INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

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FOREWORD

The Chairman of the International Commission for the Conservation of Atlantic Tunas presents his compliments to the Contracting Parties of the International Convention for the Conservation of Atlantic Tunas (signed in Rio de Janeiro, May 14, 1966), as well as to the Delegates and Advisers that represent said Contracting Parties, and has the honor to transmit to them the ***"Report for the Biennial Period, 2010-2011, Part I (2010)"***, which describes the activities of the Commission during the first half of said biennial period.

This issue of the Biennial Report contains the Report of the 17th Special Meeting of the Commission (Paris, France, November 17-27, 2010) and the reports of all the meetings of the Panels, Standing Committees and Sub-Committees, as well as some of the Working Groups. It also includes a summary of the activities of the Secretariat and the Annual Reports of the Contracting Parties of the Commission and Observers, relative to their activities in tuna and tuna-like fisheries in the Convention area.

Starting in 2010, the Report will be published in four volumes. ***Volume 1*** includes the Proceedings of the Commission Meetings and the reports of all the associated meetings (with the exception of the Report of the Standing Committee on Research and Statistics-SCRS). ***Volume 2*** contains the Report of the Standing Committee on Research and Statistics (SCRS) and its appendices. ***Volume 3*** includes the Annual Reports of the Contracting Parties of the Commission and the Observers. ***Volume 4*** is published for the first time in the 2010 Biennial Report and includes the Secretariat's Report on Statistics and Coordination of Research, the Secretariat's Administrative and Financial Reports, and the Secretariat's Reports to the ICCAT Conservation and Management Measures Compliance Committee (COC), and to the Permanent Working Group for the Improvement of ICCAT Statistics and Conservation Measures (PWG). Volumes 3 and 4 of the Biennial Report are only published in electronic format.

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

FABIO HAZIN
Commission Chairman

REPORT OF THE STANDING COMMITTEE OF RESEARCH AND STATISTICS
(Madrid, Spain, October 4-8, 2010)

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

(Madrid, Spain - October 4 to 8, 2010)

1. Opening of the meeting

The 2010 Meeting of the Standing Committee on Research and Statistics (SCRS) was opened on Monday, October 4 at the Hotel Velázquez in Madrid by Mr. Gerald Scott, Chairman of the Committee. Mr. Scott welcomed all the participants to the annual meeting.

The ICCAT Executive Secretary, Mr. Driss Meski, addressed the meeting and welcomed all the participants to Madrid. In his opening address, Mr. Meski expressed appreciation to the Kingdom of Spain for its valuable contributions to and collaboration with the Secretariat. The SCRS has a special mandate to ensure the recovery and sustainable exploitation of stocks, a task that is followed closely by fishery experts throughout the world. This means that ICCAT is considered one of the major Regional Fishery Management Organizations (RFMOs) in the world. 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 (attached as **Appendix 1)**. Stock assessments were carried out this year on bluefin tuna (BFT), bigeye tuna (BET), and Mediterranean swordfish (SWO-Med).

The following scientists served as rapporteurs of the various species sections (Agenda Item 8) of the 2010 SCRS Report.

Tropical tunas- General			J. Pereira
YFT	-	Yellowfin tuna	C. Brown
BET	-	Bigeye tuna	D. Die
SKJ	-	Skipjack tuna	D. Gaertner
ALB	-	Albacore	V. Ortiz de Zarate
BFT	-	Bluefin tuna	C. Porch (W), J.M. Fromentin (E)
BIL	-	Billfishes	F. Arocha
SWO	-	Swordfish	J. Neilson, P. Travassos (Atl.), G. Tserpes (Med.)
SBF	-	Southern bluefin	
SMT	-	Small tunas	J. Ortiz de Urbina
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 20 Contracting Parties present at the 2010 meeting: Angola, Brazil, Canada, Cape Verde, China, Côte d'Ivoire, Croatia, European Union, Ghana, Japan, Korea, Mauritania, Mexico, Morocco, Norway, Russian Federation, Senegal, United Kingdom (Overseas Territories), United States and Uruguay. 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 (General Fisheries Commission for the Mediterranean-GFCM), and non-governmental organizations (Federation of Maltese Aquaculture Producers-FEAP, Greenpeace, International Seafood Sustainability Foundation-ISSF, The Pew Environmental Group, and World Wide Fund for Nature-WWF were admitted as observers and welcomed to the 2010 SCRS (see **Appendix 2)**.

5. Admission of scientific documents

The Secretariat informed the Committee that 145 scientific papers had been submitted at the various 2010 inter-sessional meetings.

Besides the scientific documents, there are nine 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

The Secretariat presented the "Secretariat Report on Statistics and Coordination of Research 2010" which summarizes activities in 2010. This document was discussed at length during the Species Groups meetings and during the session of the Sub-Committee on Statistics. The first eight tables of this document point out the improvements in data submission and the use of the electronic forms. This report also notes the Secretariat's efforts to implement last year's recommendations from the SCRS concerning the purchase of computer hardware, software and WiFi internet equipment.

The report by the Secretariat also includes summary tables of the information available in the compliance-related databases, as requested by the Commission. In 2009, the SCRS requested the Commission´s approval of a Data Confidentiality proposal (see Appendix 10 of the 2009 Biennial Report). The SCRS again requests the Commission´s approval of the Data Confidentiality proposal and reiterates its importance for the purpose of use of detailed information at the Secretariat by the SCRS working groups.

The Executive Secretary informed the SCRS of the incorporation of Mr. Mauricio Ortiz and the permanent position of Mr. Alberto Parrilla to the Secretariat staff in 2010. He also noted that Mr. Antonio Di Natale was appointed Coordinator of the Atlantic-wide Bluefin Year Programme (GBYP), and Mr. Takahiro Ara as Coordinator of the ICCAT/Japan Project for the Improvement of Data and Management of Tuna Fisheries (JDMIP).

