74	68	124
		Chinese Taipei	87	559	780	1156	709	1641	762	5221	2009	2974	2895	2809	2017	2668	1473	1685	1022	1647	2018	1296	1540	1679	1269	430	156
		Colombia	29	0	180	211	258	206	136	237	92	95	2404	3418	7172	238	46	46	46	46	46	46	46	46	46	46	
		Cuba	793	2538	1906	2081	1062	98	91	53	18	11	1	14	54	40	40	15	15	0	0	65	65	65	65	65	
		Dominica	0	0	0	0	0	0	0	18	12	23	30	31	9	0	0	0	80	78	120	169	119	81	119	65	103
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	220	226	226	226	226	226	226	226	
		EC.España	1957	3976	1000	0	0	1	3	2	1462	1314	989	7	4	36	34	46	30	171	0	0	0	0	0	1	84
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	60	88
		Grenada	169	146	170	506	186	215	235	530	620	595	858	385	410	523	302	484	430	403	759	593	749	460	492	502	633
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	21	21	0	0	0	0	0	0	0	0	0	
		Japan	1218	1030	2169	2103	1647	2395	3178	1734	1698	1591	469	589	457	1004	806	1081	1304	1775	1141	571	755	1194	1159	455	309
		Korea Rep.	1920	989	1655	853	236	120	1055	484	1	45	11	0	0	84	156	0	0	0	0	0	0	0	580	279	
		Mexico	612	1059	562	658	33	283	345	112	433	742	855	1093	1126	771	826	788	1283	1390	1084	1133	1313	1208	1050	938	890
		NEI (Flag related)	651	352	450	806	1012	2118	2500	2985	2008	2521	1514	1880	1227	2374	2732	2875	1730	2197	793	42	112	0	0	0	
		Netherlands Antilles	173	173	150	150	160	170	170	170	150	160	170	155	140	130	130	130	130	130	0	0	0	0	0	0	
		Panama	62	246	0	5278	3289	2192	1595	2651	2249	2297	0	0	0	0	0	0	5	0	0	0	0	0	0	2804	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	106	78	12	79	145	299	299	234	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	1	40	48	22	65	16	43	37	35	48	38	1989	1365	1160	568	4251	0	2680	2989
		Sta. Lucia	23	56	79	125	76	97	70	58	49	58	92	130	144	110	110	276	123	134	145	94	139	147	172	103	82
		Trinidad and Tobago	232	31	0	0	0	1	11	304	543	4	4	120	79	183	223	213	163	112	122	125	186	224	295	459	615
		U.S.A.	2553	2180	9735	9938	9661	11064	8462	5666	6914	6938	6283	8298	8131	7745	7674	5621	7567	7051	6703	5710	7695	6516	5568	7091	5529
		UK.Bermuda	10	11	42	44	25	23	22	15	17	42	58	44	44	67	55	53	59	31	37	48	47	82	61	31	30
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		UK.Turks and Caicos	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
		Uruguay	357	368	354	270	109	177	64	18	62	74	20	59	53	171	53	88	45	45	90	91	95	204	644	218	35
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	681	689	661	
		Venezuela	26576	21879	20535	11755	11137	10949	15567	10556	16503	13773	16663	24789	9714	13772	14671	13995	11187	10549	18651	11421	7411	5774	5097	6514	3911
Discards	ATW	Mexico	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
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	0	



a. YFT(1950-59)

b. YFT(1960-69)

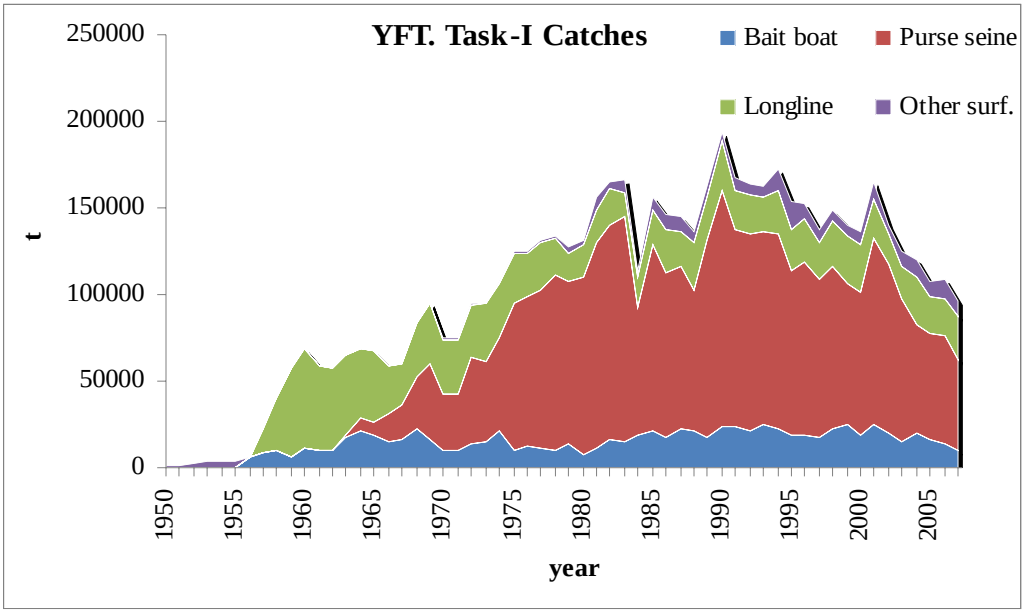
c. YFT(1970-79)

d. YFT(1980-89)

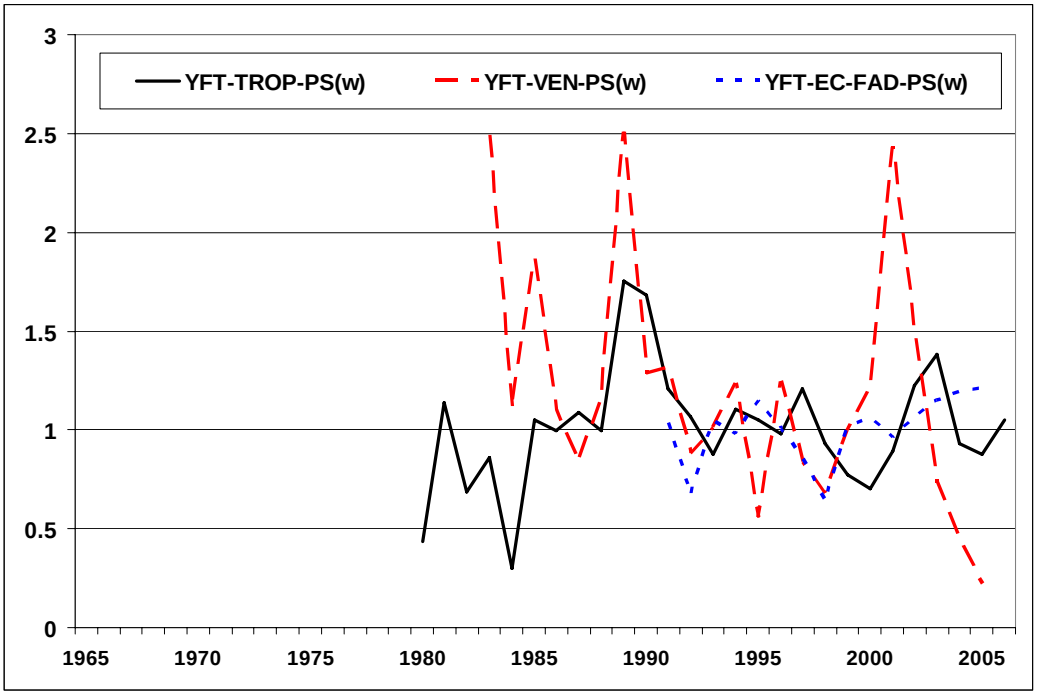
e. YFT (1990-99)

f. YFT (2000-2006)

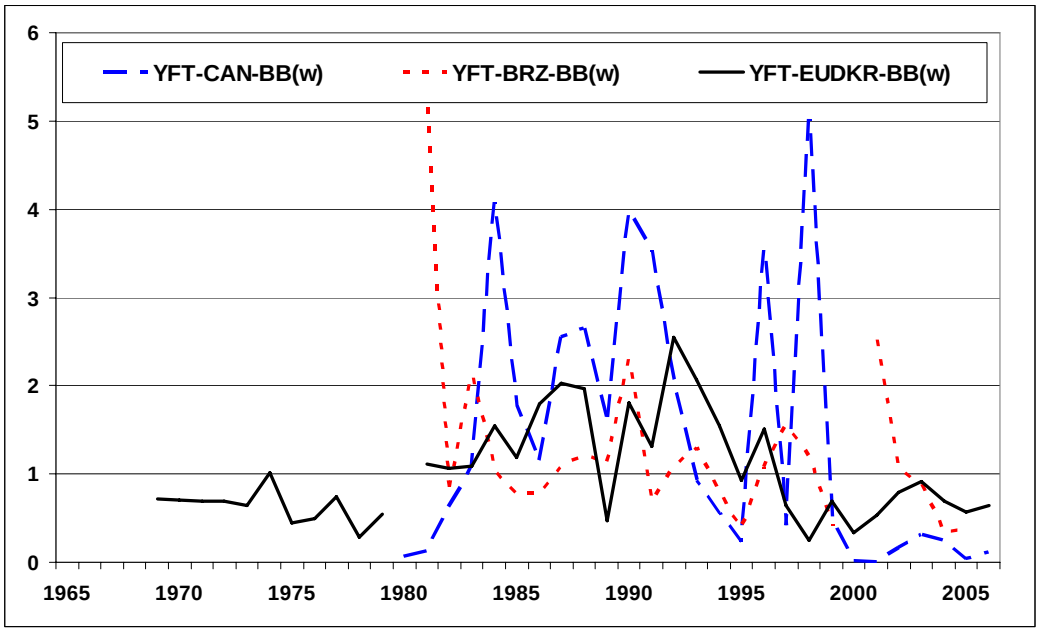
YFT-Figure 1 [a-f]. Geographical distribution of yellowfin catch by major gears and decade.



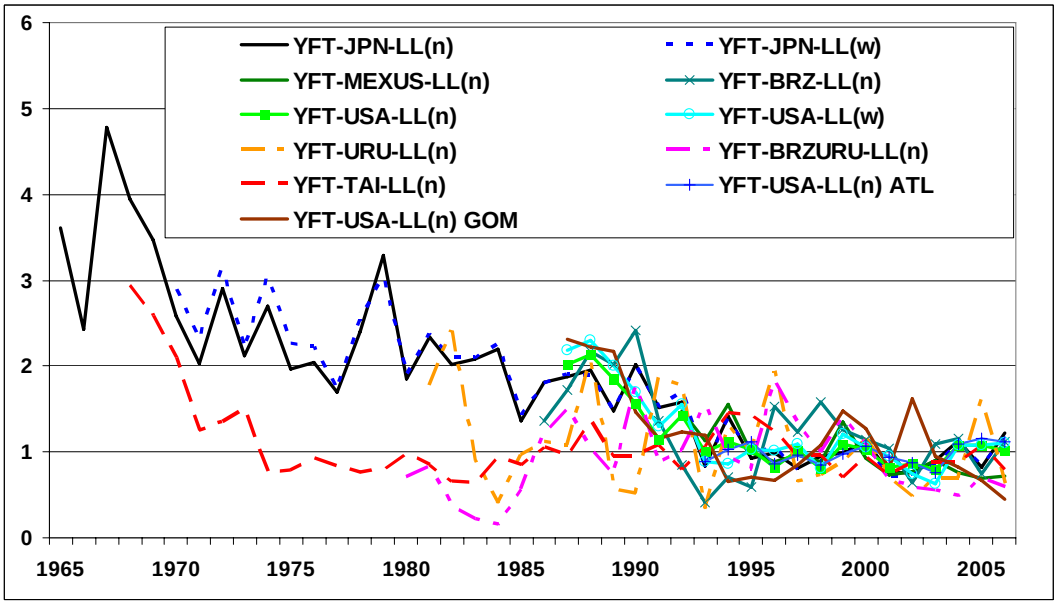
YFT-Figure 2. Estimated annual catch (t) of Atlantic yellowfin tuna by fishing gear, 1950-2007.



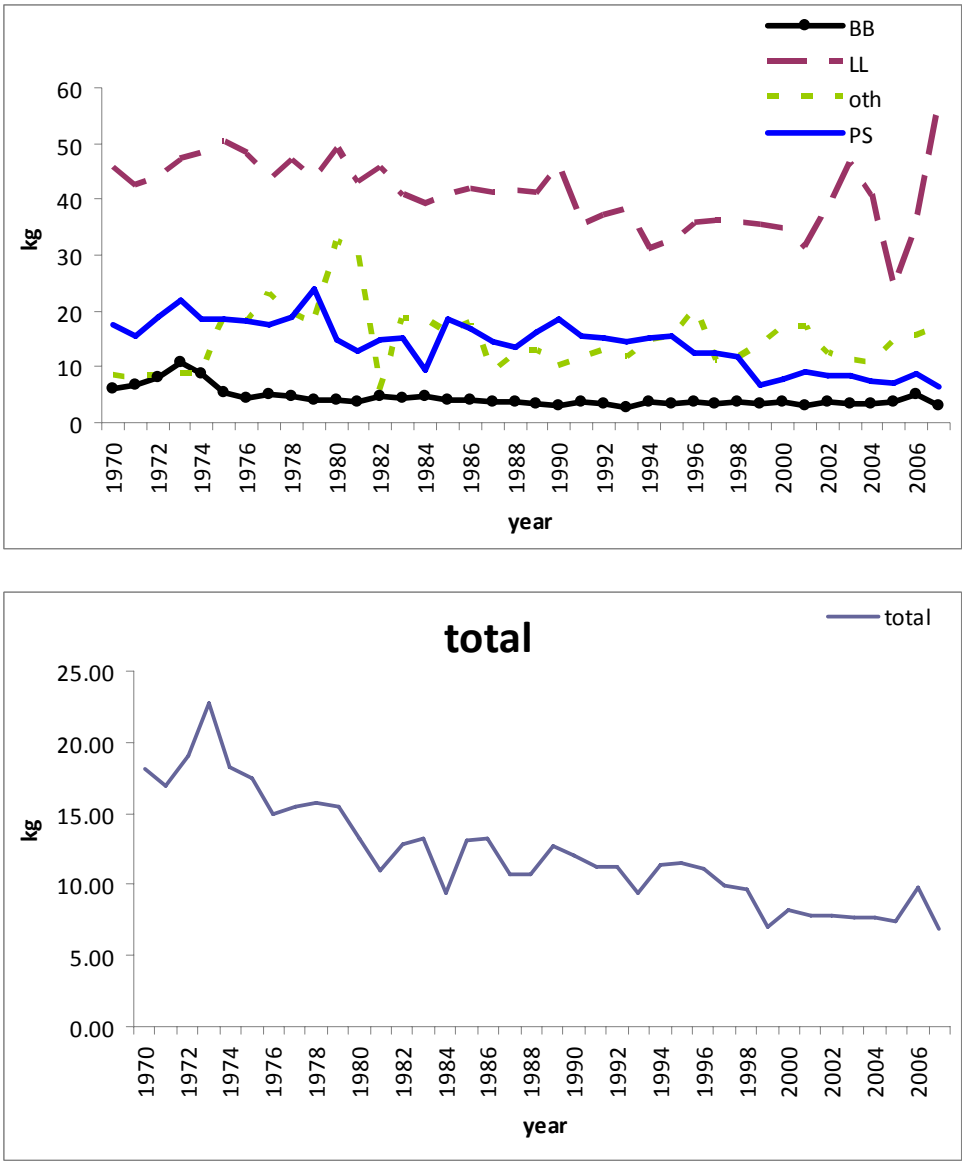
YFT-Figure 3. Yellowfin nominal catch rate trends from purse seine fleets, in weight. The Venezuelan trend (YFT-VEN-PS) reflects catches from the western Atlantic; the remaining two series YFT-TROP-PS (EU tropical) and YFT-EC-FAD-PS (EU tropical FAD sets) reflect catches in the eastern Atlantic.



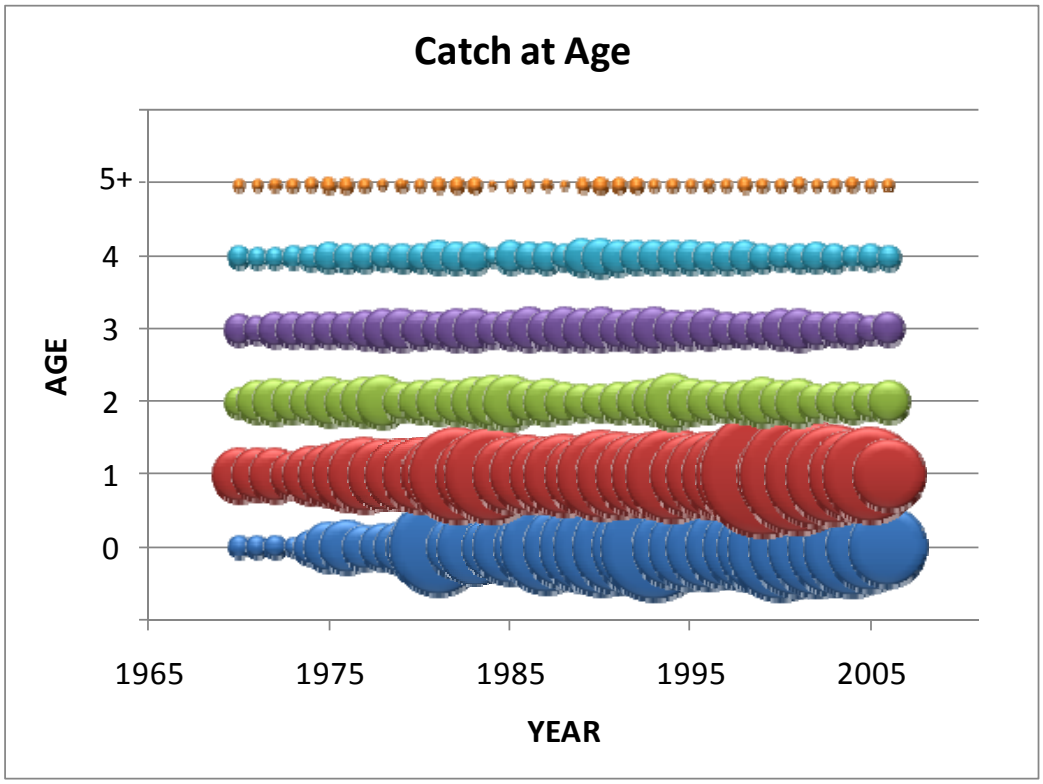
YFT-Figure 4. Yellowfin standardized catch rate trends from baitboat fleets, in weight. The Brazilian trend (YFT-BRZ-BB) reflects catches from the western Atlantic; the remaining two series YFT-CAN-BB (Canary Islands) and YFT-EUDKR-BB (EU Dakar based) reflect catches in the eastern Atlantic.



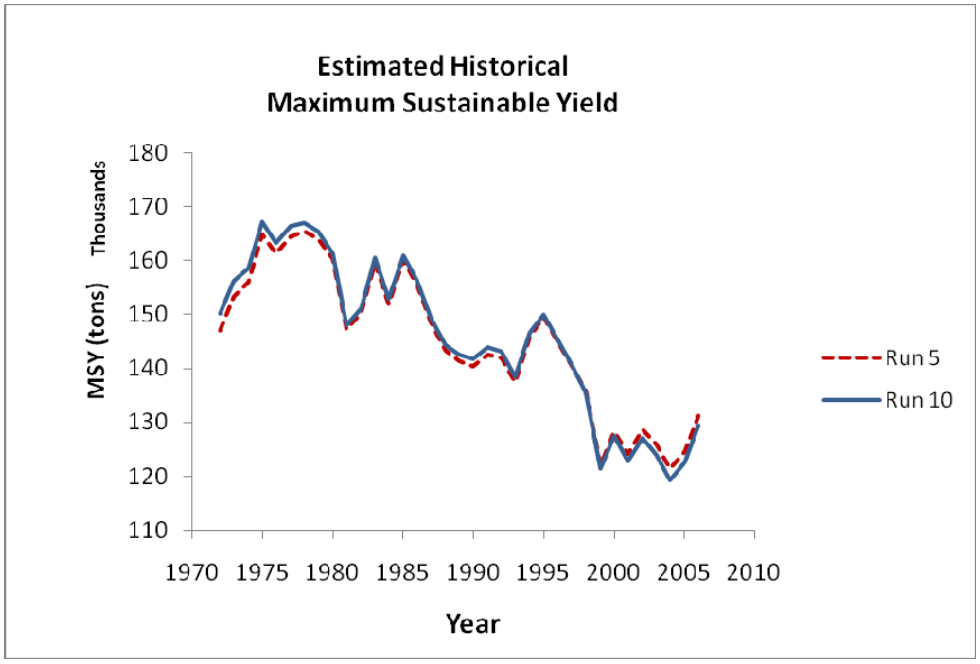
YFT-Figure 5. Yellowfin standardized catch rate trends from longline fleets, in weight and numbers. The Japanese (YFT-JPN-LL) and Chinese Taipei (YFT-TAI-LL) trends reflect catches from throughout the Atlantic; the remaining series reflect catches in the western Atlantic. Series are identified using abbreviations for the flags; indices developed jointly include a Mexico-USA series (MEXUS) and a Brazil-Uruguay series (BRZURU).



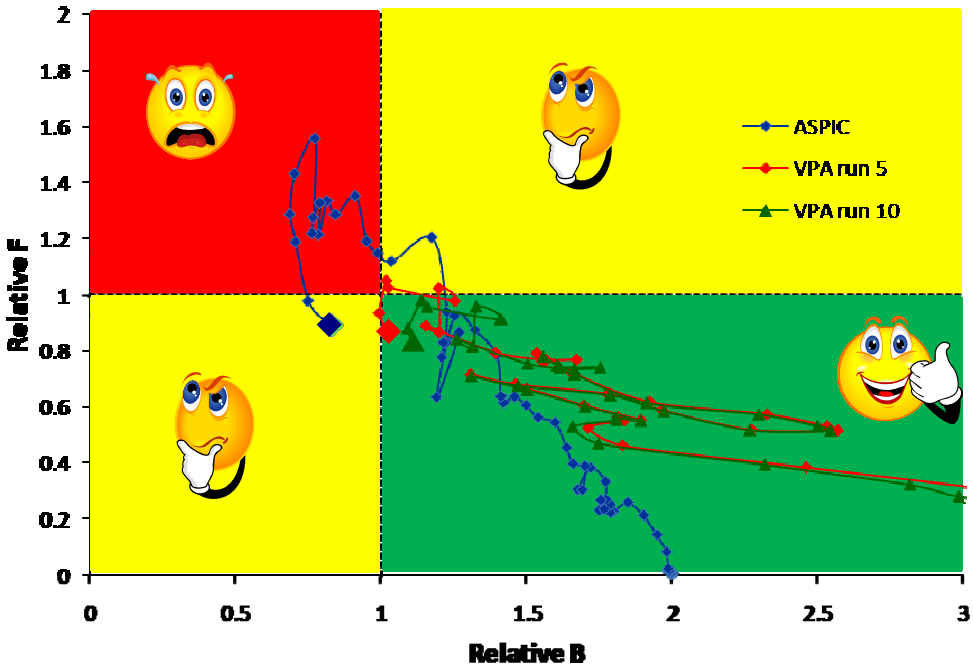
YFT-Figure 6. Trend in yellowfin tuna average weight by gear group (top) and total (bottom) calculated from available catch-at-size data. Purse seine averages are calculated across all set types (floating object and free school).



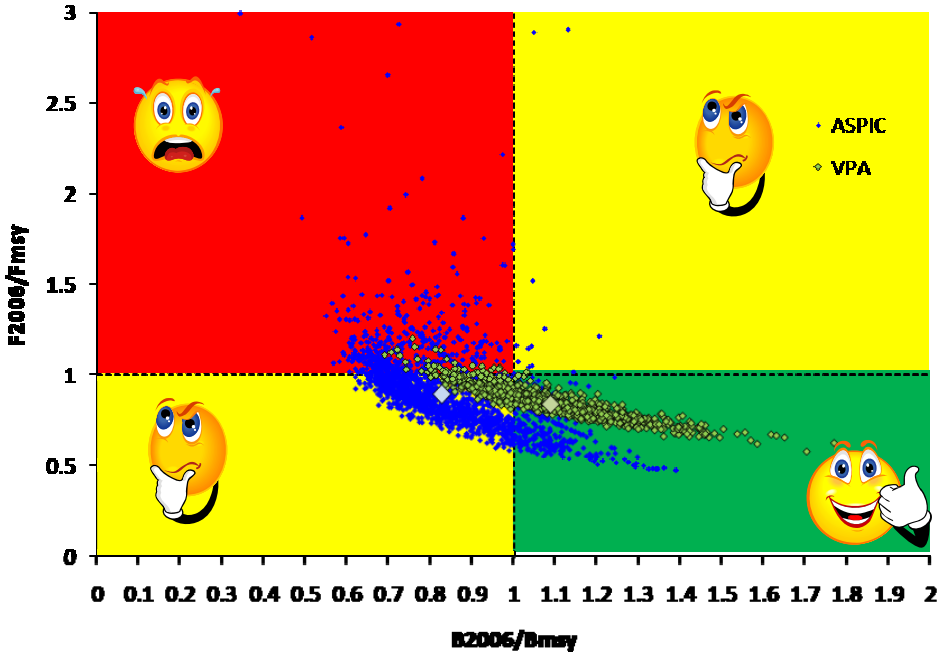
YFT-Figure 7. Relative distribution of Atlantic yellowfin catches by age (0-5+) and year (bubble size is proportional to total catches), in number.



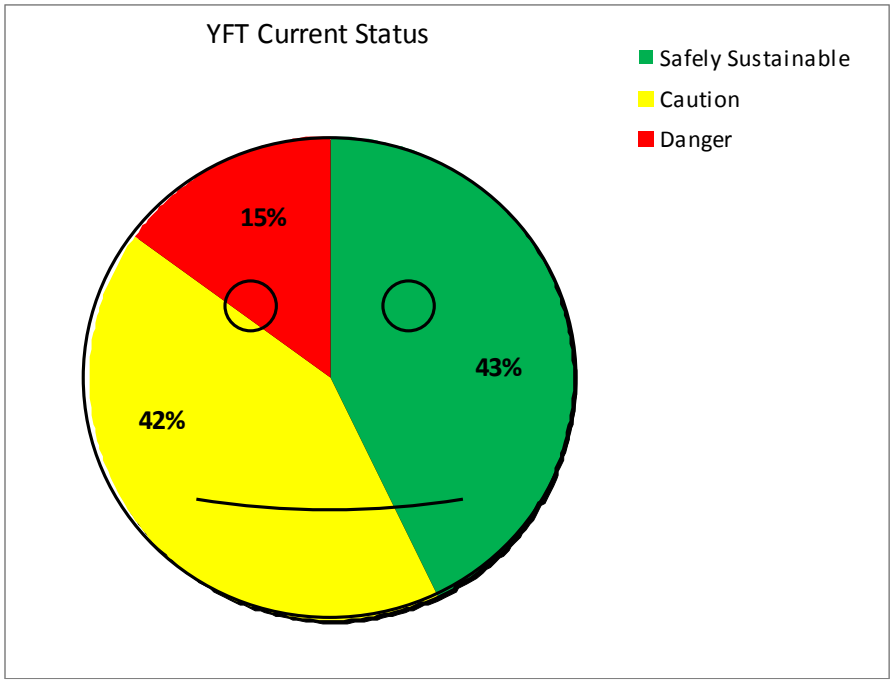
YFT-Figure 8. Estimates of historical MSY values for Atlantic yellowfin obtained through the age-structured model analysis, which considers the changes in selectivity that have occurred.



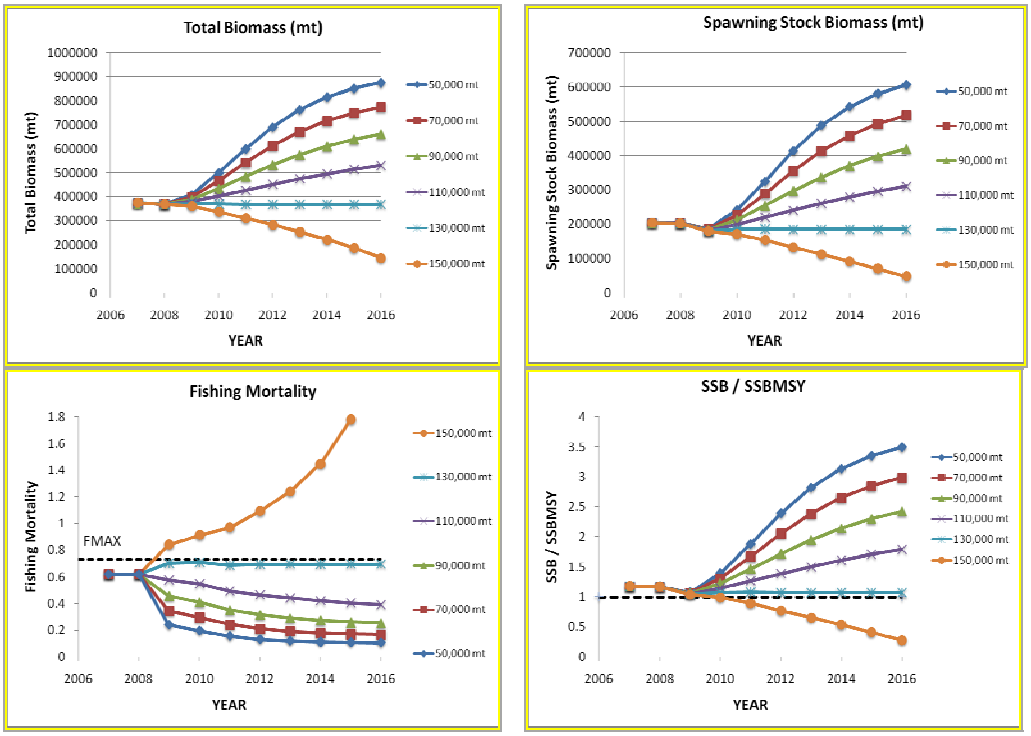
YFT-Figure 9. Stock status trajectories of B/BMSY and F/FMSY from age structured (VPA runs 5 and 10) and production model (ASPIC) analyses. The age structured analysis started in 1970 and the production model in 1950. Current status is indicated by the large point at the end of each time-series.



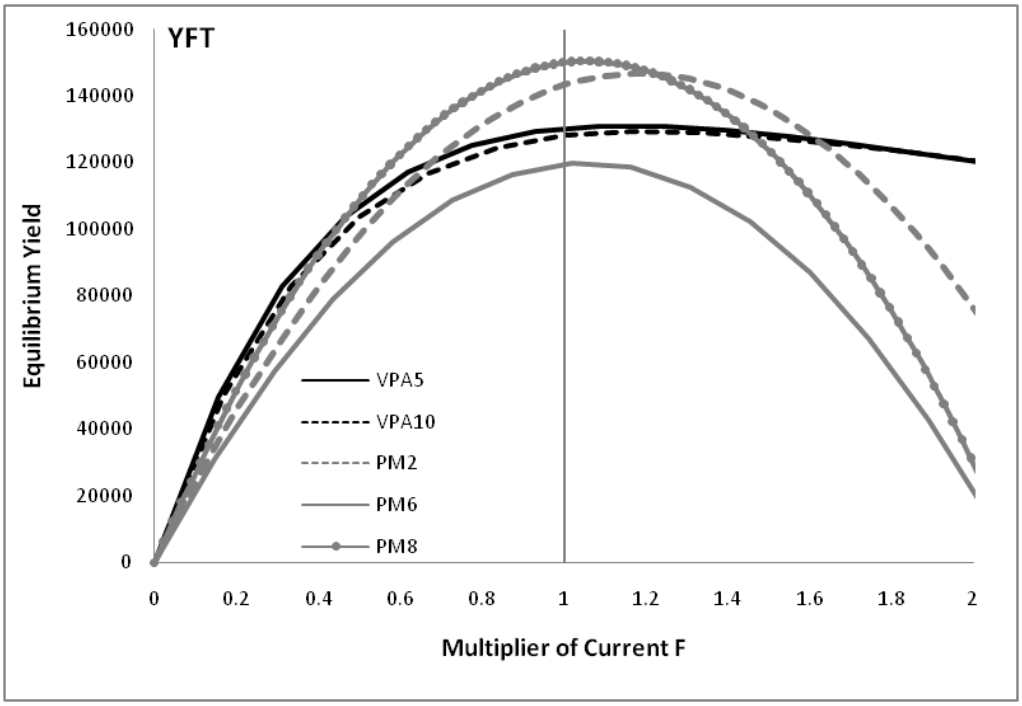
YFT-Figure 10. Current status of yellowfin tuna based on age structured and production models. The median point estimate for each model is shown as a large diamond and the clouds of symbols depict the bootstrap estimates of uncertainty for the most recent year.



YFT-Figure 11. Summary of current status estimates for the yellowfin tuna stock based on age structured and production models making use of the catch and effort data through 2006.



YFT-Figure 12. Constant catch projection results using the results of age-structured (VPA) analyses.



YFT-Figure 13. Relationship between equilibrium yield (t) and fishing mortality estimated from various models (VPA refer to age-structured models and PM refers to surplus production models). The X-axis has been scaled for each model such that a value of 1.0 represents that model's estimate of current (2006) fishing mortality.

8.2 BET- BIGEYE TUNA

The last stock assessment was conducted for bigeye tuna in 2007. Due to the early date of the assessment meeting, the last year covered of catch data was 2005 (71,000 t at the time of the assessment). Information including biology, fisheries, tagging, genetic studies and stock modeling can be found in the ICCAT special editions of the Bigeye Tuna Year Program (Anon. 2005), the Second World Meeting on Bigeye Tuna (Anon. 2005a) and Chapter 2 of the *ICCAT Manual*.

BET-1. Biology

Bigeye tuna are distributed throughout the Atlantic Ocean between 50ºN and 45ºS, but not in the Mediterranean Sea. This species swims at deeper depths than other tropical tuna species and exhibits extensive vertical movements. Similar to the results obtained in other oceans, pop-up tagging and sonic tracking studies conducted on adult fish in the Atlantic has revealed that they exhibit clear diurnal patterns: they are found much deeper during the daytime than at night. Spawning takes place in tropical waters when the environment is favorable. From nursery areas in tropical waters, juvenile fish tend to diffuse into temperate waters as they grow larger. Catch information from surface gears indicate that the Gulf of Guinea is a major nursery ground for this species. Dietary habits of bigeye are varied and prey organisms like fish, mollusks, and crustaceans are found in stomach contents. Bigeye exhibit relatively fast growth: about 105 cm fork length at age 3,140cm at age of 5 and 163cm at age 7. Bigeye tuna over 200cm are relatively rare, but do occur with some frequency. Bigeye tuna become mature at about 3 and a half years old. Young fish form schools mostly mixed with other tunas such as yellowfin and skipjack. These schools are often associated with drifting objects, whale sharks and sea mounts. This association appears to weaken as bigeye grow larger. Estimated natural mortality rates (M) for juvenile fish, that were obtained from tagging data, were of a similar range as those applied in other oceans. Various pieces of evidence, such as a lack of identified genetic heterogeneity, the time-area distribution of fish and movements of tagged fish, suggest 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.

In 2008, the tropical species group concentrated its effort on yellowfin and skipjack tuna. There were few documents that directly dealt with bigeye tuna.

A paper was presented that analyzed the trend of fishing effort and catches of bigeye, yellowfin and skipjack by European purse seine fleet during 1994 to 2007. The total nominal fishing effort and bigeye catch of this fleet has declined by nearly 40% and 60%, respectively. The percentage (in number of fish) of small bigeye (<53cm. FL) in the total bigeye purse seine catch declined in 1998 and 1999, and remained relatively stable thereafter. In 2007 that percentage was nearly 80%.

BET-2. Fisheries indicators

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)**. The size of fish caught varies among fisheries: medium to large for the longline fishery, small to large for the directed baitboat fishery, and small for other baitboat and for purse seine fisheries. Average weights are 45-50 kg, 20-30 kg and 3-4 kg for these three types of fisheries (**BET-Figure 2**), respectively. There is a declining trend in overall mean weight since 1990 and the most recent value was slightly less than 8 kg.

The total annual catch **(BET-Figure 3)** increased up to the mid-1970s reaching 60,000 t and fluctuated over the next 15 years. In 1991, catch surpassed 95,000 t and continued to increase, reaching a historic high of about 132,000 t in 1994. Reported and estimated catch has been declining since then and fell below 100,000 t in 2001, and reached 67,000 t in 2006, which is the lowest recorded level since 1988. The preliminary estimate for 2007 was 67,172 t.

After the historic high catch in 1994, all major fisheries exhibited a decline of catch while the relative share by each fishery in total catch remained relatively constant. These reductions in catch are related to declines in fishing fleet size (purse seine and longline) as well as decline in CPUE (longline and baitboat).

The major baitboat fisheries are located in Ghana, Senegal, the Canary Islands, Madeira and the Azores. The tropical purse seine fleets operate in the Gulf of Guinea and off Senegal in the East Atlantic and off Venezuela in

the West Atlantic. In the eastern Atlantic, these fleets are comprised of vessels flying flags of Ghana, EC-France, EC-Spain and others which are mostly managed by EC companies. In the western Atlantic the Venezuelan fleet dominates the purse-seine catch of bigeye. While bigeye tuna is now a primary target species for most of the longline and some baitboat fisheries, this species has always been of secondary importance for the other surface fisheries. Unlike yellowfin, bigeye tuna are mostly caught while fishing on floating objects such as logs or man-made fish aggregating devices (FADs). There are two major longline fisheries, operated by Japan and Chinese Taipei, whose combined catch accounted for 43% of the total catch in weight in 2007. While Chinese Taipei's catch remained relatively stable since the mid-1990s (averaging about 18,000 t per year), Japan's catch declined after a high of 1994 catch of 38,500 t to the lowest amount (14,000 t) in 2005 since 1979. Catches recovered in 2006 and 2007. China and the Philippines joined this fishery in 1993 and 1998, respectively, and currently account for about 8,000-10,000 t per year in combination.

The activities of illegal, unreported and unregulated (IUU) longliners that fly flags of convenience appear to have started in the early 1980s, and became significant thereafter. IUU longline catches were estimated from Japanese import statistics but the estimates are considered uncertain. These estimates indicate a peak in unreported catches of 25,000 t in 1998 and a quick reduction thereafter **(BET-Figure 4)**. This quick reduction reflects increased reporting by the countries/entities who engaged in this activity as well as the efforts made by the longline countries that have cooperated in reducing the number of IUU boats. Nevertheless, the Committee expressed concern that unreported catches from the Atlantic might have been poorly estimated and maybe continuing, but available statistical data collection mechanisms are insufficient to fully investigate this possibility.

BET-3. State of the stock

The 2007 stock assessment was conducted using various types of models. In general, data availability has improved but there is still a lack of information regarding detailed fishing and size data from certain fleets, in addition to the past catch and fishing activities of IUU fleets (e.g., size, location and total catch), leading to the need to assume catch-at-size for an important part of the overall catch. Species composition of Ghanaian fisheries catch was reconstructed for 1997 based on improved sampling and catch-at-size estimated in recent years as part of the data improvement projects of ICCAT (Anon. 2005b).

Two new indices of relative abundance and updated indices of those previously used were made available to the Committee for use in the assessment. In total, six indices **(BET-Figure 5)** were provided, of which four were from longline fisheries from Japan, Chinese Taipei, United States, and Brazil. The other two were from a purse seine fishery operated by EC and another from baitboat fishery located in Azores. While the Japanese indices have the longest duration and represent roughly 20-40% of the total catch, the other indices are shorter and generally account for smaller fractions of the catch than the Japanese fishery, except for Chinese Taipei's longline index which is based on catch which is currently as high as the Japanese catch. These longline indices primarily relate to medium and large-size fish. The purse seine index was developed from FAD fishing operations, and this index represents the stock trend in recruitment. The Azorean baitboat index represents various size components.

Several types of assessment models, including production models, VPA, and a statistical integrated model (Multifan-CL) were applied to the available data. There was a range of stock status evaluations from the various model formulations applied, not all of which were judged to be equally likely.

Consistent with previous assessments of Atlantic bigeye, the results from non-equilibrium production models are used to provide our best characterization of the status of the resource. The current MSY estimated using two types of production models was around 90,000 t and 93,000 t, although uncertainty in the estimates broadens the range. In addition, these estimates reflect the current relative mixture of fisheries that capture small or large bigeye; MSY can change considerably with changes in the relative fishing effort exerted by surface and longline fisheries.

The estimated stock trajectory is shown in **BET-Figure 6**. The biomass at the beginning of 2006 was estimated to be nearly 92% of the biomass at MSY and the 2005 fishing mortality rate was estimated to be about 13% below the fishing mortality rate at MSY. The replacement yield for the year 2006 was estimated to be slightly below MSY. The uncertainty in our estimates of current stock status is characterized by the range in **BET-Figure 7**.

While the Committee feels this characterization best represents the current status of bigeye in the Atlantic, there are other model formulations which would admit both more optimistic and more pessimistic stock status evaluations.

BET-4. Outlook

Stock projections were conducted, assuming a catch of 71,000 t in 2006 (this was the best preliminary estimate at the time of the assessment. The reported catch for 2007 is preliminary and incomplete and likely is about 71,000 t if unreported catches continued at about the level of 2006) and varying levels of the constant catch thereafter. It should be noted that the *Recommendation by ICCAT on a Multi/Year Conservation and Management Program for Bigeye Tuna* [Rec. 04-01] potentially allows for substantially more catch as compared to the assumed 2006 catch level or the estimated MSY. The projection results suggest that the biomass of the stock would possibly decline further with constant catches of 90,000 t or more. Some increase in biomass, leading to the rebuilding of the $B_{MSY,}$ is expected with catches which amount to less than 85,000 t **(BET-Figure 8)**.

In accordance with concerns expressed in the report of Panel 1 of the Commission stating that alternatives be examined, a limited evaluation was conducted on the relative impact of effective effort restrictions on individual fisheries in terms of yield per recruit and spawning biomass per recruit. This evaluation is given in Section 15.6 of this Report.

BET-5. Effects of current regulations

Recommendation by ICCAT on a multi-year conservation and management program for bigeye tuna [Rec. 04-01] sets a number of regulations for 2005-2008 including an overall TAC for major countries set at 90,000 t as well as a specific limit for the number of vessels for several countries. The overall estimated catch in 2007 (67,172 t) was well below the TAC (20,000 t).

Recommendation 04-01 also implemented a new, smaller closure for the surface fishing in the area 0º - 5ºN, 10ºW-20ºW during November in the Gulf of Guinea. The Committee examined the percentages of the small bigeye based on the catch-at-size information created at the time of 2007 assessment. Based on that information, the percentage of small bigeye is at about 70% in number of fish and there is a general increasing trend (**BET-Figure 9**). Considering that the new closed area is much smaller in time and area than the previous moratorium time/area, and is located in an area which historically has lower effort anyway, this regulation is likely to be less effective in reducing the overall catches of small bigeye by the surface fishery. This expectation is supported by an analysis of 1994-2007 purse seine catches which was presented to the Committee, confirming that the new closure has been less effective than previous moratoria in reducing the proportional catch of small bigeye. The Committee stresses that, if time/area closures are to be effective in reducing small fish harvests and growth overfishing, such a closure should be expanded in time and space and focused in locations with optimal potential benefit.

BET-6. Management recommendations

This assessment results indicated that the stock declined rapidly during the 1990s due to the large catches taken in that period, and recently it has stabilized at around or below the level that produces MSY in response to a large reduction in reported catches. Estimated fishing mortality exceeded FMSY for several years in the period of the mid-1990s and rapidly reduced since 1999 (**BET-Figures 6 and 7**). Projections indicate that catches reaching 85,000 t or less will permit the stock to rebuild in the future. The Commission should be aware that if major countries were to take the entire catch limit set under Recommendation 04-01 and other countries were to maintain recent catch levels, then the total catch could well exceed 100,000 t. The Committee recommends that the total catch does not exceed 85,000 t.

The assessment and subsequent management recommendations are conditional on the reported and estimated history of catch for bigeye in the Atlantic. The Committee reiterates its concern that unreported catches from the Atlantic might have been poorly estimated and continues this way, but available statistical data collection mechanisms are insufficient to fully investigate this possibility. Coordination amongst the tuna RFMOs should

be encouraged, among other objectives, examining the possibility of 'fish laundering' for bigeye and other species.

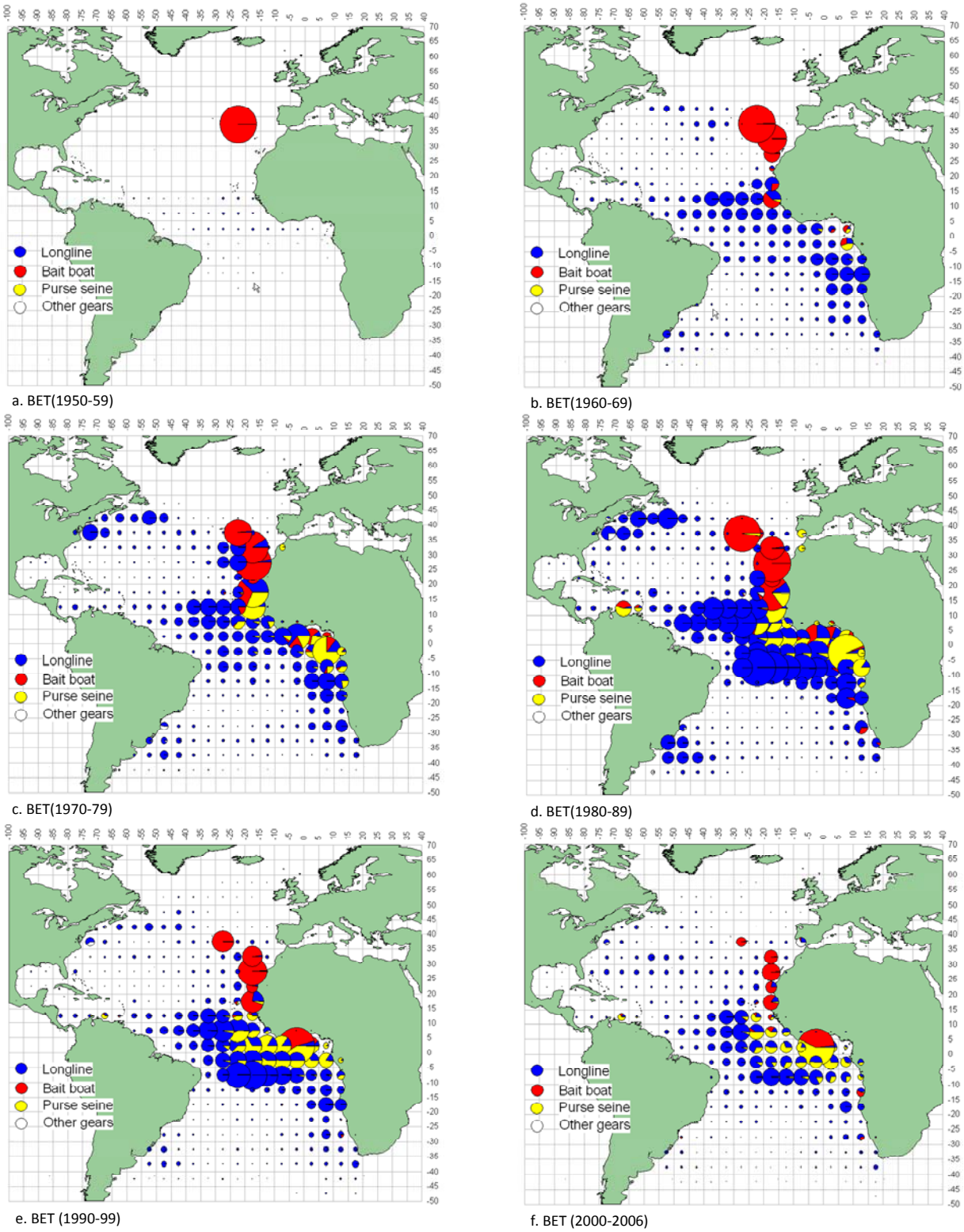
ATLANTIC BIGEYE TUNA SUMMARY	
Maximum Sustainable Yield	90,000 t-93,000 t [1] (68,000- 99,000) [2]
Current (2007) Yield[1]	67,172 t[3]
Replacement Yield (2006)	Slightly below MSY[1]
Relative Biomass (B_{2006}/B_{MSY})	0.92[1] (0.85-1.07)[2]
Relative Fishing Mortality	
F_{MSY}	0.20[1] (0.07-0.33) [2]
F_{2005}/F_{MSY}	0.87[1] (0.70-1.24) [2]
Conservation & management measures in effect:	[Rec. 04-01] replaced [Rec. 79-01 and Rec. 99-01] after June, 2005. − Total allowable catch for 2005 is set at 90,000 t for major country and entity. − Limits on numbers of fishing vessels less than the average of 1991 and 1992. − Specific limits of number of longline boats; China (45), Chinese Taipei (98), Philippines (8). − Specific limits of number of purse seine boats for Panama (3). − No purse seine and baitboat fishing during November in the area encompassed by 0º-5ºN and 10º W- 20ºW.

[1] Base Case production model (Logistic) results based on catch data 1950-2005.
[2] 80% confidence limits.
[3] Reports for 2007 should be considered provisional.

BET-Table 1. Estimated catches (t) of bigeye tuna *(Thunnus obesus)* by major area, gear and flag.

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL		59546	71092	78241	65447	56315	66140	78376	84727	96074	99330	112572	132918	126716	121559	109230	110423	128305	103651	94291	77177	91949	86921	72345	66575	67172
Landings	Bait boat	9796	11439	17651	15618	12631	9710	12672	18106	17750	16248	16467	20290	25552	18959	21037	21381	25868	12634	15842	8367	13437	18879	15092	14671	11549
	Longline	33757	43303	52595	39942	35570	47758	58389	56537	61556	62359	62871	78296	74816	74900	68251	71836	76527	71193	55265	46438	54464	48379	38125	34887	42037
	Other surf.	163	247	415	550	626	474	644	293	437	607	652	977	567	357	536	434	1377	1226	1628	1479	1318	1245	533	559	436
	Purse seine	15830	16103	7580	9336	7487	8198	6671	9791	16331	20116	32582	33355	25782	27343	19406	16771	24533	18599	21556	20894	22731	18417	18595	16457	13150
	Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	476	75	0	
	Argentina	0	0	100	41	72	50	17	78	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	17	18	18	6	11	11	0	0	18	14
	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	60
	Benin	0	0	0	15	6	7	8	10	10	7	8	9	9	9	30	13	11	0	0	0	0	0	0	0	
	Brasil	521	656	419	873	756	946	512	591	350	790	1256	601	1935	1707	1237	644	2024	2768	2659	2582	2455	1496	1081	1479	1593
	Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	
	Canada	0	0	0	11	144	95	31	10	26	67	124	111	148	144	166	120	263	327	241	279	182	143	187	196	144
	Cape Verde	293	167	112	86	60	117	100	52	151	105	85	209	66	16	10	1	1	2	0	1	1	1	1092	1437	1147
	China P.R.	0	0	0	0	0	0	0	0	0	0	70	428	476	520	427	1503	7347	6564	7210	5840	7890	6555	6200	7200	7399
	Chinese Taipei	1623	925	1220	1125	1488	1469	940	5755	13850	11546	13426	19680	18023	21850	19242	16314	16837	16795	16429	18483	21563	17717	11984	2965	12116
	Congo	0	0	8	19	10	10	14	15	12	12	14	9	9	8	0	0	0	0	0	0	0	0	0	0	
	Cuba	421	447	239	171	190	151	87	62	34	56	36	7	7	5	0	0	0	0	0	16	16	0	0	0	
	Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
	Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	
	EC.España	8794	13617	10340	10884	8875	8475	8263	10355	14705	14656	16782	22096	17849	15393	12513	7115	13739	11250	10134	10524	10969	8251	7618	7464	6608
	EC.France	8124	4254	4615	4266	3905	4161	3261	5023	5581	6888	12719	12263	8363	9171	5980	5624	5529	5949	4948	4293	3940	2926	2816	2984	2031
	EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	33	0	
	EC.Portugal	4075	4354	6457	7428	5036	2818	5295	6233	5718	5796	5616	3099	9662	5810	5437	6334	3314	1498	1605	2590	1655	3204	4053	5068	5505
	EC.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	3	
	FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	28	6	0	
	Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	8	0	0	0	0	0	0	
	Gabon	0	0	0	0	0	0	0	0	0	0	1	87	10	0	0	0	184	150	121	0	0	0	0	0	
	Ghana	491	2162	1887	1720	1178	1214	2158	5031	4090	2866	3577	4738	5517	5805	9829	13370	17764	5910	12042	7106	13557	14901	13917	9141	4633
	Grenada	0	0	0	0	0	0	0	0	65	25	20	10	10	0	1	0	0	0	0	0	0	0	0	0	10
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1003	923	836
	Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	
	Iceland	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
	Japan	15212	24870	32103	23081	18961	32064	39540	35231	30356	34722	35053	38503	35477	33171	26490	24330	21833	24605	18087	15306	19572	18509	14026	16440	18443
	Korea Rep.	9383	8989	10704	6084	4438	4919	7896	2690	802	866	377	386	423	1250	796	163	124	43	1	87	143	629	770	2067	
	Liberia	0	0	0	0	0	0	206	16	13	42	65	53	57	57	57	57	57	57	57	57	57	0	0	0	
	Libya	0	0	0	0	0	0	0	0	0	508	1085	500	400	400	400	400	400	400	31	593	593	0	0	4	
	Maroc	552	120	30	0	8	0	0	0	0	0	0	0	0	0	0	0	700	770	857	913	889	929	519	887	700
	Mexico	0	0	0	0	0	0	0	0	0	0	1	4	0	0	6	8	6	2	2	7	4	5	4	3	3
	Mixed flags (FR+ES)	176	40	26	50	339	339	300	384	807	893	1000	690	426	424	357	409	498	688	519	218	361	383	339	386	238
	NEI (ETRO)	1141	157	0	0	85	20	93	785	1221	2138	4594	5034	5137	5839	2746	1685	4011	2285	3027	2248	2504	1387	294	81	
	NEI (Flag related)	46	369	354	758	1406	2155	4650	5856	8982	6151	4378	8964	10697	11862	16569	24896	24060	15092	8470	531	0	0	0	0	
	NEI (UK.OT)	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	
	Namibia	0	0	0	0	0	0	0	0	0	0	0	7	29	7	46	16	423	589	640	274	215	177	307	283	41
	Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	1893	2890	2919	3428	2359	2803	1879	2758	3343	0	416	251
	Norway	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Panama	2732	3165	4461	5173	5616	3847	3157	5258	7446	9991	10138	13234	9927	4777	2098	1252	580	952	89	63	0	1521	2310	2415	2922
	Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1154	2113	975	377	837	855	1854	1855	1816	
	Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	13	38	4	8	91	0	0	0	0	1	1	26
	S. Tomé e Príncipe	0	0	0	0	0	5	8	6	3	4	4	3	6	4	5	6	5	4	4	4	4	11	6	4	
	Senegal	0	0	0	0	0	0	0	0	15	5	9	126	237	138	258	730	1473	1131	1308	565	474	561	721	1267	805
	Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	162	0	0	0	0	
	Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	
	South Africa	187	60	102	168	200	553	367	296	72	43	88	76	27	7	10	53	55	249	239	341	113	270	221	84	171
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	1	3	0	0	4	2	2	1	1216	506	15	103	18	0	114	567

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sta. Lucia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	2	0	2	0	
Togo	14	52	18	24	22	7	12	12	6	2	86	23	6	33	33	33	0	0	0	0	0	0	0	0	
Trinidad and Tobago	191	41	22	0	0	1	19	57	263	0	3	29	27	37	36	24	19	5	11	30	6	5	9	12	27
U.S.A.	315	539	639	1085	1074	1127	847	623	975	813	1090	1402	1209	882	1138	929	1263	574	1085	601	482	416	484	991	522
U.S.S.R.	352	1233	870	1071	1887	1077	424	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
UK.Sta Helena	14	19	0	0	5	1	1	3	3	10	6	6	10	10	12	17	6	8	5	5	0	0	0	25	18
Uruguay	605	714	597	177	204	120	55	38	20	56	48	37	80	124	69	59	28	25	51	67	59	40	62	83	22
Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	109	52	
Venezuela	4284	4142	2918	1136	349	332	115	161	476	270	809	457	457	189	274	222	140	226	708	629	516	1060	243	261	318



a. BET(1950-59)

b. BET(1960-69)

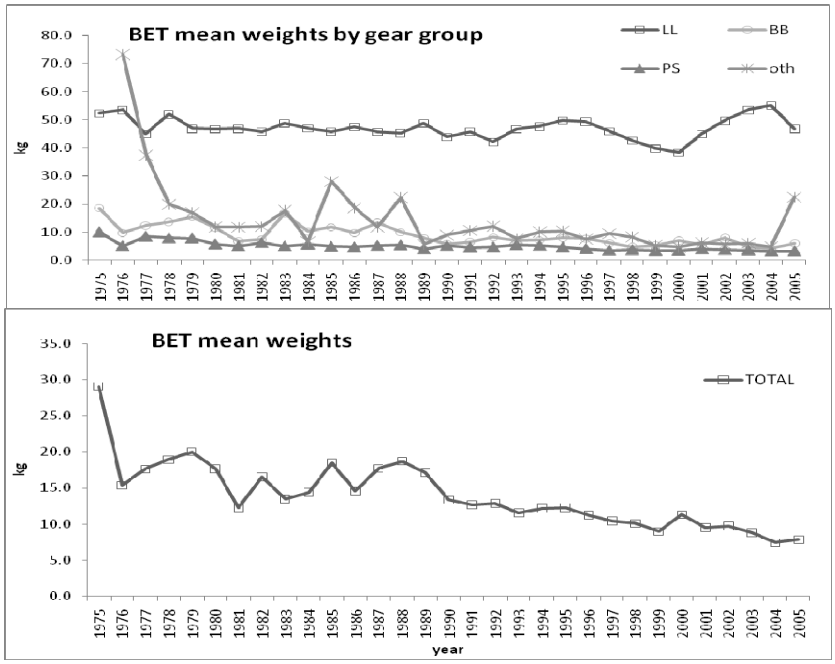
c. BET(1970-79)

d. BET(1980-89)

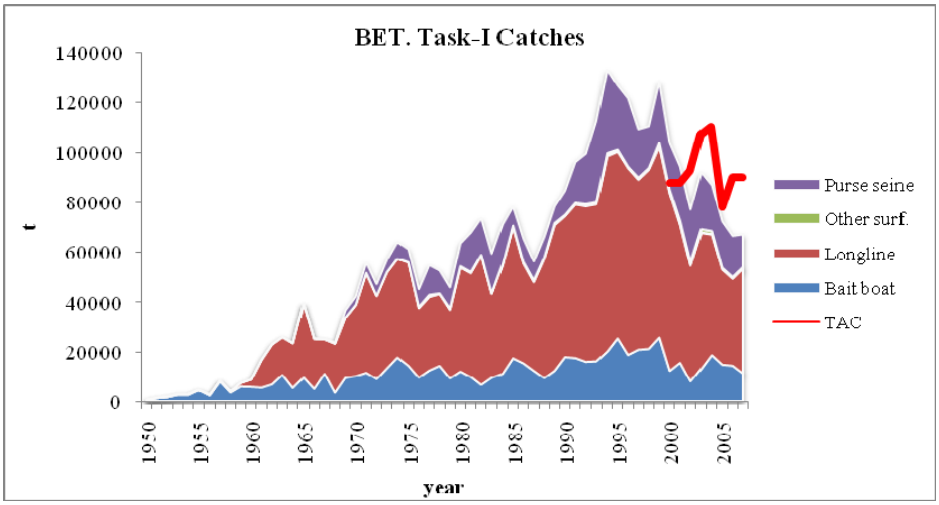
e. BET (1990-99)

f. BET (2000-2006)

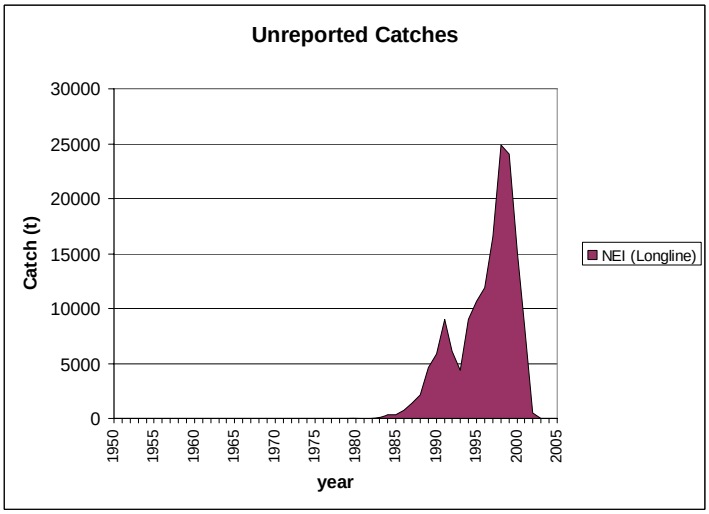
BET-Figure 1. Historical development of the area distribution of bigeye catches by fishing gear. The most recent period (2000-2006) is shown below on the right. Ghana's catches have been included in the same 5x5º square, as no detailed information on the spatial distribution of these catches is available.



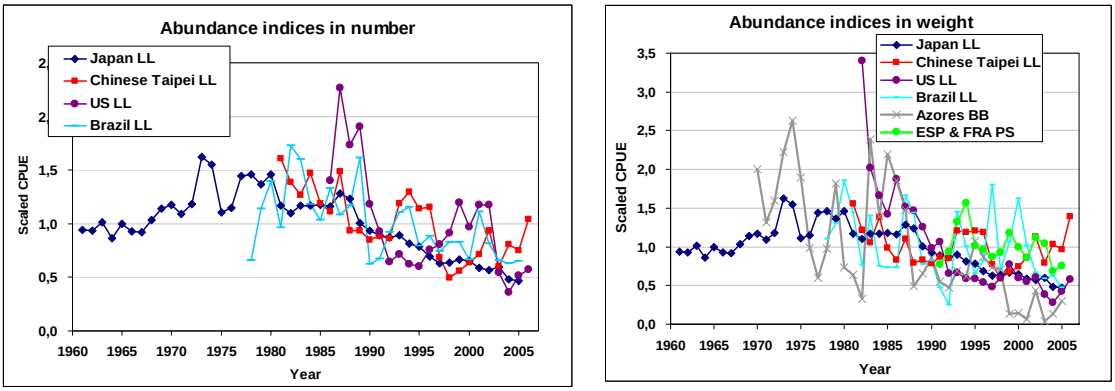
BET-Figure 2. Trend of mean weight for bigeye by major fisheries (1975-2005) based on the catch-at-size data.



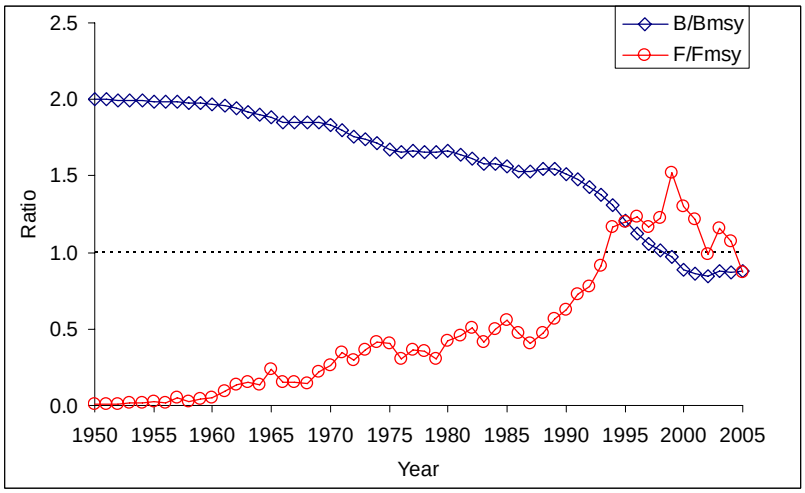
BET-Figure 3. Trend of bigeye catches (1950-2007) by major tuna fishery. Red line indicates past TAC level set for major country/entity for 2001-2007. For other countries, fleet size limitation (average number of boats in 1991 and 1992) was set.



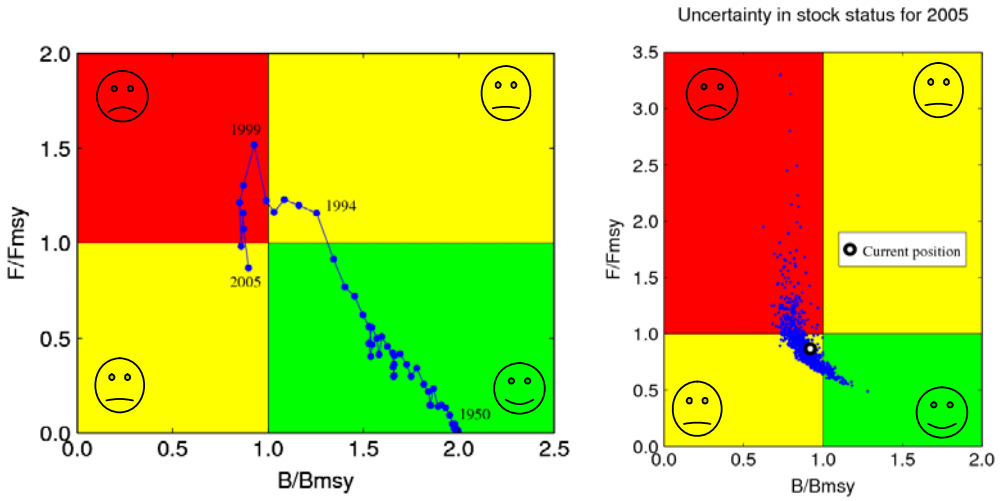
BET-Figure 4. Estimated longline IUU catches recorded as NEI in the ICCAT database.



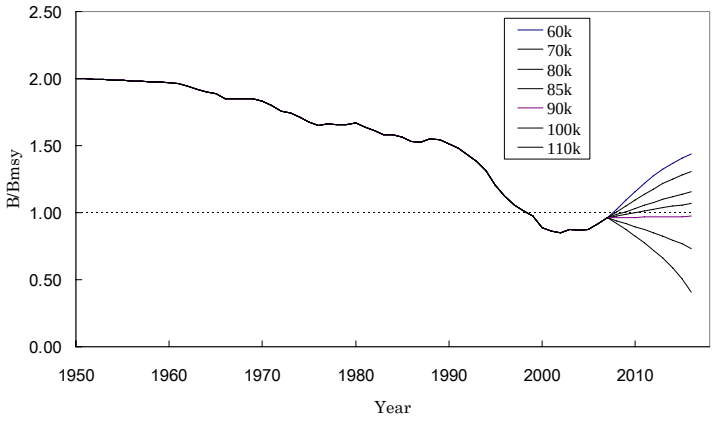
BET-Figure 5. Abundance indices provided for the 2007 assessment.



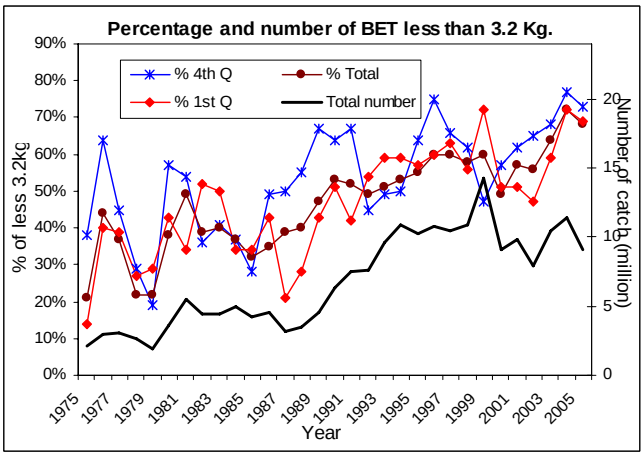
BET-Figure 6. Trajectories of B/B_{MSY} and F/F_{MSY} estimated from the assessment.



BET-Figure 7. Estimated range of stock status results (B/B_{MSY} and F/F_{MSY}) for 2005 which characterizes our uncertainty in stock status (right panel). Time series of B/B_{MSY} and F/F_{MSY} from 1950 to 2005 showing the progression of stock status as the Atlantic tuna fisheries evolved (left panel).



BET-Figure 8. Stock projections by ASPIC model assuming a catch of 71,000 t in 2006 and varying levels of the constant catch thereafter.



BET-Figure 9. Overall percentages and number of small bigeye tuna less than 3.2 kg calculated from catch-at-size data.

8.3 SKJ – SKIPJACK TUNA

Atlantic skipjack stock assessments, using available catches to 2006, were conducted in 2008. Skipjack was assessed previously in 1999. Consequently, this report includes the most recent information on the state of the stocks on this species.

SKJ-1. Biology

Skipjack tuna is a gregarious species that is found in schools in the tropical and subtropical waters of the three oceans **(SKJ-Figure 1)**. Skipjack is the predominant species under FADs where it is caught in association with juvenile yellowfin tuna, bigeye tuna and with other species of epipelagic fauna. One of the characteristics of skipjack is that from its first year of life it spawns opportunistically throughout the year and in vast sectors of the ocean. A recent analysis of tagging data from the eastern Atlantic confirmed that the growth of skipjack varies according to the latitude. However, this variation is not as great as had been previously thought. For example, the growth curve parameters obtained recently for the 10° N latitude region were closer to the estimates made in the Gulf of Guinea or in other oceans than those that had been estimated in Senegal in the early 1980s.

The increasing use of fish aggregation devices (FADs) since the early 1990s, have changed the species composition of free swimming schools. It is noted that, in effect, the free schools of mixed species were considerably more common prior to the introduction of FADs. Furthermore, the association with FADs may also have an impact on the biology (food intake, growth rate, plumpness of the fish) and on the ecology (displacement rate, movement orientation) of skipjack and yellowfin (ecological trap concept).

SKJ-2. Fisheries indicators

The total catches obtained in 2007 in the entire Atlantic Ocean (including estimates of skipjack in the *faux-poisson* landed in Cote d'Ivoire by the EC-purse seiners) were close to 156,300 t **(SKJ-Table 1**, **SKJ-Figure 2)** which represents an increase on the order of 8% as compared to the average of the last five years.

The numerous changes that have occurred in the skipjack fishery since the early 1990s (such as the use of FADs and the increase of the fishing area towards the west) have brought about an increase in skipjack catchability and in the proportion of the skipjack stock that is exploited. At present, the major fisheries are the purse seine fisheries, particularly those of EC-Spain, Ghana, NEI, Panama, EC-France and Netherlands Antilles, followed by the baitboat fisheries of Ghana, EC-Spain, EC-Portugal and EC-France. The preliminary estimates of catches made in 2007 in the East Atlantic amounted to 130,800 t, representing an increase of 10% as compared to the average of 2002-2006 **(SKJ-Figure 3)**.

The estimate of the average discard rate of skipjack tuna under FADs from data collected since 2001 by observers on-board Spanish purse seiners operating in the East Atlantic has been confirmed by a new study conducted on board French purse seiners (estimated at 42 kg per ton of skipjack landed). Furthermore, this last study showed that the amount of small skipjack (average size 37 cm FL) landed in the local market of Abidjan in Côte d'Ivoire as *faux-poisson* is estimated at 235 kg per ton of skipjack landed (i.e. an average of 6,641 t/year between 1988 and 2007, **SKJ-Figure 4**). The Committee integrated these estimates in the reported historical catches for the EC-purse seiners since 1981, as well as in the catch-at-size matrix.

In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. Estimates of catches in 2007 in the West Atlantic amounted to 25,400 t, a minor decrease of 1.2% as compared to recent years **(SKJ-Figure 5)**.

Estimates of the effective fishing effort exerted on skipjack tuna in the East Atlantic are limited, but nominal purse seine effort has decreased regularly in recent years **(SKJ-Figure 6)**. It is considered, however, that the increase in fishing power linked to the introduction to improved technologies on board the vessels as well as to the development of fishing under floating objects has resulted in an increase in the efficiency of the various fleets, since the early 1980s. In addition to the use of a 3% annual increase in catchability to account for these changes, a new analysis has been conducted by fixing MSY and K at levels agrees with estimates made during previous stock assessments. This method provides a range of increase in catchability from 1 to 13% per year. It is unclear, however, whether these estimates reflect changes in fishing technology only, or in the availability of the fish (e.g., resulting from an expansion of the surface exploited over the years; **SKJ-Figure 7**). The significant increase in the estimates of total mortality (Z) between the early 1980s and the end of the 1990s obtained from different methods, such as tag-recovery model, length converted catch curves and the average size in the yearly

catches, supports this hypothesis. The change in the selectivity pattern observed for the purse seine fishery from a gear-specific selectivity analysis suggests that this fleet is targeting primarily juveniles and tunas. The comparison of the size distributions of skipjack for the East Atlantic between the periods prior to, and following the use of FADs, also reinforces this interpretation insofar as an increase is observed in the proportion of small fish in the catches, as shown by the change of the average weight over the years (**SKJ-Figure 8**). Generally, it is noted that the average weight observed in the east Atlantic (close to 2 kg) is much lower than the estimates given in the other oceans (closer to 3 kg).

The regular increase in fishing pressure observed for the other indicators is confirmed up to about 1995, then the decline in apparent Z (a trend observed for yellowfin also) could be a consequence of the moratoria on floating objects which has mainly affected skipjack **(SKJ-Figure 9)**.

With respect to the West Atlantic, the fishing effort of the Brazilian baitboats (i.e., the major skipjack fishery in this region) seems to be stable over the last 20 years.

SKJ-3. State of the stocks

Traditional stock assessment models have been difficult to apply to skipjack because of their particular biological (continuous spawning, areal variation in growth) and fishery characteristics (non-directed effort, weak cohorts identified). In order to overcome these difficulties, several different assessment methods which accommodate expert opinion and prior knowledge of the fishery and biological characteristics of skipjack have been carried out on the two stocks of Atlantic skipjack. Additionally, several fishery indictors were analyzed for evidence of changes in the state of the stock over time.

Although the fisheries operating in the east have extended towards the west beyond 30^{o}W longitude, the Committee decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies. However, taking into account the state of current knowledge of skipjack tuna migrations and the geographic distances between the various fishing areas **(SKJ-Figure 1 and SKJ-Figure 10)**, the use of smaller stock units continues to be the envisaged hypothesis.

Eastern stock

The Committee analyzed two standardized indices from the EC-purse seine fishery: The first index depicting skipjack caught in free school in the Senegalese area during the 2nd quarter of the year and the second index characterizing small fish captured under FADs in the equatorial area (**SKJ-Figure 11**). In previous meetings of the Tropical Tunas Species Group it was confirmed that the increase in CPUE of the European purse seiners in the late 1990s was due, mainly, to the increase in the catches of positive sets under FADS (**SKJ-Figure 12**). Furthermore, the regular increase in the skipjack yields of the baitboats based in Senegal (contrary to the other two tropical tuna species) may only have been the result of an increase in catchability linked to the adoption of the so-called “baitboat associated school” fishing towards the mid-1980s (**SKJ Figure 13**). Furthermore, no marked trend has been observed for the Canary Islands baitboats as well as for a peripheral fishery such as the Azorean baitboat fishery. The fact that a reduction in abundance for a local segment of the stock would have little repercussion on abundance in other areas, leads to suppose that only a minor proportion of skipjack carry out extensive migrations between areas (**SKJ-Figure 10**; *cf.* notion of stock viscosity). This assumption was reinforced by a recent tagging study on growth variability of skipjack between two eastern Atlantic regions divided by 10°N latitude, which were established on the basis of their low amount of mixing (only 0.9% of the tagged fish crossed this limit).

A new Bayesian method, using only catch information estimated the MSY (under a Schaefer-type model parameterization) at 143,000-156,000 t, a result which agrees with the estimate obtained by the modified Grainger and Garcia approach: 149,000 t.

In addition, two surplus biomass production models (a multi-fleets generalized dynamic model and a Schaefer-based dynamic model) were applied for 8 time series of CPUEs, and for a combined index weighted by fishing areas. To account for the increase in catchability of purse seine fisheries, a correction factor of 3% per year was applied. As for the catch only model, different working hypothesis on the distribution of the priors of the parameters of the surplus production model (i.e., growth rate, carrying capacity, catchability coefficient of each fleet, etc.) were tested. In general, the range of plausible MSY values estimated from these models (155,000-170,000 t) were larger than in the catch only model. The Committee stated the difficulty to estimate MSY due to

the one-way trip trend depicted by this fishery and, as the result, the needs to constraint the range distribution of some priors (e.g., for growth rate, or for the shape parameter of the generalized model).

Although some caution is needed as regards to the generalization of the status to the overall stocks in the East Atlantic, due to the moderate mixing rates that seem to occur among the different sectors of this region, it is unlikely that skipjack be exploited in the eastern Atlantic **(SKJ-Figure 14)**.

Western stock

The standardized CPUEs of Brazilian baitboats remain stable while that of Venezuelan purse seiners and USA rod and reel decreased in recent years **(SKJ-Figure 15)**. This decrease, also observed in the yellowfin CPUE time series of Venezuela, could be linked to specific environmental conditions (high surface temperatures, lesser accessibility of prey). The average weight of skipjack caught in the western Atlantic is higher than in the east (3 to 4.5 kg vs. 2 to 2.5 kg), at least for the Brazilian baitboat fishery.

Catch only model estimated MSY at around 30,000 t (similar to the estimate provided by the Grainger and Garcia approach) and the Bayesian surplus model (Schaefer formulation) at 34,000 t.

The Group attempted several analyses, specifically sensitivity runs using different values of natural mortality, with Multifan-CL. For this stock only the three fisheries mentioned above were considered. The final estimate of MSY converges also at about: 31,000-36,000 t. It must be stressed that all of these analyses correspond to the current geographic coverage of this fishery (i.e., relatively coastal fishing grounds due to the deepening of the thermocline and of the oxycline to the East).

For the western Atlantic stock, it is unlikely that the current catch is larger than the current replacement yield as shown by the trajectories of B/B_{MSY} and F/F_{MSY} **(SKJ-Figure 16)**.

SKJ-4. Effects of current regulations

There is currently no specific regulation in effect for skipjack tuna.

However, with the aim of protecting juvenile bigeye tuna, the French and the Spanish boat owners voluntarily decided to apply a moratorium for fishing under floating objects between November and the end of January for the 1997-1998 and 1998-1999 periods. The Commission implemented a similar moratorium from 1999 to January 2005. This moratorium has had an effect on skipjack catches made with FADs.

On the basis of a comparison of average catches between 1993-1996, prior to the moratoria, and those between the 1998-2002 period, the average skipjack catches between November and January for the purse seine fleets that applied the moratoria, were reduced by 64%. During that period (1998-2002), the average annual skipjack catches by purse seine fleets that applied the moratoria decreased by 41% (42,000 t per year). However, this decrease is possibly a combined result of the decrease in effort and the impact of the moratoria (the average annual catch per boat decreased only 18% between these two periods).

The repealing in 2006 of Recommendation [Rec. 05-01] on the 3.2 kg minimum size limit on yellowfin tuna [Rec. 72-01] (although it remained in force in 2005) and the establishment of a time/area closure of the surface fishery [Rec. 04-01], which replaces the old strata relative to the moratorium on catches under floating objects, are regulatory measures whose effects were analyzed during the species Group meeting.

Considering that the new closed area is much smaller in time and surface than the previous moratorium time/area, and is located in an area which historically has lower effort anyway, this regulation is likely to be less effective in reducing the overall catches of small bigeye (the species for which the regulation was applied) by the surface fishery. When the fishing effort for the EC purse seine fleet was at its maximum value (period 1994-1996, i.e., before the implementation of the first moratorium), the skipjack catch from this fleet within the time and area limits defined by Rec. 04-01, was only on average at 7180 t (i.e., 7.5% of the total skipjack catch from the EC purse seiners).

SKJ-5. Management recommendations

Although the Committee makes no management recommendations in this respect, catches should not be allowed to exceed MSY. The Commission should be aware that increasing harvests and fishing effort for skipjack could

lead to involuntary consequences for other species that are harvested in combination with skipjack in certain fisheries.

ATLANTIC SKIPJACK TUNA SUMMARY

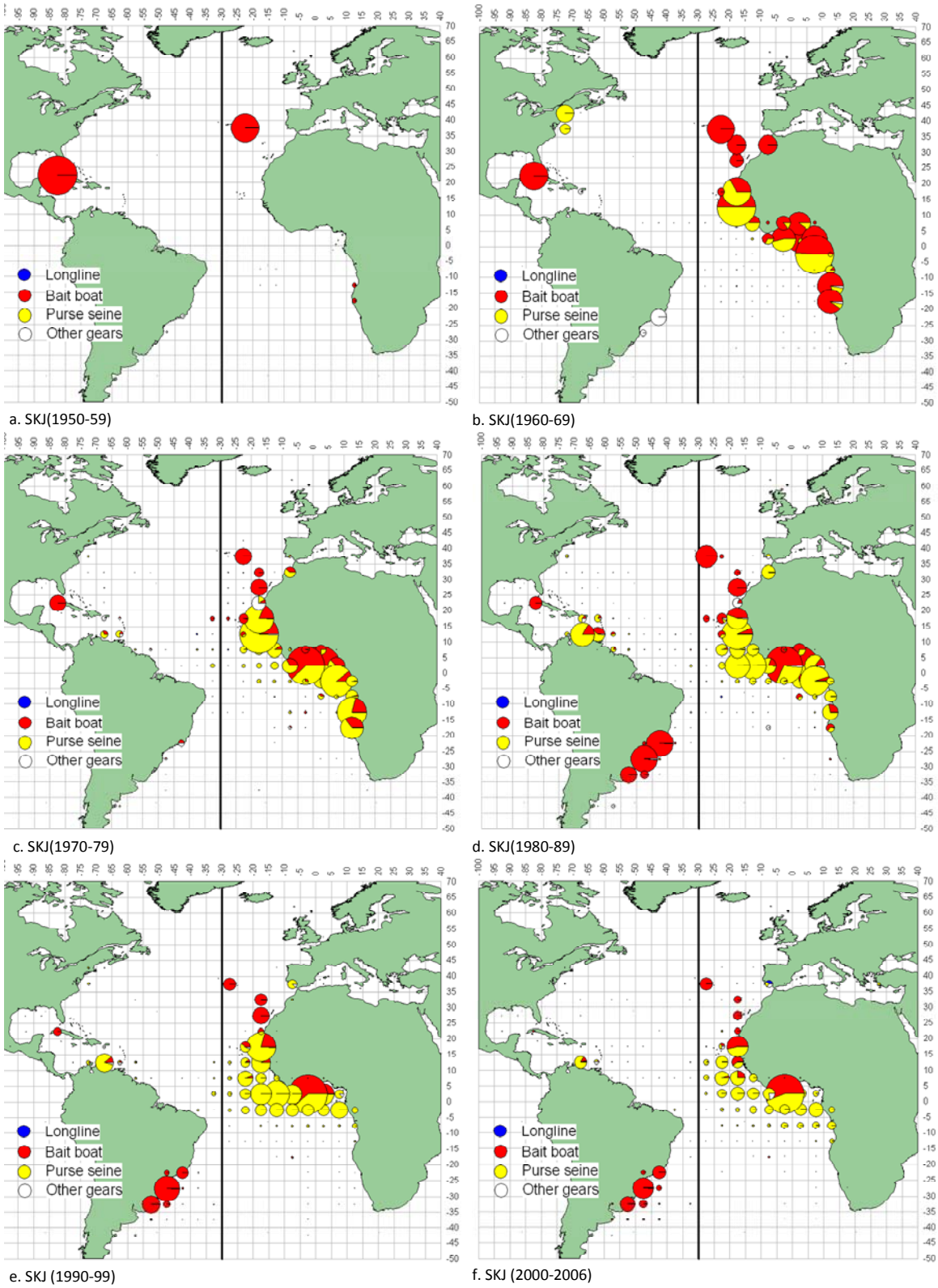
	East Atlantic	**West Atlantic**
Maximum Sustainable Yield	Around 143,000-170,000 t	Around 30,000-36,000 t
Current (2007) Yield[1]	125,400 t	25,400 t
Current Replacement Yield	somewhat higher than 125,400 t	somewhat higher than 25,400 t
Relative Biomass (B_{2006}/B_{MSY})	most likely>1	most likely>1
Relative Fishing Mortality: F_{2006}/F_{MSY}	most likely<1	most likely<1
Management measures in effect	Rec. 04-01 (effective 2005[2])	None

[1] Reports for 2007 should be considered provisional.
[2] Although this time area measure was implemented to reduce mortality on bigeye juvenile tuna, as a total area closure has affected all the tropical tuna species.