A summary of the activities carried out by the ICCAT/Japan Data and Management was presented (JDMIP) (ICCAT, 2011). This project continues to support port sampling developed in Tema (Ghana) and Abidjan (Côte d'Ivoire). This program has also made financial contributions towards the holding of training courses in Sao Tome and Senegal.

Likewise, the Secretariat informed of the activities carried out in 2010 in relation to publications.

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).

Angola

The major scombrid species caught in Angola are: yellowfin tuna (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*), bigeye tuna (*Thunnus obesus*), albacore (*Thunnus alalunga*) and small tunas, such as Atlantic black skipjack (*Euthynnus alletteratus)*, Atlantic bonito (*Sarda sarda*), and frigate tuna (*Auxis thazard*). These resources are caught by the artisanal, semi-industrial and industrial fleet. Angola does not have any vessels for fishing directed at tunas. These are foreign flag vessels that fish in the Exclusive Economic area of Angolan waters. Therefore, Angola does not have any data to report to ICCAT on large tunas. In 2009, 54 foreign vessels reported catches of large tunas. The total catch of small tunas was about 3,669 tons (t) off the Antolan coast, of which 1,979 t were *Sarda sarda*, 1,644 t *Euthynnus alletteratus*, and 46 t *Auxis thazard*. These catches are from the artisanal, semi-industrial and local industrial fleet. The gear types normally used for the target species are seine, trawl, baitboat, hand line, mainly trap, and also longline by the foreign vessels. The *Institut National de Recherches de Pêches*-INIP (National Institute on Fishing) through its Research Center at Lobito reinforces the sampling program through the collection of biological data, in particular, size frequency data on the major species of small tunas from the traps. In 2009, 22 samplings of small tunas were carried out with a total of 2,419 fish measures. The statistical data are obtained from the *Direction Nationale de Pêche et Aquaculture*-DNPA (National Directorate of Fishing and Aquaculture), the *Cabinet d'Études de Plans et Statistiques*-GEPE (Cabinet of Studies of Plans and Statistics), the *Institut National de Recherches de Pêches*-INIP (National Institute on Fishing), the *Centres de Recherches de Pêches*-CIPs (Fisheries Research Centers), and the *Institut de Pêches Artisanale*-IPA (Institute of Artisanal Fishing).

Brazil

In 2009, the Brazilian tuna longline fleet consisted of 86 vessels registered in 6 different ports. Of these, 80 were national and 6 were foreign chartered vessels. The number of vessels decreased by about 9.5% from 2008 when 95 vessels operated. The number of chartered vessels, however, decreased by about 33%. The number of bait-boats operating in 2009 was 43, increasing slightly (5%) from 2008. These 43 vessels (100% national) were based in the same ports (Rio de Janeiro-RJ, Itajaí-SC, and Rio Grande-RS). In 2009, the number of purse seiner boats was 8, remaining the same as in the previous year.

The Brazilian catch of tunas and tuna-like fish, including billfish, sharks, and other species, was about 40,000 t (live weight), in 2009, representing an increase of about 12%, from 2008. The majority of the catch again was taken by bait-boats, which accounted for about 60% of the catches, with skipjack tuna being the most abundant species, representing close to 95% of the bait-boat catches. Total catch of the tuna longline fishery was equal to 7,800t, in 2009, being thus about 15% smaller than in 2008, with swordfish being again the most abundant species, with a total catch close to 3.100 t. Blue shark, yellowfin tuna and bigeye tunas were the three most caught species, after the swordfish, accounting for about 16% (1,268 t), 13.5% (1,038 t) and 13% (1,008 t) of the total longline catches. The total catch of white marlin and blue marlin was 52 t and 149 t, respectively, which is similar to the 2008 levels (47 t and 161 t, respectively).

Part of the Brazilian catches continued to result from a small-scale fishing fleet based mainly in Itaipava, on the southeast coast. Although comprised of relatively small boats of about 15 m in total length, this fleet is highly mobile, operating throughout most of the Brazilian coast and targeting a variety of species with different gears, including longline, handline, trolling and other surface gears. The total catch of this fleet, which mainly targets dolphin fish, in 2009, was about 8,000 t, of which 4,372.2 t (53%) was dolphinfish.

Several institutions directly assisted the Ministry of Fisheries and Aquaculture (MPA) in processing and analyzing data from the Brazilian tuna fishery in 2009. Besides the catch and effort data regularly collected in 2009, about 16,000 fish were measured at sea while landings included skipjack= 9,724; swordfish= 2,109; bigeye= 1,843; yellowfin= 782; blue shark= 596; albacore= 179; sailfish= 111; blue marlin= 102; and white marlin= 42, among others.

In 2009, an important shark and billfish research effort, in cooperation with U.S., Venezuelan and Uruguayan scientists, continued to be developed, including the collection of vertebrae, spines, stomachs and gonads, for age and growth, feeding habits and reproduction studies, as well as habitat utilization, through PSAT tags, and gear selectivity, by the use of circle hooks, hook timers, and TDRs.

Research on the incidental catches of seabirds continued and was aimed mainly at monitoring by-catch and testing mitigation measures, particularly the use of different kinds of torilines. The monitoring of sea turtle by-catches in longline fisheries also continued by the “Projeto Tamar”, including tests with the use of circle hooks and other mitigation measures to reduce the catch rates of sea turtles.

In order to adequately comply with ICCAT recommendations, the Brazilian government has implemented several rules regulating the Brazilian tuna fishery, although no new regulation was introduced in 2009. It is important to note, however, that in 2009 Brazil adopted a new law on fisheries and aquaculture and raised the Secretariat of Fisheries and Aquaculture to the level of Ministry.

Canada

Bluefin tuna are harvested in Canadian waters from July through December over the Scotian Shelf, in the Gulf of St. Lawrence, in the Bay of Fundy, and off Newfoundland. The adjusted Canadian quota for 2009 was 553.8 t. A total of 420 licensed fishermen participated in the directed bluefin fishery using rod and reel, handlines, electric harpoon and trap nets to harvest 461.9 t. Each fish harvested is individually tagged with a unique number and it is mandatory to have every fish weighed out at dockside.