SKJ-Table 1. Estimated catches (t) of skipjack tuna *(Katsuwonus pelamis)* by major area, gear and flag.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL			137458	127376	119071	122865	119229	144796	120419	144118	219733	170708	205685	185014	167381	154127	146082	151699	166488	148598	155767	116781	145293	158707	162241	142177	150848
ATE			105442	91770	78786	90711	95052	121060	94037	118008	186329	140554	172462	155065	145479	126557	114367	122436	139079	119202	124239	95144	120412	131085	133597	115703	125338
MED			2	10	13	2	13	0	0	0	0	0	2	0	43	9	4	176	53	90	77	37	132	161	127	20	66
ATW			32015	35596	40272	32151	24164	23736	26382	26110	33404	30155	33221	29949	21859	27562	31712	29087	27356	29307	31451	21600	24749	27461	28517	26454	25443
Landings	ATE	Bait boat	34873	28075	29868	30009	38803	48015	41000	36569	41611	35660	31656	37817	33691	32047	37293	42045	37696	29967	46281	27590	29847	39539	43603	41175	34452
		Longline	417	22	6	19	6	4	9	0	5	3	2	10	3	7	47	85	42	48	53	56	66	316	458	2957	1599
		Other surf.	2240	1328	206	1638	1027	1506	1643	1357	2067	1602	1223	501	445	501	304	923	417	2423	764	681	551	816	1898	2402	2172
		Purse seine	67912	62345	48706	59045	55216	71535	51385	80082	142646	103288	139581	116737	111340	94002	76722	79383	100925	86763	77142	66817	89948	90414	87638	69170	87114
	ATW	Bait boat	20057	16771	28490	25278	18675	21057	23292	22246	23972	20852	19697	22645	17744	23741	26797	24724	23881	25754	25142	18737	21990	24082	26028	23749	22865
		Longline	184	25	24	8	6	9	25	23	33	29	20	16	33	19	12	21	58	23	60	349	95	206	207	287	52
		Other surf.	653	842	567	1657	518	355	600	600	872	764	710	1577	2023	452	556	516	481	466	951	398	367	404	316	372	1317
		Purse seine	11121	17958	11191	5208	4964	2315	2466	3241	8527	8509	12794	5712	2059	3349	4347	3826	2936	3063	5297	2116	2296	2769	1967	2045	1209
	MED	Bait boat	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	17	21	13	8	20
		Other surf.	2	0	13	2	13	0	0	0	0	0	2	0	43	9	4	176	53	90	77	32	12	40	16	12	28
		Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	103	101	99	0	19
Landings	ATE	Angola	318	46	131	56	80	30	85	69	66	41	13	7	3	15	52	2	32	14	14	14	14	10	0	0	
		Benin	38	10	20	11	5	3	7	2	2	2	2	2	2	2	7	3	2	2	0	0	0	0	0	0	
		Cape Verde	1400	1391	2030	877	2076	1456	971	806	1333	864	860	1007	1314	470	591	684	962	789	794	398	343	1097	7504	7930	6026
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	
		Chinese Taipei	2	7	4	0	0	1	3	0	5	3	2	10	3	5	47	73	39	41	24	23	26	16	10	8	14
		Congo	5	10	8	8	8	8	11	12	9	9	10	7	7	6	0	0	0	0	0	0	0	0	0	0	
		Cuba	135	310	246	569	81	206	331	86	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1173	259	292	143	559	1259	1565	1817
		EC.Bulgaria	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.España	28933	46649	35100	41992	33076	47643	35300	47834	79908	53319	63660	50538	51594	38538	38513	36008	44520	37226	30954	25456	44837	38725	28139	22206	23670
		EC.Estonia	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.France	29727	12994	13645	13045	17114	16504	15211	17099	33271	21890	33735	32779	25188	23107	17023	18382	20344	18183	16593	16615	19899	21879	14850	7034	5124
		EC.Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	14	
		EC.Latvia	0	0	0	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Lithuania	0	0	0	0	0	0	0	0	221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	1113	3974	2409	5446	8420	14257	7725	3987	8059	7477	5651	7528	4996	8297	4399	4544	1810	1302	2167	2958	4315	8504	4735	11158	8995
		Gabon	0	0	0	0	0	0	0	0	0	0	1	11	51	26	0	59	76	21	101	0	0	0	0	0	
		Ghana	24376	20697	19082	22268	24347	26597	22751	24251	25052	18967	20225	21258	18607	19602	26336	34183	40216	28974	42489	30499	24597	25727	44671	30236	45709
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6389	5162	5546
		Japan	6002	1504	2098	2031	1982	3200	2243	2566	4792	2378	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
		Korea Rep.	1908	699	153	5	6	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	2531	885	1002	1220	1028	428	295	1197	254	559	310	248	4981	675	4509	2481	848	1198	268	280	523	807	1893	3779	1570
		Mixed flags (FR+ES)	2420	550	358	692	4663	4660	4125	5280	11101	12273	13750	9492	5862	5831	4905	5621	6845	9461	7137	2995	4959	5262	4666	5313	3275
		NEI (ETRO)	3383	927	590	540	791	2994	2263	10516	11335	12409	20291	17418	16235	16211	6161	6748	8893	7127	8122	8550	9688	11137	2873	629	
		Namibia	0	0	0	0	0	0	0	0	0	0	0	2	15	0	1	0	0	0	8	0	0	0	0	0	
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	7096	8444	8553	9932	10008	13370	5427	10092	8708	0	3042	1252
		Norway	0	0	0	0	581	738	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Panama	1611	0	0	0	0	0	0	0	8312	8719	13027	12978	14853	5855	1300	572	1308	1559	281	342	0	7126	11490	13468	18821
		Rumania	0	0	0	3	0	0	59	142	349	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	1175	1110	540	1471	1450	381	1146	2086	1426	374	0	0	0	0	0	392	1130
		S. Tomé e Príncipe	103	18	20	20	20	195	196	204	201	178	212	190	180	187	178	169	181	179	179	179	179	117	166	143	
		Senegal	0	0	0	0	0	0	47	134	652	260	95	59	18	163	455	1963	1631	1506	1271	1053	733	1333	4874	3534	2278
		South Africa	104	14	66	101	88	157	96	17	15	7	6	4	4	1	6	2	1	0	1	0	2	2	1	0	0
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
		U.S.S.R.	1223	1000	1404	1688	547	1822	1915	3635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	103	85	62	139	139	158	397	171	24	16	65	55	115	86	294	298	13	64	205	63	63	63	63	88	110
		Venezuela	0	0	358	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	243	505	101	138	90	7	111	106	272	123	50	1	0	1	0	2	0	1	0	0	0	30	0	0	
		Barbados	39	48	36	33	21	3	9	11	14	5	6	6	6	5	5	10	3	3	0	0	0	0	0	0	
		Brasil	15945	13567	25101	23155	16286	17316	20750	20130	20548	18535	17771	20588	16560	22528	26564	23789	23188	25164	24146	18338	20416	23037	26388	23270	24191
		Chinese Taipei	6	6	3	1	2	7	19	0	32	26	9	7	2	10	1	2	1	0	1	16	14	27	28	30	2
		Colombia	0	0	0	0	0	0	0	0	0	0	2074	789	1583	0	0	0	0	0	0	0	0	0	0	0	

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	Cuba	1700	1248	1632	1277	1101	1631	1449	1443	1596	1638	1017	1268	886	1000	1000	651	651	651	0	0	624	545	514	536	
	Dominica	0	0	0	0	0	0	0	60	38	41	24	43	33	33	33	33	85	86	45	55	51	30	20	28	32
	Dominican Republic	106	68	204	600	62	63	117	110	156	135	143	257	146	146	0	0	0	0	0	0	0	0	0	0	
	EC.España	209	2610	500	0	0	0	0	0	1592	1120	397	0	0	0	0	0	1	1	0	0	0	0	0	0	5
	EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	3	3	5	21	11
	Grenada	15	12	7	9	5	22	11	23	25	30	25	11	12	11	15	23	23	23	15	14	16	21	22	15	26
	Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	62	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	1	0
	Korea Rep.	175	17	20	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mexico	25	30	48	11	13	10	14	4	9	8	1	1	0	2	3	6	51	13	54	71	75	9	7	10	7
	Netherlands Antilles	40	40	40	40	40	40	40	40	40	40	45	40	35	30	30	30	30	30	0	0	0	0	0	0	
	St. Vincent and Grenadines	0	0	0	0	0	17	28	29	27	20	66	56	53	37	42	57	37	68	97	357	92	251	251	355	90
	Sta. Lucia	35	64	53	76	60	53	38	37	51	39	53	86	72	38	100	263	153	216	151	106	132	137	159	120	89
	Trinidad and Tobago	1	2	1	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
	U.S.A.	697	853	1814	1115	734	57	73	304	858	560	367	99	81	85	84	106	152	44	70	88	79	103	30	61	66
	UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
	Venezuela	12778	16526	10712	5690	5750	4509	3723	3813	8146	7834	11172	6697	2387	3574	3834	4114	2981	3003	6870	2554	3247	3270	1093	2008	921
MED	Algerie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	43	89	77	0	0	0	0	0	
	EC.España	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	26	10	15	44
	EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	
	EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102	99	99	0	
	EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	29	34	17	0	
	Maroc	1	0	13	2	13	0	0	0	0	0	2	0	43	9	4	5	10	1	0	1	1	2	1	5	22



a. SKJ(1950-59)

b. SKJ(1960-69)

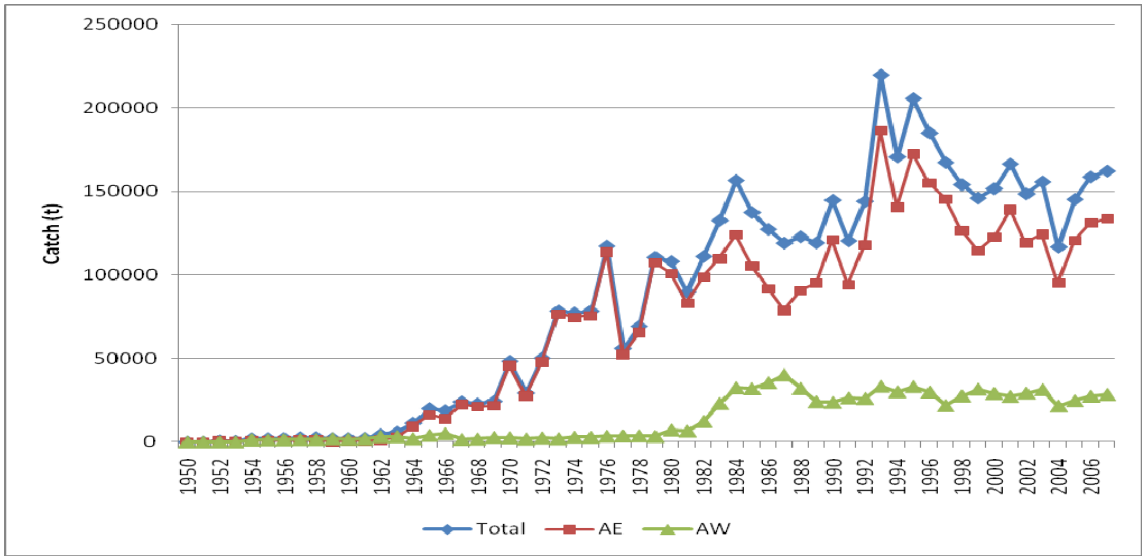
c. SKJ(1970-79)

d. SKJ(1980-89)

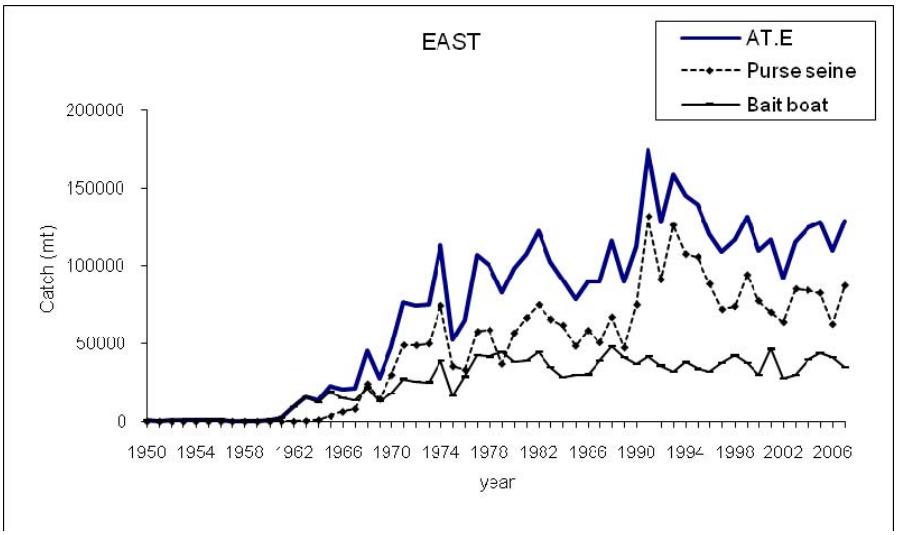
e. SKJ (1990-99)

f. SKJ (2000-2006)

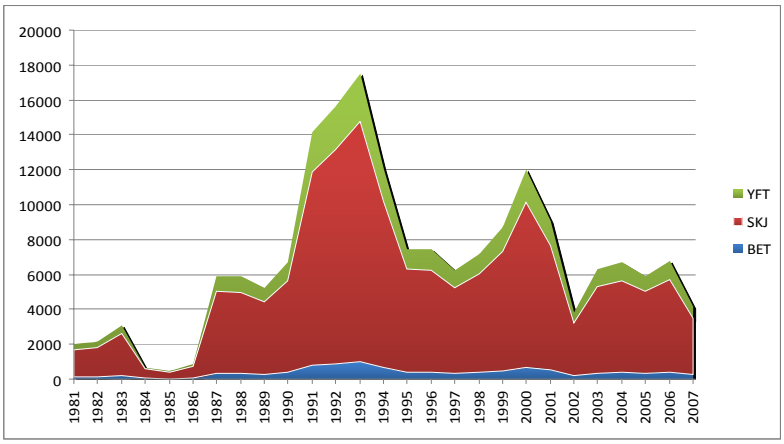
SKJ-ATL-Figure 1. Historical development of the area distribution of skipjack tuna catches by fishing gear. The most recent period (from 2000 to 2006) is shown below on the right (the biggest circle = 248,295 t).



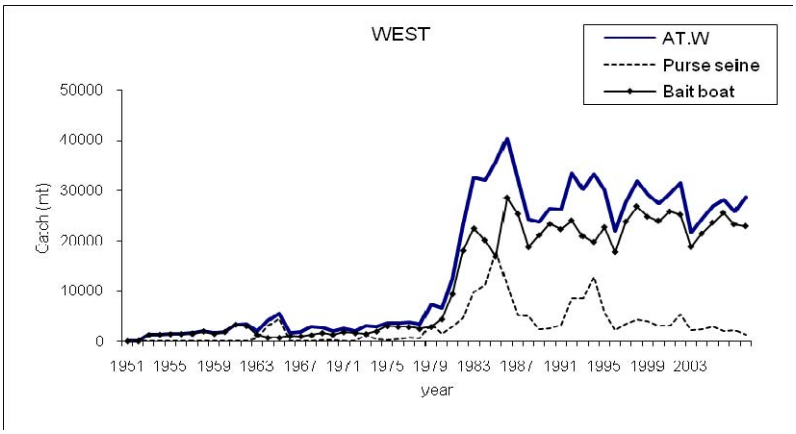
SKJ-Figure 2. Total catch (t) for skipjack in the Atlantic Ocean and by regions (East and West). Estimates of skipjack in the "faux poissons" landed in Côte d'Ivoire were included in the historical catch in the East Atlantic (only catches to 2006 were considered for the stock assessment). (Catch for 2007 is still considered preliminary).



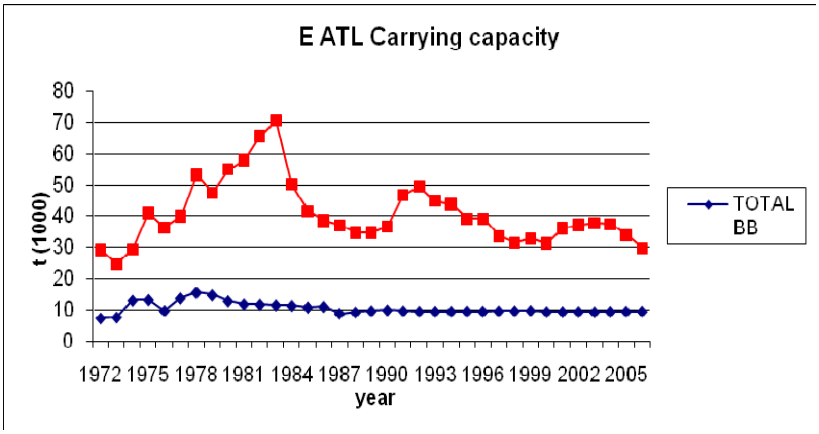
SKJ-Figure 3. Reported landings of skipjack in the eastern Atlantic, by major gear (1950-2006). (Catch for 2007 is still considered preliminary).



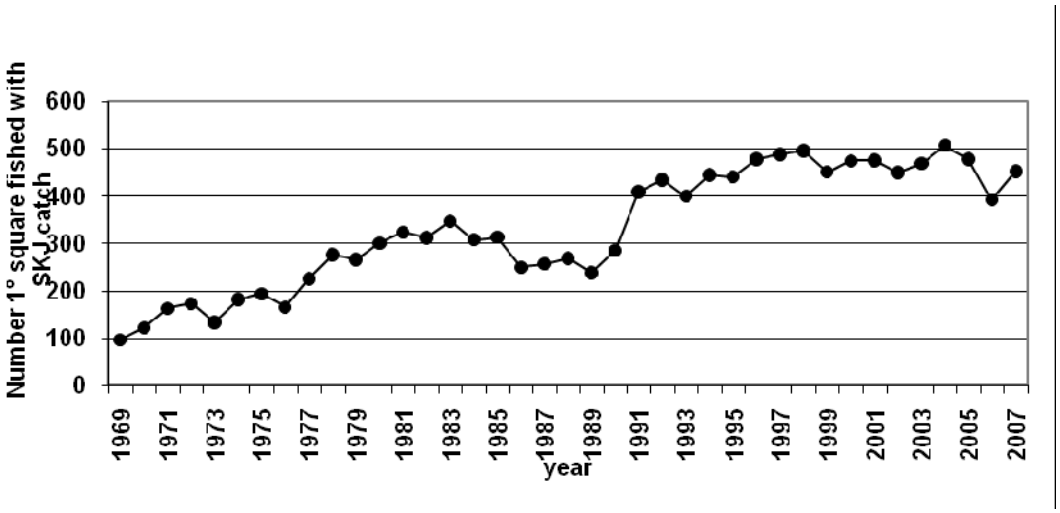
SKJ-Figure 4. Cumulative landings of "faux poissons" for the three main species of tropical tunas in the local market of Abidjan (Côte d'Ivoire).



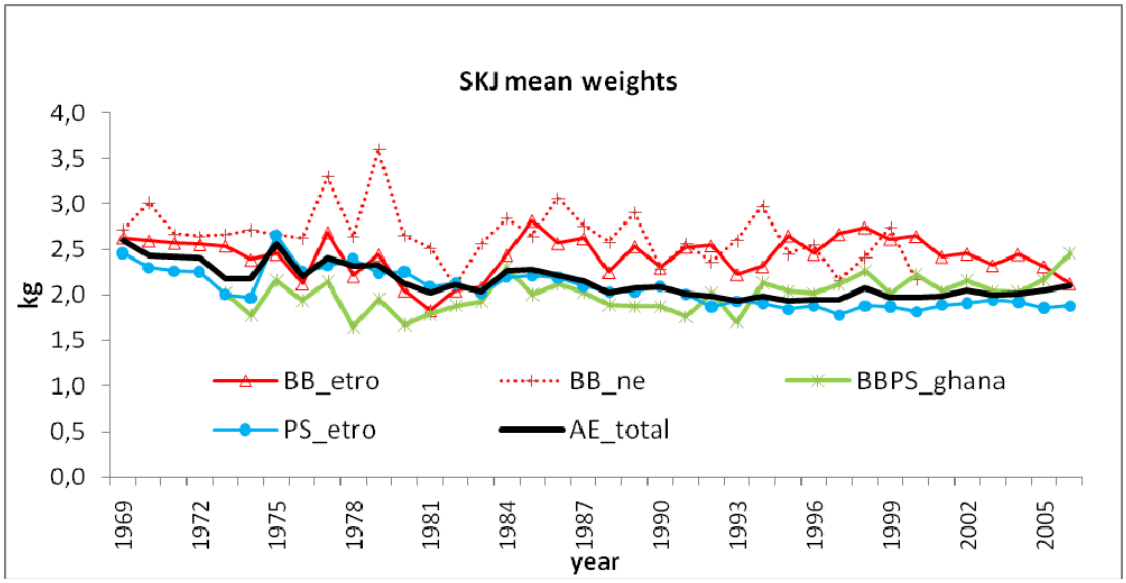
SKJ-Figure 5. Reported landings of skipjack in the western Atlantic, by major gear (1950-2006). (Catch for 2007 is still considered preliminary).



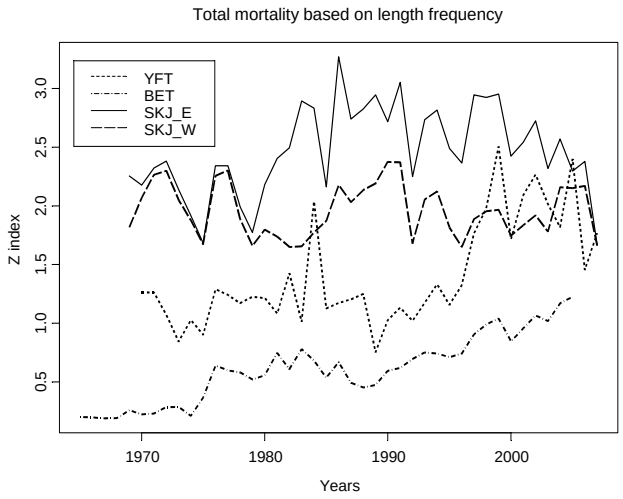
SKJ-Figure 6. Changes over time (1971-2006) of the carrying capacity (corrected by time at sea) for the purse seiners and baitboats operating in the eastern Atlantic.



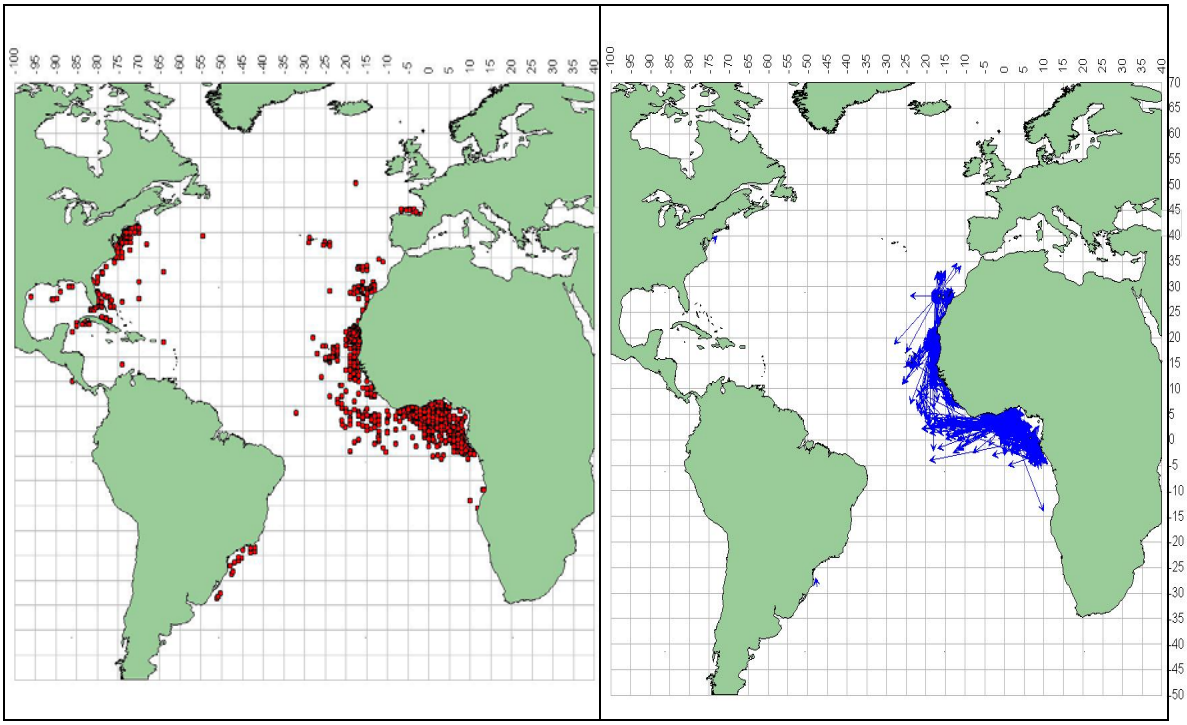
SKJ-Figure 7. Number of 1° x 1° squares with catch of skipjack for the purse seiners operating in the eastern Atlantic (1969-2007). The significant increase observed since 1991 could be due in part to a modification of the species composition correction procedure implemented at this date.



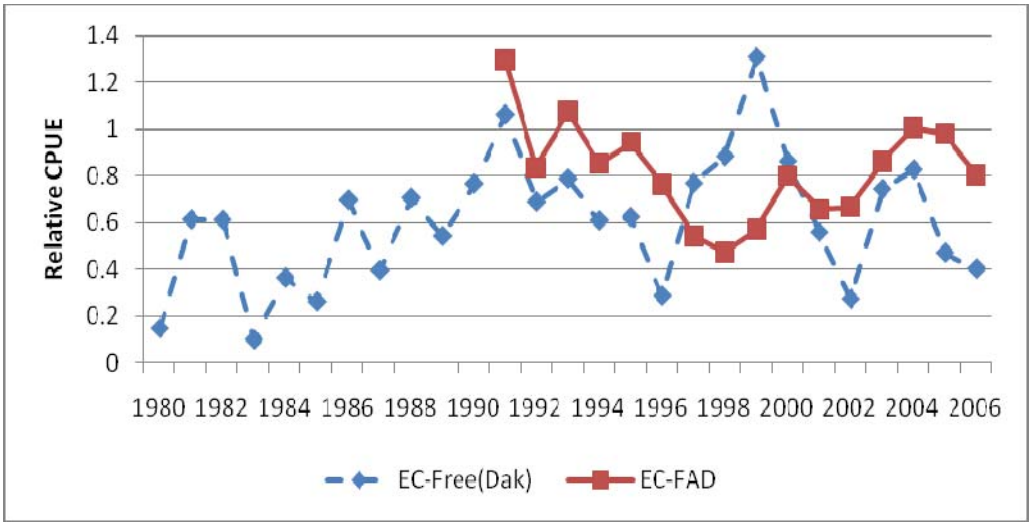
SKJ-Figure 8. Estimation of the mean weight of the skipjack landed, by major fishery, in the eastern Atlantic (1969-2006). Given the fishing mode in which Ghanaian baitboats and purse seiners collaborate they were estimated as a combined fishery.



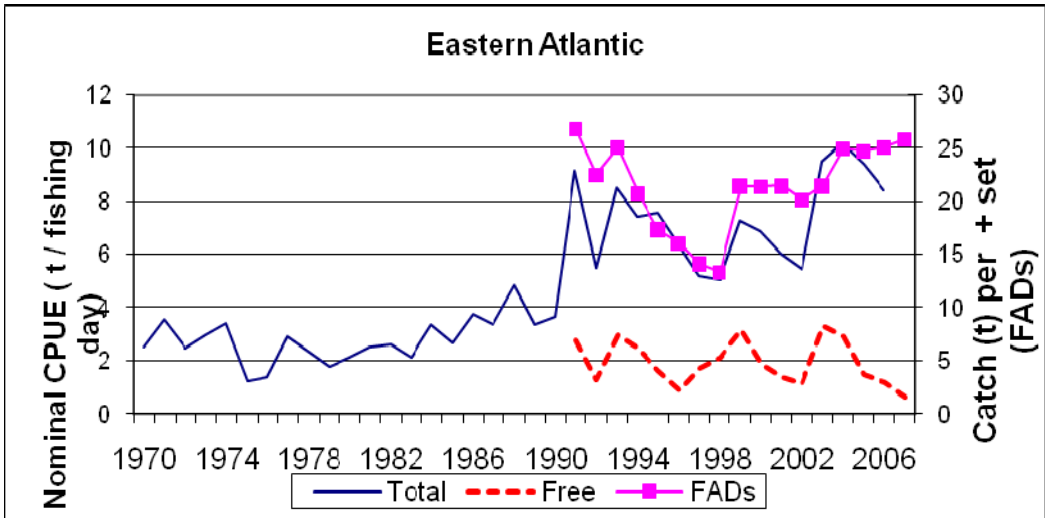
SKJ-Figure 9. Changes over the years in the apparent total mortality *Z* , based on Beverton and Holt's equation, for the three tropical tuna species in the Atlantic Ocean. YFT = yellowfin, BET = bigeye, SKJ E = Eastern skipjack, SKJ W = Western skipjack. Z is calculated as $Z = K*(L\infty - L\ moy) / (L\ moy - L\ c)$, with $L\infty$ and K representing the parameters of the von Bertalanffy growth equation, *Lc* = the length at which the fish are fully recruited (fixed here at 50 cm), and *Lmoy* the medium length of fishes fully recruited (Beverton and Holt, 1956).



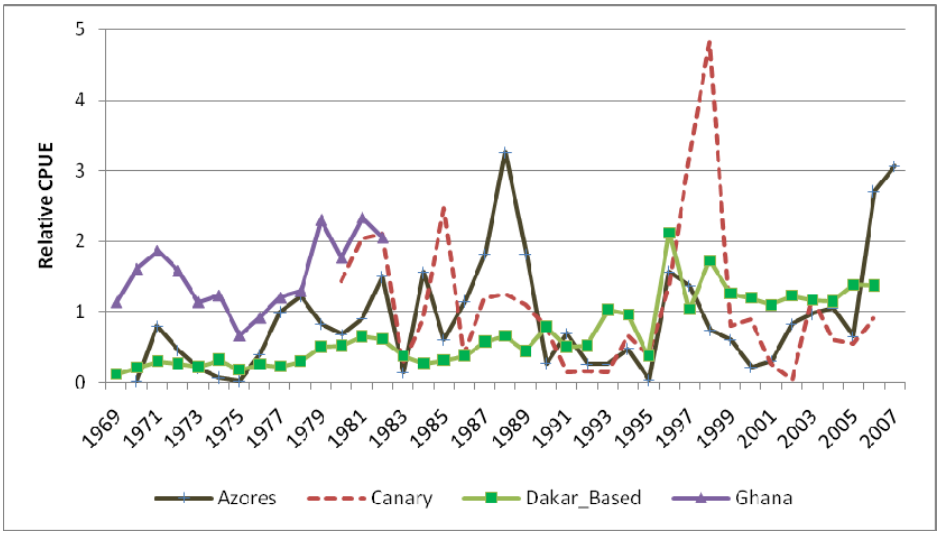
SKJ-Figure 10. Distribution of released SKJ (left panel) and apparent movement from recoveries (right panel). On the basis of current knowledge, there are few recoveries in the West.



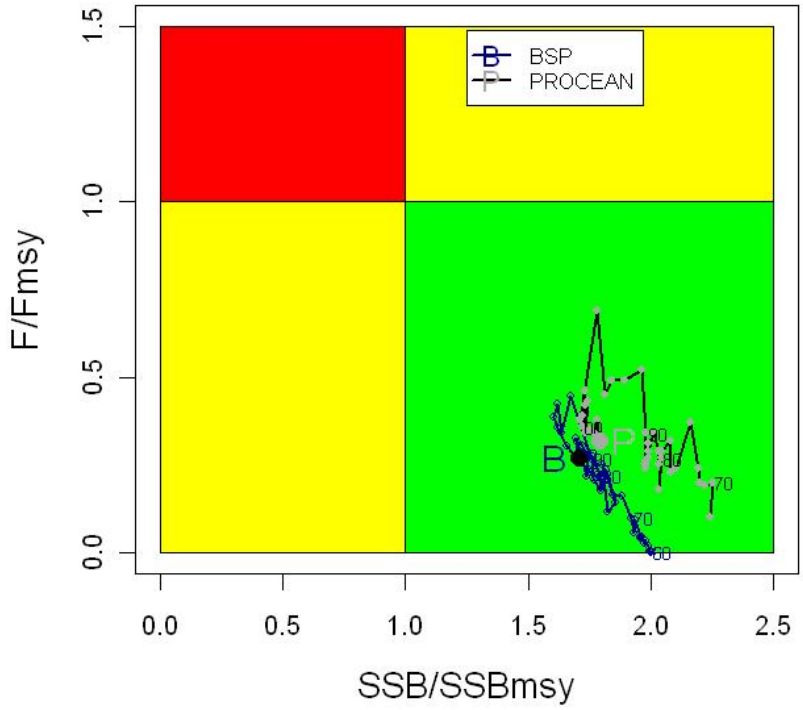
SKJ-Figure 11. Standardized skipjack CPUE indices for EC purse seiners in the eastern Atlantic Ocean. Free = free school in the Senegalese area; FAD = artificial floating object in the equatorial areas.



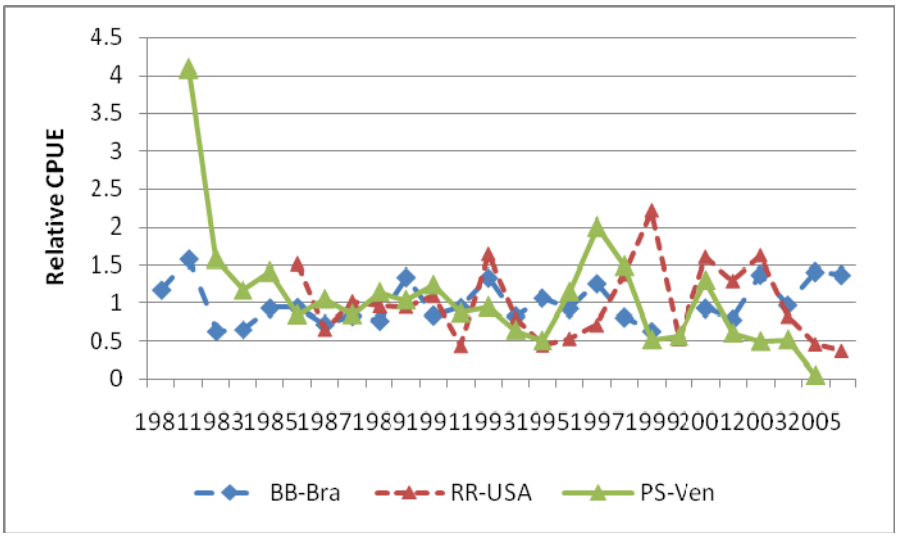
SKJ-Figure 12. Changes in nominal CPUE for the European purse seiners in the eastern Atlantic. Free = free school (t/ f. day) in the Senegalese area; FADs = artificial floating object (t / successful set) in the equatorial area.



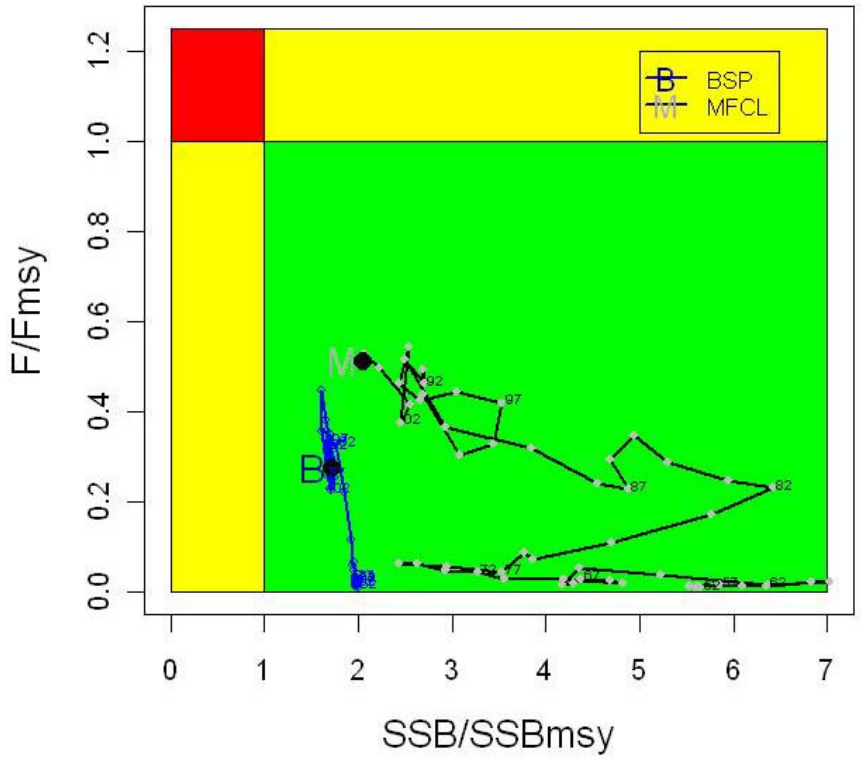
SKJ-Figure 13. Standardized CPUE indices for the main baitboat fleets in the eastern Atlantic Ocean: Azores, Canary islands (non standardized), Dakar based and Ghana.



SKJ-Figure 14. 2007 stock status for eastern skipjack. Trajectories of B/B_{MSY} and F/F_{MSY} from the Bayesian surplus production model (Schaefer type), and from the generalized multi-fleets dynamic model.



SKJ-Figure 15. Standardized CPUEs for Brazilian bait boats, for USA rod and reel and non standardized relative CPUE for the Venezuelan purse seiners in the western Atlantic Ocean.



SKJ-Figure 16. 2007 stock status for western skipjack. Trajectories of B/B_{MSY} and F/F_{MSY} from the Bayesian surplus production model (Schaefer type) and from the generalized multi-fleets dynamic model and from MULTIFAN-CL.

8.4 ALB – ALBACORE

An assessment of stock status for northern and southern Albacore was conducted in 2007 (SCRS/2007/015). The previous assessment of the North stock was conducted in 2000 (Anon. 2001a) (using data from 1975-1999) and that of the Southern stock in 2003 using data up to 2002; no assessment of the Mediterranean stock has ever been carried out.

Complete information on the data preparatory meeting and North and South albacore stocks assessments can be found in the Report of the Ad Hoc Meeting to Prepare Multifan CL-Inputs for the 2007 Albacore Assessment (SCRS/2007/017) and the Report of the 2007 ICCAT Albacore Stock Assessment Session (SCRS/2007/015), respectively.

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 5ºN) and Mediterranean stock (**ALB-Figure 1 a) and b))**. Nevertheless, there is likely intermingling of Indian Ocean and South Atlantic immature albacore which needs further research. Present available knowledge about habitat distribution according to size, spawning areas and maturity estimates are based on limited studies and old parameter estimates have been presented for the three albacore stocks considered, with the exception of the new growth equation for the South stock.

ALB-2. Description of fisheries or fisheries indicators

North Atlantic

The northern stock is exploited by surface fisheries targeting mainly immature and sub-adult fish (50cm to 90 cm FL) and longline fisheries targeting immature and adult albacore (60-130 cm FL). The main surface fisheries are carried out by EC fleets (Ireland, France, Portugal and Spain) in the Bay of Biscay, in the adjacent waters of the northeast Atlantic, and in the vicinity of the Canary and Azores Islands in summer and fall. The main longline fleet is the Chinese Taipei fleet which operates in the central and western North Atlantic year round. Over time, the relative contribution of different fleets to the total catch of North Atlantic albacore has changed, which resulted in differential effects on the age structure of the stock.

The historical time series of catch was extended back to 1930 for the troll fishery after revision of data for the assessment with Multifan-CL model. Total reported landings for the North Atlantic generally began to decline after 1986, largely due to a reduction of fishing effort by the traditional surface (trolling and baitboats) and longline fisheries (**ALB-Table 1**; **ALB-Figure 2a**). Some stabilization was observed in the 1990s, mainly due to the increased effort and catch by new surface fisheries (driftnets and mid-water pair pelagic trawl) with a maximum catch in 1993 at 38,063 t.

Total catch in 2007 was 21,549 t representing a decrease compared to the 2006 peak catch of (36,199 t) and the lowest recorded. The surface fisheries accounted for the bulk of the total 2007 catch (87%) **(ALB-Table 1)**. The reported catch for EC-France in 2007 was 3,179 t, a decrease of 51% from the 2006. EC-Spain troll fleet and bait boat fleets (Cantabrian Sea and Canary Is.) catches in 2007 showed a strong decrease of 40 % from the high catch registered in 2006. In contrast, EC-Ireland catches have increased by 14 % from 2006. Standardized catch rates of fish age 1 to 3 from the Spanish troll fleet were presented. The estimate of 2007 showed a steep decline for age 1, and a continued decreasing trend for age 2 since 2005. Age 3, however remained at a similar level since 2004. Likewise catch rates of the mid-water pelagic Irish fleet were also presented showing a steep decline in 2007 compared to the higher estimates for 2005 and 2006.

The French albacore data for the North eastern Atlantic between 1999 and 2007 have been updated. Catch and effort data by gear and by 1° square are now available (SCRS/2008/165). Likewise, a historical data series of French Albacore landings from 1886 to 2007 was presented to the group and will be submitted shortly to the ICCAT Secretariat (Task I).

Additionally mean weight trend for all surface fleets (baitboat, troll, mid-water, pair pelagic and other surface) from the 1975 to 2005 period is shown in **ALB-Figure 3a**. Quite a stable trend is identified with an average of 6,7 kg and maximum and minimum weight of 8,2 kg and 5.1 kg.

Overall catches by longline fisheries showed a decrease in 2007, mostly due to a decrease in landings by the Chinese Taipei fleet of almost 45% compared to 2006 due to decline in fishing effort and the decrease of albacore as by-catch by the Japanese. A similar mean weight trend for all longline fleets from the 1975 to 2005 period is shown in **ALB-Figure 3a**. Quite a stable trend is identified except for a few years, with an average of 18,8 kg and maximum and minimum weight of 25,7 kg and 13,4 kg.

South Atlantic

The recent total annual South Atlantic albacore landings were largely attributed to four fisheries, namely the surface baitboat fleets from South Africa and Namibia, and the longline fleets from Brazil and Chinese Taipei (**ALB-Table 1**; **ALB-Figure 2b**). The surface fleets are entirely albacore directed and mainly catch juvenile and sub-adult fish (70-90 cm FL). These surface fisheries operate seasonally, from October to May, when albacore are available in coastal waters. Brazilian longliners target albacore during the first and fourth quarters of the year, when an important concentration of adult fish (> 90 cm) is observed off the northeast coast off Brazil, between 5º S and 20º S, being likely related to favorable environmental conditions for spawning, particularly of sea surface temperature. The longline Chinese Taipei fleet operates over a larger area and throughout the year, and consists of vessels that target albacore and vessels that take albacore as by-catch, in bigeye directed fishing operations. On average, the longline vessels catch larger albacore (60-120 cm) than the surface fleets.

Total reported albacore landings for 2007 were 20,032 t a decrease of about 4,000 t compared to the 2006 catch. The Chinese Taipei catch increased in 2007 to 13,146 t. Regarding Brazilian catches, Chinese Taipei longliners (including boats flagged Belize and St. Vincent) stopped fishing for Brazil in 2003, which resulted in albacore only being caught as a by-catch in tropical tuna-directed longline fisheries. In 2007, the catch of the Brazilian longline fleet was 535 t, an increase of about 48% compared to the 2006 catch and much lower than the average catch during the period 2000-2003 of about 4,287 t. The annual albacore catch for South Africa was 3,797 t in 2007, consistent with low catches in recent years, and well below the mean annual catch over the last decade (~ 4,900 t). Reduced catches, particularly in the bait-boat fishery, have been compounded by the sporadic availability of sub-adult albacore in near-shore waters, change of targeting to yellowfin tuna using rod-and-reel gear, and high fuel prices. Furthermore, large reduction on baitboat and long-line catch for Namibia was observed in 2007. Moreover, mean weight trend for all surface fleets (baitboat and other surface fleets) from the 1975 to 2005 period is shown in **ALB-Figure 3b.** From 1981 onwards quite a stable trend is identified with an average of 13,4 kg and maximum and minimum weight of 17,6 kg and 11 kg. While the mean weight trend for longline fisheries showed and increase trend after 1996.

Mediterranean

Reported landings in 2007 accounted for 6,546 t, which represented a slight increase with respect to the 2006 catches (**ALB-Table 1** and **ALB-Figure 2c**). Major contribution came from gillnets and longline fisheries.

ALB-3. State of stocks

A thorough revision of North and South Atlantic Task I and Task II data was conducted and a more robust method for catch-at-size analyses was implemented for the 2007 assessment session. In addition, catch rate analyses were improved and updated with new information for the northern and southern albacore fisheries and a substantial effort was undertaken to implement assessment methods which do not assume that catch-at-age is perfectly known. The analyses were also conducted to incorporate longer time-series of catch, effort and size information into the assessment to guide the evaluation. The approach provided the opportunity to evaluate a range of hypothesis about how the fisheries operated over time and their impact on the population. The results of these efforts are reflected in the following summaries of stock status that analysed data through 2005.

North Atlantic

As previously noted, the CPUE trends based upon the most recent available data showed somewhat different patterns for the surface fleets, catching mostly immature fish, and the longline fleets, which catch mostly mature fish (**ALB-Figure 4**). The Spanish age 2 troll series, showed evidence of a relatively strong 2003 year class

entering the fishery. For the Spanish age 3 troll series, the age-two signal is not yet fully reflected, leading to uncertainty about the possibility of a good year class. For the longline fleets, the general trend in CPUE indices is a decline over time, with varying rates. Given the variability associated with these catch rate estimates, definitive conclusions about recent trends could not be reached just by examining the CPUE trends alone which represent different parts of the population.

Based on the current assessment which considers catch, size and effort since the 1930s, our view of the northern albacore resource status is that spawning stock size has declined and in 2005 was about one quarter of the peak levels estimated for the late 1940s. Estimates of recruitment to the fishery, although variable, have shown generally higher levels in the 1960s and earlier periods with a declining trend thereafter until 2004. However, the most recent recruitment is estimated to be large albeit uncertain (**ALB-Figure 5**). The 2007 current assessment indicated that the stock recently rebuilt to levels near B_{MSY} (current SSB is approximately 20% below the MSY level, compared to 2000 when it was 50% below). Recent fishing mortality rates have generally been above F_{MSY} (current F is approximately 50% larger than F_{MSY}) (**ALB-Figure 6**).

While estimates of MSY varied over time as the relative combination of fisheries taking juvenile and mature albacore varies, which results in different overall selectivity patterns across time, the biomass that supports that MSY has little variation. For the three more recent years, the estimate of MSY is about 30,000 t, but over time the estimates ranged from about 26,000 t to 34,000 t, depending on the relative importance of the surface and longline fisheries catch levels. If recruitment were at the levels estimated in the 1960s then the MSY would be higher. Total annual albacore average catch was 50,000 t during 30 years (1956-1986), which is higher than the 2005 MSY estimated about 30,200 t. This decline observed may be partly due to environmental factors affecting the productivity of the stock and to some extent to economic variables. Thus, further studies need to be addressed for an improved perception of the stock.

Distribution of the pairs of the 2005 status of biomass and fishing mortality ratios estimated from the statistical model used are displayed to show the uncertainty around the estimates (**ALB-Figure 7**).

South Atlantic

In 2003 the Committee assessed the status of the Southern Atlantic albacore stock using the same specifications as were used in 2000, but with updated data. Because of the detailed review, revisions, and updates of the data since that time, the Committee was able to incorporate additional information into the model used for assessing the Southern Albacore stock and incorporated an assessment methodology that more objectively brought information about fishery selectivity into the evaluation.

For the southern CPUE trends, those from the longline fisheries harvesting mostly mature albacore showed a strong declining trend in the early part of the time series, and less steep decline over the past decade; while those from the surface fishery, harvesting mostly juvenile albacore, are more recent and show no apparent trend (**ALB-Figure 8**).

Based on the 2007 assessment which considers catch, size and effort since the 1950s, our view of the southern albacore resource status stock is that the spawning stock has declined to about 25% of its unfished level in 2005 (**ALB-Figure 9**). The Committee concluded that it is likely that the stock was below the maximum sustainable yield (MSY) level as it was estimated to about 90% of B_{MSY} in 2005, while the 2005 fishing mortality rate was about 60% of F_{MSY}. MSY was estimated to be around 33,300 t, whereas the replacement yield averaged over the last 10 years, is approximately 29,000 t.

Distribution of the pairs of current 2005 status of catch and fishing mortality ratios estimated from the production model are displayed to show the uncertainty around the estimates (**ALB-Figure 10**).

Mediterranean

Due to the lack of appropriate data, an assessment of the Mediterranean stock has never been carried out by the ICCAT Committee.

ALB-4. Outlook

North Atlantic

The assessment indicated that the spawning stock will decline from the levels estimated in 2005 over the next few years, particularly given the fact that the 2006 catch was higher than the 2005 level (**Figure 11**).

The spawning stock response to different catch levels after the next few years depends upon the real strength of the 2003 year class, which our assessment indicates could be relatively strong, although we do not have confidence in the overall level.

South Atlantic

The assessment indicates that the spawning stock will increase from the levels estimated in 2005 over the next few years, assuming catches in 2006 and 2007 remain about the 2005 level, which is below the estimated replacement yield of about 29,000 t **(Figure 9)**

ALB-5. Effects of current regulations

North Atlantic

Since 2001, the Commission established a total allowable catch (TAC) of 34,500 t for this stock and, in 2003 extended it to 2007. Furthermore, a 1998 recommendation that limits fishing capacity to the average of 1993-1995, remains in force. The Committee noted that reported 2001-2004 catches had been below the TAC, but that 2005 and 2006 catches were above TAC. However, the 2007 reported catch of 21,549 t, well below the TAC **(ALB-Table 1).**

South Atlantic

Since 1999, the Commission established the total allowable catch (TAC) for this stock (in 2001-2003 the TAC has been set to 29,200 t) and since then has been extended until 2007. The Committee noted that reported catches in 2007 were well below the TAC.

Mediterranean

There are no ICCAT regulations directly aimed at managing the Mediterranean albacore stock.

ALB-6. Management recommendations

North Atlantic

The total allowable catch (TAC) for the northern albacore stock until 2007 was 34,500 t. The Committee noted that the reported catches for 2005 and 2006 were over the TAC and that the 2007 catch was well below the TAC. Furthermore, stock projections indicated that the northern stock will not recover from the overfished conditions if catch levels remain over 30,000 t. If strong year classes enter the fishery, which is uncertain but suggested by some CPUE series, the stock would recover faster. In 2007, the Commission implemented [Rec. 07-02], intended to reduce the TAC to 30,200 t in 2008 and 2009 and allow the rebuilding of the northern albacore stock from the overfished condition. However, it was noted that the fishing opportunities provided in [Rec. 07-02] allow the potential catch to exceed the TAC (**ALB-Figure 2a**).

South Atlantic

In the case of the southern stock, the present TAC is 29,200 t. Recent catches were below the TAC level. The assessment showed that the southern stock is overfished; model projections indicated that catches, at about the 2006 level, will recover the stock. The observed 2007 catch was, however, even lower. The Committee considered that the current management regulations are sufficient for the recovery of the southern stock. In 2007, the Commission recommended [Rec. 07-03] adopting a catch limit of 29,900 t (the lowest estimate of MSY) until 2011.

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY

	North Atlantic	South Atlantic	Mediterranean
Current (2007) Yield	21,549 t	20,032 t	6,546 t
Maximum Sustainable Yield	30,200 t (26,800-34,100) [1]	33,300 t (29,900-36,700) [1]	Unknown
Replacement Yield (2006)	~ 32,000 t	28,800 t (25,800-29,300)[1]	Not estimated
B_{2005}/B_{MSY}	0.81 (0.68-0.97)[1]	0.91 (0.71-1.16)[1]	Not estimated
Relative Fishing Mortality			
F_{2005}/F_{MSY}	1.5 (1.3-1.7)[1]	0.63 (0.47-0.9)[1]	Not estimated
F_{2005}/F_{MAX}	2.6 (1.1-3.5)[2] - 1.0[3]	--	Not estimated
$F_{2005}/F_{0.1}$	5.5 (2.4-6.8)[2] - ~ 2.0[3]	--	Not estimated
Management measures in Effect	[Rec. 98-08]: Limit Number of vessels to 1993-1995 average TAC: 34,500 t [Rec. 03-06] until 2007 TAC: 30,200 t [Rec. 07-02] for the 2008 and 2009 period	[Rec. 03-07]: Limit Catches to 29,900 t until 2011	None

[1] Approximately 80% confidence bounds from the base case analysis in the North stock and 95% confidence bounds in the South stock.

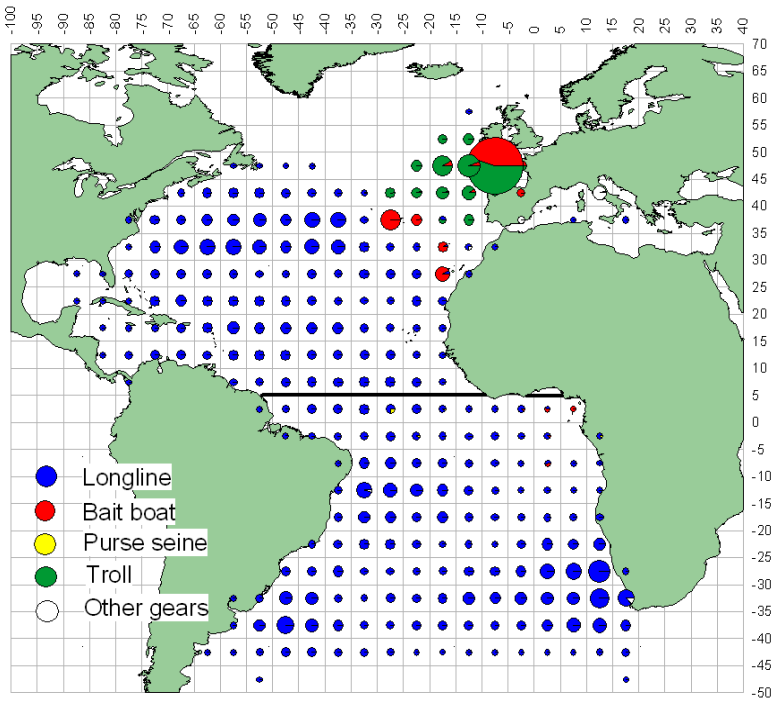
[2] Approximately 80% confidence bounds from bootstrapped VPA and yield-per-recruit analysis.

[3] From Multifan-CL yield-per-recruit analysis not confidence bounds estimated.

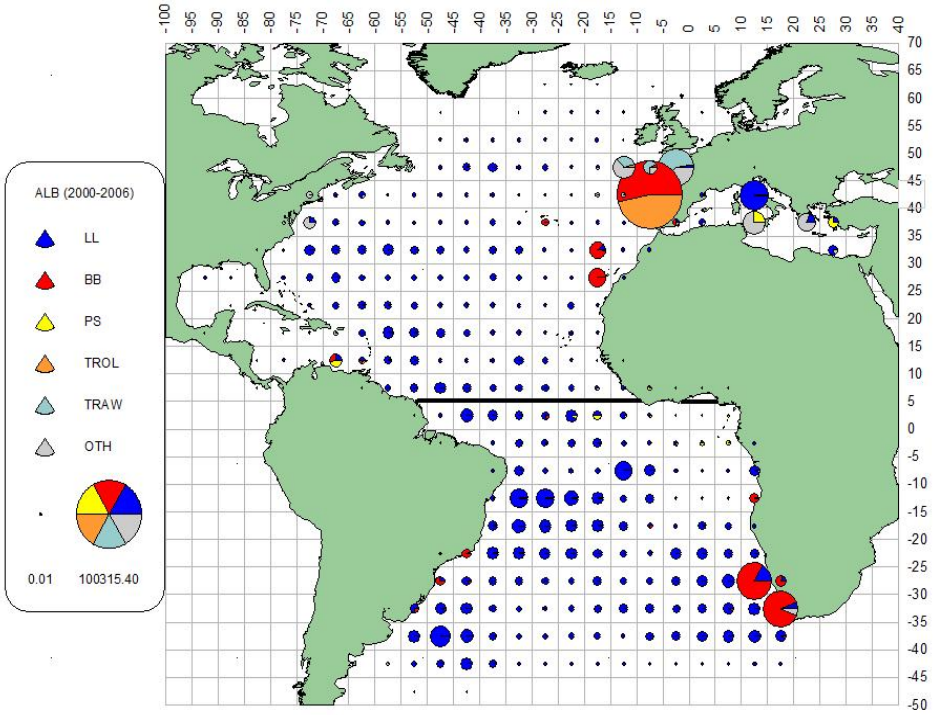
ALB-Table 1. Estimated catches (t) of albacore *(Thunnus alalunga)* by major area, gear and flag.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL			67643	59850	76052	88554	82738	67229	63342	67167	56343	69598	73078	71613	67512	60353	59560	58888	67045	71157	69916	60094	61530	53359	57619	67434	48127
ATN			51490	41800	40826	47554	38115	33059	32070	36557	27949	30861	38135	35149	38376	28803	28997	25595	34551	34199	26254	22741	25642	25958	35260	37017	21549
ATS			14918	14599	31097	37288	40630	30107	27212	28714	26016	36533	32813	35115	27549	28426	28022	30595	27642	31380	38796	31746	27995	22527	18829	24469	20032
MED			1235	3451	4129	3712	3993	4063	4060	1896	2378	2203	2130	1349	1587	3125	2541	2698	4851	5577	4866	5608	7893	4874	3529	5947	6546
Landings	ATN	Bait boat	21108	8313	12589	15202	18756	15933	15374	18625	8985	12448	15646	11967	16411	11338	9821	7562	8780	12148	6104	6638	7918	8128	10458	14273	8497
		Longline	16863	19709	17413	21232	7296	3013	2238	2683	5315	3152	7093	7308	4857	4641	4051	3884	6710	7321	7372	6180	7698	6909	6890	5251	2794
		Other surf.	367	2194	108	213	343	994	1652	3865	3999	5172	7279	7506	3555	3337	4378	6846	6817	5970	2828	422	550	696	622	625	526
		Purse seine	364	555	59	60	1	97	12	1	222	139	229	278	278	263	0	91	56	191	264	118	211	355	65	188	198
		Trawl	0	0	2	0	262	1693	2240	1033	469	2603	1779	2131	3049	2571	2877	1318	5343	3547	5374	5376	3846	2369	7001	6385	3429
		Troll	12788	11029	10654	10847	11457	11329	10554	10350	8959	7348	6109	5959	10226	6652	7870	5894	6845	5023	4312	4007	5419	7501	10224	10296	6105
	ATS	Bait boat	1794	4166	7909	6829	8181	7696	7393	5981	3454	6490	7379	8947	7091	6960	8110	10353	6709	6873	10355	9712	6973	7475	5084	5876	3374
		Longline	11941	9834	22672	29815	30964	21828	19407	21590	22008	27133	23947	24607	20036	21000	19547	19799	20626	24398	28039	21671	20619	14735	12925	17757	14851
		Other surf.	484	234	334	400	537	398	411	1139	137	393	39	483	10	209	127	0	73	58	377	323	82	299	288	395	1762
		Purse seine	699	365	182	244	948	185	0	4	416	2517	1448	1078	412	257	117	434	183	51	25	39	309	0	533	441	45
		Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	9	52	0	0	0	12	18	0	0	
	MED	Bait boat	535	1331	243	0	0	0	0	83	499	171	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0
		Longline	0	226	375	150	161	168	165	624	523	442	402	350	87	366	348	194	417	2800	2597	3706	4248	2345	2012	3010	4113
		Other surf.	700	1753	2973	3552	3782	3879	3879	1098	1198	1534	879	766	1031	2435	1991	2426	4265	2689	2193	1755	3166	2176	1200	134	1400
		Purse seine	0	141	274	10	50	16	16	91	110	6	559	23	0	0	0	0	0	0	0	1	478	353	317	2803	1033
		Troll	0	0	264	0	0	0	0	0	48	50	59	129	306	119	202	45	73	0	0	117	0	0	0	0	
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	5	5	0	0	9	7
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
		Canada	0	0	0	1	21	47	22	6	5	1	9	32	12	24	31	23	38	122	51	113	56	27	52	27	25
		Cape Verde	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	14	8	20	0	0	21	16	57	196	155	32	112	202	59
		Chinese Taipei	14254	14923	14899	19646	6636	2117	1294	3005	4318	2209	6300	6409	3977	3905	3330	3098	5785	5299	4399	4330	4557	4278	2540	2357	1297
		Cuba	38	69	20	31	15	4	0	2	0	0	0	0	0	0	0	0	0	0	0	1	322	435	424	527	
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	323	121	73	95	0	0	0	0	0	0	
		EC.España	29557	15656	20672	24387	28206	26738	25424	25792	17233	18174	18380	16998	20197	16324	17295	13285	15363	16000	9177	8952	12530	15379	20447	24538	14582
		EC.France	2391	2797	1860	1200	1921	2805	4050	3300	4123	6924	6293	5934	5304	4694	4618	3711	6888	5718	6006	4345	3456	2455	7232	6585	3179
		EC.Ireland	0	0	0	0	0	0	0	40	60	451	1946	2534	918	874	1913	3750	4858	3464	2093	1100	755	175	306	521	596
		EC.Portugal	1778	775	657	498	433	184	169	3185	709	1638	3385	974	6470	1634	395	91	324	278	1175	1953	553	513	556	119	184
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	59	499	613	196	49	33	117	343	15	0	0	0	0	6	19	30
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	7	2	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	7	6	12	21	23	46	25	29	19	20
		Japan	1156	576	844	470	494	723	764	737	691	466	485	505	386	466	414	446	425	688	1126	711	681	893	1336	809	261
		Korea Rep.	478	967	390	373	18	16	53	34	1	0	8	0	0	2	1	0	0	0	0	0	0	0	59	45	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	81	120	178	98	96
		Mexico	33	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 (Flag related)	0	0	0	0	0	0	0	0	11	19	13	10	8	11	3	8	12	0	0	0	0	0	0	0	
		Panama	357	2551	601	525	44	0	0	0	0	29	60	103	73	11	5	0	0	0	0	0	0	0	0	96	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	704	1370	300	1555	89	802	76	263
		Sta. Lucia	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	1	3	2	10	0	2	2	2
		Trinidad and Tobago	268	194	318	0	0	0	0	4	0	247	0	0	0	0	2	1	1	2	11	9	12	12	9	12	18
		U.S.A.	347	2206	98	251	301	288	243	357	479	438	509	741	545	472	577	829	315	406	322	480	444	646	488	400	532
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	2	0	0	1	1	0	0
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	414	507	235	
		Venezuela	823	1076	467	172	26	137	41	95	319	205	246	282	279	315	49	107	91	1374	349	162	424	457	175	321	375
	ATS	Argentina	55	209	153	356	469	344	354	151	60	306	0	2	0	0	120	9	52	0	0	0	12	18	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	32
		Belize (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	8	2	0	0	0	0	0	0	
		Brasil	731	732	382	520	395	421	435	514	1113	2710	3613	1227	923	819	652	3418	1872	4411	6862	3228	2647	522	556	361	535
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	89	26	30	26	112	95	100	35
		Chinese Taipei	9502	7889	19643	27592	28790	20746	18386	21369	19883	23063	19400	22573	18351	18956	18165	16106	17377	17221	15833	17321	17351	13288	10730	12293	13146

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	Cuba	36	67	27	24	10	2	1	2	17	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EC.España	295	307	155	200	807	185	0	0	280	1943	783	831	457	184	256	193	1027	282	573	836	376	81	285	367	758
	EC.France	372	7	18	35	100	0	0	0	50	449	564	129	82	190	38	40	13	23	11	18	63	0	478	347	12
	EC.Portugal	0	741	1357	1029	899	1153	557	732	81	184	483	1185	655	494	256	124	232	486	41	433	415	9	43	8	13
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	
	Honduras (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	2	0	7	1	6	0	0	0	0	0	0	0	
	Japan	188	224	623	739	357	405	450	587	654	583	467	651	389	435	424	418	601	554	341	231	315	509	312	333	236
	Korea Rep.	599	348	511	321	383	180	54	19	31	5	20	0	0	18	4	7	0	18	1	0	5	37	42	66	
	Maroc	0	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NEI (ETRO)	0	0	0	0	0	0	0	4	8	122	68	55	63	41	5	27	0	0	10	14	53	0	15	46	15
	NEI (Flag related)	0	0	0	0	0	0	0	0	149	262	146	123	102	169	47	42	38	0	0	0	0	0	0	0	
	Namibia	0	0	0	0	0	0	0	0	0	0	0	915	950	982	1199	1429	1162	2418	3419	2962	3152	3328	2344	5100	1196
	Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	192	0	2	0	0	0	0	0	0	
	Panama	0	0	0	280	924	0	0	0	240	482	318	472	228	380	53	60	14	0	0	0	0	0	17	0	18
	Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	
	South Africa	2760	3540	6697	5930	7275	6570	6890	5280	3410	6360	6881	6931	5214	5634	6708	8412	5101	3610	7236	6507	3469	4502	3198	3735	3797
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2116	4292	44	0	0	0	65	160
	U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	1	1	2	8	2	1	0	0	
	UK.Sta Helena	7	9	0	0	2	1	1	1	5	28	38	5	82	47	18	1	1	58	12	2	0	0	0	62	46
	Uruguay	373	526	1531	262	178	100	83	55	34	31	28	16	49	75	56	110	90	90	135	111	108	120	32	93	34
	Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	1400	
MED	EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	12	30	255	425	507	712
	EC.España	535	1368	531	0	0	3	0	84	547	228	290	218	475	404	380	126	284	152	200	209	1	138	189	382	516
	EC.France	0	141	250	20	60	31	31	121	140	11	64	23	3	0	5	5	0	0	0	1	0	0	0	0	
	EC.Greece	0	0	0	484	500	500	500	500	500	500	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448
	EC.Italy	700	1942	3348	3208	3433	3529	3529	1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6912	3671	2248	4584	4017
	EC.Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	0	2	0	10	15	0	1
	NEI-2	0	0	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	30	73	852

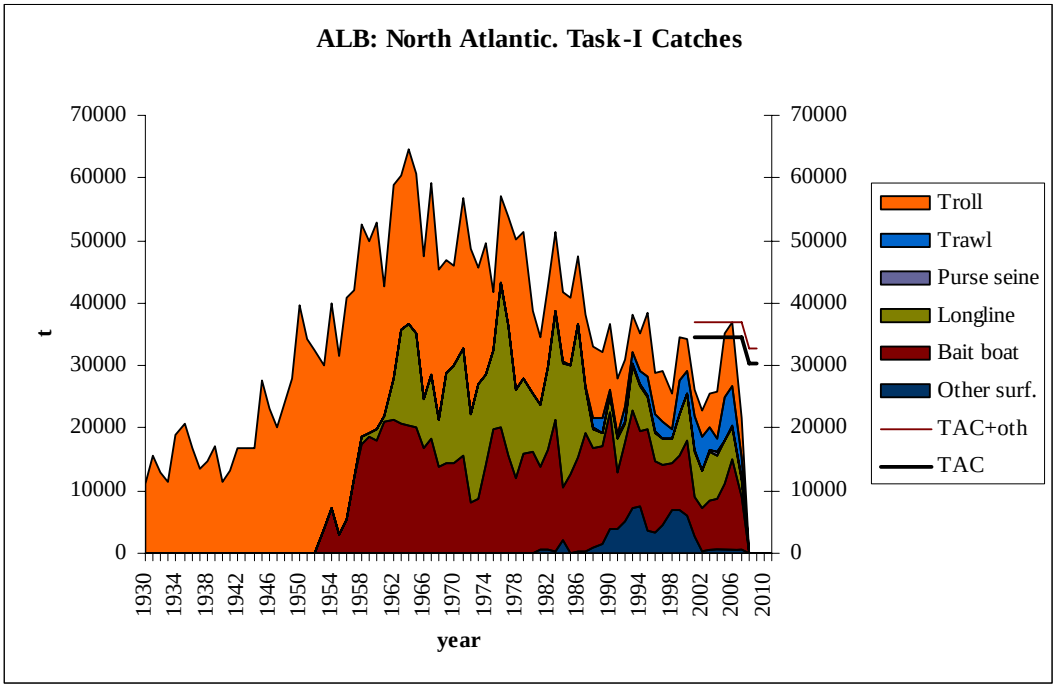


ALB-Figure 1a. Geographic distribution of ALB catch by major gears (1970-1979).

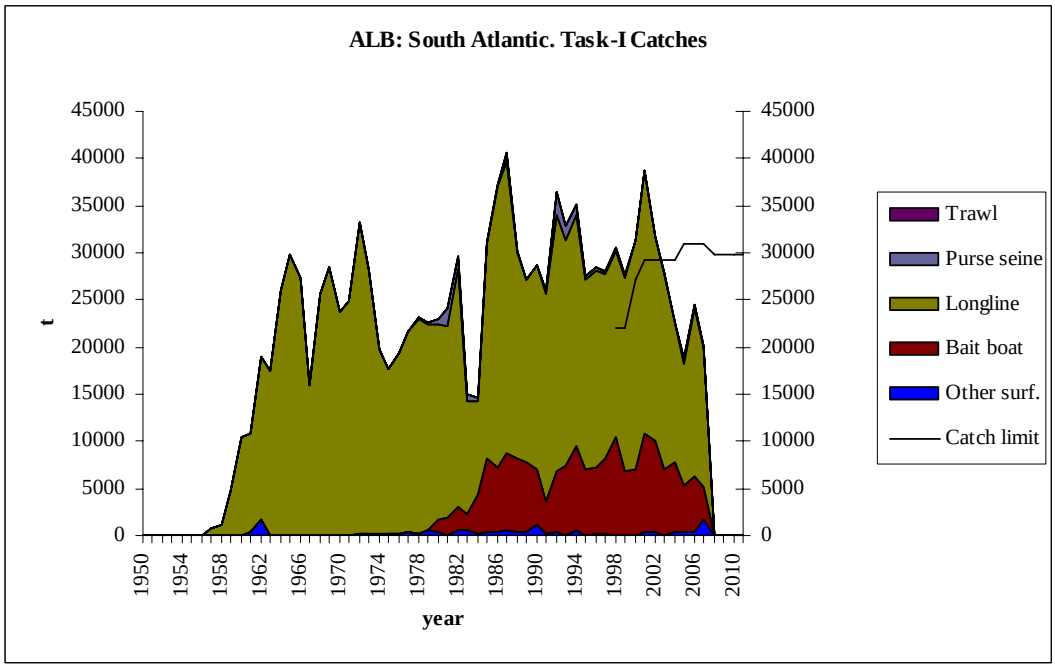


ALB-Figure 1b. Area distribution of average 2000-2006 albacore catches by gear.

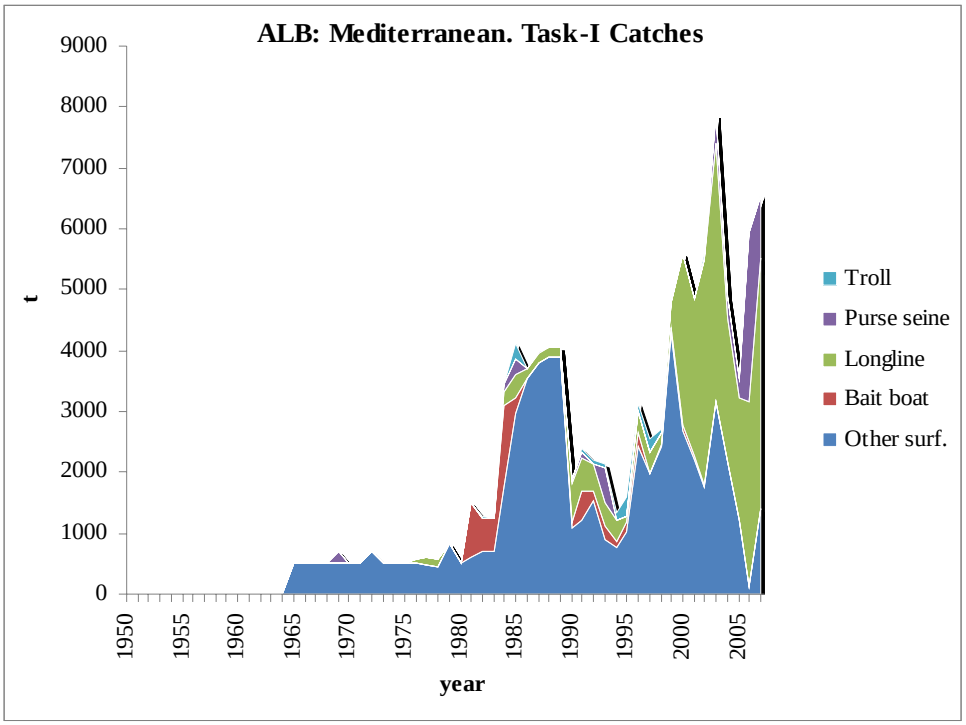
a)


ALB: North Atlantic. Task-I Catches
t
year
Troll
Trawl
Purse seine
Longline
Bait boat
Other surf.
TAC+oth
TAC

b)

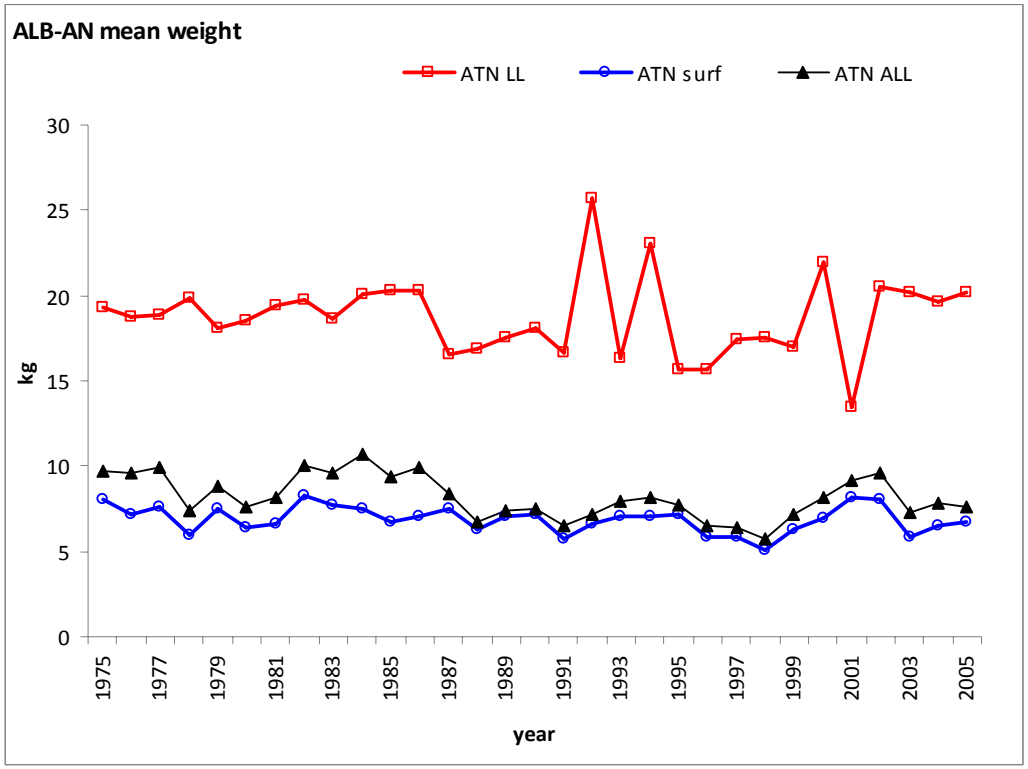

ALB: South Atlantic. Task-I Catches
t
year
Trawl
Purse seine
Longline
Bait boat
Other surf.
Catch limit

c)

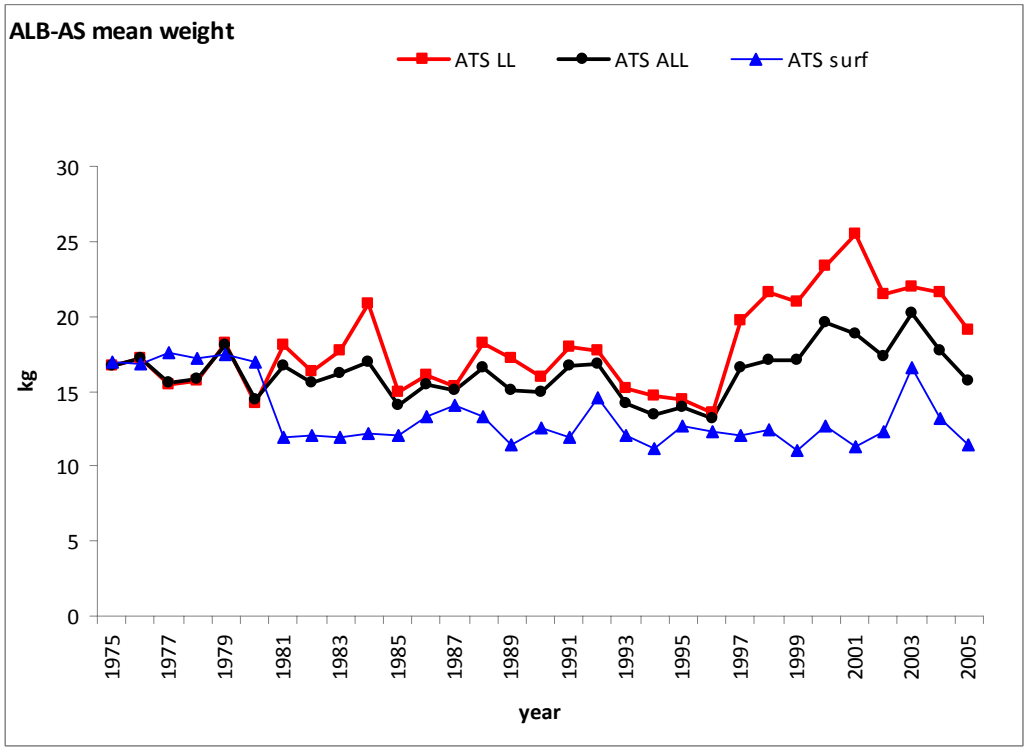


ALB-Figure 2a, b, c. Total albacore catches reported to ICCAT (Task I) by gear for the northern, southern Atlantic stocks including TAC, and Mediterranean stock.

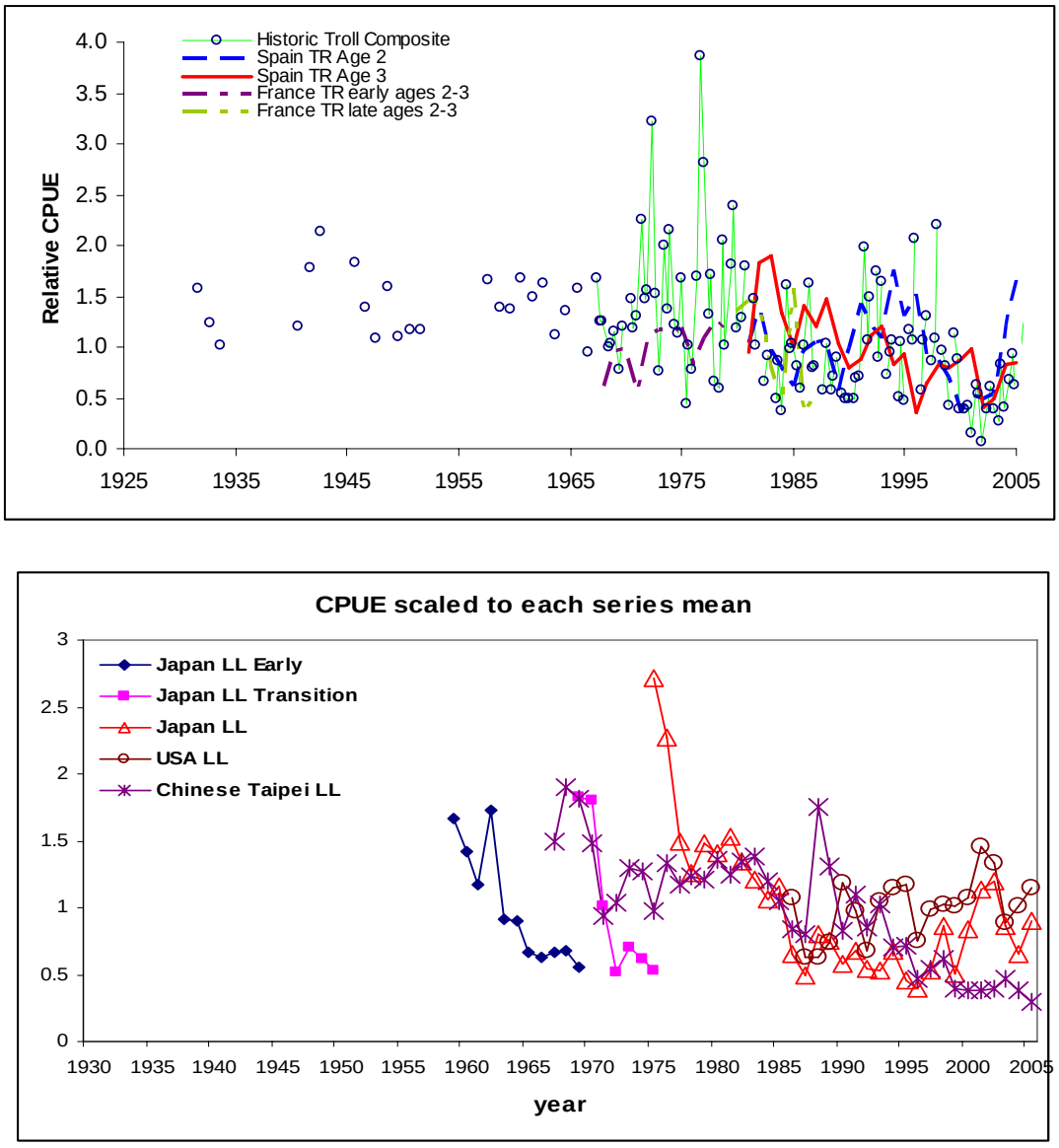
a)



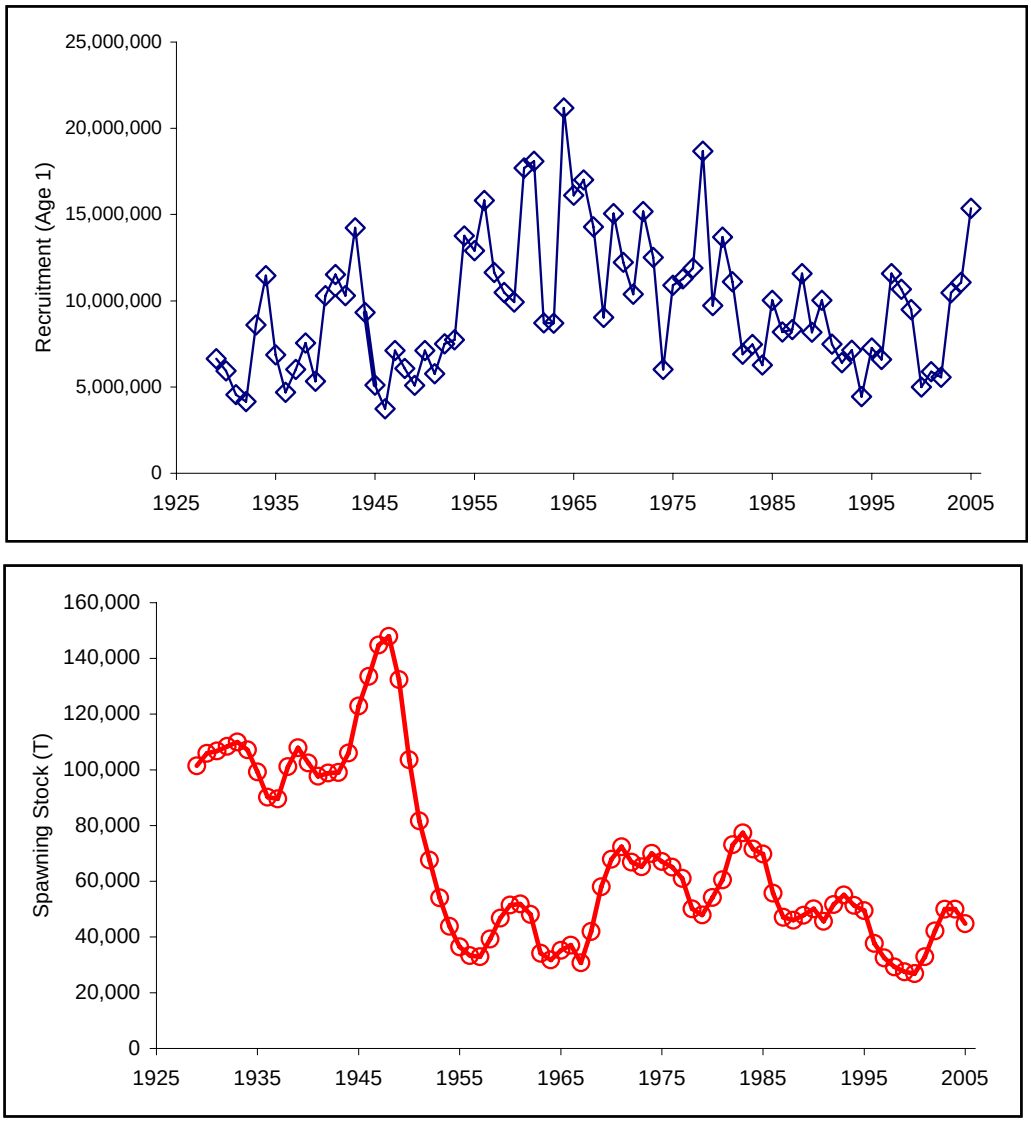
b)



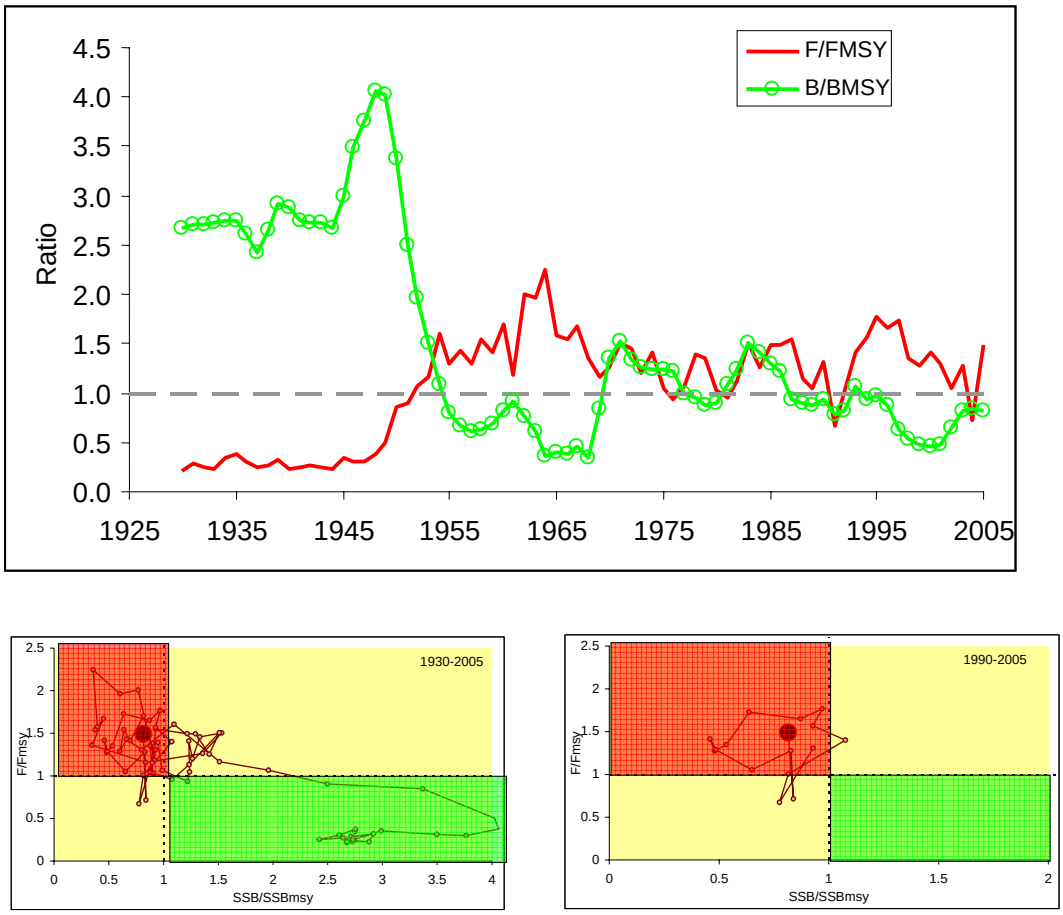
ALB-Figure 3a, b. Mean weight trend by surface and longline fisheries in North and South Atlantic stocks.



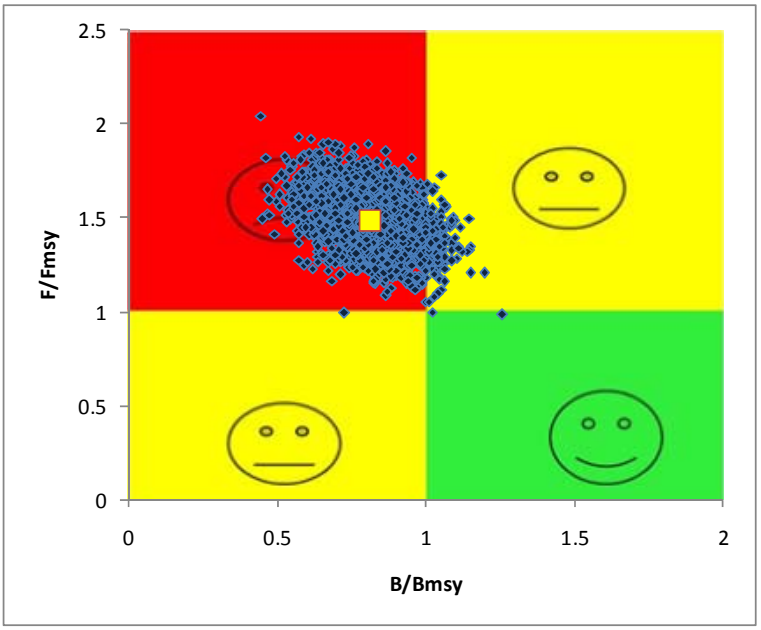
ALB-Figure 4. Standardized catch rate indices used in the 2007 northern albacore stock assessment from the surface fisheries (upper panel), which take mostly juvenile fish, and from the longline fisheries (lower panel), which take mostly mature fish.



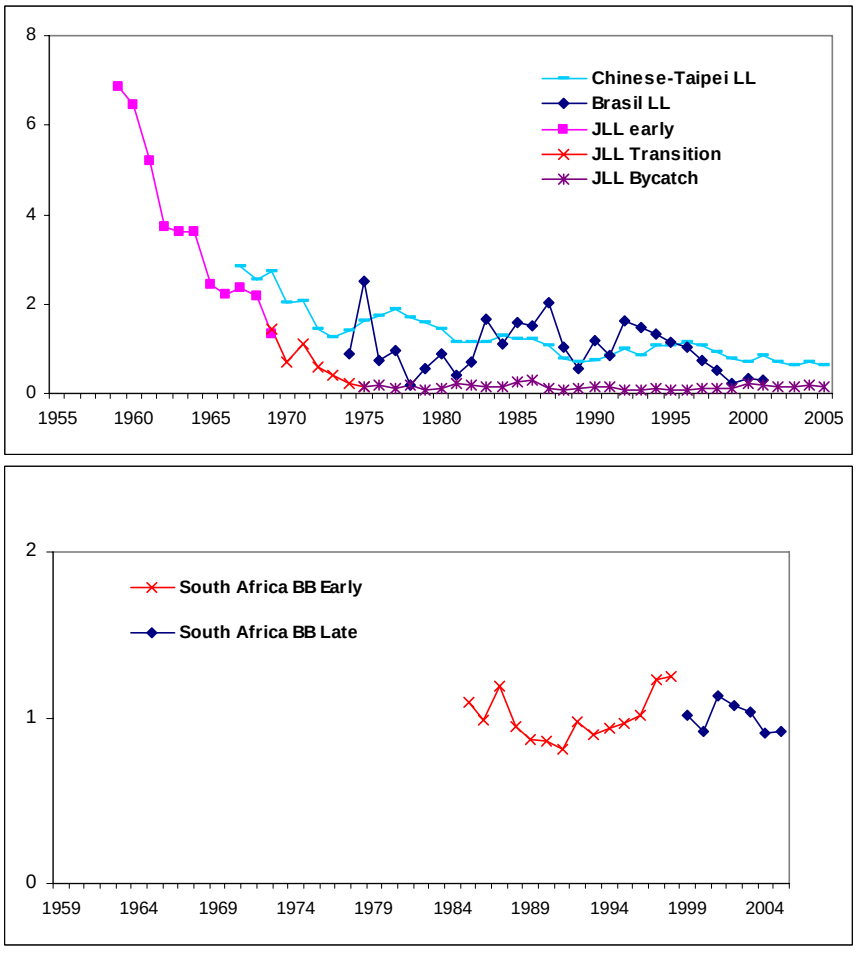
ALB-Figure 5. Estimates of northern Atlantic albacore recruitment (age 1) and spawning stock size from 1930-2005 from Multifan-CL output. Uncertainty in the estimates has not been characterized, but the uncertainty in recent recruitment levels is considered to be higher than in the past.



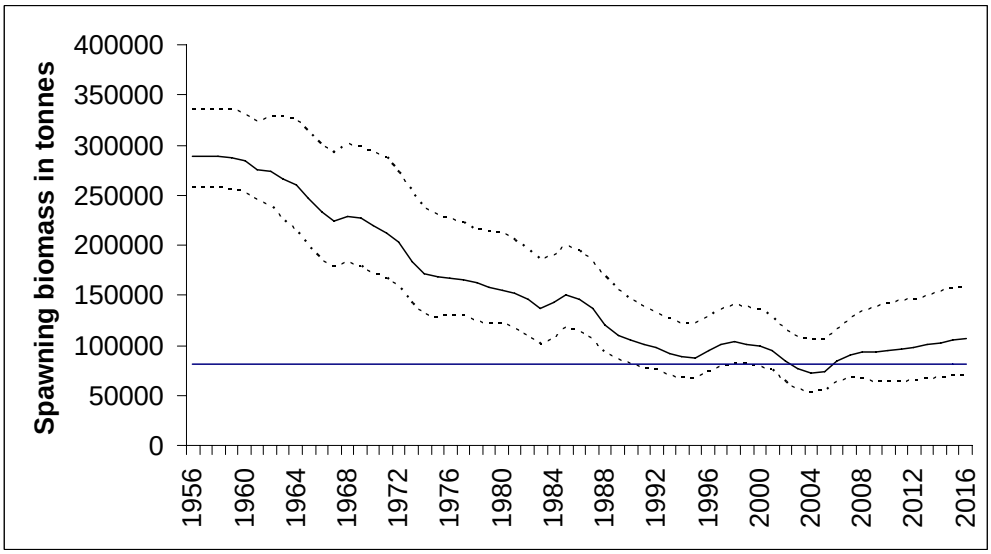
ALB-Figure 6. Stock status of northern albacore, estimated with Multifan-CL. Top: Relative biomass (B/B_{MSY}) and relative fishing mortality (F/F_{MSY}) trajectories over time. Bottom: joint trajectories of B/B_{MSY} and F/F_{MSY}. The large closed circle in the lower panels represents the stock status in 2005.

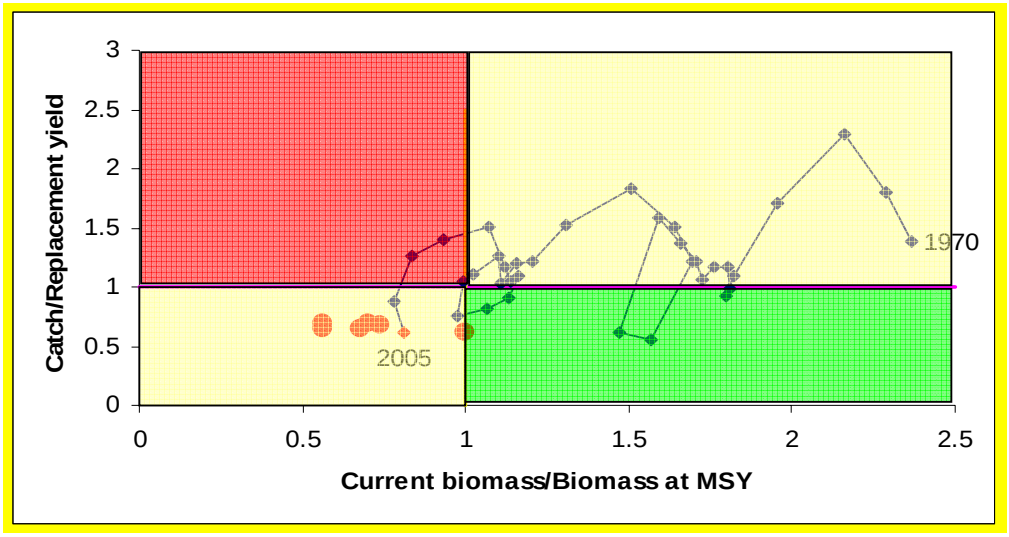


ALB-Figure 7. The distribution of stock status determination for North Atlantic albacore en 2005 indicating the uncertainty in this evaluation.

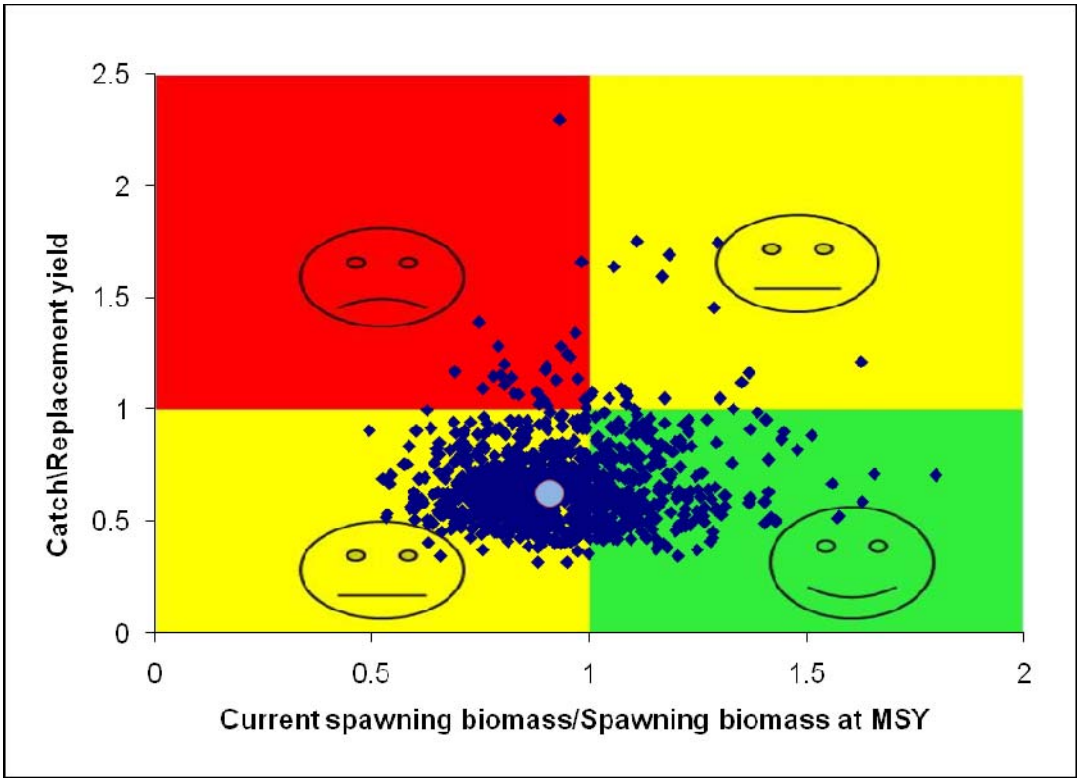


ALB-Figure 8. Standardized catch rates indices used in the 2007 southern albacore stock assessment from the longline fisheries (upper panel), which take mostly mature fish, and from the surface fisheries (lower panel), which take mostly juvenile fish.

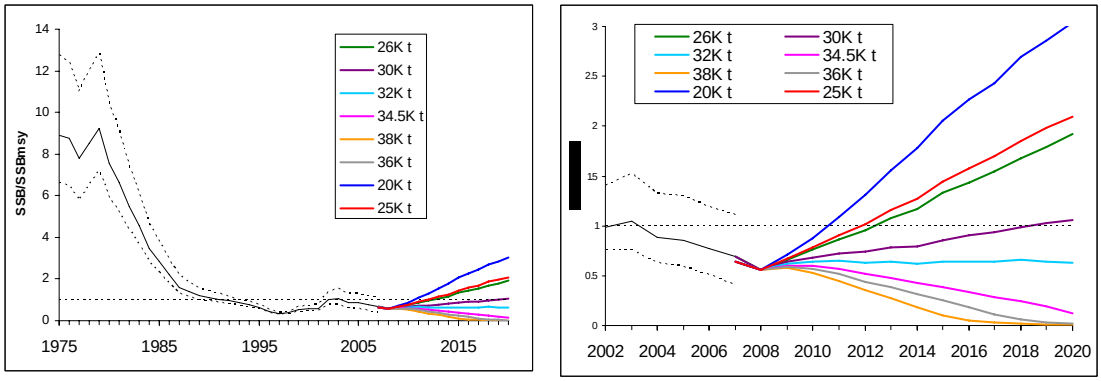




ALB-Figure 9. The upper plate indicates southern albacore spawning biomass over time, projections with a constant catch of 25,000 t over the next years and the reference B_{MSY} level with 80% confidence bounds. The lower plate indicates catch relative to replacement yield vs. current biomass relative to the biomass at MSY for the period 1970-2005. The circles are the current state of the stock for all the sensitivity runs.



ALB-Figure 10. The distribution of stock status determination for South Atlantic albacore in 2005 indicating the uncertainty in this evaluation.



ALB-Figure 11. Estimated projections of relative SSB (SSB/SSB_{MSY}) for different scenarios of constant catch assuming average recent year-class strengths for the North Atlantic albacore stock.

8.5 BFT – ATLANTIC BLUEFIN TUNA

In response to [Rec. 06-05] and [Rec. 06-06], the SCRS conducted updated assessments of the status of the bluefin tuna resource in the Atlantic, taking into account the most recently available catch and effort data. In the case of the western stock, the available data included catch, effort and size statistics through 2007, while for the eastern stock, data for 2007 were unavailable for analysis during the assessment session (see ICCAT Circular #1227/08). There are considerable data limitations for the eastern stock for the recent period. These include poor temporal and spatial coverage for detailed size and catch-effort statistics for many fisheries, especially in the Mediterranean. Substantial under-reporting of total catches is also evident. Nevertheless, the Committee assessed the stock in 2008 as requested by the Commission (see SCRS/2008/019 for the detailed report).

BFT-1. Biology

Atlantic bluefin tuna (BFT) mainly live in the pelagic ecosystem of the entire North Atlantic and its adjacent seas, primarily the Mediterranean Sea. Bluefin tuna has a wide geographical distribution and is one of the only large pelagic fish living permanently in temperate Atlantic waters **(BFT-Figure 1)**. Archival tagging and tracking information confirmed that bluefin tuna can sustain cold as well as warm temperatures while maintaining stable internal body temperature. Until recently, it was assumed that bluefin tuna preferentially occupies the surface and subsurface waters of the coastal and open-sea areas, but archival tagging and ultrasonic telemetry data indicate that bluefin tuna frequently dive to depths of 500m to 1,000m. Bluefin tuna is also a highly migratory species that seems to display a homing behavior and spawning site fidelity in both the Mediterranean Sea and Gulf of Mexico, which constitute the two main spawning areas being clearly identified today. Less is known about feeding migrations within the Mediterranean and the North Atlantic, but results from electronic tagging indicated that bluefin tuna movement patterns vary considerably between individuals, years and areas. The appearance and disappearance of important past fisheries further suggest that important changes in the spatial dynamics of bluefin tuna may also have resulted from interactions between biological factors, environmental variations and fishing. Although the Atlantic bluefin tuna population is managed as two stocks, separated by the 45°W meridian, its population structure remains poorly understood and needs to be further investigated. Recent genetic and microchemistry studies as well as work based on historical fisheries tend to indicate that the bluefin tuna population structure is complex.

Currently, bluefin tuna is assumed to mature at 4 years of age (approximately 25 kg) in the Mediterranean and at 8 years of age (approximately 140 kg) in the Gulf of Mexico. Juvenile and adult bluefin tuna are opportunistic feeders (as are most predators) and their diet can include jellyfish and salps, as well as demersal and sessile species such as, octopus, crabs and sponges. However, in general, juveniles feed on crustaceans, fish and cephalopods, while adults primarily feed on fish such as herring, anchovy, sand lance, sardine, sprat, bluefish and mackerel. Juvenile growth is rapid for a teleost fish (about 30cm/year), but slower than other tuna and billfish species. Fish born in June attain a length of about 30-40cm long and a weight of about 1 kg by October. After one year, fish reach about 4 kg and 60cm long. Growth in length tends to be lower for adults than juveniles, but growth in weight increases. At 10 years old, a bluefin tuna is about 200cm and 150 kg and reaches about 300cm and 400 kg at 20 years. However, there remain large uncertainties about bluefin tuna growth curves. Bluefin tuna is a long lived species, with a lifespan of 20 years or more, as indicated by recent studies from radiocarbon deposition.

In the 2006 stock assessment conducted by the SCRS, a need to integrate recent and anticipated advances in otolith microconstituent analyses, age determination, archival tagging and genetics into the next assessment and management evaluation processes, was noted. While more work needs to be completed, the SCRS has achieved important progress towards that goal. Concerning age determination, the SCRS received new information that presented a novel approach for determining age and area of natal origin from the same otolith, allowing construction of area-specific growth curves. The preliminary results diverge considerably from the age-length relationship used by the SCRS for the western stock, and could have significant impacts for estimates of stock productivity.

The information on natal origin derived from otolith microchemistry received by the SCRS indicated that there is an increasing contribution of eastern origin fish to the western fisheries with decreasing average size of the fish in the catch (*i.e.* up to 62% for fish in the 69-119 cm size class). In contrast, other western fisheries supported by the largest size classes had minimal or no eastern component in the catch. However, there remains considerable uncertainty and therefore additional samples are needed to improve our understanding of the relative contribution of the two populations to the different fisheries over time.

BLUEFIN TUNA - EAST

BFTE-2. Fishery Indicators – East Atlantic and Mediterranean

It is very well known that introduction of fattening and farming activities into the Mediterranean in 1997 and good market conditions resulted in rapid changes in the Mediterranean fisheries for bluefin tuna mainly due to increasing purse seine catches. In the last few years, nearly all of the declared Mediterranean bluefin fishery production is exported overseas. Declared catches in the East Atlantic and Mediterranean reached a peak of over 50,000 t in 1996 and, then decreased substantially, stabilizing around TAC levels established by ICCAT for the most recent period **(BFT-Table 1** and **BFTE-Figure 1)**. Both the increase and the subsequent decrease in declared production occurred mainly for the Mediterranean **(BFTE-Figure 1)**. In 2006, declared catch was about 30,647 t for the East Atlantic and Mediterranean, of which about 23,154 t were declared for the Mediterranean (note that 2007 catch reports were unavailable at the time of the assessment meeting; 2007 reported catches on the September 25, 2008, were still provisional and at 32,398 t).

Information available reinforces the Committee's belief that catches of bluefin tuna from the eastern Atlantic and Mediterranean have been seriously under-reported in recent years. An estimate made by the Committee in 2006 based on the number of vessels operating in the Mediterranean Sea and their respective catch rates, indicates that the volume of catch taken in recent years likely significantly exceeded TAC levels and probably was close to 43,000 t in the Mediterranean during the early 2000s. The Committee's evaluation in 2008 using the information from the ICCAT List of Bluefin Vessels and scientific knowledge of the fisheries led to a 2007 probable catch of 47,800 t for the Mediterranean and 13,200 t for the East Atlantic, leading to a total of about 61,100 t for the Eastern Atlantic bluefin tuna stock (**BFTE-Figure 1**, **BFTE-Table 1**). The Committee's belief in significant underreporting is further supported by examination of the information reported through various market data sources and which all leads us to conclude that the exports to the Japanese and US markets largely exceed the reported catches (see Section 5.3 of SCRS/2008/019). This apparent lack of compliance with the TAC and underreporting of the catch will undermine conservation of the stock.

Available indicators from small fish fisheries in the Bay of Biscay did not show any clear trend since the mid 1970s **(BFTE-Figure 2)**. This result is not particularly surprising because of strong inter-annual variation in year class strength. Indicators from longliners and traps targeting large fish (spawners) in the East Atlantic and the Mediterranean Sea displayed a recent increase after a general decline since the mid-1970s **(BFTE-Figure 2)**. The Committee found it difficult to derive any clear conclusion from fisheries indicators in the absence of more precise information about the catch composition, effort and spatial distribution of the purse seine fisheries (which represent more than 60% of the total recent reported catch). Fisheries-independent indicators (scientific surveys) and a large scale tagging program in the Mediterranean Sea are also needed.

BFTE-3. State of the stock

There are considerable data limitations for the assessment of the stock. These include poor temporal and spatial coverage for detailed size and catch-effort statistics for many fisheries, especially in the Mediterranean. Substantial under-reporting of total catches is also evident. Nevertheless, the Committee assessed the stock in 2008 as requested by the Commission. Unless substantial improvements are made in the catch and effort statistics or new information on key issues is available, there is little scientific need to perform a stock assessment every two years because many results are based on equilibrium assumptions. Furthermore, any change in exploitation or management will take several years to have a detectable effect on the biomass because bluefin tuna is a long lived species. This explains why the Committee's diagnosis and advice is very similar to that of 2006 and 2007.

The assessment results indicate that the spawning stock biomass (SSB) has been declining rapidly in the last several years while fishing mortality (F) has been increasing rapidly, especially for large bluefin (i.e. ages 10+, **BFTE-Figure 3**). The increase in mortality for large bluefin tuna is consistent with a shift in targeting towards larger individuals destined for fattening and/or farming. The decline in SSB is evident from the results of analyses that used both reported and adjusted (for underreporting) catch and CPUE information. These analyses indicate that recent (2003-2007) SSB is less than 40% of the highest estimated levels (at the start of the time series 1970-1974 or 1955-1959, depending on the analysis). The decline in SSB appears to be more pronounced during the more recent years, especially under the scenarios with adjusted catches, although estimates for the most recent years should be judged with caution due to high uncertainties and lack of data. The absolute values estimated for *F* and SSB remain sensitive to the assumptions of the analysis. But, it is noteworthy that results are

consistent between different types of models which make use of different assumptions (Section 8.1 of SCRS/2008/019). All the analyses indicate a general recent increase in *F* for large fish and, consequently, a decline in SSB.

Estimates of current stock status relative to MSY benchmarks are uncertain, but lead to the conclusion that recent F is too high and recent SSB too low to be consistent with the Convention Objectives. Depending on different assumed levels of resource productivity current F is most likely at least 3 times that which would result in MSY and SSB is most likely to be about 36% or less than the level needed to support MSY **(BFTE-Figure 4)**. Even in the most optimistic evaluation of the Committee, assuming recruitment will not decrease if SSB continues to decline, substantial overfishing is occurring and spawning biomass is well below levels needed to sustain MSY.

BFTE- 4. Outlook

During the last decade, there has been an overall shift in targeting towards large bluefin tuna, mostly in the Mediterranean. As the majority of these fish are destined for fattening and/or farming operations, it is crucial to get precise information about the total catch, the size composition, the area and flag of capture, time in captivity as well as growth and death in farms. The under-reporting of overall catches (of both small and large fish) further undermines the assessment. These factors, combined with the lack of reliable historical information for several fleets and for the Mediterranean as a whole, means the stock cannot be monitored with confidence and, therefore, severe depletion can easily go undetected.

It should be noted that if the overall selectivity pattern has shifted towards larger fish **(BFTE-Figure 3)**, this could result in improved yield-per-recruit levels in the long-term if *F* were reduced to F_{MSY}. However, such changes would take many years to translate into gains in yield due to the longevity of the species. Realization of higher long-term yields would further depend on future recruitment level, but the possibility of recruitment overfishing in the near future cannot be dismissed considering the high current *F* on spawners.

Continuing fishing at the current level fishing mortalities is expected to drive the spawning stock biomass, to very low levels; i.e. to about 18% of the SSB in 1970 and 6% of the unfished SSB. This combination of high *F*, low SSB and severe overcapacity result in a high risk of fisheries and stock collapse **(BFTE-Table 1, BFTE-Figure 3)**.

The Committee also evaluated the potential effects of [Rec. 06-05]. As 2007 catch data from the fishery operating under these management measures were not available for comprehensive analysis at the 2008 assessment (see Circular #1227/08), the Committee has performed equilibrium-based and non-equilibrium-based projections starting from the 2006 estimates. Acknowledging that there is insufficient scientific information to determine precisely the productivity of the stock, the Committee considered different contrasting and plausible productivity scenarios as well as different scenarios about the historical catches and the implementation of [Rec. 06-05] (Section 10.1 of SCRS/2008/019). The results clearly indicate that only scenarios with a high productivity over the next 15 years that will not be affected by the current low level of the SSB allow the rebuilding of the stock with probability greater than 50% by 2023. The remaining scenarios of a low or medium productivity of the stock which are considered to be as plausible as the high productivity scenarios would not allow the rebuilding of the stock by 2023. Furthermore, [Rec. 06-05] would not avoid a high risk of collapse of the population in a substantial number of scenarios considered.

Although the results of the projections are highly dependent on estimated state of the stock in 2007 and future recruitment levels (both being uncertain), the overall evaluation of [Rec. 06-05] is viewed by the Committee as unlikely to rebuild the stock in 15 years with 50% probability. Therefore, the Committee decided to contrast the above projections related to [Rec. 06-05] with additional management strategies, i.e. (i) $F_{0.1}$ or F_{MAX} strategies (implying short-term yields at 15,000 t or less), (ii) a closure of the Mediterranean Sea in May-June-July together with a size limit at 25 kg (as recommended by the SCRS in 2006) or (iii) a moratorium over the East Atlantic and Mediterranean Sea during 1, 3 or 5 years followed by an $F_{0.1}$ strategy. The results clearly indicate that all these alternative management strategies would have a higher probability of rebuilding the stock by 2023 and a lower probability of stock collapse in the future than [Rec. 06-05], regardless of the assumed productivity of the stock. The moratorium scenarios and $F_{0.1}$ strategy lead to similar outcomes while the closure of the Mediterranean Sea in May-June-July is quite similar as the F_{MAX} strategy (note that these last two scenarios are slightly less conservative than the first ones).

BFTE-5. Effect of current regulations

Catch limits have been in place for the eastern Atlantic and Mediterranean management unit since 1998. In 2002, the Commission fixed the Total Allowable Catch (TAC) for the East Atlantic and Mediterranean bluefin tuna at 32,000 t for the years 2003 to 2006 [Rec. 02-08] and at 29,500 t and 28,500 t for 2007 and 2008, respectively [Rec. 06-05]. In 2008, the reported catches for 2003 to 2007 were about TAC levels, albeit slightly higher in 2005 (35,732 t) and possibly in 2007 (preliminary reported catches being 32,398 t). However, the Committee strongly believes, based on the knowledge of the fisheries and trade statistics, that substantial under-reporting is occurring and that present catches are well above TAC. The SCRS estimates since the late 1990s, present catches are close to the levels reported in the mid-1990s, but for 2007, the estimates were higher *i.e.* about 50,000 tonnes in the Mediterranean and about 61,000 t in 2007 for both the East Atlantic and Mediterranean Sea (**BFTE-Table 1, BFTE-Figure 1**).

[Rec. 06-05] states that "*the SCRS shall monitor and review the progress of the plan and submit an assessment to the Commission for the first time in 2008, and each two years thereafter"*. However, the lack of catch, effort and size data for 2007 from many Contracting Parties (ICCAT Circular #1227/08) as well as the inaccessibility of VMS data for 2007 and 2008 did not allow the Committee to evaluate the effects of the recovery plan on the basis of real observations. Consequently, the Committee had to make its evaluation assuming that the 2007 selectivity pattern is similar to this of 2006 and that total catch in 2007 was at 61,000 t.

Based on the Committee's analysis, it is apparent that the TAC is not respected and is largely ineffective in controlling overall catch although enforced control seems to have deployed in 2008 in the Mediterranean Sea. Regarding the above results, the Committee believes that unless fishing mortality rates are substantially reduced in the near future, the current management scheme will most probably lead to further reduction in spawning stock biomass with high risk of fisheries and stock collapse.

BFTE-6. Management Recommendations

The available information indicates that the current fishing mortality rate (under the current overall fishing pattern) is more than three times the level which would permit the stock to stabilize at the MSY level. The intention of [Rec. 06-05] is seen as a step in the right direction, but as previously noted, the Committee considers that it is unlikely to fully fulfill the objective of the plan to rebuild the stock to the MSY level by 2023.

To address the various sources of uncertainties in the scientific diagnosis, especially regarding the data quality and availability, the Committee has investigated different quantitative approaches and it has considered a variety of scenarios for the projections. On this basis, the best advice of the Committee is currently to follow an $F_{0.1}$ (or another adequate F_{MSY} proxy, such as F_{MAX}) strategy to rebuild the stock, because such strategies appear much more robust than [Rec. 06-05] to a wide range of uncertainties about the data, the current status and future productivity. These strategies would imply much lower catches during the next few years (on the order of 15,000 t or less), but the long-term gain could lead to catches of about 50,000 t with substantial increases in spawning biomass. For a long lived species such as bluefin tuna, it will take some time (> 10 years) to realize the benefit. The Committee further believes that a time area closure could greatly facilitate the implementation and the monitoring of such rebuilding strategies. The Committee also believes that it is timely to make a substantial increased investment to enhance the data collection and to tackle key and recurrent issues on bluefin tuna population dynamics. Without such a significant effort, it is unlikely that the Committee can improve, in the near future, its scientific diagnosis and management advice.

Clearly, an overall reduction in fishing effort and mortality is needed to reverse current trends. Current fishing capacity largely exceeds the current TAC and has even increased over the last four years. Therefore, management actions are also needed to mitigate the impacts of overcapacity as well as to eliminate illegal fishing. Deferring effective management measures will likely result in even more stringent measures being necessary in the future.

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY		
Current (2006) Yield[1]	Reported: 30,647 t	SCRS Estimate for 2006: 50,000 t
Current (2007) Yield[1]	Reported: 32,398 t	SCRS Estimate for 2007: 61,000 t
Short-term Sustainable Yield[2]		
F_{MAX}	15,000 t or less	
$F_{0.1}$	8,500 t or less	
Long-term potential yield[3]	about 50,000 t	
SSB_{2007}/SSB_{FMAX}		
High recruitment (1990s)	0.14	
Low recruitment (1970s)	0.35	
F_{2007}/F_{MAX}[4]		
Reported catches	3.04	
Ajusted catches	3.42	
TAC (2007-2010)	29,500 - 28,500 - 27,500 - 25,500 t	

[1] Correspond to the reported catches on the September 25, 2008.
[2] Approximated as a 4-years average yield expectation from the 2010-2013 constant F_{MAX} or $F_{0.1}$ projections.
[3] Approximated as the average of long-term yield at F_{MAX} or $F_{0.1}$ that were calculated over a broad range of scenarios including contrasting recruitment levels and different selectivity patterns (estimates from these scenarios ranged between 29,000 t and 91,000 t).
[4] The recruitment levels do not impact the *F ratio*.

BLUEFIN TUNA - WEST

BFTW-2. Fishery indicators

The total catch for the West Atlantic peaked at nearly 20,000 t in 1964, mostly due to the Japanese longline fishery for large fish off Brazil and the United States purse seine fishery for juvenile fish (**BFT-Table 1**, **BFTW-Figure 1**). Catches dropped sharply thereafter with the collapse of the longline fishery off Brazil and decline in purse seine catches, but increased again to average over 5,000 t in the 1970s due to the expansion of the Japanese longline fleet into the northwest Atlantic and Gulf of Mexico and an increase in purse seine effort targeting larger fish for the sashimi market. The total catch for the West Atlantic including discards has generally been relatively stable since 1982 due to the imposition of quotas. However, since a total catch level of 3,319 t in 2002 (the highest since 1981, with all three major fishing nations indicating higher catches), total catch in the West Atlantic has declined steadily reaching 1,624 t in 2007 (**BFTW-Figure 1**). This decline is primarily due to considerable reductions in catch levels for United States fisheries. Since 2002, the Canadian annual catches have been relatively stable at about 500-600 t (733 t in 2006); the 2006 catch was the highest recorded since 1977. Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons. The overall number of Japanese vessels engaged in bluefin fishing has declined from more than 100 boats in recent years to about 50 boats in 2007, of which about 20 boats operated in the West Atlantic. After reaching 2,014 t in 2002 (the highest level since 1979), the catches (landings and discards) of U.S. vessels fishing in the northwest Atlantic (including the Gulf of Mexico) declined precipitously during 2003-2007. The United States did not catch its quota in 2004-2007 with catches of 1,066, 848, 615, and 849 t, respectively. It was noted that some nations have adopted a fishing year that is different from the calendar year to manage their quota.

BFTW-3. State of the stock

An updated assessment was conducted this year, including information up to 2007. This assessment is consistent with previous analyses in that spawning stock biomass (SSB) declined steadily between the early 1970s and 1992. Since then, SSB has fluctuated between 18% and 27% of the 1975 level (**BFTW-Figure 2**). The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets (**BFTW-Figure 2**). Fishing mortality on spawners (ages 8 and older) declined markedly between 2002 and 2007.

Estimates of recruitment were very high in the early 1970's (**BFTW-Figure 2**), and additional analyses involving longer catch and index series suggest that recruitment was also high during the 1960s. Since 1977, recruitment has varied from year to year without trend. The Committee noted that a key factor in estimating MSY-related benchmarks is the highest level of recruitment that can be achieved in the long term. Assuming that average recruitment cannot reach the high levels from the early 1970s, recent F (2004-2006) is about 30% higher than the MSY level and SSB is about half of the MSY level (**BFTW-Figure 3**). Estimates of stock status are more pessimistic if a high recruitment scenario is considered (F/F_{MSY}=2.1, B/B_{MSY}=0.14).

One important factor in the recent decline of fishing mortality on large bluefin is that the TAC has not been taken during this time period, due primarily to a shortfall by the United States fisheries that target large bluefin. Two plausible explanations for the shortfall were put forward previously by the Committee: (1) that availability of fish to the United States fishery has been abnormally low, and/or (2) the overall size of the population in the Western Atlantic declined substantially from the level of recent years. While there is no overwhelming evidence to favor either explanation over the other, the base case assessment implicitly favors the first hypothesis (regional changes in availability) because a large recent reduction in SSB is not estimated. Nevertheless, the Committee notes that there remains substantial uncertainty on this issue and more research needs to be done.

The SCRS cautions that the conclusions of this assessment do not capture the full degree of uncertainty in the assessments and projections. An important factor contributing to uncertainty is mixing between fish of eastern and western origin. Limited analyses were conducted of the two stocks with mixing. Depending on the types of data used to estimate mixing (conventional tagging or isotope signature samples) and modeling assumptions made, the estimates of stock status varied considerably. However, these analyses are preliminary and more research needs to be done before mixing models can be used operationally for management advice. Another important source of uncertainty is recruitment, both in terms of recent levels (which are estimated with low precision in the assessment), and potential future levels (the "low" vs "high" recruitment hypotheses which affect management benchmarks). Finally, the growth curve assumed in the analyses may be revised based on new

information that is being collected. If the curve changes substantially, it may impact the assessment results as well as management benchmarks.

BFTW-4. Outlook

A medium-term (12-year) outlook evaluation of changes in spawning stock size and yield over the remaining rebuilding period under various management options was conducted. Future recruitment was assumed to fluctuate around two alternative scenarios: (i) average levels observed for 1976-2004 (70,000 recruits, the low recruitment scenario) and (ii) levels that increase as the stock rebuilds (MSY level of 160,000 recruits, the high recruitment scenario). The Committee has no strong evidence to favor either scenario over the other and notes that both are reasonable (but not extreme) lower and upper bounds on rebuilding potential.

The outlook for bluefin tuna in the West Atlantic with the low recruitment scenario (**BFTW-Figure 4**) is similar to that from the 2006 assessment. A total catch of 2,100 t is predicted to have at least a 50% chance of achieving the convention objectives of preventing overfishing and rebuilding the stock to MSY levels by 2019, the target rebuilding time. The outlook under the high recruitment scenario (**BFTW-Figure 4**) is more pessimistic since the rebuilding target would be higher; a total catch of less than 1,500 t is predicted to stop overfishing in 2009, but the stock would not be expected to rebuild by 2019 even with no fishing.

BFTW-Table 1 summarizes the estimated chance that various constant catch policies will allow rebuilding under the high and low recruitment scenarios for the base-case. The low recruitment scenario suggests that catch levels of 2,400 t will have about a 50% chance of rebuilding the stock by 2019 and catches of 2,000 t or lower will have greater than a 75% chance of rebuilding. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,500 t or less are expected to immediately end overfishing (50% chance) and initiate rebuilding (**BFTW-Table 2**).

Among the alternative models examined by the Committee, the option that excluded the Canadian Gulf of St. Lawrence index was examined further, due to the considerations of possible resource re-distribution, and the observation that the recent high values were difficult to reconcile with other available fisheries data, and could reflect the impact of a single or a limited number of strong year-classes. The levels of catch that lead to rebuilding with that alternative model are lower; 1,800 t will have about a 50% chance and 1,500 t will have a 75% chance.

The Committee notes that considerable uncertainties remain for the outlook of the western stock, including the effects of mixing and management measures on the eastern stock.

BFTW-5. Effects of current regulations

Catches of western bluefin have been below the TAC since 2003, although that was not always the case prior to then (**Figure BFTW-1**). The estimated percentage of fish less than 115cm in the catch has been less than 8% of the TAC from 1992 to 2006, although this percentage increased in 2007 to about 11% of TAC.

The Committee previously noted that Recommendation 06-06 was expected to result in a rebuilding of the stock towards the convention objective, but also noted that there has not yet been enough time to detect with confidence the population response to the measure.

BFTW-6. Management recommendations

In 1998, the Commission initiated a 20-year rebuilding plan designed to achieve Bmsy with at least 50% probability. The current assessment indicates that the stock has not yet rebuilt as projected under the plan initially. The 2007 SSB is estimated to be 7% below the level of the Plan's first year.

Based on a strict interpretation of the base case projections and the Western Atlantic Rebuilding Plan [Rec. 98-07], the Commission is faced with TAC options that range between 2,400 t and zero depending on its choice of recruitment scenarios and choice of the probability of rebuilding. The Committee notes that making decisions based on the low recruitment scenario when in fact the high recruitment scenario is true, could be riskier in terms

of stock rebuilding. In light of the uncertainty about recruitment and other uncertainties not taken into account in the projections, the Committee strongly advises against an increase in TAC. Analyses conducted during the Joint ICCAT-Canada Precautionary workshop as well as two subsequent analyses reviewed by the Committee (SCRS/2008/089, SCRS/2008/175) suggested that the projections made during past assessments were too optimistic. This is reinforced by the observation that, halfway through the rebuilding program, biomass is still below what it was at the beginning. The Committee notes that there is a provision of the rebuilding plan to adopt harvest levels that provides a 50% or greater chance of meeting rebuilding targets. Given this possibility and the lack of progress on rebuilding, the Committee recommends that the Commission adopt more conservative catch levels that will result in a higher probability (for example, 75% chance) that Bmsy is achieved by the beginning of 2019. Under the more optimistic "low recruitment" scenario, this target could be achieved with a TAC of 2,000 t. However, if the assessment and estimates of future yield are positively biased or if there is implementation error (both of which have occurred in the past), the TAC should be lower (for instance, based on the assessment results without the Gulf of St. Lawrence CPUE index, the TAC would need to be reduced to less than 1,500 t in order to achieve Bmsy by 2019 with 75% probability).

As noted previously by the Committee, both the productivity of western Atlantic bluefin and western Atlantic bluefin fisheries are linked to the eastern Atlantic and Mediterranean stock. Therefore, management actions taken in the eastern Atlantic and Mediterranean are likely to influence the recovery in the western Atlantic, because even small rates of mixing from East to West can have significant effects on the West due to the fact that Eastern plus Mediterranean resource is much larger than that of the West.

WEST ATLANTIC BLUEFIN TUNA SUMMARY
(Catches and Biomass in t)

Current (2007) Catch (including discards)	1,624 t
Assuming Low Potential Recruitment	
Maximum Sustainable Yield (MSY|R[1])	2,852 (2,680-3,032)[2]
Relative Spawning Stock Biomass:	
B_{2007}/B_{1975}	0.25 (0.16-0.38)[2]
$B_{2007}/B_{MSY\|R}$	0.57 (0.46-0.70)[2]
Relative Fishing Mortality[3]:	
$F_{2004\text{-}2006}/F_{MSY\|R}$	1.27 (1.04-1.53)[2]
$F_{2004\text{-}2006}/F_{0.1}$	2.23 (1.82-2.72)[2]
$F_{2004\text{-}2006}/F_{max}$	1.27 (1.04-1.53)[2]
Assuming High Potential Recruitment	
Maximum Sustainable Yield (MSY)	6,201 (4,887-9,142)[2]
Relative Spawning Stock Biomass:	
B_{2007}/B_{1975}	0.25 (0.16-0.38)[2]
$B_{2007}/B_{MSY\|R}$	0.14 (0.08-0.21)[2]
Relative Fishing Mortality[3]:	
$F_{2004\text{-}2006}/F_{MSY\|R}$	2.18 (1.74-2.64)[2]
$F_{2004\text{-}2006}/F_{0.1}$	2.23 (1.82-2.72)[2]
$F_{2004\text{-}2006}/F_{max}$	1.27 (1.04-1.53)[2]
Management Measures:	[Rec. 06-06] TAC of 2,100 t which began in 2007, including dead discards

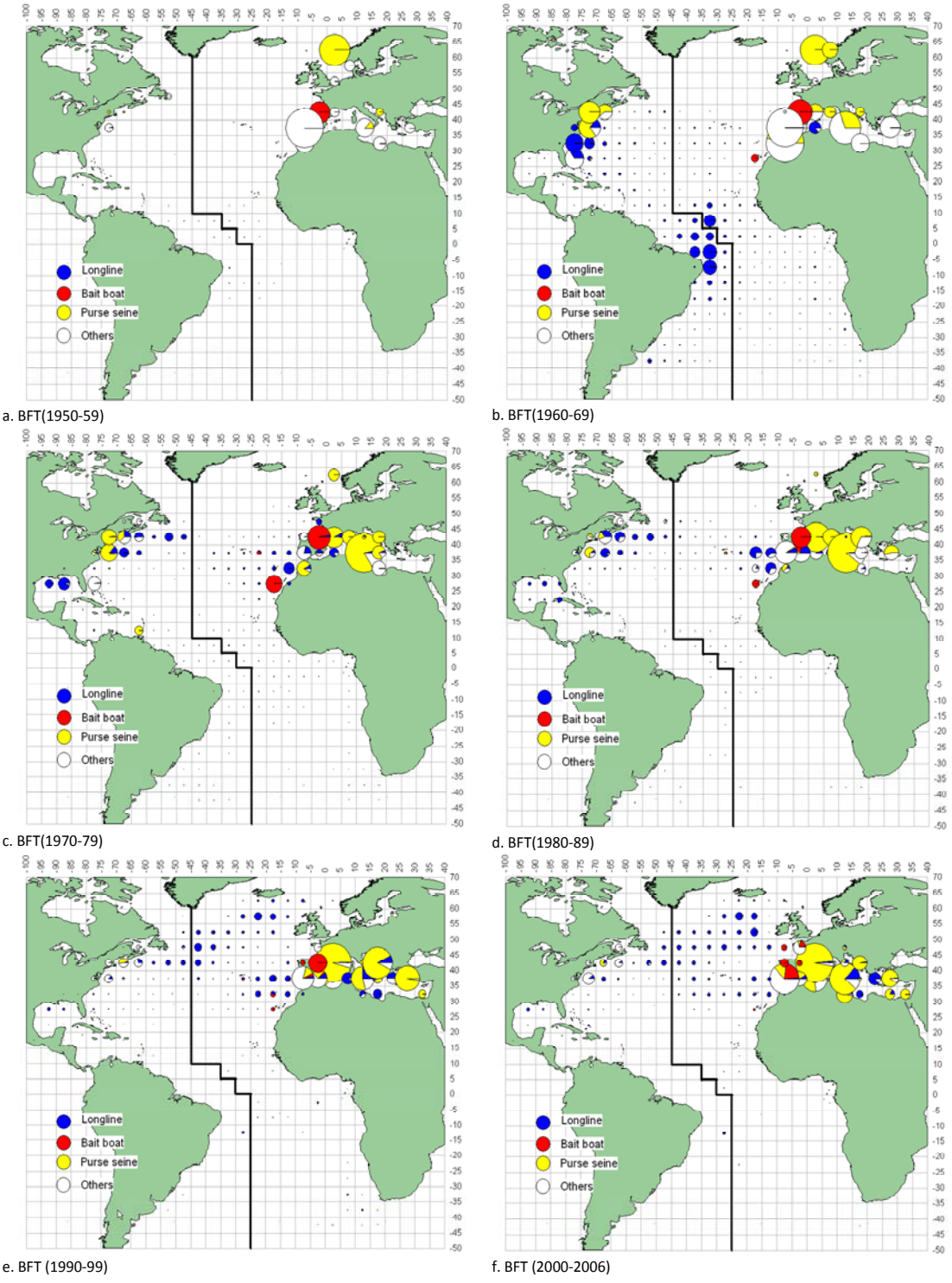
[1] MSY calculated conditional that recruitment remains at recent (1976-2004) levels.
[2] Median and approximate 80% confidence interval from bootstrapping from the assessment.
[3] $F_{2004\text{-}2006}$ refers to the geometric mean of the estimates for 2004-2006 (a proxy for recent F levels).

BFT-Table 1. Reported catches(t) including fish transferred to farms of northern bluefin tuna *(Thunnus thynnus)* by major area, gear and flag.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
TOTAL			24344	26716	24680	21373	20699	27016	23690	26027	29350	34131	36636	48853	49714	53302	49485	42375	35228	36541	37390	37089	33469	33502	37602	32459	34030
ATE+MED			21802	24427	21995	19051	18199	24118	20952	23247	26429	31849	34268	46740	47291	50807	47151	39718	32456	33766	34605	33770	31163	31377	35845	30647	32398
ATE			8152	7395	4792	4491	4435	6951	5324	6040	6556	7619	9367	6930	9650	12663	13539	11376	9628	10528	10086	10347	7362	7407	9036	7493	8035
MED			13650	17032	17203	14560	13764	17167	15628	17207	19872	24230	24901	39810	37640	38144	33612	28342	22828	23238	24519	23424	23801	23970	26810	23154	24363
ATW			2542	2289	2685	2322	2500	2898	2738	2780	2921	2282	2368	2113	2423	2495	2334	2657	2772	2775	2785	3319	2306	2125	1756	1811	1632
Landings	ATE	Bait boat	1882	2262	2004	1414	1821	1936	1971	1693	1445	1141	3447	1980	2601	4985	3521	2550	1492	1822	2275	2567	1371	1790	2018	1116	2033
		Longline	2626	1541	535	770	904	1169	853	1496	3197	3817	2717	2176	4392	4788	4534	4300	4020	3736	3303	2896	2750	2071	2713	2406	1698
		Other surf.	1426	948	536	972	668	1221	1020	562	347	834	1548	932	1047	646	511	621	498	703	712	701	560	402	1014	1047	506
		Purse seine	262	373	86	276	0	0	0	54	46	462	24	213	458	323	828	692	726	1147	150	884	490	1078	871	332	
		Sport (HL+RR)	0	0	1	1	3	1	2	1	0	0	0	0	0	0	162	28	33	126	61	63	109	87	11	4	10
		Traps	1956	2271	1630	1057	1040	2624	1478	2234	1522	1365	1631	1630	1152	1921	3982	3185	2859	2996	3585	3235	2082	1978	2408	2588	3788
	MED	Bait boat	0	1699	278	0	0	0	0	25	148	158	48	0	206	5	4	11	4	0	0	1	9	17	5	0	
		Longline	980	1196	1228	678	799	1227	1121	1026	2869	2599	2342	7048	8475	8171	5672	2749	2463	3317	3750	2614	2476	2564	3101	2202	2470
		Other surf.	674	1738	3211	3544	2762	2870	3289	1212	1401	1894	1607	3218	1043	1197	1033	1880	2976	1067	1096	990	2536	1106	480	301	699
		Purse seine	10484	9888	11219	9333	8857	11198	9450	11250	13245	17807	19297	26083	23588	26021	24178	21291	14910	16195	17174	17656	17167	18785	22475	20020	21030
		Sport (HL+RR)	194	275	507	322	433	838	457	1552	738	951	1237	2257	3556	2149	2340	1336	1622	1921	1321	1647	1392	1339	634	503	70
		Traps	1318	2236	760	683	913	1034	1311	2142	1471	821	370	1204	772	601	385	1074	852	739	1177	515	221	159	115	129	95
	ATW	Longline	829	832	1245	764	1134	1373	678	739	895	674	696	539	466	528	382	764	914	859	610	730	186	644	425	565	423
		Other surf.	514	377	293	166	156	425	755	536	578	509	406	307	384	433	295	344	281	283	202	108	140	97	89	85	63
		Purse seine	384	401	377	360	367	383	385	384	237	300	295	301	249	245	250	249	248	275	196	208	265	32	178	4	28
		Sport (HL+RR)	808	676	750	518	726	601	786	1004	1083	586	854	804	1114	1028	1179	1106	1124	1120	1649	2035	1398	1139	924	1005	1023
		Traps	7	3	20	0	17	14	1	2	0	1	29	79	72	90	59	68	44	16	16	28	84	32	8	3	4
Discards	ATW	Longline	0	0	0	514	99	102	119	115	128	211	88	83	138	167	155	123	160	222	105	211	232	181	131	149	91
		Other surf.	0	0	0	0	0	0	14	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	
		Sport (HL+RR)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	3	0	0	6	0	0	0	0	0	
Landings	ATE	Cape Verde	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	103	80	68	39	19	41	24	0	72
		Chinese Taipei	2	3	0	0	0	0	0	0	0	0	6	20	8	61	226	350	222	144	304	158	0	0	10	4	
		EC.Denmark	0	0	37	0	0	1	0	0	0	0	37	0	0	0	0	1	0	0	0	0	0	0	0	0	
		EC.España	4587	4804	3628	2876	2479	4567	3565	3557	2272	2319	5078	3137	3819	6174	6201	3800	3360	3474	3633	4089	2138	2801	3102	2033	3269
		EC.France	400	602	490	348	533	724	460	510	565	894	1099	336	725	563	269	613	588	542	629	755	648	561	818	1218	634
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	21	52	22	8	15	3	1	1	2	1
		EC.Portugal	174	34	29	193	163	48	3	27	117	38	25	240	35	199	712	323	411	441	404	186	61	27	79	97	29
		EC.Sweden	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	12	0	0	0	0	0	0	0	
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	104	118	0	0	0	0	0	0	
		Guinée Conakry	0	0	0	0	0	0	0	0	0	0	0	330	0	0	0	0	0	0	0	0	0	0	0	0	
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	27	0	0	1	0	0	0	0	
		Japan	2609	1514	420	739	900	1169	838	1464	2981	3350	2484	2075	3971	3341	2905	3195	2690	2895	2425	2536	2695	2015	2598	1896	1612
		Korea Rep.	3	0	77	0	0	0	0	0	0	0	0	4	205	92	203	0	0	6	1	0	0	0	0	1	
		Libya	0	0	0	0	0	0	0	0	0	312	0	0	0	576	477	511	450	487	0	0	0	0	0	47	
		Maroc	365	171	86	288	356	437	451	408	531	562	415	720	678	1035	2068	2341	1591	2228	2497	2565	1797	1961	2405	2196	2418
		NEI (ETRO)	0	6	3	4	0	5	6	74	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (Flag related)	0	0	0	0	0	0	0	0	85	144	223	68	189	71	208	66	0	0	0	0	0	0	0	0	
		Norway	1	243	0	31	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	
		Panama	0	17	22	11	4	0	0	0	0	0	0	1	19	550	255	0	13	0	0	0	0	0	0	0	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	118	0	0	0	0	0	
	MED	Algerie	252	254	260	566	420	677	820	782	800	1104	1097	1560	156	156	157	1947	2142	2330	2012	1710	1586	1208	1530	1038	1511
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	97	137	93	49	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	328	709	494	411	278	106	27	169	329	508	445	51	267	5	
		Croatia	0	0	0	0	0	0	0	0	1418	1076	1058	1410	1220	1360	1105	906	970	930	903	977	1139	827	1017	1022	821
		EC.Cyprus	10	10	10	10	10	10	10	10	10	10	14	10	10	10	10	21	31	61	85	91	79	105	149	110	1
		EC.España	812	2743	1460	701	1178	1428	1645	1822	1392	2165	2018	2741	4607	2588	2205	2000	2003	2772	2234	2215	2512	2353	2758	2689	2414
		EC.France	3660	3600	5430	3490	4330	5780	4434	4713	4620	7376	6995	11843	9604	9171	8235	7122	6156	6794	6167	5832	5859	6471	8638	7663	10157
		EC.Greece	0	0	11	131	156	159	182	201	175	447	439	886	1004	874	1217	286	248	622	361	438	422	389	318	255	285
		EC.Italy	5865	7140	7199	7576	4607	4201	4317	4110	3783	5005	5328	6882	7062	10006	9548	4059	3279	3845	4377	4628	4973	4686	4841	4695	4621

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
		EC.Malta	31	21	21	41	36	24	29	81	105	80	251	572	587	399	393	407	447	376	219	240	255	264	346	263	334
		EC.Portugal	0	0	0	0	0	0	0	0	278	320	183	428	446	274	37	54	76	61	64	0	2	0	0	11	
		Israel	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	
		Japan	677	1036	1006	341	280	258	127	172	85	123	793	536	813	765	185	361	381	136	152	390	316	638	378	556	466
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	684	458	591	410	66	0	0	0	0	0	700	1145	26	
		Libya	270	274	300	300	300	300	84	328	370	425	635	1422	1540	812	552	820	745	1063	1941	638	752	1300	1091	1280	
		Maroc	1	4	12	56	116	140	295	1149	925	205	79	1092	1035	586	535	687	636	695	511	421	760	819	92	190	641
		NEI (ETRO)	0	19	0	168	183	633	757	341	1750	1349	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (Flag related)	0	0	0	0	0	0	0	0	0	0	0	427	639	171	1066	825	140	17	0	0	0	0	0	0	
		NEI (combined)	0	0	0	0	0	0	0	0	0	0	0	773	211	0	101	1030	1995	109	571	508	610	709	0	0	
		NEI-2	0	0	0	0	0	0	0	19	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	72	67	0	74	287	484	467	1499	1498	2850	236	0	0	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	4	0	0	0	0	0	0	
		Tunisie	293	307	369	315	456	624	661	406	1366	1195	2132	2773	1897	2393	2200	1745	2352	2184	2493	2528	791	2376	3249	2545	2195
		Turkey	557	869	41	69	972	1343	1707	2059	2459	2817	3084	3466	4220	4616	5093	5899	1200	1070	2100	2300	3300	1075	990	806	918
		Yugoslavia Fed.	1222	755	1084	796	648	1523	560	940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	0	0	6	0	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	1	0	1	0	2	0	2	1	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	
		Canada	433	264	142	73	83	393	619	438	485	443	459	392	576	597	503	595	576	549	524	604	557	537	600	733	491
		Chinese Taipei	2	0	3	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	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	74	11	19	27	19	
		EC.España	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***
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	10	5	0	
		Japan	711	696	1092	584	960	1109	468	550	688	512	581	427	387	436	322	691	365	492	506	575	57	470	265	376	277
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	52	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	8	14	29	10	12	22	9	10	14	7
		NEI (ETRO)	1	0	0	0	0	0	30	24	23	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (Flag related)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	429	270	49	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	1	3	2	14	14	14	2	43	9	3	0	0	0	0	0	0	0	0	0	0	
		Trinidad and Tobago	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	1394	1320	1424	1142	1352	1289	1483	1636	1582	1085	1237	1163	1311	1285	1334	1235	1213	1212	1583	1840	1426	899	717	468	758
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	0	0	0	0	
		Uruguay	0	9	16	6	0	2	0	0	1	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	
Discards	ATW	Canada	0	0	0	0	0	0	14	0	0	0	0	0	0	0	6	16	11	46	13	37	14	15	0	2	0**
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	0	514	99	102	119	115	128	211	88	83	138	171	155	110	149	176	98	174	218	167	131	147	91

* DATA reported in 2007 are provisional.
** Canada's Task I included 0.75 t in 2007 for dead discards. This does not appear in the Task I summary table.
*** The seven tonnes of EC-Spain must go to ATE.



a. BFT(1950-59)

b. BFT(1960-69)

c. BFT(1970-79)

d. BFT(1980-89)

e. BFT (1990-99)

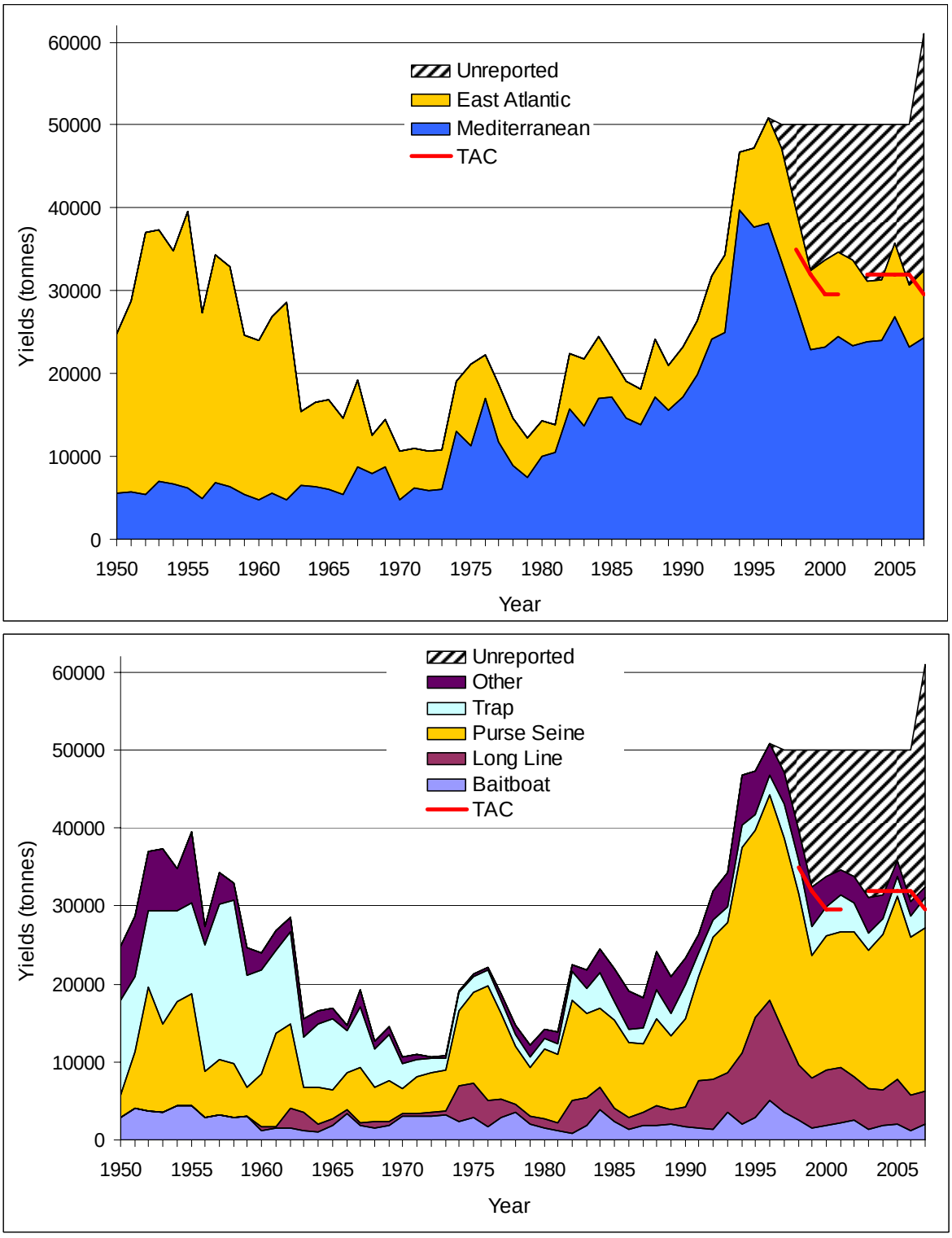
f. BFT (2000-2006)

BFT-Figure 1. Geographic distribution of bluefin tuna catches per 5x5 degrees and per main gears.

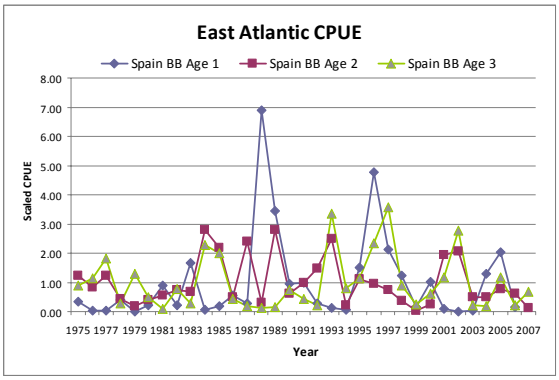
BFTE-Table 1. Estimates of the total number of vessels fishing bluefin tuna in the Mediterranean Sea (top) and East Atlantic (bottom) during 2007 (*i.e.* active capacity), probable catch (yield) estimated from catch rates per vessel and per year. Calculations that are based on ICCAT vessels list and/or scientific information are expressed in t/year.

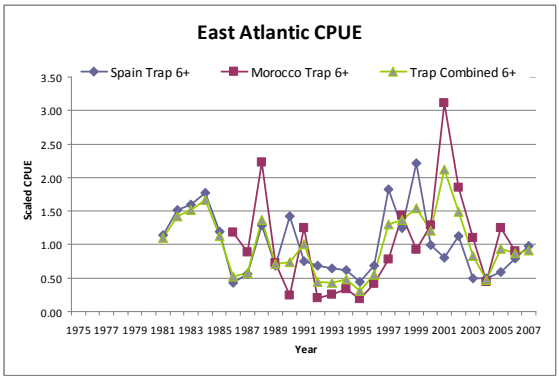
Mediterranean 2007	***Active fleet***		
Vessel category	*Vessels*	*Catch rates*	*Probable yields*
PS large (>= 40 m)	83	150 - 300	17550
PS medium (> 24 m & < 40 m)	205	75 - 150	22050
PS small (<= 24 m)	63	20 - 40	2040
LL large (>= 40 m)	43	50	2150
LL medium (> 24 m & < 40 m)	9	20	180
LL small (<= 24 m)	221	10	2210
Handline	127	3	381
Trawler	25	2	50
Trap	10	40	400
Other artisanal	220	4	880
Total Mediterranean	**1006**		**47891**
Mediterranean PS			41640
Mediterranean LL			4540
Mediterranean OTH			1711

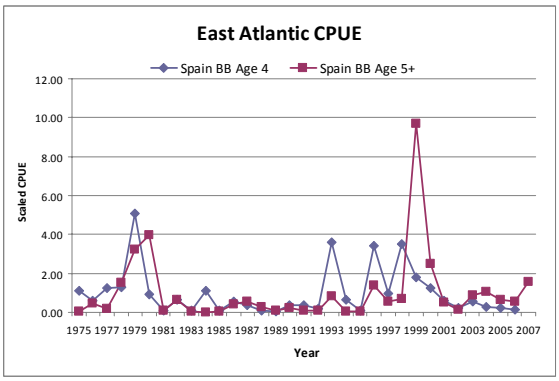
East Atlantic 2007	***Active fleet***		
Vessel category	*Vessels*	*Catch rates*	*Probable yields*
PS medium (> 24 m & < 40 m)	30	50	1500
PS small (<= 24 m)	4	25	100
LL large (>= 40 m)	55	50	2750
LL medium (> 24 m & < 40 m)	29	20	580
LL small (<= 24 m)	13	10	130
Baitboat > 24 m	39	40	1560
Baitboat <= 24 m	42	15	630
Handline	12	5	60
Trawler	98	15	1470
Trap	18	245	4410
Other artisanal	20	3	60
Total East Atlantic	**330**		**13250**
East Atlantic PS			1600
East Atlantic LL			3460
East Atlantic OTH			8190

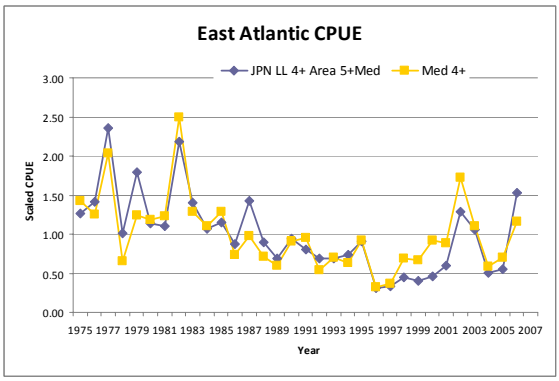


BFTE-Figure 1. Reported catch from Task I data from 1950 to 2007 split by main geographic areas (top panel) and by gears (bottom panel) together with unreported catch estimated by the Committee from active fishing capacity and mean catch rates over the last decade (see BFTE-**Table 1**) and TAC levels from 1998 to 2006.

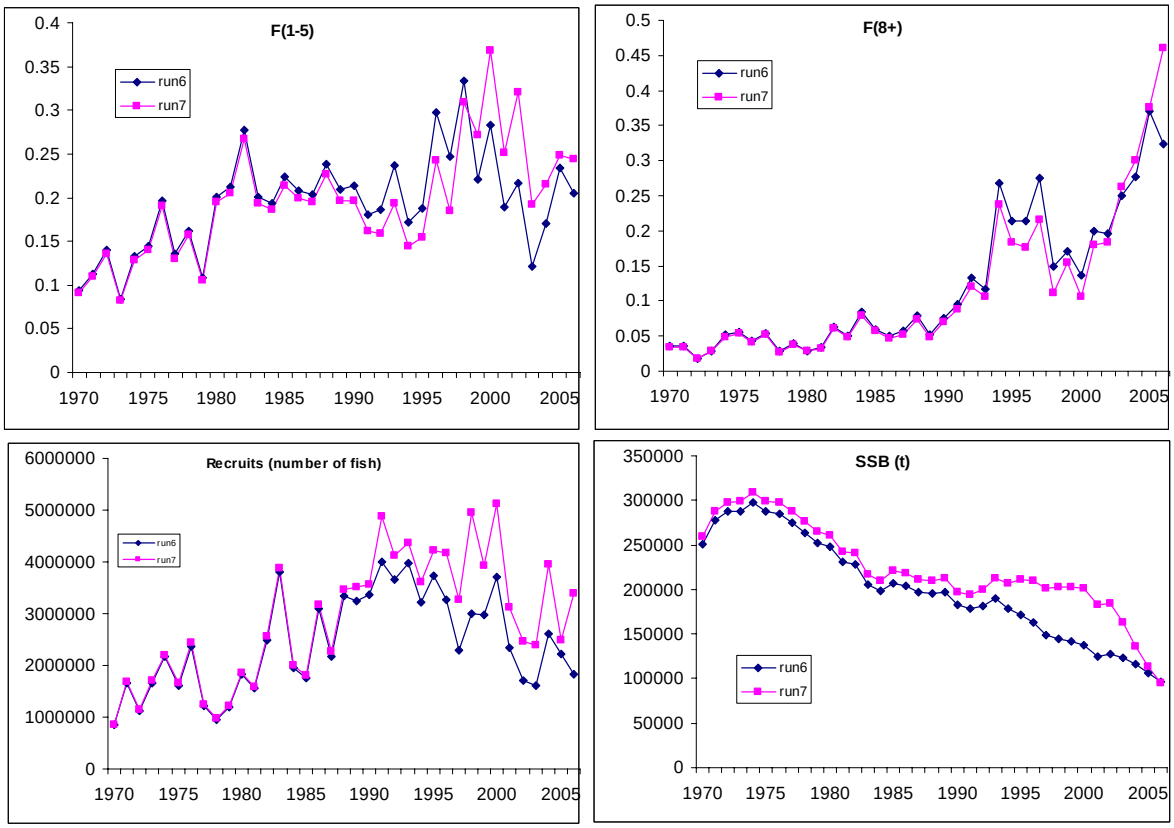




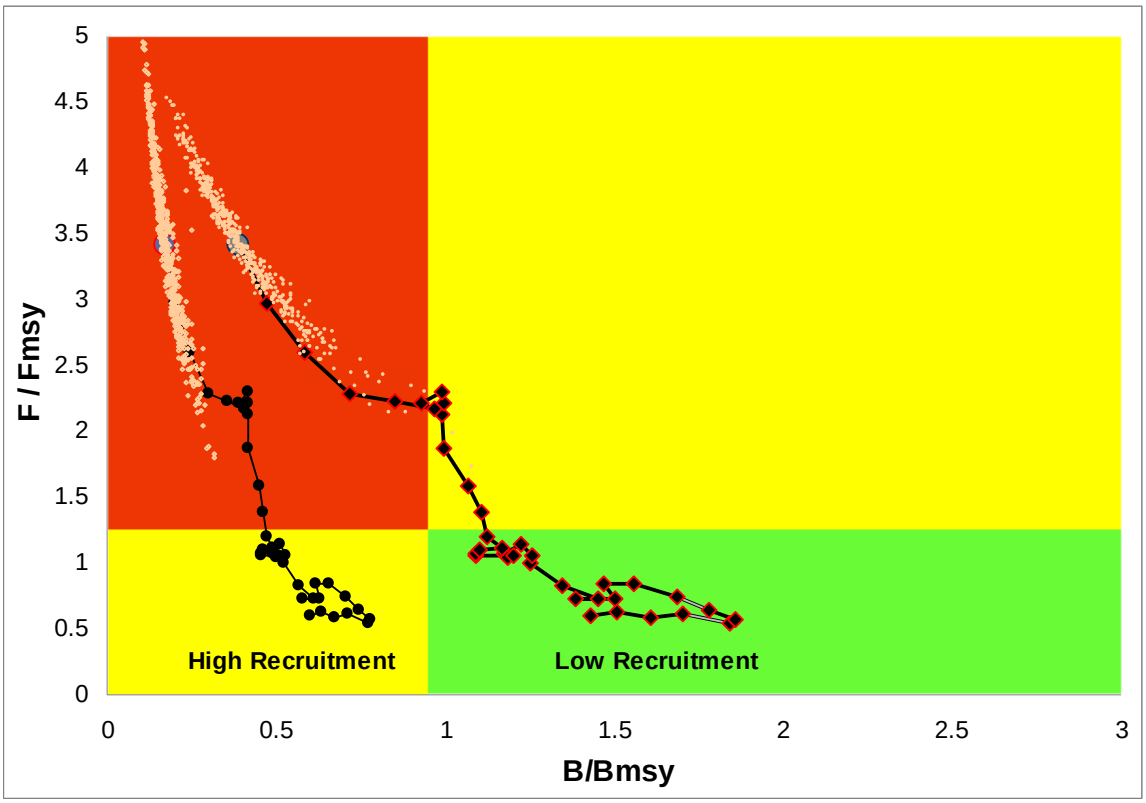




BFTE-Figure 2. Plots of the standardized CPUE time series that have been used in the different VPA runs of the East Atlantic and Mediterranean bluefin tuna stock.



BFTE-Figure 3. Fishing mortality (for ages 1 to 5 and 8+), spawning stock biomass and recruitment estimates from VPA runs 6 (reported catch) and run 7 (adjusted catch).



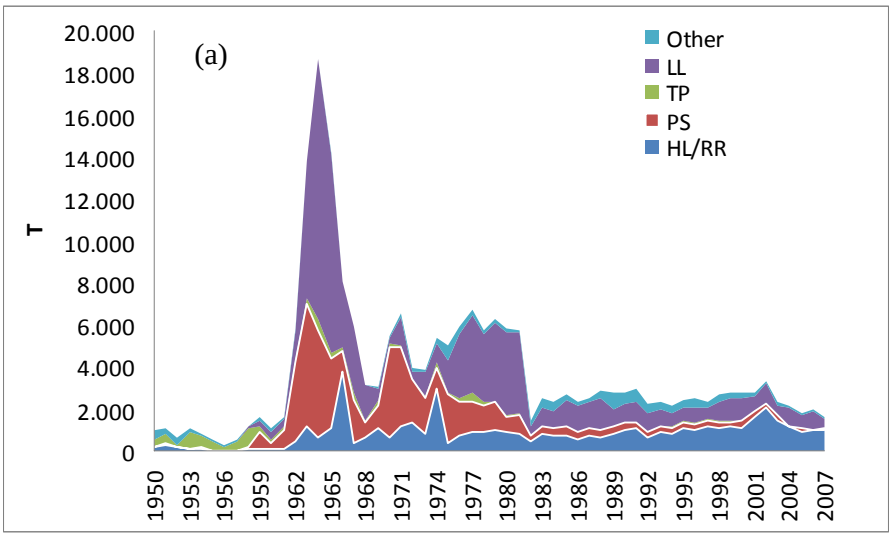
BFTE-Figure 4. Stock status estimated from VPA run 14 (i.e. equivalent to run 7 but for the 1955-2006 period) considering either high recruitment (average from the 1990s) or low recruitment (average from the 1970s) levels. The terminal year (2006) is highlighted by a larger dot. White dots represent the distribution of the terminal year obtained through bootstrapping.

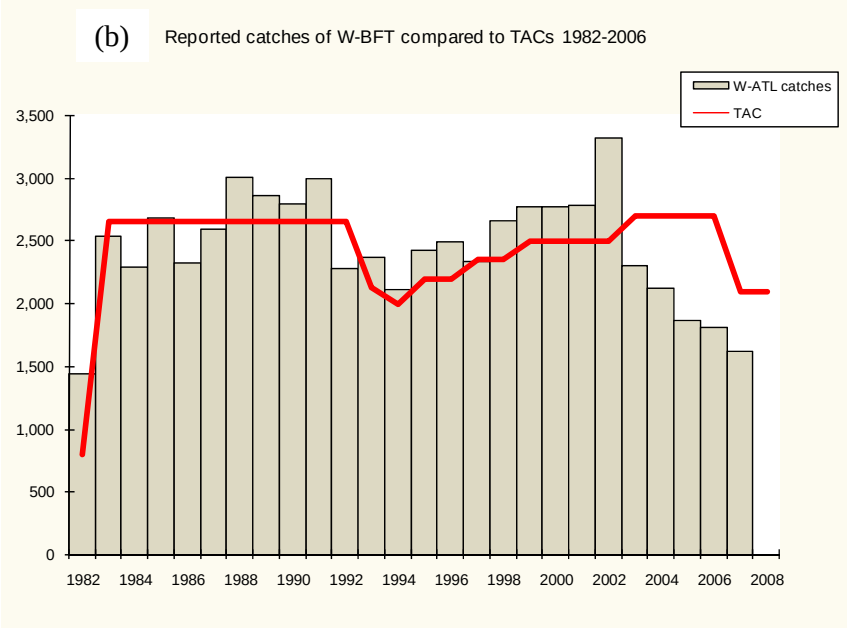
BFTW-Table 1. Estimated chance of recovery under the high and low recruitment scenarios and various levels of future catch. Green shading indicates the chance of recovery by the given year is greater than or equal to the reference probability level (50 or 75 percent). Red shading indicates the chance of recovering by 2019 is less than the reference probability level.

Projected Catch Level (t)	*50% Probability*		*75% Probability*	
	Low	*High*	*Low*	*High*
0	2012	No	2013	No
500	2012	No	2013	No
1,000	2013	No	2014	No
1,500	2014	No	2015	No
1,600	2014	No	2016	No
1,700	2015	No	2016	No
1,800	2015	No	2017	No
1,900	2015	No	2018	No
2,000	2016	No	2019	No
2,100	2017	No	No	No
2,200	2017	No	No	No
2,300	2018	No	No	No
2,400	2019	No	No	No
2,500	No	No	No	No
2,600	No	No	No	No
2,700	No	No	No	No
3,000	No	No	No	No
5,000	No	No	No	No

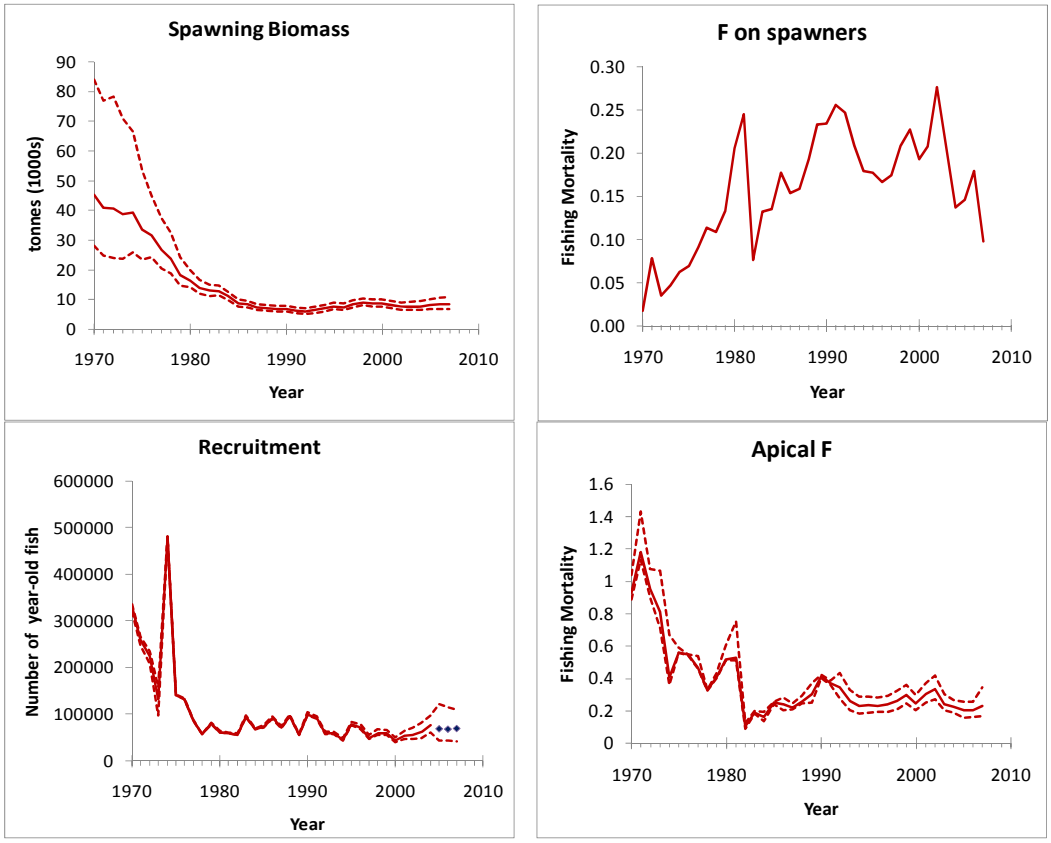
BFTW-Table 2. Estimated chance of ending overfishing under the high and low recruitment scenarios and various levels of future catch. Entries are year overfishing ends or "no" if overfishing has less than the given probability of success by 2019.

Projected Catch Level (t)	*50% Probability*		*75% Probability*	
	Low	*High*	*Low*	*High*
0	2009	2009	2009	2009
500	2009	2009	2009	2009
1,000	2009	2009	2009	2010
1,500	2009	2009	2009	2015
1,600	2009	2010	2009	2016
1,700	2009	2011	2009	2018
1,800	2009	2012	2011	2019
1,900	2009	2013	2012	No
2,000	2010	2014	2013	No
2,100	2011	2015	2014	No
2,200	2012	2016	2016	No
2,300	2014	2017	2019	No
2,400	2015	2018	No	No
2,500	2017	No	No	No
2,600	No	No	No	No
2,700	No	No	No	No
3,000	No	No	No	No
5,000	No	No	No	No

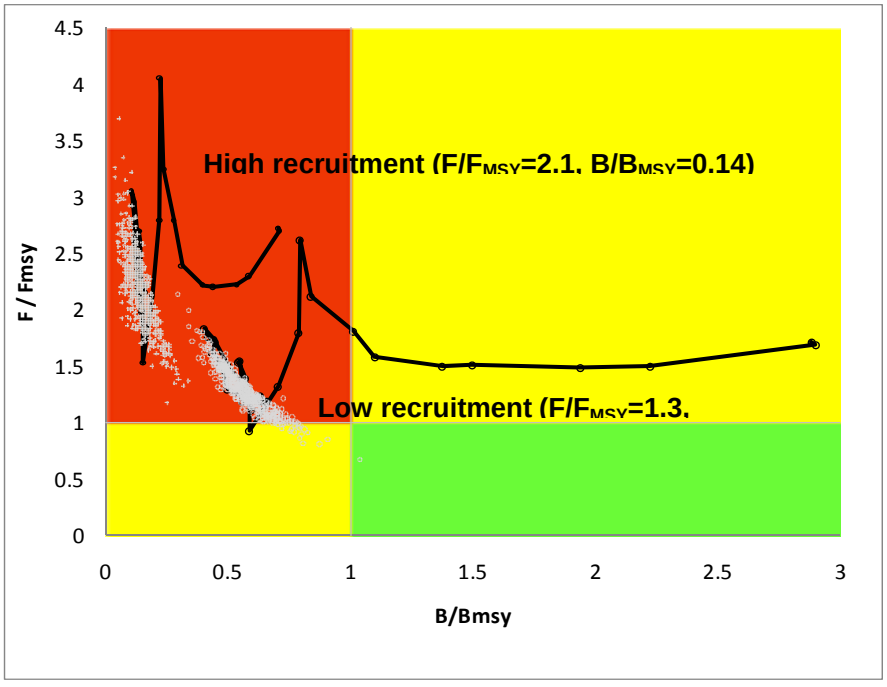




BFTW-Figure 1. Historical catches of western bluefin tuna: (a) by gear type (LL=longline, TP=trap, PS=purse seine, HL/RR= hand line/rod and reel) and (b) in comparison to TAC levels agreed by the Commission.