The swordfish fishery in Canadian waters takes place from April to December. Canada's adjusted swordfish quota for 2009 was 1343.2 t with landings reaching 1299.7 t. The tonnage taken by longline was 1051.8 t while 247.7 t were taken by harpoon. Only 52 of the 77 licensed swordfish longline fishermen landed fish in the 2009 fishery.

The other tunas (albacore, bigeye and yellowfin) are at the northern edge of their range in Canada throughout the year. Canadian catches of these species have traditionally been a minor portion of the overall Canadian catch of large pelagic species. Porbeagle is the only shark species for which there is a directed longline fishery and the combined directed and by-catch harvests were 62.2 t in 2009.

All commercial vessels fishing pelagic species are required to hail out their intention to fish prior to a trip and hail in any harvests. The Canadian Atlantic statistical systems provide real time monitoring of catch and effort for all fishing trips on pelagic species. At the completion of each fishing trip, independent and certified Dockside Monitors must be present for off-loading, and log record data must be submitted by each fisherman whether fish are harvested or not.

The Annual Report of Canada contains details of recent scientific initiatives, and interested parties are referred to that document. In addition, a population dynamics specialist has been retained on a full time basis, and this individual will be devoted to ICCAT-related work.

Cape Verde

In 2009, the Cape Verde industrial and semi-industrial tuna fleet was comprised of about 70 operational vessels. The total catch amounted to 10,583 tons (t), caught mainly with purse seine and pole and line in the industrial fishery or semi-industrial fishery and with hand line in artisanal fishing. This shows a notable declining trend as compared to the previous year. There are no fishing activities targeting sharks, but due to the fragility of our surveillance, sharks are often part of the by-catches of the foreign longline fleet that fishes in the Cape Verde EEZ. The sport fishery has been the target of a reasonable demand but there is not yet any clear, detailed regulation on this matter. Billfishes are caught in Cape Verde waters, mainly by EU vessels and sport fishing. The licensed foreign fleet, fishing in the Cape Verde EEZ, is based on fishing agreements or contracts. These vessels are mostly from European Union and Asian countries. The objective of the research is to make recommendations for optimal and sustainable exploitation of the aquatic living resources, so as to achieve the economic and social objectives established in the policy on development. Research on fishing and the environment and socio-economic studies are thus of considerable importance for the development of fishing. Cape Verde submits information related to catches and thus contributes to the updating of statistics and the ICCAT stock assessments.

China (People´s Republic)

Longline is the only fishing gear used by the Chinese fishing fleet to fish tunas in the Atlantic Ocean. Twenty-six (26) Chinese tuna longliners operated in 2009, with a total catch (in round weight) of 6,357.5 t including tuna, tuna-like species and sharks, 938.8 t less than that of 2008 (7,296.3 t). The target species were bigeye tuna and bluefin tuna, whose catches in 2009 amounted to 4,973 t and 41.7 t, respectively. Bigeye tuna was the major target species in the Chinese catch, accounting for 78.2% of the total; however, this was 713 t lower than that of 2008 (5,686 t). Yellowfin tuna, swordfish and albacore were taken as by-catch. The catch of yellowfin tuna decreased from 649 t in 2008 to 462 t in 2009. The catch of swordfish was 383 t, with a decrease from the previous year (562 t in 2008). The catch of albacore was 116 t, which represented a 136.7% increase from the previous year.

The data compiled, including Task I and Task II as well as the 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. The People's Republic of China has carried out a national scientific observer program for the tuna fishery in ICCAT waters since 2001. One observer has been dispatched on board one Chinese Atlantic tuna longline fishing vessel covering the area of 6°13′N~14°15′N, 30°51′W~35°36′W since November, 2009. Data of target species and non-target species (sharks, sea turtles, especially) were collected during the observation.

In terms of implementation of the relevant ICCAT conservation and management measures, the 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 China Fisheries Association and the Tuna Technical Working Group in order to comply with the catch limits. The 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. The BOF has strictly followed the National Observer Program and the ICCAT Regional Observer Program for transshipment at sea.

Côte d'Ivoire

An international fleet of large tuna vessels lands and/or transships at the port of Abidjan. Thus, in 2009, 52 vessels (10 French, 26 Spanish, 11 Ghanaian and 5 Korean and Guinean cargo vessels) landed and transshipped 133,796 tons (t) of major tunas and 23,605 t of "*faux poissons*" for sale on the local market.

The *Centre de Recherches Océanologiques* (Center for Oceanographic Research) and equivalent institutions of the flag countries of this international fleet (notably the IRD of France and the IEO of Spain) have implemented a permanent statistical monitoring system of their activity.

Moreover, an artisanal driftnet fishery (about 200 canoes), which is more or less active, landed close to 29,000 t of tunas (yellowfin: 649 t; skipjack: 5,330 t; black skipjack: 3,170 t; frigate tuna: 19,684 t) and associated species (billfishes: 205.7 t; sharks: 72.7 t). This fishery is monitored jointly by the CRO and the *Direction des Productions Halieutiques* (Directorate of Fishing Production).

Croatia

The total Croatian catch of bluefin tuna in 2009 was 618.6 metric tons (t). Bluefin tuna were predominantly transferred into farming cages (608.96 kg, 98.44%) and 9.65 t (1.56 %) were landed. Catches of bluefin tuna were mostly made by purse seiners (98.51%), while the remainder was caught using hook and line gears.

The total Croatian catch of Mediterranean (Adriatic) swordfish amounted to 3,119 kg in 2009.

Significant improvements in fleet registry and data collection were made in 2009, enabling Croatia to report more detailed data on bluefin tuna and other tuna-like species. Research was continued on the growth and reproductive biology of bluefin tuna. A national sampling program targeting bluefin tuna harvested from aquaculture facilities has been carried out. Further activities to increase MSC activities (including VMS and electronic logbooks) have been undertaken.

Preliminary results from the 2010 bluefin tuna fishing season and small pelagic fishing are indicating a higher abundance of both juvenile and adult bluefin tuna in the Adriatic Sea than in the previous years.

Croatia has adopted the Regulation on the catch, farming and trade of bluefin tuna that includes provisions of ICCAT Recommendations 06-07, 08-12, 08-05, 09-06 and 09-11 and transposes these into national legislation in full. Croatia implemented the Regional Observers Programme (ROP) on bluefin tuna farms in 2009, in full accordance with the provisions of ICCAT Recommendation 08-05.

Croatia has undergone significant changes in terms of organization of its inspection services.

European Union

In recent years, the EU fleets have caught close to 40% of the total ICCAT catches which amounted to 174,000 tons in 2009. These 2009 catches are increasing slightly compared to the 160,000 tons in 2008, but they continue to be less than the catches of close to 300,000 t that were observed for the EU countries in the early 1990s. Eight EU countries carry out tuna fishing in the Atlantic and Mediterranean, in descending order of the catches in 2009: Spain (112,000 t), France (32,000 t), Italy (13,600 t), Portugal (10,700 t), Greece (2,700 t), Ireland (2,100 t), Malta and Cyprus. The major species caught by the EU countries in 2009 were yellowfin tuna (51,400 t) and skipjack tuna (45,400 t.), swordfish and bigeye tuna (20,000 t each)), albacore (17,500 t), and bluefin tuna (11,000 t). It is noted that the 2009 catches of tropical tunas have been, as in 2008, increasing slightly, albacore and bluefin tuna catches were have declined again in 2009. All the traditional fishing gears are active in the EU: purse seiners, baitboats, longliners, hand lines, trolling line, driftnets, harpoons, pelagic trawls, traps and sport fishing.

It is noted that in 2010 the financial support from the EU was decisive in launching the large-scale programme on bluefin tuna that was being initiated by ICCAT. The EU also finances to a large extent and routinely since 2001 the collection of biological data and considerable research projects on tunas of all its member countries. Task I and Task II statistical data which were submitted in 2010 to ICCAT by the EU countries are generally complete and in accordance with ICCAT rules. It is further noted that the EU also supports observer programmes on various fleets, tropical purse seiners with about 10% of the fishing effort monitored by observers and, since 2009, 100% of the fishing days are observed on the purse seiners fishing bluefin tuna in the Mediterranean. Biological sampling of tropical tunas of European purse seiners is also continuing as well as being routinely carried out in the Abidjan canneries. Also of note in 2010 is an effort by France to better estimate the activities and the catches of its artisanal fisheries on FADs for billfishes and tunas Martinique and Guadeloupe.

In addition, the active participation is noted of European scientists at all the ICCAT scientific meetings as well as the large number of SCRS documents in 2010 co-authored by EU scientists on all subject areas of ICCAT research. The EU countries conduct considerable research of a more fundamental nature on tunas, for example, on the ecosystems, the reduction of by-catches, tunas-environment relationships, tuna behavior, FADs, spawning and the production of larvae and juvenile bluefin tuna, etc. Scientists from EU countries actively participate, for example, within the framework of the CLIOTOP/GLOBEC Programme which has broad tuna research objectives that are multi-disciplinary and worldwide, and which are aimed at carrying out better modelling of the sustainable exploitation of the tuna resources based on the environment and the ecosystems.

Ghana

The tuna industry in Ghana comprises skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*). Twenty-one (21) baitboats, 11 purse seiners and 4 longliners currently fishing within the EEZ of Ghanaian coastal waters and beyond exploit these tuna species amongst other minor tuna-like species such as black skipjack (*Euthynnus alletteratus*).

During the year under review, skipjack catches were the highest (54.3%) followed by yellowfin (27.6%) and bigeye tunas (15.8%), respectively. Both fleets use Fish Aggregating Devices (FADs) in fishing and collaborate extensively in sharing their catch during fishing operations. Over 80% of catches are conducted off FADs. Catches for 2009 rose slightly to 66,470 metric tons (t) from 64,093 t in 2008, an increase of approximately 2,400 t.

Recent improvements in sampling, coupled with the provision of more logbook information from the fishery, have contributed to a better understanding of the time-area distribution of the species. It is envisaged that further synthesis of the database on Ghana since 1980-2009 would give a clear picture on the catch and species composition of the entire catch in relation to the collaborative fishing strategies and innovations and other factors influencing catchability of the species.

Ghana's Action Plan to strengthen the collection of statistical data and control measures to ensure the implementation of conservation and management measures were presented to the commission.

An observer programme was organized in March-May 2009 on board four purse seine vessels with the aim of training officers on the proper methods of estimating catches and filling out of information in logbooks. Also noted was massive use of FADs throughout the programme. In one recommendation, among others, it was suggested that due to the massive use of FADs and its attendant effect on juvenile destruction, a precautionary approach should be made to safeguard the industry.

Beach sampling of billfishes continued off the western coast of Ghana from artisanal drift gill operators. Revision of Task III for the period 1996-2009 has been finalized and standardized CPUE series will be carried out in 2011.