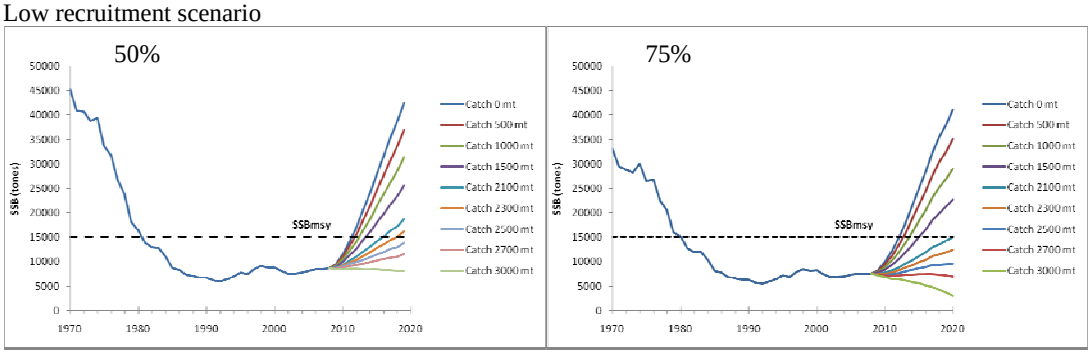


BFTW-Figure 2. Median estimates of spawning biomass (age 8+), fishing mortality on spawners, apical fishing mortality (F on the most vulnerable age class) and recruitment for the base VPA model. The 80% confidence intervals are indicated with dotted lines.

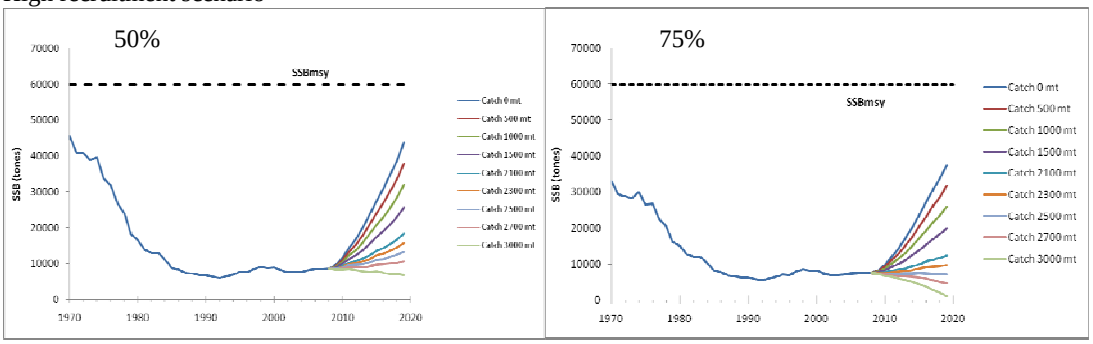


BFTW-Figure 3 Estimated status of stock relative to the Convention objectives (MSY) by year (1970 to 2007). The lines give the time series of point estimates for each recruitment scenario and the clouds of white symbols depict the corresponding bootstrap estimates of uncertainty for the most recent year.

Low recruitment scenario



High recruitment scenario



BFTW-Figure 4 Projections of spawning stock biomass (SSB) for the Base Case assessment under low recruitment (top panels) and high recruitment (bottom panels) and various levels of constant catch. The labels "50%" and "75%" refer to the probability that the SSB will be greater than or equal to the values indicated by each curve. Note that curves are arranged sequentially in the same order as the legends. The dashed horizontal lines represent the median (50%) level of SSB at MSY.

8.6 BLUE MARLIN AND WHITE MARLIN

BUM/WHM-1. Biology

The central and northern Caribbean Sea and northern Bahamas have historically been known as the primary spawning area for blue marlin in the western North Atlantic. Recent reports show that blue marlin spawning can also occur north of the Bahamas in an offshore area near Bermuda at about 32º-34º North. In the South Atlantic, offshore from southeast Brazil (17º to 18ºS and 37º to 38ºW) blue marlin spawn from March to April. New information on the reproduction of blue marlin from West Africa reported no evidence of spawning events from female blue marlin caught by artisanal vessel in Côte d'Ivoire. Pre-spawning and post-spawning females are present in larger numbers than males (4:1 female/male ratio) in this area. Coastal areas off West Africa have strong seasonal upwelling, and may be feeding areas for blue marlin.

Previous reports have mentioned spawning of white marlin off southeast Brazil in the same area where blue marlin spawn, but later in the year from April to June. Off southern Brazil (25º to 26ºS and 45º to 45ºW) white marlin spawn from December to March. In the northwest Atlantic white marlin have been reported to spawn in the Gulf of Mexico in June. Recent reports confirm that white marlin also spawns offshore and north of the Antilles (19º to 23ºN and 60º to 70ºW) between April and July.

Larval blue marlin are voracious predators and feed on copepods and cladocerans in their first feeding stages but soon switch to a piscivourous diet.

Temperature-depth vertical habitat utilization for Atlantic blue marlin has been recently studied using data collected by 51 electronic pop-up satellite archival tags (PSATs) attached to fish released by recreational and commercial fishers. The average maximum depth observed was 319 m. A few of the monitored animals confined their vertical excursions to less than 100 m but dives below 800 m were also observed. The mean of the lowest temperatures explored was 17°C, with a range from just less than 10°C to just over 24°C. The distributions of times at depth were significantly different between day and night. At night, the fish spent most of their time at or very close to the surface. During daylight hours, they were typically below the surface, often at 40 to 100+ m. The blue marlin sometimes remained below the near-surface layer throughout the daylight hours, but they often returned briefly to the surface. This pattern of behavior also meant the distributions of time at temperature were significantly different between day and night, with the fish occupying warmer strata during darkness. Frequency distributions of the time blue marlin spend at temperatures relative to the temperature of the surface mixed layer, a key issue in some CPUE analyses, were determined for periods of darkness, daylight and, twilight. Results were highly variable within the time series for individual fish, and among individuals. These findings indicate that simplistic assumptions about habitat usage in CPUE analyses are clearly inappropriate and may lead to serious errors that can propagate through the fisheries management system.

BUM/WHM-2. Catch

The geographic distribution of the catches is given in **BUM/WHM-Figure 1**. The Committee used Task I catches as the basis for the estimation of total removals. In recent years some catches of billfish continue to be reported as unclassified billfish **(BUM/WHM-Figure 2** and reporting gaps remain for some important fleets, as was identified in (Anon. 2006). Total removals for the period 1990-2004 were obtained during the 2006 assessment by modifying Task I values with the addition of blue marlin and white marlin that the Committee estimated from catches reported as billfish unclassified. Additionally the reporting gaps were filled with estimated values for some fleets.

During the 2006 marlin assessment (Anon. 2007a) it was noted that catches of blue marlin and white marlin continued to decline through 2004. Over the last fifteen years, Antillean artisanal fleets have increased the use of Moored Fish Aggregating Devices (MFAD) to capture pelagic fish. Catches of blue marlin caught around MFADs are known to be significant but reports on these catches made to ICCAT are very incomplete. Task I catches of blue marlin (**BUM/WHM-Table 1)** in 2006 were 2,182 t. In 2007 task I catches of blue marlin were 2,303 t. Task I catches of white marlin in 2006 and 2007 were 387 t and 302 t, respectively (**BUM/WHM-Table 2)**. Task I catches of white marlin and blue marlin for 2007 are preliminary. Historical reports of unclassified billfish remain an important issue in the estimation of historical removals from marlin stocks.

BUM/WHM*-3. *Fishery indices

A number of relative abundance indices were estimated during the 2006 assessment however, given the apparent shift in landings from industrial to non-industrial fleets in recent times, it is imperative that CPUE indices are developed for all fleets that have substantial landings.

During the 2006 assessment combined indices for both species were estimated to have declined during the period 1990-2004. However, the trends for 2001-2004 suggest that the decline in abundance of blue marlin may have slowed or halted, and that the decline in white marlin may have reversed, with abundance increasing slightly in the most recent years. As evidenced by differences between the trends from the individual and combined indices, four years is likely to be too short a period to reach definitive conclusions about abundance trends. Several years of additional data will be required to confirm recent changes in these abundance trends. A new relative abundance index has been recently developed for blue marlin from CPUE data for a sport fishery in southeastern Brazil, and progress has been made towards obtaining an equivalent index for the artisanal fishery off Côte d'Ivoire. This recent information does not appear to conflict with the conclusions of the assessment of blue marlin made in 2006.

BUM/WHM-4. State of the stocks

Blue marlin

No new information on stock status has been provided since the 2006 assessment (Anon. 2007a). The recent biomass level most likely remains well below the B_{MSY} estimated in 2000. Current and provisional diagnoses suggest that F declined during 2000-2004 and was possibly smaller than $F_{replacement}$[1] but larger than the F_{MSY} estimated in the 2000 assessment. Over the period 2001-2005 several abundance indicators suggest that the decline has been at least partially arrested, but some other indicators suggest that abundance has continued to decline. Confirmation of these recent apparent changes in trend will require at least an additional four or five years of data, especially since the reliability of the recent information has diminished and may continue to do so.

White marlin

No new information on stock status has been provided since the 2006 assessment. The biomass for 2000-2004 most likely remained well below the B_{MSY} estimated in the 2002 assessment. During the last assessment, it was estimated that F 2004 was probably smaller than $F_{replacement}$ and probably also larger than the F_{MSY} estimated in the 2002 assessment. Over the period 2001-2004 combined longline indices and some individual fleet indices suggest that the decline has been at least partially reversed, but some other individual fleet indices suggest that abundance has continued to decline. Confirmation of these recent apparent changes in trend will require at least an additional four or five years of data, especially since the reliability of the recent information has diminished and may continue to do so.

BUM/WHM*-5. *Outlook

No new information on the recovery/outlook for marlins has been provided since the 2006 assessment. The Commission's current management plan has the potential of recovering the stocks of blue marlin and white marlin to the B_{MSY} level. However, reports of recent increases in catches of blue marlin by artisanal fisheries in both sides of the Atlantic may negate the effectiveness of the ICCAT plan that aims to recover this stock.

Recent analyses suggest that the recovery of blue marlin stock might proceed faster than would have been estimated at the 2000 assessment, provided catches remain at the level estimated for 2004. Some signs of stabilization in the abundance trend are apparent in the most recent catch per unit of effort data of blue marlin (2000-2004). Similarly, some signs of a recovery trend are apparent in the most recent catch per unit of effort data for white marlin (2000-2004).

[1] $F_{replacement}$ is the fishing mortality that will maintain the biomass constant from one year to the next. Thus, biomass is expected to grow when $F<F_{replacement}$ and vice-versa.

It should be noted that these trends are based only on a few years of observations. Confirmation of these recent apparent changes in abundance trends of white marlin and blue marlin will require at least an additional four or five years of relative abundance data.

BUM/WHM-6. Effect of current regulations

Recommendations [Rec. 00-13], [Rec. 01-10] and finally [Rec. 02-13] placed additional catch restrictions for blue marlin and white marlin. The latter established that "the annual amount of blue marlin that can be harvested by pelagic longline and purse seine vessels and retained for landing must be no more than 33% for white marlin and 50% for blue marlin of the 1996 or 1999 landing levels, whichever is greater". That recommendation established that, "All blue marlin and white marlin brought to pelagic longline and purse seine vessels alive shall be released in a manner that maximizes their survival. The provision of this paragraph does not apply to marlins that are dead when brought along the side of the vessel and that are not sold or entered into commerce". The Committee estimated the catch of pelagic longline vessels for a subset of fleets that the Committee thought would be expected to be affected by Recommendations [Rec. 00-13] and [Rec. 02-13]. Catches of these fleets represent, for the period 1990-2007, 97% of all longline caught blue marlin and 93% of all longline caught white marlin. Catches of both species have declined since 1996-99, the period selected as the reference period by the recommendations. Since 2002, the year of implementation of the last of these two recommendations, the catch of blue marlin has been below the 50% value recommended by the Commission. Similarly, the catch of White marlin since 2002 has been at about the 33% value recommended by the Commission **(BUM/WHM-Figure 3)**. This analysis represents only longline caught marlin even though the recommendations referred to the combined catch of pelagic longline and purse seine because the catch estimates of billfish by-catch from purse seine vessels are more uncertain than those from longline. Over the period considered, purse seine caught marlin represent 2% of the total catch reported by the combination of purse seine and pelagic longline.

More countries have started reporting data on live releases in 2006. Additionally, more information has come about, for some fleets, on the potential for using gear modifications to reduce the by-catch and increase the survival of marlins. Such studies have also provided information on the rates of live releases for those fleets. However there is not enough information on the proportion of fish being released alive for all fleets, to evaluate the effectiveness of the ICCAT recommendation relating to the live release of marlins.

BUM/WHM-7. Management recommendations

- The Commission should, at a minimum, continue the management measures already in place because marlins have not yet recovered.
- The Commission should take steps to assure that the reliability of the recent fishery information improves in order to provide a basis for verifying possible future rebuilding of the stocks. Improvements are needed in the monitoring of the fate and amount of dead and live releases, with verification from scientific observer programs; verification of current and historical landings from some artisanal and industrial fleets; and complete and updated relative abundance indices from CPUE data for the major fleets.
- Should the Commission wish to increase the likelihood of success of the current management measures of the marlin rebuilding plan, further reduction in mortality would be needed, for example by:
  - implementing plans to improve compliance of current regulations,
  - encouraging the use of alternative gear configurations, including certain types of circle hooks, hook/bait combinations etc., in fisheries where its use has been shown to be beneficial,
  - broader application of time/area catch restrictions.
- Given the recent importance of the catch from artisanal fisheries, and to increase the likelihood of recovery of marlin stocks, the Commission should consider regulations that control or reduce the fishing mortality generated by these fisheries.
- While substantial research into habitat requirements of blue and white marlin have been undertaken since the last assessments, the results of this research are not yet sufficient to allow the Committee to reach scientific consensus on the best method for directly estimating MSY benchmarks for these species based on the complete time-series of data. The Commission should encourage continued research on development of methods to incorporate this information into stock assessments in order to provide a basis for increasing the certainty with which management advice can be provided.

Atlantic blue marlin and Atlantic white marlin summary		
	WHM	**BUM**
$B_{2004} < {}^{1}B_{MSY}$	Yes	Yes
Recent Abundance Trend (2001-2004)	Slightly upward	Possibly stabilizing
$F_{2004} > F_{replacement}$	No	Possibly
$F_{2004} > {}^{1}F_{MSY}$	Possibly	Yes
${}^{2}Catch_{recent}/Catch_{1996}$ Longline and Purse seine	0.47	0.52
${}^{3}Catch_{2004}$	610 t	2,916 t
Rebuilding to B_{MSY}	Potential to rebuild under current management plan but needs verification.	Potential to rebuild under current management plan but needs verification.
${}^{1}MSY$	[4] 600-1,320 t	~ 2,000 t (1,000 ~ 2,400 t)

[1] As estimated during the 2000 (Anon. 2001) and 2002 (Anon. 2003a) assessments.
[2] Catch recent is the average longline catch for 2000-2004.
[3] Estimate of total removals obtained by the Committee. The Task I catch reported for 2006 is 2,182 t for blue marlin and 387 t for white marlin. The preliminary Task I catch reported for 2007 is 2,303 t for blue marlin and 302 t for white marlin. Final estimates for 2005-2007 are likely to be greater.
[4] Range of estimates were obtained in the previous assessments, but recent analyses suggest that the lower bound for white marlin should be at least 600.

BUM-Table 1. Estimated catches (t) of Atlantic blue marlin *(Makaira nigricans)* by major area, gear and flag.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL BUM			2130	2748	3311	1993	2053	2764	4234	4541	4152	2985	3045	4131	4085	5208	5490	5513	5096	4859	3672	2874	3519	2130	3436	2182	2303
ATS			749	1252	1623	789	1085	1718	2549	2396	2604	1789	1828	2454	2376	3141	3370	2883	2983	2710	2611	2108	2546	1439	1886	1412	1506
ATN			1214	1378	1566	1069	836	909	1540	1946	1411	1080	1071	1544	1583	1971	1985	2549	1992	2015	982	767	766	692	1549	771	797
UNK			167	118	122	135	132	137	144	199	137	116	146	133	126	96	135	80	121	134	79	0	207	0	1	0	0
Landings	ATN	Longline	809	920	1223	695	327	415	1009	1601	981	628	614	1099	974	1347	1353	1310	1076	866	461	413	462	518	556	486	465
		Other surf.	206	252	174	160	190	184	197	137	225	223	217	212	379	362	480	1133	797	1053	409	216	263	111	949	186	267
		Sport (HL+RR)	199	206	169	214	181	186	143	50	63	83	113	122	77	66	56	56	38	36	87	89	22	29	18	62	27
	ATS	Longline	533	975	1362	661	964	1530	2017	1958	2286	1490	1419	1764	1679	2193	2519	2068	1973	1774	1446	896	1212	844	997	742	1242
		Other surf.	216	276	260	127	121	187	531	435	316	298	407	688	696	945	781	813	1007	935	1165	1212	1334	595	887	666	255
		Sport (HL+RR)	0	1	1	1	0	1	1	2	1	0	1	2	2	2	28	0	0	0	0	0	0	0	2	1	9
	UNK	Longline	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
		Other surf.	167	118	122	135	132	137	144	199	137	116	146	133	126	96	135	80	121	134	79	0	207	0	0	0	
Discards	ATN	Longline	0	0	0	0	138	124	191	159	142	146	127	111	153	196	97	49	81	60	22	37	19	34	24	36	39
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	11	0	1	1	0	
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	2	0
Landings	ATN	Barbados	126	126	10	14	13	46	3	18	12	18	21	19	31	25	30	25	19	19	18	11	11	0	0	25	
		Brasil	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
		Canada	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	41	48	41	51	79	133	9	31	15	17	10	49	0	4
		Chinese Taipei	125	102	148	117	52	26	11	937	716	336	281	272	187	170	355	80	44	64	65	48	66	104	38	35	29
		Cuba	273	214	246	103	68	94	74	112	127	135	69	39	85	43	0	12	0	0	0	34	3	4	7	7	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	69	75	36	44	55	58
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	71	29	19	0	0	0	0	0	0	
		EC.España	0	3	4	1	0	8	7	5	1	6	7	6	2	25	5	36	15	25	8	1	6	27	12	23	14
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	776	0	
		EC.Portugal	2	1	8	12	8	2	1	1	4	2	15	11	10	7	3	47	8	15	17	1	31	27	24	64	56
		Grenada	6	8	11	36	33	34	40	52	64	52	58	52	50	26	47	60	100	87	104	69	72	45	42	33	49
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	
		Japan	192	351	409	174	78	206	593	250	145	193	207	532	496	798	625	656	427	442	155	125	148	174	251	209	188
		Korea Rep.	43	110	154	36	13	14	252	240	34	11	2	16	16	41	16	0	0	0	0	0	0	0	0	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	0	0	87	148	148	701	420	712	235	158	115	0	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	3	13	13	13	13	27	35	68	37	50	70	90	86	64	91
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	71	134	149	178	225	330	312	202	112	7	6	0	0	0	
		Netherlands Antilles	50	50	50	50	50	50	50	50	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	38	38	0	0	0	0	0	0	
		Senegal	0	0	0	0	0	0	1	1	5	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	1	0	0	1	2	2	2	0	1	0	0	0	0	19	0	0	0	0	1
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	10	5	0	18	17	21	53	46
		Trinidad and Tobago	3	8	3	17	2	0	28	4	6	4	3	27	46	21	81	70	33	55	17	16	4	11	5	12	14
	*	U.S.A.	215	280	295	273	291	221	124	29	33	51	80	88	43	43	46	50	37	24	16	17	19	26	16	17	
		U.S.S.R.	0	0	0	7	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	7	8	9	11	6	8	15	17	18	19	11	15	15	15	3	5	1	2	2	2	2	2	2	2	2
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
		Ukraine	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	
		Venezuela	172	117	219	218	60	76	149	70	49	66	74	122	106	137	130	205	220	108	72	76	84	83	138	131	206
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
		Benin	0	9	10	7	4	12	0	6	6	6	6	5	5	5	5	5	5	5	0	0	0	0	0	0	
		Brasil	27	32	33	46	51	74	60	52	61	125	147	81	180	331	193	486	509	452	780	387	577	195	612	298	262
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	21	25	21	27	41	68	15	61	73	72	49	47	0	61
		Chinese Taipei	47	70	165	98	265	266	462	767	956	488	404	391	280	490	1123	498	442	421	175	246	253	211	113	64	204
		Cuba	123	159	205	111	137	191	77	90	62	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	100	100	100	100	130	82	88	105	79	139	212	177	157	222	182	275	206	196	78	109	115	107	178	150
		EC.España	0	0	0	0	0	0	15	0	12	40	37	49	38	133	117	159	110	115	86	27	6	24	12	68	25

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	1	0	24	69	79
		Gabon	0	0	0	0	0	0	0	0	0	0	1	2	0	304	5	0	0	0	1	0	3	0	0	0	
		Ghana	216	166	150	16	5	7	430	324	126	123	236	441	471	422	491	447	624	639	795	999	415	470	759	405	
		Japan	248	482	691	335	362	617	962	967	755	824	719	991	913	881	724	529	363	441	180	142	294	366	191	301	721
		Korea Rep.	88	234	262	60	139	361	437	84	503	13	11	40	40	103	40	2	0	1	1	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	103	192	214	256	323	474	449	290	162	10	8	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	33	0	0	0	0	0	0	0	
		S. Tomé e Príncipe	0	0	0	0	0	28	19	17	18	21	25	28	33	36	35	33	30	32	32	32	32	9	21	26	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	73	53	141	103	775	0	0	0	
		U.S.S.R.	0	0	7	16	22	32	5	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	0	0	0	0	23	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UNK	Cuba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	38	55	56	0	0	0	0	0	
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	207	0	0	0	
		Mixed flags (FR+ES)	167	118	122	135	132	137	144	199	137	116	146	133	126	96	82	80	83	79	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
Discards	ATN	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
		U.S.A.	0	0	0	0	138	124	191	159	142	146	127	111	153	196	97	50	81	60	25	49	19	35	25	36	38
	ATS	Brasil	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
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	0	

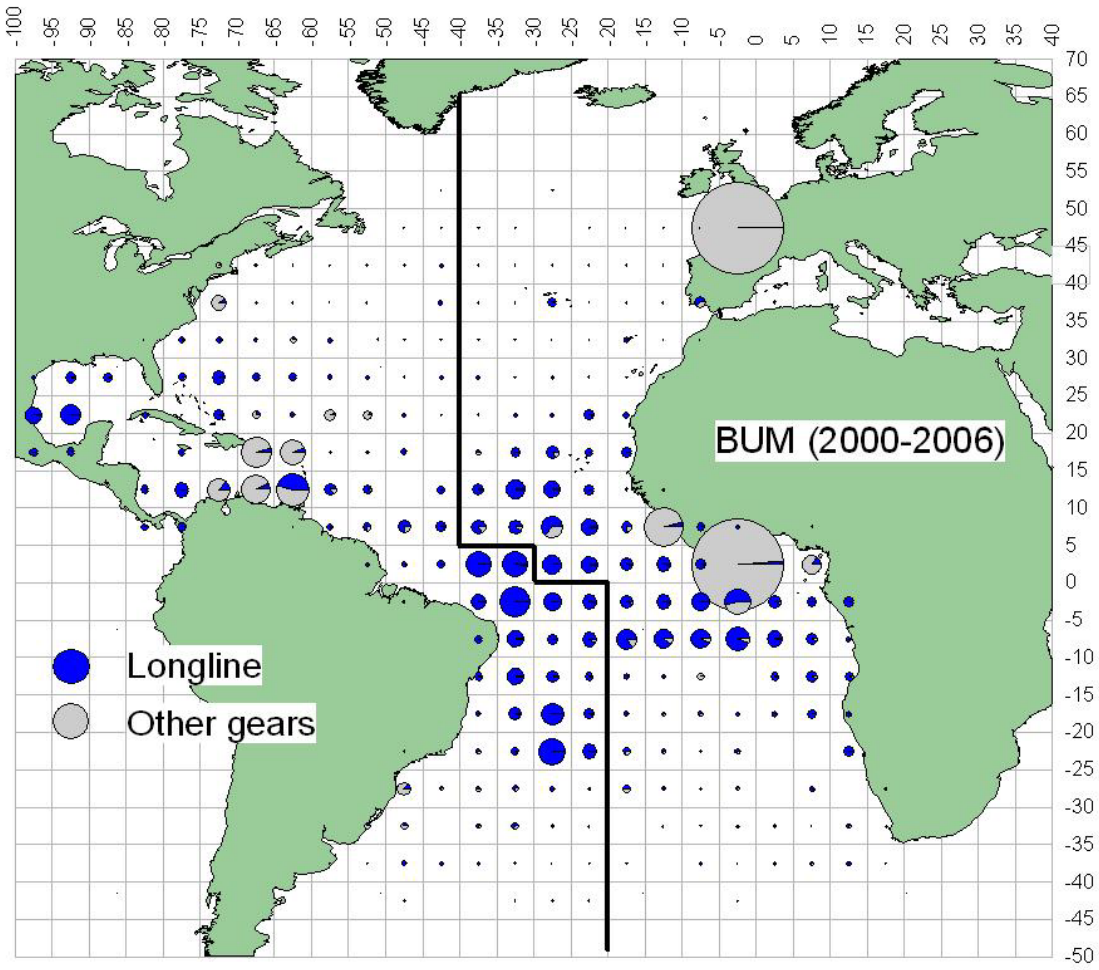
* USA, reported additional figures of rod and reel landings of 9.001 t for 2007 in the North Atlantic.

WHM-Table 1. Estimated catches (t) of Atlantic white marlin *(Tetrapturus albidus)* by major area, gear and flag.

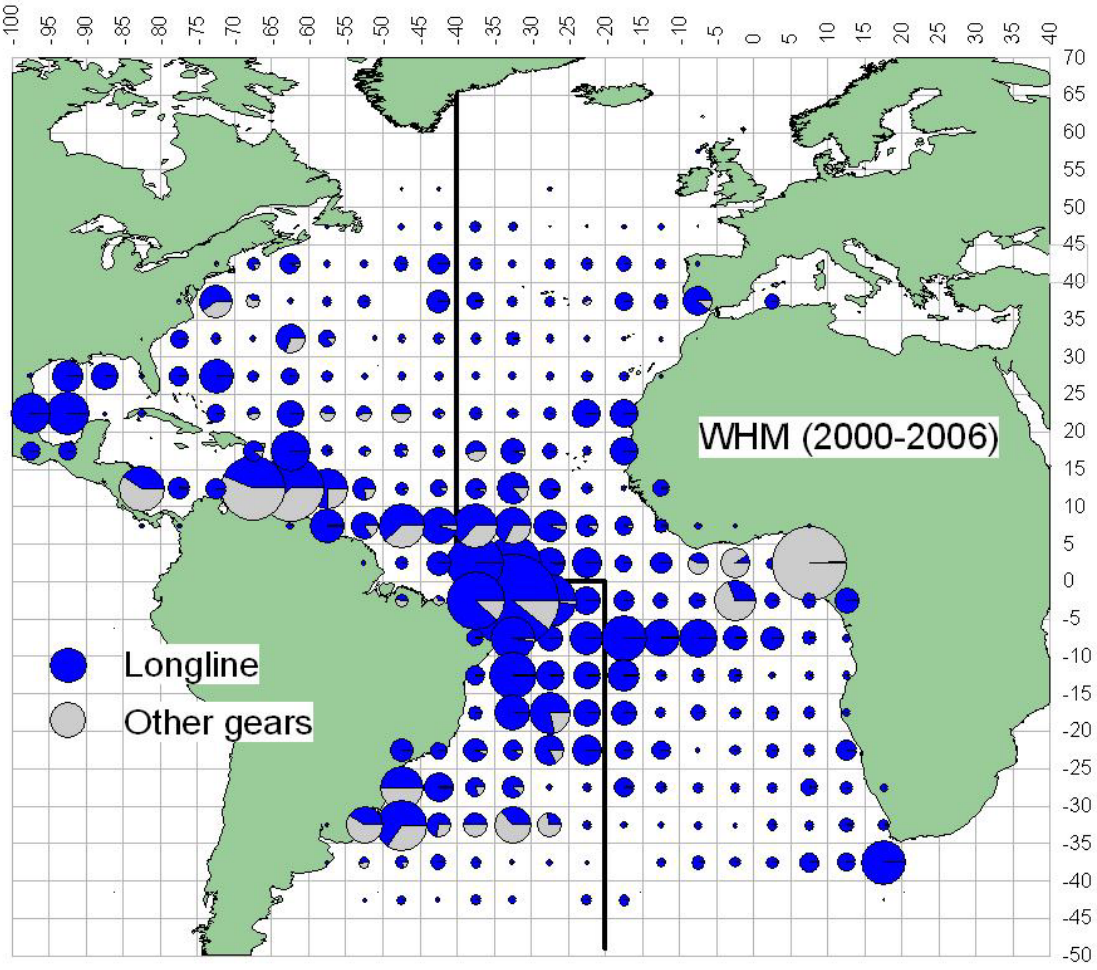
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL WHM			1771	1200	1727	1611	1491	1366	1821	1653	1624	1462	1543	2100	1742	1562	1373	1672	1556	1325	888	889	676	594	596	387	302
ATN			1280	653	860	905	587	406	368	401	236	610	542	650	621	658	451	520	476	430	353	287	237	252	257	186	142
ATS			461	526	844	680	879	935	1426	1215	1377	843	990	1440	1112	897	915	1143	1069	874	534	602	438	342	339	201	160
UNK			31	22	23	25	25	25	27	37	11	10	12	11	9	7	7	9	11	21	0	0	1	0	0	0	
Landings	ATN	Longline	1196	570	788	812	433	167	234	259	106	466	412	520	455	543	358	465	386	347	308	226	193	204	225	153	106
		Other surf.	5	17	29	61	54	150	11	40	21	35	34	57	48	31	50	17	26	42	24	22	27	20	14	21	28
		Sport (HL+RR)	79	66	43	32	38	29	16	21	19	21	30	30	18	20	9	6	6	1	4	6	1	1	1	2	1
	ATS	Longline	308	471	825	654	870	832	1333	1152	1328	805	950	1417	1086	859	828	979	1021	827	471	496	394	318	304	165	133
		Other surf.	153	55	19	26	9	103	92	59	49	38	40	22	22	33	50	164	47	47	63	107	44	23	35	34	9
		Sport (HL+RR)	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0
	UNK	Other surf.	31	22	23	25	25	25	27	37	11	10	12	11	9	7	7	9	11	21	0	0	1	0	0	0	
Discards	ATN	Longline	0	0	0	0	62	60	107	81	90	88	66	42	100	64	33	31	57	41	16	29	17	27	17	9	7
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	2	19
Landings	ATN	Barbados	0	0	0	0	0	117	11	39	17	24	29	26	43	15	41	33	25	25	24	15	15	0	0	33	
		Brasil	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
		Canada	0	0	0	0	1	0	0	0	0	0	0	4	4	8	8	8	5	5	3	2	1	2	5	3	2
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	6	7	6	7	10	20	1	7	4	2	1	4	0	0
		Chinese Taipei	203	96	128	319	153	0	4	85	13	92	123	270	181	146	62	105	80	59	68	61	15	45	19	17	1
		Cuba	728	241	296	225	30	13	21	14	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	
		EC.España	0	9	14	0	0	61	12	12	9	18	15	25	17	97	89	91	74	118	43	4	19	19	48	28	32
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	11	30	3	2
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	8	14	33	10	12	11
		Japan	27	52	45	56	60	68	73	34	45	180	33	41	31	80	29	39	25	66	15	10	21	23	28	29	8
		Korea Rep.	6	18	147	37	2	2	82	39	1	9	4	23	3	7	5	0	0	0	0	0	0	0	4	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	8	4	3	4	3	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	2	8	8	0	5	6	11	18	44	15	15	28	25	16	13
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	23	43	47	57	72	105	100	64	36	2	2	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	44	0	0	0	
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	9	6	5	5	12
	*	U.S.A.	81	81	75	116	124	42	10	17	13	11	19	13	7	12	8	5	5	1	3	6	1	1	1	1	
		UK.Bermuda	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		Venezuela	234	155	155	151	154	42	47	79	47	187	226	148	171	164	90	80	61	25	72	110	55	55	60	26	52
	ATS	Argentina	0	0	4	4	0	0	8	9	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Belize (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	
		Brasil	81	61	87	143	93	149	204	205	377	211	301	91	105	75	105	217	158	105	172	407	266	80	244	90	52
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	3	4	3	4	5	10	1	13	19	6	6	4	0	10
		Chinese Taipei	87	124	172	196	613	565	979	810	790	506	493	1080	726	420	379	401	385	378	84	117	89	127	37	27	53
		Cuba	112	153	216	192	62	24	22	6	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	5	1	2	2	3	1	1	1	1
		EC.España	0	0	0	0	0	1	1	0	17	6	12	2	19	54	4	10	45	68	18	2	3	45	10	23	14
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	19	0
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
		Ghana	142	54	15	22	6	88	68	31	17	14	22	1	2	1	3	7	6	8	21	2	1	1	1	0	
		Honduras (foreign obs.)	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	17	24	81	73	74	76	73	92	77	68	49	51	26	32	29	17	15	17	41	5	12	13	6	12	11
		Korea Rep.	9	44	225	34	25	17	53	42	56	1	4	20	20	52	18	0	0	0	0	0	11	40	3	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	91	171	190	228	288	421	399	258	144	9	7	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	
		S. Tomé e Príncipe	0	0	0	0	0	14	16	19	26	24	17	21	21	30	45	40	36	37	37	37	37	21	33	29	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	2	0	0	0	
		Uruguay	13	65	44	16	6	1	1	1	1	3	0	0	0	0	0	22	0	0	0	0	0	0	0	0	

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	UNK	Costa Rica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	14	0	0	1	0	0	0	
		Mixed flags (FR+ES)	31	22	23	25	25	25	27	37	11	10	12	11	9	7	7	9	8	7	0	0	0	0	0	0	
Discards	ATN	U.S.A.	0	0	0	0	62	60	107	81	90	88	66	42	100	64	33	32	57	41	17	33	17	27	17	10	7
	ATS	Brasil	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
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	0	

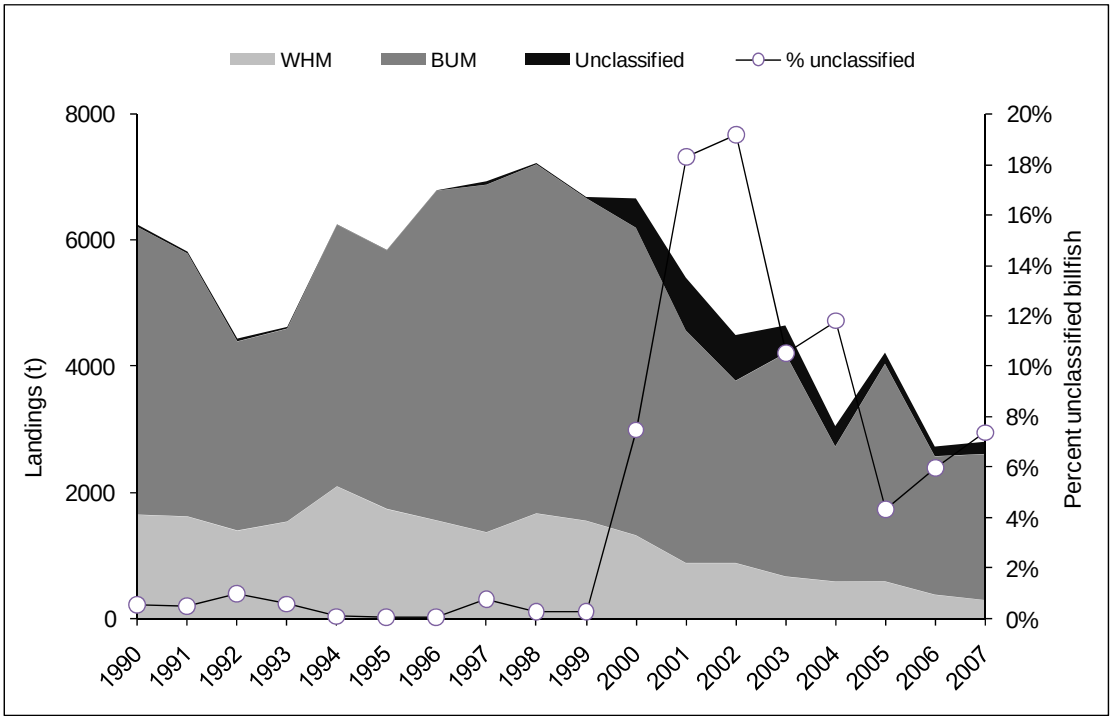
* USA reported additional figures of rod and reel landings of 0.478 t for 2007 in the North Atlantic.



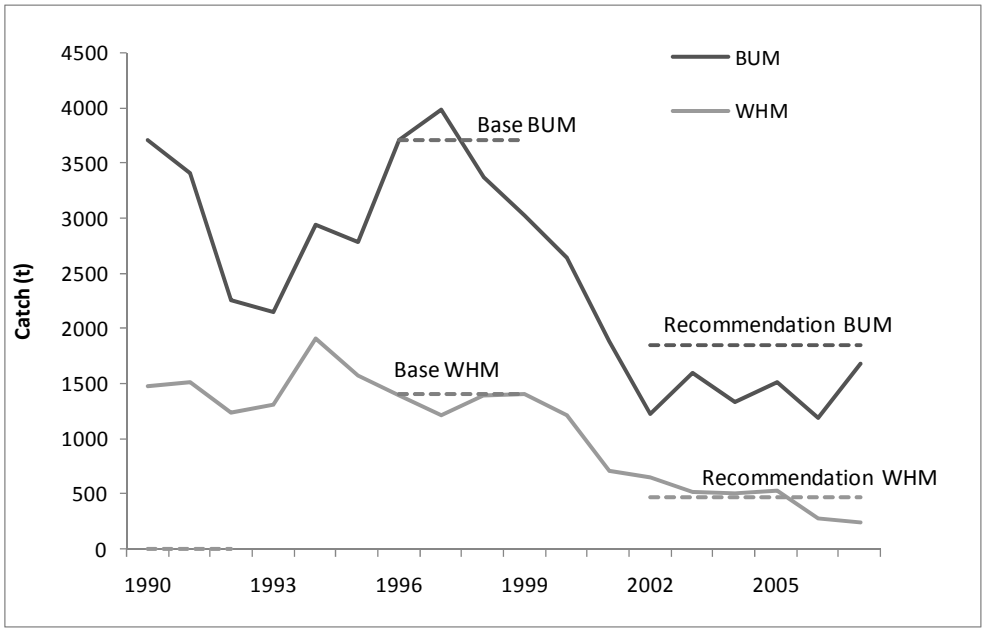
BUM/WHM-Figure 1a. Geographic distribution of mean blue marlin catch (2000-2006) by major gears. Largest circle corresponds to a catch of 789 t.



BUM/WHM-Figure 1b. Geographic distribution of mean white marlin catch (2000-2006) by major gears. Largest circle corresponds to a catch of 52 t.



BUM-WHM Figure 2. Total catch of blue marlin, white marlin, and unclassified billfish for 1990-2006, and ratio (percentage) of unclassified billfish to the total blue marlin and white marlin catch.



BUM/WHM Figure 3. Estimates of pelagic longline catch for blue marlin and white marlin for the period 1990-2007 and reference catch levels relevant to ICCAT recommendations [Rec. 00-13] and [Rec. 02-13]. Base is defined as the maximum of either the 1996 or 1999 catch of marlins, whichever is greatest. Recommendation calls for a reduction in marlin catch in comparison to this base. The reduction recommended for blue marlin was 50% and for white marlin 67%.

8.7 SAI - SAILFISH

The last sailfish assessment was conducted in 2001. Sailfish *(Istiophorus platypterus)* has a pan-tropical distribution. ICCAT has established, based on life history information on migration rates and geographic distribution of catch, that there are two management units for Atlantic sailfish, eastern and western **(SAI-Figure 1)**.

SAI-1. Biology

Larval sailfish are voracious feeders initially feeding on crustaceans from the zooplankton but soon switching to a diet of fish larvae. Temperature preferences for adult sailfish appear to be in the range of 25-28°C. Depth distribution, from a study undertaken in the southern Gulf of Mexico indicated that habitat preferences from PSAT tagged sailfish were primarily within the upper 20 m of the water column. The tag data also indicated common short-term movements to depths in excess of 100 m. Sailfish is the most coastal of all billfish species and conventional tagging data suggest that they move shorter distances than the other billfish (**SAI-Figure 2**). Sailfish grow rapidly and reach a maximum size of 160 cm for males and 220 cm for females, with females reaching maturity at 155 cm. Sailfish reach a maximum age of at least 17 years.

Sailfish spawn over a wide area and year around. There have been collections of larvae in the Straits of Florida, and of females ready to spawn off the Venezuelan, Guyanase and Surinamese coasts. In the southwest Atlantic, spawning occurs off the southern coast of Brazil between 20° and 27°S, and in the east Atlantic, off Senegal and Côte d'Ivoire. Timing of spawning can differ, however, and occurs from the late spring to late summer in the higher latitudes (Florida, Southern Brazil) and more towards the end and beginning of the year in the lower latitudes (Caribbean Sea, West Africa).

SAI-2. Description of the fisheries

Sailfish are targeted by coastal artisanal and recreational fleets and, to a less extent, are caught as a by-catch in longline and purse seine fisheries **(SAI-Figure 1)**. Historically, catches of sailfish were reported together with spearfish by many longline fleets. At present it is not possible to separate the catches of these two species **(SAI-Table 1)**. However, recent analyses of observer data from selected fleets were used to obtain species ratios by 5X5 degree squares that may be used to conduct this separation. These ratios need to be updated with the data for all fleets. Historical catches of unclassified billfish continue to be reported to the Committee making the estimation of sailfish catch difficult. In 2008, a review of Task I data for sailfish was conducted and a number of modifications of these data were made.

Reports to ICCAT estimate that the Task I catch for 2007 was 1,060 t and 920 t, respectively, for the east and west region **(SAI-Figure 3)**. Task I catches of sailfish for 2007 are preliminary because they do not include reports from some important fleets.

SAI-3. State of the stocks

The last assessment of the sailfish stocks was attempted in 2001 (Anon. 2002), and a full assessment is planned for 2009. The 2001 attempts at quantitatively assessing the status of these two stocks (eastern and western sailfish), proved to be unsatisfactory. Updated and new relative abundance indices were recently reported (**SAI-Figure 4**). However, there is still a need to update sailfish abundance indices for all important fleets. The available indices confirm the decreases in abundance of the eastern stock reported during 2001. Recent biological and fishery studies have suggested an alternative hypothesis to the accepted hypothesis about sailfish stock structure. This alternative hypothesis would split the western stock of sailfish into two sub-stocks separated at 5 degrees North. Both hypotheses will be considered at the next sailfish assessment.

SAI-4. Outlook

There is no new information available to change the outlook as presented in the 2001 report. It is unknown if the western or eastern sailfish stocks are undergoing over-fishing ($F>F_{MSY}$) or if the stocks are currently over-fished ($B<B_{MSY}$) and for these reasons the outlook for future conditions of the stocks are best interpreted based on the

recent trends of CPUE and catch. For the western stock, catches and relative abundance indices have fluctuated without a trend since the mid 1980s. For the eastern stock, catches and relative abundance indices have declined over the same period. However, these trends are not very informative and the outlook for both the eastern and western stock is uncertain. However, there is particular concern over the outlook for the eastern stock.

SAI-5. Effect of current regulations

No ICCAT regulations for sailfish or spearfish are in effect.

SAI-6. Management recommendations

Management recommendations here are the same as those made in 2007. The previous management recommendations indicated that the Commission should consider methods for reducing fishing mortality rates. The current western Atlantic assessment leads the Committee to recommend that the western Atlantic sailfish catches should not exceed current levels. For the east Atlantic, sailfish catches should not exceed current levels and the Commission should consider practical and alternative methods to reduce fishing mortality and assure continued improvements of data collection and analysis of fisheries data.

The Committee is concerned about the incomplete reporting of sailfish catches, particularly for the most recent years. The Committee recommends all countries landing or having dead discards of sailfish and spearfish, report these data by species to the ICCAT Secretariat.

The Committee reviewed catch and CPUE data during 2008, in preparation for the assessment of 2009. There is still a need for further analysis of CPUE data particularly for some of the longline fleets, and separation of spearfish/sailfish catches prior to the assessment. This data is expected to be available for the 2009 assessment.

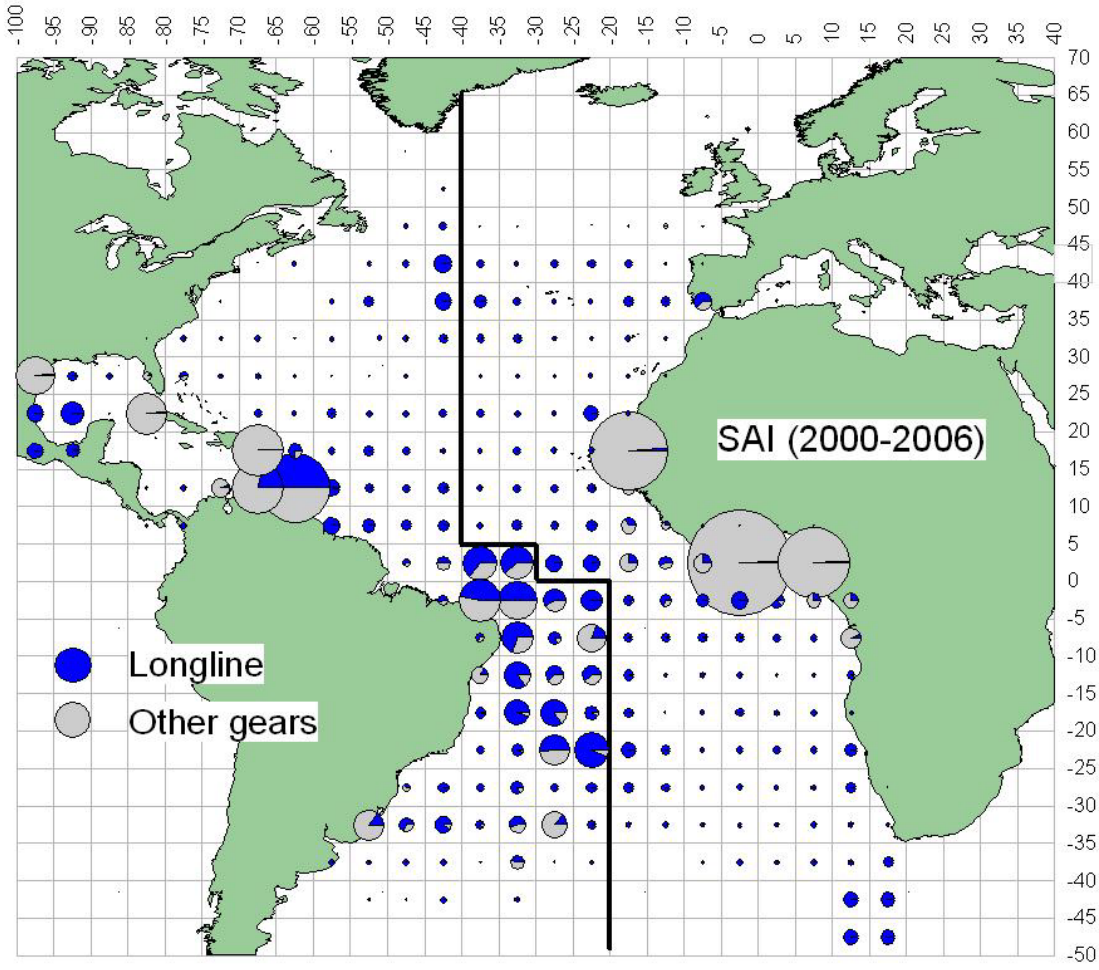
ATLANTIC SAILFISH SUMMARY[1]

	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	Not estimated	Not estimated
Recent Yield (2000)	506 t	969 t
2000 Replacement Yield	~ 600 t	Not estimated
Management Measures in Effect	None	None

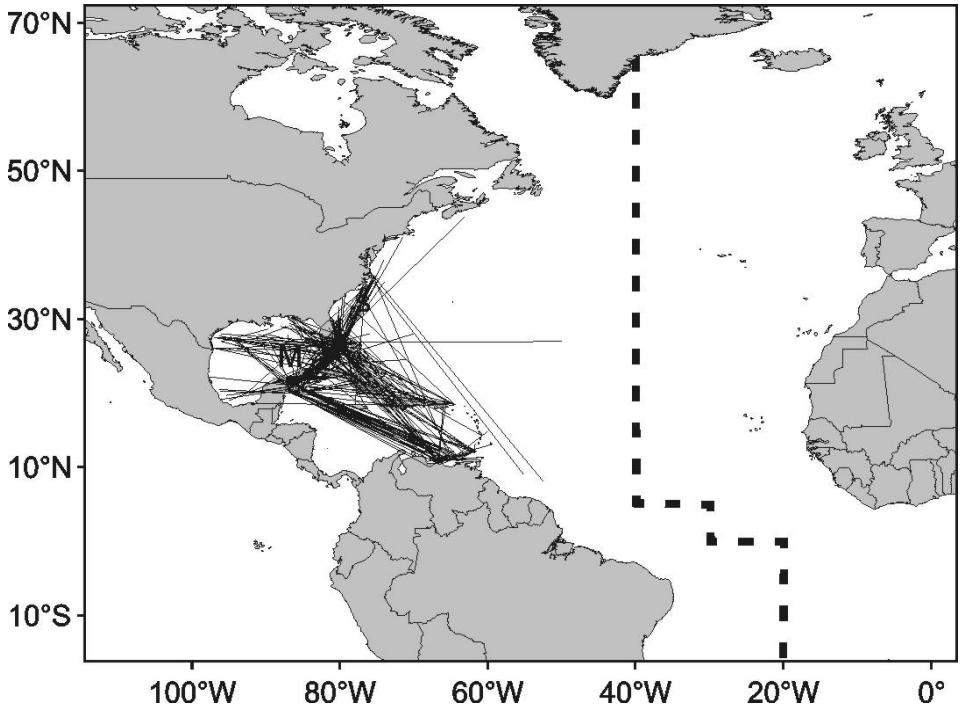
[1]As estimated in 2001.

SAI-Table 1. Estimated catches (t) of Atlantic sailfish *(Istiophorus albicans)* and spearfish by major area, gear and flag.

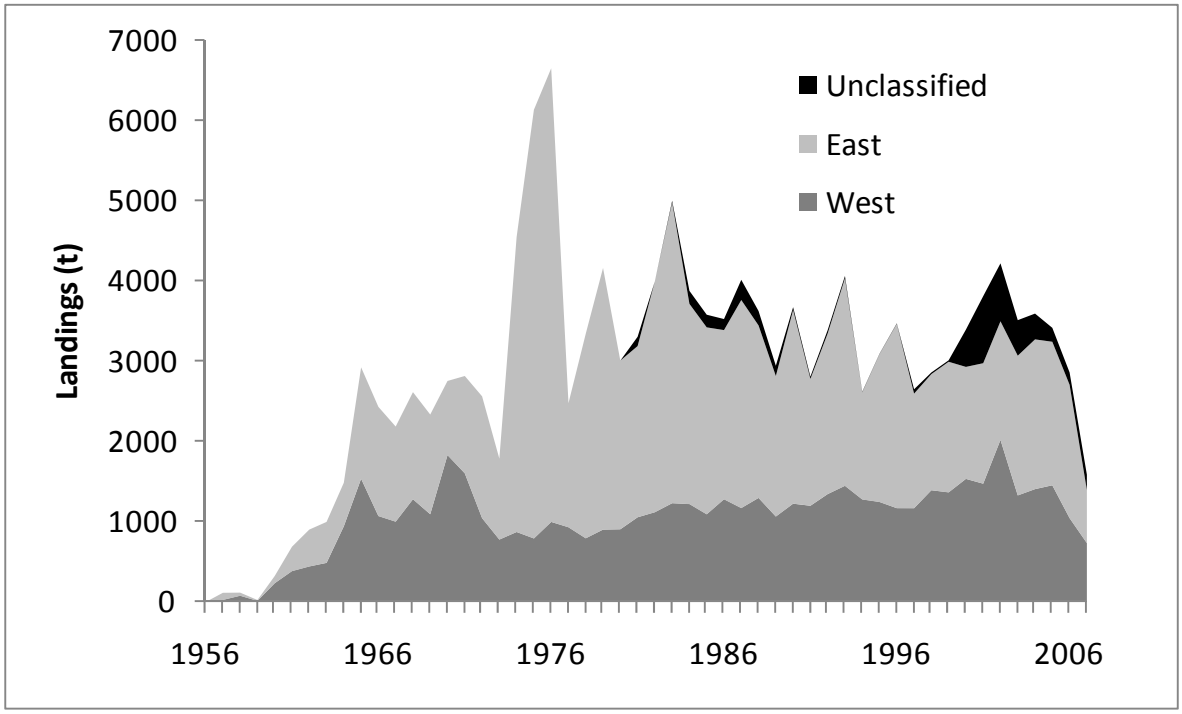
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL SAI			4976	3713	3421	3386	3761	3446	2815	3637	2779	3344	4032	2613	3089	3465	2597	2839	2993	2929	2975	3559	3084	3289	3241	2707	1980
ATW			1231	1221	1093	1281	1171	1297	1065	1226	1200	1345	1447	1278	1246	1170	1168	1393	1366	1534	1475	2019	1328	1407	1455	1045	920
ATE			3745	2492	2328	2105	2590	2148	1750	2411	1580	1999	2585	1334	1843	2295	1429	1446	1627	1395	1501	1540	1756	1882	1786	1662	1060
Landings	ATE	Longline	277	224	148	140	136	132	152	153	71	267	552	215	287	239	301	349	384	242	306	374	295	274	319	483	588
		Other surf.	2962	2107	1940	1394	1870	1479	1153	1240	1002	995	1201	892	968	1531	580	834	836	746	928	1028	1100	1345	1214	886	472
		Sport (HL+RR)	506	161	240	571	584	537	445	1018	507	738	833	227	588	524	548	263	407	407	266	138	361	263	254	292	
	ATW	Longline	356	512	506	489	451	561	417	382	244	377	654	565	461	389	328	545	517	811	1002	1303	883	757	1083	663	656
		Other surf.	141	173	274	295	187	208	238	514	521	599	498	468	410	482	433	553	615	602	401	603	440	642	368	374	248
		Sport (HL+RR)	735	536	313	497	491	471	353	267	371	333	232	217	347	230	350	267	163	76	60	106	0	0	0	2	8
Discards	ATW	Longline	0	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	3	5	7
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Landings	ATE	Benin	51	53	50	25	32	40	8	21	20	21	20	20	20	19	6	4	5	5	12	2	2	5	3	3	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	5	9	4	5	11	4	4	8	0	8
		Chinese Taipei	20	8	9	1	5	6	7	13	10	215	420	101	155	65	150	117	178	120	101	124	74	30	50	73	131
		Cuba	200	115	19	55	50	22	53	61	184	200	77	83	72	533	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	40	40	40	40	66	55	58	38	69	40	54	66	91	65	35	80	45	47	65	121	73	93	78	52
		EC.España	7	4	7	9	19	28	14	0	13	3	42	8	13	42	38	15	20	8	150	210	183	148	177	200	257
		EC.Portugal	0	0	0	0	0	0	0	0	0	1	2	1	2	1	2	27	53	11	3	8	13	19	11	136	43
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		Gabon	0	0	0	0	0	0	0	0	0	0	3	3	110	218	2	0	0	0	0	0	4	0	0	0	
		Ghana	2408	1658	1485	925	1392	837	465	395	463	297	693	450	353	303	196	351	305	275	568	592	566	521	542	282	420
		Japan	47	63	84	71	37	57	57	63	16	42	58	45	52	47	19	58	16	26	6	20	21	70	50	64	143
		Korea Rep.	3	34	29	2	20	15	17	16	30	3	3	6	6	14	5	0	0	0	0	0	0	0	0	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	0	0	33	85	43	136	122	154	56	133	127	106	122	118	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	
		Mixed flags (FR+ES)	499	354	364	403	394	408	432	595	174	150	182	160	128	97	110	138	131	98	44	39	44	41	35	32	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	27	51	57	69	86	127	120	77	43	3	2	16	7	8	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		S. Tomé e Príncipe	0	0	0	0	0	78	86	97	84	78	81	88	92	96	139	141	141	136	136	136	136	515	346	292	
		Senegal	510	163	241	572	596	587	552	1092	546	917	936	260	678	610	556	270	412	412	266	138	361	263	254	292	2
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	5
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	22	36	23	62	55	95	71	73	80	
		U.S.A.	0	0	0	0	0	0	0	0	2	4	1	1	3	1	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	0	0	0	2	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Aruba	30	30	30	30	23	20	16	13	9	5	10	10	10	10	10	10	10	10	0	0	0	0	0	0	
		Barbados	0	0	0	0	0	0	69	45	29	42	50	46	74	25	71	58	44	44	42	26	27	26	42	58	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	12
		Brasil	60	121	187	292	174	152	147	301	90	351	243	129	245	310	137	184	356	598	412	547	585	534	416	139	123
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	9	4	3	1	0	1	0	0	0
		Chinese Taipei	31	45	39	64	31	300	171	83	73	33	223	233	38	37	4	129	33	22	57	70	25	19	41	22	34
		Cuba	28	169	130	50	171	78	55	126	83	70	42	46	37	37	40	28	196	208	68	32	18	50	72	47	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	1	0	3	3
		Dominican Republic	50	49	46	18	40	44	44	40	31	98	50	90	40	40	101	89	27	67	81	260	91	144	165	133	
		EC.España	0	0	0	0	0	0	0	0	8	13	13	19	36	5	30	42	7	14	354	449	196	181	113	148	184
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	2	12	12	110	19	53
		Grenada	37	66	164	211	104	114	98	218	316	310	246	151	119	56	83	151	148	164	187	151	171	112	147	159	174
		Japan	22	34	38	28	6	22	22	25	73	1	2	8	2	4	17	3	10	12	3	3	8	5	22	4	2
		Korea Rep.	36	52	72	14	1	3	17	25	1	3	6	8	8	22	8	0	0	0	0	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	2	19	19	10	9	65	40	118	36	34	45	51	55	41	46
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	15	27	30	36	46	67	64	41	23	1	1	9	4	4	
		Netherlands Antilles	21	21	10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15	0	0	0	0	0	0	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	2	1	4	4	4	2	1	3	0	1	0	2	164	3	86	73	59	18
		Trinidad and Tobago	64	58	14	25	35	24	11	9	4	4	56	101	101	104	10	7	4	3	7	6	8	10	9	17	13
		U.S.A.	734	495	282	462	454	451	324	242	343	294	202	179	345	231	349	267	163	76	58	103	0	0	0	0	2
		Venezuela	119	81	81	77	80	22	24	24	65	71	206	162	93	155	175	248	169	83	126	159	133	158	178	184	248
Discards	ATW	Brasil	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
		U.S.A.	0	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	4	5	7



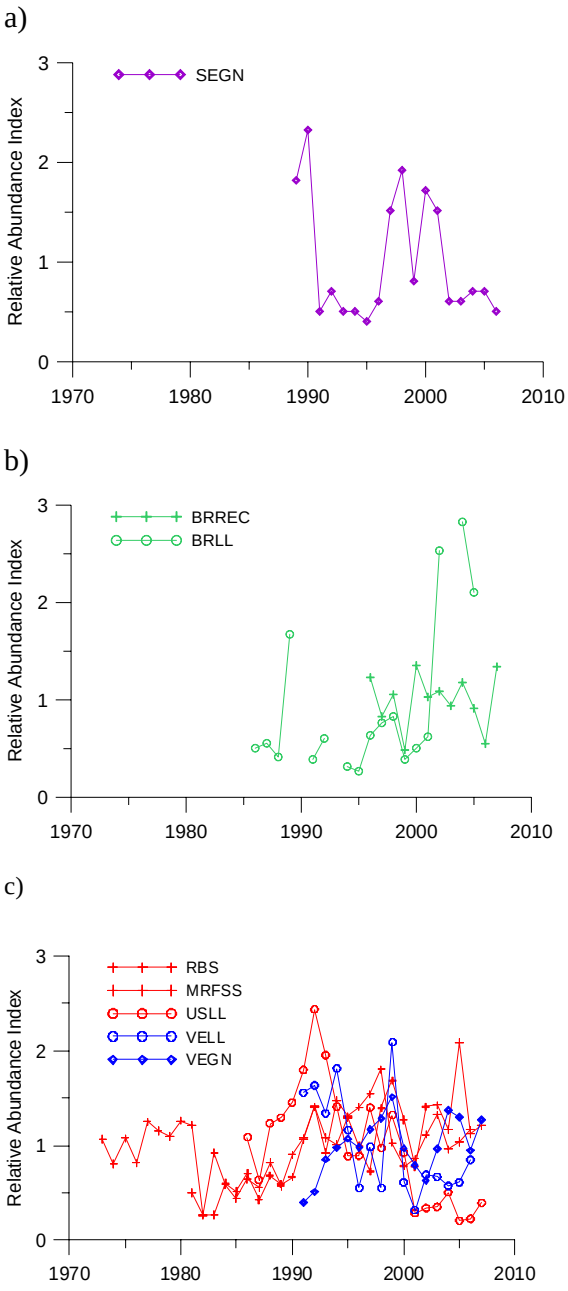
SAI-Figure 1. Geographic distribution of the mean sailfish catch (2000-2006) by major gears. The largest circle corresponds to a catch of 543 t.



SAI-Figure 2. Conventional tag returns for Atlantic sailfish. Lines join the locations of release and recapture.



SAI-Figure 3. Task I catches of sailfish and spearfish (*T. pfluegeri+T.belone)* combined for each of the two Atlantic stocks, East and West and unclassified billfish. Estimates for 2007 are preliminary.



SAI-Figure 4. Relative abundance index estimated for the (a) Eastern stock area from the artisanal fleet of Senegal (SEGN), (b) Western stock area from the Brazilian recreational (BRREC) and longline fleets (BRLL), and (c) Western stock for the U.S. recreational (RBS and MRFSS) and longline (USLL) fleets, and the Venezuelan longline (VELL) and artisanal gillnet (VEGN).

8.8 SWO-ATL-ATLANTIC SWORDFISH

The last assessment for Atlantic swordfish was conducted in 2006 (Anon. 2007b). Other information relevant to Atlantic swordfish is presented in the Report of the Sub-Committee on Statistics, included as **Appendix 8** to this SCRS Report, and recommendations pertinent to Atlantic swordfish are presented in Section 14.

SWO-ATL-1. Biology

Swordfish *(Xiphias gladius)* are members of the family *Xiphiidae* and are in the suborder *Scombroidei.* They can reach a maximum size in excess of 500 kg. They are distributed widely in the Atlantic Ocean and Mediterranean Sea. The management units for assessment purposes are a separate Mediterranean group, and North and South Atlantic groups separated at 5°N. This stock separation is supported by recent genetic analyses. However, the precise boundaries between stocks are uncertain, and mixing is expected to be highest at the boundary in the tropical zone. Swordfish feed on a wide variety of prey including groundfish, pelagic fish, deep-water fish, and invertebrates. They are believed to feed throughout the water column, and undertake extensive diel vertical migrations.

Swordfish mostly spawn in the western warm tropical and subtropical waters throughout the year, although seasonality has been reported in some of these areas. They are found in the colder temperate waters during summer and fall months. Young swordfish grow very rapidly, reaching about 140 cm LJFL (lower-jaw fork length) by age three, but grow slowly thereafter. Females grow faster than males and reach a larger maximum size. Tagging studies have shown that some swordfish can live up to 15 years. Swordfish are difficult to age, but about 50% of females were considered to be mature by age five, at a length of about 180cm. However, the most recent information indicates a smaller length and age at maturity.

One scientific document related to the selectivity of the surface longline on swordfish was presented during the 2008 species group meeting. Three types of hooks (2 circle hooks with two different offsets and one J hooks) and two types of bait (squid and mackerel) were tested over a period of 240 days at sea. The data indicated that the overall catch rates in weight of the swordfish target species would be reduced with the two circle hooks and squid bait. These results were similar to related investigations conducted in North and South Atlantic waters.

SWO-ATL-2. Fishery indicators

Due to the broad geographical distribution of the Atlantic swordfish **(SWO ATL-Figure 1)**, in coastal and off-shore areas, mostly ranging from 50ºN to 45ºS, this species is available to a large number of fishing countries. The ages exploited in the North Atlantic fisheries include primarily ages two and three in recent years **(SWO ATL-Figure 2)**. Directed longline fisheries from Canada, EC-Spain, and the United States have operated since the late 1950s or early 1960s, and harpoon fisheries have existed at least since the late 1800s. Other directed swordfish fisheries include fleets from Brazil, Morocco, Namibia, EC-Portugal, South Africa, Uruguay, and Venezuela. The primary by-catch or opportunistic fisheries that take swordfish are tuna fleets from Chinese Taipei, Japan, Korea and EC-France. The 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 of tuna fisheries. The largest proportion of the Atlantic catches is made using surface drifting longline. However, many additional gears are used, including traditional gillnets off the coast of western Africa.

Total Atlantic

The total Atlantic estimated catch of swordfish (North and South, including discards) reached a historical high of 38,803 t in 1995 **(SWO-ATL-Table 1** and **SWO-ATL-Figure 3**). The 2007 reported catch was 27,354 t, a 6% increase compared with 2006. A substantial number of countries have not yet reported their 2007 catches and therefore values should be considered provisional and subject to revision.

North Atlantic

For the past decade, the North Atlantic reported catch (landings plus discards) has averaged about 11,400 t **(SWO-ATL-Table 1** and **SWO-ATL-Figure 3)**. Since the 1987 peak in North Atlantic landings (20,236 t), the reported catch has declined to 9,654 t in 2002, in response to ICCAT recommendations. Reduced landings have

also been attributed to shifts in fleet distributions, including movement of some vessels to the South Atlantic and out of the Atlantic. In addition, some fleets, including Canada, EC-Portugal, EC-Spain, and the United States, have changed operating procedures to opportunistically target other large pelagic species (tuna and/or sharks), taking advantage of market-price conditions and their high relative catch rates. Since 2002, the reported catches of swordfish have increased moderately. The 2007 reported catch (11,938 t) reflects a slight increase compared with 2006 (11,504 t).

The available age-specific indices of abundance from the various fleets harvesting northern Atlantic swordfish show generally consistent trends over the period of overlap, with a few exceptions especially in the most recent period. A period of relatively strong recruitment occurred in the mid-1990s. This, in combination with lower catches subsequently resulted in an increase in spawning biomass. Unfortunately, there is little information available with which to judge the most recent recruitment levels. The overall indicator of northern Atlantic swordfish biomass from the major fisheries reflected an increase in biomass in the late 1990s **(SWO-ATL-Figure 4)**; the trend has been generally flat since 2000 until 2005. More recent indices were available for the Canadian longline fishery (until 2007), and indicated stability in catch rates from 2000 to 2007. Anecdotal reports from other swordfish longline fisheries (USA and EC-Spain) indicate that catch rates in those fisheries have remained stable in recent years.

South Atlantic

The historical trend of catch (landings plus discards) can be divided in two periods: before and after 1980. The first one is characterized by relatively low catches, generally less than 5,000 t (with an average value of 2,300 t). After 1980, landings increased continuously up to a peak of 21,780 t in 1995, levels that match the peak of North Atlantic harvest (20,236 t). This increase of landings was in part due to progressive shifts of fishing effort to the South Atlantic, primarily from the North Atlantic, as well as other waters. Expansion of fishing activities by southern coastal countries, such as Brazil and Uruguay, also contributed to this increase in catches. The reduction in catch following the peak in 1995 resulted from regulations and is due in part to a shift to other oceans and target species. In 2007, the catches (15,416 t) were about 29% lower than the 1995 reported level but 8% higher than the 2006 reported catches (14,277 t). The reported 2007 catch should be considered provisional and is probably an underestimate.

As observed in the 2006 assessment, the CPUE trend from targeted and by-catch fisheries were similar in the early part of the available time-series, but the patterns diverged starting in the mid 1990s (**SWO-ATL-Figure 5**). It was noted that there was little overlap in fishing area and strategies between the by-catch and targeted fleets used for estimating CPUE pattern, and therefore the by-catch and targeted fisheries CPUE trends could be tracking different components of the population.

Discards

Since 1991, several fleets have reported discards (see **SWO-ATL-Table 1**). The volume of Atlantic-wide reported discards since then has ranged from 215 t to 1,139 t. The most recent (2007) reported level of discards is 363 t, a reduction of 68% from the peak level reported for 2000.

SWO-ATL-3. State of the stocks

North Atlantic

The last assessment conducted in 2006 indicated that North Atlantic swordfish biomass had improved possibly due to strong recruitment in the late 1990s, combined with reductions in reported catch since then, especially compared to the peak catch values of 1987 **(SWO-ATL-Figure 3)**. The estimate of maximum sustainable yield from production model analyses is about 14,100 t. The biomass at the beginning of 2006 was estimated to be about 99% of the biomass needed to produce MSY and the 2005 fishing mortality rate was estimated to be about 14% below the fishing mortality rate at MSY. Although there is some uncertainty in these estimates, the stock trajectory with respect to F_{MSY} and B_{MSY} shows that the status of North Atlantic swordfish is close to the Convention objectives (**SWO-ATL-Figure 6**). The replacement yield for the year 2006 (14,438 t) was estimated to be slightly more than the MSY level. As the TAC for North Atlantic swordfish for 2005 was 14,000 t (about equal to MSY), it was considered likely that biomass would continue to approach or attain the B_{MSY} level under those catch levels.

South Atlantic

The 2006 assessment indicated that if the available CPUE information is used in a simple production model, two different conclusions are reached about the status of southern Atlantic swordfish. Using by-catch fishery data leads to overly-pessimistic results while using target fishery data leads to optimistic results (**SWO-ATL-Figure 5**). The Committee believes that in the case of the by-catch CPUE data, the estimates of MSY and intrinsic growth rate obtained could not be supported by current knowledge of swordfish population dynamics and historical catch levels. On the other hand, the Committee believed that the recent increase in the target pattern CPUE was more likely due to changes in catchability than it was to an increase in abundance, possibly leading to an overestimation of the intrinsic growth rate. As a result, the Committee based its base case analyses on a composite CPUE pattern that has been constructed from both types of fisheries. Recognizing that further research is required in order to make better use of the available data, the results obtained indicate that the stock is in good condition: The current estimated fishing mortality rate is likely below that which would produce MSY, and the current biomass is likely above that which would result from fishing at F_{MSY} in the long term (**SWO-ATL-Figure 7**). The estimated MSY (about 17,000 t) is 9% higher than current reported landings.

SWO-ATL-4. Outlook

North Atlantic

Results from the 2006 assessment indicated that it is likely that the northern swordfish stock is nearly rebuilt to B_{MSY} (**SWO-ATL-Figure 6**). Although there is some uncertainty associated with this conclusion, almost half of the bootstrap estimates of current biomass were greater than or equal to B_{MSY}. Projections based on the last assessment taking into account the current agreement [Rec. 06-03], if fully realized, indicates that the stock is likely to decline to below the level that would produce MSY.

South Atlantic

The 2006 assessment indicated that while the southern swordfish stock appears to be in a healthy condition at present, it is unclear if substantially higher catches than currently envisioned by the Commission could be sustained in the long-run, due to the divergent views of stock status provided by the targeted and by-catch fisheries indicators.

SWO-ATL-5. Effects of current regulations

In 2006, the Committee provided information on the effectiveness of existing minimum size regulations. New regulations are being implemented on the basis of Rec. 06-03, which entered into effect in 2007. The next assessment will provide the first opportunity to measure the effectiveness of these new regulations.

Catch limits

The total allowable catch in the North Atlantic during the 2003 to 2007 period was 14,000 t per year. The reported catch during that period averaged 11,897 t and did not exceed the TAC in any year. Reports for 2007 are considered provisional and subject to change.

The total allowable catch in the South Atlantic for the years 2007 through 2009 was 17,000 t

Minimum size limits

There are two minimum size options that are applied to the entire Atlantic: 125 cm LJFL with a 15% tolerance, or 119 cm LJFL with zero tolerance and evaluation of the discards. In the absence of size data, these calculations could not be updated or examined for 2005.

For the period 2001-2005, our estimate of the percentage of swordfish reported landed (throughout the Atlantic) less than 125 cm LJFL was about 22% (in number) overall for all nations fishing in the Atlantic. If this calculation is made using reported landings plus estimated discards, then the percentage less than 125 cm LJFL would be slightly higher, but still about 22%. These estimates are based on the overall catch at age, which have high levels of substitutions for a significant portion of the total catch.

Other implications

The Committee is concerned that in some cases regulations have resulted in the discard of swordfish caught in the North stock and, to a certain extent, could have influenced similar behavior of the fleet that fishes the South Atlantic swordfish stock. The Committee considers that regulations may have had a detrimental effect on the availability and consistency of scientific data on catches, sizes and CPUE indices of the Atlantic fleet. The Committee expressed its serious concern over this limitation on data for future assessments.

SWO-ATL-6. Management recommendations

North Atlantic

In order to maintain the northern Atlantic swordfish stock close to a level that would produce MSY, the Committee continues to recommend continuing the present TAC (14,000 t). Given the estimated stock productivity (r=0.49) and MSY (14,100 t), this TAC should be sustainable into the future, and reflects the maximum yield that could be harvested from the population under existing environmental and fishery conditions.

South Atlantic

Until sufficiently more research has been conducted to reduce the high uncertainty in stock status evaluations for the southern Atlantic swordfish stock, the Committee recommends that annual catch should not exceed the provisionally estimated MSY (about 17,000 t).

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	**South Atlantic**
Maximum Sustainable Yield[1]	14,133 t (12,800-14,790)[3]	~17,000t[4]
Current (2007) Yield[2]	11,938 t	15,416 t
2006 Replacement Yield	14,438 t	Not estimated
Relative Biomass (B_{2006}/B_{MSY})	0.99 (0.87 - 1.27)[3]	Likely >1
Relative Fishing Mortality		
F_{2005}/F_{MSY}[1]	0.86 (0.65 - 1.04)[3]	Likely <1
F_{2005}/F_{max}	1.2	Not estimated
$F_{2005}/F_{0.1}$	2.4	Not estimated
$F_{2005}/F_{30\%SPR}$	2.4	Not estimated
Management Measures in Effect:	Country-specific TACs [Rec. 06-02]; 125/119 cm LJFL minimum size.	Country-specific TACs [Rec. 06-03]; 125/119 cm LJFL minimum size.

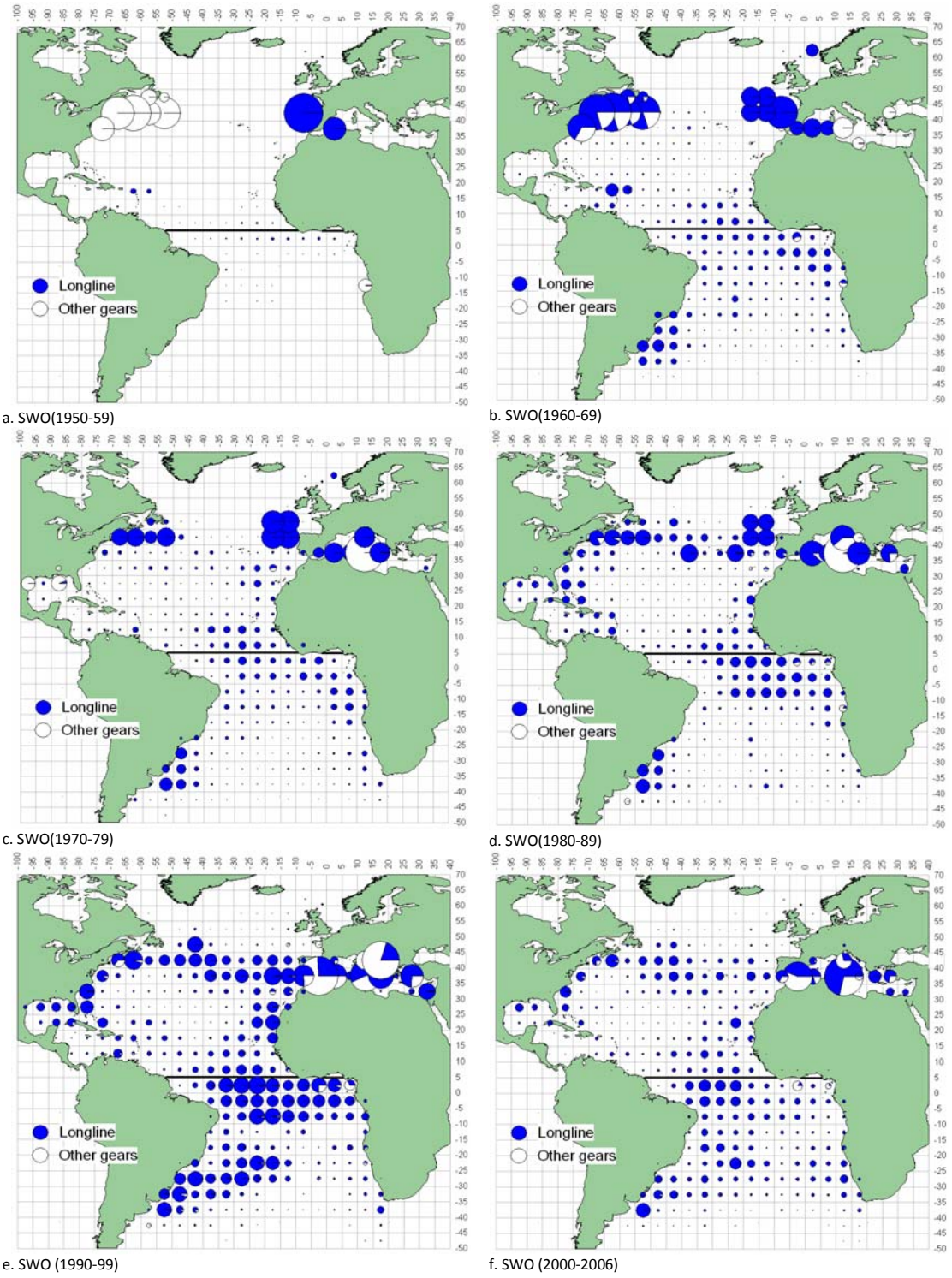
[1] Base Case production model (Logistic) results based on catch data 1950-2005.
[2] Provisional and subject to revision.
[3] 80% confidence intervals are shown.
[4] Provisional and preliminary, based on production model (exponential) results based on catch data 1970-2005.