Japan

Longline is the only tuna-fishing gear deployed by Japan at present in the Atlantic Ocean. The final coverage of logbooks from the Japanese longline fleet was 90-95% before 2008. The current coverage for 2009 is estimated to be about 90%. In 2009, the number of fishing days was about 25,000 days, which was close to the average value in the recent ten year period. The catch of tunas and tuna-like fishes (excluding sharks) is estimated to be about 30,000 t, which is about 90% of the past ten years´ average catch. The most important species was bigeye tuna, representing 55% of the total tuna and tuna-like fish catch in 2009. The next dominant species was yellowfin tuna, which represented 19% in weight, and the third species was bluefin tuna (7%). Observer trips on longline boats in the Atlantic were conducted and a total of about 530 fishing days were monitored. In addition to the logbook submission mentioned above, the Fisheries Agency of Japan (FAJ) has set catch quotas for western and eastern Atlantic bluefin as well as for northern and southern Atlantic swordfish, blue marlin, white marlin and bigeye tuna, and has required all tuna vessels operating in the Atlantic Ocean to submit catch information every day (bluefin tuna) and every ten-day period (for other tunas) by radio or facsimile. All Japanese longline vessels operating in the Convention area have been equipped with satellite tracking devices (VMS) onboard. In accordance with ICCAT recommendations, the FAJ has taken the necessary measures to comply with its minimum size regulations, time area closures, etc. by Ministerial Order. Each species statistical or catch document programs has been conducted. Records of fishing vessels larger than 24 meters in length overall (LSTLVs) have been established. The FAJ has dispatched patrol vessels to the North Atlantic to monitor and inspect Japanese tuna vessels and also to observe the fishing activities of other nations' fishing vessels, and has inspected landings at Japanese ports to enforce the catch quotas and minimum size limits. Prior permission from the FAJ is required in the case that Japanese tuna longline vessels tranship tuna or tuna products to reefers at foreign ports or at sea.

Korea

In recent years, the annual catch of tuna and tuna-like species by Korean tuna longliners and purse seiners in ICCAT areas has increased and ranges from 2,438 to 4,668 t, with an average of 3,773 from 2005 to 2009. The major species were bigeye tuna (55.6% of total), yellowfin tuna (16.5%) and bluefin tuna (10.5%) during the recent five years, of which bigeye tuna and yellowfin tuna were the most important species in terms of catch size and high commercial value in sashimi markets. In 2009, 24 Korean longliners and one purse seiner operated in the ICCAT area and caught a total of 3,856 t, which was a decrease as compared to the catch of the previous year. Almost 78% of the total catch was comprised of the three major species, of which the bigeye tuna catch was 2,134 t (55% of total), albacore 458 t (12%) and yellowfin tuna 433 t (11%). It was apparent that the yellowfin tuna catch sharply decreased from 993 t in 2008 to 433 t in 2009, while albacore catch increased from 147 t in 2008 to 458 t in 2009. Korean longliners operated mainly in the tropical area of the Atlantic Ocean and targeted bigeye tuna and yellowfin tuna. The fishing season was throughout the year, from January to December in 2009, in the central Atlantic Ocean (15°N~5°S, 0°W~40°W). One Korean purse seiner based in Malta fished bluefin tuna in the Maltese area (34°~35°N, 13~15°E) of the Mediterranean Sea for one month. During the 2009 fishing season, a total of 102 t of bluefin tuna was caught in a joint fishing operation (Korea and France). The Korean catch of bluefin tuna accounted for 77% of the Korean quota (132.26 t) for 2009. The CPUE (t/set) of the bluefin tuna catch by joint fishing fleets was 42 t/set.

Mexico

High seas longline fishing is directed at yellowfin tuna (*Thunnus albacares*), in which other species groups are caught, and is concentrated in oceanic waters and limited to the Exclusive Economic Zone (EEZ) in the Gulf of Mexico and Caribbean Sea. Of the 37 large vessels with fishing permits, currently 29 operate that have carrying capacity. Among the coastal states of the Gulf of Mexico and Caribbean Sea, Veracruz and Yucatan contribute 85% of the total catch. The major catch of yellowfin tuna is obtained during the summer months. The product is mainly exported fresh to the United States. The catch of yellowfin tuna reported a historical maximum of 1,390 t in 2000, while in 2003 there was a reported gradual decrease from 1,362 t to 890 t in 2007, followed by a slight increase of 956 t in 2008 and 1,210 t in 2009. With regard to fishing effort, a marked decrease in fishing effort was noted in 2009. The total report catch in 2009 (catch stored in holds, released live and dead discards) was 1,723 t, comprised of yellowfin tuna (73%), and incidental by-catch (27%).

In 2009, efforts in Mexico were directed at improving the quality and quantity of scientific information, through validation, publication and interrelating. Additionally, the training and updating of observers on board vessel in the Gulf of Mexico was also carried out. The purpose was the timely compliance with national as well as international commitments within the framework of management of the longline fishery. Further, priority was given to the scientific dissemination of these achievements through technical meetings, fora, and educational exchanges that have involved participation from the industrial, governmental and educational sectors.

Morocco

The fishing of tuna and tuna-like species reached a production of 13,956 tons in 2009, the same level of general catches as in 2008.

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

The collection of statistical data and effort data is carried out in an exhaustive manner by the fisheries administration structures, such as the *Département des Pêches* (Department of Fishing) and the *Office National des Pêches* (National Office of Fishing), which are located throughout the Atlantic and Mediterranean coasts of Morocco. Monitoring of the export of fishing products is also carried out by the *Office des Changes* (the Exchange Office).

As regards scientific work, the *Institut National de Recherche Halieutique*-INRH (National Institute of Fisheries Research), through its Regional Centers (of which there are five) covering the entire Moroccan coast, reinforces the collection of biological data on the major species (bluefin tuna and swordfish). The Regional Center of the INRH in Tangiers serves as coordinator of the collection of all these data. In recent years, the monitoring of other species has been started, particularly tropical tunas (bigeye tuna among others), with extensive research work in areas located to the south of Morocco.

Considerable progress has also been reported as regards the collection of biological data, as noted by the series of scientific documents as well as the Task II databases submitted by Moroccan scientists at the various SCRS meetings for the stock assessments on tunas.

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. It is also prohibited to import and export Atlantic bluefin tuna, bigeye tuna and Atlantic swordfish in Norway without valid catch documentation.

No catches of Atlantic bluefin tuna were reported by Norway in 2009. Only one visual sighting of a juvenile bluefin tuna was reported in western Norway in June 2009.

Norway continuously works on historical data, and aims to put the data on this species into an ecosystem perspective. Extensive data and preliminary results on catch per unit effort (CPUE) from the Norwegian bluefin tuna fleet for the period 1950-1980 was made available for SCRS in 2009.