SWO-ATL-Table 1. Estimated catches (t) of Atlantic swordfish *(Xiphias gladius)* by gear and flag.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL			19929	21930	23969	24380	26266	32685	34305	32976	28826	29204	32861	34437	38803	33489	31567	26222	27115	27166	25139	23758	24064	25228	25603	25782	27354
ATS			5402	9139	9586	5894	6030	13172	17055	17304	13893	13810	16130	18936	21930	18289	18542	13998	15497	15728	15128	14104	12633	13068	13152	14277	15416
ATN			14527	12791	14383	18486	20236	19513	17250	15672	14934	15394	16731	15501	16872	15200	13025	12223	11619	11439	10011	9654	11431	12160	12451	11504	11938
Landings	ATN	Longline	14023	12664	14240	18269	20022	18927	15348	14026	14208	14288	15641	14309	15765	13787	12186	10783	10449	9642	8425	8664	9988	11393	11503	10872	11122
		Other surf.	504	127	143	217	214	586	1902	1646	511	723	683	484	581	825	388	956	640	659	685	374	820	447	615	409	544
	ATS	Longline	5307	8920	8863	4951	5446	12404	16398	16705	13287	13173	15547	17365	20806	17799	18239	13720	14819	15448	14302	13576	11712	12485	12915	13757	14956
		Other surf.	95	219	723	943	584	768	657	599	606	637	583	1571	1124	489	282	269	672	278	825	527	920	582	238	520	369
Discards	ATN	Longline	0	0	0	0	0	0	0	0	215	383	408	708	526	562	439	476	525	1137	896	607	618	313	323	215	264
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	26	12	9	4	1	6	8	5	7	10	8	8
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	91
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	33	16	16	12	13	19	10	10	10	10	39	27
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0
		Canada	1088	499	585	1059	954	898	1247	911	1026	1547	2234	1676	1610	739	1089	1115	1119	968	1079	959	1285	1203	1558	1404	1348*
		China P.R.	0	0	0	0	0	0	0	0	0	0	73	86	104	132	40	337	304	22	102	90	316	56	108	72	85
		Chinese Taipei	272	164	152	157	52	23	17	270	577	441	127	507	489	521	509	286	285	347	299	310	257	30	140	172	103
		Cuba	410	206	162	636	910	832	87	47	23	27	16	50	86	7	7	7	7	0	0	10	3	3	2	2	
		Dominica	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
		EC.España	7100	6315	7441	9719	11135	9799	6648	6386	6633	6672	6598	6185	6953	5547	5140	4079	3993	4595	3968	3957	4586	5376	5521	5448	5564
		EC.France	0	1	4	4	0	0	0	75	75	75	95	46	84	97	164	110	104	122	0	74	169	102	178	92	46
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15	132	81	35	17	5	12	1	1	3	2
		EC.Portugal	9	14	22	468	994	617	300	475	773	542	1961	1599	1617	1703	903	773	777	732	735	766	1032	1320	900	949	778
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	2	3	1	5	11	0	2	1	0	0	0	0	0	0	0
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	36	48	0	
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	
		Grenada	0	0	0	0	0	56	5	1	2	3	13	0	1	4	15	15	42	84	0	54	88	73	56	30	26
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		Japan	537	665	921	807	413	621	1572	1051	992	1064	1126	933	1043	1494	1218	1391	1089	161	0	0	0	575	705	688	800
		Korea Rep.	53	32	160	68	60	30	320	51	3	3	19	16	16	19	15	0	0	0	0	0	0	0	51	65	
		Liberia	53	0	24	16	30	19	35	3	0	7	14	26	28	28	28	28	28	0	0	0	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	0	2	
		Maroc	129	81	137	181	197	196	222	91	110	69	39	36	79	462	267	191	119	114	523	223	329	335	334	341	237
		Mexico	0	0	0	0	0	0	0	0	0	0	6	14	0	0	14	28	24	37	27	34	32	44	41	31	35
		NEI (ETRO)	0	0	0	0	0	76	112	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI-2	0	0	0	14	3	131	190	185	43	35	111	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	44	5	5	8	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		Senegal	0	0	0	0	0	0	1	0	6	6	0	0	0	0	0	0	0	0	0	0	0	108	108	0	38
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	3	0	3	23	0	4	3	1	0	1	0	22	22	7	7	7	0	51
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0
		Trinidad and Tobago	21	26	6	45	151	42	79	66	71	562	11	180	150	158	110	130	138	41	75	92	78	83	91	19	29
		U.S.A.	4820	4749	4705	5210	5247	6171	6411	5519	4310	3852	3783	3366	4026	3559	2987	3058	2908	2863	2217	2384	2513	2380	2160	1873	2454
		U.S.S.R.	0	16	13	18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	5	3	3	2	0	0	1	1	0	3
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	7	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	29	14	
		Venezuela	35	23	51	84	86	2	4	9	75	103	73	69	54	85	20	37	30	30	21	34	45	53	55	22	30
	ATS	Angola	0	26	228	815	84	84	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	
		Argentina	0	0	361	31	351	198	175	230	88	88	14	24	0	0	0	0	38	0	5	10	8	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120
		Belize (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	17	8	0	0	0	0	0	0	
		Benin	0	86	90	39	13	19	26	28	28	26	28	25	24	24	10	0	3	0	0	0	0	0	0	0	
		Brasil	781	468	562	753	947	1162	1168	1696	1312	2609	2013	1571	1975	1892	4100	3847	4721	4579	4082	2910	2920	2998	3785	4430	4153
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	534	344	200	423	353	278	91	300	473
		Chinese Taipei	261	199	280	216	338	798	610	900	1453	1686	846	2829	2876	2873	2562	1147	1168	1303	1149	1164	1254	745	744	377	671
		Cuba	818	1161	1301	95	173	159	830	448	209	246	192	452	778	60	60	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	10	10	10	10	12	7	8	18	13	14	20	19	26	18	25	26	20	19	19	43	29	31	39	17
		EC.España	0	0	0	66	0	4393	7725	6166	5760	5651	6974	7937	11290	9622	8461	5832	5758	6388	5789	5741	4527	5483	5402	5300	5283
		EC.Lithuania	0	0	0	0	0	0	0	0	0	0	0	794	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	0	1	0	0	380	389	441	384	381	392	393	380	354	345	493	440	428
		EC.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	49	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	
		Ghana	5	15	25	13	123	235	156	146	73	69	121	51	103	140	44	106	121	117	531	372	734	343	55	32	
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	
		Honduras (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	6	4	5	2	8	0	0	0	0	0	0	0	
		Japan	1908	4395	4613	2913	2620	4453	4019	6708	4459	2870	5256	4699	3619	2197	1494	1186	775	790	685	833	924	686	480	1124	2461
		Korea Rep.	409	625	917	369	666	1012	776	50	147	147	198	164	164	7	18	7	0	10	0	2	24	70	36	94	
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	0	856	439	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	730	469	751	504	191	549	832	1118	1038
		Nigeria	83	69	0	0	0	0	0	0	0	3	0	0	0	9	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	8	1	1	4	
		S. Tomé e Príncipe	0	0	0	0	0	216	207	181	179	177	202	190	178	166	148	135	129	120	120	120	120	126	147	138	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	
		South Africa	7	0	8	5	5	4	0	0	5	9	4	1	4	1	1	240	143	328	547	649	293	295	199	186	207
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
		Togo	0	0	6	32	1	0	2	3	5	5	8	14	14	64	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	171	396	160	179	142	43	200	21	15	0	0	
		U.S.S.R.	46	158	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	4	0	0	0	0	
		Uruguay	1084	1927	1125	537	699	427	414	302	156	210	260	165	499	644	760	889	650	713	789	768	850	1105	843	620	464
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	26	
Discards	ATN	Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	52	35	50	26	33	79	45	106	38	61
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	598	567	319	263	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	215	383	408	708	526	588	446	433	494	490	308	263	282	275	227	185	212
	ATS	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	91
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	

* Canada landings in 2007 include 82 t caught under charter arrangements with FR-St. Pierre and Miquelon.



a. SWO(1950-59)

b. SWO(1960-69)

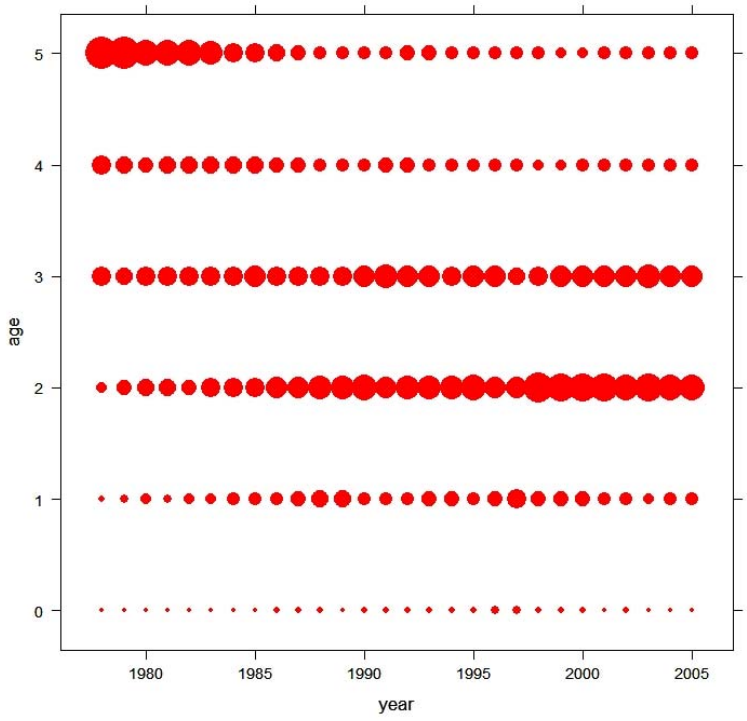
c. SWO(1970-79)

d. SWO(1980-89)

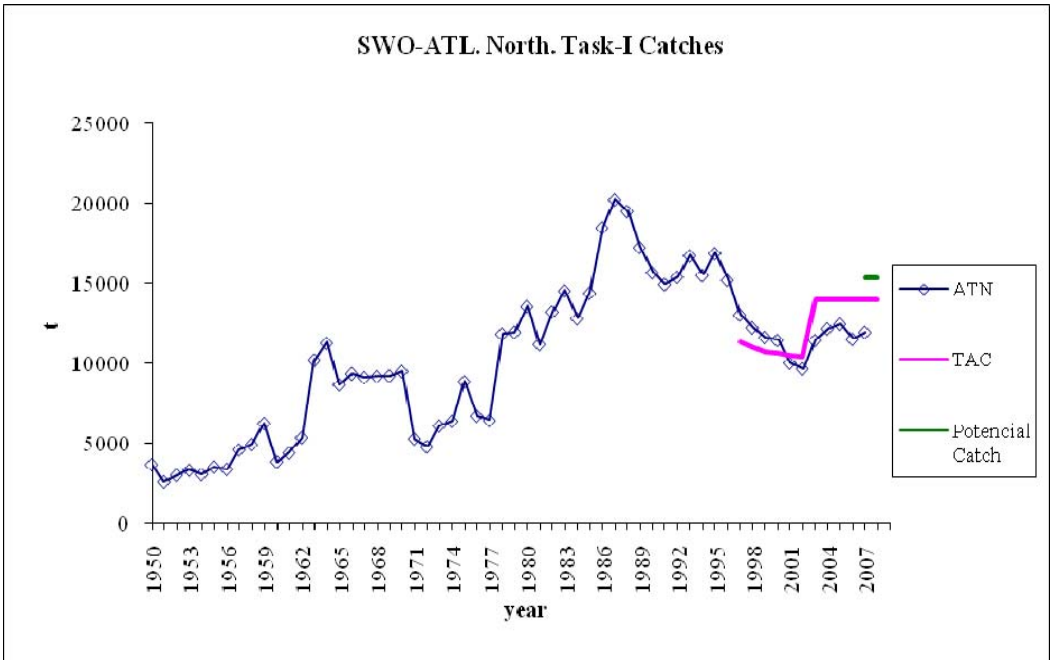
e. SWO (1990-99)

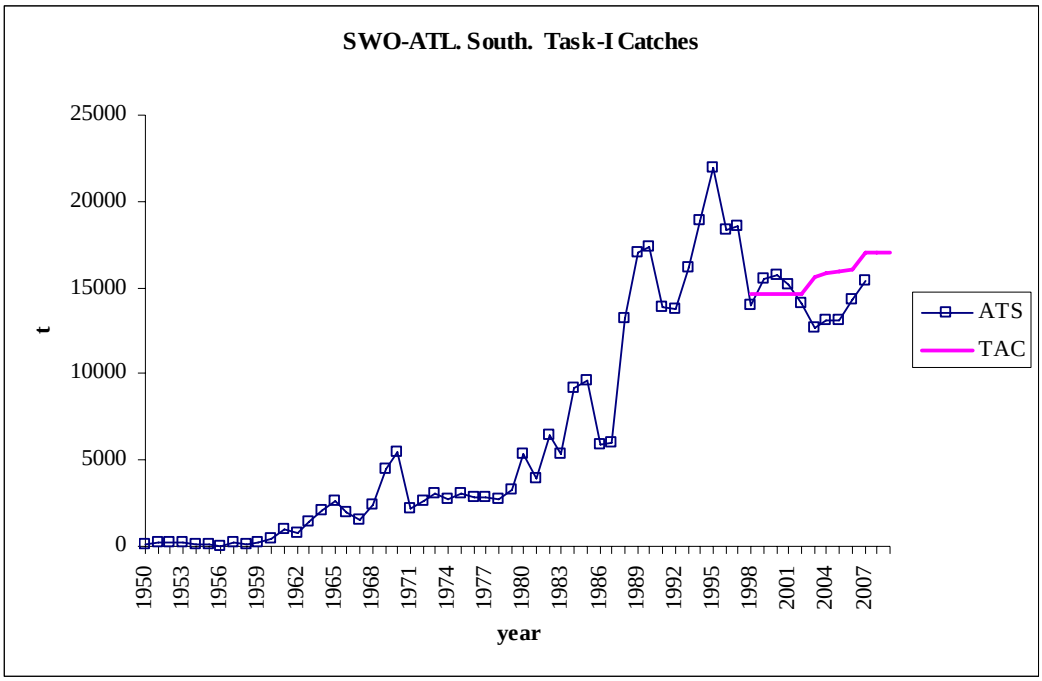
f. SWO (2000-2006)

SWO-ATL Figure 1. Geographic distribution of swordfish cumulative catch (t) by gear, in the Convention area, shown on a decadal scale. The more contemporary period (2000 to 2006) is shown on the bottom right.

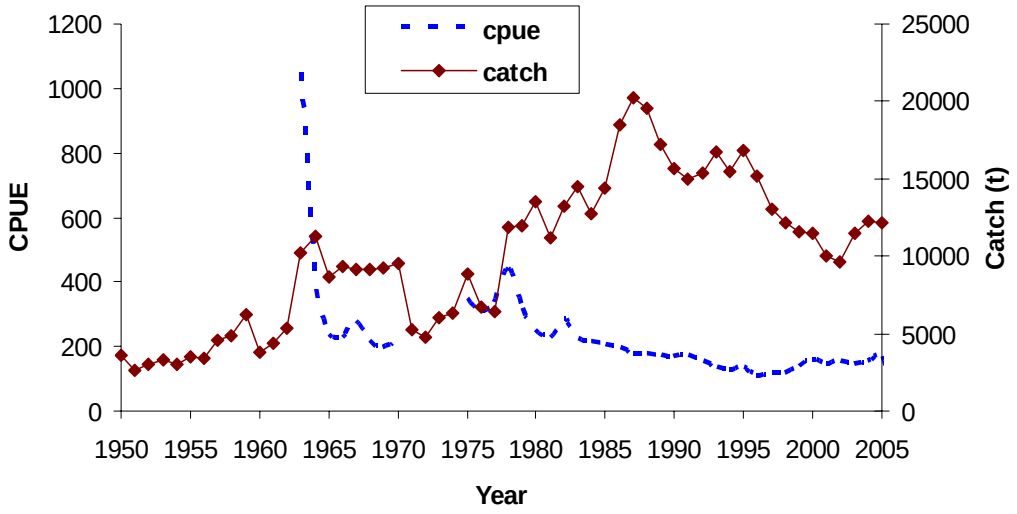


SWO-ATL Figure 2. Catch at age, in numbers, of North Atlantic swordfish, with the area of the filled circle showing proportional catch at age. Note: Age 5 is a plus group.

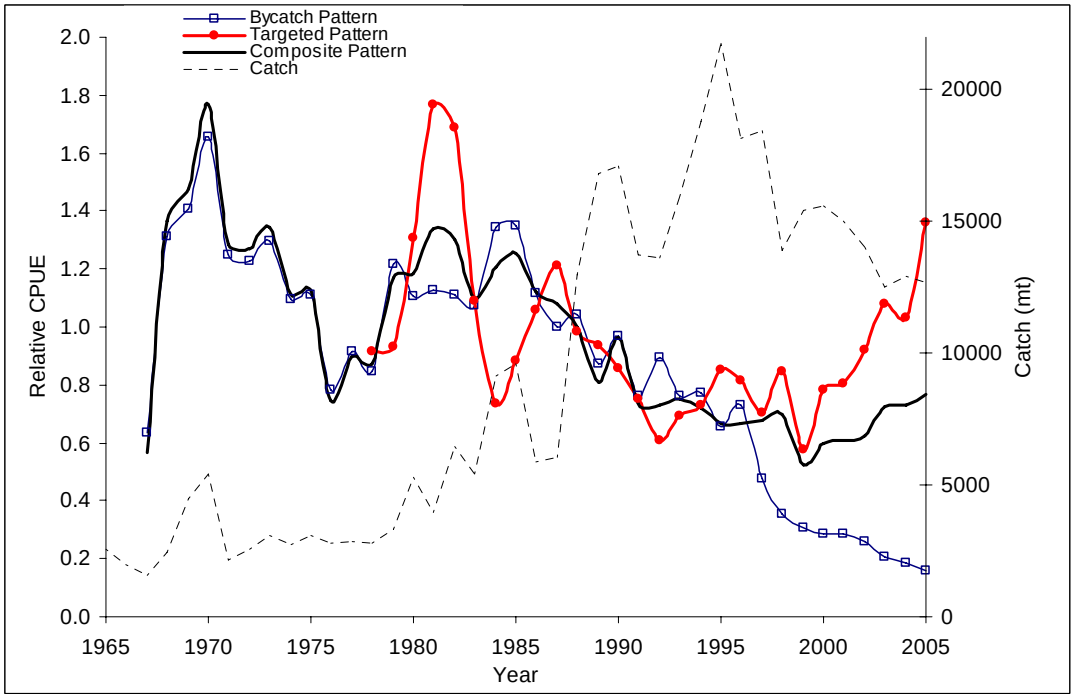




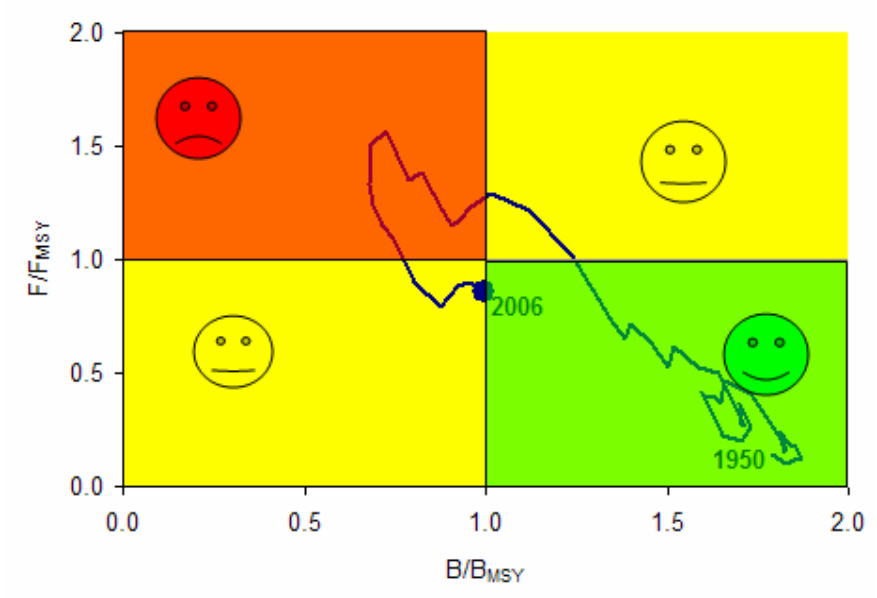
SWO-ATL Figure 3. Swordfish reported catches for North and South Atlantic, in tons, for the period 1950-2007 and the corresponding TACs. For the North Atlantic, "Potential catch" refers to the potential catch from the fishing possibilities identified in [Rec. 06-02].



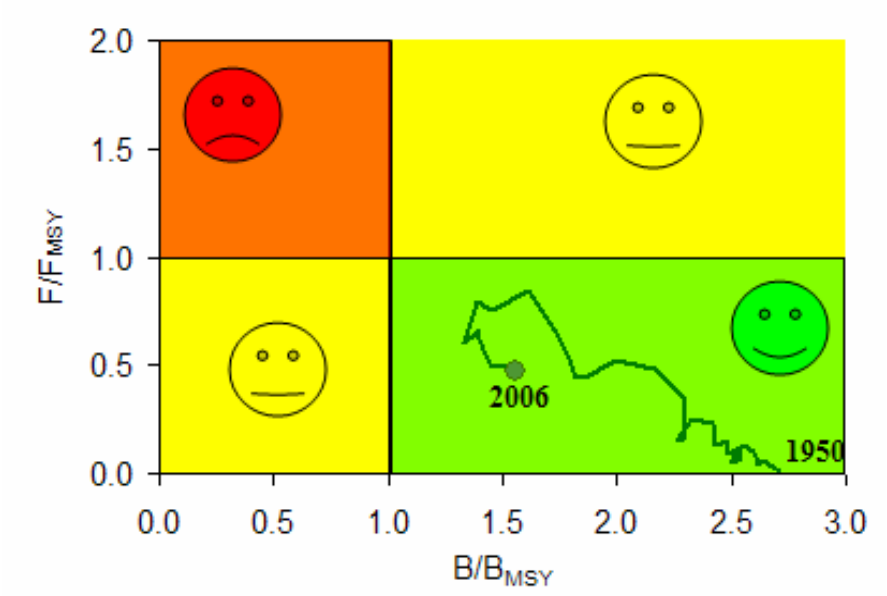
SWO-ATL Figure 4. Estimated catches of North Atlantic swordfish (in t, including discards) for 1950-2005, and the combined CPUE index based on weight.



SWO-ATL Figure 5. Relative CPUE patterns from by-catch (Japan and Chinese Taipei) and targeted (Brazil and EC-Spain) fleets harvesting southern Atlantic stock swordfish compared to the catch of southern Atlantic swordfish.



SWO-ATL Figure 6. Time series of B/B_{MSY} and F/F_{MSY} from 1950 to 2006 showing the progression of stock status as the North Atlantic tuna fisheries evolved. Results are from surplus production analyses.



SWO-ATL Figure 7. Time series of B/B_{MSY} and F/F_{MSY} from 1950 to 2006 showing the progression of stock status as the South Atlantic tuna fisheries evolved. Results are from surplus production analyses.

8.9 SWO-MED-MEDITERRANEAN SWORDFISH

The most recent assessment was conducted in 2007 (SCRS/2007/016), making use of catch and effort information through 2005. The present report summarizes assessment results and readers interested in more detailed information on the state of the stock should consult the report of the 2007 Stock Assessment Session. The impact of different management measures on stock levels and fisheries was examined during an inter-sessional meeting held in February 2008 and the main findings are presented in the current report. More details can be found in the "Report of the 2008 Analysis of Mediterranean Swordfish Management Measures" (SCRS/2008/011).

SWO-MED-1. Biology

Research results have demonstrated that Mediterranean swordfish compose a unique stock separated from the Atlantic stocks, although there is incomplete information on stock mixing and boundaries. However, mixing between stocks is believed to be low and generally limited to the region around the Straits of Gibraltar.

According to previous knowledge, the Mediterranean swordfish have different biological characteristics compared to the Atlantic stock. The growth parameters are different, and the sexual maturity is reached at younger ages as compared to the Atlantic, although more recent information for the Atlantic indicates that these differences may be smaller than was previously thought. In the Mediterranean, mature females as small as 110 cm LJFL have been observed and the estimated size at which 50% of the female population is mature, occurs at about 140cm. According to the growth curves used by the SCRS in the past for Mediterranean swordfish, these two sizes correspond to 2 and 3.5 year-old fish, respectively. Males reach sexual maturity at smaller sizes and mature specimens have been found at about 90 cm LJFL. Based on the fish growth pattern and the assumed natural mortality rate of 0.2, the maximum yield would be obtained through immediate fishing at age 6, while current catches are dominated by fish less than 4 years-old.

SWO-MED-2. Fishery indicators

Annual catch levels have been rather stable in the last decade, fluctuating between 12,000-16,000 t. Those levels are relatively high and similar to those of bigger areas such as the North Atlantic. This could be related to higher recruitment levels in the Mediterranean as compared to the North Atlantic, different reproduction strategies (larger spawning areas in relation to the area of distribution of the stock) and the lower abundance of large pelagic predators (e.g. sharks) in the Mediterranean. Updated information on Mediterranean swordfish catch by gear type is provided in **SWO-MED-Table 1** and **SWO-MED-Figure 1**. The total 2006 catch is estimated to be around to 14,000 t, while 2007 catch data are incomplete. The biggest producers of swordfish in the Mediterranean Sea in recent years are EC-Greece, EC-Italy, EC-Spain and Morocco. Furthermore, Algeria, EC-Cyprus, EC-Malta, EC-Portugal, Tunisia and Turkey have fisheries targeting swordfish in the Mediterranean. Minor catches of swordfish have also been reported by Albania, Croatia, EC-France, Japan, and Libya. The Committee recognized that there may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria; however, the data are not reported to ICCAT or FAO.

Mediterranean swordfish landings showed an upward trend from 1965-1972, stabilized between 1973-1977, and then resumed an upward trend reaching a peak in 1988 (20,365 t; **SWO-MED-Table 1, SWO-MED-Figure 1**). The sharp increase between 1983 and 1988 may be partially attributed to improvement in the national systems for collecting catch statistics. Since 1988, the reported landings of swordfish in the Mediterranean Sea have declined, and in the last decade, they have fluctuated between about 12,000 t to 16,000 t.

The main fishing gears used are surface longline and gillnets. Minor catches are also reported from harpoon, trap and recreational fisheries. Surface longlines are used all over the Mediterranean, while gillnets are still used in some areas and there are also countries known to be fishing with gillnets but not reporting their catches. However, following ICCAT recommendations for a general ban of driftnets in the Mediterranean, the gillnet fleet has been decreasing, although the total number of vessels cannot be determined from ICCAT statistics.

Preliminary results of a study presented during the 2006 SCRS meeting indicated that selectivity of the surface longline targeting swordfish was more affected by the type and size of the bait, the depth of the set and the distance between branch lines rather than the type (circular vs. J-shaped) and the size of the hook. In general,

American-style longlines capture less juvenile fish than the traditional Mediterranean longline gear, while a significant reduction of swordfish catches was found when using circle hooks.
As observed in the 2007 assessment, the combined CPUE series from the main longline and gillnet fisheries targeting swordfish did not show any trend over time (**SWO-MED-Figure 2)**. A working paper that updated the Moroccan driftnet fishery CPUE series following a GLM approach indicated a stable trend of catch rates over the examined time series (1999-2007) which was similar to previous analyses.

SWO-MED-3. State of the stocks

Two forms of assessment gave a consistent view of the declining stock abundance, but differed in the extent of the decline, in the sense that some models suggested relatively modest changes in the last decade. Estimates of population status from production modeling using a longer time-series of catch and effort (a series for which we have less confidence) showed a 2005 stock level that was most likely about 13% below the amount necessary to achieve the ICCAT Convention objective, while recent fishing mortality was about 25% above the level that would permit the stock to attain MSY levels. The results of the production model assessment indicate that the fishery underwent a rapid expansion in the 1980s resulting in F's likely at or above F_{MSY} and a slow declining stock biomass which has recently most likely fallen below the level which can support MSY. Estimates of stock status from virtual population analysis using a shorter time series of catch and effort data, for which we have more confidence, indicated about a 40% reduction in spawning stock level yet stable recruitment over the past 20 years. This spawning stock level is less than half that necessary to achieve the ICCAT Convention objective and estimates of recent fishing mortality rates from this form of assessment are more than twice that amount, which if continued without abatement, is expected to drive the spawning biomass to a very low level (about 10% SPR) within a generation. These low levels are considered to give rise to non-negligible risks of rapid declines in the stock although this indicator has not yet been observed in the Mediterranean swordfish fisheries (**SWO-MED-Figures 3 and 4**).

Furthermore, the Committee noted the large catches of small size swordfish, i.e., less than 3 years old (many of which have probably never spawned) and the relatively low number of large individuals in the catches. Fish less than 3 years-old usually represent 50-70% of the total yearly catches in terms of numbers and 20-35% in terms of weight **(SWO-MED-Figure 5)**. A reduction of the volume of juvenile catches would improve yield per recruit and spawning biomass per recruit levels.

SWO-MED-4. Outlook

The assessment of Mediterranean swordfish indicates that the stock is below the level which can support MSY and that current fishing mortality exceeds F_{MSY}. The degree to which biomass is below B_{MSY} and F is above F_{MSY} differs between assessment models. Overall results indicate fishing mortality (and near-term catches) needs to be reduced to move the stock toward the Convention objective of biomass levels which could support MSY and away from levels which are considered to result in non-negligible risks of rapid stock decline. While one modeling approach indicates that the current stock status is only about 13% below B_{MSY}, it also indicates that future catches exceeding 12,000 t will not result in the improvement of the stock status. In contrast, the modeling approach that provides a more pessimistic view of the current status, at less than half $B_{MSY,}$ indicates that future catches, that allow rebuilding, are somewhat higher, up to about 14,000 t, assuming that the current high selectivity for juvenile fish continues, and that recruitment does not improve (**SWO-MED-Figure 6**).

Simulations projected the levels of landings and spawning stock biomass (SSB) for a period of 25 years under different management schemes including fishery closures of different duration in the East, central and West Mediterranean. Considering the estimated statistical uncertainty, gains in terms of landings and SSB from short fishery closures (e.g. one month) will be negligible. In contrast, relatively long (over three months) Mediterranean-wide closures in the last two quarters of the year would result in important long term gains, which are more profound in the case of SSB. The ICCAT convention objectives concerning SSB, however, can only be met with Mediterranean-wide drastic closures in the last two quarters of the year (i.e. six months). Such closures would result in short term decreases in landings (**SWO-MED-Figure 7**).

SWO-MED-5. Effects of current regulations

ICCAT imposed a Mediterranean-wide one month fishery closure for all gears targeting swordfish in 2008. As already mentioned (see Section 4), it is unlikely that such a measure would result in any detectable increase

either in SSB or landing levels. Several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems. The EC introduced a driftnet ban in 2002 and in 2003 ICCAT adopted a recommendation for a general ban of this gear in the Mediterranean [Rec. 03-04]. Rec. 04-12 forbids the use of various types of nets and longlines for sport and recreational fishing for tuna and tuna-like species in the Mediterranean.

In the past meetings, the Committee has reviewed the various measures taken by member countries and noted the difficulties in implementing some of the management measures, particularly that of minimum landing size.

SWO-MED-6. Management recommendations

The Commission should adopt a Mediterranean swordfish fishery management plan with the goal of rebuilding the stock to levels that are consistent with the ICCAT Convention objective. Until now, the Committee has evaluated the technical measure for time-area fishing closures, which could initiate rebuilding, depending on the duration and timing of these closures. The Committee recommends the Commission to consider the adoption of such measures which will move the stock condition to the level which will support MSY.

Following the results from recent studies (de la Serna *et al.* 2006), technical modifications of the longline fishing gears, as well as the way they are operated, can be considered an additional technical measure to reduce the catch of juveniles. The Committee recommends that future work should consider a broader set of scenarios including such modifications of the fishing gears, as well as fishing capacity reductions, minimum landing size regulations (MLS) and quota scenarios. However, the Group considers that MLS and quota might be difficult to implement in the Mediterranean swordfish fisheries. In addition, future analyses of management measures should include economic aspects.

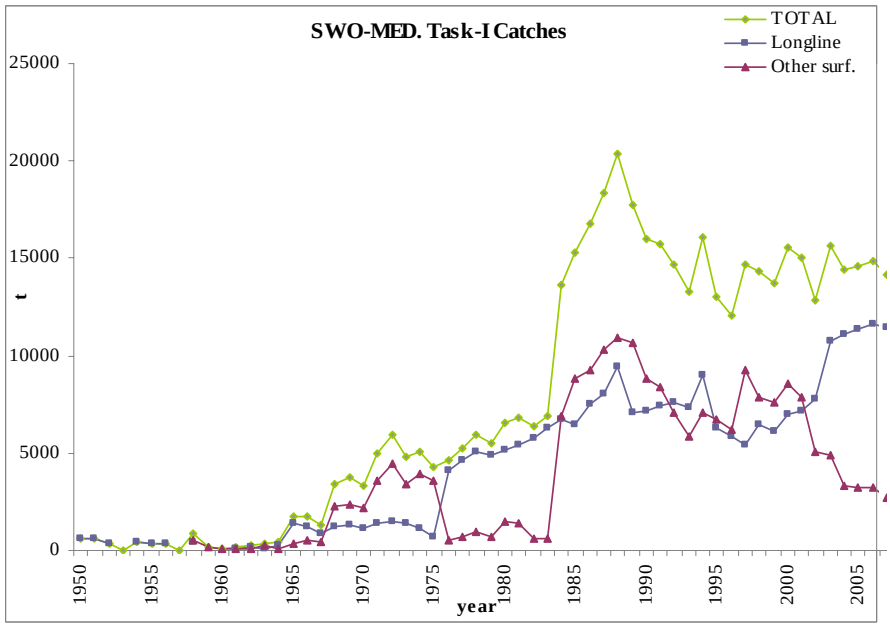
MEDITERRANEAN SWORDFISH SUMMARY

Maximum Sustainable Yield	14,250-15,500 [1]
Current (2005) Yield[2]	14,600 t
Current (2007) Replacement Yield	~12,000-14,000 t[1]
Relative Biomass (B_{2005}/B_{MSY})	0.26-0.87 [1]
Relative Fishing Mortality	
F_{2005}/F_{MSY}	1.3 (0.6-2.5) [3]
F_{2005}/F_{max}	2.9 (2.4->5) [4]
$F_{2005}/F_{0.1}$	4.6 (3.7->5)[4]
$F_{2005}/F_{20\%SPR}$	3.0 (2.6->5)[4]
$F_{2005}/F_{30\%SPR}$	4.2 (3.6->5) [4]
Management measures in effect	Driftnet ban (Rec. 03-04) One month fishery closure in 2008 (Rec. 07-01)[5]

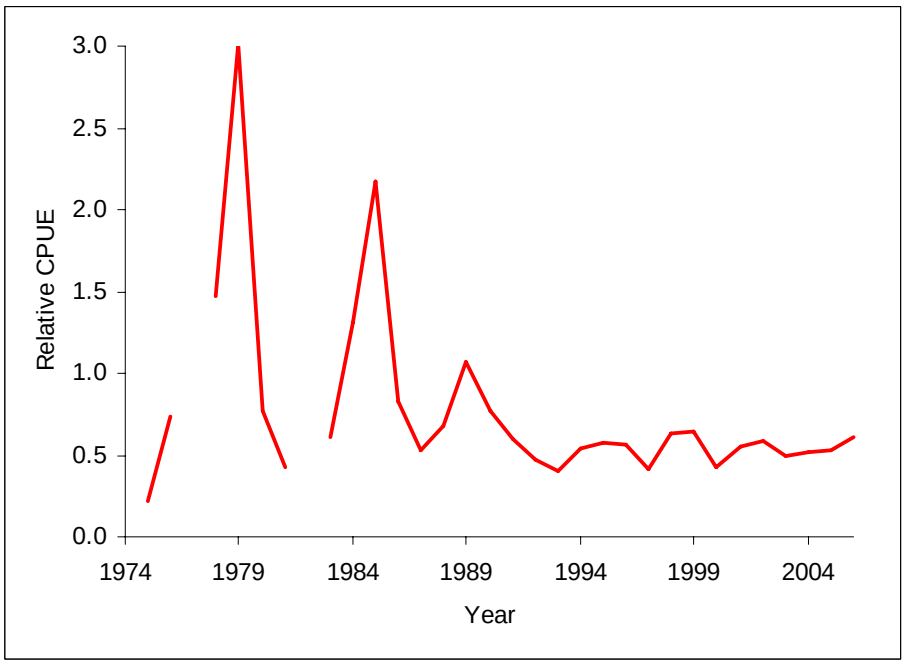
[1] Range indicated is average estimates from production models and age-structured models. The uncertainty in the estimates is broader than indicated.
[2] The 2006 reported catch is considered incomplete and too provisional to use in this table.
[3] Based on production model analysis using a long time series of catch effort data for which we have less confidence, range represents approximately 80% confidence region for the model assumptions.
[4] Based on age-structured analysis using a shorter times-series of catch effort data for which we have greater confidence, range represents approximately 80% confidence region for the model assumptions.
[5] Various technical measures, such as closed areas, minimum size regulations and effort controls are implemented at the national level.

SWO-MED-Table 1. Estimated catches (t) of swordfish *(Xiphias gladius)* in the Mediterranean Sea by gear and flag.

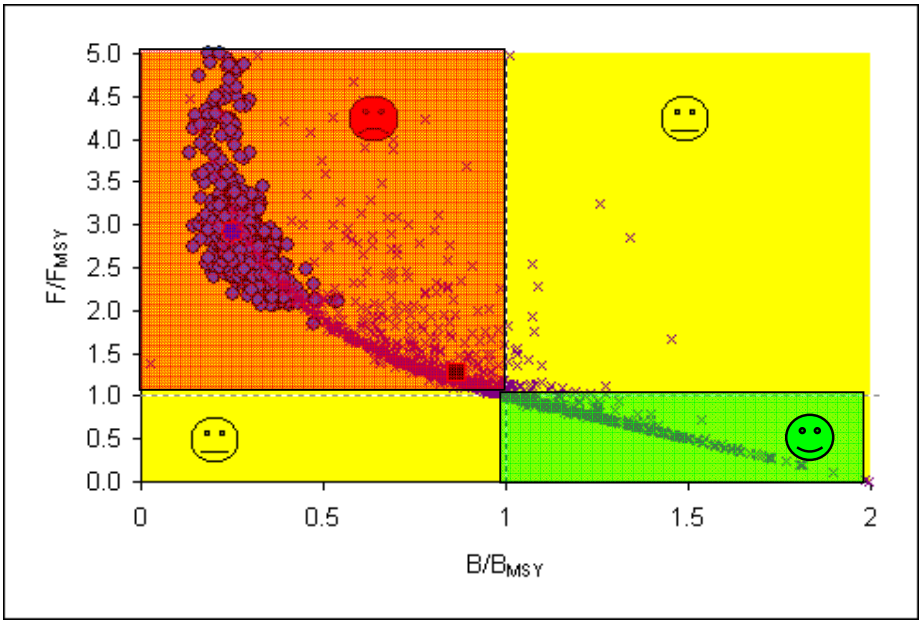
		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL		6896	13666	15292	16765	18320	20365	17762	16018	15746	14709	13265	16082	13015	12053	14693	14369	13699	15569	15006	12814	15674	14405	14600	14893	14190
Landings	Longline	6313	6749	6493	7505	8007	9476	7065	7184	7393	7631	7377	8985	6319	5884	5389	6496	6097	6963	7180	7767	10765	11053	11273	11638	11429
	Other surf.	583	6917	8799	9260	10313	10889	10697	8834	8353	7078	5888	7097	6696	6169	9304	7873	7602	8606	7826	5047	4909	3343	3214	3239	2741
Discards	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19
Landings	Albania	0	0	0	0	0	0	0	0	0	0	0	0	0	13	13	13	13	0	0	0	0	0	0	0	
	Algerie	877	884	890	847	1820	2621	590	712	562	395	562	600	807	807	807	825	709	816	1081	814	665	564	635	702	601
	Chinese Taipei	0	0	0	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0	0	0	
	Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	0	0	0	0	
	EC.Cyprus	28	63	71	154	84	121	139	173	162	56	116	159	89	40	51	61	92	82	135	104	47	49	53	43	67
	EC.España	1322	1245	1227	1337	1134	1762	1337	1523	1171	822	1358	1503	1379	1186	1264	1443	906	1436	1484	1498	1226	951	910	1462	1697
	EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	27	0	19	0	0	14
	EC.Greece	772	1081	1036	1714	1303	1008	1120	1344	1904	1456	1568	2520	974	1237	750	1650	1520	1960	1730	1680	1230	1120	1311	1358	1887
	EC.Italy	3026	9360	10863	11413	12325	13010	13009	9101	8538	7595	6330	7765	7310	5286	6104	6104	6312	7515	6388	3539	8395	6942	7460	7626	6518
	EC.Malta	59	94	172	144	163	233	122	135	129	85	91	47	72	72	100	153	187	175	102	257	163	195	362	239	213
	EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	115	8	1	120	14	16	
	Japan	6	19	14	7	3	4	1	2	1	2	4	2	4	5	5	7	4	2	1	1	0	2	4	0	3
	Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	8	6	0	10	2	0	14	
	Maroc	43	39	38	92	40	62	97	1249	1706	2692	2589	2654	1696	2734	4900	3228	3238	2708	3026	3379	3300	3253	2523	2058	1722
	NEI-2	532	771	730	767	828	875	979	1360	1292	1292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Tunisie	15	15	61	64	63	80	159	176	181	178	354	298	378	352	346	414	468	483	567	1138	288	791	791	949	1024
	Turkey	216	95	190	226	557	589	209	243	100	136	292	533	306	320	350	450	230	370	360	370	350	386	425	410	423
Discards	EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19



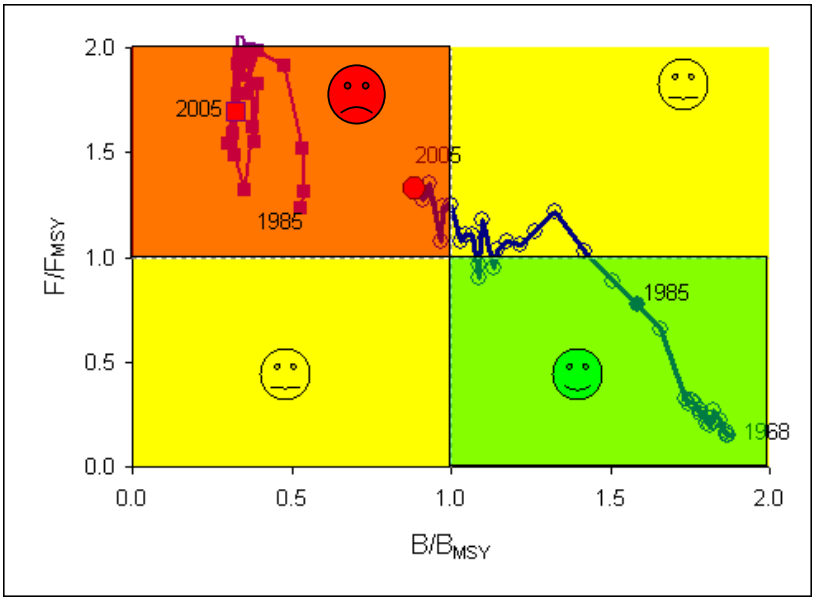
SWO-MED-Figure 1. Cumulative estimates of swordfish catches (t) in the Mediterranean by major gear type, 1950-2006.



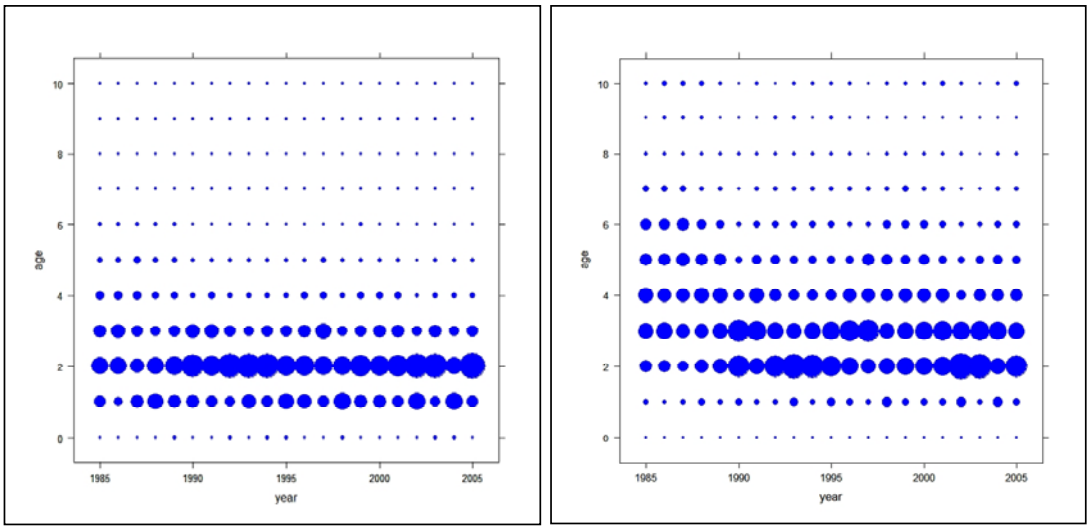
SWO-MED-Figure 2. The relative CPUE time series which results from the combined information in the Italian longline, Greek longline, Spanish longline, Japanese longline, Moroccan gillnet, and Italian gillnet time series.



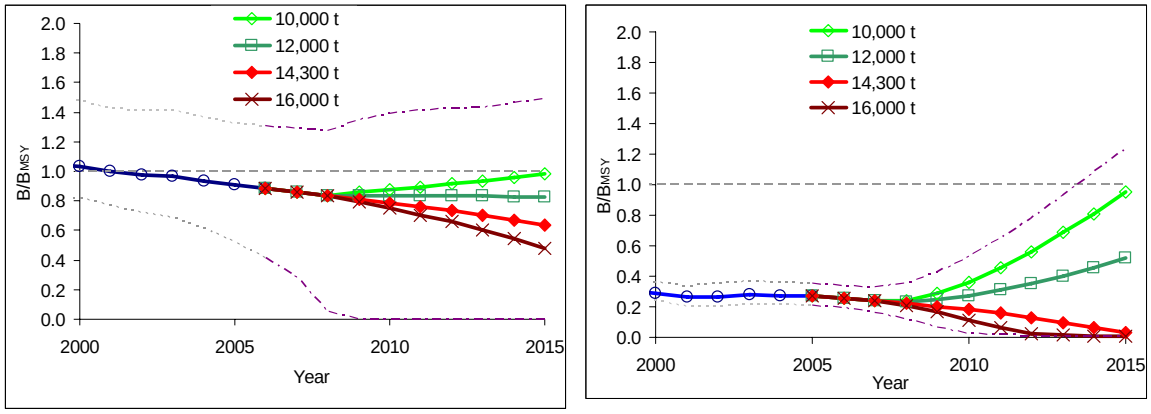
SWO-MED-Figure 3. Current (2005) stock status (B/B_{MSY} and F/F_{MSY}) outcomes from production model analysis (crosses) of a long time-series of catch and effort data for which we have less confidence and from age - structured analysis (solid circles) of a shorter time-series of catch-effort data for which we have more confidence. The median outcome from the production model analysis is shown as a large solid square and that of the age-structured analysis, a large solid circle.



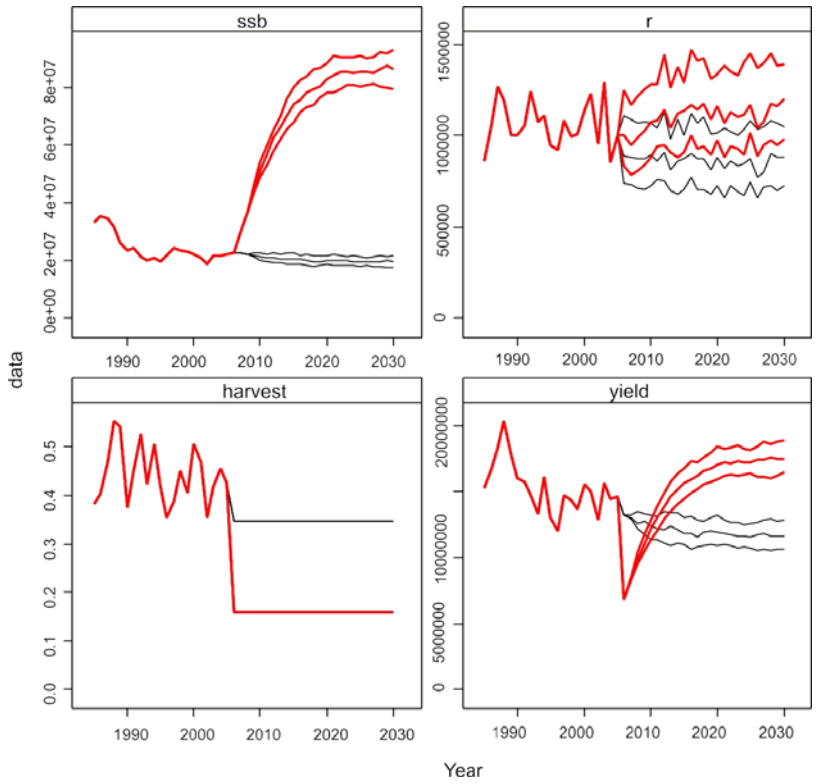
SWO-MED-Figure 4. Time trend for stock status (B/B_{MSY} and F/F_{MSY}) outcomes from production model analysis (circles) of a long time-series of catch and effort data for which we have less confidence and from age structured analysis (squares) of a shorter time-series of catch-effort data for which we have more confidence. The 2005 outcome from the production model analysis is shown as a large solid circle and that of the age-structured analysis, a large solid square. The beginning and ending years for the time-series shown are indicated for each form of analysis.



SWO-MED-Figure 5. Proportion of catch numbers (left) and catch weight (right) at age by year.



SWO-MED-Figure 6. Median forecasts of stock status from production model analysis (left) and age-structured analysis (right) for different levels of future constant catch, as indicated, starting in year 2008. The dashed horizontal line at a biomass ratio of 1 represents the ICCAT Convention objective of B_{MSY}. Confidence bounds (80%) for the projections are also indicated as broken, irregular lines.



SWO-MED-Figure 7. Time series with the 25th, 50th and 75th percentiles for SSB, r, fishing mortality (harvest) and yield for the scenario assuming a Mediterranean-wide fishing closure in the third and fourth quarter of the year (i.e. six months). A Beverton-Holt stock recruitment relationship was assumed.

8.10 SBF – SOUTHERN BLUEFIN TUNA

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is charged with assessing the status of southern bluefin tuna. Each year, SCRS reviews the CCSBT reports to learn about southern bluefin research and stock assessments. These reports are available form CCSBT.

8.11 SMT - SMALL TUNAS

SMT-1. Generalities

Small tunas include the following species:

- Blackfin tuna (*Thunnus atlanticus*) – BLF
- Bullet tuna (*Auxis rochei*) – BLT
- Atlantic bonito (*Sarda sarda*) – BON
- Plain bonito (*Orcynopsis unicolor*) – BOP
- Serra Spanish mackerel (*Scomberomorus brasiliensis*) – BRS
- Cero (*Scomberomorus regalis*) – CER
- Frigate tuna (*Auxis thazard*) – FRI
- King mackerel (*Scomberomorus cavalla*) – KGM
- Scomberomorus unclassified (*Scomberomorus* spp.) – KGX
- Little tunny (*Euthynnus alletteratus*) – LTA
- West African Spanish mackerel (*Scomberomorus tritor)* – MAW
- Atlantic Spanish mackerel (*Scomberomorus maculatus)* – SSM
- Wahoo (*Acanthocybium solandri*) – WAH

Knowledge on the biology and fishery of small tunas is very fragmented in several areas. Furthermore, the quality of the knowledge is very different according to the species concerned. This is due in large part because many of these species are often perceived to have little economic importance compared to other tuna and tuna-like species, and owing to the difficulties in conducting sampling of the landings from artisanal fisheries, which constitute a high proportion of the fisheries exploiting small tuna resources. The large industrial fleets often discard small tuna catches at sea or sell them on local markets mixed with other by-catches, especially in Africa. The amount caught is rarely reported in logbooks.

Small tuna species have a very high relevance from a socio-economic point of view, because they are important for many coastal communities in all areas and are a main source of food. The socio-economic value is often not evident because of the underestimation of the total figures, due to the above mentioned difficulties in data collection. Several statistical problems are also caused by misidentification and some of them were faced and discussed during this Small Tunas Species Group meeting. The small tuna species can reach high levels of catches and value in some years.

Scientific collaboration among ICCAT, RFOs and countries in the various regions is imperative to advance understanding of the distribution, biology and fishery of these species. The Joint GFCM/ICCAT Meeting on Small Tunas Fisheries in the Mediterranean and Black Sea, held in Malaga, May 5 to 9, 2008 clearly demonstrates how such collaboration has improved the general knowledge on these species. The data and information provided during that Joint GFCM/ICCAT Meeting (SCRS/2008/014) have contributed significantly to the improvement of this executive summary.

SMT-2. Biology

These species are widely distributed in the tropical and subtropical waters of the Atlantic Ocean and several are also distributed in the Mediterranean Sea and the Black Sea. Some species extend their range even to colder waters, like the North and South Atlantic Ocean. They often form large schools with other small sized tunas or related species in coastal and high seas waters.

Generally, the small tuna species have a varied diet with a preference for small pelagics (e.g., clupeids, mullets, carangids, etc.), crustaceans, mollusks and cephalopods. The reproduction period varies according to species and spawning generally takes place near the coast in oceanic areas, where the waters are warmer. 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. Studies about the migration patterns of small tuna species are very rarely available, due to the practical difficulties in manipulating and tagging these species.

Many new data have been provided during the meeting and 11 documents were presented, several of them directly coming from the Joint GFCM/ICCAT Meeting (SCRS/2008/014). Furthermore, a comprehensive draft GFCM report was available during the meeting (the summary was in SCRS/2008/056), providing the available data for all the species present in the Mediterranean and the Black Sea, including growth equations and length/weight relationships, improving substantially the knowledge of the several species present in these areas.

SCRS/2008/042 provided an overview of the larval distribution in the Balearic Sea of bullet tuna, Atlantic bonito and little tunny, clarifying the importance of environmental and oceanographic factors on the presence and abundance of the various species. SCRS/2008/050 presented detailed information on the size frequency and length/weight relationships of Atlantic bonito in two central Mediterranean areas for the period 2002 to 2007, including information on fishery. SCRS/2008/051 finally provided a comprehensive overview of the systematic situation of *Auxis* spp. in the Mediterranean, providing all the available details, clarifying that catches are to be referred only to bullet tuna, because only a very specimens of frigate tuna are known from the area. SCRS/2008/052 provided some fishing and population parameters on little tunny in the northeastern Mediterranean Sea for the years 1998-1999, including the minimum size at first maturity and length/weight parameters. SCRS/2008/054 provided a genetic analysis of Atlantic bonito and little tunny in all areas, discussing the hypothesis of the presence of subpopulations in the Mediterranean and a possible cryptic species in the Atlantic.

SCRS/2008/55 presented a comprehensive overview of the fishery and biology of all species distributed in the Tunisian waters, providing detailed population parameters, including the size at first maturity, for bullet tuna, Atlantic bonito, little tunny and plain bonito, along with catch data. SCRS/2008/056 provided a summary of the study carried out by GFCM, reviewing the available data on the biology and distribution of all small tuna species in the Mediterranean and the Black Sea, including all the available population parameters and their analysis. SCRS/2008/057 provided a detailed overview of the biology of bullet tuna in the Ligurian Sea, including population parameters, correlations with other Mediterranean areas and the size of first maturity, along with a comprehensive analysis of the diet. SCRS/2008/189 provided detailed information about the size composition and length/weight relationship of little tunny in two different Spanish fisheries in the western Mediterranean Sea.

All these documents, together with others (Doc. GFCM-ICCAT/ST/005 and GFCM-ICCAT/ST/009) presented only during the Joint GFCM/ICCAT Meeting and included in the "Report of the Jjoint GFCM/ICCAT 2008 Workshop on the Precautionary Approach for Western Bluefin Tuna" (SCRS/2008/014) show the relevant and growing interest of these species and the broad efforts to provide updated scientific information.

SMT-3. Description of the fisheries

Small tunas are exploited mainly by coastal fisheries and artisanal fisheries, although substantial catches are also made as target species and as by-catch by purse seine, mid-water trawlers (i.e., pelagic fisheries of West Africa-Mauritania), handline and small scale gillnets. Unknown quantities of small tuna also comprise the incidental catches of some longline fisheries. The increasing importance of FAD fisheries in the eastern Caribbean and in other areas has improved the efficiency of artisanal fisheries in catching small tunas. Various species are also caught by the sport and recreational fisheries.

Despite of the scarce monitoring of various fishing activities in some areas, all the small tuna fisheries have a high socio-economic relevance for most of the coastal countries concerned and for many local communities, particularly in the Mediterranean Sea, in the Caribbean region and in West Africa.

Several documents presented at the meeting improved the knowledge of the small tuna species fisheries. SCRS/2008/050 presented an overview of the most relevant fisheries of Atlantic bonito in two Central Mediterranean areas for the period 2002 to 2007, including economic information. SCRS/2008/052 provided information on the fishery of little tunny in the northeastern Mediterranean Sea for the years 1998-1999. SCRS/2008/055 presented a comprehensive overview of the fishery of Bullet tuna, Atlantic bonito, little tunny and plain bonito in the Tunisian waters, along with catch data. SCRS/2008/056 provided a summary of the study carried out by GFCM, reviewing the available data on the fishery, the economy and the catch statistics of all small tuna species in the Mediterranean and the Black Sea. SCRS/2008/189 provided information on little tunny in two different Spanish fisheries in the western Mediterranean Sea. SCRS/2008/173 revised the U.S. landing statistics of king mackerel and Spanish mackerel in the Gulf of Mexico and northwest Atlantic Ocean for the years 1986-2007.

A preliminary exercise of data mining for small tuna species, according to the previous SCRS recommendations, was informally presented during the Small Tunas Species Group meeting. This exercise provided a revision of catches for Angola for a long period, starting from 1940, thanks to a time-consuming examination and analysis of all the available documents found so far. These new figures, together with others concerning Cape Verde and Sao Tome whenever they will be available, should be provided to the ICCAT Secretariat after a further check.

SMT-Table 1 shows historical landings of small tunas for the 1980 to 2007 period although data for last year are preliminary. This table does not include species reported as "mixed" or "unidentified", as was the case in previous years, since these categories include large tuna species. There are more than 10 species of small tunas,

but only five of these account for about 88% of the total reported catch by weight. These five species are: Atlantic bonito *(Sarda sarda)*, frigate tuna *(Auxis thazard* which may include some catches of *Auxis rochei)*, little tunny *(Euthynnus alletteratus)*, king mackerel *(Scomberomorus cavalla)*, and Atlantic Spanish mackerel *(Scomberomorus maculatus)* **(SMT-Figure 2)**. In 1980, there was a marked increase in reported landings compared to previous years, reaching a peak of about 145,951 t in 1988 **(SMT-Figure 1)**. Reported landings for the 1989-1995 period decreased to approximately 92,637 t, and then an oscillation in the values in the following years, with a minimum of 69,895 t in 2003 and a maximum of 123,600 t in 2005. Overall trends in the small tuna catch may mask declining trends for individual species because annual landings are often dominated by the landings of a single species. These fluctuations seem to be related to unreported catches, as these species generally comprise part of the by-catch and are often discarded, and therefore do not reflect the real catch.

A preliminary estimate of the total nominal landings of small tunas in 2007 is 70,520 t. The Small Tunas Species Group pointed out the relative importance of small tuna fisheries in the Mediterranean and the Black Sea, which account for about 28% of the total reported catch in the ICCAT area for the period 1980-2007.

Despite the recent improvements in the statistical information provided to ICCAT by several countries, either with the provision of Task I data or with information provided by national scientists during the Small tunas Species Group meeting, the Committee also noted that uncertainties remain regarding the accuracy and completeness of reported landings in all areas. There is a general lack of information on the mortality of these species as by-catch, exacerbated by the confusion regarding species identification.

SMT-4. State of the stocks

There is little information available to determine the stock structure of many small tuna species. The Committee suggests that countries be requested to submit all available data to ICCAT as soon as possible, in order to be used in future meetings of the Committee.

Generally, current information does not allow the Committee to carry out an assessment of stock status of the majority of the species. Some analyses will be possible in future if data availability improves with the same trend of the latest year. Nevertheless, few regional assessments have been carried out. In the western Atlantic the king mackerel in the Gulf of Mexico and king mackerel and Spanish mackerel in U.S. eastern Atlantic were assessed in 2008 by the U.S. scientists. During the period 2004-2007, the Caribbean Regional Fisheries Mechanism (CRFM) undertook assessments of the serra Spanish mackerel, king mackerel and wahoo fisheries operating within the southeastern Caribbean. Further progress in the CRFM assessments requires improvements in statistics and estimation of key biological parameters, as well as close collaboration with neighboring non-CRFM countries sharing these fisheries within the sub-region.

SMT-5. Outlook

There is an improvement in the availability of catch and biological data for small tuna species particularly in the Mediterranean and the Black Sea. However, biological information, catch and effort statistics for small tunas remain incomplete for many of the coastal and industrial fishing countries. Given that, many of these species are of high importance to coastal fishermen, especially in some developing countries, both economically and often as a primary source of protein, therefore the Committee recommends that further studies be conducted on small tuna species due to the small amount of information available.

SMT-6. Effects of current regulations

There are no ICCAT regulations in effect for small tunas. Several regional and national regulations are in place.

SMT-7. Management recommendations

No management recommendations have been made.

SMT-Table 1. Best scientific estimates based on Task I.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
BLF			1738	1908	1403	2822	3462	3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2358	4034	4756	1303	1926	1031	1937	1548
Thunnus atlanticus		Brasil	57	203	133	172	254	229	120	335	130	49	22	38	153	649	418	55	55	38	149	1669	1	118	91	242	233
		Cuba	558	487	157	486	634	332	318	487	318	196	54	223	156	287	287	0	0	0	0	0	0	0	0	0	0
		Dominica	0	0	0	0	0	1	4	19	10	14	15	19	30	0	0	0	79	83	54	78	42	20	38	47	29
		Dominican Republic	144	106	90	123	199	4	564	520	536	110	133	239	892	892	0	0	0	0	0	0	0	0	0	0	0
		EC.España	0	0	0	0	0	0	0	0	0	307	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.France	809	821	755	729	669	816	855	865	1210	1170	1140	1330	1370	1040	1040	1040	1040	1040	1040	1040	0	0	0	0	
		Grenada	102	232	193	256	141	220	134	293	195	146	253	189	123	164	126	233	94	164	223	255	335	268	306	371	291
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	148	0	0	0	0	0	0	0	0	0	0	0
		Liberia	0	0	0	0	0	229	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	12	0	10	9	10	10	12
		NEI (ETRO)	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
		Netherlands Antilles	55	55	55	60	60	70	70	70	60	60	65	60	50	45	45	45	45	45	45	45	0	0	0	0	0
		St. Vincent and Grenadines	0	0	0	0	0	19	15	38	11	7	53	19	20	18	22	17	15	23	24	24	0	0	0	0	24
		Sta. Lucia	0	0	0	0	2	1	1	17	14	13	16	82	47	35	40	100	41	45	108	96	169	96	126	182	151
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5
		U.S.A.	7	0	11	32	44	154	87	81	112	127	508	492	582	447	547	707	617	326	474	334	414	675	225	831	19
		UK.Bermuda	6	4	9	17	11	7	14	13	8	6	5	7	4	5	4	6	6	5	4	5	9	4	5	8	7
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
		Venezuela	0	0	0	947	1448	1240	652	1150	1598	2148	1224	21	624	758	498	1034	1192	589	1902	1210	319	732	225	237	777
BLT			0	0	0	2	0	357	723	3634	2206	814	394	177	0	0	0	1700	579	1230	1577	950	1348	686	1950	1920	2692
Auxis rochei		EC.Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	263	494	208	166	231	300	791	867	849
		Russian Federation	0	0	0	0	0	0	0	0	2171	814	70	100	0	0	0	1672	0	420	1053	468	128	102	139	22	5
		Tunisie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	989	1760	1	766	842
		Turkey	0	0	0	0	0	0	0	0	35	0	324	77	0	0	0	0	316	316	316	316	0	284	1020	1031	993
		U.S.A.	0	0	0	2	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	0	0	357	723	3634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BON			42386	21907	24905	21320	29712	46382	29721	28941	33561	22025	30584	21505	20841	24692	24641	44897	36196	28306	28533	25400	14228	14222	77067	35504	16828
Sarda sarda	ATL TOTAL		6840	6849	6946	5892	7395	22354	17766	6844	8306	6914	4587	5823	5652	7497	10563	15167	8026	6334	6297	9684	3112	2975	2692	3764	5475
		Angola	124	225	120	101	144	180	168	128	102	4	49	20	9	39	32	0	2	118	118	118	0	0	138	0	931
		Argentina	310	2058	1399	699	1607	2794	1327	1207	1794	1559	434	4	138	108	130	12	68	19	235	1	129	269	110	0	
		Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	
		Benin	16	25	30	6	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	0	187	179	523	345	214	273	226	71	86	142	142	137	0	0	0	0	0	0	0	0	0	90	0	
		Cuba	0	0	0	0	23	173	26	28	0	0	0	0	0	0	0	230	0	0	0	0	0	0	0	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	16	16
		EC.Bulgaria	46	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.España	414	173	398	145	41	91	57	18	8	39	5	3	2	2	1	0	12	12	10	5	23	9	2	15	14
		EC.Estonia	0	0	0	0	0	668	859	187	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.France	547	569	492	431	331	395	427	430	820	770	1052	990	990	610	610	610	24	32	0	18	0	0	0	0	122
		EC.Germany	0	0	0	0	0	0	0	53	0	0	0	0	0	714	0	0	0	0	0	38	0	0	0	0	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	
		EC.Latvia	0	0	0	0	0	1191	1164	221	7	4	0	3	19	301	887	318	0	416	396	639	0	0	0	0	
		EC.Lithuania	0	0	0	0	0	1041	762	162	11	10	0	0	0	0	0	0	0	0	0	793	0	0	0	0	
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344
		EC.Poland	5	0	0	0	0	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	86	56	50	168	371	377	80	202	315	133	145	56	78	83	49	98	98	162	47	61	40	50	38	318	439
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	287	0	0	0	0	0	0	0	0	0	35	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	0	0	0	
		Georgia	0	0	0	0	0	39	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Germany Democratic Rep.	274	26	40	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	13	8	10	0	943	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	24	6	14	16	7	10	10	0	0	0	0	
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	

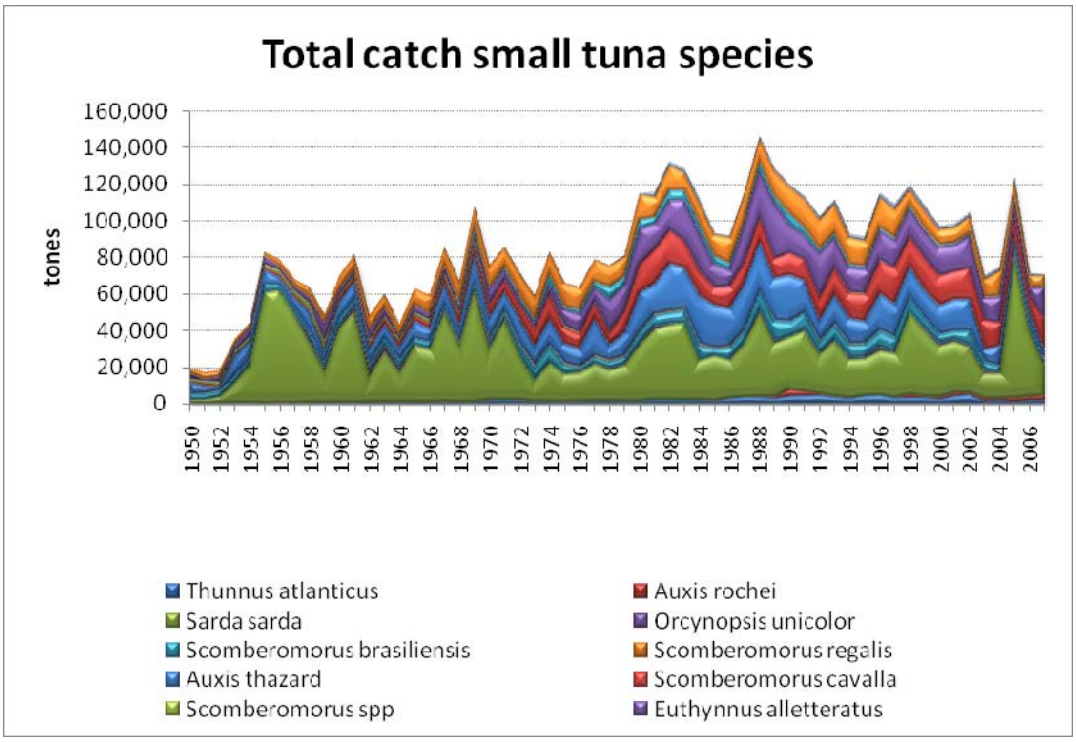
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Maroc	561	310	268	251	241	589	566	492	794	1068	1246	584	699	894	1259	1557	1390	2163	1700	2019	928	989	1411	1655	1053
		Mexico	567	744	212	241	391	356	338	215	200	657	779	674	1144	1312	1312	1632	1861	1293	1113	1032	1238	1066	654	1303	1188
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
		Rumania	192	8	32	71	3	255	111	8	212	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	948	29	0	0	0	0	0	4960	0	0	574	1441	461	16	79	316	259
		Senegal	497	200	495	510	463	2066	869	525	597	345	171	814	732	1,012	1,289	2,213	2,558	286	545	621	195	197	486	2304	996
		Sierra Leone	5	5	10	10	10	10	10	10	4	6	0	0	0	0	0	0	0	11	245	44	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	18	0	16	23
		Sta. Lucia	0	0	0	0	0	1	0	3	3	3	4	1	1	1	0	0	0	0	0	0	0	1	0	0	
		Togo	0	0	254	138	245	400	256	177	172	107	311	254	145	197	197	197	197	0	0	0	0	0	0	0	
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	17	703	169	266	220	30	117	117	56	452	188	280	81	7	7
		U.S.A.	253	217	110	84	130	90	278	299	469	498	171	128	116	156	182	76	83	142	120	139	44	70	68	40	64
		U.S.S.R.	2375	1290	2073	1085	1083	8882	7363	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ukraine	0	0	0	0	0	1385	985	0	0	25	0	0	0	342	2786	1918	1114	399	231	1312	30	0	0	0	
		Uruguay	1	0	0	3	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Venezuela	554	748	774	1401	1020	1153	1783	1514	1518	1454	5	1661	1651	1359	1379	1659	1602	2	0	61	13	0	16	18	19
	MED TOTAL		35546	15058	17959	15428	22317	24028	11955	22097	25255	15111	25997	15682	15189	17195	14078	29730	28170	21972	22236	15716	11117	11247	74375	31740	11352
		Albania	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	
		Algerie	867	874	880	459	203	625	1528	1307	261	315	471	418	506	277	357	511	475	405	350	597	0	609	575	684	910
		Croatia	0	0	0	0	0	0	0	0	49	128	6	70	0	0	0	25	120	0	0	0	0	0	0	0	
		EC.Bulgaria	24	1	1	0	13	0	0	17	17	20	8	0	25	33	16	51	20	35	35	35	0	0	0	0	
		EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	10	10	6	4	3	
		EC.España	1225	984	1045	729	51	962	609	712	686	228	200	344	632	690	628	333	433	342	349	461	544	272	215	429	531
		EC.France	33	16	0	0	0	10	0	1	10	5	6	0	0	0	0	0	0	0	0	27	0	0	0	0	15
		EC.Greece	1367	1732	1321	1027	1848	1254	2534	2534	2690	2690	2690	1581	2116	1752	1559	945	2135	1914	1550	1420	1538	1321	1390	845	1123
		EC.Italy	1806	2777	1437	1437	2148	2242	1369	1244	1087	1288	1238	1828	1512	2233	2233	2233	4159	4159	4159	4579	2091	2009	1356	1543	1601
		EC.Malta	1	0	0	0	0	0	0	0	0	0	0	0	0	2	7	2	2	1	0	0	0	0	0	0	2
		Egypt	14	48	62	68	35	17	358	598	574	518	640	648	697	985	725	724	1442	1442	1128	1128	0	0	0	0	
		Libya	0	0	0	0	0	0	0	0	0	71	70	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	92	75	57	51	127	108	28	69	69	31	25	93	37	67	45	39	120	115	5	61	85	78	38	89	87
		NEI-2	452	694	359	359	537	561	342	311	311	311	300	300	300	300	75	0	0	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	0	0	0	45	0	3	2	6	10	12	12	14	17	17	0	0	0	0	0	
		Tunisie	600	600	482	504	500	600	422	488	305	643	792	305	413	560	611	855	1350	1528	1183	1112	848	1251	1666	1205	1119
		Turkey	29034	7220	12281	10756	16793	17613	4667	14737	19151	8863	19548	10093	8944	10284	7810	24000	17900	12000	13460	6286	6000	5701	70797	29690	5965
		Yugoslavia Fed.	31	37	34	38	62	36	98	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BOP			38	49	133	87	564	1482	1116	457	588	600	601	775	640	2136	476	159	844	1193	984	917	729	513	139	3	867
Orcynopsis unicolor	ATL TOTAL		38	49	124	86	538	1474	1109	420	487	424	349	599	525	2004	249	29	627	1048	830	780	706	506	137	3	695
		Benin	1	1	1	3	1	2	1	1	1	1	1	1	1	1	3	1	1	0	0	0	0	0	0	0	
		EC.Portugal	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	1
		Maroc	0	0	83	33	487	1422	1058	369	486	423	348	598	524	2003	246	28	626	1048	830	780	706	503	132	0	634
		Mauritania	37	40	40	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Senegal	0	0	0	0	0	0	0	16	20	41	29	16	63	60	5	18	24	14	28	6	7	67	85	29	60
	MED TOTAL		0	0	9	1	26	8	7	37	101	176	252	176	115	132	227	130	217	145	154	137	23	8	2	0	172
		Algerie	0	0	0	0	0	0	0	0	87	135	198	153	92	119	224	128	216	135	145	128	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		Libya	0	0	0	0	0	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	0	0	9	1	26	8	7	37	14	1	14	23	23	13	3	2	1	10	9	9	20	7	1	0	172
		Tunisie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	0	0
BRS			6632	8129	3501	6549	6212	9510	10778	7698	8856	6051	8049	7161	7006	8435	8004	7923	5754	4785	4553	7750	5137	3410	3712	3587	2341
Scomberomorus brasiliensis		Brasil	4511	6259	1504	5011	4741	5063	5927	2767	1437	1149	842	1149	1308	3047	2125	1516	1516	988	251	3071	2881	814	471	1432	563
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	
		Guyana	0	0	0	0	0	0	0	0	0	0	0	0	0	211	571	625	1143	308	329	441	389	494	521	377	
		Trinidad and Tobago	0	0	0	0	0	2704	2864	2471	2749	2130	2130	2130	1816	1568	1699	2130	1328	1722	2207	2472	1867	2103	2720	1778	1778
		Venezuela	2121	1870	1997	1538	1471	1743	1987	2460	4670	2772	5077	3882	3882	3609	3609	3651	1766	1766	1766	1766	0	0	0	0	
CER			677	680	574	500	392	219	234	225	375	390	450	490	429	279	250	250	0	3	5	1	2	1	1	1	0
Scomberomorus regalis		Dominica	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
		Dominican Republic	110	106	63	52	48	57	59	50	45	79	50	90	29	29	0	0	0	0	0	0	0	0	0	0	
		EC.France	567	574	511	448	344	162	175	175	330	310	400	400	400	250	250	250	0	0	0	0	0	0	0	0	

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	1	2	0	1	0	0
FRI			22482	26083	22993	20533	24933	26699	22798	25096	16928	11268	15672	13520	11836	19717	18024	16483	15065	15603	17000	16727	7015	10694	6585	7085	4346
Auxis thazard	ATL TOTAL		16662	19746	17753	15476	21193	20573	16411	16736	10357	6367	12645	8397	7535	13808	14954	14197	12998	12909	12758	11627	4565	5163	4096	4926	4346
		Angola	212	256	90	21	115	20	70	28	1	0	4	6	21	29	12	31	2	38	38	38	0	0	0	0	95
		Benin	32	49	50	1	3	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	11	634	623	941	1260	1904	700	592	746	291	608	906	558	527	215	162	166	106	98	1117	860	414	532	603	202
		Cape Verde	0	0	0	0	2	86	105	75	135	82	115	86	13	6	22	191	154	81	171	278	321	344	475	544	498
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	170	135
		EC.Bulgaria	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.España	2691	5746	3702	3164	4538	3938	1877	2240	541	228	362	297	386	947	581	570	23	17	722	438	635	34	166	73	267
		EC.Estonia	0	0	0	0	0	0	0	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.France	0	640	416	1904	3392	3392	3008	3872	0	121	63	105	126	161	147	146	0	91	127	91	0	168	47	6	98
		EC.Latvia	0	0	0	0	0	0	0	0	243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Lithuania	0	0	0	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	14	30	32	2	2	4	26	3	0	0	0	0	0	1	31	5	9	28	5	4	6	0	3	3
		Germany Democratic Rep.	55	40	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	5632	4530	4500	3256	4689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	
		Maroc	1271	198	424	302	465	194	599	1045	1131	332	274	122	645	543	2614	2137	494	582	418	441	184	542	61	48	135
		Mixed flags (FIS)	2800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Mixed flags (FR+ES)	792	180	117	227	1526	1525	1350	1728	3633	4017	9674	3107	1919	7177	6063	6342	8012	9864	9104	7748	1623	1722	1527	1739	1072
		NEI (ETRO)	333	46	0	0	17	381	155	237	1	4	32	68	70	180	120	309	491	291	420	186	71	180	297	149	238
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	590	1157	1030	1159	1122	989	710	505	474	0	150	25
		Panama	0	0	0	0	0	0	0	0	243	57	118	341	328	240	91	0	0	0	0	0	0	394	975	970	1349
		Rumania	0	0	0	51	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	1078	627	150	405	456	46	500	761	477	0	0	300	50	56	63	6	1
		S. Tomé e Príncipe	0	32	0	0	0	23	32	35	41	39	33	37	48	79	223	197	209	200	200	200	200	234	215	290	
		Senegal	0	0	0	0	0	810	784	94	4	0	33	10	0	0	0	0	7	0	4	0	13	285	159	83	176
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	17	0	56	199	368	127	138	245	0	0	0	414	0	0	
		U.S.S.R.	1655	5903	6055	3465	2905	5638	5054	2739	0	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	36	48	0	43	0	0	0	0	
		Venezuela	1171	1478	1746	2109	2264	2654	2670	3037	1762	368	886	2609	2601	3083	2839	2164	1631	215	444	32	113	182	42	165	52
NOTE	MED TOTAL		5820	6337	5240	5057	3740	6126	6387	8360	6571	4901	3027	5123	4301	5909	3070	2286	2067	2694	4242	5099	2450	5531	2488	2159	1047
THIS GROUP BELONGS TO Auxix rochei		Algerie	0	0	0	0	0	0	0	0	174	270	348	306	230	237	179	299	173	225	230	481	0	391	547	586	477
in the BLT group, Tunisie data was already update		Croatia	0	0	0	0	0	0	0	0	24	21	52	22	28	26	26	26	26	0	0	0	0	0	0	0	
		EC.España	2135	2301	2047	1555	631	2669	2581	2985	2226	1210	648	1124	1472	2296	604	487	669	1024	861	493	495	1009	845	1101	
		EC.France	0	0	0	0	0	0	0	0	8	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
		EC.Greece	1887	2060	1419	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1426	1426	0	0	196	125	120	246	226	180	274	157
		EC.Italy	1494	1610	1344	1344	906	609	509	494	432	305	379	531	531	229	229	229	462	462	462	2452	1463	1819	866	385	378
		EC.Malta	11	4	1	13	5	8	18	21	20	11	10	1	2	3	6	6	3	1	0	0	0	0	0	0	
		Maroc	57	52	48	175	178	811	1177	2452	1289	1644	170	1726	621	1673	562	1140	682	763	256	621	246	326	50	199	35
		Serbia & Montenegro	0	0	0	0	0	0	0	0	13	1	0	0	2	6	6	6	7	8	8	0	0	0	0	0	
		Tunisie	218	294	367	538	606	588	660	985	985	35	20	13	14	13	32	93	45	15	2300	932	0				
		Yugoslavia Fed.	18	16	14	32	14	41	42	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
KGM			14607	13182	9964	12187	11890	13038	10835	12232	11530	12439	14462	13868	14916	17775	19712	16392	17678	16161	15349	17277	15855	12667	11609	8185	17708
Scomberomorus cavalla		Antigua and Barbuda	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
		Brasil	2695	2588	806	2890	2173	2029	2102	2070	962	979	1380	1365	1328	2890	2398	3595	3595	2344	1251	2316	3311	247	202	316	33
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	35	2	0	0	0	0	0	0
		Dominican Republic	0	0	0	0	0	20	29	33	34	47	52	0	0	0	589	288	230	226	226	226	0	0	0	0	0
		Grenada	40	19	0	0	0	0	0	0	0	0	0	0	0	2	4	28	14	9	4	5	0	0	0	0	3
		Guyana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	270	440	398	214	239	267	390	312	245	168	
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0
		Mexico	2874	2164	2303	2643	3067	3100	2300	2689	2147	3014	3289	3097	3214	4661	4661	3583	4121	3688	4200	4453	4369	4564	3447	4201	3526
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	9	1	1	0	1	1	1	2
		Trinidad and Tobago	20	43	11	38	82	752	541	432	657	0	1192	0	471	1029	875	746	447	432	410	1457	802	578	747	661	661
		U.S.A.	7068	7444	6011	7486	7530	7100	5681	4127	8213	9344	9616	7831	7360	7058	8720	7373	6453	6780	6603	6061	6991	7129	7123	2837	13482

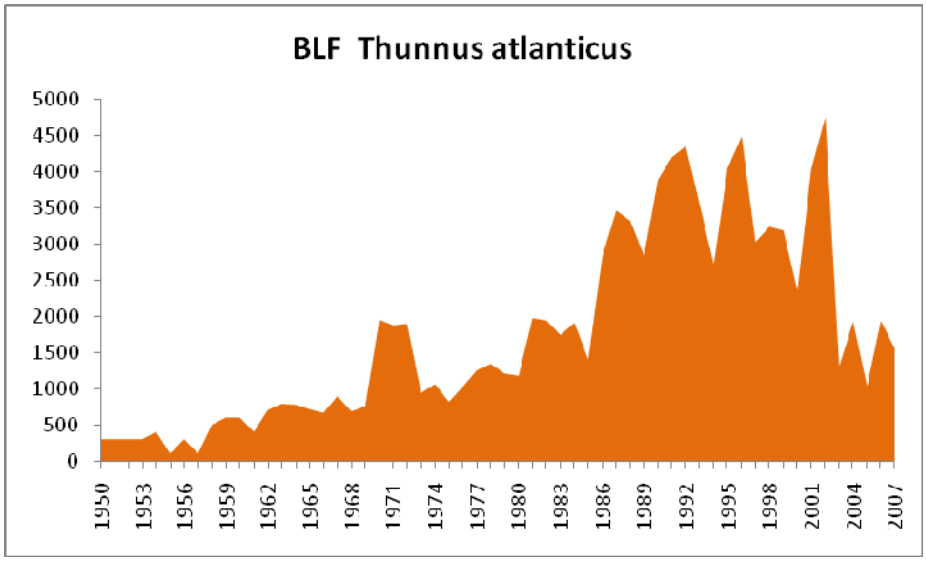
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		Venezuela	1910	924	833	933	940	1330	1500	1069	1228	1308	801	2484	2558	2140	2139	340	2424	2424	2424	2424	0	0	0	0	
KGX			20	485	22	149	261	491	105	131	225	266	301	508	512	824	156	251	1	229	48	0	15	0	1	26	16
Scomberomorus spp		Barbados	0	0	0	138	159	332	68	51	45	51	55	36	42	49	0	0	0	0	0	0	0	0	0	0	
		Colombia	20	485	22	11	102	159	37	25	7	12	21	148	111	539	0	0	0	0	0	0	0	0	0	0	
		Cuba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	26	16
		Gabon	0	0	0	0	0	0	0	0	0	0	0	140	145	79	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	155	0	0	44	48	0	0	0	0	0	
		Puerto Rico	0	0	0	0	0	0	0	0	0	53	84	86	134	106	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	15	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	138	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	55	79	150	141	98	80	50	0	0	0	48	0	0	0	0	0	0	
		Ukraine	0	0	0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LTA			22742	20745	12974	8960	20759	26182	30791	15563	13378	24280	16721	13718	13348	16058	15108	15775	14871	15834	14584	17680	12342	14142	9494	5024	17024
Euthynnus alletteratus	ATL TOTAL		21181	19095	10934	6794	18335	23777	28756	12946	11055	22524	15455	12513	11446	13939	13504	12861	11996	12540	11721	15038	11660	12705	8454	3422	13860
		Angola	1632	1632	1433	1167	1345	1148	1225	285	306	14	175	121	117	235	75	406	118	132	132	132	0	0	2	0	4365
		Argentina	0	0	11	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Benin	20	31	30	90	14	7	43	66	61	49	53	60	58	58	196	83	69	69	69	69	0	0	0	0	0
		Brasil	0	765	785	479	187	108	74	685	779	935	985	1225	1059	834	507	920	930	615	615	615	0	320	280	0	
		Cape Verde	34	16	160	29	14	1	18	65	74	148	17	23	72	63	86	110	776	491	178	262	168	137	269	269	187
		Cuba	6	15	16	24	55	53	113	88	63	33	13	15	27	23	23	0	0	0	0	0	0	0	0	0	0
		Côte D'Ivoire	0	0	0	20	5300	38	4900	2800	100	142	339	251	253	250	114	108	0	108	0	0	0	0	270	298	404
		EC.España	2	27	34	12	11	7	11	55	81	1	0	0	10	55	27	110	6	2	22	8	1	489	50	16	0
		EC.Estonia	0	0	0	0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.France	0	0	0	0	0	0	195	0	74	13	8	54	59	22	215	21	696	631	610	613	0	10	27	12	
		EC.Germany	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Latvia	0	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Lithuania	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Netherlands	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
		EC.Poland	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Portugal	0	0	0	80	21	86	91	2	61	73	45	72	72	218	320	171	14	50	0	2	16	19	21	24	43
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	182	0	18	159	301	213	57	173	0	0	0	0
		Germany Democratic Rep.	543	99	40	10	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ghana	5009	5966	901	649	5551	11588	12511	323	201	11608	359	994	513	113	2025	359	306	707	730	4768	8541	7060	5738	216	4449
		Israel	282	271	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Maroc	19	15	447	47	108	49	14	367	57	370	44	43	230	588	195	189	67	101	87	308	76	91	33	0	40
		Mauritania	54	60	60	50	50	50	50	50	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Mixed flags (FR+ES)	528	120	78	151	1017	1017	900	1152	2422	2678	4975	2071	1279	3359	2836	2936	3846	4745	4238	3334	1082	1148	1018	1159	715
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	8	20	0	0	0	0	0	0	0	33	2	0	22	0	0
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0
		Panama	0	0	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rumania	216	266	126	81	7	88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Russian Federation	0	0	0	0	0	0	0	0	617	306	265	189	96	49	0	88	0	0	0	74	13	0	0	0	0
		S. Tomé e Príncipe	0	101	0	0	0	30	36	52	46	48	41	40	43	40	50	39	37	33	33	33	33	178	182	179	
		Senegal	5623	8408	4566	2392	2985	6343	6512	4184	2955	3137	3913	4238	3560	1972	2734	3372	1398	3336	4969	2659	4394	4160	2 166	3826	3384
		South Africa	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
		St. Vincent and Grenadines	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
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0	1	10	1	0	0	1	0
		U.S.A.	107	41	74	104	118	204	129	173	228	597	1286	1142	1312	2230	2015	1546	1623	1209	1451	1366	1492	1382	765	1351	259
		U.S.S.R.	6528	613	1040	271	61	1707	543	667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		UK.Bermuda	5	5	7	13	13	17	14	8	10	11	5	6	6	7	6	5	4	2	1	5	4	5	7	5	
		Venezuela	573	644	1050	1123	1467	1236	1374	1294	1963	1409	1889	2115	2115	1840	1840	2815	2247	2247	2247	2254	50	0	0	0	0
	MED TOTAL		1561	1650	2040	2166	2424	2405	2035	2617	2323	1756	1266	1205	1902	2119	1604	2914	2875	3294	2863	2642	682	1438	1040	1602	3165
		Algerie	0	0	0	0	0	0	0	0	522	585	495	459	552	554	448	384	562	494	407	148	0	158	116	187	96
		Croatia	0	0	0	0	0	0	0	0	2	3	2	15	15	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Cyprus	17	31	32	13	25	41	20	23	25	21	11	23	10	19	19	19	16	19	19	19	0	0	0	0	6
		EC.España	0	32	12	5	0	5	0	0	0	0	0	0	15	18	9	15	0	8	82	32	0	41	262	116	203

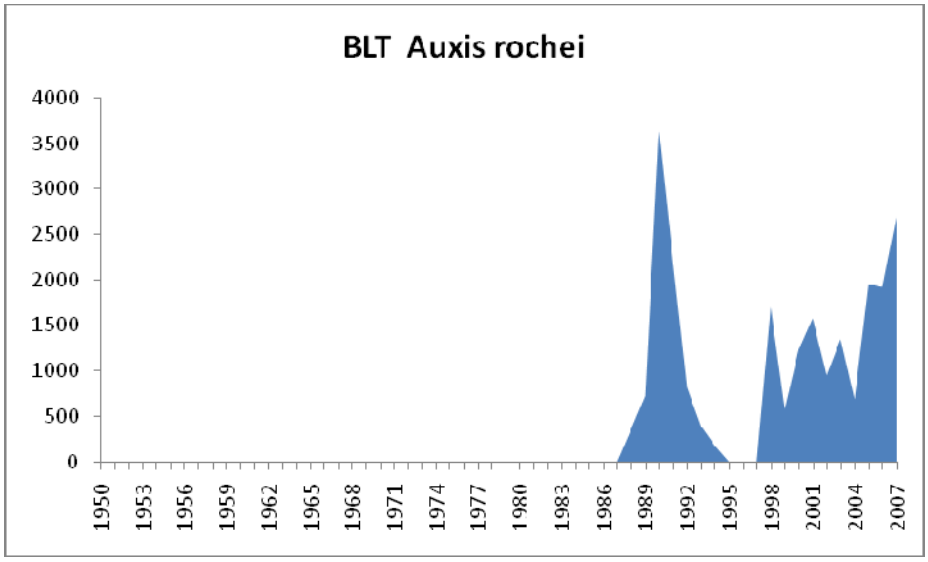
		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	112	69	72
	EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	24	38	34	513	615
	EC.Malta	0	0	0	0	0	0	0	0	8	1	8	8	8	3	3	0	0	0	0	0	0	0	0	0	1
	Israel	35	60	259	284	273	135	124	129	108	126	119	119	215	119	119	119	119	119	119	119	0	0	0	0	0
	Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	52	0	5	4	4	0	0	0	0	
	Maroc	0	1	0	0	0	12	0	16	0	0	0	0	1	0	1	14	8	0	0	3	1	0	9	0	331
	NEI-2	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	0	0	0	0	0	0	0	0
	Palestina	0	0	0	0	0	0	0	0	0	0	0	0	0	90	59	61	60	60	60	129	0	0	0	0	0
	Serbia & Montenegro	0	0	0	0	0	0	0	0	5	0	28	21	35	22	18	20	18	16	16	0	0	0	0	0	0
	Syrian Arab Republic	80	96	95	73	121	99	121	127	110	156	161	156	155	270	350	417	390	370	370	330	0	0	0	0	0
	Tunisie	1228	1224	1441	1590	1803	1908	1566	2113	1343	664	242	204	696	824	333	1113	752	1453	1036	960	657	633	496	569	1056
	Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	750	750	750	750	0	568	507	1230	785
	Yugoslavia Fed.	1	6	1	1	2	5	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAW		4716	4498	3989	3292	1799	3921	2938	5616	3788	1530	1780	1276	1270	1272	878	1116	732	754	733	1073	18	397	12	14	338
Scomberomorus tritor	Benin	30	46	50	104	17	13	334	211	214	202	214	194	188	188	362	511	205	205	205	205	0	0	0	0	0
	EC.Estonia	0	0	0	0	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EC.Latvia	0	0	0	0	0	0	0	208	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EC.Lithuania	0	0	0	0	0	0	0	0	52	4	0	0	0	0	0	0	0	0	0	298	0	0	0	0	0
	Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0
	Germany Democratic Rep.	537	33	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ghana	2225	3022	3000	1453	0	1457	1457	1500	2778	899	466	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Russian Federation	0	0	0	0	0	143	195	1032	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	S. Tomé e Príncipe	0	0	0	0	0	6	4	6	5	3	5	6	6	8	7	8	5	6	6	6	6	21	12	13	13
	Senegal	754	1174	732	1516	1754	2159	753	1220	520	1225	1019	939	1614	1318	837	522	491	778	408	584	532	288	489	196	324
	U.S.S.R.	1170	223	206	219	28	143	195	1240	0	0	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	90	0	0	0	0	0	0	0	21	0	42	12	0	0	0	0
SSM		9574	11362	11590	14117	14531	12712	13946	14500	15546	16346	16231	14777	13857	16725	15501	8723	9973	8336	8492	9461	9853	13582	10334	6282	6102
Scomberomorus maculatus	Colombia	10	77	101	81	72	151	112	76	37	95	58	69	69	0	0	0	0	0	0	0	0	0	0	0	
	Cuba	689	544	443	621	1606	803	746	665	538	611	310	409	548	613	613	0	0	0	0	0	0	0	0	0	
	Dominican Republic	168	1058	1267	1271	1321	1415	1401	1290	728	735	739	1330	2042	2042	231	191	125	158	158	158	0	0	0	0	
	Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	265	0	0	0	0	
	Grenada	1	1	4	17	0	0	1	3	0	0	1	2	2	0	0	0	0	0	0	1	0	0	0	0	
	Mexico	5922	5777	5789	6170	6461	5246	7242	8194	8360	9181	10066	8300	7673	11050	11050	5483	6431	4168	3701	4350	5242	3641	5723	3856	3955
	Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	27	0	0	0	0	0
	U.S.A.	2784	3905	3986	6047	5001	5056	4343	2554	5655	5663	5143	4380	3363	2866	3509	2968	3282	3893	4524	4613	4552	4477	4747	2425	2147
WAH		2366	2159	920	1151	1235	1635	1527	1498	1721	1834	2607	2143	2408	2515	3085	2487	2952	2020	2296	2202	2049	2535	1665	1610	708
Acanthocybium solandri	Antigua and Barbuda	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
	Aruba	115	115	115	120	90	80	80	70	60	50	50	125	40	50	50	50	50	50	50	50	0	0	0	0	
	Barbados	222	219	120	138	159	332	51	51	60	51	91	82	42	35	52	52	41	41	0	0	43	0	0	41	36
	Benin	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Brasil	0	0	21	141	133	58	92	52	64	71	33	26	1	16	58	41	0	0	0	0	405	519	449	111	75
	Cape Verde	1588	1365	142	205	306	340	631	458	351	350	326	361	408	503	603	429	587	487	578	500	340	458	522	537	454
	Dominica	0	0	0	0	0	0	0	38	43	59	59	59	58	58	58	58	50	46	11	37	10	6	8	15	14
	Dominican Republic	0	0	0	0	0	1	3	6	9	13	7	0	0	0	325	112	31	35	35	35	0	0	0	0	
	EC.España	0	0	4	9	9	32	18	23	28	32	22	20	15	25	25	29	28	32	38	46	48	305	237	110	65
	EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0
	Grenada	94	50	51	82	54	137	57	54	77	104	96	46	49	56	56	59	82	51	71	59	44	0	0	0	64
	Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	
	Netherlands Antilles	215	215	245	250	260	280	280	280	250	260	270	250	230	230	230	230	230	230	230	230	0	0	0	0	
	Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	
	S. Tomé e Príncipe	0	0	0	0	0	23	20	28	34	27	36	39	46	80	52	56	62	52	52	52	52	94	88	76	
	Saint Kitts and Nevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	7	0	
	Senegal	0	0	0	0	0	0	0		0	2	64	0	0	1	0	1	5	0	0		7	0	0	1	0
	St. Vincent and Grenadines	0	0	0	0	0	4	4	28	33	33	41	28	16	23	10	65	52	46	311	17	40	60	0	241	29
	Sta. Lucia	0	0	0	0	0	0	0	77	79	150	141	98	80	221	223	223	310	243	213	217	169	238	169	187	211
	Trinidad and Tobago	0	0	0	0	0	0	0	0	118	1	0	0	0	0	1	1	1	2	1	9	7	6	6	7	7
	U.S.A.	0	0	13	13	57	128	110	82	134	203	827	391	764	608	750	614	858	640	633	846	789	712	558	89	86
	UK.Bermuda	49	46	46	65	43	61	63	74	67	80	58	50	93	99	105	108	104	61	56	91	87	88	83	86	124

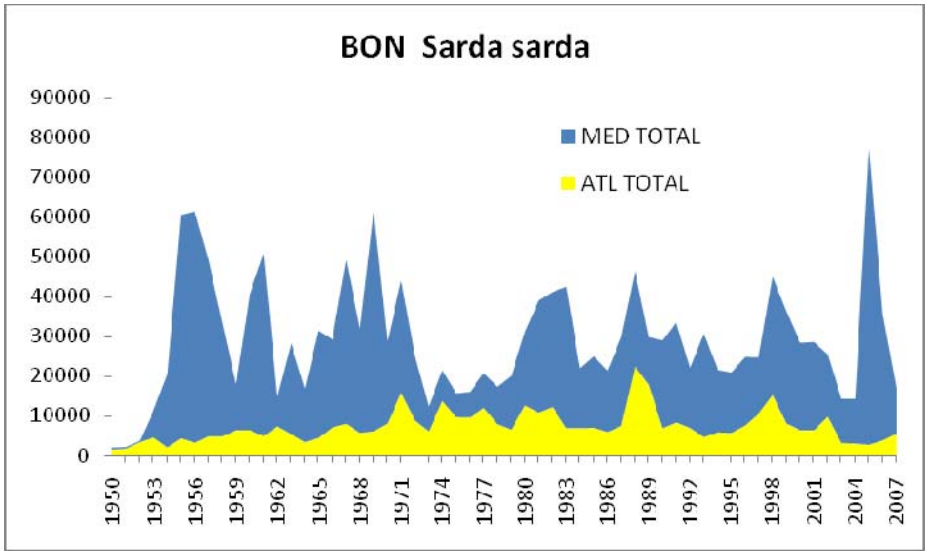
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
UK.Sta Helena	16	23	15	15	18	18	17	18	12	17	35	26	25	23	0	0	0	0	0	0	0	0	0	0	0
Venezuela	66	125	147	113	106	141	101	159	302	333	514	542	540	487	488	360	467	4	17	13	9	7	16	13	33

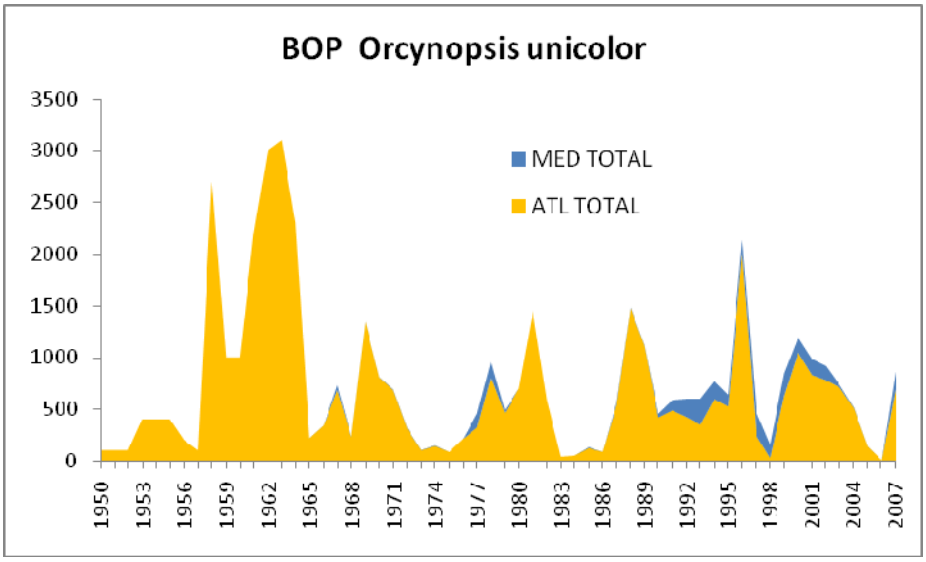


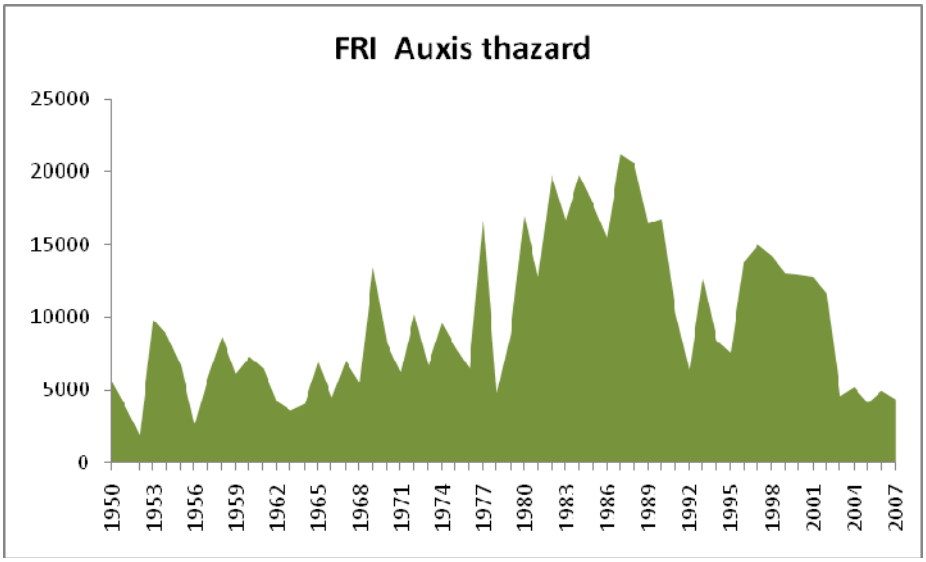
SMT-Figure 1. Estimated landings (t) of small tunas (combined) in the Atlantic and Mediterranean, 1950-2007. The data for the last years are incomplete.