Norway participated in all major international scientific meetings concerning Atlantic bluefin tuna in 2009.

Russia

The Fishery. In 2009 a specialized purse-seine tuna fishery was carried out periodically in the Equatorial area by two purse seiners in an experimental mode of operation. The total catch amounted to 336 t (33 t of yellowfin tuna, 43 t of bigeye tuna and 260 t of oceanic skipjack).

The trawl fishery vessels caught 161 t of tunas and 366 t of bonito as by-catch from the Central-East Atlantic Ocean during 2009. In the first half of 2010, the trawl fishery vessels caught 168 t of tunas and 426 t of bonito.

Scientific research and statistics. In 2009 and the first half of 2010, the observers collected material onboard trawlers. The tuna species, size composition and proportions of all fish species in the total catches were estimated.

A comparative morphologic analysis of the teeth and body parameters of blue shark from the Atlantic and eastern Pacific Oceans was carried out.

The comparison indicates that the teeth morphology of Atlantic and Pacific sharks is similar. Sharks from different oceans differed in body proportions. Sexual dimorphism was found in blue sharks.

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

Senegal

In Senegal, tuna and tuna-like species are mostly caught by the industrial fishery comprised of baitboats targeting the major tuna species: yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*) and skipjack tuna (*Katsuwonus pelamis*), and longliners searching for swordfish *(Xiphias gladius*). Furthermore, a part of the artisanal fisheries uses hand line, pole and line and purse seine to catch small tunas: black skipjack (*Euthynnus alletteratus*), mackerel (*Scomberomus tritor*), plain bonito (*Orcynopsis unicolor*) and Atlantic bonito (*Sarda sarda*), wahoo (*Acanthoncybium solandri*), and frigate tuna (*Auxis thazard*). Billfishes (swordfish-*Xiphias gladius,* blue marlin *-Makaira nigricans* and sailfish-*Istiophorus platypterus* are also caught. The sport fishery targets billfishes (marlins and sailfish) during the fishing season that goes from May to December.

In 2009, the seven Senegalese purse seiners landed 6,720 tons (t), comprised of 1,157 t yellowfin tuna, 4,513 t skipjack tuna, 1,041 t bigeye tuna, 6 t black skipjack and 4 t frigate tuna. The longline fishery, which is comprised of four vessels, landed 590 t. The catches were made up of 195 t of swordfish, 327 t of sharks, 11 t of yellowfin tuna, 24 t of blue marlin, 2 t of sailfish and 27 t of fins.

With regard to the artisanal fisheries, the landings of all species mixed was estimated at 5,315 t in 2009. The sport fishery catches amounted to 78 t of sailfish and 37 t of marlins for an effort of 638 trips.

As regards scientific work, the collection of statistical data on the tunas landed by the national and foreign fleets (mainly French and Spanish) based at Dakar is carried out regularly by the team at the *Centre de Recherches Océanographiques de Dakar/Thiaroye* (CRODT). The information obtained is supplemented by the catches made from various sources (boat owners, *Direction des Pêches Maritimes*, etc.).

Sampling is conducted during the landings of the national and foreign vessels at the port of Dakar by a team of three. In 2009, 226 multi-species size samples were taken from Senegalese baitboats. Samñling of billfishes (mostly sailfish-*Istiophorus platypterus)* is also carried out at the major landing sites of the artisanal fishery, mainly at Soumbédioune, Yoff and Mbour.

The ICCAT conservation and management measures are well monitor by Senegal. The system of monitoring, control and surveillance of all the fishing activities in place at port permits carrying out inspections as well as identifying any vessel involved in illegal fishing activities.

Turkey

During the course of 2009, the total catch of tuna and tuna-like fishes amounted to 8,633 t. In 2009, Turkey's total catches of bluefin tuna, albacore, Atlantic bonito and swordfish were 665.4 t, 631 t, 7,036 t, and 301 t, respectively. All bluefin catch was caught by purse seiners, the majority of which have an overall length of 30-50 m and a GRT of 200-300. The fishing operation was conducted intensively off Antalya Bay and in the region between Antalya Gazi Paşa and Cyprus. In the Mediterranean, fisheries were conducted in the region between Cyprus-Turkey and in the Cyprus-Syria region. The highest bluefin tuna catch was obtained in June. Recommendations and resolutions imposed by ICCAT were transposed into national legislation and implemented. All the conservation and management measures regarding bluefin tuna fisheries and farming are regulated by national legislation through notifications, considering ICCAT's related regulations. The Fisheries Information System has been updated in order to meet the requirements of data exchange at the national and regional level. Major research activities in 2009 focused on albacore.

United States

The total (preliminary) reported U.S. catch of tuna and swordfish, including dead discards, in 2009 was 9,605 metric tons (t), an increase of about 16% from 8,304 t in 2008. Estimated swordfish catch (including estimated dead discards) increased from 2,530 t in 2008 to 2,838 t in 2009, and provisional landings from the U.S. fishery for yellowfin slightly increased in 2009 to 2,802 t from 2,407 t in 2008. In 2009, U.S. vessels fishing in the northwest Atlantic caught an estimated 1,228 t of bluefin, an increase of 307 t compared to 2008. Provisional skipjack landings increased by 52 t to 119 t from 2008 to 2009, estimated bigeye landings slightly increased by about 28 t compared to 2008 to an estimated 516 t in 2009, and estimated albacore landings decreased from 2008 to 2009 by 60 t to 188 t.

In 2009, the United States continued research to enhance the knowledge of tuna and tuna-like species in areas such as age and growth, stock structure, biological characteristics, migration patterns, habitat utilization, etc. As in previous years, the United States maintained its scientific observer coverage of the pelagic and bottom longline fleets and the gillnet fisheries. A description of time-area closures and the impact of such management measures to reduce the dead discards in the swordfish pelagic longline fisheries are also provided.

Uruguay

In 2009, nine vessels operated using surface longline and five vessels used deep longline. The latter vessels fished jointly with a Japanese company within a bigeye tuna prospection project. The total catch (preliminary) landed and reported in 2009 was approximately 2,525 tons (t).

Research and statistics

Various activities were carried out in 2009 related to statistics, research and management. Some of these activities were developed jointly with other national and international institutions. In 2009 fisheries-independent research was initiated on board DINARA´s scientific research vessel. The overall objective was to collect more detailed information on the species in the oceanic pelagic environment and to carry out experiments on mitigating measures, etc.

Research

Research was developed mainly information from the fishing sector and from the Observers Program (PNOFA) and during 2009 data obtained on the research vessel were integrated. PNOFA covered an important part of the activity of the national flag fleet and 100% of the deep longline fleet that participated in the bigeye prospection research. In 2009, there were approximately 1,600,000 hooks observed. The tagging program continued in 2009, with 473 fish tagged with tags provided by ICCAT (5 recoveries), as did diffusion and circulation activities.

Uruguay collaborated in various inter-sessional meetings (swordfish, porbeagle), submitting papers for the assessments and the data preparatory meetings. Genetic studies are being carried out jointly with other countries for species identification and age and growth studies on *Tetrapturus pfluegeri*. Work was done for the preparation of the ICCAT shark identification sheets and information on sharks was updated (ICCAT Manual, 2010c) for the new *ICCAT Manual*. Research has been carried out on the monitoring and evaluation of the problem of the incidental catch of sea birds, as well as the implementation of mitigation measures for their enforcement on the fleet.

Studies have also been carried out on feeding, migration, habitat use, genetics, among others, of marine turtles. Experiments continue to be conducted with circle hooks in the longline fleet that uses American type longline as well as well on the DINARA research vessel. Research continued on marine mammals that interaction with the fleet. In 2009 a prospection project was carried out to determine the possibility of fishing bigeye tuna *(T. obesus)* in Uruguayan waters. For this, five Japanese vessels of approximately 50 m in length operated between March and September within the 200 mile area of Uruguay, mainly on the continental shelf. During this prospection, 501 sets were made, with 100% coverage by Uruguayan observers. Besides, these vessels continued testing mitigation measures, using “scarecrow” lines designed by Uruguay.

Implementation of the ICCAT conservation and management measures

Also continued were the implementation of the “National Action Plan to Reduce the Incidental Catch of Sea Birds in Uruguayan Fisheries” and the “National Action Plan for the Conservation of Chondrichthyes in Uruguayan Fisheries”

Among the national management measures, those referring to minimum size of the catch of swordfish (25 kg, 15% tolerance), bigeye tuna and yellowfin tuna (3.2 kg) remained in effect.

Venezuela

The Venezuelan fleet targeting pelagic resources was comprised of 60 industrial vessels in 2009: 46 longliners, 6 purse seiners and 8 baitboats. Besides there were 35 artisanal vessels registered that fish using driftnets and 48 using surface longline. Landings in this year of tunas and tuna-like species from the Atlantic Ocean amounted to 7,103 t. Of this amount, 91.6% were tunas, of which the most important species was yellowfin tuna (*T. albacares*) with 45%, while catches of skipjack tuna (*K. pelamis*) and blackfin tuna (*T. atlanticus*) and bigeye tuna (*T. obesus*) reached 32%, 4% and 6%, respectively. The incidental catch was comprised of billfishes, particularly sailfish (*Istiophorus albicans*) with 2.2% and blue marlin (*Makaira nigricans*) with 1.5%, and sharks whose landings represented 2.3%. 52% of the landings were from the purse seine fishery, 19% from baitboat, 24% from longline, and 5% from the artisanal fisheries. In 2009, research continued on the fishery for large pelagics, including tunas, billfishes and sharks. The scientific observer program on board industrial longline vessels continued as did coverage of the sport fishing tournaments.

− ***Cooperating Parties, Entities or Fishing Entities***

Chinese Taipei

In 2009, the total number of authorized longline vessels in the Atlantic Ocean was 109, which included 60 longliners authorized to target bigeye tuna and 49 to target albacore. The catch of the longline fleet declined from 45,437 metric tons (t) in 1998 to 28,090 t in 2009, and the catches of bigeye tuna, yellowfin tuna and albacore were 13,252 t, 1,391 t and 9,541 t, respectively. Bigeye and yellowfin tuna catches increased from those of 2008, which was mainly due to the increase in fishing effort from the low fishing effort level because of the high fuel price in 2008. However, albacore catches decreased for some longliners that were temporarily out of operation. There were 25 observers placed on fishing vessels in the Atlantic Ocean, and the observer coverage rate was above the requirement set by ICCAT. The research projects conducted by scientists in 2009 included CPUE standardizations for North and South Atlantic albacore, swordfish and bigeye tuna, and distribution of ecologically related species in the Atlantic Ocean. Scientific documents on these research projects were submitted to various inter-sessional scientific meetings organized by ICCAT.

8. Executive Summaries on species

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 catches through 2009. 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 (Anon. 2009a).

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. 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). Movement rates, routes, and local residence times remain highly uncertain, however. Males are predominant in the catches of larger sized fish, which may indicate that there are important differences between sexes with respect to growth and/or natural mortality. Natural mortality is assumed to be higher for juveniles than for adults; this is supported by tagging studies for Pacific yellowfin. Uncertainties remain as to the scale of these natural mortality rates, however, with important implications for stock assessment.

Growth rates have been described as relatively slow initially, increasing at the time the fish leave the nursery grounds, and is supported by results from tagging data in other oceans. Nevertheless, questions remain concerning the most appropriate growth model for Atlantic yellowfin tuna. A recent study (Shuford *et al.* 2007) 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; however, recent analyses indicate that assuming this alternative growth model would result in only moderate changes to estimates of stock status using current age-structured assessment models and assumptions of natural mortality vectors.