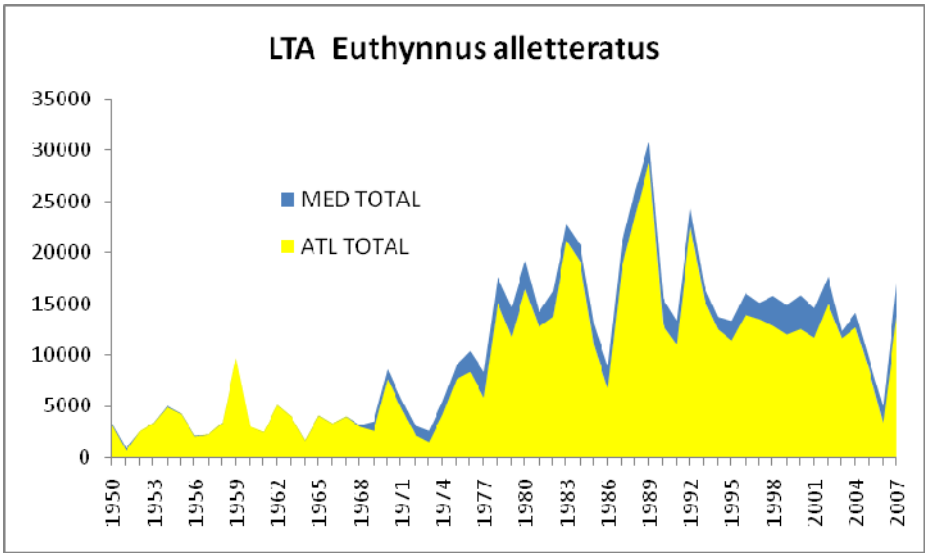

BLF Thunnus atlanticus
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

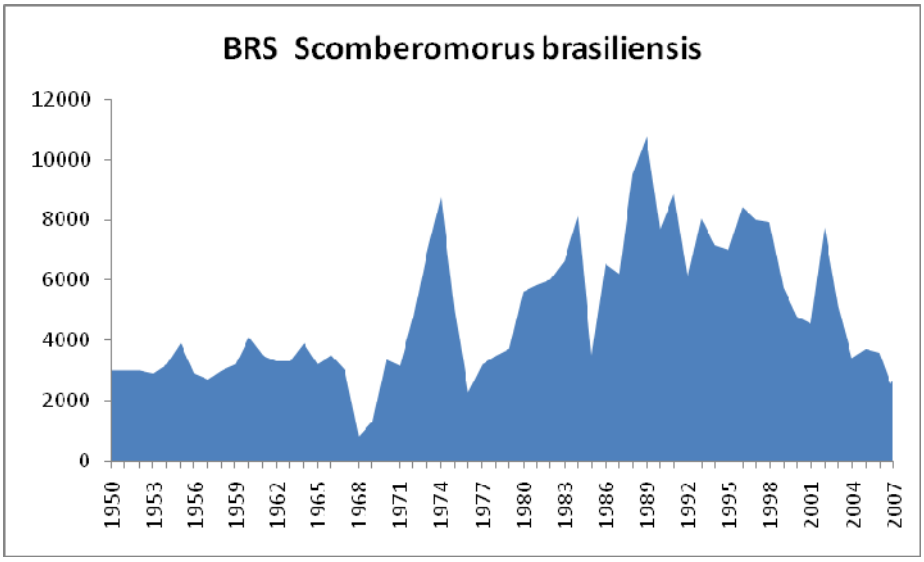

BLT Auxis rochei
4000
3500
3000
2500
2000
1500
1000
500
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

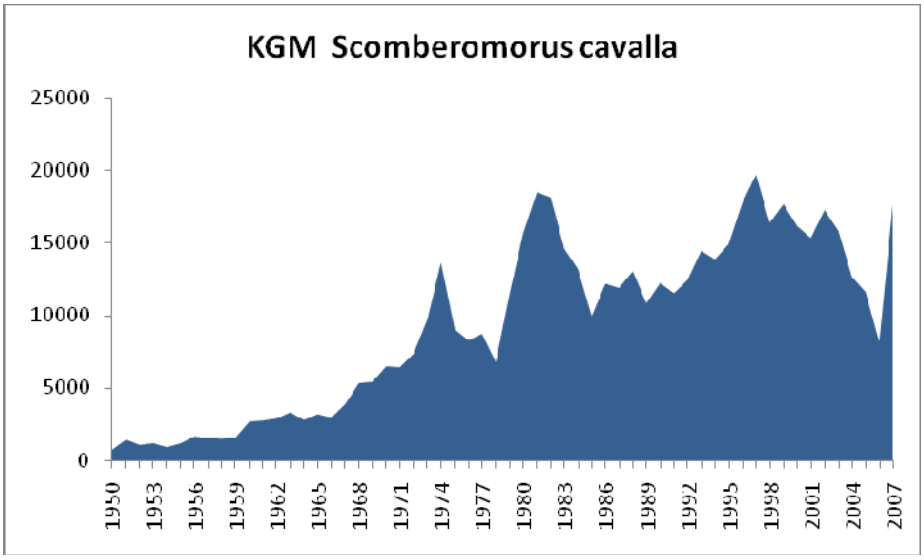

BON Sarda sarda
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
MED TOTAL
ATL TOTAL
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

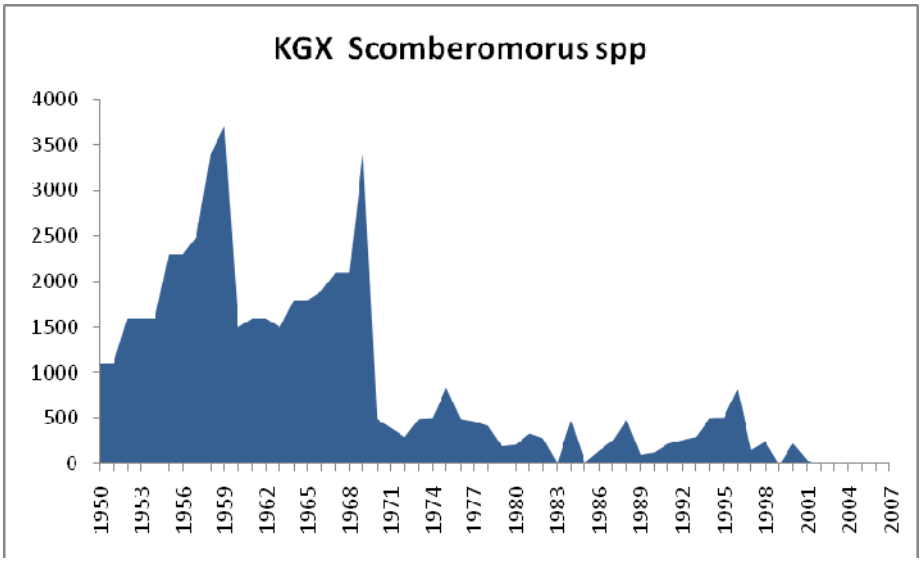

BOP Orcynopsis unicolor
MED TOTAL
ATL TOTAL
3500
3000
2500
2000
1500
1000
500
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

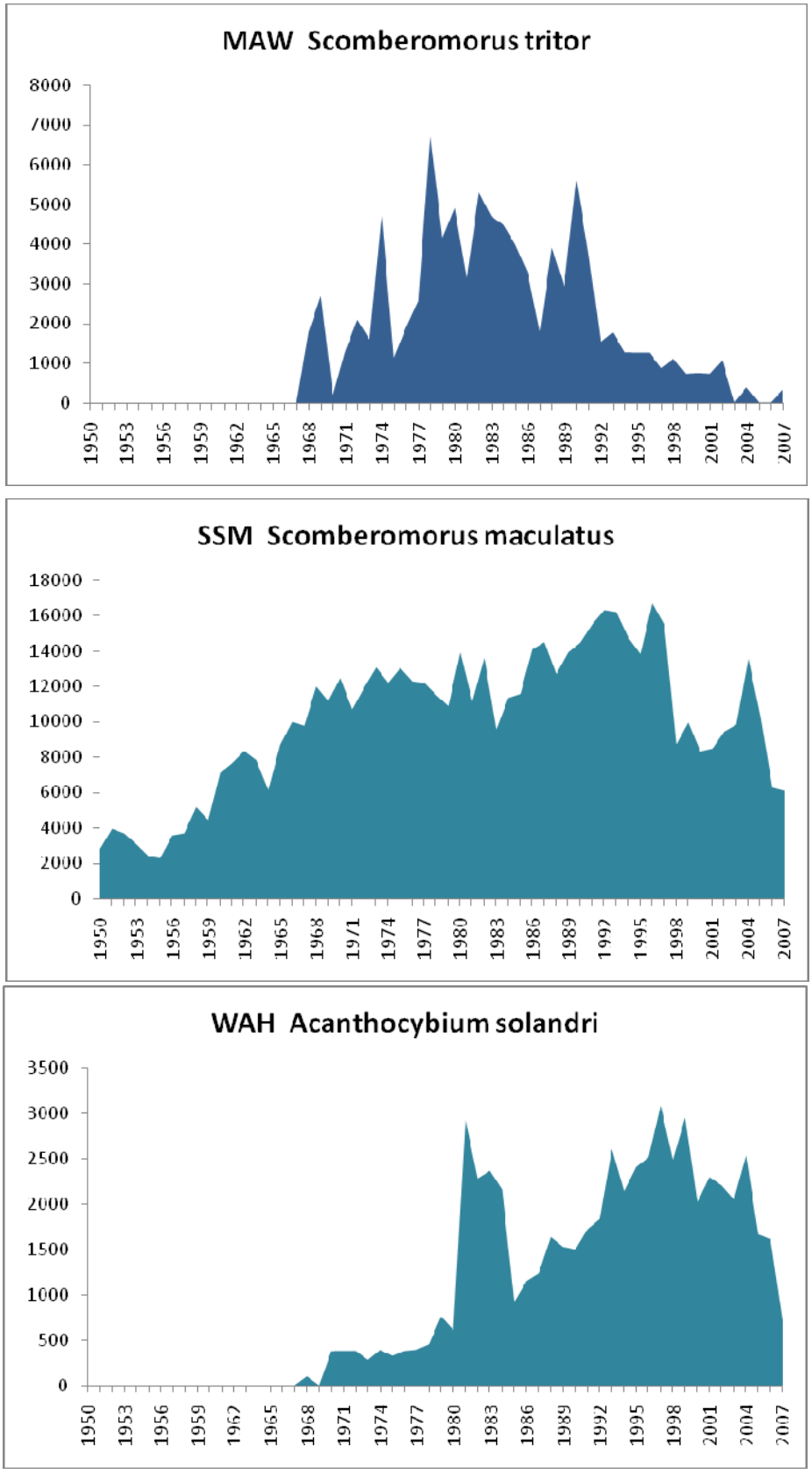

FRI Auxis thazard
25000
20000
15000
10000
5000
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007


LTA Euthynnus alletteratus
MED TOTAL
ATL TOTAL
35000
30000
25000
20000
15000
10000
5000
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007


BRS Scomberomorus brasiliensis
12000
10000
8000
6000
4000
2000
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007


KGM Scomberomorus cavalla
25000
20000
15000
10000
5000
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007


KGX Scomberomorus spp
4000
3500
3000
2500
2000
1500
1000
500
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007



SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2007. The data for the last years are incomplete.

8.12 SHK - SHARKS

In response to the *Supplementary Recommendation by ICCAT Concerning the Conservation of Sharks caught in Association with Fisheries Managed by ICCAT* [Rec. 06-10], an updated assessment of the stocks of blue shark *(Prionace glauca*) and shortfin mako *(Isurus oxyrinchus)* was conducted in 2008. Ecological risk assessments (ERA) were also conducted for nine additional priority species of pelagic elasmobranchs, for which available data are very limited (*Isurus paucus*; *Alopias superciliosus*; *Alopias vulpinus*; *Carcharhinus longimanus*; *C. falciformis*; *Lamna nasus*; *Sphyrna lewini*; *Sphyrna zygaena*; and *Pteroplatytrygon violacea*).

Although both the quantity and quality of the data available to conduct stock assessments have increased with respect to those available in 2004, they are still quite uninformative and do not provide a consistent signal to inform the assessment. Unless these and other issues can be resolved, the assessments of stock status for this and other species will continue to be very uncertain and our ability to detect stock depletion to levels below the Convention Objective level will remain considerably low.

A summary of the Committee's findings based on the assessment results is presented below. Although pelagic sharks are captured in the Atlantic Ocean with a wide variety of fishing gears, the largest volume of most of the species of major concern to ICCAT are captured by pelagic longline fisheries. The Committee assessed blue and shortfin mako sharks assuming the existence of three separate stocks: North, South and Mediterranean. However, the data available to the Committee for the Mediterranean were not considered sufficient to conduct quantitative assessments for these species. The assessment results presented high levels of uncertainty due to data limitations. Therefore, increased research and data collection are required to enable the Committee to improve the advice it can offer. A complete discussion on the uncertainties about stock structure, movements, life history and characteristics of some of the fisheries affecting these stocks can be viewed in the Detailed Report of the 2008 SCRS Shark Stock Assessment Session (SCRS/2008/017).

SHK-1. Fishery indicators

Earlier reviews of the shark database resulted in recommendations to improve data reporting on shark catches. Though global statistics on shark catches included in the data base have improved, they are still insufficient to permit the Committee to provide quantitative advice on stock status with sufficient precision to guide fishery management toward optimal harvest levels. Reported catches for blue shark, shortfin mako and porbeagle are provided in **SHK-Table 1**. Given that catch reports to ICCAT are incomplete, the Committee attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets **SHK-Figure 1**, as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in blue shark and shortfin mako assessments.

A number of standardized CPUE data series for blue shark and shortfin mako were presented in 2008 as relative indices of abundance. The Committee placed emphasis on using the series that pertained to fisheries that operate in oceanic waters over wide areas**. SHK-Figure 2** presents the central tendency of the available series for the four stocks.

Considering the quantitative and qualitative limitations of the information available to the Committee, the results presented below, as those of the 2004 assessments, are not conclusive.

With regard to the species for which ERAs were conducted, the Committee understands that, in spite of existing uncertainties, results make it possible to identify those species that are more susceptible and vulnerable (based only on productivity) to prioritize research and management measures **(SHK-Table 2)**. These ERAs are conditional on the biological variables used to estimate productivity as well as the susceptibility values for the different fleets and thus may change in the future as new information becomes available.

SHK-2. Blue shark

For both North and South Atlantic blue shark stocks, although the results are highly uncertain, biomass is believed to be above the biomass that would support MSY and current harvest levels below F_{MSY}. Results from all models used were conditional on the assumptions made (*e.g.*, estimates of historical catches and effort, the relationship between catch rates and abundance, the initial state of the stock in the 1950s, and various life-history

parameters), and a full evaluation of the sensitivity of results to these assumptions was not possible during the assessment. Nonetheless, as for the 2004 stock assessment, the weight of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective (**SHK-Figure 3**).

SHK-3. Shortfin mako shark

Estimates of stock status for the North Atlantic shortfin mako obtained with the different modeling approaches were much more variable than for blue shark. For the North Atlantic, most model outcomes indicated stock depletion to about 50% of biomass estimated for the 1950s. Some model outcomes indicated that the stock biomass was near or below the biomass that would support MSY with current harvest levels above F_{MSY}, whereas others estimated considerably lower levels of depletion and no overfishing (**SHK-Figure 3**). In light of the biological information that indicates the point at which B_{MSY} is reached with respect of the carrying capacity which occurs at levels higher than for blue sharks and many teleost stocks. There is a non-negligible probability that the North Atlantic shortfin mako stock could be below the biomass that could support MSY. A similar conclusion was reached by the Committee in 2004, and recent biological data show decreased productivity for this species. Only one modeling approach could be applied to the South Atlantic shortfin mako stock, which resulted in an estimate of unfished biomass which was biologically implausible, and thus the Committee can draw no conclusions about the status of the South stock.

SHK-4 Porbeagle shark

The Committee has not yet conducted an assessment of porbeagle.

Porbeagle in the Atlantic is mainly taken in fisheries which are not directed at tuna and tuna-like species and has been the target of several Atlantic fisheries in both the north and south. For the purposes of analysis, in the Atlantic, porbeagle are considered to be comprised of four stocks: NW, NE, SW, and SE. Available catch information is in **SHK-Table 3**. **SHK-Figure 4** shows the degree of overlap between the distribution of porbeagle and that of the fishing effort exerted by the major pelagic longlines fleets operating in the Atlantic Ocean.

Canadian scientists conducted a recent assessment of porbeagle stock status in the NW Atlantic, which indicated the stock had been depleted to levels well below B_{MSY} by 2004 and that rebuilding to MSY levels could require long recovery periods due to the level of depletion and the low intrinsic rate of increase for the stock. Recent fishery monitoring information suggests that harvest rates in these areas have exceeded sustainable levels and thus resulted in further decline in the stock.

Similar assessments have not yet been conducted for the other stocks, due to data limitations. ICES has undertaken data compilations and provided advice to the EC for NE porbeagle. Similar data compilations need to be undertaken for SE and SW porbeagle stocks. A joint ICCAT-ICES Inter-sessional meeting is proposed in 2009 to further assess porbeagle in conformity with [Rec.07-06]. As porbeagle are mainly taken in fisheries not directed at tuna, participation in the proposed assessment by additional RFMO scientific experts would be most beneficial.

SHK 5. Other species

Ecological risk assessments for eleven priority species of sharks (including blue shark and shortfin mako) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. Specifically, the analyses indicated that bigeye threshers, longfin makos, and shortfin makos have the highest vulnerability (and lowest biological productivity) of the shark species examined (with bigeye thresher being substantially less productive than the other species). All species considered in the ERA, particularly smooth hammerhead, longfin mako, bigeye thresher and crocodile sharks, are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end. **SHK-Table 4** provides a productivity ranking of the species considered. ERAs should be updated with improved information on the productivity and susceptibility of these species.

SHK 6. Management Recommendations

Precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there is very little data (**SHK-Table 4**). Management measures should ideally be species-specific whenever possible.

For species of high concern, which are expected to have high survivorship on longlines, like the bigeye thresher, prohibition of landings could be effective for conservation. However, for other species which can be easily misidentified, such prohibitions could complicate compliance monitoring. Minimum landings sizes or maximum landing length would afford protection to juveniles or the breeding stock, respectively, although other technical measures such as gear modifications, time-area restrictions, or other approaches, could be alternative means to protecting different life stages, provided they are tested for effectiveness before they are implemented through research projects.

NORTH ATLANTIC BLUE SHARK SUMMARY

Current Yield		61,845 t
Relative Biomass:	B_{2007}/B_{MSY}	1.87 (0.13)-2.74[1] (0.54)
	B_{2007}/B_0	0.67 (0.35)-0.93[2] (0.13)
Relative Fishing Mortality:	F_{MSY}	0.15[3] (0.02)
	F_{2007}/F_{MSY}	0.13 (0.11)-0.17[4] (2.57)

[1] Range obtained from the Bayesian Surplus Production (BSP) (low) and the Catch-Free Age Structured Production (CFASP) (high) models. Value from CFASP is SSB/SSB_{MSY}. All values in parentheses are CVs.
[2] Range obtained from BSP (high), CFASP and Age-Structured Production Model (ASPM) (low) models.
[3] From BSP and CFASP models (same value). CV is from CFASP model.
[4] Range obtained from BSP (high) and CFASP (low) models.

SOUTH ATLANTIC BLUE SHARK SUMMARY

Current Yield		37,075 t
Relative Biomass:	B_{2007}/B_{MSY}	1.95 (0.06)-2.80[1] (0.40)
	B_{2007}/B_0	0.86 (0.10)-0.98[2] (0.06)
Relative Fishing Mortality:	F_{MSY}	0.15-0.20[3] (0.02)
	F_{2007}/F_{MSY}	0.04 (2.74)-0.09[4] (0.08)

[1] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is SSB/SSB_{MSY}.
[2] Range obtained from BSP (high) and CFASP (low) models. Value from CFASP is SSB/SSB0.
[3] Range obtained from BSP (low) and CFASP (high) models.
[4] Range obtained from BSP (low) and CFASP (high) models.

NORTH ATLANTIC SHORTFIN MAKO SUMMARY

Current Yield		5,996 t
Relative Biomass:	B_{2007}/B_{MSY}	0.95 (0.45)-1.65[1] (0.53)
	B_{2007}/B_0	0.47 (0.45)-0.73[2] (0.16)
Relative Fishing Mortality:	F_{MSY}	0.007-0.05[3]
	F_{2007}/F_{MSY}	0.48 (0.39)-3.77[4] (1.09)
Management measures in effect		[Rec. 04-10], [Rec. 07-06]

[1] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is SSB/SSB_{MSY}.
[2] Range obtained from BSP (low), AS, and CFASP (high) models. Value from CFASP is SSB/SSB0.
[3] Range obtained from BSP (low) and CFASP (high) models.
[4] Range obtained from BSP (high) and CFASP (low) models.

SHK-Table 1. Estimated catches (t) of major sharks species (BSH,SMA,POR) by major area, gear and flag (v.03 Oct. 1, 2008). Shaded cells indicate new figures included/changed after the sharks assessmet.

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
BSH Total			613	121	380	1482	1614	1835	1810	3028	4307	3643	9577	16658	14509	16304	43742	40047	39413	43310	37811	34908	40329	40152	45671	45116	45623
ATN			613	121	380	1482	1614	1835	1810	3028	4299	3536	9566	9559	9739	11010	32454	30153	27631	30372	23137	21525	24858	23574	23752	25207	25655
ATS			0	0	0	0	0	0	0	0	8	107	10	7093	4762	5293	11140	9833	11762	12893	14627	13367	15460	16452	21848	19730	19916
MED			0	0	0	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	125	72	178	51
Landings	ATN	Other surf.	613	121	380	1482	1088	1414	1330	900	1270	1768	2696	1632	1793	1086	1255	1030	1228	1355	904	1543	975	1372	1258	1080	905
		longline	0	0	0	0	0	0	0	1387	2257	1583	5734	5307	5348	5280	27622	25671	24418	26515	20093	18662	22007	20306	20706	22506	24712
	ATS	Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	1	4	6	99	3	59	10
		longline	0	0	0	0	0	0	0	0	8	107	10	1570	1360	2344	8362	7089	9170	11108	13342	12431	12578	14401	20739	17326	19846
	MED	Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	0	95	2
		longline	0	0	0	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	44	72	83	49
Discards	ATN	Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	103	0	22	4	0	0	0	0	1	0	0	0
		longline	0	0	0	0	526	421	480	741	772	184	1136	2620	2598	4541	3577	3431	1981	2502	2140	1320	1876	1895	1788	1621	38
	ATS	longline	0	0	0	0	0	0	0	0	0	0	0	5523	3402	2949	2772	2741	2566	1785	1283	932	2877	1952	1105	2345	60
Landings	ATN	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
		Canada	0	0	0	320	147	968	978	680	774	1277	1702	1260	1494	528	831	612	547	624	581	836	346	965	1134	977	843
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185	104	148	0	0	0	367
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	206	240	595	320
		EC.Denmark	0	0	0	0	0	0	2	2	1	1	0	1	2	3	1	1	0	2	1	13	5	1	0	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24497	22504	21811	24112	17362	15666	15975	17314	15006	15464	17038
		EC.France	8	14	39	50	67	91	79	130	187	276	322	350	266	278	213	163	399	395	207	221	57	106	120	99	167
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	31	66	11	2	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	1387	2257	1583	5726	4669	4722	4843	2630	2440	2227	2081	2110	2265	5643	2025	4027	4338	5283
		EC.United Kingdom	0	0	0	0	0	0	0	1	0	0	0	0	12	0	0	1	0	12	9	6	4	6	5	3	6
		*Japan	0	0	0	0	0	0	0	0	0	0	0	630	622	431	493	722	370	315	430	622	629	1037	1402	1843	1531
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	254	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	0	0	0	0	43
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	2	1	1	0
		U.S.A.	605	107	341	1112	874	355	271	87	308	215	680	29	23	283	211	255	217	291	39	0	0	7	2	2	1
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	26	10	18
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	259	0	236
		Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	743	1103	0	179	1683	2173	1971	2166	1667	2523	2591	2258
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	565	316	452	0	0	0	585
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521	800	866	1788	2019
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5272	5574	7173	6951	7743	5368	6626	7366	6410	8724	8942
		EC.Netherlands	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
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	847	867	1336	876	1110	2134	2562	2324	1841	1863	3184	2751	4493
		EC.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	239	
		*Japan	0	0	0	0	0	0	0	0	0	0	0	1486	456	475	470	368	401	238	148	96	264	271	337	970	902
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2213	0	1906	6616	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168	22	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	21	0	83	63	232	128	154	90	82
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	
		Uruguay	0	0	0	0	0	0	0	0	8	107	10	84	57	259	180	248	118	81	66	85	480	462	376	232	337
	MED	EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	6	5	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	146	59	20	31	6	3	3	4	8	61	3
		EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	1	95	46
		EC.Malta	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	2
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	41	14	3	0	56	22	
		Japan	0	0	0	0	0	0	0	0	0	0	0	5	7	1	1	0	0	0	0	0	1	1	2	0	
Discards	ATN	*Japan	0	0	0	0	0	0	0	0	0	0	0	2048	1977	3939	3397	3261	1877	2365	2035	1252	1876	1832	1722	1576	
		U.S.A.	0	0	0	0	526	421	480	741	772	184	1136	572	618	704	180	192	100	137	106	68	0	65	66	45	38
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	8	0	0	0	0	0	0	0	
	ATS	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	60
		*Japan	0	0	0	0	0	0	0	0	0	0	0	5523	3402	2942	2767	2737	2565	1785	1283	932	2877	1952	1105	2345	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	
SMA Total			975	1793	3803	1951	1028	1562	1648	1349	1326	1446	2966	2025	2984	1717	5204	4563	3982	4750	4618	4939	7205	6956	6566	6419	6452
ATN			569	1112	3143	1481	766	1014	1011	785	797	953	2193	1417	2632	1373	3334	3083	2689	2482	2646	3071	3797	4802	3353	3318	3822
ATS			405	680	661	471	262	548	637	564	529	493	773	608	352	344	1864	1471	1289	2264	1965	1866	3405	2153	3197	3092	2628
MED			0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2
Landings	ATN	Other surf.	368	929	2949	1297	462	795	681	278	213	254	670	331	1447	248	177	168	91	313	227	266	104	308	18	8	10
		longline	201	183	194	184	295	214	321	497	573	660	1499	1028	1096	1018	3156	2816	2563	2147	2371	2744	3589	4275	3271	3238	3771

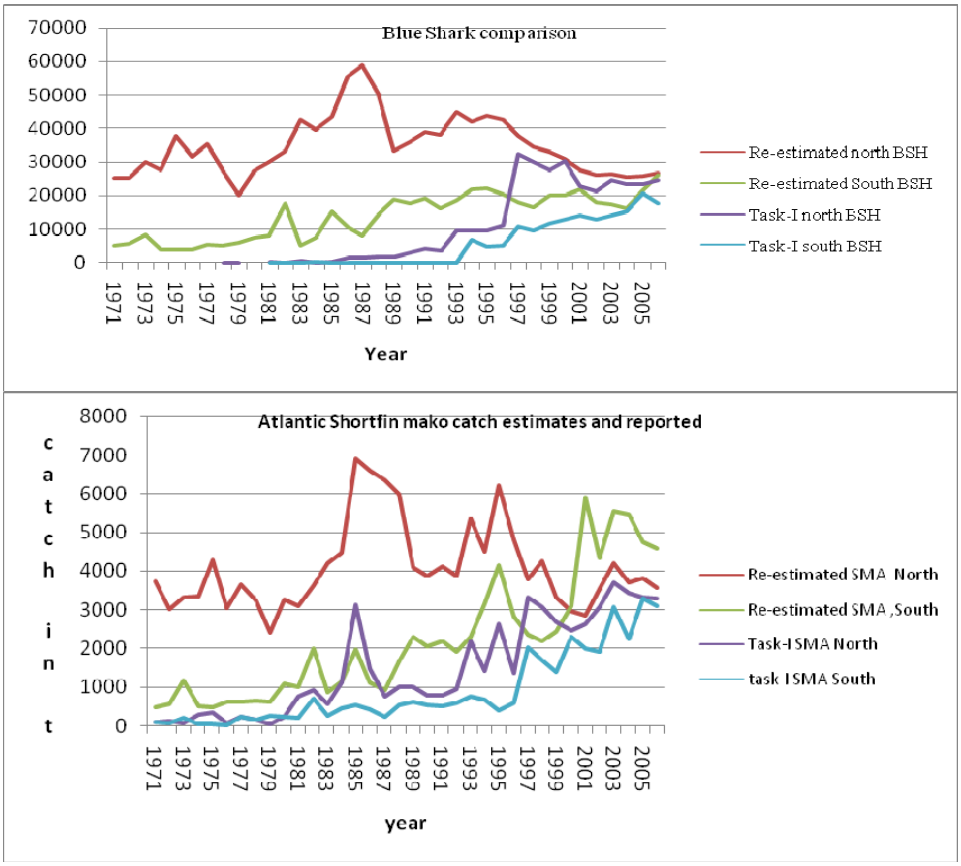
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	ATS	Other surf.	0	0	0	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	18	15	31	76	14	43	25
		longline	405	680	661	471	262	548	637	564	519	480	763	195	205	293	1815	1426	1238	2208	1948	1841	3326	1999	3145	2998	2603
	MED	longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2
Discards	ATN	Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
		longline	0	0	0	0	9	5	9	10	11	38	24	57	89	107	2	99	33	21	48	61	105	219	64	72	39
	ATS	longline	0	0	0	0	0	0	0	0	0	0	0	393	134	36	27	35	41	47	0	10	48	78	38	50	
Landings	ATN	Canada	0	0	0	0	0	0	0	0	0	0	0	0	111	67	110	69	70	78	69	78	73	80	91	71	72
		China P.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	81
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	57	19	31	27
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2416	2199	2051	1566	1684	2047	2068	3404	1751	1918	1816
		EC.Portugal	0	0	0	0	0	0	0	193	314	220	796	649	657	691	354	307	327	318	378	415	1249	473	1109	951	1540
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	1	1	0	0	0
		*Japan	159	141	142	120	218	113	207	221	157	318	425	69	55	38	45	60	38	31	52	53	64	92	99	132	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	16	0	10	6	9	5	8
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	0	0	8
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3	1	2	1	1
		U.S.A.	410	971	3001	1361	540	896	795	360	315	376	948	642	1710	469	407	347	159	454	395	415	142	411	187	130	215
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	20	6	11
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	17
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	83	190	0	27	219	409	226	283	238	426	210	36
		China P.R.	0	0	0	0	0	0	0	0	0	0	34	45	23	27	19	74	126	305	22	208	260	0	0	0	77
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	121	128	141	199
		Côte D'Ivoire	0	0	0	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	15	15	30	15	14	16	25
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1356	1141	861	1200	1235	811	1158	703	584	664	654
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	92	94	165	116	119	388	140	56	625	13	242	493	375
		EC.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	5	
		*Japan	252	462	540	428	234	525	618	538	506	460	701	138	74	63	62	51	44	59	25	25	49	50	29	88	
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	459	0	509	1415	1243	1002
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	1	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	13	0	79	19	138	126	125	99	208
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	
		Uruguay	153	218	121	43	28	23	19	26	13	20	28	12	17	26	20	23	21	35	40	38	188	249	146	68	36
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	12	13	
	MED	EC.Cyprus	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
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	7	5	3	2	2	2	2	2	4	1
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0	0	15	5	
Discards	ATN	*Japan	0	0	0	0	0	0	0	0	0	0	0	36	60	106	2	99	33	21	48	61	105	219	64	72	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	0	0	9	5	9	10	11	38	24	21	28	1	0	0	0	0	0	0	0	0	0	0	41
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	
	ATS	*Japan	0	0	0	0	0	0	0	0	0	0	0	393	134	36	27	35	41	47	0	10	48	78	38	50	
POR Total			1141	706	664	706	813	957	971	1282	1944	2588	1886	2673	2120	1517	1859	1468	1403	1468	1000	848	636	727	571	503	490
MED			0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0
ATS			0	0	0	0	0	1	0	0	0	0	1	2	3	3	26	17	10	11	1	11	43	17	31	37	8
ATN			1141	706	664	706	813	955	971	1282	1943	2588	1885	2670	2117	1513	1833	1450	1393	1456	999	838	592	707	539	466	482
Landings	ATN	All gears	1141	706	664	706	813	955	971	1282	1943	2586	1885	2669	2117	1513	1833	1450	1393	1456	999	838	592	707	539	466	482
	ATS	All gears	0	0	0	0	0	1	0	0	0	0	1	2	3	3	26	16	9	11	1	11	43	17	31	37	8
	MED	All gears	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0
Discards	ATN	All gears	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	
	ATS	All gears	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	
Landings	ATN	Canada	9	20	26	24	59	83	73	78	329	813	919	1575	1353	1051	1334	1070	965	902	499	237	142	232	202	192	93
		EC.Denmark	45	38	72	114	56	33	33	46	85	80	91	93	86	72	69	85	107	73	76	42	0	0	0	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	18	13	24	54	27	11	14	34	8
		EC.France	791	411	254	260	280	446	341	551	300	496	633	820	565	267	315	219	240	410	361	461	303	413	276	194	354
		EC.Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	1	3	0	0	0	0	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	6	3	0	0	0	0	
		EC.Portugal	0	0	0	0	3	3	2	2	1	0	0	0	0	0	0	0	0	7	4	10	101	50	14	6	0
		EC.Sweden	5	9	10	8	5	3	3	2	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0	
		EC.United Kingdom	2	5	12	6	3	3	15	9	0	0	0	0	0	0	0	1	6	8	12	10	0	0	24	11	26
		Faroe Islands	256	126	210	270	381	373	477	550	1189	1149	165	48	44	8	9	7	10	0	0	0	0	0	0	0	
		Iceland	0	1	0	0	0	0	0	0	0	1	0	1	5	3	2	3	3	2	4	2	0	1	0	1	

			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	
		Norway	33	96	80	24	25	11	25	43	32	41	24	24	26	28	17	27	32	22	11	14	19	0	8	27	
		U.S.A.	0	0	0	0	1	0	2	2	5	1	50	106	35	78	56	13	3	1	1	1	0	1	0	0	0
	ATS	Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	
		Chile	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	7	1	2	9	4	0	3	5
		EC.Poland	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	
		Falklands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
		Japan	0	0	0	0	0	1	0	0	0	0	1	0	0	3	14	0	1	0	0	0	0	0	0	0	
		Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	3	0	5	13	2	4	0	8	34	8	28	34	3
	MED	EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	
		EC.Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0
Discards	ATN	EC.Ireland	0	0	0	0	0	0	0	0	0	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	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
	ATS	Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	

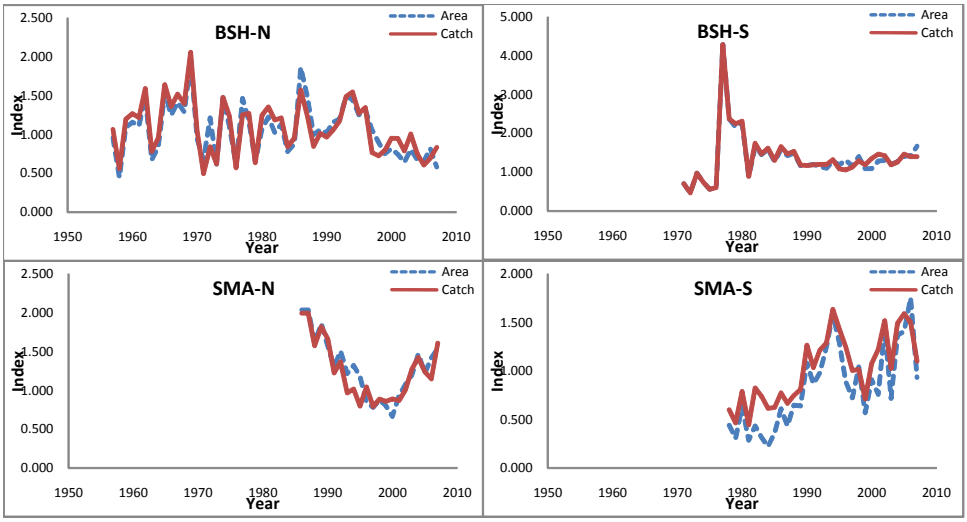
* Japanese catch series (1996-2006 for BSH and SMA) used in the assessment were obtained from scientific estimations presented on documents SCRS/2008/150 & SCRS/2008/151.

SHK-Table 2. Productivity values ranked from lowest to highest.

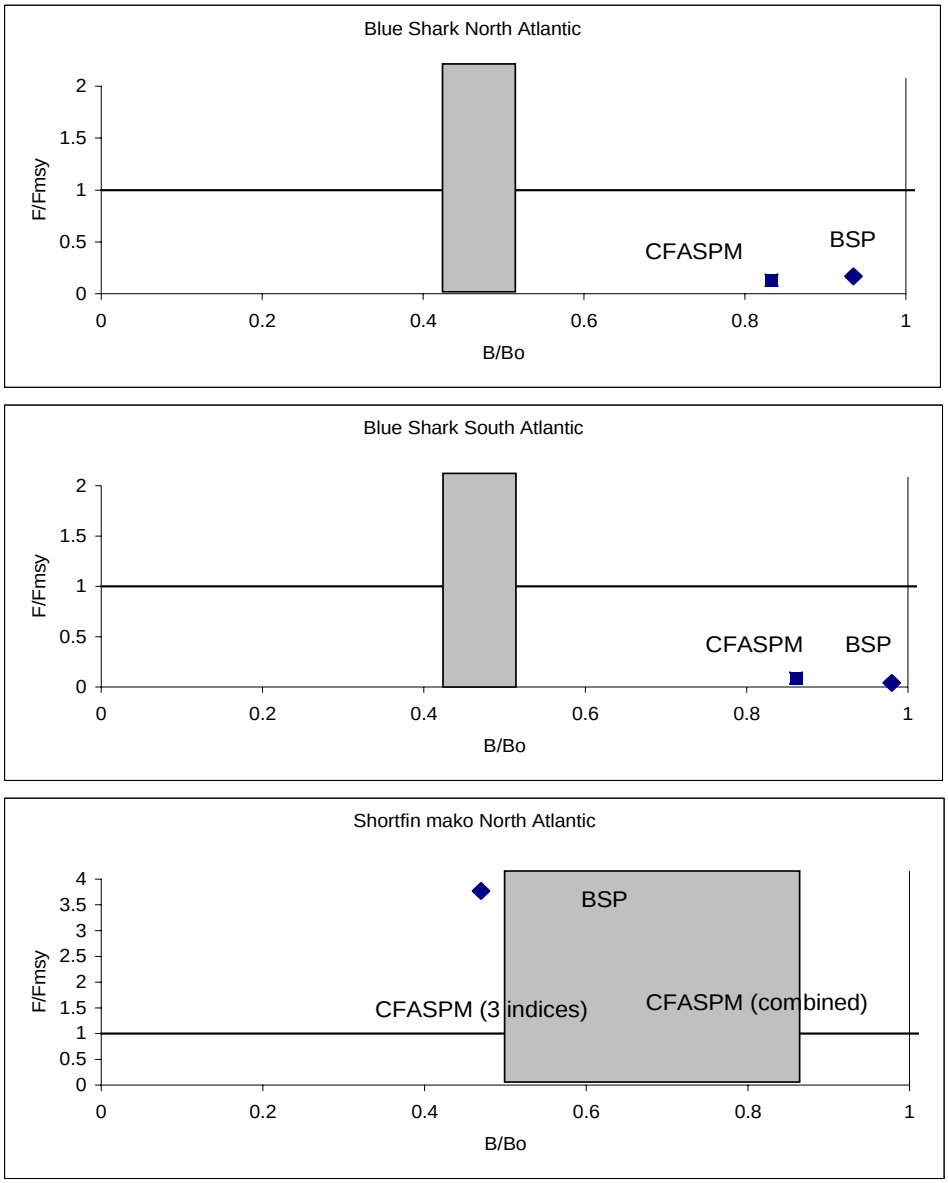
Species	*Productivity (r)*	*Productivity rank*
BTH (*Alopias superciliosus*)	0.010	1
SMA (*Isurus oxyrinchus*)	0.014	2
LMA (*Isurus paucus*)	0.014	3
POR (*Lamna nasus*)	0.053	4
SMA (Iccat 2004)	0.073	5
FAL (*Carcharhinus falciformis*)	0.076	6
OCS (*Carcharhinus longimanus*)	0.087	7
SPL (*Sphyrna lewini*)	0.090	8
SPZ (*Sphyrna zygaena*)	0.124	9
ALV (*Alopias vulpinus*)	0.141	10
PST (*Pteroplatytrygon violacea*)	0.169	11
BSH (*Prionace glauca*)	0.301	12
CRO (*Pseudocarcharias kamoharai*)	-	-



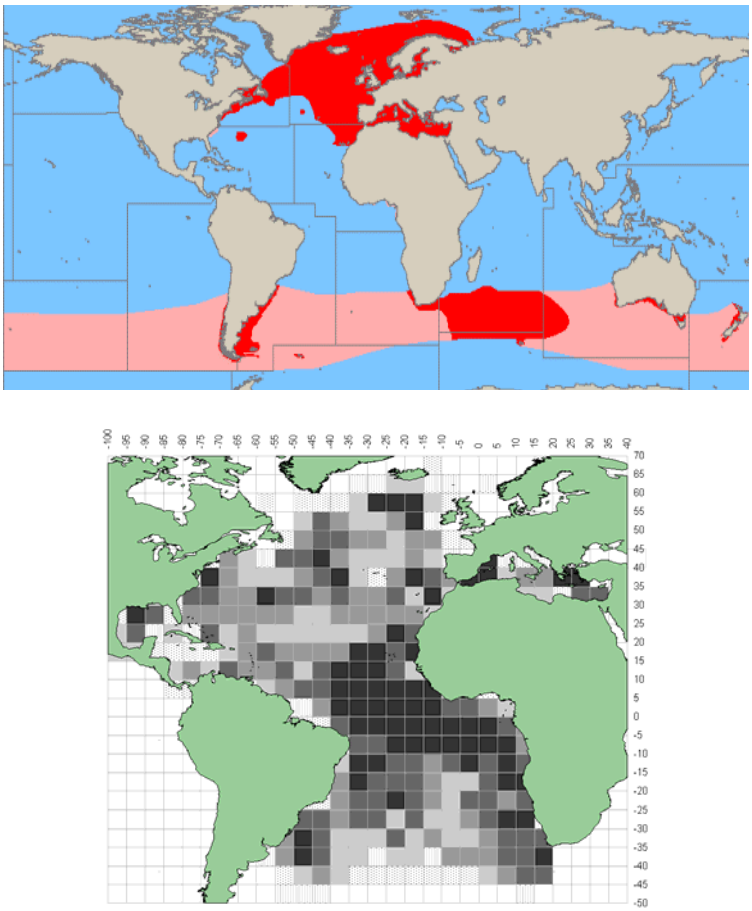
SHK-Figure 1. Blue shark and shortfin mako catches reported to ICCAT and estimated by the Committee.



SHK-Figure 2. Average trends in the CPUE series used in the assessments of blue shark (BSH) and shortfin mako (SMA). The averages were calculated by weighting the available series either by their relative catch or by the relative spatial coverage of the respective fisheries.



SHK-Figure 3. Phase plots summarizing base scenario outputs for the current stock status of blue shark (BSH) and shortfin mako (SMA). BSP=Bayesian surplus production model; CFASPM=catch-free, age-structured production model. The shaded box represents the area at which the biomass at MSY is estimated to be reached. Any points inside or to the left of the box indicate the stock is overfished (with respect to biomass). Any points above the horizontal line indicate overfishing (with respect to F) is occurring.



SHK-Figure 4. Distribution of porbeagle in the Atlantic and other ocean areas (FAO) (upper), compared against the distribution of estimated pelagic longline fishing effort (hooks fished from 1950-2006 by 5x5) in the Convention area.

9. Report of inter-sessional meetings

That Committee considered that only reports of meetings that were not directly related to the stock assessments should be presented and, therefore, their results are not included and presented in the Executive Summaries. Following this criteria, summaries of the following meetings were presented:

9.1 Working Group on Stock Assessment Methods

The Ad Hoc Working Group on Stock Assessment Methods met February 18 to 22, 2008, in Madrid, to address two objectives: (1) To assess fishing capacity by species, country and gear, as requested by the Commission's Working Group on Capacity, and (2) to review ongoing activities related to quality control procedures for stock assessments. In terms of capacity, the group noted that the information available in the ICCAT Task II database and Vessel Records was insufficient to make accurate and detailed analyses as requested by the Commission's Working Group.

Nevertheless, the group was able to obtain some estimates by gear, particularly for longline effort, tropical and temperate baitboats, and tropical purse seine. The Group also recommended that the Commission adopt precise terminology regarding the term "capacity". In terms of quality control procedures, the Group noted that slow progress was being made in the software catalog and in the production of a manual on CPUE standardization practices, and recommended that a future meeting be held exclusively to address CPUE-related issues.

A number of specific research recommendations derived from the Workshop are given in Section 14 of this Report.

Document SCRS/2008/027 contains the detailed report of the meeting.

9.2 Inter-sessional Meeting of Mediterranean Swordfish

The meeting was held in Madrid, Spain, February 25 to 29, 2008. The objective of the meeting was to conduct additional research on technical measures and time-area closures which could optimize protections of juvenile Mediterranean swordfish and improve fisheries exploitation patterns. The Group focused on time-area closures and evaluated a range of 24 scenarios that included fishery closures of different duration in different Mediterranean areas.

Projections realized through a series of simulations demonstrated that gains in terms of landings and SSB from short fishery closures (e.g. one month) will be negligible. Relatively long (over three months) Mediterranean-wide closures during the peak recruitment period would result in important long-term SSB gains, but the ICCAT convention objectives concerning SSB, can only be met with Mediterranean-wide drastic closures in the last two quarters of the year (i.e. six months). Such drastic closures, however, would result in short-term decreases in landings.

The detailed report of the meeting is included as document SCRS/2008/011.

9.3 Inter-sessional Meeting of the Sub-Committee on Ecosystems

The meeting was held in Madrid, Spain, March 10 to 14, 2008. Substantial work was conducted regarding the ongoing seabird assessment. An updated longline fishing effort database (EFFDIS) was provided by the Secretariat, to be used in this assessment. Several documents were presented that allowed clarification on how to perform the analyses regarding the different stages of the seabird assessment, specially the overlap between fishing effort and at sea seabird distribution, as well as the estimation of the number of seabirds caught in ICCAT fisheries and the effect on seabird populations. It was also pointed out that unless far more data become available, the assessment might have to be based on important assumptions about catch rates in different fleets, time periods and areas. The group also produced a questionnaire on observer programs with the aim of creating an observer program metadatabase, as well as seabird awareness materials with general information about the seabird by-catch issues and some mitigation measures.

Document SCRS/2008/012 contains the detailed report of the meeting.

The Committee considered that the results of the analyses on the impact of the tuna and tuna-like fisheries on the seabird stocks, which the Sub-Committee is carrying out, should be contemplated in a global framework that

includes other oceans and/or other fisheries. This is especially relevant if the relative effect of the ICCAT fisheries with respect to the rest of the sources of mortality (including other oceans or fisheries) is to be analyzed. The Committee also recognized the difficulty involved in establishing, on a scientific basis, a hierarchy of species caught as by-catch that are priority for the Sub-Committee.

The Committee further considered that the Sub-Committee should expand its work towards more global assessments of the impact of the ICCAT fisheries on the ecosystem.

9.4 World Symposium for the Study into the Stock Fluctuation of Northern Bluefin Tunas (Thunnus thynnus and Thunnus orientalis) Including Historic Periods

ICCAT and the Spanish Institute of Oceanography (IEO) jointly organized the "World Symposium for the Study into the Stock Fluctuation of Northern Bluefin Tunas *(Thunnus thynnus* and *Thunnus orientalis)* Including Historic Periods". At this event, which took place in Santander (Spain) April 22 to 24, 2008 there were participants from 85 countries around the world.

The objective of the Symposium was to gain more insight into research on events that took place decades ago and which resulted in the disappearance of some bluefin tuna fisheries and the drastic reduction of others. The results of the Symposium will contribute to improved knowledge of the aforementioned events and will help improve the management measures in force on bluefin tuna.

The Symposium was in response to a recommendation from the SCRS in 2006 which was later approved by the Commission.

In 2007, the SCRS Chairman named a Steering Committee comprised of Drs. J.M. Fromentin (France), J. Powers (United States) and N. Miyabe (Japan). Dr. J.L. Cort coordinated the Committee.

Dr. Fabio Hazin, Chairman of ICCAT, opened the Symposium on the morning of April 22, 2008 at the Hotel Santemar (Santander) and thanked the Regional Community of Cantabria and the city of Santander for hosting this event. The Chairman pointed out that the Symposium is being held right at the time when the North Atlantic bluefin tuna stock, particularly in the East Atlantic and Mediterranean, is facing one of the worst crises in the history of this fishery. He further expressed his wish that the Symposium will contribute to helping ICCAT improve advice on the stock and thus contribute to a better management of the stocks. Then other scientific authorities from the national and local administrations, as well as the municipal authority, intervened before proceeding to the start of the work.

At the Symposium, which was organized in seven subject areas, coordinated by a Moderator, 22 scientific documents were presented.

The results of the Symposium can be found in Document SCRS/2008/018.

9.5 GFCM-ICCAT Joint Mediterranean Small Tuna Working Group

The Joint GFCM/ICCAT meeting on small tunas in the Mediterranean Sea and the Black Sea, held in Malaga, Spain, May 5 to 9, 2008, clearly demonstrates how such collaboration between RFOs can improve the general knowledge on these particular species. The data and information on both biology, fisheries and socio-economic aspects, through 11 scientific documents submitted at the meeting, have significantly contributed to the improvement of the 2008 SCRS executive summary of these highly valuable species, economically and socially as well.

Based on the inventory made for possible indicators of stock status for the five most important species which constitute the priority list, the meeting agreed on five general items regarding a work plan for the period 2009-2010. The meeting developed several recommendations in order to keep the optimistic trend achieved in improving collection of data on small tuna species and the related fisheries, including socio-economic aspects; the aim is to be able to carry out assessments for the small tunas in the near future, necessary to provide appropriate management advice.

Mr. Abdellah Srour, GFCM Executive Secretary, referred to the good collaboration between GFCM and ICCAT and to the joint GFCM/ICCAT meeting on small tuna fisheries in the Mediterranean, held during the

intersessional period of 2008 in Malaga. He noted with satisfaction that this joint activity as well as the GFCM regional publication on small tunas contributed substantially to improve the knowledge on these fisheries and that this experience will be followed by similar collaboration with other RFMOs acting in others areas. Mr. Srour informed the meeting that the final version of the above mentioned publication (GFCM Studies and Reviews No. 85) was finalized and made available to the SCRS.

Document SCRS/2008/014 contains the detailed report of the meeting.

9.6 Sailfish Data Preparatory Meeting

A Sailfish Data Preparatory Meeting was held in Madrid, May 19 to 24, 2008 to review the biological information, catch reports and relative abundance indices for Atlantic sailfish. New information on depth and temperature preferences of adult sailfish was presented. Biological samples conducted from some longline and artisanal fleets provide sex ratios in the catch and information on the spawning locations and the timing of spawning. Furthermore, recent research provides a description of the physical and biological characteristics of sailfish spawning habitat. New information was also provided on the survival of sailfish after release from longline gear. Analysis of reported catches generated new estimates of total catch for the eastern and western stocks. These analyses included disaggregation of catches reported as unclassified billfish and filling the gaps of the time series for fleets that had incomplete historical reports. Work on the separation of sailfish and spearfish catches of selected longline fleets was initiated by developing a preliminary matrix of ratios of sailfish/spearfish by 5 degree grids. A number of relative abundance indices were presented at the meeting including updates of the U.S. recreational and longline, Venezuelan gillnet and longline and new indices for the Brazilian longline and recreational, and the artisanal Senegalese fleets. This review provided enough information to support the goal of assessing sailfish during a meeting in 2009.

Document SCRS/2008/015 contains the detailed report of the meeting.

9.7 Bluefin Tuna Stock Assessment Session

The Atlantic Bluefin Tuna Stock Assessment Session was held (Madrid, June 23 to July 4, 2008) at the request of the Commission, in particular, to conduct a first assessment for the East Atlantic and Mediterranean Bluefin Tuna Stock Rebuilding Plan adopted in 2006 [Rec. 06-05]. Unfortunately, after four days of the Working Group meeting, only 15% of the official expected catches for 2007 were available for the East Atlantic and Mediterranean. This situation is very unfortunate as it has, on the one hand, considerably disrupted the work of the Group and on the other hand it prohibited conducting the assessment, [Rec. 06-05] on actual data. The Group recommends that measures be taken soon so that data are available 15 days prior to the assessment groups and thus avoid this situation. The analyses carried out in 2008 confirmed the remarkable (and uncontrolled) increase in the fishing capacity of this species, particularly in the Mediterranean, which even seems to have increased in 2007. The Group's report for 2008 reiterates the overall perception of 2006. Once again the results show a strong decrease in the spawning stock during the last ten years. The selectivity pattern and the current fishing mortality levels are still 3 to 3.4 times higher than the F_{MAX}, which could lead the spawning stock to very low levels (~6% of the virgin biomass). This is considered as a high risk of stock collapse. The evaluation of [Rec. 06-05] shows that only the scenarios that allow a high productivity of the stock for the next fifteen years (that would be unaffected by a low spawning biomass), will allow the rebuilding of the stock with 50% probability in 2023. The Group has therefore concluded that an $F_{0.1}$ or F_{MAX} strategy would achieve the rebuilding of the stock with better chance of success and a lesser risk of collapse. An assessment was also conducted on the West Atlantic bluefin tuna stock. The results were consistent with previous assessments.

Document SCRS/2008/019 contains the detailed report of the meeting.

9.8 Yellowfin and Skipjack Stock Assessments Session

The meeting was held in Florianopolis, Brazil, July 21 to 29, 2008. According to the objectives of the meeting, a simultaneously assessment was hold for the yellowfin and skipjack tuna stocks. In the case of skipjack, the last assessment had been carried out in 1999 and few studies have been made on this species since that time

Document SCRS/2008/016 contains the detailed report of the meeting.

9.9 Sharks Stock Assessment Session

The ICCAT stock assessment on blue and shortfin mako sharks was carried out in Madrid, September 1 to 5, 2008, with the participation of more than 30 scientists. An Ecological Risk Assessment (ERA) was also carried out for nine additional species for which available data are very limited. Although this analysis does not substitute the assessment methods used in fisheries, it allows determining the priority levels for research, conservation and management.

Document SCRS/2008/017 contains the detailed report of the meeting.

10. Report of Special Research Programs

10.1 Bluefin Year Program (BYP)

Dr. N. Miyabe, Program Coordinator for the West Atlantic and Mr. J.M. de la Serna, Program Coordinator for the East Atlantic, presented the report on the Bluefin Year Program (BYP) activities carried out in 2007 and 2008 and the research plan and the corresponding budget for 2009.

The report was adopted and is attached as **Appendix 6**.

10.2 Enhanced Research Program for Billfish

The report of the Program for Enhanced Research on Billfish, together with the proposed budget for 2009, was presented by the Program Coordinator.

The report was adopted and is attached as **Appendix 7**.

10.3 Requests for funding possibilities

The Committee was informed on the existing procedures for request financial support to the different ICCAT programs and other funding sources. The SCRS considered helpful establishing a standard form for requests of financial support to the ICCAT programs that support data collection, capacity building, participation at ICCAT meetings, fishery analysis and biological research. This format would provide information so that the SCRS chairman and the advisory/coordination committees responsible of assigning funds from these programs can improve their decisions on fund allocations. Furthermore the format will encourage SCRS oversight and promote coordination and prioritization of funding requests. The one-page form should include, at a minimum:

- person/institution proposing the activity
- Short description of the activity proposed for funding,
- Links of the proposed activity to the work plan of the appropriate species group/committee,
- Program(s) that may be considered for financial support,
- List of expected outputs from the activity,
- Start and end date of activity,
- Budget.
- Description of how the information collected will be reported to ICCAT and disseminated.

This proposed format should only be considered as an expression of interest. Each ICCAT funding program may choose to require a more detailed proposal before it approves funding of the activity.

These requests and subsequent review procedures should be coordinated by the Secretariat.

11. Report of the Sub-Committee on Statistics

The recommendations that are pertinent to this Sub-Committee are listed under Agenda item 14 of this Report and in the Report of the Sub-Committee on Statistics, which is attached as **Appendix 8**.

Dr. Mauricio Ortiz, Convener of the Sub-Committee of Statistics presented the report (**Appendix 8**) of the Group's two day meeting. Dr. Ortiz was pleased with the number of scientists that took part in the work. Unfortunately, he noted the absence of two species groups rapporteurs. Thus, the Group reiterated the need for the participation of all the rapporteurs of the Secies Groups in these discussions at which issued are raised and decisions affecting the various groups are made.

During the review of the application of the recommendations made in 2007, the Group was pleased to note the Secretariat had purchased computer equipment and software. However, the improvement of a wireless network connection at the Secretariat continues to be an important priority that needs to be resolved in the future. The Secretariat informed the Group that when the Secretariat moves to the new headquarters, this problem will be resolved.
During the presentation of the report, the Group discussed at length the format and the content of the table summarizing the state of data submission to the Secretariat. The format developed by the SCRS Chairman and presented to the 2007 Commission meeting is maintained as a model. Suggestions were made to include in this model the dates when information is received as compared to the deadline dates.

The Sub-Committee was also pleased at the excellent quality of the recent publication of the *Statistical Bulletin* issued by the Secretariat and it recommended making electronic versions available on CD and on the Internet. In order to reduce paper copies, a questionnaire should be developed by the Secretariat to identify the people and institutions who would be interested in receiving this publication and the format to receive this publication.

The Sub-Committee also emphasized the need to strengthen the Secretariat's scientific team to confront the multiple requests of the Commission and the SCRS. The Executive Secretary took the opportunity of this discussion to reiterate the considerable increase in the Secretariat's tasks and commended the exceptional work done by his staff to confront these new tasks. The SCRS Chairman clarified that the Sub-Committee's request as regards to the human resources required at the Secretariat supports the conclusions of the report of the Panel of Experts who have caried out the Performance Review of ICCAT.

The recommendations made by the Sub-Committee on Statistics, included in the Sub-Committee's report, were fully adopted by the Scientific Committee.

12. Report of the Sub-Committee on Ecosystems

The Convener of the Sub-Committee on Ecosystems presented the report of the meeting held on September 26. This report is attached as **Appendix 9**.

The pertinent recommendations of this Sub-Committee are listed under Agenda item 14 of this Report, and the response to the Commission regarding Recommendation [07-07], are included in the Agenda item 15

Following the presentations, the group discussed about the activities of the Sub-Committee, as at present, most of the work is devoted to the seabird assessment, in detriment of other high priority items identified by the Sub-Committee. In general, it was agreed that the Sub-Committee needs to address the requirements of the Commission. However, it would also be desirable that the Sub-Committee could perform an objective and scientific exercise to prioritize future work, so as to be able to argue and advice the commission on where to focus future efforts. To that end, it was agreed to prioritize the Ecological Risk Assessment exercise that the SC identified as an appropriate tool for that task. Given that some other tuna RFMOs, as well as other species groups (e.g. Shark Species Group) have already worked on that direction, it was agreed that interaction with those groups should be continued. It was also agreed that some specific ecosystem considerations should be handled within the species group of concern, while the Sub-Committee should prioritize issues of more general concern.

13. Consideration of plans for future activities

The Committee discussed the activities to carry out in 2009. The Committee recognized the advantages of having a system of web conferences and web-folder working space. These tools will help in advancing a large part of the work that is currently carried out during the meetings, especially as concerns the data preparatory work. However, the Committee considered that these facilities should not be used as a substitute for the meetings, but as important support for the SCRS Species Groups' work which would provide more time to conduct analyses during the meetings.

13.1 Annual Work Plans for 2009

The rapporteurs presented the 2009 Work Plans for the various Species Groups. These Plans were adopted and are attached as **Appendix 5**.

13.2 Inter-sessional meetings proposed for 2009

Taking into account the assessments mandated by the Commission in 2009 and 2010, and the Committee's recommendations for research coordination and stock monitoring, the proposed inter-sessional meetings for 2009 are shown in **Table 13.1**.

The Committee decided that the Methods Working Group meet for five days early in 2009 (around March) to address the following terms of reference:

1) Make progress towards the completion of a CPUE Standardization Manual
2) Evaluate, through simulation or other means, the merits of alternative CPUE standardization methods that aim to take the following into account:
   a) Changes in species targeting
   b) Overlap between fishing gear and species distribution/behavior ("habitat-based standardization")
3) Evaluate alternative methods for estimating species composition, with emphasis on tropical tunas
4) Investigate the influence of life history characteristics, environmental variability and gear selectivity on Status Determination with respect to the Convention objectives

The Committee notes that the schedule is ambitious and that there is a need to maintain some flexibility in order to account for any changes that may result from the deliberations held by the Commission in November 2008.

Table 13.1. Proposed calendar of ICCAT scientific meetings for 2009.

ICCAT MEETINGS 2009

	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Jan							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Feb			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28							
																		CARIBEAN TRAINING C.																			
Mar			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
											METHODS																										
Apr						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
																									TROPICALS TAGGING												
May	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31						
																		AFRICA TRAINIG C.																			
Jun				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				
				SAI ASSESS							SC-ECO																					CES-ICCA						
Jul						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
					POR ASSESS															ALB ASSESS																		
Aug		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					
Sep						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
					SWO ASSESS																												SPECIES -					
Oct								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
							GROUP				SCRS																											
Nov			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					
Dec					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		

Possible ICCAT Holid Scientific meeting

Brazil informed the Committee that it would release part of the Chairman's funds to co-finance training courses for Central-South American and African countries, which should take place in 2009. Furthermore, he expressed his interest that the sailfish assessment be held in Brazil. The Committee appreciated the invitation from Brazil and welcomed his collaboration for the training courses.

As on other occasions, the Committee reiterated that although the Commission does not systematically request assessments (or accepts when these have been proposed by the SCRS), the Committee considers that it is their responsibility to carry out a regular follow-up (in as much as possible, annually) of the fisheries development and proceed, routinely, to carry out necessary analysis to formulate advice on the most recent state of the stocks that are under its mandate. This occurs especially when the available information is contradictory or indicative of the poor stock status.

13.3 Date and place of the next SCRS Meeting

It was agreed to propose that the next meeting of the Standing Committee on Research and Statistics be held in Madrid, October 5 to 9, 2009. The Species Groups will meet from September 28 to October 2, at the ICCAT Secretariat.

14. General Recommendations to the Commission

The Committee expressed concern that ICCAT stocks are being subjected to higher and higher exploitation rates, and that this increase has not been accompanied by the types of enhanced research and data collection activities that are necessary in order to ensure resource conservation. This view is also held in the independent review of ICCAT's performance (Hurry *et al.* 2008).

The increase in exploitation rates on most ICCAT stocks has produced severe declines of some stocks that may hamper their conservation. Comprehensive research is thus needed to enhance the advice on the state of the stocks of high concern to the Commission, especially those which are currently estimated to be below the Convention objectives. These include northern albacore, bluefin, marlins and Mediterranean swordfish. In the view of the Committee, these increasing conservation concerns should oblige the Commission to take action. The SCRS identified below high priority recommendations to the Commission which carry with them a need for increased financial support to address the issues.

- Given the increase in the demands for scientific advice the Commission has placed and in view of the increase in compliance monitoring by the Secretariat and acknowledging the recent appointment of a compliance expert within the Secretariat, the Committee strongly recommends that the Commission provides additional human resources to the Secretariat for (in order of priority): (i) a population dynamics modeling expert and (ii) a by-catch coordinator to support the scientific needs of SCRS to achieve its requirements.

- Large-scale, coordinated and well designed tagging programs for tropical and temperate species stocks of high interest to the Commission, similar to those underway in other Tuna Commission Convention areas (e.g. IOTC, IATTC, WCPFC), should be initiated to provide data which will enable the SCRS to improve the assessment advice. These large scale tagging are essential to provide basic information on stocks and fishery status independently of fishery bias. The need of such large scale tagging programs has been widely increased by the high rate of exploitation of most tuna stocks in the Atlantic. In the absence of such data, the Commission might need to take more precautionary actions to assure achieving the Convention objectives. For the short term, recent projects have greatly expanded the available ICCAT tagging database for tropical tunas. The Tropical Tunas Working Group proposes that a workshop be held in 2009 to jointly analyze these data. The Secretariat should make the current tropical tunas tagging database available to National Scientists early in 2009, for the purpose of providing an opportunity to conduct preliminary analyses in preparation for this workshop.

- Data mining made by individual scientists has allowed the SCRS and the ICCAT Secretariat to reconstruct historical series of total catch and size composition for some species such as bluefin tuna in the Northeast Atlantic and Mediterranean Sea back to 1955. The use of longer time series for stock assessment improves substantially the overall perception of the stock status. The Committee thus recommends that data mining continues in order that future stock assessment could include longer historical series. In the case of bluefin tuna there is still highly valuable historical information on past bluefin tuna fisheries. For other species, such

as small tunas or tropical tuna, data mining should allow to fill gaps in the historical series and/or improve the existing series in particular regarding size data. The Committee also noted that data mining should not be limited to the recovery of data but should also include the analyses of historical series.

- The Committee recommends that scientific observer and logbook programs, in combination, be used to collect data useful for quantifying total catch (including by-catch) composition and disposition by the tuna fleets and report these data to ICCAT. The Committee further recommends that CPCs adequately fund such programs in order to meet data reporting obligations. Further, the Commission should consider the merits of instituting an ICCAT scientific observer program similar to those operated by other tuna RFMOs to collect and make available the needed scientific data.

- The Committee noted that deadline for reporting statistics is frequently ignored, thus, the preparation of basic inputs to the assessment, such as catch-at-age takes an inordinate amount of time during the assessment meetings. The Committee considered that the use of time during the assessment needs to be more efficient and this can only be achieved through better preparation before the meeting and by CPCs fulfilling their data collection and reporting requirements. Once data are received, the Secretariat needs sufficient resources to prepare available data files (table of substitutions, catch-at-size, catch-at-age, tagging) at least two weeks before the meeting and National Scientists need to devote sufficient resources to review those files before the start of the meeting and request any necessary modifications. Therefore to facilitate preparatory analysis, the Committee recommended that the Secretariat procure and install web-based programs and provide logistic support for creating a) web-conferences and b) web-folder working spaces. In addition, the Committee strongly recommended that the established deadline be enforced.

- The Committee reiterated its concern on the quality of the fishery statistics (Task I and II) in particular for some stocks. The poor quality of statistics specially affects the SCRS assessments, depending almost exclusively on fisheries-dependent information. In the case of the East Atlantic and Mediterranean bluefin the 80% to 85% of yields from the Mediterranean Sea are nowadays made by purse seine fisheries. However, little information is available on these fisheries and their corresponding Task I are likely to be strongly underreported since a decade. Task II data remains largely insufficient for the purpose of stock assessment. To conduct more precise and reliable assessment, it is necessary to obtain reliable information about the total catch, catch composition, effort (e.g. day-at-sea, day of active fishing, etc.), spatial distribution (e.g. VMS and Task II) and technological equipments of the purse seine fisheries operating in the Mediterranean Sea, so that an accurate CPUE index might be computed. In addition to this information, the group also stresses the strong need for fisheries-independent indices as this is currently available for many stocks assessed by ICES or GFCM. In the case of bluefin, European and Mediterranean scientists have recently conducted over several years and, with success, aerial surveys and larval surveys. These surveys have been stopped and the group recommends that such monitoring be restated. On the same line, large scale well planned conventional tagging experiments would provide valuable information on both biological and fishery parameters.

- Participation of external experts in stock assessment meetings is an important mechanism for quality control of stock assessment advice developed by the Committee. The Committee recommends that the Commission make available funding to invite external experts to participate in stock assessment meetings.

- Holding tuna in fattening farms introduces additional uncertainties to estimates of total catch, catch-at-age and catch by area. These quantities are essential to properly conduct stock assessments. The conversion of total catch into catch-at-age requires that there be size or size-at-age samples at time of capture. For farmed fish, fish-size data are currently only available at time of sale. In addition, because fish grow in farms, reliable fish-growth measures in farms are also needed. These can be achieved by conducting regular size-sampling in each farm; tracking size and weight changes from entry to departure; and by conducting mark-recapture studies on fish inside the farms to better estimate growth. In order to properly determine total numbers, observers need to record number of fish transferred and collect data on deaths occurring in pens and during the transfer process. Observers also need to collect otolith and genetic samples from harvested fish. Finally original set locations of each purse seine used to transfer fish should be recorded to determine original catch areas. To resolve these issues, the SRCS recommends that additional data be collected by observers now having farm access.

- The Committee recognizes that many issues concerning ICCAT stocks are common to other RFMOs. In particular stock assessment methods, statistical issues, shared stocks such as some shark or small tuna species. Hence, the Committee recommended that:

- Efforts be made to better coordinate future meetings of the ad hoc Methods Working Group with experts who work in other Oceans.
- In agreement with *Supplemental Recommendation by ICCAT Concerning Sharks* [Rec. 07-06], a joint ICCAT-ICES assessment of porbeagle North and South stock would be conducted in 2009. Task I and Task II data as well as standardized CPUE series would be available in advance to the meeting.
- Following up of the 4th meeting of the WCPFC Scientific Committee during which there were serious doubts expressed on the bias encountered by the port sampling method used in the Atlantic, an analysis of the multi-species landings of tropical purse seiners should be conducted by an ad hoc working group with tunas scientists from the different RFMOs. Such Working Group should have a wide participation of field scientists and statisticians, and should also evaluate all the main potential types of difficulties and errors involved in the multi-species sampling with the aim of optimizing the multi-species sampling and the correction procedure of the catch data.
- Joint meetings to be agreed between ICCAT and RFOs, with the purpose to encourage countries and national scientists to provide data and scientific information on small tuna species in the various regions. As a first priority, besides further improvements identified for the Mediterranean and the Black Sea (within the GFCM area), two other regions were identified to hold joint meetings: the Caribbean area (within the WECAFC and CRFM area) and the West African area (within the CECAF area).

The above recommendations carry significant financial implications for the Commission. The following ones may have lower financial implications, but are still of high priority in the Committee's view.

- The Committee reiterates the fact that its general advice is unlikely to change significantly within a period of two years for long-lived species, such as bluefin tuna, and the inherent delay in the ability to detect change in population status as new regulations are implemented. The Committee recommends that a four-year period between each comprehensive stock assessment would be more appropriate, unless fisheries indicators suggest substantial changes in stock status. This approach would allow the group more time for inter-sessional work that would focus on important or novel issues regarding data and models which are generally not possible with a high frequency assessment schedule. This would improve the quality and credibility of future assessments.

- The SCRS recognized the need to increase effort to improve sampling coverage for many of the stocks and/or conduct special sampling programs needed to obtain accurate information on the stock. Therefore, the SCRS recommended CPCs:

  - Collect representative samples of otoliths of bluefin from all major fisheries, in all areas. Otolith samples can be very useful to determine stock origin with relatively high accuracy, and thus could be a key factor to improve our ability to conduct growth and mixing analyses. Added value would be obtained if genetic samples were also collected from the same fish, which could potentially result in more accurate and less expensive tests for stock origin. In terms of the mixing analyses, it is also important to identify existing collections of otoliths collected in historical time periods (1970s, 1980s) in order to understand how the stock origin proportions in the catch may have changed.

  - To develop and implement of sampling protocols to collect detailed information on “faux poisons” landed in Abidjan in order to estimate the amounts of landings, the species composition and the size composition of this small fish whose level of landings (in the order of 10,000 t for skipjack) was important enough to potentially affect the results of stock assessments.

- The Joint GFCM/ICCAT Meeting has already identified high priority small tuna species, which include: bullet tuna, Atlantic bonito, little tunny and plain bonito. The CRFM has also identified two first priority species for the Caribbean area: the blackfin tuna and the Serra Spanish mackerel. And, the Small Tunas Species Group has defined priority species for the West African area, including: Atlantic bonito, little tunny, bullet tuna and West African Spanish mackerel. The Committee recommended giving high priority for the collection of data and reporting fishery data (Task I), size frequencies (Task II) and biological information on these species.

- The SCRS requests CPCs enhance their scientific delegations to include experts in seabird and turtle biology population dynamics and sharks. It is anticipated that funding for the seabird assessment framework might need to continue into the future.

- The Committee noted with satisfaction that extra-budgetary funds had been contributed to assist scientists of Contracting Parties to get training and participate at SCRS meetings. Consequently, it was recommended that the Commission insist in maintaining the participation of these same scientists in this research work.

15. Responses to the Commission's requests

15.1 Calls for an evaluation of data deficiencies at ICCAT with emphasis on how such deficiencies may affect management advice. Recommendation by ICCAT on compliance with statistical reporting obligations [Rec. 05-09]

Recommendation 05-09 calls for an evaluation of data deficiencies at ICCAT with emphasis on how such deficiencies may affect management advice.

The Committee reviewed the advice provided the Commission on this topic in 2007 and updated this advice. **Figure 15.1.1** provides a general view of the impact of data deficiencies on the Committee's ability to provide precise stock assessment advice across the species of concern to ICCAT. The operative concepts adopted by the Committee in formulating advice with respect to data deficiencies and subsequent affect on management advice include:

- Absence of information leads to increased and, at times, unquantifiable uncertainty in stock status evaluations.
- With increased uncertainty, more conservative (*i.e.* more constraining) measures need be taken to assure achieving Convention Objectives.

To the degree possible, SCRS aims to characterize this uncertainty so that the Commission can weigh the relative risks and odds of achieving the objective and presents this information in its stock status summaries written for the Commission.

Overall, the Committee characterizes the impact of data deficiencies on management advice as:

- Lack of meeting basic obligations for data reporting has impeded SCRS from providing the type of management advice the Commission has requested.
- Capabilities could be enhanced substantially if many of the detailed fishery (catch-effort, etc) datasets that are available to National Scientists were assimilated into the Secretariat's databases.
- A decision by the Commission, taking into account confidentiality concerns, may be required before such datasets could be submitted to the Secretariat.

Data deficiencies [Rec. 05-09]	CATCH DATA		EFFORT DATA	SIZE DATA	STANDARDIZED CPUE	BIOLOGY	ASSESSMENT Attempted?	ASSESSMENT Category
Stock	IUU	UNC						
SHK*	☹☹☹	☹☹☹	☹☹☹	☹☹☹	☹☹☹	☹☹☹	Y	
ALB-MED	☹☹☹		☹☹☹	☹☹☹	☹☹☹	☹☹☹	N	
SMT*	☹☹	☹☹	☹☹☹	☹☹☹	☹☹☹	☹☹	Y	
BSH	☹☹	☹	☹☹	☹☹	☹	☹☹	Y	
SMA	☹☹	☹	☹☹	☹☹	☹	☹☹	Y	
BIL	☹☹	☹☹☹	☹☹	☹☹	☹☹	☹	Y	
BFT-E-M	☹☹☹		☹☹	☹☹	☹	☹	Y	
SWO-MED	☹	☹	😐	☹☹	☹☹	☹	Y	
YFT					☹☹	☹	Y	
BET	☹			☹	☹	☹	Y	
SKJ					☹☹	☹	Y	
ALB-ATL			☹	☹	☹	☹	Y	
BFT-W					☹	☹	Y	
SWO-ATL					☹	😐	Y	

Figure 15.1.1 A characterization of the impact of data deficiencies on stock assessment and fishery management advice by stock (where available). Note that the categories SHK and SMT represent groups of species for which little information is available.

15.2 Consideration of information on fishing capacity [Res. 06-19] and Capacity WG request

The 2007 Capacity Working Group meeting noted that in order to further its work, it required an individual report (to be prepared by the Secretariat and SCRS) on each stock outlining the current status of the stock and information on the different fleets actively engaged in the fisheries. During 2008, the Committee worked on this task during the meetings of the Methods Working Group and the bluefin tuna assessment. The result of that work reinforces the conclusion that available information in ICCAT databases relating catch by flag and gear to the effort expended to realize that catch is sparse, and the diversity of units used in reporting effort make it difficult to estimate capacity in a comprehensive manner. Nevertheless, Task II data can be used to obtain gross estimates of overall fishing effort such as number of longline hooks, or number of days fished by baitboats or purse seiners. However, the usefulness of that information on a species-by-species basis is limited. More detailed data are available from National scientists but these are not made available for inclusion in ICCAT databases.

The Committee reiterates that a simple measure of overcapacity is given by the ratio of current fishing mortality to F_{MSY}. Overcapacity is evident when the ratio exceeds 1.0, and thus the executive summaries in Section 8 suggest that overcapacity exists for the following: North Atlantic albacore, eastern Atlantic and Mediterranean bluefin tuna, western Atlantic bluefin tuna, Mediterranean swordfish, North Atlantic shortfin mako shark, blue marlin, and white marlin. Given the information available, it is not obvious how this measure of overcapacity could be apportioned quantitatively to various gears/flags. The Committee is thus unable to provide the Commission's Capacity Working Group with detailed estimates of capacity by flag and gear.

In terms of eastern Atlantic and Mediterranean bluefin tuna, which is of primary interest to the Capacity Working Group, the Committee's estimates of capacity are given in **Table BFTE-1**.

15.3 Consideration of information on seabirds by-catch reduction [Rec. 07-07]

Recommendation [07-07] requires the use of tori lines for vessels operating below 20ºS. The vessels targeting swordfish with monofilament are exempted, if they set their longlines at night and provide scientific information of their observer programs. The Recommendation also requires that CPCs record and provide data to the SCRS on seabird interactions, so that the Commission can adjust the recommendation (e.g. in the area of application) based on new scientific advice.

The Committee has received some detailed information about seabird interactions in response to [07-07], although the recommendation has been in effect since mid-2008. Furthermore, the Committee did not yet finalize the seabird assessment, although it expects to do so in 2009 (including an overlap analysis between seabird at sea distribution and the longline fishing effort). Thus, the Committee expects to give advice on alternative areas of application after the completion of the seabird assessment and as results of experiments are reported. For that purpose, it is essential that CPCs follow the Recommendation [07-07] and provide detailed spatial and temporal information about their interactions with seabirds. The Committee also noted that some CPCs have notified that they have observer programs with some information about seabird mitigation measures. The Committee recommends that those datasets be properly analyzed and presented to the SCRS to enable the Committee to provide advice to the Commission on how to best adjust Recommendation [07-07].

As pointed in Section 3 of the Report of the Sub-Committee on Ecosystems, seabird awareness materials (posters) are being distributed among fishermen with information on additional measures (night setting, etc.) that can help to reduce the by-catch of seabirds and that are easily implementable.

15.4 Review of information on farmed bluefin tuna growth rates [Rec. 06-07]

Following the *Recommendation by ICCAT on Bluefin Tuna Farming* [Rec. 06-07], the Committee reviewed in 2007 available scientific information for identification of growth rates of caged bluefin tuna. This information was rather limited at that moment. Based on available information for the SCRS, the Committee assumed that large fish held for several months for fattening gain on average weight 25% of their capture weight (i.e. a conversion factor of 0.8). Ticina *et al.* (2006) reported significantly higher growth rates for small (juvenile) bluefin tuna in the cages. A more detailed study presented by Tičina (2007) indicated that small bluefin tuna are able to increase their initial biomass by more than 340% within 511 days. In other words, juvenile bluefin would gain weight twice as fast in cages as compared to the wild.

The Committee expected that weight gain was highly variable depending on various factors, such as season, year, duration of caging, initial size of the fish, feeding, location, environmental conditions, etc.

This year the Committee updated the review with new information.

The Committee used the available data to attempt to calculate the increase in weight of bluefin during their fattening in pens (Section 15.4). These are bluefin that are kept in pens for relatively short period of times (usually 2-6 months) with the goal of increasing the body fat content. This operation is different from the farming operation that keeps bluefin tuna for longer periods (usually more than one year) to increase the biomass.

Not all of the available datasets had an essential piece of information: the weight of fish at the time they were placed in the pens. Results based on the provided length at harvest and the ICCAT length-weight relationship for eastern bluefin showed some estimates which appeared to be biased and some showed negative growth. Excluding negative growth estimates, the estimated average growth was 14.5% which was lower than the previously assumed estimate of 25%.

It is of benefit to all parties that improved estimates of growth during all caging operations (defined as both farming and fattening, [Rec. 06-05]) be obtained so that total removals can be accurately estimated. The Committee recognizes the difficulty of obtaining weights of live fish at the time of initial capture. However, given that the absence of this information can lead to anomalous or biased estimates of growth, the Committee requests that CPCs involved in farming or fattening operations find the means to best obtain these growth rates. This could be achieved either by providing best estimates of the weight of fish at time of capture or by providing another suitable proxy for this information based upon their expert knowledge of the caging processes.

15.5 Other considerations about the ability to monitor the eastern bluefin tuna recovery plan

Recommendation [06-05] calls for the SCRS to "monitor and review the progress of the Plan and submit an assessment to the Commission for the first time in 2008, and each two years thereafter". The Committee's overall assessment of the progress of the Plan in relation to stock status is given in the Executive Summary (Section 8.5). This section provides additional considerations about the task given to SCRS.

Management measures (Part II of the Plan):

- TAC and Quotas: The Committee estimates that the TAC was exceeded substantially in 2007, the first year when the Plan came into effect (see Section 8).
- Closed fishing seasons: This matter may be more pertinent to the Compliance Committee.
- Use of aircraft: This matter may be more pertinent to the Compliance Committee.
- Minimum size: Very little Task II (size) information for 2007 was reported in time for the assessment meeting, when a detailed analysis would have been possible (see ICCAT Circular #1227/08).
- By-catch: Very little Task II (size) information for 2007 was reported in time for the assessment meeting, when a detailed analysis would have been possible (see ICCAT Circular #1227/08).
- Recreational fisheries: No catch data for 2007 that are explicitly associated with recreational fisheries have been reported to SCRS.
- Sport fisheries: No catch data for 2007 that are explicitly associated with sport fisheries have been reported to SCRS.

Observer Programs (paragraphs 50 and 51 of the Plan):

The Committee's understanding of the objective of the Plan's observer program is that it is for compliance purposes, until such time that the Commission decides that the programs should also be used to carry out scientific work. At that time, SCRS will have to develop specific directions of how to collect and report the required data. However, it is possible for Contracting Parties to use the observer programs to collect Task II information without waiting for the Commission to mandate such type of data collection. **Appendix 10** shows two example forms used by EC-France and EC-Spain to collect Task II information.

15.6 Strategies to increase the yield per recruit and MSY of bigeye tuna by reducing mortality on small bigeye tuna

In the report of Panel 1 of the Commission, it was suggested that the SCRS analyze and present a range of options to the Commission to increase the yield per recruit and MSY of bigeye tuna by reducing mortality on small bigeye tuna through the use of such measures as closed areas (i.e. total closure of all surface fisheries) and moratoriums on the use of Fish Aggregating Devices (FADs). It was also suggested that the SCRS analyze the impacts of such measures on the catches of yellowfin tuna and skipjack tuna. In accordance with these suggestions, a versatile tool was developed to enable the analysis of the potential impacts of adjustments to effective effort levels and/or the selectivity patterns of individual fisheries.

The Committee used this tool to conduct a limited evaluation on the relative impact of effective effort restrictions on individual fisheries in terms of yield per recruit and spawning biomass per recruit. This evaluation is presented separately as part of an annex to the Detailed Report of the 2008 SCRS Stock Assessment of Yellowfin of Skipjack and Yellowfin Tuna. In these analyses, the Committee examined effect of reducing or increasing the effective effort of two fleets, the equatorial surface fleet (EU purse seine and Ghana) and an aggregate fleet (all others), on the yield-per-recruit (YPR) and spawning stock biomass-per-recruit (SPR) of yellowfin and bigeye tunas. An evaluation of the impact on skipjack tuna was not conducted as estimates of fishing mortality-at-age, which are required for these analyses, are not currently available for those stocks.

The results of these analyses indicate that modest gains in YPR for yellowfin and bigeye can be obtained by simultaneously decreasing considerably the surface fleet fishing mortality and noticeably increasing the fishing mortality exerted by the other fleets. The results also show that increases in effective effort levels, particularly that of the surface fleets, would likely result in substantial reductions in SPR. One implication of these results is that it would be more difficult to maintain spawning stock biomass at high levels under scenarios such as a reallocation of surface fleet effort from other oceans toward the tropical Atlantic.

The Committee emphasizes that these analyses are a simplified treatment of the data. A more detailed analysis (which was not possible given available data and time constraints) would separate surface fleet catches under floating aggregation devices (FADs) from those targeting free schools. The selectivity pattern of these components differs substantially, particularly for yellowfin, and an analysis considering these differences may suggest greater impacts on YPR and SPR. The evaluation of the impacts on skipjack is also considered important in these multi-species fisheries. Also, the Committee stresses that these results are extremely sensitive to the assumed natural mortality vectors, which are quite high on ages 0 and 1 (assumed at about M=0.8) and also poorly known. The results are also dependent upon the assumed fishing mortality-at-age vectors, which in turn are sensitive to estimates of growth and the assignment of ages.

Noting these concerns, as well as acknowledging that these results do not represent a full range of management options, the Committee underscores that these results should be considered preliminary. Therefore, the Committee does not recommend any particular management measure, but cautions that an increase in overall fishing mortality, and in particular increases in the effective effort of the surface fleets, may adversely impact the spawning stock biomass of bigeye and yellowfin. The Committee suggests that this topic, as well as the implications for skipjack catch, be explored in more detail at a future inter-sessional meeting. Furthermore, it would be best to precede such an analysis with an inter-sessional meeting (such as the planned tagging data workshop in 2009) to improve the quantification of the various model inputs, such as the natural mortality vector, which have important implications for tropical tuna stock status.

16. Other matters

16.1 Scientific Implications of the Performance Review

The SCRS discussed the Part II of the report of the ICCAT Performance Review. While the SCRS was pleased to consider that the general advice of the independent panel about the structure, the quality and the provision of the scientific advice of the SCRS was positive, it also recognized that there is room for improvement. The SCRS further endorses most of the independent recommendations of the review panel. Some of these recommendations appear of particular importance to the SCRS:

- The importance of collecting and reporting accurate Task I and Task II data from all ICCAT fisheries according to ICCAT protocols and requirements;
- The need to conduct ambitious scientific programs to resolve in a timely manner priority knowledge gaps (that have been already identified by the SCRS for several ICCAT species);
- To consider a special fund to pay the salaries and expenses related to ICCAT activities of the SCRS Chair.

16.2 IUCN Ecolabeling – Scientific/Technical requirements for this activity Document

The Chairman presented the IUCN initiative for the development of standards for environmental sustainability of tuna fisheries, which includes commercial and marketing aspects of ecolabeling. There was some discussion on the viability of this proposal, since there is considerable difficulty in uniquely defining the term “sustainability”. The Committee considered that not a completely scientific issue, but involved matters of policy and therefore it is best dealt with by the Commission.

16.3 Species ID posters – sharks & small tunas

The Secretariat informed the Committee that following the 2007 recommendation by the SCRS to prepare identification sheets for species such as small tunas and sharks, Drs. T. Diouf and A. Domingo have been contacted to coordinate the development of these sheets. A proposal was presented that was discussed in the Species Groups. The identification sheets will be finalized in 2009.

16.4 Needed improvement in Secretarial support for SCRS requirements to fulfill Commission requests

As was discussed at length in the Sub-Committee on Statistics, the SCRS reiterated the need for improvement of Secretariat support with the hiring of additional staff with scientific capabilities and experience which would enhance the scientific support for the Committee’s work. More detailed information on this matter can be found in Section 14.

16.5 Profile for the By-Catch Coordinator position

The Convener of the Sub-Committee on Ecosystems presented an overview of the development of the profile for the By-catch Coordinator position. This proposal was further discussed in the Sub-Committee on Statistics which also provided input to the profile. The proposal tried to establish a balance between the duties involving database management and the scientific analysis of by-catches. The Committee noted that this position is pending the Commission's approval for inclusion in the 2010 Commission Budget.

Reference was made to the funds made available from the United States that would permit hiring a person for about one-year to carry out this work. Therefore, the SCRS considered it was priority to get the Commission's approval for this as a permanent position at the Secretariat.

The proposed profile is attached as **Appendix 11**.

16.6 Others

The Committee discussed the need to update the current glossary of assessment terms. In view of time constraints at this session, the Committee decided that this work should proceed in the intersessional period.

17. Adoption of the report and closure

The Committee adopted the Report during the meeting.

Following the adoption of the Report, the Secretariat presented the French and Spanish versions of the ICCAT web page. The Committee recognized the Secretariat's work and its quality. Likewise, the Committee commended the excellent level of the ICCAT web site, in particular, its extensive content and constant updating. The SCRS also pointed out the quality and professionalism of ICCAT's translation work.

The SCRS Chairman thanked the scientists and the Secretariat for their collaboration during the meeting and also expressed his appreciation to the interpreters for their work.

Lastly, the Executive Secretary reiterated his gratitude to the scientists, interpreters and the Secretariat for the excellent work done.

Following these interventions, the meeting was adjourned.

Appendix 1

AGENDA OF THE
STANDING COMMITTEE ON RESEARCH & STATISTICS (SCRS)

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. Report of Secretariat activities in research and statistics
7. Review of national fisheries and research programs
8. Executive Summaries on species:
   YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack, ALB-Albacore, BFT-Bluefin, BIL-Billfishes, SWO-Atl. Swordfish, SWO-Med. Swordfish, SBF-Southern Bluefin, SMT-Small Tunas, SHK-Sharks
9. Report of inter-sessional meetings
   - 9.1 Working Group on Stock Assessment Methods
   - 9.2 Inter-sessional Meeting of Mediterranean Swordfish
   - 9.3 Inter-sessional Meeting of the Sub-Committee on Ecosystems
   - 9.4 World Symposium for the Study into the Stock Fluctuation of Northern Bluefin Tunas (*Thunnus thynnus* and *Thunnus orientalis*) including historic periods
   - 9.5 GFCM-ICCAT Joint Small Tunas Working Group
   - 9.6 Sailfish Data Preparatory Meeting
   - 9.7 Bluefin Stock Assessment Session
   - 9.8 Yellowfin and Skipjack Stock Assessments Session
   - 9.9 Sharks Stock Assessment Session
10. Report of Special research programs
    - 10.1 Bluefin Year Program (BYP)
    - 10.2 Enhanced Research Program for Billfish
    - 10.3 Requests for funding possibilities
11. Report of the Sub-Committee on Statistics
12. Report of the Sub-Committee on Ecosystems
13. Consideration of plans for future activities
    - 13.1 Annual Work Plans
    - 13.2 Inter-sessional meetings proposed for 2009
    - 13.2 Date and place of the next meeting of the SCRS
14. General recommendations to the Commission
15. Responses to Commission's requests
    - 15.1 Calls for an evaluation of data deficiencies at ICCAT with emphasis on how such deficiencies may affect management advice [Rec. 05-09]
    - 15.2 Consideration of information on Fishing Capacity [Res. 06-19] and Capacity WG requests
    - 15.3 Consideration of information on seabirds by-catch reduction [Rec. 07-07]
    - 15.4 Review of information on farmed bluefin tuna growth rates [Rec. 06-07]
    - 15.5 Other considerations about the ability to monitor the eastern Atlantic Bluefin Tuna Recovery Plan
    - 15.6 Strategies to increase the yield per recruit and MSY of bigeye tuna by reducing mortality on small bigeye tuna
16. Other matters
    - 16.1 Scientific implications of Performance Review
    - 16.2 IUCN Ecolabeling – scientific/technological requirements for this activity document
    - 16.3 Species ID posters – sharks and small tunas
    - 16.4 Needed improvement in Secretariat support for SCRS requirements to fulfill Commission requests
    - 16.5 Profile for the By-Catch Coordinator position
    - 16.6 Others
17. Adoption of report and closure

Appendix 2

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Appendix 3

LIST OF 2008 SCRS DOCUMENTS

Number	*Title*	*Author(s)*	*Subject*
SCRS/2008/010	Report of the 2008 Meeting of the ICCAT Working Group on Stock Assessment Methods *(Madrid, Spain, February 18 to 22, 2008).*	Anonymous	GEN
SCRS/2008/011	Report of the 2008 Analysis of Mediterranean Swordfish Management Measures (*Madrid, Spain, February 25 to 29, 2008*).	Anonymous	SWO
SCRS/2008/012	Report of the 2008 Inter-sessional Meeting of the Sub-Committtee on Ecosytems *(Madrid, Spain, March 10 to 14, 2008)*	Anonymous	ECO
SCRS/2008/013	Proceedings of the joint CANADA-ICCAT 2008 Workshop on the Precautionary Approach for Western Bluefin Tuna *(Halifax, Nova Scotia, Canada, March 17 to 20, 2008).*	Gavaris, S. (Chairman), F. Hazin, J.N. Neilson, P. Pallares, C. Porch C, V.R. Restrepo, G. Scott G, P. Shelton, Y. Wang (eds.)	BFT
SCRS/2008/014	Report of the Joint GFCM/ICCAT Meeting on Small Tunas Fisheries in the Mediterranean *(Malaga, Spain, May 5 to 9, 2008).*	Anonymous	SMT
SCRS/2008/015	Report of the 2008 ICCAT Sailfish Data Preparatory Meeting *(Madrid, Spain, May 19 to 24, 2008).*	Anonymous	BIL
SCRS/2008/016	Report of the 2008 Yellowfin and Skipjack Stock Assessments *(Florianopolis Island, Brazil, July 21 to 29, 2008).*	Anonymous	SKJ, YFT
SCRS/2008/017	Report of the 2008 Shark Stock Assessment Session *(Madrid, Spain, September 1 to 5, 2008).*	Anonymous	SHK
SCRS/2008/018	World Symposium for the Study into the Stock Fluctuation of Northern Bluefin Tunas (*Thunnus thynnus* and *Thunnus orientalis*), including the Historic Periods.	Anonymous	BFT
SCRS/2008/019	Report of the 2008 Bluefin Stock Assessment Session *(Madrid, Spain, Julne 23 to July 4, 2008).*	Anonymous	BFT
SCRS/2008/024	Description of the ICCAT tagging information system	Palma, C. and P. Kebe	GEN
SCRS/2008/025	Swordfish (*Xiphias gladius* L.) Fishery in Turkish Aegean Sea.	Ceyhan Tevfik and Okan Akyol	SWO
SCRS/2008/026	A bioeconomic evaluation of different management measures for the Mediterranean swordfish.	Tserpes, G., E. Tzanatos, P. Peristeraki and L. Kell	SWO
SCRS/2008/027	Preliminary data on seabird by-catch from the Maltese long line fishery (central Mediterranean)	Dimech,M., M. Darmanin, R. Caruana and H. Reine	ECO
SCRS/2008/028	Modelling the impact of fishery by-catch on wandering and black-browed albatrosses of South Georgia.	Thomson, R., R.A. Phillips, G.N. Tuck.	ECO
SCRS/2008/029	Spatial and temporal overlap between seabird distribution in the Atlantic Ocean and ICCAT longline fishing effort.	Small, C. and F. Taylor	ECO
SCRS/2008/030	The impact of Taiwanese longline fisheries on seabirds in the Atlantic Ocean.	Hsiang-Wen Huang, J.	ECO
SCRS/2008/031	Preliminary estimates of total seabird by-catch by ICCAT fisheries in recent years.	Klaer, N. and A. Black	ECO
SCRS/2008/032	Seabird by-catch on Brazilian pelagic longline fishery and implications for the conservation in South Atlantic	Bugoni, L., P. Luciano Mancini, D. Silveira Monteiro, L. Nascimento, T. Silva Neves	ECO

SCRS/2008/033	Analysis of the size data of sworfish *(Xiphias gladius)* caught by the Moroccan driftnet fishery operating in the Mediterranean Sea: Period 1999-2006.	Abid, N. and M. Idrissi	SWO
SCRS/2008/034	Description of the U.S. Pelagic Observer Program (POP)-	Guillermo A. Diaz, Larry R. Beerkircher, and Victor R. Restrepo	ECO
SCRS/2008/035	Anzuelos circulares vs. anzuelos "j" en la flota palangrera uruguaya.	Domingo, A., C. Barceló , Y. Swimmer , M. Pons and P. Miller	ECO
SCRS/2008/036	Patrones espacio-temporales en la captura incidental de *Thalassarche melanophrys*, *T. chlororhynchos* y *Procellaria aequinoctialis* con palangre pelágico en el Atlántico sudoccidental.	Jiménez, S., M. Pons and A. Domingo	ECO
SCRS/2008/037	Estandarización de la CPUE de la tortuga cabezona, *Caretta caretta*, en el Atlántico sur occidental.	Pons, M., A. Domingo, G. Sales and B. Giffoni	ECO
SCRS/2008/038	Machine learning procedures: an application to bycatch data of the marine turtles, *Caretta caretta*.	Pons, M., S. Marroni, I. Machado, B. Ghattas and A. Domingo	ECO
SCRS/2008/039	Update of standardized catch rates for sailfish *(Istiophorus albicans)* from the Venezuelan pelagic longline fishery off the Caribbean Sea and ajacent areas: Period 1991-2006.	Arocha, F. and M. Ortiz	BIL
SCRS/2008/040	Standardized catch rates for sailfish *(Istiophorus albicans)* from the small scale fishery off La Guaira, Venezuela: Period 1991-2007.	Arocha, F., A. Barrios, D. Debrot and L. Marcano	BIL
SCRS/2008/041	Exploitation du voilier *Istiophorus albicans* (Istiophoridae, Latreille1804) par la pêcherie artisanale maritime en Côte d'Ivoire.	N'Da, K. and G.R. Dedo	BIL
SCRS/2008/042	Distribution and abundance of frigate tuna larvae *(Auxis rochei)* off the Balearic Sea during the 2003-2005 spawning seasons.	Garcia, A., F. Alemany, J.M., Rodríguez, D. Cortes, F. Corregidor, E. Ceballos, L. Quintanilla and P. Velez-Belchí	SMT
SCRS/2008/043	Updated sailfish *(Istiophorus platypterus)* catch rates from the U.S. pelagic longline fishery in the northwest Atlantic and Gulf of Mexico, 1986-2007.	Ortiz, M., G. Diaz and J.P. Hoolihan	BIL
SCRS/2008/044	Estimated sailfish catch-per-unit-effort of the U.S. Recreational Billfish Tournament and U.S. recreational fishery (1973-2007).	Hoolihan, J.P., M. Ortiz, G.A. Diaz, and E.D. Prince	BIL
SCRS/2008/045	Scientific estimations of by-catch landed by the Spanish surface longline fleet targeting swordfish *(Xiphias gladius)* in the Atlantic Ocean with special reference to the years 2005 and 2006.	Mejuto, J., B. García-Cortés, A. Ramos-Cartelle and J.M. de la Serna	BYC
SCRS/2008/046	Análisis de la captura, distribución y composicin de tallas de istioforidos en el Atlántico sur observada en la flota de palangre uruguaya (1998-2007).	Domingo, A., M. Pons and M. Rios	BIL
SCRS/2008/047	Stomachal content of sailfish, *Istiophorus platypterus*, caught off northern Rio de Janeiro State, Brazil.	Pimenta, E.G., M.F. Rezende and A.F. de Amorim	BIL
SCRS/2008/048	Sailfish sports fishing off Rio de Janeiro State, Brazil (2002-2008).	Amorim, A.F., C.A. Arfelli, E. Pimenta, N.D. Fina, N.P. Silva and B.P. Silva	BIL
SCRS/2008/049	Catch probabilities of sailfish *(Istiophorus platypterus)* based on environmental factors in the southwestern Atlantic Ocean.	Hazin, H.G., C. Wor, B. Mourato, F.H.V. Hazin, P. Travassos, C.A. Arfelli and F. Amorim	BIL

SCRS/2008/050	New data on catch composition of Atlantic bonito (*Sarda sarda*, Bloch 1763) in the Tyrrhenian Sea and in the Strait of Sicily.	Di Natale, A. and A. Mangano	SMT
SCRS/2008/051	Between lumpers and splitters, which taxonomical approach to Mediterranean small tuna of the genus Auxis?	Orsi Relini, L., G. Palandri, F. Garibaldi, L. Lanteri and F. Tinti	SMT
SCRS/2008/052	Preliminary study on the Atlantic black skipjack (*Euthynnus alletteratus*, Rafinesque 1810), caught by common purse seine fisheries off the northeastern Mediterranean Coast of Turkey.	Zengin, M. and F.S. Karakulak	SMT
SCRS/2008/053	A profıle of Turkey's fısherıes in 2006.	Ates, C.	SMT
SCRS/2008/054	Value of population genetic studies in small tunas	Viñas, J. and C. Pla	SMT
SCRS/2008/055	Les thons mineurs tunisiens: étude biologiques et pêche.	Hattour, A.	SMT
SCRS/2008/056	Report on the GFCM study on small tunas in the Mediterranean including the Black Sea.	Srour, A., A. Di Natale, A. Hattour, Ç. Keskin, M. Idrissi and L. Orsi Relini	SMT
SCRS/2008/057	Biological parameters of bullet tuna in the Ligurian Sea.	Palandri, G., L. Lanteri, F. Garibaldi and L. Orsi Relini	SMT
SCRS/2008/058	Atlantic bluefin tuna: An overview of 100 centuries of moving fisheries.	Fonteneau, A.	BFT
SCRS/2008/059	Bluefin fishing in Lannion Bay, northern Brittany, during the 1946-1953 period.	Fonteneau, A. and A. Le Person	BFT
SCRS/2008/060	The Norwegian bluefin tuna fishery for the period 1920-1986.	Tangen, M., Ø. Tangen and L. Nøttestad	BFT
SCRS/2008/061	Possible mechanisms and explanations for the drastic decline and disappearance of Atlantic bluefin tuna in the Norwegian fisheries since the early 1960s: What went wrong and what can we do?	Nøttestad, L., Ø. Tangen and S. Sundby	BFT
SCRS/2008/062	Ecological and fishing influences on the presence of bluefin tuna in northern European waters.	MacKenzie, B.R. and R.A. Myers	BFT
SCRS/2008/063	The bluefin tuna *(Thunnus thynnus)* fishery in the Bay of Biscay.	Cort, J.L.	BFT
SCRS/2008/064	The bluefin tuna *(Thunnus thynnus)* fishery in the Bay of Biscay: evolution of the 5+ group since 1970.	Cort, J.L. and E. Rodríguez-Marín	BFT
SCRS/2008/065	Analysis of the northeast Atlantic juvenile bluefin tuna *(Thunnus thynnus)* population between 1949 and 1960.	Cort, J.L., P. Abaunza and G. De Metrio	BFT
SCRS/2008/066	Following bluefin tuna cohorts from east Atlantic Spanish fisheries since the 1980s.	Rodríguez-Marín, E., J.M. Ortíz de Urbina, E. Alot, J.L. Cort, J.M. de la Serna, D. Macias, C. Rodríguez-Cabello, M. Ruiz and X. Valeiras	BFT
SCRS/2008/067	Back to the future: investigating historical data of bluefin tuna fisheries.	Fromentin, J.M.	BFT
SCRS/2008/068	Analysis of the Moroccan trap fishery targeting bluefin tuna *(Thunnus thynnus)* during the period 1986-2006.	Abid, N. and M. Idrissi	BFT
SCRS/2008/069	Possible sst and NAO influences on the eastern bluefin tuna stock - the inexfish approach.	Bridges, C.R., O. Krohn, M. Deflorio and G. De Metrio	BFT
SCRS/2008/070	Remarks on the fluctuations of bluefin tuna catches in Turkish waters.	Karakulak, F.S. and I.K. Oray	BFT

SCRS/2008/071	Bluefin tuna *(Thunnus thynnus)* fisheries of the Maltese Islands in the central and southern Mediterranean Sea.	Vella, A.	BFT
SCRS/2008/072	Anthropogenic impacts on the bluefin tuna *(Thunnus thynnus* L.) trap fishery of Sardinia (western Mediterranean).	Addis, P., I. Locci and A. Cau	BFT
SCRS/2008/073	Inference on the nature of Atlantic bluefin tuna off Brazil caught by the Japanese longline fishery around the early 1960s.	Takeuchi, Y., K. Oshima and Z. Suzuki	BFT
SCRS/2008/074	Pacific bluefin tuna fisheries in Japan and adjacent areas before the mid-20th century.	Muto, F., Y. Takeuchi, K. Yokawa, S. Ochi and M. Tabuchi	BFT
SCRS/2008/075	Overview of the Pacific bluefin tuna fisheries.	Yamada, H., T. Matsumoto and N. Miyabe	BFT
SCRS/2008/076	Biological information from Pacific northern bluefin tuna in captivity.	Masuma, S.	BFT
SCRS/2008/077	An historical overview of the bluefin fishery in the eastern Pacific Ocean.	Aires-da-Silva, A., G. Compean and M. Dreyfus	BFT
SCRS/2008/078	Changes in abundance and spatial distribution of southern bluefin tuna.	Polacheck, T.	BFT
SCRS/2008/079	Standardized catch rate of sailfish *(Istiophorus platypterus)* caught by Brazilian longliners in the Atlantic Ocean (1986-2006).	Wor, C., B.L. Mourato, H.G. Hazin, F.H.V. Hazin and P. Travassos	BIL
SCRS/2008/080	Preliminary analysis of gonad development, spawning period, sex ratio and length at first sexual maturity of sailfish, *Istiophorus platypterus*, off the Brazilian coast.	Mourato, B.L., P. Pinheiro, F.H.V. Hazin, V. Basante, A.F. Amorim, E. Pimenta and C. Guimarães	BIL
SCRS/2008/081	Standardized CPUE of Atlantic sailfish *(Istiophorus platypterus)* caught by recreational fishery in southern Brazil (1996-2007).	Mourato, B.L., A.F. Amorim, C.A. Arfelli, H.G. Hazin, F.H.V. Hazin and C. Wor	BIL
SCRS/2008/082	Relative abundance indices for sailfish from the artisanal fleet from Senegal.	Diatta, Y., D.J. Die and M. Fitchett	BIL
SCRS/2008/083	Indices of stock status from the Canadian bluefin tuna fishery.	Neilson, J., S. Smith, M. Ortiz and B. Lester	BFT
SCRS/2008/084	Growth of Atlantic bluefin tuna: direct age estimates	Secor, D.H., R.L. Wingate, J.D. Neilson, J.R. Rooker, and S.E. Campana	BFT
SCRS/2008/085	Standardized catch rates of bluefin tuna *(Thunnus thynnus)* from the U.S. pelagic longline vessels in the Gulf of Mexico 1987-2007.	Diaz, G., and S. Cass-Calay	BFT
SCRS/2008/086	Annual indices of bluefin tuna *(Thunnus thynnus)* spawning biomass in the Gulf of Mexico developed using delta-lognormal and multivariate models.	Ingram, G.W. Jr., W.J. Richards, C.E. Porch, V. Restrepo, J.T. Lamkin, B. Muhling, J. Lyczkowski-Shultz, G.P. Scott and S.C. Turner	BFT
SCRS/2008/087	Characterization of the U.S. commercial and recreational tuna fleets during 2007.	Diaz, G.A., V. Restrepo, and B. McHale	BFT
SCRS/2008/088	Standardized catch rates of bluefin tuna, *Thunnus thynnus*, from the rod and reel/handline fishery off the northeast United States during 1980-2007.	Brown, C.	BFT
SCRS/2008/089	Three different strategies for modeling the terminal-year fishing mortality rates in Virtual Population Analyses of western bluefin tuna: Retrospective patterns and consequences for projections.	Walter, J. and C. Porch	BFT

SCRS/2008/090	Virtual Population Analyses of Atlantic bluefin tuna that include conventional and electronic tagging data: Revisitiing the 2006 assessment.	Porch, C., S. Turner, M. Lutcavage	BFT
SCRS/2008/091	Sensitivity of Virtual Population Analyses of western Atlantic bluefin tuna to the use of an alternative growth curve for estimation of catch at age.	Porch, C., V. Restrepo, J. Nielson and D. Secor	BFT
SCRS/2008/092	Preliminary results from electronic tagging of bluefin tuna *(Thunnus thynnus)* in the Gulf of St. Lawrence, Canada.	Block, B.A., G.L. Lawson, A. M. Boustany, M.J.W. Stokesbury, M. Castleton, A. Spares, and J.D. Neilson	BFT
SCRS/2008/093	A year-class curve analysis to estimate mortality of Atlantic bluefin tuna caught by the Norwegian fishery from 1956 to 1979.	Fromentin, J.M. and V. Restrepo	BFT
SCRS/2008/094	Evaluation of the performance and robustness of VPA-based stock assessment and MSY-based management strategy to process error: An Atlantic bluefin tuna case study.	Fromentin, J.M. and L. Kell	BFT
SCRS/2008/095	Standardized catch rates for blue shark *(Prionace glauca)* from the Venezuelan pelagic longline fishery off the Caribbean Sea and adjacent areas: period 1994-2007.	Arocha, F., M. Ortiz, R. Tavares and L. Marcano	SHK
SCRS/2008/096	Preliminary estimation of the size composition of bluefin tuna (*thunnus thynnus*) caugt by Moroccan Atlantic traps from biological scraps in 2006.	Idrissi, M. and N. Abid	BFT
SCRS/2008/097	A multi-stock tag integrated age structured assessment of Atlantic bluefin tuna.	Taylor, N., M. McAllister, B. Block and G. Lawson	BFT
SCRS/2008/098	Updated standardized indices for bluefin tuna from the Moroccan trap fishery (1998-2006).	Abid, N., M. Idrissi and J.M. Ortiz de Urbina	BFT
SCRS/2008/099	Updated standardized indices for bluefin tuna from the Spanish trap fishery (1981-2007).	Ortiz de Urbina, J.M., J.M. de la Sern and D. Macías	BFT
SCRS/2008/100	Updated standardized CPUE of Atlantic bluefin tuna caught by the Spanish baitboat fishery in the Bay of Biscay (eastern Atlantic). Time series from 1975 to 2007.	Rodriguez-Marin, E., M. Ortiz, C. Rodríguez-Cabello and S. Barreiro	BFT
SCRS/2008/101	The key importance of the underlying stock-recruitment assumption when evaluating the potential of management regulations of Atlantic bluefin tuna.	Fromentin, J.M.	BFT
SCRS/2008/102	Revised catch-at-size estimates of Atlantic bluefin tuna (eastern and western stocks: 1960-2006).	Palma, C. and P. Kebe	BFT
SCRS/2008/103	Standardized bluefin CPUE from the Japanese longline fishery in the Atlantic up to 2007.	Ohshima, K., Y. Takeuchi and N. Miyabe	BFT
SCRS/2008/104	Répartition démographique du thon rouge engraissé dans les fermes Tunisiennes pendant les campagnes 2005 à 2007.	Hattour , A.	BFT
SCRS/2008/105	Estadísticas españolas de la pesquería atunera tropical, en el Océano Atlántico, hasta 2007.	Delgado de Molina, A., J.C. Santana and J. Ariz	TROP
SCRS/2008/106	Datos estadísticos de la pesquería de túnidos de las Islas Canarias durante el periodo 1975 a 2007.	Delgado de Molina, A., J. Ariz, R. Delgado de Molina and J.C. Santana	TROP
SCRS/2008/107	A management strategy evaluation framework for Mediterranean Atlantic bluefin tuna.	Kell, L and J.M. Fromentin	BFT
SCRS/2008/108	Japanese longline CPUE for yellowfin tuna (*Thunnus albacares*) in the Atlantic Ocean standardized using GLM up to 2006.	Okamoto, H	TROP

SCRS/2008/109	Estandarización de la CPUE del atún aleta amarilla *(Thunnus albacares)* capturados por las flotas de palangre de Brasil y Uruguay (1980-2006).	Pons, M., P. Travassos, A. Domingo, H. Hazin and F. Hazin	TROP
SCRS/2008/110	Estandarización de la CPUE del atún aleta amarilla de la flota palangrera uruguaya (1982-2007).	Pons, M. and A. Domingo	TROP
SCRS/2008/111	Distribucion espacio temporal, composición de tallas y relaciones ambientales del atun aleta amarilla (*Thunnus albacares)* en el Atlantico SW.	Domingo, A., M. Rios and M. Pons	TROP
SCRS/2008/112	Standardization of (*Thunnus albacares*) CPUE series caught by Brazilian longliners in the Atlantic Ocean.	Travassos, P., H. Hazin, F. Hazin, B. Mourato and F. Carvalho	TROP
SCRS/2008/113	Standardized catch rate of skipjack tuna (*Katsuwonus pelamis*) caught in the southwest of the South Atlantic Ocean.	Andrade, H.A.	TROP
SCRS/2008/114	Estimates of total mortality and selectivity for eastern Atlantic skipjack *(Katsuwonus pelamis)* from catch curves based on length composition data (1971-2005).	Gaertner, D.	SKJ
SCRS/2008/115	Actualización de la CPUE estandarizada de rabil de la flota de cerco tropical en el océano Atlántico de 1980 a 2006.	Soto, M, P. Pallarés, A. Delgado de Molina and D. Gaertner	YFT
SCRS/2008/116	Stardardized CPUE for juvenile Atlantic yellowfin and bigeye and skipjack tunas caught by the purse seine fleet fishing with FADs.	Soto, M., D. Gaertner, A. Delgado de Molina and P. Pallarés	TROP
SCRS/2008/117	A preliminary attempt to estimate tuna discards and by-catch in the French purse seine fishery of the eastern Atlantic Ocean.	Chassot, E., M.J. Amande, R. Pianet, P. Chavance and R. Dedo	BYC
SCRS/2008/118	Stardardized CPUE for eastern Atlantic skipjack tuna caught in free school by the purse seine fleet.	Soto, M, D. Gaertner, J. Ariz and P. Pallarés	SKJ
SCRS/2008/119	Standardized catch rates for yellowfin tuna *(Thunnus albacares)* in the Gulf of Mexico longline fishery for 1992-2007 based upon observer programs from Mexico and the United States.	Brown, C.A. and K. Ramírez-López	YFT
SCRS/2008/120	Standardized catch rate in number and weight of yellowfin tuna *(Thunnus albacares)* from the United States pelagic longline fishery 1986-2007.	Walter, J	YFT
SCRS/2008/121	Standardized catch rate of skipjack tuna *(Katsuwonus pelamis)* from the United States pelagic longline fishery 1991-2007.	Walter, J	SKJ
SCRS/2008/122	Catch rate indices of yellowfin (*Thunnus albacares*) and skipjack *(Katsuwonus pelamis)* tunas from the United States recreational fishery in the western North Atlantic Ocean, 1986-2007.	Cass-Calay, S.L.	TROP
SCRS/2008/123	Atún blanco (*Thunnus alalunga* Bonaterre, 1788). Datos de la pesquería de las Islas Canarias.	Delgado de Molina, A., R. Delgado de Molina, J.C. Santana and J. Ariz	ALB
SCRS/2008/124	Statistiques de la pêcherie thonière Européenne et assimilée durant la période 1991-2007.	Pianet, R., V. Nordström, P. Dewals, A. Delgado, J. Ariz, R. Saralde, R. Gnegoury Dédo and Y. Diatta	TROP
SCRS/2008/125	Datos estadísticos de la flota palangrera mexicana dedicada a la pesca del atún aleta amarilla en el Golfo de México durante el periodo 1994 a 2007.	Ramirez Lopez, K.	YFT

SCRS/2008/126	Recollection (historical years, 1969-2004) and update (new years, 2005-07) of skipjack *(Katsuwonus pelamis)* catch-at size for the Atlantic eastern and western stocks.	Palma, C. and P. Kebe	SKJ
SCRS/2008/127	Update (years, 2005-06) of yellowfin tuna *(Thunnus albacares)* catch-at-size for the overall Atlantic stock.	Palma, C. and P. Kebe	YFT
SCRS/2008/128	Ratios between the wet fin weight and body weights of blue shark *(Prionace glauca)* in the Spanish surface longline fleet during the period 1993-2006.	Mejuto, J., B. García-Cortés, A. Ramos-Cartelle and J.M. de la Serna	SHK
SCRS/2008/129	Standardized catch rates for blue shark *(Prionace glauca)* and shortfin mako *(Isurus oxyrinchus)* caught by the Spanish longline fleet in the Atlantic Ocean during the period 1990-2007.	Mejuto, J., B. García-Cortés, A. Ramos-Cartelle and J.M. de la Serna	SHK
SCRS/2008/130	Tagging and CPUE data on blue shark from Irish recreational fisheries, 1970-2006.	Green, P., D. O'Sullivan, P. Fitzmaurice, D. Stokes, G. Keirse, M. Kenny, S. Mariani and M.W. Clarke	SHK
SCRS/2008/131	Updates estimates of stock status of blue shark in the North Atlantic.	Apostolaki, P.	SHK
SCRS/2008/132	Contradictory catch rates of blue shark caught in the Atlantic Ocean by the Brazilian longline fleet as estimated using Generalized Linear Models.	Andrade, Humber A.	SHK
SCRS/2008/133	Biologie de la reproduction des voiliers *(Istiophorus albicans)* de la pêcherie artisanale maritime en Côte d´Ivoire: Aspect macroscopique et microscopique des gonades.	N'Da, K. et Y. Soro	BIL
SCRS/2008/134	Pelagic sharks in the Atlantic and Mediterranean French fisheries: Analysis of catch statistics.	Poisson, F. and B. Séret	SHK
SCRS/2008/135	Updated Bayesian surplus production model applied to blue and mako shark catch, CPUE and effort data.	Babcock, E.A. and E. Cortes	SHK
SCRS/2008/136	Standardized catach rates for mako and blue sharks in the Virginia-Massachusetts (U.S.) rod and reel fishery during 1986-2007.	Andrews, K.	SHK
SCRS/2008/137	Standardized catch rates for blue and mako sharks from the U.S. pelagic longline logbook (1986-2007) and observer (1992-2007) programs.	Cortés, E.	SHK
SCRS/2008/138	Ecological Risk Assessment of pelagic sharks caught in Atlantic pelagic longline fisheries.	Cortés, E., F. Arocha, L. Beerkircher, F. Carvalho, A. Domingo, M. Heupel, H. Holtzhausen, M. Neves, M. Ribera, and C. Simpfendorfer	SHK
SCRS/2008/139	Estimating historic shark removals in the Atlantic using shark fin trade data and Atlantic-specific area, catch and effort scaling factors.	Clarke, S.	SHK
SCRS/2008/140	An integrated approach to determining the risk of over-exploitation for data-poor pelagic Atlantic sharks.	Simpfendorfer, C., E. Cortés, M. Heupel, E. Brooks, E. Babcock, J. Baum, R. McAuley, S. Dudley, J.D. Stevens, S. Fordham, A. Soldo	SHK
SCRS/2008/141	Actualización de la estandarización de la CPUE del tiburón azul *(Prionace glauca)* capturado por la flota de palangre de Uruguay (1992-2007).	Pons, M. y Andrés Domingo.	SHK
SCRS/2008/142	Actualización de la estandarización de la CPUE del tiburón moro *(Isurus oxyrinchus)* capturado por la flota de palangre de Uruguay (1982-2007).	Pons, M. y Andrés Domingo	SHK

SCRS/2008/143	Distribución de algunos tiburones pelágicos capturados en el Atlántico sur.	Domingo, A, P. Millar, A. Tobón y F. Doño	SHK
SCRS/2008/144	Aspectos del ciclo reproductivo y estructura de la población del tiburón azul *(Prionace glauca)* en el Océano Atlántico Sur.	Domingo, A., A. Amorim, P. Miller, C.A. Arfeli, R. Forselledo, M. Rios y C. Pasadore.	SHK
SCRS/2008/145	Captura incidental de marrajo dientuso y tintorera por la flota palangrera mexicana dedicada a la pesca del atún aleta amarilla en el Golfo de México durante 1994-2007.	Ramírez, K., Jorge L. Oviedo, Leticia González	SHK
SCRS/2008/146	Presencia de *Isurus oxyrhincus* (marrajo dientuso) y *Prionace glauca* (tintorera) en la pesquería ribereña de esalmobranquios en el Golfo de México	Oviedo, Jorge L., Leticia González, Karina Ramírez, Luis E. Martínez	SHK
SCRS/2008/147	Commercial by-catch rates of blue shark *(Prionace glauca)* from longline fisheries in the Canadian Atlantic.	Fowler, G.M., S.E. Campana	SHK
SCRS/2008/148	Commercial by-catch rates of shortfin make *(Isurus oxyrinchus)* from longline fisheries in the Canadian Atlantic.	Fowler, G.M., S.E. Campana	SHK
SCRS/2008/149	Standardized CPUE for blue shark and shortfin mako caught by the Japanese tuna longline fishery in the Atlantic Ocean	Matsunaga, H.	SHK
SCRS/2008/150	Estimation of catches for blue shark and shortfin mako by the Japanese tuna longline fishery in the Atlantic Ocean, 1994-2006.	Matsunaga, H.	SHK
SCRS/2008/151	Tag and release of pelagic shark species by the observers on Japanese tuna longline vessels in the Atlantic Ocean.	Matsunaga, H.	SHK
SCRS/2008/152	Preliminary results on the French fishery targeted porbeagle shark *(Lamna lasus)* in the northeast Atlantic Ocean: biology and catch statistics.	Jung, A.	SHK
SCRS/2008/153	Preliminary estimates of blue and mako sharks by-catch and CPUE of Taiwanese longline fishery in the Atlantic Ocean.	Kwang-Ming Liu, Shoou-Jeng Joung, and Wen-Pei Tsai	SHK
SCRS/2008/154	CPUE and catch trends of blue and mako sharks caught by Brazilian longliners in the southwestern Atlantic Ocean (1978-2007).	Carvalho, F., H. Hazin, F. H.V. Hazin, C. Wor, D. Murie, P. Travassos and G. Burgess	SHK
SCRS/2008/155	Notes on the reproduction of the oceanic whitetip shark, C*archarhinus longimanus*, in the southwestern equatorial Atlantic Ocean.	Coelho, R., F.H.V. Hazin, M. Rego, M. Tambourgi, P. Oliveira, P. Travassos, F. Carvalho and G. Burgess	SHK
SCRS/2008/156	Shark by-catch observation in the ICCAT waters by Chineses longline observers in 2007.	Dai, X. and R. Jiang	SHK
SCRS/2008/157	Etude prliminaire sur la biologie de la reproduction du marlin bleu (*Makaira nigricans*, Lacépède, 1802) de la pêcherie artisanale maritime de Côte d'Ivoire: aspects macroscopiques et microscopiques des gonades.	N'Da K., Soro Y	BIL
SCRS/2008/158	Description of the European Union surface longline fleet operating in the Atlantic Ocean and compilation of detailed EUROSTAT data on shark catches by EU fleets in the Atlantic.	Oceana	SHK
SCRS/2008/159	Report of a meeting held during the Secretariat's visit to the USA to improve the tagging data exchange protocol.	Anonymous	GEN

SCRS/2008/160	Statistics of the Spanish albacore (*Thunnus alalunga*) surface fishery in the northeastern Atlantic in 2007.	Ortiz de Zárate, V., S. Barreiro and C. Rodríguez-Cabello	ALB
SCRS/2008/161	Standardized age specific catch rates for albacore, *Thunnus alalunga*, from the Spanish troll fishery in the northeast Atlantic: 1981 to 2007.	Ortiz de Zárate, V. and J.M. Ortiz de Urbina	ALB
SCRS/2008/162	Potential bias in multispecies sampling of purse seine catches.	Fonteneau A., E. Chassot, F.Abascal and S. Ortega	GEN
SCRS/2008/163	Updated standardized catch rates for swordfish *(Xiphias gladius)* caught by the Moroccan driftnet fishery in the Mediterranean Sea for the period 1999-2007.	Abid, N. and M. Idrissi	SWO
SCRS/2008/164	Analysis of the size structure and length-weight relationships of swordfish (*Xiphias gladius*) caught by the Moroccan driftnet fishery in the Mediterranean Sea during 2007.	Abid, N. and M. Idrissi	SWO
SCRS/2008/165	Bilan et mise à jour des données françaises de germon (*Thunnus alalunga*) dans l'Atlantique Nord pour la période de 1999 à 2007.	Marc Taquet and Elodie Hoang	ALB
SCRS/2008/166	Using delta-gamma generalized linear models to standardize catch rates of yellowfin tuna caught by Brazilian baitboats.	Andrade, H.A.	YFT
SCRS/2008/167	Impending collapse of bluefin tuna in the northeast Atlantic and Mediterranean.	MacKenzie, B.R., H. Mosegaard and A.A. Rosenberg	BFT
SCRS/2008/168	Comparison of growth between cohorts of juvenile bluefin tuna (*Thunnus thynnus*).	Saul, S., S.C. Turner, D. Die and A. Livergood	BFT
SCRS/2008/169	A catch rate index for skipjack tuna *(Katsuwonus pelamis)* from landings of the Azorean baitboat fleet 1970-2007.	Cass-Calay, S.L. and J. Pereira	SKJ
SCRS/2008/170	Evaluating the impact of fishing pressure on Atlantic tropical tunas using yield-per-recruit and spawner-per-recruit analyses: Implications for management.	Cass-Calay, S. L. et al	TROP
SCRS/2008/171	Progress of the ICCAT Enhanced Research Program for Billfish in the western Atlantic Ocean during 2008.	Prince, E.P., and J.P. Hoolihan	BIL
SCRS/2008/172	Red, green and yellow: Thoughts on stock status and the ICCAT Convention objectives.	Restrepo, V.R.	GEN
SCRS/2008/173	Revision of the U.S. commercial landings of king mackerel *(Scomberomorus cavalla)* and Spanish mackerel *(Scomberomorus maculatus).*	Diaz, G.A. and R. Orhun	SMT
SCRS/2008/174	A protocol for age estimation of striped and white marlin (*Kajikia* spp.) using fin spine cross-sections.	Keller Kopf, R., K. Drew, R. L. Humphreys, Jr.	BIL
SCRS/2008/175	On the possible current status of the western Atlantic bluefin tuna stock, had the main fisheries caught their 2003-2007 quota.	Restrepo, V.R.	BFT
SCRS/2008/176	Trials using different hook and bait types in the configuration of the surface longline gear used by the Spanish swordfish (*Xiphias gladius*) fishery in the Pacific Ocean.	García-Cortés, B., J. Ortiz de Urbina, A.Ramos-Cartelle, J. Mejuto	SWO
SCRS/2008/177	Observer report of Japanese longline fishery in the Atlantic in 2007.	Semba. Y.	GEN
SCRS/2008/178	Nominal CPUE for the Canadian swordfish longline fishery 1988-2007.	Smith, S. and J.D. Neilson	SWO

SCRS/2008/179	Preliminary result of pop-up archival tagging for Atlantic bluefin tuna (*Thunnus thynnus*) released in the northeastern Atlantic Ocean.	Yasuko Semba, Yukio Takeuchi	BFT
SCRS/2008/180	Statistiques de la pêcherie thonière française durant la période 1991-2007.	Pianet R., V. Nordström, P. Dewals, R. Gnegoury Dédo, F. Sow	TROP
SCRS/2008/181	Note on the yearly catches by country and gear of the FISM (France-Ivory Coast-Senegal-Morocco) fleet during the 1969-1990 period.	Chassot, E., A. Fonteneau, R. Pianet, P. Chavance	TROP
SCRS/2008/182	Report on the automatic imaging system for the Taiwanese tuna longline fishery from January 2007 to August 2008.	Ching-Lu. Hsieh	GEN
SCRS/2008/183	Blue marlin and white marlin CPUE and feeding time of the sports fishery off Rio de Janeiro State, Brazil (2001-2008).	Amorim, A.F., C.A. Arfelli, N. Della Fina, N. Piva Silva, B. Piva Silva and B. Leite Mourato	BIL
SCRS/2008/184	Standardized CPUE of blue marlin (*Makaira nigricans*) caught by the recreational fishery off southeast Brazil (1996-2008).	Amorim, A.F., B.L. Mourato, C.A. Arfelli, F.H.V. Hazin, H.G. Hazin	BIL
SCRS/2008/185	Standardised catch rates of albacore tuna (T*hunnus alalunga*) from the Irish mid-water paired trawl fleet 1998-2007.	Cosgrove, R.	ALB
SCRS/2008/186	Results of a pilot archival tagging programme including a preliminary analysis of factors, at the point of release, affecting tag recovery for albacore tuna (*Thunnus alalunga*) in the northeast Atlantic.	Cosgrove, R., I. Arregi, D. Brophy, H. Arrizabalaga, V. Ortiz de Zarate and N. Griffin	ALB
SCRS/2008/187	Algunas consideraciones sobre los efectos de las moratorias realizadas por la flota européa de cerco en el Océano Atlántico (Recomendaciones CICAA 98-01, 99-01 y 04-01).	Ariz, J., A. Delgado de Molina, R. Pianet and V. Nordström	TROP
SCRS/2008/188	Marcado de túnidos y especies afines durante el desarrollo del campeonato “Desafío Mediterráneo” de captura, marcado y suelta organizado por la confederación mediterránea de pesca recreativa responsable en cooperación con el Instituto Español de Oceanografía.	de la Serna, J.M. and D. Godoy Garrido	GEN
SCRS/2008/189	Size distribution of Atlantic little tuna (*Euthynnus alletteratus*) caught by southwestern Spanish Mediterranean traps and the recreational trawl fishery.	Macías, D., J.M. Ortiz de Urbina, M.J. Gómez-Vives, L. Godoy and J.M. de la Serna	SMT
SCRS/2008/190	A preliminary investigation of the yellowfin tuna *(Thunnus albacares)* population in the Atlantic Ocean using the integrated stock assessment model, Multifan-CL.	P. de Bruyn, V. Restrepo and G. Scott	YFT
SCRS/2008/191	Preliminary analysis of reproductive biology of pelagic stingray, *Pteroplatytrygon violacea*, in the south-western Atlantic.	Véras, D.P., I.S.L. Branco, F.H.V. Hazin, C. Wor, M. Travassos Tolotti	SHK
SCRS/2008/192	The effect of light toriline on seabird by-catch and fish catch rates in the pelagic longline fishery off southern Brazil.	Mancini, P.L., L. Bugoni, T. Neves, D.S. Monteiro and S.C. Estima	BYC
SCRS/2008/193	Overview of the Taiwanese Observers Program for Large Scale Tuna Longline Fisheries in Atlantic Ocean from 2002 to 2006.	Huang, H., S. Chou, J. Dai, and C. Shiao	BYC

SCRS/2008/194	MADE: Preliminary information on a new EC project to propose measures to mitigate adverse impacts of open ocean fisheries targeting large pelagic fish.	Dagorn L., J. Robinson, P. Bach, J.L. Deneubourg, G-Moreno, A. Di Natale, G. Tserpes, P. Travassos, L. Dufossé, M. Taquet, J.J. Robin, B. Valettini, P. Afonso, C. Koutsikopoulos	ECO
SCRS/2008/195	Processus de révision des séries de données du centre de recherches océanographiques Dakar-Thiaroye	Ngom Sow, F. and D. Thiao	SMT

Appendix 4

OPENING ADDRESS OF DRISS MESKI, ICCAT EXECUTIVE SECRETARY

It is always a great pleasure for me to address your regular meeting to welcome all the participants. Furthermore, I would like to take this opportunity, on behalf of ICCAT, to express my wholehearted gratitude to the Spanish authorities and, through them, to the Spanish people for all their support towards the Secretariat of the Commission. As you already know, Spain has provided the Secretariat with new independent headquarters which are fully equipped and which will be operational very soon. Once again, this shows great support and I would like to reiterate all my appreciation and recognition.

The new headquarters has a fully equipped meeting room where your Committee will be able to hold its annual meetings as well as other meeting rooms for small group meetings. The final details and the administrative procedures are in the final stage for ICCAT to move to these headquarters in early 2009. If all goes well, your Committee will be able to hold its 2009 meeting at the new headquarters.

The Scientific Committee meeting of our Commission has been held in a context of concern and apprehension for some time. The uncertain future of some of the tuna species under our Commission's mandate is confirmed from one year to another. The preliminary work carried out thus far at this plenary meeting indicates that the status of some species is of great concern and more than ever more precautionary measures are required.

As you know, the 2007 annual meeting mandated a performance review of our Commission. This review was carried by a panel of three renowned international experts who have prepared a report and the scientific section has been distributed to you.

Without wanting to anticipate the discussion of this report, which shall be presented at the next Commission meeting, its conclusions will show that we have a lot of work to do. I am sure your Committee will be required to work even more than in the past, so that our Commission can overcome the difficulties that it is currently facing.

You certainly have noted the amount of work requested by the Commission. As customary, the Secretariat puts forth all its efforts to support and assist both the Committee and the Commission in order to meet the objectives required.

During 2008, more work was requested of the Secretariat than in the past. Very urgent tasks had to be carried out, such as the implementation of the VMS system to monitor the fleet involved in fishing eastern bluefin tuna, the entry into force of the Bluefin Tuna Catch Document (BCD), translation of the web site to French and Spanish, recruitment of staff requested by your Committee and by the Commission, and the acquisition of equipment and software. The Secretariat also had to select a new auditing firm and other service providers. Moreover, the Secretariat had to organize and manage more than 16 scientific inter-sessional meetings and other meetings, as well as all the work that is generated by these meetings.

With the provision of extra-budgetary funds from voluntary contributions from the United States, EC, Japan and Brazil, the Secretariat is often requested to organize regional workshops and training courses which are very useful for the work of your Committee and the Commission.

I would further wish to add that the Secretariat is always pleased to support and take part in the work of the SCRS and I can assure you that the entire Secretariat staff, to whom I now pay tribute, has always puts forth all their efforts to carry out the work required.

It is clear that because of the Commission's requests, the Secretariat workload is more and more demanding. Unfortunately, it has been noted that most of the data are generally reported too late and too close to the meetings and are submitted in incorrect formats. This makes the processing of these data very difficult and generally results in a heavy workload for the Secretariat. I would like to request the goodwill of scientists of Contracting Parties to assist the Secretariat in this sense by submitting data with reasonable timeliness, thus making the processing of the information much less stressful.

The Secretariat is always concerned about supporting your work in an efficient and effective way even when time constraints make it very difficult.

I wish you every success in your work and I thank you.

Appendix 5

WORK PLANS OF THE SPECIES GROUPS FOR 2009

Tropical Tunas Species Work Plan for 2009

An understanding of natural mortality, growth, stock structure and movement is of fundamental importance in conducting stock assessments. Recent analyses conducted by the Tropical Tunas Species Group have confirmed the sensitivity of current models to such basic biological parameters. The Group places a high priority on the improved quantification of these factors.

Tag-recapture studies are an important tool in addressing these biological questions. Recent projects have greatly expanded the available ICCAT tagging database for tropical tunas. The Tropical Tunas Species Group proposes that a workshop be held in 2009 to jointly analyze these data. The Secretariat should make the current tropical tunas tagging database available to national scientists early in 2009, for the purpose of providing an opportunity to conduct preliminary analyses in preparation for this workshop, including full validation and correction of the tagging database.

The Species Group also recommends data-mining efforts by the ICCAT Secretariat and national scientists to recover tagging data available for the period 1970-1980. These data were used in the past for scientific analyses of tropical species, but they are not currently available in the ICCAT database.

Albacore Work Plan

Overview

In July 2007 the assessment of both North and South Atlantic albacore stocks was carried out. The assessment of the North Atlantic stock indicated that the stock is overfished. This result indicates a need to continue monitoring the catch rates (standardized CPUEs) for all the major fleets exploiting this stock, mainly the surface fisheries relative abundance indices. Furthermore, uncertainty on some biological parameters (growth and reproductive biology) should be studied further for both the North stock and the South stock. Moreover, abiotic variables affecting the distribution of immature and adult albacore in the Atlantic shall be investigated, as well as the market price as an indicator of the catch trend.

The basic input data according to statistical requirements and the need to obtain fishery independent data have been pointed out as a way to discern if the status of the stock corresponds to the analyses performed using only fishery dependent data.

As for the Mediterranean stock, basic information of Task I and Task II data from the fisheries is incomplete and biological information of the stock is still poor.

The 2007 Commission meeting resumed in Recommendation 07-02 to conduct an assessment of the North stock in 2009.

North stock schedule for tasks to be done prior to the assessment session in 2009

Data (Task I and Task II) up to 2007 will be analyzed for assessment of the status of stock and shall be available by May 15, 2009. In this way the Secretariat will proceed to update (2005-2007) the sampling data base needed for Multifan-CL modeling by May 30 and circulate it among national scientists. Likewise the catch-at-size (CAS) updated from 1975-2007 and the conversion for this time period of catch-at-size (CAS) into catch-at-age (CAA) will be finalized by June 30.

This schedule of tasks will allow updating the assessment with both VPA-Adapt and Multifan-CL models.

Standardized CPUE series for all the main surface and longline fleets exploiting the North will be available by June 30, 2009.

Before the assessment session a website will be set by the Secretariat to help exchange and prepare data on Multifan-CL. Input data for Multifan-CL shall be finalized one month (30 days) prior to the assessment session scheduled for mid-July 2009. Moreover, a video conference facility can be set by the Secretariat in order to discuss issues related to the modeling of the albacore stock on agreed dates among participants of the albacore Committee after June 30, and prior to the assessment session.

General tasks and on going research activities for 2009

Increase the coverage of Task II data for major fleets in the Atlantic and Mediterranean, especially, for longline fisheries of the North and South stocks.

Develop standardized CPUE series for the main surface and longline fleets exploiting the South Atlantic albacore to monitor the evolution of the relative abundance indicators of the stock.

Continue to investigate the conversion of catch-at-size (CAS) into catch-at-age (CAA) for both North and South Atlantic albacore stocks (i.e. length slicing methods, age-length keys derived from aging methods).

Studies on fecundity and maturity for both North and South albacore are needed to better estimate the potential spawning stock biomass.

Initiate tagging electronic experiments of North and South Atlantic albacore stock as the only possible mean to obtain independent datain order to understand the dynamics of this stock.

Examination of the effects of markets on the catch rates of Atlantic albacore will contribute to understand the observed trends in the fisheries.

Bluefin Tuna Work Plan

The Bluefin Tuna Species Group reiterates the fact that, unless substantial improvements are made in the catch and effort statistics or new information on key issues is available, there is little scientific need to perform a stock assessment every two years. Furthermore, any change in exploitation or management will take several years to have a detectable effect on bluefin tuna biomass because bluefin is a long lived species. Therefore, the Bluefin Tuna Species Group does not plan to conduct a new comprehensive assessment for the three to four coming years., In the interim if adequately funded, the Bluefin Tuna Species Group plans to focus efforts on the research activities outlined within the Bluefin Year Program and within the proposed Bluefin Research Plan, such as tagging, otolith microconstituent analyses, genetics, etc. This interim will further give the opportunity to the Bluefin Tuna Species Group to improve models for evaluating Bluefin dynamics and status (which can hardly be done during a stock assessment year), including operating models that incorporate spatial variability and mixing as an example. The preliminary work of the SCRS has indicated that mixing has fundamental importance for the assessment of both eastern and western stocks, and the research work planned will improve our knowledge in this critical area. The overall approach would allow the Bluefin Tuna Species Group focus on important or novel issues regarding data and models which will thus improve the quality and credibility of future assessments.

Swordfish Work Plan

North and South Atlantic

Assessment. In conformity with Recommendation [06-02], it is recommended that the next North and South Atlantic swordfish stock assessment be conducted in September 2009. The priority for the north stock assessment is to monitor the status of the stock relative to B_{MSY}.

The Atlantic assessment will be completed in five days. Given this timeframe, it is envisaged that the 2009 assessment will update the approaches used in the 2006 assessment. To accomplish this, the lumped biomass production model analyses will be updated using data to the end of 2007, or 2008 where available, and include 5-year projections Action: National Scientists

Catch and effort data and reporting deadlines. The deadline for submission of Task I and II data is July 31, 2009.

Combined biomass index. It is recommended that scientists from Japan, Canada, Portugal and the United States coordinate their work before the meeting (possibly using videoconference), with the goal of updating the index prior to the start of the assessment. Action: National Scientists.

Catch-at-size data. Catch at size is desirable to evaluate the effects of regulations. Catch at size should be available at the beginning of the meeting. Action: Secretariat.

Mediterranean

Catch and effort. All countries catching swordfish (directed or by-catch) should report catch, catch-at-size (by sex) and effort statistics by as small an area as possible (5-degree rectangles for longline, and 1-degree rectangles for other gears), and by month. It is recommended that at least the order of magnitude of unreported catches be estimated. The Group noted that it is important to collect size data together with the catch and effort data to provide meaningful CPUEs. Although CPUE by age is the usual input for the age-structured analyses, the Group recognized that this must be based on an increased level of sampling, not merely substitution of the current data. Therefore, it is recommended that increased sampling take place so that CPUEs can be developed by age. Action: National Scientists.

Age determination. Recent research work has indicated that estimates of age at length from direct ageing studies vary within the Mediterranean on a geographic basis. To avoid the possibility that such variation results from differences in age determination methods, national scientists were encouraged to exchange spine sections and share age determination methodology. Action: National Scientists.

Gear selectivity studies. Further research on gear design and use is encouraged in order to minimize catch of age-0 swordfish and increase yield and spawning biomass per recruit from this fishery. Action: National Scientists.

Management. The Working Group recommends that future work should consider a broader set of management scenarios including, apart from seasonal fishery closures, modifications of the fishing gears, fishing capacity reductions, minimum landing size regulations (MLS) and quota limitations. Economic aspects should be also considered. Action: National Scientists.

Billfish Work Plan

Summary

The Working Group proposed to conduct the next assessment of sailfish in 2009.

The Working Group is planning new assessments for blue marlin and white marlin in 2011, with a preceding data preparatory meeting to be held in 2010. To achieve this, the Working Group needs to continue with developing methods to better interpret the historical changes in billfish CPUE from longline data; and, the continued improvement of biological parameters, catch and relative abundance of marlins.

Background

The last stock assessments for blue marlin and white marlin were conducted in 2006. No assessments have ever been conducted on spearfish. The last attempted assessment for sailfish (2001) was unable to estimate biological reference points such as maximum sustainable yield or the current state of the stock, mainly because of the uncertainty in the basic data required in the assessment. ICCAT has invested in billfish research for the purpose of improving the quality of data needed for stock assessments. However, additional information is still required to elucidate biological characteristics (e.g. defining essential habitat, survival, and growth), catch statistics (particularly for artisanal fisheries), and relative abundance indices.

Work completed in 2008

− A data preparatory meeting for the sailfish assessment was held in May 2008.

- The estimation of age and growth parameters has been completed for white marlin. Work is in progress on an equivalent study of blue marlin, while new studies are just getting underway for sailfish and longbill spearfish.
- A study on blue marlin reproduction off West Africa was completed, but similar work on sailfish in the same area requires an additional year for completion.
- A research project is underway to identify genetic biomarkers for Atlantic billfishes, with emphasis on delineating the genetic stock structure of white marlin and roundscale spearfish. The project is supported through international collaboration and facilitated by members of the ICCAT Billfish Species Group.
- Research on vertical habitat of sailfish and white marlin expanded in 2008, whereas equivalent research on blue marlin was conducted in earlier years.
- The review of billfish catches from artisanal fleets continued, especially in West Africa; however, a more recent smaller initiative has started in the Caribbean with a study in the Dominican Republic.
- New relative abundance indices for sailfish were obtained from several recreational, artisanal and longline fleets. Several previously available sailfish indices were updated. A new index was obtained for West African blue marlin.
- A review of Atlantic-wide sailfish catches was conducted, however, there is still a need to separate spearfish from some of the historical longline catches. To that extent, preliminary ratios of sailfish/spearfish have been developed by 5 degree grid.

Proposed work for 2009

Work can be separated into two major programs, one aimed at preparing the next sailfish assessment, and the other at preparing for future blue marlin and white marlin assessments.

In preparation for the 2009 sailfish assessment the following analyses are required:

- Continue the collection and analysis of biological samples to study the age, growth and reproduction of sailfish in Côte d'Ivoire.
- Continue the efforts of reviewing catch estimates, especially for those countries that are known to land sailfish but do not report it to ICCAT.
- The relative abundance indices of the following fleets need to be updated to provide estimates that include the year 2007:
  - Japanese longline
  - Chinese Taipei longline
- Analyses of data from the following artisanal fleets need to be initiated, or completed, to obtain new relative abundance indices for all important artisanal fleets:
  - Côte d'Ivoire
  - Ghana
  - Sao Tomé and Principe
- If possible, updates should be conducted for those indices presented before the 2009 sailfish assessment so that they include data through year 2007. Additionally, a summary of all available size frequency data should be provided for all fleets.
- In order to prepare for an assessment of blue marlin and white marlin in 2011 the Working Group should prepare and plan for a marlin data preparatory meeting in 2010 that focuses on:
  - developing methods and data analyses that can facilitate the interpretation of historical longline CPUE indices;
- accounting for under-reporting in the fleets that have been required to release marlins;
  - recovering and compiling statistics on marlin catches made by FAD fisheries from the Caribbean;
  - Use genetic analyses to review the reliability of species identification for marlins and spearfish, as reported by the various fleets and observer programs;
  - Post-release survival of marlins.

Small Tunas Work Plan (2009-2010)

- 2009: Priority in ICCAT for the data collection of all small tuna species.
- 2009: First priority data collections on the following species:
  - Mediterranean and Black Sea: Bullet tuna, Atlantic bonito, little tunny and plain bonito;
  - West Africa: Atlantic bonito, little tunny, bullet tuna and West African Spanish mackerel;
  - Caribbean area: Blackfin tuna and serra Spanish mackerel.

The Small Tunas Species Group considers that cooperation should be possibly established between ICCAT and other RFOs in areas within the ICCAT Convention, because of the nature of the small tuna fisheries, which usually necessitate a deep knowledge of coastal artisanal fisheries. It recommends that the Commission examines this opportunity and if approved, pursue the necessary steps to achieve the desired cooperation agreements between ICCAT and concerned RFOs.

If the formal cooperation agreements with other RFOs cannot be supported at this time, a secondary option would be for the SMTG to try to establish contacts with national scientists in the various areas with the purpose to develop informal collaboration at the scientific level.

- Spring/summer 2009: preparatory work for data collection on small tunas in W. Africa, Caribbean area, Mediterranean countries where data on small tunas are not provided.

  The preparatory work should be conducted by a web-based / video conference strategy, after a possible agreement with the RFOs concerned (CECAF, CRFM, WECAF and GFCM), in direct contact with all CPCs and local scientists concerned.

- Late spring/beginning summer 2009: to be eventually agreed by the ICCAT with CECAF-Joint ICCAT/CECAF meeting on small tuna species fisheries in West Africa.

  This is considered as an essential meeting to start a process of data gathering and data sharing in the area, including the artisanal fisheries and the by-catch in other fisheries (like the small pelagic fisheries). EC countries having fishery permits in the area, West African coastal countries and other countries having fishery permits in the area should be invited.

- 2009: Data mining in all areas where catch statistics and biological data are lacking, largely incomplete or apparently inconsistent. This exercise should be continued at national level, with the support of RFOs when possible.

- Summer 2009: for the CPCs concerned: provide local stock assessments results and reports to ICCAT.

- September/October 2009: SCRS/ICCAT Small Tuna Species Group – Evaluation of the data availability for the most relevant species, with the purpose to identify and plan priority stock analyses to be undertaken, as agreed, during proposed joint ICCAT/regional RFO Spring/Summer 2010 meetings, and to identify practical methods to fill the gaps.

- Spring/Summer 2010: to be eventually agreed with WECAF and CRFM-Joint ICCAT/WECAF/CRFM Meeting on Small Tuna Species in the Caribbean Area.

- Spring/Summer 2010: to be eventually agreed with GFCM – Joint ICCAT/GFCM Meeting on Small Tuna Species in the Mediterranean and the Black Sea (with a particular attention for the coastal countries not reporting catches of these species).

Sharks Work Plan

Background

In the assessment meeting held in September 2008, some of the problems that were already discussed in the 2004 assessment meeting and the data preparatory meeting in 2007 persisted. The missing total or partial data for Task I and Task II, lack of standardized CPUE series for some fleets as well as biological information produced great uncertainty in the assessment. Besides these problems was the non participation of scientists of some of the Parties which have important catches of these species. This situation does not only occur for this group and raises a problem which should be resolved through a solid commitment on behalf of Parties.

Proposed work

Develop standardized CPUE series for future assessments, for as many species as possible, for all major fleets that exploit North and South Atlantic shark species, as either target or by-catch. For this purpose, generating collaboration among Parties would result in the exchange of knowledge, encouraging agreements or specific projects, which could be financed by the ICCAT funds for capacity building.

Develop a more extensive and improved database for updating the Environmental Risk Assessment (ERA) conducted in 2008. In this regard, researchers are encouraged to conduct studies on the life history of shark species and provide available information in their countries for incorporation in future assessments. Information on fishing operations, status, disposition (fate) and size of the animals caught (collected in observer programs) is needed to estimate susceptibility and thus produce fleet-specific ERAs.

The species that should be inserted in the guide were identified and the development of the guide is foreseen in the first half of 2009.

Considering the Commission's request, a proposal is presented to assess the North Atlantic porbeagle stocks jointly with ICES. Task I and Task II information from all the Parties, as well as standardized CPUE series for this species, should be made available as soon as possible.

There is a need to obtain CPUE time-series and other fishery-independent information to determine whether the assessments conducted using fishery-dependent data only are correct.

Electronic tagging programs for shark stocks should be initiated or encouraged to obtain fishery-independent data and information related to habitat.

Appendix 6

BLUEFIN YEAR PROGRAM (BYP) ACTIVITIES

Introduction

The Bluefin Tuna Year Program (BYP) Working Group reviewed the progress made under this program during 2007-2008 conducted by the BYP funded research projects. The current financial status was reviewed and the BYP funded research projects for 2008-2009 was discussed. The primary areas of research considered important by the Working Group are data mining of bluefin tuna purse seine catch and effort in Norway during 1950-1970, bluefin tuna larval survey, biological sampling for stock structure, ageing and maturity. While the above-mentioned activities are high priority of the BYP, it was also considered important to enhance the coordination for tagging and larval sampling. The Committee recommends the Commission to endorse the initiation of a large-scale Bluefin Research Program, given the amount and number of tasks that the scientists should address in order to meet the Commission's request. It should be noted that the BYP fund is seed money to start off the research subjects prior to the large-scale Bluefin Research Program. It is obvious that future funding levels need to be significantly expanded. In this sense, the Committee welcomed the recent research funds by the EU made available for bluefin research to the various EU members. The biological sampling under the BYP framework has contributed to obtain good results. Active and efficient coordination is also essential in order to bring high quality research results.

1. Financial report

The financial status of the BYP funds through October 1, 2008 was reviewed. With the expected 2008 Commission contribution of €14,588, the 2008-2009 BYP operating budget should be on the order of €30,000 **(Table 1)**.

2.1 Western Atlantic

2.1.1 Biological sampling

A sampling program for bluefin tuna funded by BYP has continued since 2004 in North Lake, Prince Edward Island, Canada. Sampling was continued in 2008 with national funding. Fish are sampled for hard parts and DNA material for ageing and stock structure studies. The Gulf of St. Lawrence bluefin tuna fishery provides a unique opportunity to sample large bluefin since the fish are landed in the whole condition and dressed on the wharf.

2.2 Eastern Atlantic and Mediterranean

2.2.1 Biological sampling

The main objective of biological sampling within the BYP is to support research on stock structure by means of genetic analyses (tissue) and microconstituents analyses (otoliths); research on reproduction (gonads) and research on growth (spines, vertebrae and otoliths). Sampling in the eastern Atlantic as well as the whole Mediterranean was accomplished.

The IEO (Spain) has carried out a series of studies on the biological parameters of bluefin tuna in the western Mediterranean. Samples were taken for studies on reproduction (maturity and fecundity), age and growth (spines, otoliths), as well as for the study of stock structure (otoliths for micro-constituents) and genetics. The samples taken for each study are summarized in the following table:

Mediterranean BFT (IEO- Spain)	
Maturity sampling (gonads)	164
Genetic sampling (muscle)	307
Growth sampling (spines)	350
Otoliths sampling	49

For the 2007-2008 period, Turkey carried out specific research activities on bluefin tuna fisheries and biology.

As for the Italian biological sampling activities, more than 100 spines were collected from bluefin tuna caught in all the Italian fisheries in the Mediterranean.

2.2.2 Larval surveys

A tuna larval survey in the eastern Mediterranean was carried out in 2007 by Turkey. This survey in this area will continue in the coming years.

In addition, the scientific team TUNIBAL (IEO-Spain) engaged in different types of activities during the 2007. These activities include planning of future researches, larval bluefin surveys that address small-scale movements off the Balearic Sea and the presentation of TUNIBAL research results at different fora. Future research was contemplated within the 7th EU Framework for which a meeting was held in Séte, France, March 6-7, hosted by IFREMER. A multi-disciplinary project for bluefin (METROPOLIS) was designed and presented to the EU, in which importance of bluefin larval ecology study was strongly emphasized.

2.2.3 Review of ongoing tag recovery programs and related research activities in Contracting Parties

Regarding Croatian tuna tag recovery activity for the period 2007-2008 (November 2007-January 2008), two observers were hired for the purpose of better recovery of tag at the bluefin tuna harvesting sites near the growth-out rearing cages at different farming places (Drvenik-tuna, Kali-tuna, Marituna and Jadran-tuna). Much of the observer's attention was specifically paid to the medium and larger bluefin tuna specimens (captured in the Mediterranean and imported from other countries´ catch quotas) because these large fish could have higher possibility of carrying tags. In total, they investigated approximately 12,000 medium and large bluefin ranging between 160 and 285 cm in fork length. Among these fish, observers found and recovered tags from three fish (one archival tag, one basal part of pop-up tag and one conventional tag). Furthermore, observers made an effort to recover tag recovery information provided last year by Marituna, which was reported but subsequently lost at the end.

Tagging activities of Italy in 2007-2008 were carried out by the University of Bari and 10 bluefin tuna (spawning size) were tagged using electronic satellite pop-up tags;

As regards to tuna tagging activities in Spain, a collaboration agreement for tagging was signed in collaboration with the Mediterranean Confederation for Responsible Recreational Fishing (Confederación Mediterránea para la Pesca Recreativa Responsible). The agreement contemplates to provide technical courses to learn how to tag fish for sport fishers by IEO staff. In turn, Confederation committed tagging and release contests. The development of the "Desafío Mediterráneo" (Mediterranean Challenge) contest, carried out at various ports along the Spanish Mediterranean coast, has resulted in the tagging of 275 bluefin tuna in the 50-130 cm (FL) size range. Besides, during the contests 33 internal electronic tags were placed as part of the activities foreseen in the MIGRATUN project, in which the University of Cadiz and the IEO participate, in collaboration with WWF-Adena. The tagging carried out during the "Desafío Mediterráneo" contests are considered to be of great interest since the tagging takes place in different areas and occasions and on tunas of different ages. This activity will continue in the future (SCRS/2008/188).

In addition, bluefin tuna electronic tagging was accomplished under the supervision of the IEO (Oceanographic Center of Malaga) in collaboration with the University of Bari and with the participation of the following companies: Tuna Graso, S.L., Pesquerías de Almadraba, S.L., and Taxon Estudios Ambientales, S.L. Fish caught by the Barbate (Cadiz) trap were tagged during feeding migration. In total, 9 fish were tagged, using various combinations of tag anchors. The estimated weight of the tagged fish varied between 77 and 188 kg. In addition, and jointly with AZTI, 144 internal tags were placed on yearling tuna in the Bay of Biscay (in the framework of the European Tuna Tagging Program.

From 2006 to 2008, EC-France conducted tagging on bluefin tuna in the Mediterranean. This was carried out within the framework of the DG MARE program to collect data, by deploying 11 pop-up electronic archival tags on fish weighing from 30 to 50 kg (for which we have little information on migratory routes) off Marseilles (northwestern Mediterranean) through sport fishing contests. Five other tags of the same type were deployed in the summer of 2008; four others will be placed this fall. EC-France has also assured scientific coordination of a conventional tagging program implemented by the recreational fishers from the Fédération Française de la Pêche en Mer (FFPM) (French Federation of Fishing at Sea) which was started in 2006 and has been actively continued

since then. This program, which is carried out in contact with the ICCAT Secretariat has resulted in the deployment of 400 conventional tags in 2007.

2.2.4 BFT ageing coordination

Atlantic bluefin tuna length distributions of baitboat fisheries, both in the Bay of Biscay and areas close to the Strait of Gibraltar, as well as trap catches from the Spanish Atlantic coast were converted to age distributions using age length keys from calcified structures. Relative abundance and mean size by age analyses were accomplished in search of an exceptionally abundant cohort in the last 20 years. Results showed a relationship between juveniles' fisheries in the Bay of Biscay and the Strait of Gibraltar (SCRS/2008/066).

New information (SCRS/2008/084) presented a novel approach for determining age and area of natal origin from the same otolith, allowing construction of area-specific growth curves. The preliminary results diverge considerably from the age-length relationship used by the SCRS for the western stock, and could have significant impacts for estimates of stock productivity (SCRS/2008/091). Estimated growth from age interpretations of juvenile bluefin tuna vertebrae was compared across two different cohorts. Analysis of covariance indicated that growth rates were the same between the two cohorts and future work was proposed for additional cohorts and age groups (SCRS/2008/168).

3. BYP Research Plan for 2008-2009

The following research plans are determined as BYP funded projects:

3.1 Data mining purse seine catch and effort for bluefin tuna in Norway during 1950-1970

Detailed purse seine catch and effort data for bluefin is quite important to investigate the CPUE during the 1950-1970, as this index will be used in the east Atlantic bluefin tuna stock assessment. Detailed logbook data are available and will be digitized.

3.2 Tuna larval survey in the eastern Mediterranean by Turkey

In order to determine the spatial distribution and abundance of tuna larvae, Turkey is planning a larval cruise in June 2009 in the eastern Mediterranean Sea. A commercial Turkish trawler is used and about 90 bongo net tows are scheduled. Turkey has undertaken bluefin larval survey during the past years. It is also essential to hold workshops and/or meetings with the purpose of establishing a common sampling strategy, methodologies, and solving taxonomic issues in the identification of bluefin larvae.

3.3 Biological sampling in Morocco

Biological samples and various size measurements data will be collected from fishes caught in the Moroccan Atlantic traps targeting the adults during the period from April to August. Biological samples include gonad, otolith, tissue, spine, liver and vertebrae. The sampling will be conducted with a frequency of 10 days per month, by two biologists and a technician, during the trap fishing season (May-June); a total of 20 sampling days will be spent in tuna traps.

3.4 Tagging coordination meeting

Various tagging activities are being conducted in the Mediterranean Sea as well as east Atlantic. In order to better exchange information and to coordinate these activities, some coordination meeting is necessary.

4. Other Research Plan for 2008-2009

In addition to these plans, various research projects are going to be executed utilizing other fund.

The TUNIBAL research team has submitted a project proposal under the Spanish Research Council (Spanish Ministry of Education) which contemplated a global study on the bluefin spawning habitat using the TUNIBAL survey series dating from 2001 to 2005.

4.2 The MIGRATUN project, which studies bluefin tuna migrations using electronic tags, will continue in 2008-2009. The National Plan of Basic Data for the Common Policy of the European Union is also expected to continue, and the preliminary results will be discussed at a meeting to take place soon in Sète (France).

4.3 In October 2008, EC-France will organize the final meeting of the tuna tagging group that has been carried out in the scope of the DG MARE data collection program (previous meetings on coordination of this program were held in Malta and in Crete in 2006 and 2007). The objective of this working group is to synthesize the major results obtained on bluefin tuna and swordfish in the framework of the European program and to develop a proposal for a new tagging program (which has been halted in 2008). The overall data obtained in the scope of this program should be transmitted to the ICCAT Secretariat through the Contracting Parties involved.

Table 1. Recommended 2008-2009 BYP contributions to bluefin research (€), balance at October 2, 2008.

Project description 2008-2009	*BYP Fund*	*Balance*	*Research Priority*
		14,566	
Anticipated 2009 Commission contribution	14,588	30,931	
Planned expenditures in 2008-2009			
1. Data mining for BFT catch and effort data in Norway during 1950-1970	15,000	15,931	1
2. Larval survey in the eastern Mediterranean Sea by Turkey	9,000	6,931	1
3. Biological sampling in Morocco	3,000	3,931	2
4. Tagging coordination meeting	1,500	2,431	3
Contingencies	2,431	0	

Appendix 7

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH
EXECUTIVE SUMMARY
(Expenditures/ Contributions 2008 & Program Plan for 2009)

Summary and Program objectives

The ICCAT Enhanced Research Program for Billfish (IERPB), which began in 1987, continued in 2008. The Secretariat coordinates the transfer of funds and the distribution of tags, information, and data. The General Coordinator of the Program is Dr. David Die (USA); the East Atlantic Co-coordinators were Mr. Paul Bannerman (Ghana) and Mr. T. Diouf (Senegal), while the West Atlantic Coordinator is Dr. Eric Prince (USA). The billfish tagging database is maintained at the NMFS Southeast Fisheries Science Center (Miami, Florida) and at the ICCAT Secretariat.

The original plan for the ICCAT Enhanced Research Program for Billfish (SCRS 1986) included the following specific objectives: (1) to provide more detailed catch and effort statistics, particularly for size frequency data; (2) to initiate the ICCAT tagging program for billfish; and (3) to assist in collecting data for age and growth studies. During the 2005 and 2006 Billfish Species Group meetings, the Working Group requested that the IERPBF also focus its objectives to evaluate habitat use of adult marlin using electronic tags. The Working Group believes that these data will facilitate use of more sophisticated models for billfish assessments. Efforts to meet these goals continued during 2008 and are highlighted below.

Over the last few years financial support to the program has been eroding and compromising its ability to reach its objectives. It is imperative that all parties provide financial and in-kind support to the program so that the program continues to deliver the useful data and knowledge it has produced to date. This is especially critical because the largest portion of billfish landings is now coming from countries that depend on the support of the program to collect fishery data and biological samples.

2008 Activities

The following is a summary of the activities of the program; more details of activities conducted in the western Atlantic can be found in SCRS/2008/171. Eleven observer trips onboard Venezuelan longline vessels were completed between August 2007 and July 2008. Sampling of Venezuelan artisanal catches also continued at Margarita Island and the central coast of Venezuela. Biological sampling from both the pelagic longline and artisanal Venezuelan fisheries has provided large numbers of spines and gonads for age, growth and reproductive studies of blue marlin and white marlin. Notably, this program recovered 59 tagged billfish between October 2007 and August 2008.

Brazil continued the collaborative program with U.S. institutions that started in 2005 and focused during 2008 on testing the performance of circle hooks on board commercial vessels, deploying pop-up satellite tags, tissue sampling for genetic analyses, and fin spine sampling for age and growth studies. Bermuda continued to collect biological materials during billfish tournaments. With IERPB support, Uruguay started collecting samples this year for age, growth and genetic analysis of billfish onboard longline vessels.

In West Africa the program continued to support a review of billfish statistics in Ghana, Senegal and Côte d'Ivoire. Improvements of catch records from these countries are reflected in the Task I tables for billfish, and were obvious during the 2008 sailfish data preparatory meeting. Support of this program facilitated the estimation of relative abundance indices for Cote d'Ivoire and Senegal during 2008.

Documents that were produced with the benefit of direct support of the IERPB were SCRS/2008/039, 040, 041, 046, 049, 080, 082, 133, 157, 171 and 174.

2009 Plan and activities

The highest priority is to support improvement in the statistics of artisanal fisheries Atlantic-wide and estimation of relative abundance indices for sailfish from these fisheries. Other important activities include the support for

the continuation of the monitoring of the Uruguayan, Venezuelan and Brazilian longline fleets through onboard observers, reporting of conventional tags, and biological sampling. All these activities depend on successful coordination and adequate support resources. IERPB activity details for 2009 are provided below, while a corresponding budget is detailed in **Table 4**.

Shore-based sampling

Sampling of artisanal and small scale fisheries to support the estimation of catch and effort statistics will be focused on fleets contributing the largest parts of the catch and/or those having traditionally provided the higher quality data in the past, to ensure the preservation of an uninterrupted time series of catch and relative abundance indices.

West Atlantic

Sampling at landing sites will be conducted for the following fleets: billfish tournaments from Bermuda, southeastern Brazil, Fernando de Noronha Island, and other locations off northeastern Brazil; longline landings in Venezuela, Uruguay and Brazil; and, gillnet landings in central Venezuela.

East Atlantic

Monitoring and sample collection will be supported for the gillnet fisheries of Ghana, CÔte d'Ivoire and Senegal as well as the recreational fishery off Senegal. The program will support efforts to recover data on billfish catch and effort from contracting parties in the Southeast Atlantic (Gabon, Sao Tome and Angola). This will complement improvements made with the support of the ICCAT data improvement program.

At-sea sampling

West Atlantic

Continued support will be provided to the sampling made onboard the Uruguayan, Venezuelan, and Brazilian vessels that have been supported in the past by the IERPB.

Critical habitat of billfish using pop-up satellite archival tags

Several on-going projects are evaluating habitat use and critical habitat needs of blue and white marlin using pop-up satellite archival tag technology. These projects are independently funded but will require the support of the program to facilitate coordination.

Tagging

The program will need to continue to support conventional tagging and recapture reporting conducted by program partners.

Biological studies

Efforts to collect biological samples for genetics, reproduction, age and growth studies requires IERPB support to facilitate cooperation from fleets that are monitored with IERPB funds. The emphasis of biological sampling for age, growth, and reproductive studies will now be directed at sailfish and longbill spearfish.

Coordination

Training and sample collection

Program coordinators need to travel to locations not directly accessible to promote IERPB and its data requirements. This includes travel to West African countries as well as the lesser Antilles and South America by the General Coordinator and the Coordinator for the West. Strong coordination between activities of the IERPB and the ICCAT data improvement project will continue to be required.

Program management

Management of the IERPB budget is assumed by the Program Coordinators, with the support of the Secretariat. Reporting is also the responsibility of the coordinators. Countries that are allocated budget lines for program activities need to check with the respective Program Coordinators (East or West) for approval of expenditures before the work is carried out, and need to invoice ICCAT to obtain allocated funds after completion of work.

2008 Budget and Expenditures

This section presents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 2008. The 2008 budget recommended by the Billfish Species Group for IERPB was €47,650. The only new contribution made to the IERPB during 2008 was an allocation of €20,000.00 from the regular ICCAT budget. Carryover funds remaining from previous years were €3,232.28, thus total funds available for 2008 were €23,232.28 **(Table 1)**. As a consequence some of the activities of the program were not carried out. To date, expenditures during 2008 were €12.430.55, but estimated expenses at the end of 2008 are €23,030.55. The estimated balance of the program at the end of 2008 is €201.73 (**Table 2)**.

In-kind contributions to the Program continued to be made during 2008. Since 1996, the FONAIAP (Venezuela) and since 1997, the Instituto Oceanográfico (University of Oriente) has provided personnel and other resources as in-kind contributions to the at-sea sampling program, thereby reducing the amount of funds needed for this activity from the ICCAT billfish funds. Also, the Program Coordinator traveled to the Dominican Republic to oversea IERPB work. Travel expenditures for this last trip were absorbed by the U.S. National Marine Fisheries Service, the University of Miami and, as such, represented in-kind contributions to IERPB for 2008. Ghana and Senegal provided in-kind contributions by support labor provided by Mr. P. Bannerman and Mr. T. Diouf (Senegal), the Co-coordinators for the East Atlantic.

2009 Budget and requested contributions

The summary of the 2009 proposed budget, totaling €42,350 is attached as **Table 3**. The Species Group requests that the Commission increase its contribution to **€30,000** for 2009 to cover the most critical parts of the 2009 IERPB (see **Table 4**). This includes funding to monitor catches of longliners in Venezuela, Brazil, Uruguay, and the artisanal fleets of the Caribbean and West Africa. This increase will allow for covering high priority program activities as detailed in **Table 4**. Some high priority program activities were curtailed in 2008 because of budget limitations. The requested contribution from ICCAT and voluntary contributions of **€12,500** from other sources are necessary to fully implement the IERPB 2009 Program Plan.

The consequence of the Commission failing to provide the requested contribution of **€30,000** will be to stop or reduce program activities for 2009 including: (1) important at-sea observer trips in Venezuela, Uruguay and Brazil; (2) coordination travel for the eastern coordinators; (3) sampling of artisanal fleets in the western and eastern Atlantic (4) sampling necessary for age and growth and genetic analyses; (6) conventional tagging activities, including the distribution of tag recovery incentive rewards.

Conclusion

The IERPB has been credited for major improvements in the data supporting the last two ICCAT billfish assessments, and has already supported improvements in data in preparation for next year's sailfish assessment. If the IERPB program were to be terminated due to lack of funds, essential research and monitoring activities that are now supported by the Program will suffer and the Species Group will be in a difficult position to address the needs of the Commission. Although considerable benefits will accrue from various outputs of the ICCAT data improvement program, the IERPB is the only Program that exclusively focuses on billfish. By having this focus it is in the best position to ensure that the research and monitoring activities not covered by the ICCAT data improvement program are given some minimal resources. The IERPB is an important mechanism towards completing the goal of having the highest quality information to assess billfish stocks.

Table 1. Summary budget for 2008 for the Billfish Program.

Source	*Euros (€)*
Balance at start of Fiscal Year 2008	**3,232.28**
Budget recommended by the Working Group	47.650.00
Income (Allocation from ICCAT Regular Budget)	20,000.00
Expenditures and obligations (for details see **Table 2)**	-23,030.55
BALANCE	**201.73**

Table 2. Detailed 2008 Budget & Expenditures (as of September 25, 2008).

			Euros (€)
Balance as of December 32, 2007			3,232.28
Income	ICCAT Comission		**20,000.00**
Expenditures	(as of 25 sept 2008)		**-12,430.55**
	Venezuela	1-2 quarters	-4,350.00
	Côte d'Ivoire		-3,000.00
	Uruguay		-2,000.00
	Ghana		-3,000.00
	Bank charges		80.55
Balance as of September 25, 2008			**10,801.73**
Funds obligated until end of 2008			
	Venezuela	3 & 4 quarters	**-3,500.00**
	Brazil		**-4,000.00**
	Senegal		**-2,500.00**
	Tag reward		**-500.00**
	Bank charges		**-100.00**
Total obligated			**-10,600.00**
Total estimated expenditures			**-23,030.55**
Estimated balance December 31, 2008			**201.73**

Table 3. 2009 Summary budget of the ICCAT Enhanced Research Program for Billfish.

Source	*Euros (€)*
Balance at start of Fiscal Year 2009	201.73
Budget recommended by the Working Group	42,350.00
Income (Requested from ICCAT Regular Budget)	30,000.00
Other contributions	12,500.00
Expenditures (see **Table 2)**	42,350.00
BALANCE	**351.73**

Table 4. Detailed 2009 Budget and Expenditures.

	Amount (€)
STATISTICS & SAMPLING	
West Atlantic shore-based sampling:	
Venezuela	5,000 *
Barbados	1,000
St. Maarten, Netherlands Antilles	1,000
Brazil	2,000 .
Others	2,000
West Atlantic at-sea sampling:	
Venezuela	6,000 *
Uruguay	2,000 *
Brazil	5,000 *
Others	2,000
East Atlantic shore-based sampling:	
Dakar, Senegal	3,000 *
Ghana	3,000 *
Côte d'Ivoire	3,000 *
Others	2,000
TAGGING	
Tag reward	1,500
Lottery rewards	500 *
Outreach	1,000
COORDINATION	
Coordination travel East Atlantic	2,000 *
Mailing & miscellaneous-East Atlantic	100 *
Bank charges	250 *
GRAND TOTAL	**42,350**

Authorization of all these expenditures depend on sufficient funds being available by ICCAT and from other contributions.
* Highest priority to be funded mainly by requested ICCAT contribution. Total budget for these activities is € 29,850

Appendix 8

REPORT OF THE 2008 MEETING OF THE SUB-COMMITTEE ON STATISTICS
(Madrid, Spain - September 22-23, 2008)

1. Opening, adoption of Agenda and meeting arrangements

The Sub-Committee on Statistics met on September 22 and 23, 2008 at the offices of the ICCAT Secretariat. The meeting was chaired by Dr. Mauricio Ortiz (United States); Dr. Guillermo Diaz (Unites States) served as Rapporteur. The Agenda (**Addendum 1 to Appendix 8**) was adopted with minor changes. The Chair reiterated the importance for the Chairs of all Species Working Groups to be present at this meeting. Unfortunately, this year not all Working Groups were represented. The Sub-Committee recommended that the Chairs name a representative delegate if it is not possible for them to be present.

2. Review prior recommendations and actions resulting

The meeting started with a review of last year sub-committee recommendations and the actions resulted in 2008. The Secretariat informed that its Report on Statistics and Coordination of Research 2008 included resulting actions of most of the recommendations adopted in 2008. Request regarding purchases and upgrades of computer and software for the Secretariat were fulfilled and/or are in the process to be. The Sub-Committee recommended that an additional server dedicated exclusively to large complex model (e.g., Multifan-CL) applications that can be easily access from meetings outside Madrid (VPN connection) be purchased. The Secretariat informed that some of the purchases related to improvement of wireless access for meetings has been postponed pending the Secretariat's move to a new building that potentially has already this infrastructure. The Group agreed with this action, but recommended that if the transfer is further delayed to acquire the upgrade software and hardware for improving the wireless access during the meetings. The Group also recommended that software requested last year (S-Plus) and not yet acquired be purchased.

The Secretariat also informed that during 2008 two new staff member were hired. One database expert was hired to take over the VMS database. It was pointed out that the VMS database does not require 100% of the staff's time and that he could collaborate with other tasks in the Statistics group. As requested by the SCRS and approved by the Commission, a data manager was also hired to work on bluefin tuna catch documentation. In summary, these new hired staff will be in charge of statistical data management. However, their support will be dependent on the work load associated with compliance issues (VMS and BFT catch documentation). The Sub-Committee indicated that the Secretariat still needs personnel to work exclusively on scientific support roles. It was noted that the ICCAT Independent Review (Hurry *et al.* 2008[1]) also pointed out to the need of more staff dedicated to science support. It was discussed that personnel working on compliance issues might not necessarily have the training to do science support work. The Secretariat indicated that a recommendation with a more detailed description of the background of the needed staff should be provided for the hiring process.

In reference to last year's recommendation number three: "The Sub-Committee recommended prioritizing the full documentation of the ICCAT database…" the Secretariat informed that some work has been done. But, given the increased number of inter-sessional meetings and the shortage of staff, there is still a lot of work pending. The Group and the Secretariat considers this task is of great importance, and reiterates its priority during the upcoming year's work-plan. Other recommendations from last year included the coordination meeting between the Secretariat and U.S. scientists regarding the transfer protocols for the tagging database. The results of this recommendation are presented later on this report (Section 3.1). The Secretariat also informed that the ICCAT web page was redesigned in 2008 and it has been translated into the three official languages of the Commission.

3. Issues regarding statistical and biological data submitted in 2008

3.1 Task I and Task II

The Secretariat presented its Report on Statistics and Coordination of Research that summarized the submission of data since the last SCRS meeting up to September 2008. It was noted that there was an increase in the

[1] G.D. Hurry, M. Hayashi and J. J. Maguire. 2008. Report of the Independent Review of the International Commission for the Conservation of Atlantic Tunas.

submission of data using the ICCAT electronic forms in 2008. Regarding Task I, the Secretariat indicated that the major issue remains the lack of submission or late submissions by some Contracting Parties (Tables 1, 2, 3 and 4 the Secretariat Report on Statistics and Coordination of Research 2008). It was observed that for some countries there is a total lack of submission of data for 2007. It was noted that few Contracting Parties report zero catch for tunas and tunas-like species (Norway and Iceland) in an annual basis, and that this lack of report makes it difficult to differentiate between non-reporting and no catches. Therefore it was recommended to communicate to the Statistical Correspondents to also include zero catches when reporting using the Task I electronic form. It was also reported that very few Contracting Parties have submitted data regarding fleet characteristics, which should be updated on an annual basis using the electronic form available. The submission of fleet characteristics information has become particularly important because of the Commission interests in controlling fleet capacity as a management tool. The Sub-Committee asked the national scientists to review the data summarized by the Secretariat and provide information on fleet characteristics on a provisional basis if lacking. **Table 1** of this report presents an updated report of the Task I data submission indicating the deadline month for a particular species and the month that the Contracting Party submitted the Task I information.

It was recommended that the deadline for data submission for stock assessment meetings be changed if the original date of the meeting is changed (as was the case for the 2008 Sharks Stock Assessment Meeting).

Discussions regarding deadlines concluded that both the Secretariat and the Species Working Group Chairs should strictly enforce the two-weeks prior to the meeting deadline for data submission. This recommendation should apply for meetings/assessments taking place before July 31. The Sub-Committee recommends that exceptions to this deadline or special circumstances will be the Chair's decision and responsibility and that only the Chair should coordinate with the Secretariat to ensure timely delivery of the data requested for the meeting. It was also recommended that these exceptions be documented in the meeting report. It was mentioned that special data treatments for applications such Multifan-CL will require an earlier submission, and the Chair should coordinate with the Secretariat with sufficient anticipation to assure timely delivery of the data.

The Sub-Committee recommended to the Secretary the implementation of web-based applications that allow web-conference and web-base folder access. These applications will provide the Species Working Group Chairs with logistic tools for reviewing, submitting, updating, and/or correcting data prior to the formal meeting. The Secretariat will provide the operational support and guidelines, while the Chairs will have the responsibility for implementation, determining access rights and permissions to the participant scientist. The Sub-Committee recommends that these web-base applications be ready before the upcoming year meetings, and that the Secretary distribute the instructions and requirements for its use to the Chairs of all Working Groups.

3.2 Tagging data

3.2.1 Report on ICCAT-U.S. tagging coordination meeting

Following last year's recommendation, the Secretariat met with U.S. scientists to coordinate protocols for the transfer of tagging data to the ICCAT tagging database. Details and results of this meeting were presented by the Secretariat in documents SCRS/2008/024 and SCRS/2008/159. The Secretariat informed of the updated structured of the tagging database, following the recommendations from the *Ad Hoc* Working Group on Tagging and also presented the new web-electronic forms for the submission of tag releases and recaptures of conventional and electronic tagging programs. The Sub-Committee approved the new database structure and forms and recommended that scientists present, disseminate, and promote its use. The Sub-Committee noted that the maintenance and update of this new tagging database is an additional task to the already overloaded Secretariat responsibilities. It was recommended that the *Ad Hoc* Tagging Working Group review the quality of the data and consider some issues such as protocols for communications of recovery information and confidentiality of personal information and then communicate to the Secretariat the necessary changes to the database to address these issues.

The Secretariat reported on the great improvement of the tagging data, that resulted from the cooperation between the Secretariat and diverse scientific groups (EC-Spain, US-Tagging Center), and recommended to continue with this type of cooperative revisions and coordination meetings through the *Ad Hoc* Tagging Working Group.

3.2.2 Revision of tagging database and current status

The Secretariat reported on the current revisions of the tagging database, particularly for bluefin tuna tag releases and recaptures indicating that corrections are being implemented and will be finalized in the near future.

3.3 Revisions to historical data

The United States presented document SCRS/2008/173 with updated commercial landings of king and Spanish mackerel in U.S. waters of the Gulf of Mexico and the northwest Atlantic. The largest differences between the data submitted to the Secretariat and the new revision were observed for years prior to 1995. EC-France (SCRS/2008/181) presented a revised landing series of tropical tunas caught off the western African coast. The document reported on catches/landings of Senegal, Côte d´Ivoire and France. The recommendation was sent to the Tropical Tuna Species Group for revision and adoption.

3.3.1 Rules for revising historical data

No changes were proposed or adopted for revision of the historical catch data (Task I). The Sub-Committee reiterates that changes to Task I data should be submitted by an Official ICCAT Statistical Correspondent with an SCRS document fully explaining the rationale for the modifications, which should be revised and approved by the Species Working Group and then approved by the Sub-Committee on Statistics.

3.3.2 Data changes adopted by Species Working Groups and permanent implementation in the ICCAT database

The Sub-Committee noted that some protocols for extraction, partition and allocation by area of total catch, as well as changes to Task II and catch-at-age data, that were approved in prior assessments by the Species Working Group, were not permanently implemented in the ICCAT database. This resulted in delays during the stock assessment meetings and overload pressure for the Secretariat staff. It was therefore recommended that modifications to data treatment and extraction, (that do not include changes to Task I data) which are approved and adopted by a species group should be made permanent in the ICCAT database. To formalize these changes, the Sub-Committee proposed that the Species Working Group Chair submit the algorithms, data, and protocols to the Secretariat with the appropriate documentation. These changes are primarily related to geographic allocation of catch and or effort, sizing and size sample distributions, protocols for ageing the catch, and partition of catch between species.

3.4 Shark statistics

The Sharks Species Group recommended that CPCs report total catch of sharks but not exclusively from tuna fisheries, if the objective of the Commission is to evaluate these resources. It was suggested to review gear codes used to report shark catches in non-tuna fisheries so they can be included in the ICCAT database. However, it was pointed out that there is a danger of duplication of landings with other regional bodies (RFMOs) by including landings from non-tuna fisheries. The Sub-Committee suggests finding ways to work with NAFO and other RFMOs to obtain data on total removals while avoiding duplication of landings at the same time, rather than requesting reporting of non-tuna fisheries catch. Although, it was noted that there was a potential for under-counting from sharks catches outside conventions RFM areas. There was a recommendation to the Shark Species Group to revise and propose appropriate recommendations for obtaining total catches of shark species with particular interest to the ICCAT Commission.

3.5 BFT, SWO, BET Statistical Documents and other trade information

The Secretariat reported on the comparisons between trade statistics and Task I data for bluefin tuna, swordfish and bigeye tuna (Secretariat Report on Statistics and Coordination of Research 2008).

Last year it was recommended that the Species Working Groups standardized the methodology (including live-weight conversion factors for swordfish and bigeye) for using trade data information. No progress has been made in this regard, and the Sub-Committee reiterated this as a recommendation for the Methods Working Group.

3.6 Other by-catch species

During 2008 the Sub-Committee on Ecosystems had an evaluation meeting for Seabird by-catch associated with tuna fisheries. The Secretariat's Report on Statistics and Coordination of Research 2008 reports the results and conclusions of this meeting. The Sub-Committee on Ecosystems Chair reported on a questionnaire distributed to

all CPCs to collect information aimed at creating a meta-database of current and past observer programs and make this information available on the ICCAT web site (see Table 6 of the Secretariat's Report ~~SCI-008/2008~~ for an available response on observer programs metadata). Although the survey specifically addressed the needs of the Sub-Committee on Ecosystems, the Chair indicated that some of the information may be useful for other Species Groups.

4. Updated report on a relational database system

The Secretariat reported on the progress and updates to the relational database and web applications for data dissemination and submission. The Sub-Committee acknowledged the effort and quality of the work carried out by the Secretariat during the year despite the heavy workload due to, *inter alia*, numerous inter-sessional meetings (e.g., stock assessments, data preparatory) in 2008. Given the recent increase in the workload for the Secretariat related to compliance matters and the continuing demand to support ICCAT scientific efforts, the Sub-Committee reiterated its prior year's recommendation that the Commission provide additional human resources to the Secretariat for scientific fishery related support. It was reiterated that the use of web based conferencing tools can help with the coordination of data needs between the Secretariat and the national scientists prior to stock assessments meetings.

The Secretariat informed that progress on the full documentation of the ICCAT database has been made, but due to the large number of intersessional meetings during this year the final product is not yet available. The Sub-Committee reiterates the importance of this task, and recommended it again as a priority task for the Secretariat in the work plan for the upcoming year.

The Secretariat reported an increase in the number of Contracting Parties submitting data using the available electronic forms. But, once again the Sub-Committee recommended moving towards fully electronic submission of data by all Contracting Parties. The Sub-Committee reminded that the inclusion of data in the Annual Report is not considered a formal data submission to the Secretariat.

4.1 Database extractions and support by the Secretariat for Species Working Groups during intersessional and assessment meetings

As noted above (Section 3.3.2), during the 2008 Bluefin Tuna Stock Assessment Session delays and a work overload resulted from data changes made in previous assessments (i.e., Task II) not being included in the ICCAT database as permanent. Therefore, during the assessment meeting the same changes have to be made and approved again by the Group. It is recommended that Task II data and conversions to CAA made during assessment meetings be made permanent in the database. However, working groups should formalize the request by submitting documentation including the changes to be made, algorithms used to convert CAS into CAA, data substitution scheme, etc. The Sub-Committee emphasizes that the decision of introducing changes as permanent in the ICCAT database corresponds to the Species Groups and not the Secretariat.

5. Evaluation of data deficiencies pursuant to [Rec. 05-09]. Analysis and presentation materials

5.1 Data report cards

The Secretariat presented a report of the data submitted during 2008 in the Secretariat Report on Statistics and Coordination of Research 2008. Table 1 of the Secretariat's Report presents a summary by Contracting Party of the Task I data submitted either before (green) or after the deadline(s) (yellow) or not submitted (red) to the Secretariat. The Sub-Committee recommended that Table 1 be updated, specifying fisheries that likely do not catch tuna or tunas-like species, either by actual reports of zero catch or evaluating catches in the last decade. Similarly, the Secretariat's Report (Tables 2, 3 and 4) reported on Task II, size data and fleet characteristics data submitted in 2008 following a similar format as Task I. The Sub-Committee requested the scientists present at the meeting to review the information provided and submit corrections if needed to the Secretariat. A revised table was prepared and presented to Plenary for further review **(Table 1)**.

5.2 Responses to questionnaire on data deficiencies, impacts, solutions and priorities for stock assessment of ICCAT species

Following last year's initiative, the Sub-Committee distributed again this year a questionnaire to the Chairs of the Species Working Groups that had preparatory or assessments meetings during 2008 to follow up changes and or improvements in the data and their impact on the assessment quality and results. This year responses were received from the West Bluefin Species Group Chair, the Sharks Species Group Chair, the Sub-Committee on Ecosystems Chair and the Small Tunas Species Group Chair. A summary of the responses is given in **Addendum 2 to Appendix 8**.

6. National and international statistical activities

6.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)

Section 6 of the Secretariat Report on Statistics and Coordination of Research 2008 reports on the participation and work of the Secretariat with international and inter-agency coordination activities. The Secretariat participated in the 2nd Session of the FIRMS Technical Working Group held in Rome, Italy that focused on establishing equivalent descriptors of the stock status used by RFMO members and the descriptors defined by FIRMS. The Secretariat also informed on the collaboration with the ASFA team and participated in a training course on the ASFA methodology to facilitate and expedite the inclusion of SCRS documents in the ASFA reference database.

The Secretariat also participated in the work of the 1st Session of the Steering Committee of the Project CopeMed II, held in Malaga, Spain (see the Secretariat's report on the scientific meetings at which ICCAT was represented**)**. The objective of this meeting was aimed at defining the major activities during the first year of the project, on the basis of priorities of participating countries and related RFMOs (GFCM and ICCAT). The Secretariat ~~did~~ could not attend the last two inter-sessional CWP meetings held this year.

6.2 National data collection systems and improvements

United States

The United States informed that during 2008 (March-June) it continued with an expanded observer coverage (75%) of its pelagic fleet operating in the Gulf of Mexico with the collection of biological samples from bluefin tuna to conduct studies on stock structure, growth, sex determination and reproduction.

Japan

Japan reported that in 2008 it started collecting size and weight information on every individual bluefin tuna caught together with a program that tags each fish. In addition, Japan formerly started in August 2008 a 10-day reporting requirement to greatly accelerate the collection and submission of bluefin tuna catch data.

Morocco

Considerable efforts have been made during the last years in terms of data collection. For Task I, data are collected exhaustively through fisheries administration authorities involved in numerous landing sites and fishing ports along the 3500-km coastline of Morocco. For Task II, catch-at-size data are regularly collected through a biological sampling network of the National Institute for Marine Research for the main tuna fisheries, bluefin tuna and swordfish, and more recently bigeye tuna, and submitted to ICCAT along with Task I data on a regular basis. In terms of data, on fishing effort in particular, Morocco reported that it is working on a project to recover historical landings and effort data for the main tunas and tuna-like resource. Its intention is that the time series goes back in time as far as possible.

Morocco has an observer program since 1989, launched with the first fishing agreement with EEC, which allowed the Fisheries Ministry to monitor the European fishing fleet. In the particular case of bluefin tuna traps, surveillance and monitoring cover 100% of these traps. During each bluefin tuna fishing season there is one observer on each trap permanently. In 2008, there was one scientific observer on board each purse seiner authorized to fish bluefin tuna out of Moroccan EEZ. There is a strong willingness to strengthen the Moroccan observer program for scientific purposes. For more details, see the Annual Report of Morocco, covering up to 2007.

Chinese Taipei

Chinese Taipei presented a document (SCRS/2008/181) describing the results of a test using an image-system onboard a fishing boat to measure tunas caught. The results indicated a measure margin error on the order of 6.8-4.8% when the system operated on automatic or manual mode, respectively.

Mexico

Mexico reported on a project to recover yellowfin tuna data (catch, effort, size and biological information) in the Mexican waters of the Gulf of Mexico from 1994 to 2007.

EC-France

During 2007-2008 France updated the French albacore data in the northeast Atlantic Ocean for the period 1999-2007. Catch and effort data by one square degree are now available for all gears for 1999-2007 in the ICCAT database.

Following up the 4th meeting of the WCPFC Scientific Committee during which there were serious doubts expressed about the bias faced by the sampling schemes used in the Atlantic, document SCRS/2008/162 discusses the potential biases associated with species and size sampling carried out in the Atlantic Ocean during landings of purse seiners. The conclusion of the paper is that the sampling scheme used in the Atlantic is consistent. However, since large sets are over sampled comparatively to small sets, minor potential biases should be better identified and reduced by improvements in the current sampling and data processing. It is recommended that an international working group is organized to identify these uncertainties and to improve the multi-species sampling schemes and the data processing of their results.

European Community

A recent Council Regulation (EC No. 199/2008) replacing Council Regulation (EC No. 1543/2000) concerns the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy. This regulation includes some important new dispositions relevant for the Sub-Committee, in particular: the institution of a stable multi-annual regional framework, adopting fisheries approach, encouraging coordination between EC countries and third countries, reinforcing participation and cooperation of Member States in the relevant international scientific bodies, encouraging the ecosystem approach of fisheries and the collection of data able to measure the effect of fisheries on the ecosystem (9 indicators) and, finally, various dispositions concerning availability of data to end users and quality controls. Member States national programs will start adopting this framework in 2009.

7. Report on data improvement activities

The Coordinator's Report on Activities of the Japan Data Improvement Project (JDIP) October 2007 to September 2008 reported on the activities and projects supported by the JDIP and the Data Fund programs. The Sub-Committee recommended that the presentations and discussions from these projects be deferred to the SCRS plenary. The Sub-Committee acknowledged the positive impact that these programs made which is evident by the increase participation of scientists from Africa and Latin-America during intersessional meetings, SCRS Species Groups meetings, and fisheries training courses.

7.1 Data recovery activities

EC-Portugal reported on a project to reconstruct catch and effort data from former Portuguese colonies: Saint Tome, Cape Verde and Angola from historical records in the Lisbon National Library and in collaboration with scientists of Angola, Cape Verde and St. Tome. Records extend from 1940 to 1973, with total landings by species and more detailed information from the early 1990s to the present, in particular, from Angola fisheries.

Bluefin data recovery prior to 1950 was started by EC-France, and data were provided to the Secretariat and the Species Group for assessment purposes in 2008. These data included catch and catch at size from trap fisheries and purse seine in the North Atlantic and Mediterranean Sea from 1900 to 1982. Full documentation and a report

will soon be provided and the Sub-Committee recommended pursuing this data mining especially in the northeast Atlantic.

8. Review of publications and data dissemination

Section 5 of the Secretariat Report on Statistics and Coordination of Research 2008 described the publications provided by the Secretariat during 2008. Detailed presentations will be deferred to the SCRS Plenary where all official scientific delegates will be present.

The Secretariat s Report on the development of the first year of the agreement between ICCAT and *Aquatic Living Resources* (ALR) gave details on this agreement. The Secretariat and the Sub-Committee reminds scientists of the need to follow the guidelines for document submission to the SCRS, noting in particular to check the references mentioned within documents.

The Secretariat also reported that tagging posters (4 designs) as recommended and adopted by the *Ad Hoc* Tagging Working Group have been already translated into the ICCAT's three official languages as well as in Italian, Portuguese, Japanese and Arabic with the collaboration of SCRS scientists. The tagging posters are ready for printing and the Sub-Committee encourages national scientists to disseminate and help distribute these posters widely at the major tuna fishing ports in each country.

The seabird poster has also been translated into the ICCAT's three official languages and into Chinese-Mandarin, Turkish, Japanese, and Portuguese. National scientists should indicate to the Secretariat how many posters they need to distribute in their respective countries. Small tuna and shark identification sheets have also been developed for port sampling purposes.

The Secretariat announced that during 2008 it published the Volume 37 of the *Statistical Bulletin*. Because of the cost and time requirements for this publication the Secretariat asked national scientists if there is an interest in continuing with this publication in the present format (presently about 300-400 copies are produced and distributed). The Sub-Committee recommended that the Secretariat ask to all current recipients via email if they prefer the hardcopy or an electronic CD-version or the pdf download version in the web page. Then the Secretariat can make a decision on the preferred format for publication.

8.1 Review of progress made for a revised ICCAT Manual

Chapter 3 is being developed, only pending the description of the longline gear. The other major gear descriptions have already been completed and included in the Chapter, and translated into the three official languages of the Commission. The Secretariat informed that the final *ICCAT Manual* is expected to be ready in 2009.

9. Future pans and rcommendations

1) The Sub-Committee recommends that the Secretariat purchase and install web-based commercial software programs and provide logistic support for creating: (a) web-conferences and (b) web-folder working spaces. While the Secretariat will provide the necessary support it will be the responsibility of the Species Working Group Chairs to use and organize these tools.

2) The Sub-Committee requests that Chairs of the Species Working Groups provide the Secretariat with the algorithms, programs and data needed to make permanent Task II (including catch-at-size dataset) changes to the ICCAT database. It is assumed that these changes were fully revised, approved and adopted by the Species Working Group, and that future assessments and data requests will include such adopted changes.

3) The Sub-Committee recommends that the present deadline of two weeks prior to the start of a meeting for submission of data to the Secretariat be fully enforced by the Species Working Group Chairs. Exceptions or special circumstances will be the Chair's responsibility in coordination with the Secretariat and must be documented. It is important to mention that special data treatments for applications such Multifan-CL will require an earlier submission.

4) The Sub-Committee recommends that the Commission provide additional human resources to the

Secretariat with expertise in fisheries and population dynamics.

5) The Sub-Committee recommends that the Secretariat purchase the software requested last year but not yet acquired, to purchase a server dedicated exclusively to run models for the Species Working Groups that require large computing capacity and to make this machine available for remote access via VPN connections. The Sub-Committee recommends that the Secretariat purchase wireless hardware, access points and software to improve network access during meetings if the move to the new Secretariat Headquarters is delay further more.

6) The Sub-Committee reiterates that the Chairs of the Species Working Groups (or a representative) should be present at the meeting of the Sub-Committee on Statistics.

7) The Sub-Committee recommends that the full documentation of the ICCAT database continue.

8) The Sub-Committee recommends that the Secretariat inquire about the preferred option for publishing the *Statistical Bulletin* volume via email.

9) The Sub-Committee recommends to the Secretariat to inform Statistical Correspondents that they should specify none or zero catch for those species for which they do not have tuna or tuna-like fisheries.

10) Because of the features of bluefin farming/ranching, the Sub-Committee and the bluefin tuna species group strongly recommends that a specific data-form be adopted for submitting biological and other data in addition to Task I obligations. This form should include: Information of initial capture, including flag, geographical position as well as length, weight and number of fish at entrance and exit from the farms along with a record of dead fish during holding. The Committee also strongly recommends the initiation of programs for collecting biological samples, such otoliths, spines, and muscle tissue at harvest and or from dead specimens and for evaluating growth in captivity.

11) Due to potential bias in the species composition and size sampling in tropical tuna purse seine fisheries worldwide, the Committee recommends that the analysis of the multi-species landings of purse seiners be conducted by an ad hoc international working group with tuna scientists from the different RFOs. Such Working Group should have a wide participation of field scientists and statisticians, and should also evaluate all the main potential types of difficulties and errors involved in the multispecies sampling with the aim of optimizing the multispecies sampling and the correction procedure of the catch data.

10. Other matters

No other matters were discussed during the meeting.

11. Adoption of the report and closure

The report was adopted during the meeting, and the meeting was adjourned.

SubCom Stats Report Table 1. Report of the Task I data submission indicating the deadline month for a particular species and the month that the CP submitted the Task I information in 2008.

Deadline for submissi	**Jul**	**Jul**	**Jul**	**Jul**	**Jun**	**Jun**	**Jul**	**Jul**	**Jul**	**May**	**Jul**	**Jul**	**Jul**	**Aug**	**Aug**	**Jul**
	Task-1															
	PA1			PA2			PA3	PA4								
Flag	BET	SKJ	YFT	ALB-N	BFT-E	BFT-W	ALB-S	BUM	WHM	SAI	SWO-N	SWO-S	SWO-M	BSH	SMA	POR
Albania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Algerie	-	-	-	-	Aug	-	-	-	-	-	-	-	Aug	-	-	-
Angola	-	-	Sep	-	-	-	-	-	-	-	-	-	-	-	-	-
Barbados	Sep	-	Sep	Sep	-	-	-	-	-	-	Sep	-	-	-	-	-
Belize	May	-	May	May	-	-	May	May	-	May	May	May	-	May	May	-
Brasil	Sep	Sep	Sep	-	-	-	Sep	Sep	Sep	Sep	-	Sep	-	Sep	Sep	-
Canada	Jun	-	Jun	Jun	-	Jun	-	-	Jun	-	Jun	-	-	Jun	-	Jun
Cape Verde	Jul	Sep	Sep	-	-	-	-	-	-	-	-	-	-	-	-	-
China P.R.	Aug	-	Aug	Aug	Aug	-	Aug	Aug	Aug	Aug	Aug	Aug	-	Aug	Aug	-
Côte D'Ivoire	-	Jun	Jun	-	-	-	-	Jun	Jun	Jun	-	Jun	-	-	Jun	-
Croatia	-	-	-	-	Jun	-	-	-	-	-	-	-	-	-	-	-
EC.Cyprus	-	-	-	-	Jul	-	-	-	-	-	-	-	Jul	-	Jul	-
EC.Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC.España	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep
EC.France	Aug	Aug	Aug	Aug	Jul	-	Aug	-	-	-	Aug	-	Aug	Aug	-	Aug
EC.Greece	-	-	-	-	Aug	-	-	-	-	-	-	-	Aug	-	-	-
EC.Ireland	-	-	-	Jul	Jul	-	-	-	-	-	Jul	-	-	-	-	-
EC.Italy	-	-	-	-	Jul	-	-	-	-	-	-	-	Jul	Aug	-	-
EC.Latvia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC.Malta	-	-	-	-	Jul	-	-	-	-	-	-	-	Jul	Jul	-	Jul
EC.Netherlands	-	Aug	-	-	-	-	-	-	-	-	-	-	-	Aug	-	Aug
EC.Portugal	Aug	Aug	Aug	Aug	Jul	-	Aug	Aug	Aug	May	Aug	Aug	-	Aug	Aug	Aug
EC.United Kingdom	-	-	-	Aug	-	-	-	-	-	-	Aug	-	-	Aug	Aug	Aug
Egypt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FR.St Pierre et Mique	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gabon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ghana	Jul	Jul	Jul	-	-	-	-	-	-	May	-	-	-	-	-	-
Guatemala	Sep	Sep	Sep	-	-	-	-	-	-	-	-	-	-	-	-	-
Guinea Ecuatorial	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Honduras	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Japan	Sep	Sep	Sep	Sep	Jun	Jun	Sep	Sep	Sep	Sep	Sep	Sep	Sep	Sep	-	-
Korea Rep.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Libya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maroc	Aug	Aug	Aug	Aug	Jun	-	-	-	-	-	Aug	-	Aug	-	-	-
Mexico	Jul	Jul	Jul	Jul	-	May	-	Jul	Jul	May	Jul	-	-	Jul	Jul	-
Namibia	Jul	-	Jul	-	-	-	Jul	-	-	-	-	Jul	-	-	Jul	-
Nicaragua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nigeria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Panama	May	May	May	-	-	Nov	May	-	-	-	-	-	-	-	Sep	-
Philippines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guinée Conakry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	Jun	Jun	Jun	-	-	-	-	-	-	-	-	-	-	-	-	-
S. Tomé e Príncipe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Senegal	Jul	Jul	Jul	-	-	-	-	-	-	Jul	Jul	-	-	Jul	Jul	-
South Africa	Sep	Sep	Sep	-	Sep	-	Sep	-	-	-	-	Sep	-	Sep	Sep	-
St. Vincent and Grena	May	May	May	May	-	-	May	May	-	May	May	May	-	-	-	-
Syrian Arab Republic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trinidad and Tobago	Jul	-	Jul	Jul	-	-	-	Jul	Jul	Jul	Jul	-	-	Jul	Jul	-
Tunisie	-	-	-	-	Jun	-	-	-	-	-	-	-	Sep	-	-	-
Turkey	-	-	-	-	Feb	-	-	-	-	-	-	-	Sep	-	-	-
UK.Bermuda	Jul	Jul	Jul	Jul	-	-	-	Jul	Jul	-	Jul	-	-	Jul	Jul	-
UK.British Virgin Isla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK.Sta Helena	Jul	Jul	Jul	-	-	-	Jul	-	-	-	-	-	-	-	-	-
UK.Turks and Caicos	-	-	May	-	-	-	-	-	-	-	May	-	-	-	-	-
U.S.A.	Jul	Jul	Jul	Jul	-	Jun	-	Jul	Jul	May	Jul	-	-	Aug	Aug	Aug
Uruguay	Jul	-	Jul	-	-	-	Jul	-	-	-	-	Jul	-	Jul	Jul	Jul
Vanuatu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela	Aug	Aug	Aug	Aug	-	-	-	Aug	Aug	Aug	Aug	-	-	Aug	Aug	-
Chinese Taipei	Jul	Jul	Jul	Jul	-	-	Jul	Jul	Jul	Apr	Jul	Jul	-	Jun	Jun	-
Guyana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands Antilles	Apr	Apr	Apr	-	-	-	-	-	-	-	-	-	-	-	-	-
Dominica	-	May	May	-	-	-	-	May	-	May	May	-	-	-	-	-
Grenada	Jul	Jul	Jul	Jul	-	-	-	Jul	Jul	Jul	Jul	-	-	-	-	-
Mixed flags (FR+ES)	Aug	Aug	Aug	-	-	-	-	-	-	-	-	-	-	-	-	-
NEI (ETRO)	Jun	Jun	Jun	-	-	-	Jun	-	-	-	-	-	-	-	-	-
Sta. Lucia	-	Mar	Mar	Mar	-	-	-	Mar	-	-	Mar	-	-	-	-	-

Addendum 1 to Appendix 8

Agenda of the Sub-Committee on Statistics

1. Opening, adoption of Agenda and meeting arrangements
2. Review prior recommendations and actions resulting
3. Issues regarding statistical and biological data submitted in 2008
   - 3.1 Task I and Task II
   - 3.2 Tagging data
   - 3.3 Revisions to historical data
   - 3.4 Shark statistics
   - 3.5 BFT, SWO, BET Statistical Documents and other trade information
   - 3.6 Other by-catch species
4. Updated report on a relational database system
   - 4.1 Database extractions and support by the Secretariat for Species Working Groups during intersessional and assessment meetings
5. Evaluation of data deficiencies pursuant to [Rec. 05-09]. Analysis and presentation materials
   - 5.1 Data report cards
   - 5.2 Responses to questionnaire on data deficiencies, impacts, solutions and priorities for stock assessment of ICCAT species
6. National and international statistical activities
   - 6.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)
   - 6.2 National data collection systems and improvements
7. Report on data improvement activities
   - 7.1 Data recovery activities
8. Review of publications and data dissemination
   - 8.1 Review of progress made for a revised ICCAT Manual
9. Future plans and recommendations
10. Other matters
11. Adoption of the report and closure

Addendum 2 to Appendix 8

RESPONSES TO QUESTIONNAIRE ON DATA DEFICIENCIES, IMPACTS, SOLUTIONS AND PRIORITIES FOR STOCK SSSESSMENT OF ICCAT SPECIES - 2008

Small Tuna Species 2008 Report

1. Species and stocks covered under the data review and preparation work.

   Since SMT (small tuna) includes a huge number of species, the priority list was: Atlantic bonito (*Sarda sarda*), bullet tuna (*Auxis rochei*), little tunny (*Euthynnus alletteratus*) and plain bonito (*Orcynopsis unicolor*), all for the Mediterranean stocks.

2. Please identify a recent data workshop or data preparation task for an assessment evaluation. (location, work time schedule, number of scientific participants)

   GFCM/ICCAT SMT. Málaga, Spain. May 5 to 9, 2008.
   About 27 scientists.
   It was not an specific data preparation meeting for stock assessment purposes, but the agenda included a review of data and information available.

3. Please detail the task performed during the data workshop with regard to catch and effort data
   a. Update and verification of landings, dead discards by? Flag, fishery, area, quarter, semester, etc.
   b. Update and verification of fishing effort
   c. Update and verification of gear/fleets distribution of catches.
   d. Revision of historical gaps or update of historical series
   e. Others (describe): Comparison of various catch/landing data bases (FAO-GFCM, ICCAT and EUROSTAT). FAO-GFCM and ICCAT are quite comparable (except for the early years and few points in some recent years). ICCAT and EUROSTAT showed remarkable discrepancies.

4. Other tasks done during the workshop
   a. CPUE series update
   b. Size, age conversions of catch data
   c. *Review and update of biological information*.
   d. Others (describe).

5. What were the main problems/difficulties associated with the catch and effort data. Please provide a brief summary if applicable.
   a. Incomplete series
   b. Lack of information from main flags/fleets for recent years
   c. Under-reporting
   d. Others.

   It was estimated that about 38% of the countries have problems y reporting catch data on small tuna and 17% of countries never reported any data to ICCAT of FAO.
   For the catch/effort data, there are remarkable gaps in data availability and in time series.

6. What other limitations of data were identified. Please provide a brief summary and their consequences.
   a. No size data available for important flags/fleets
   b. No area/ time of year of capture information
   c. Others

Harmonization of the resolution of the ICCAT reporting area and of the GFCM Statistical Areas.

7. What were the conclusions/recommendations from the scientific group with regards to the data available and likely assessment analysis to be performed?

   Use FAO- GFCM and ICCAT data bases for total catch figures; ICCAT data base for detailed catch/effort and size data and EUROSTAT data base for prices.

   Important improvement should be made before providing any scientific advice on small tuna stock status.

8. For each stock, please chose and describe the recommendations of the scientific group for the assessment analyses
   a. *Incomplete data, the group doesn't recommend any further analysis with it.*
   b. Highly deficient data of catch and effort need to restrict analyses to simple aggregated models.
   c. Sufficient data to carry out age/or group aggregated analysis
   d. Sufficient data to perform size base evaluations

9. What were the priorities identified by the scientific working group in order to improve data input for future assessment analysis (one per stock, in priority order)

All countries should make an effort to improve statistics on small tuna as well as the current knowledge on the biology, stock structure and other relevant aspects of these species. COPEMED II has just been initiated, which along with the other sub-regional projects in the Mediterranean, should result in future improvements.

Statistics on small tunas should be considered important in the Mediterranean as a whole (including the Black Sea). In particular, these species should be taken into account in the MedFiSis project, specifically dealing with the improvement of fishery statistics.

The Working Group underlined the need that the four main small tuna species (*Auxis rochei, Sarda sarda, Euthynnus alletteratus, Orcynopsis unicolor*) as well as skipjack (*Katsuwonus pelamis*) be added to the GFCM priority species list as these species already exist on the ICCAT list, in order to improve the current status of data collection, including socio-economic aspects.

Due to the large amount of catches reported and entered as unclassified tuna species or mixed tuna species in the ICCAT database, the Group recommended that scientific experts from both ICCAT and GFCM Contracting Parties review their catches and try to classify them by species.

10. Other recommendations to the data collection programs (i.e. individual ICCAT members) or the Secretariat data management group.

Sub-Committee on Ecosystems 2008

1. Species and stocks covered under the data review and preparation work.

By-catch in general and seabirds in particular.

2. Please identify a recent data workshop or data preparation task for an assessment evaluation. (location, work time schedule, number of scientific participants)

Madrid, 10-14 2008 -16

3. Please detail the task performed during the data workshop with regard to catch and effort data

The longline fishing effort database (EFFDIS, analog to CATDIS but for effort) created in the previous meeting was revised and corrected.

Update and verification of landings, dead discards by? Flag, fishery, area, quarter, semester, etc.

a. Update and verification of fishing effort
b. Update and verification of gear/fleets distribution of catches.
c. Revision of historical gaps or update of historical series
d. Others (describe).

4. Other tasks done during the workshop

Some by-catch rates by flag, with some spatial and temporal detail were presented by several countries and were revised in the group.

a. CPUE series update
b. Size, age conversions of catch data
c. Review and update of biological information.
d. Others (describe).

5. What were the main problems/difficulties associated with the catch and effort data. Please provide a brief summary if applicable.

Essentially, there is not enough by-catch data to allow estimate total removals.
To create the longline fishing effort database, a substitution scheme was necessary given that the T2CE database was incomplete.

a. Incomplete series
b. Lack of information from main flags/fleets for recent years
c. Under-reporting
d. Others.

6. What other limitations of data were identified. Please provide a brief summary and their consequences.

a. No size data available for important flags/fleets
b. No area/ time of year of capture information
c. Others

7. What were the conclusions/recommendations from the scientific group with regards to the data available and likely assessment analysis to be performed?

For seabird by-catch rates and longline fishing effort, important substitutions are needed, given the lack of data.

For by-catch in general, there is no basic catch information being routinely collected in ICCAT so as to evaluate the total removals. There's partial information collected in different observer programs that are not centralized in ICCAT. The Group is trying to create an observer metadatabase so as to evaluate the quantity and quality of the information available.

8. For each stock, please chose and describe the recommendations of the scientific group for the assessment analyses
    a. Incomplete data, the group doesn't recommend any further analysis with it.
       For by-catch in general.
    b. Highly deficient data of catch and effort need to restrict analyses to simple aggregated models.
       For seabirds in particular.
    c. Sufficient data to carry out age/or group aggregated analysis
    d. Sufficient data to perform size base evaluations
9. What were the priorities identified by the scientific working group in order to improve data input for future assessment analysis (one per stock, in priority order)

Institute data collection procedures which permit quantifying the total catch (including by-catch) composition and disposition by the tuna-fleets and report those data to ICCAT. As in the past, the Sub-Committee recommends that scientific observer and logbook programs, in combination, be used to collect dta useful for quantifying total catch (including by-catch) compositon and disposition by the tuna fleets and report these data to ICCAT.

10. Other recommendations to the data collection programs (i.e. individual ICCAT members) or the Secretariat data management group.

That national scientists provide 5x5 bird by-catch rates for the years, months, and grids for which that information is available.

Western Bluefin tuna 2008

1. Species and stocks covered under the data review and preparation work.
    a. WBFT
2. Please identify a recent data workshop or data preparation task for an assessment evaluation. (location, work time schedule, number of scientific participants)
    a. Madrid, June 23-July 4, 36
3. Please detail the task performed during the data workshop with regard to catch and effort data
    a. Update and verification of landings, dead discards by? Flag, fishery, area, quarter, semester, etc. *yes*
    b. Update and verification of fishing effort *yes*
    c. Update and verification of gear/fleets distribution of catches. *yes*
    d. Revision of historical gaps or update of historical series *yes*
    e. Others (describe).
4. Other tasks done during the workshop
    a. CPUE series update *yes*
    b. Size, age conversions of catch data *yes*
    c. Review and update of biological information. *yes*
    d. Others (describe). *Review, update tagging data, VPA models, many other supporting analyses*
5. What were the main problems/difficulties associated with the catch and effort data. Please provide a brief summary if applicable.
    a. *Incomplete series data very incomplete for all nations prior to 1970*
    b. *Lack of information from main flags/fleets for recent years no 2007 data for EBFT (affected mixing analyses)*
    c. *Under-reporting EBFT (affected mixing analyses)*
    d. *Others.*
6. What other limitations of data were identified. Please provide a brief summary and their consequences.
    a. *No size data available for important flags/fleets*
    b. *No area/ time of year of capture information*
    c. *Others final catch at size was not completed until the last few days of the meeting. This is partly a result of an overwhelmed secretariat and partly the result of at least two CPCs who found errors in the catch at size for their respective countries just a few days before the end of the meeting.*

What were the conclusions/recommendations from the scientific group with regards to the data available and likely assessment analysis to be performed?

The Group recommended that alternate assessment approaches, such as CATCHEM (Porch et al., 2001a), MULTIFAN-CL or MAST that allow for errors in the catch at age, be further developed for more extensive use at meetings in the near future. This has broad implications (not just for assessment results) in the way data are reported by national scientists and retained by ICCAT and this should be addressed (e.g., the actual size frequency observations used to estimate the catch at size for the various fleets).

7. For each stock, please chose and describe the recommendations of the scientific group for the assessment analyses
    a. Incomplete data, the group doesn't recommend any further analysis with it.
    b. Highly deficient data of catch and effort need to restrict analyses to simple aggregated models.
    c. Sufficient data to carry out age/or group aggregated analysis *yes*
    d. Sufficient data to perform size base evaluations *yes*
8. What were the priorities identified by the scientific working group in order to improve data input for future assessment analysis (one per stock, in priority order)

It is essential that representative samples of otoliths be collected from all major fisheries, in all areas3. Added value would be obtained if genetic samples were also collected from the same fish, which could potentially result in more accurate and less expensive tests for stock origin.

9. Other recommendations to the data collection programs (i.e. individual ICCAT members) or the Secretariat data management group.

It took an inordinate amount of time during this assessment meeting to prepare the basic inputs to the assessment, such as catch-at-age. The use of time during the assessment needs to be more efficient and this can only be achieved through better preparation before the meeting. The Secretariat needs sufficient resources to prepare available data files (table of substitutions, catch-at-size, catch-at-age, tagging) at least two weeks before the meeting and National Scientists need to devote sufficient resources to review those files before the start of the meeting --and request any necessary modifications, if applicable--. Note that this issue should be addressed to the Sub-Committee on Statistics and revisited in the SCRS Plenaries and we should consider the use of modern web conferencing techniques.

Appendix 9

REPORT OF THE SUB-COMMITTEE ON ECOSYSTEMS
(Madrid, Spain – September 26, 2008)

The Sub-Committee on Ecosystems met at the Secretariat on September 26, 2008. The meeting was chaired by Dr. Haritz Arrizabalaga (EC-Spain) and Dr. Guillermo Diaz (Unites States) acted as Rapporteur. The Chair opened the meeting and welcomed the participants. The agenda was revised and adopted **(Addendum 1 to Appendix 9)**.

1. Review of new scientific information

Two SCRS documents and three background documents were presented at the meeting. Their summaries are provided below.

Document SCRS/2008/192 presented results of a study on the effect of tori lines on the catch rate of target species and by-catch of seabirds in the Brazilian longline fishery operating mostly within the Brazilian EEZ (between 25ºS and 35ºS). The results of the study indicated that the use of tori lines resulted in a reduction of 64% of the catch rate of seabirds and an increase of about 15% of the fish catch rates (all target species combined). The increase in the catch rate of target species is attributed to a reduction in the number of baits lost due to interactions with seabirds. It was pointed out that the effect of tori line increasing SWO longline catch rates should be taken into consideration in the standardization procedures. To that effect, it was recommended that information regarding the use or not of tori lines in longline vessels should be recorded. The Sub-Committee also noted that additional experiments about the effect of tori lines are being conducted and requested that information of their outcomes be provided to the Sub-Committee.

Document SCRS/2008/176 presented the results of a Spanish study on the effects of circle hooks and bait on target and by-catch species in the South Pacific. The results showed that area of fishing was the most important factor affecting the catch rate of different species. In general, the use of circle hooks reduced the catch rate of SWO regardless of the bait used (i.e., squid and mackerel). The catch rate of billfish increased more than 50% when circle hooks were used. However, it was discussed that, although the proportion of positive catches of billfish was significantly affected by the hook type used, it was not possible to draw sound conclusions due to the low number of billfish caught during the experiment. The two circle hooks used with squid as bait generally increased the catch rates of sea turtles, but it also increased the proportion of external hooking in these animals. During this study, no interaction with seabirds occurred.

The results presented in this document coincided with similar studies conducted with the Spanish longline fleet in other oceans, and they emphasize the previous conclusion supported by the Sub-Committee that many factors (such as hook size and shape, and bait) can affect (i.e., increase or decrease) the catch rates of circle hooks.

Climate Change in the Spanish Mediterranean (IEO)

The Instituto Español de Oceanografía (IEO) has recently published a report entitled “Cambio Climático en el Mediterráneo Español” (Climate Change in the Spanish Mediterranean) devoted to document current changes in the marine climate of the Spanish continental shelf and slope. This effort is part of the activities of a research Group in Mediterranean Climate Change (GCC) formed by different scientists from the IEO. The group is multidisciplinary and involves several labs from IEO.

As a first step within the activities of the GCC, a large amount of environmental data from different sources was compiled. Some of the sources were the monitoring programs supported by the IEO in the Mediterranean Sea and its “Centro de Datos Oceanográficos” (Oceanographic Data Centre, http://www.ieo.es/centrodatos.html) and other institutions such as the Agencia Estatal de Meteorología (AEMET), Instituto de Ciencias del Mar (ICM/CSIC), Puertos del Estado (PE) and Instituto Mediterráneo de Estudios Avanzados (IMEDEA).

Temperature, salinity and sea level time series, as well as air temperature, sea level pressure, etc. revealed that long term changes are evident in the Mediterranean. The deep layers of the Mediterranean have experienced a continuous warming and salinity increase during the second half of the 20th century. This deep layer is an excellent proxy for climate change detection and, as it is formed from the contribution of upper and intermediate

waters, it shows that changes in the heat and water exchange processes between the sea and the atmosphere are occurring.
Other surprising result is that sea level did not follow the behavior observed in other world oceans since it stabilized or decreased from the mid-1960s to the mid-1990s. This was due to an anomalous pattern of sea level pressure. Since the mid-1990s, sea level is increasing in an accelerated way in Málaga and L'Estartit (the southern and northern limits of the study area). An acceleration of the increase in sea level has also been documented for the 1993-2003 decade on a global scale.

The Sub-Committee noted the importance of this type of studies and encouraged research aimed to link environmental factors with the distribution and abundance of different life stages of marine species.

ALB feeding ecology **(Goñi *et al*, in press)**

The goal of this study was to analyze the small scale vertical migration of immature albacore tuna in relation to the abundance and distribution of their main prey. The vertical migration patterns of this species have particular importance because it affects the catchability of surface fishing gears such as trolling. Using ultrasonic transmitters, a total of six immature albacore *(Thunnus alalunga)* were tracked in the south east Bay of Biscay in July and August 2005. Simultaneously, two echo sounders operating at 38 and 120 kHz on the research tracking vessel were used to collect data on the biotic environment (patches of prey) between the surface and 200m depth. The stomach contents of 97 albacore caught during the surveys were also analyzed, and the comparison of prey occurrences respectively in the stomachs and on the echograms showed selectivity for blue whiting in an environment with numerous patches of anchovy, mackerel and krill available. However, the biotic factors considered in this study had no significant influence on the depth of albacore, which possibly feed during night-time when blue within migrates to surface waters. The tracked albacore had a shallow depth distribution and did not exhibit any regular deep-diving behavior to forage in deep resources that would be more energy demanding. It was noted that other studies in the area have shown blue whiting as one of the preferred prey for juvenile bluefin tuna, which indicates potential overlap of feeding habitats. It was also noted that this is a small scale study, and since results could vary significantly, it would be desirable to conduct similar studies in other areas.

Are tropical tunas affected by the massive use of FADs? **(Hallier and Gaertner 2008)**

Purse seine fishing on fish aggregating devices (FADs) has expanded considerably during the last 15 yr in tropical tuna purse seine fisheries, and FADs currently account for about 70% of their reported tuna catches. The scientific community has expressed concern over the consequences of this fishing practice in terms of yield per recruit and suspected detrimental effects on FAD associated tunas. To explore possible detrimental effects, we compared stomach fullness, fish 'plumpness', growth rate, and migration behavior between free school and drifting FAD-associated tunas for skipjack tuna (*Katsuwonus pelamis*) and yellowfin tuna (*Thunnus albacares*) caught in the Atlantic and Indian Oceans. Significant differences in fish plumpness and individual growth rates were found, suggesting that individuals associated with drifting FADs were less healthy than those in free schools. Since stomach fullness indicated that tunas associated with FADs eat less than those in free schools, the difference in growth rate and condition could be the consequence of altered feeding patterns. For each species, significant changes in migratory direction and displacement rates were observed in the presence of drifting FADs. These findings support the hypothesis that FADs act as a super-stimulus, misleading tunas to make inappropriate habitat selection. However, further studies are required to investigate the long-term effect of FADs on the entire life cycle of tunas.

2. Update on the progress of the observer meta-database

The draft questionnaire for observer programs that was prepared during the intersessional meeting was distributed to SCRS officers for their suggestions, before being distributed to the national scientists. The Group reviewed the information received by the Secretariat and produced a summary table with some relevant information about the different observer programs **(Table 1)**. To date, only 15 CPCs responded to the questionnaire (including Norway which indicated that it oes not have an observer program in any ICCAT fisheries). National scientists were asked to check that the information within the summary table reflects the information on their observer programs. The table also includes the CPCs with known observer programs (past or present) that, at the time of the meeting, have not yet completed the questionnaire for some or all of their programs.

Although the observer coverage rates were very variable among programs, an initial review by the Group of the responses received indicated that the observer programs can potentially provide useful information for the goals of the Sub-Committee (such as estimation of removals of by-catch species and the influence of mitigation measures on by-catch rates). The Group also recommended that the Secretariat creates an 'electronic form' version of the questionnaire like the ones used to submit Task I and II data, and the responses be integrated into a metadatabase so that the Sub-Committee (and other working groups for which the metadatabase could be of interest) can better analyze the available information.

3. Update on the progress of the production and distribution of the seabird awareness materials

During the intersessional meeting, it was agreed that the specific wording and the artwork to be included in the awareness material would be better worked by a subgroup. This subgroup produced a general poster aimed to a wide audience **(Addendum 2 to Appendix 9)**, with general statements of the problem of seabird by-catch and information about easily implementable mitigation measures. The Sub-Committee also felt that, in the future, it may be of interest to produce more specific materials to be distributed in certain areas. The poster was translated into English, Spanish, French, Japanese, Chinese (Chinese Taipei), Portuguese and Turkish. So far, only a few countries have asked for copies of the posters, and thanks to JDIP funds, an initial set (500 in Spanish and English and 100 in each of the other languages) are being printed and distributed. Additional posters will be printed as new requests arrive to the Secretariat.

4. Response to the Commission regarding [Rec. 07-07]

Recommendation [07-07] requires the use of tori lines for vessels operating below 20ºS. The vessels targeting swordfish with monofilament are exempted, if they set their longlines at night and provide scientific information of their observer programs. The Recommendation also requires that CPCs record and provide data to the SCRS on seabird interactions, so that the Commission can adjust the recommendation (e.g. in the area of application) based on new scientific advice.

The Committee has received some detailed information about seabird interactions in response to Recommendation [07-07], although the recommendation has been in effect since mid-2008. Furthermore, the Committee did not yet finalize the seabird assessment, although it expects to do so in 2009 (including an overlap analysis between seabird at sea distribution and the longline fishing effort). Thus, the Committee expects to give advice on alternative areas of application after the completion of the seabird assessment and as results of experiments are reported. For that purpose, it is essential that CPCs follow the Recommendation [07-07] and provide detailed spatial and temporal information about their interactions with seabirds. The Committee also noted that some CPCs have notified that they have observer programs with some information about seabird mitigation measures. The Committee recommends that those datasets be properly analyzed and presented to the SCRS to enable the Committee to provide advice to the Commission on how to best adjust Recommendation [07-07].

As pointed out in Section 3, seabird awareness materials (posters) are being distributed among fishermen with information on additional measures (night setting, etc.) that can help to reduce the by-catch of seabirds and that are easily implementable.

5. Workplan for 2009

An intersessional meeting is envisaged for 2009 (not before June so as to allow enough time to complete the analyses of the seabird assessment). The Sub-Committee on Ecosystems encourages scientists to provide available detailed information about interactions with by-catch species that may allow quantification of total removals. In the case of seabirds, detailed (spatial and temporal) catch rates are required so as to avoid substitutions and incorporate spatio temporal variability in catch rates into the assessment. This information should be made available to the Sub-Committee well in advance of the meeting, so that it can be incorporated before the meeting into the analyses being conducted. Any information on by-catch mitigation measures (especially for seabirds) should also be made available to the group, so as to advice the Commission about potential modifications of Recommendation [07-07]. The Sub-Committee also requests participants to provide scientific documents on ecological risk assessment approaches aimed to identify species that are most at risk and

prioritize future work of the Sub-Committee. For this purpose, a close interaction with the shark working group (that already worked on that methodology) is recommended.

A tentative agenda for the 2009 intersessional meeting would be:

- Review of new information regarding ecosystems
- Seabird assessment
  - Analysis of overlapping between fishing effort and bird area distribution
  - Review of by-catch rates and substitutions
  - Estimation of the number of birds caught and the effect of by-catch mortality on seabird populations
- Ecological risk assessment for target and by-catch species caught by ICCAT fleets
- Other matters
- Recommendations

6. Other matters

6.1 Profile of the By-catch Coordinator position

A draft profile for a future By-catch Coordinator position was discussed. The Sub-Committee felt that, given the lack of statistics for many by-catch species that currently limits the ability of the Sub-Committee to develop some of the Terms of Reference, it would be desirable that the By-catch Coordinator have good skills in data collection issues rather than in data management. A subgroup reviewed the draft proposal and provided a revised version to the SCRS which was adopted by the Committee (see **Appendix 11**).

Sub-Com Ecosytems Table 1. Summary information for the observer questionaires received. The countries listed without observer information are believed to have additonal observer programs for which no questionnaire was received.

Reported by	*Flag of vessels*	*Fleet/Gear*	*Target Species*	*Range of vessel size*	*Years of operation of the program (1)*	*Season of operation*	*% vessels/trips with observer*	*% of total effort in the fishery with observer*	*nº Ref docs*	*By-catch quantified*	*Size*	*Fate*	*Bio. samples*	*Mitigation*
Chinese Taipei	Chinese Taipei	Pelagic Longline	BET-ALB	24-50M	2002-2008		3-8%		3	yes	some	some?	yes	yes
EC-Ireland	EC-Ireland	Mid water paired trawl	ALB	20 - 40 m	1999-2006	July - October			3	yes	yes	no	yes	yes
USA	USA	Pelagic Longline	SWO-BET-YFT-TUN	less than 49 m	1992-present	All year	1.2-6.6%	2.2-13.9%	5	yes	yes	yes	yes	no
Iceland	Japanese	Pelagic Longline	BFT	379-409 GRT	1996-2005	August-Nov	100%	100%	12	yes	no	no	yes	no
Russian Federation	Russian Federation	Pelagic Longline	SWO-BET-YFT-ALB-SHK		1965-1991, 2005, 2006	all year round			2	no	no	no	yes	no
Russian Federation	Russian Federation	Purse seine	YFT-TUN	50-85 m	1973-2000, 2006, 2007	all year round			2	no	no	no	yes	no
Japan	Japan	Pelagic Longline	BET-YFT-BFT	45 - 55 m in LOA	1995-2008. 1995 and 1996 are preliminary.	All year round, but mostly June-January	4-7%		10	yes	yes	yes	yes	some
Turkey	Turkey	Purse seine	BFT	17.3-62 m	2003-2006	May-June	5.2-10.7%		0	no	no	no	some	no
Mexico	Mexico	Pelagic Longline	YFT	13-25 m	1994-2008	All year	100%	100%	27	yes	yes	yes	yes	yes
Venezuela	Venezuela	Pelagic Longline	SWO-BET-ALB		1991-2008	All year	8.1-19.7%	6.2-36.4%	8	some	some	some	yes	no
EC-France	EC-France	France PS Med	BFT	27-34 m	2003	01/05/2003 au 30/09/2003	5.25%	35%	1	yes	no	yes	no	yes
Norway	Norway does not have any relevant information to provide concerning this iccat questionnaire on scientific observer programs													
EC-Greece	EC-Greece	Pelagic Longline	SWO	12m to 20m	2004 to 2006	February to September	3.2-4.7%	0.59-0.89%	7	yes	some	yes	no	no

Uruguay	Uruguay	Pelagic Longline	SWO, YFT, TUN	15-55	1998-2007	All year	4-39%	5-65%	17	yes	yes	yes	yes	some
Canada	Canada	Pelagic Longline	SWO, BET, YFT, BFT, ALB, SHKTUN	45-100 feet	1980-2008	Tuna-fall, SWO summer/fall, SHK-all year	5-25%		4	yes	some	yes	yes	some
Morocco														
South Africa	South Africa and foreign	Pelagic Longline	SWO, BET, YFT	50-600 GT	1998-2008	Throughout the year, particularly April-October	5-80%	2.7%-18.1%	0	yes	yes	yes	yes	yes
Spain														
Brazil	Brazil	Pelagic Longline	SWO, TUN, SHK	15-35	2000-2007	all year	1.8%-6.45	2.16-5.01	8	yes	yes	yes	no	yes
Brazil	Foreign vessels operating in Brazil	Pelagic Longline	SWO, TUN, SHK	20-50	2004-2007	all year	100%	100%	6	yes	no	yes	yes	yes
China														
Ghana														
EU-France														
USA	Japan													
Canada	Japan													

(1)The last year indicates the last year reported in the questionaire. However, it is believed that years 2007 and 2008 might indicate on-going programs.

Addendum 1 to Appendix 9

Agenda of the Sub-Committee on Ecosystems

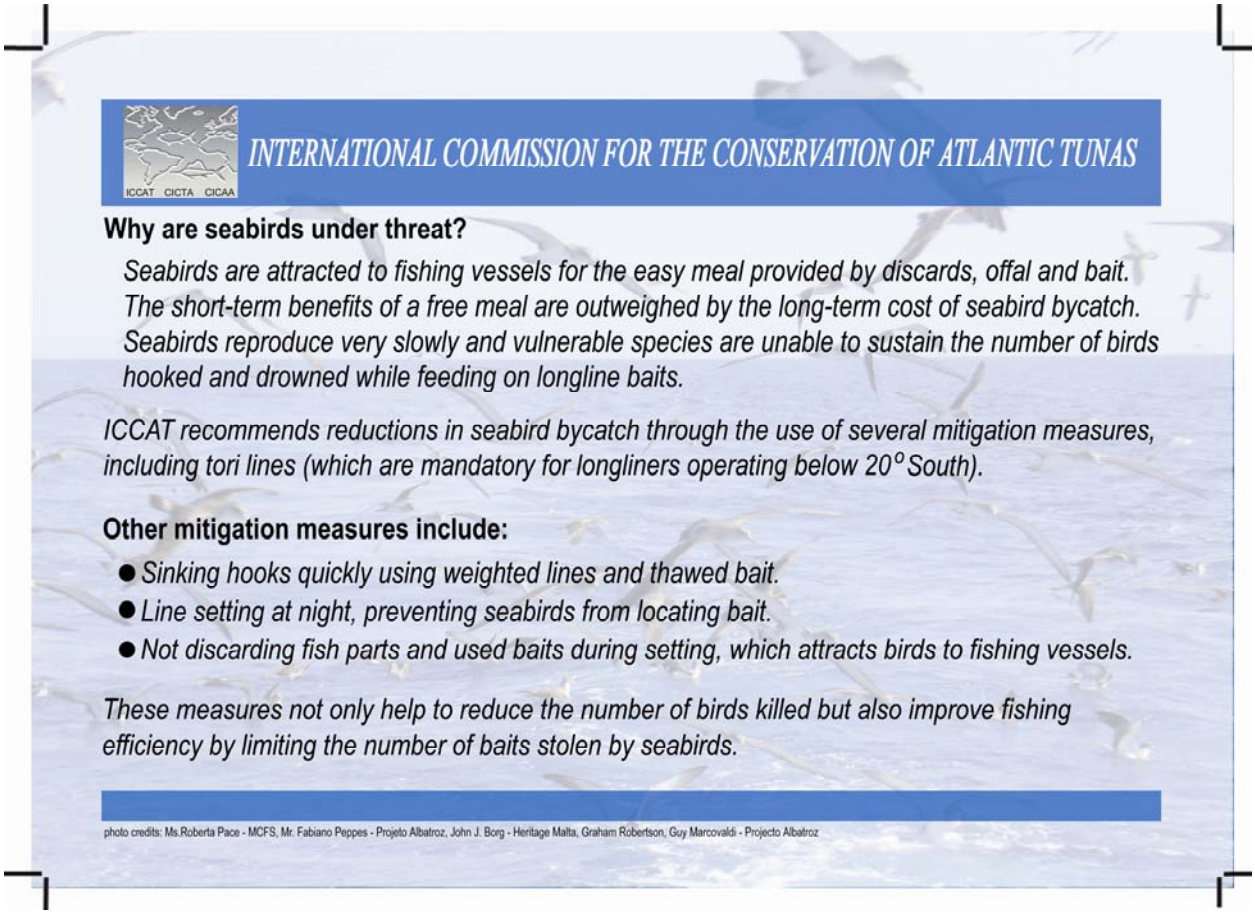
1. Review of new scientific information
2. Update on the progress regarding the observer metadatabase
3. Update on the progress regarding production and distribution of seabird awareness materials
4. Response to the Commission regarding [Rec. 07-07].
5. Workplan for 2009
6. Other Matters
   6.1 Definition of the profile for the By-Catch Coordinator position

Addendum 2 to Appendix 9

General poster – Seabird Awareness

Front side

Reverse side



Appendix 10

EXAMPLE FORMS USED FOR COLLECTING TASK II INFORMATION FROM BFTE FISHERIES

PROGRAMME OBSERVATEUR IFREMER **Formulaire Route**

ROUTE ET PARAMETRES D'ENVIRONNEMENT

Formulaire route n°:

Nom du thonier:

Nom de l'observateur:

Date	heure	Latitude		Longitude		Mer	SST	Vent	Mode de détection	Profondeur détection	n° cal.

Notes:

Données vérifiées: saisies:

APPENDIX

PROGRAMME OBSERVATEUR IFREMER **Formulaire Calée**

CARACTERISTIQUES DE LA PECHE

Calée n° :	Date :	Nom du thonier :
Formulaire route n° :		Nom de l'observateur :

CARACTERISTIQUES DE LA CALEE

Latitude		H. début calée		Appareils	Avion	Sonar	Sondeur	Autres
		H. fin calée		Avant la calée				
Longitude								
		Fermeture (m)		Pendant la calée				

COUP NUL	
Avarie	Echappement
Sous taille	Autres

INFO - BANC		
Apparence en surface	Situation proximité	
Estimation de la taille du banc	Périmètre et Hauteur	

REJETS			
Montés sur le pont :		Rejetés vivants :	
Espèce Nombre et poids		Espèce Nombre et poids	
Espèce Nombre et poids		Espèce Nombre et poids	
Espèce Nombre et poids		Espèce Nombre et poids	

CAPTURES DE THON ROUGE			
Information globale			
Nombre d'individus dans la matte		Poids total estimé	
Nombre de thons mesurés à bord		Poids des thons mesurés	
Information Bordereau de transbordement (T2M)			
Nombre d'individus transférés en cage		Poids total des thons transférés en cage	
Destination de la cage		Autre information	

Nombre et poids des thons échantillonnés en groupe (suite au dos)

	Nb de thons	**P** total (kg)		**Nb** de thons	**P** total (kg)
Groupe 1			**Groupe 2**		
Groupe 3			**Groupe 4**		
Groupe 5			**Groupe 6**		
Groupe 7			**Groupe 8**		
Groupe 9			**Groupe 10**		
Groupe 11			**Groupe 12**		
Groupe 13			**Groupe 14**		
Groupe 15			**Groupe 16**		

Taille et poids de thon échantillonnés individuellement							
L (cm)	**P (kg)**	**L (cm)**	**P (kg)**	**L (cm)**	**P (kg)**	**L (cm)**	**P (kg)**

Données vérifiées :	saisies:

PROGRAMA DE OBSERVACION DE ATUN ROJO DEL INSTITUTO ESPAÑOL DE OCEANOGRAFIA

Programa Observación Atún Rojo-CAÑEROS Formulario **A**

INFORMACIÓN DEL BUQUE Y RESUMEN DE MAREA

IDENTIFICACIÓN DEL BUQUE

Nombre:
Matrícula:
Distintivo radiófonico:
Nacionalidad:
Puerto base:

DATOS EMPRESA ARMADORA

Nombre armador:
Nombre empresa:
Dirección:
Teléfono:
Fax:
Nombre patrón:
Dirección:
Teléfono:

DESCRIPCIÓN DEL CAÑERO

Eslora:
Manga:
TRB:
Potencia motriz:
Año de construcción:
Nº de tripulantes:

Nº de cañas a bordo:
Descripción de las cañas:
Material de construcción

Sistemas de ayuda para la detección de la pesca:

VIVEROS

Nº de viveros:
Capacidad total de los viveros
Bombas de oxigenación:
Luz (w):

EMBARCACIÓN AUXILIAR

Eslora:
Luz artificial:

RESUMEN DE MAREA

Código de marea:
Nombre del observador:
Fecha de embarque:
Fecha de desembarque:
Días de embarque:
Días de pesca:

DESCRIPCIÓN DEL CERCO

Longitud:
Calado:
Nº de paños:
Nº de flotadores:
Nº de cáncamos:

Observaciones:

Programa Observación Atún Rojo-CAÑEROS Formulario **B**

BITÁCORA OPERACIONES PESCA CEBO VIVO

Nombre del buque:
Nombre del observador:
Código de marea:

										CAPTURA						
Nº Lance	ESP___	Fecha	Hora	Latitud	Longitud	Tª	Sonar	Emb. auxiliar	Luz atificial	Especie	Kilos	Especie	Kilos	Especie	Kilos	OBSERVACIONES

Indicar especies y cantidad descartada. Si se utilizan otras unidades de medida como salabardos, indicar cuantos y su equivalencia en kilos

Observaciones:

Programa Observación Atún Rojo-CAÑEROS Formulario **C**

CARACTERÍSTICAS DE LA PESCA

Formulario Nº::	Nombre del buque:
	Nombre del observador:
Hoja Diario de Pesca:	Código de marea:

DATOS AMBIENTALES

	Hora inicio	TSM1	
Fecha:			Velocidad del viento (1):
Coordenadas			1 Escala Beaufort
Lat.:	Hora fin	TSM2	Estado del mar (2):
Long.:			2 Escala Douglas
			Nubosidad (3):
			3 Escala cobertura nubosa

CARACTERÍSTICAS DEL APAREJO DE PESCA

Nº de cañas en pesca	Tipo de anzuelo	Tamaño de anzuelo	Cebo vivo

DATOS DE CAPTURA

Cód.	Nº ejemplares	Kilos
BFT		

Cód.	Nº ejemplares	Kilos

DESCARTES

Cód.	Nº ejemplares	Kilos	Cód.	Nº ejemplares	Kilos

Indicar número por categoría comercial

Observaciones:

Programa de observación del atún rojo-CAÑEROS Formulario **D**

MUESTREO ATÚN ROJO

Formulario de muestreo Nº:	Nombre del buque:
Formulario de pesca Nº:	Nombre del observador:
Fecha:	Código de marea del observador:
	Peso captura total BFT(Kg):
	Nº total ejemplares BFT :

Nº	LF/LD1/LFC	PESO	Nº	LF/LD1/LFC	PESO	Nº	LF/LD1/LFC	PESO
1			**26**			**51**		
2			27			52		
3			28			53		
4			29			54		
5			**30**			**55**		
6			31			56		
7			32			57		
8			33			58		
9			34			59		
10			**35**			**60**		
11			36			61		
12			37			62		
13			38			63		
14			39			64		
15			**40**			**65**		
16			41			66		
17			42			67		
18			43			68		
19			44			69		
20			**45**			**70**		
21			46			71		
22			47			72		
23			48			73		
24			49			74		
25			**50**			**75**		

Muestrear por categorias comerciales

Indicar unidades e instrumentos de medida

Observaciones:

Appendix 11

ICCAT BY-CATCH SPECIES COORDINATOR
JOB DESCRIPTION

The International Commission for the Conservation of Atlantic Tunas (ICCAT) (www.iccat.int), an intergovernmental organization whose Secretariat headquarters is based in Madrid, Spain, is seeking to hire a By-Catch species of tuna fisheries Coordinator.

Duties and Responsibilities

Under the overall guidance of the ICCAT Executive Secretary, to be responsible for the development and maintenance of a by-catch species of tuna fisheries database and the coordination of the SCRS activities related with these species.

Specific duties include:

- Research potential sources of by-catch information such as, and not limited to, peer-review publications, reports, working documents, etc.

- Development and maintenance of a by-catch species database that includes information on catches, catch rates and biological information as detailed as possible (by country, area, gear, year, season, etc.).

- Interact with National Scientists leading National Observer Programs to obtain relevant national observer data and develop appropriate rules for their use.

- Work in close collaboration with the Sub-Committee on Ecosystems and other Species Groups such as sharks or billfish supporting their works and preparing data for stock assessments during the meetings.

- Assess in the preparation of educational/informative/scientific material on by-catch species of tuna fisheries, including updates to the *ICCAT Manual*.

- Participation in the Secretariat's scientific work in the following areas:

    - Maintenance and dissemination of appropriate and approved software for analyses of by-catch species of ICCAT tuna fisheries and maintenance and archives of previous assessment data and analytical methodology.

    - Participation in multi-disciplinary teams and committees to develop quality control procedures for ICCAT by-catch assessment methodologies and data bases.

    - Review of by-catch data collection proposals and provide advice on their technical feasibility and the soundness of proposed institutional arrangements.

    - Preparation of by-catch data, including quality assessments, to be used in stock assessments and provide assistance to the Sub-Committee on Ecosystems and scientific groups.

    - Perform other related duties as needed by the SCRS.

Qualifications and Experience (Essential)

Post-graduate degree in Fisheries, or a closely related field.

Experience in ecosystem modeling and fisheries stock assessments and the development of management advice based on scientific studies.

Demonstrated ability to make judicious choices as to the appropriateness of models based upon available data and experience utilizing fishery data bases for use in assessments.

Experience in leading and participating in multi-disciplinary teams for ecosystem approach, fisheries biology and assessment.

Demonstrated experience in computer modeling technology as it pertains to fisheries assessment and environmental data base.

Good knowledge of the management and standardization of databases.

Demonstrated capacity to conceptualize and quantify scientific problems associated with by-catch assessment and management and to communicate these orally and in writing.

Knowledge of the fisheries for tuna and tuna like species within the ICCAT Convention area.

Ability to work well under pressure and to work effectively and harmoniously with people of different national and cultural backgrounds.

Excellent working knowledge of one of the three official languages of ICCAT (English, French and Spanish). If the candidate is not a Spanish native speaker, the ability to communicate in that language is also desirable.

Applicants should be willing and able to travel frequently to other countries, including remote areas.