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 reduction in overall Atlantic catches, with an overall decline of 39% from the peak catches of 1990, although catches have increased by 10% (to a provisional 118,871 t) relative to 2006, the last year of data available for the assessment). Recent trends have differed between the western and eastern Atlantic, with the overall catches in the west declining by 26% since 2006. In the eastern Atlantic, on the other hand, catches increased by 23% since 2006, mainly due to substantial increases in purse seine effort.

In the eastern Atlantic, where overall catches peaked in 1990, purse seine catches declined from 128,729 t in 1990 to less than half that (58,319 t) in 2006, but then increased by nearly a third from that level to 76,392 t in 2009 **(YFT-Table 1; YFT-Figure 2)**. Baitboat catches declined by half from 1990 to 2006(from 19,648 t to 10,434 t), but have increased by 5% to 10,949 in 2009. Longline catches, which were 10,253 t in 1990, have fluctuated since between 5,790 t and 14,638 t and were 7,219 t in 2006 (a 30% decrease from 1990), increasing again by 8% between 2006 and 2009 to 7808 t. In the western Atlantic where overall catches peaked in 1994, purse seine catches declined by three-quarters from 1994 to 2006(from 19,612 t to 4,442 t), and by 2009 had decreased by another two-thirds relative to 2006 (1,365 t). Baitboat catches declined by nearly two-thirds between 1994 and 2006, from 7,094 t to 2,695 t, and in 2009 were reduced by half again from the 2006 level (to 1331 t). Longline catches, which were 11,343 t in 1994, have fluctuated since between 10,059 t and 16,019 t, were 14,249 t in 2006 (a 26% increase from 1990) and remained about the same by 2009 (14,992 t). It was noted that Brazilian catches declined in 2008-2009 as a result of reductions in effort and targeting; this may also be the case for Venezuela in 2007-2009. However, United States catches during 2008-2009 declined substantially despite maintaining similar effort levels to previous years. The most recent available catch distribution is given in **YFT-Figure 1.** However, it should be noted that official reports are not yet available from several Contracting and/or non-Contracting Parties, and some of these figures are based upon data provided by CPC scientists and/or derived from recent catch levels.

The nominal effort in the purse seine fishery had been declining through 2006. As an indicator, the number of purse seiners from the European and associated fleet operating in the Atlantic had declined from 44 vessels in 2001 to 25 vessels in 2006 (the last year of data included during the assessment), with an average age of about 25 years (see **SKJ-Figure 3** for trends in number of vessels and carrying capacity**)**. Since then, however, the number of purse seiners has increased by 50% to 37, as vessels have moved from the Indian Ocean to the Atlantic. At the same time, the efficiencies of these fleets have been increasing, particularly as the vessels which had been operating in the Indian Ocean tend to be newer and with greater fishing power and carrying capacities. On the other hand, since 2006 the European and associated baitboat fleet, based in Dakar, varied in number only slightly.

Several scientific documents were presented which were descriptive of the catches by country fleets. Catch rate trends for a number of fisheries were considered during the assessment. 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

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**. When considering the results of each model, it should be noted that each has relative strengths and weaknesses; the production model utilizes all the years of available data but assumes that selectivity across lengths (ages) doesn't change over time, whereas the age structure model can track changes in selectivity but relies on accurate assignment of ages and is restricted to years for which adequate catch at size data are available. 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 through 2006 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 was still about a 60% chance that stock status was 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.

It is noted that catch levels until 2007 had been held in check, despite increasing efficiencies of individual vessels, by a continued decline in the number of purse seine vessels in the eastern Atlantic. This trend has since reversed, and given a continuation of the recent movement of additional, newer vessels from the Indian Ocean into the Atlantic, with a corresponding increase in fishing mortality, the situation should be monitored closely to avoid adverse impacts on stock status.

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. Yield-per-recruit analyses, the results of which are strongly dependent upon the natural mortality vector assumed, 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. Evaluations have been conducted on the relative impact of effective effort restrictions on individual fisheries in terms of yield per recruit and spawning biomass per recruit and are presented in the Report of the 2009 Inter-sessional Meeting of the Tropical Tunas Species Group (Anon. 2010b). This year, a scientific document (SCRS/2010/152) has been presented describing initiatives to develop and test bycatch (including juvenile tuna) mitigation options for tropical purse seine fisheries, with investigations to be conducted in all oceans.

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. This expectation is supported by analyses of purse seine catches which were presented to the Committee, confirming that the new closure has been less effective than previous moratoria in reducing the proportional catch of small fish harvest and avoiding growth overfishing, at least with respect to the catches of European and associated fleets. If management objectives include reductions in juvenile mortality, there is a general agreement that larger time/area moratoria are likely to be more precautionary than a smaller moratoria, providing that the moratoria are fully complied with. As requested by the Commission, in 2009 the Committee analysed the closure contained in [Rec. 08-01] and alternative closures. The response to the Commission's request is provided in a separate section of the 2009 SCRS report.

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 showed some improvement between the 2003 and 2008 assessments, which is not surprising in that catches and fishing effort generally declined and there were small increases in catch rates observed for some longline fisheries over the past few years. Stock biomass in 2006 was estimated to be near the Convention Objective and 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)
2006 Yield [3]	108,160 t
Current Yield[3] (2009)	118,871 t
Replacement Yield (2006)	~ 130,000 t
Relative Biomass B_{2006}/B_{MSY} [4]	0.96 (0.72-1.22)
Relative Fishing Mortality: $F_{current(2006)}/F_{MSY}$ [4]	0.86 (0.71-1.05)
$F_{current(2006)}/F_{0.1}$ [5]	1.26 (1.11-1.44)
$F_{current(2006)}/F_{20\%SPR}$ [5]	0.81 (0.73-0.93)
$F_{current(2006)}/F_{30\%SPR}$ [5]	1.12 (1.01-1.29)
$F_{current(2006)}/F_{40\%SPR}$ [5]	1.52 (1.35-1.73)

Management measures in effect:

− Effective fishing effort not to exceed 1992 level [Rec. 93-04].

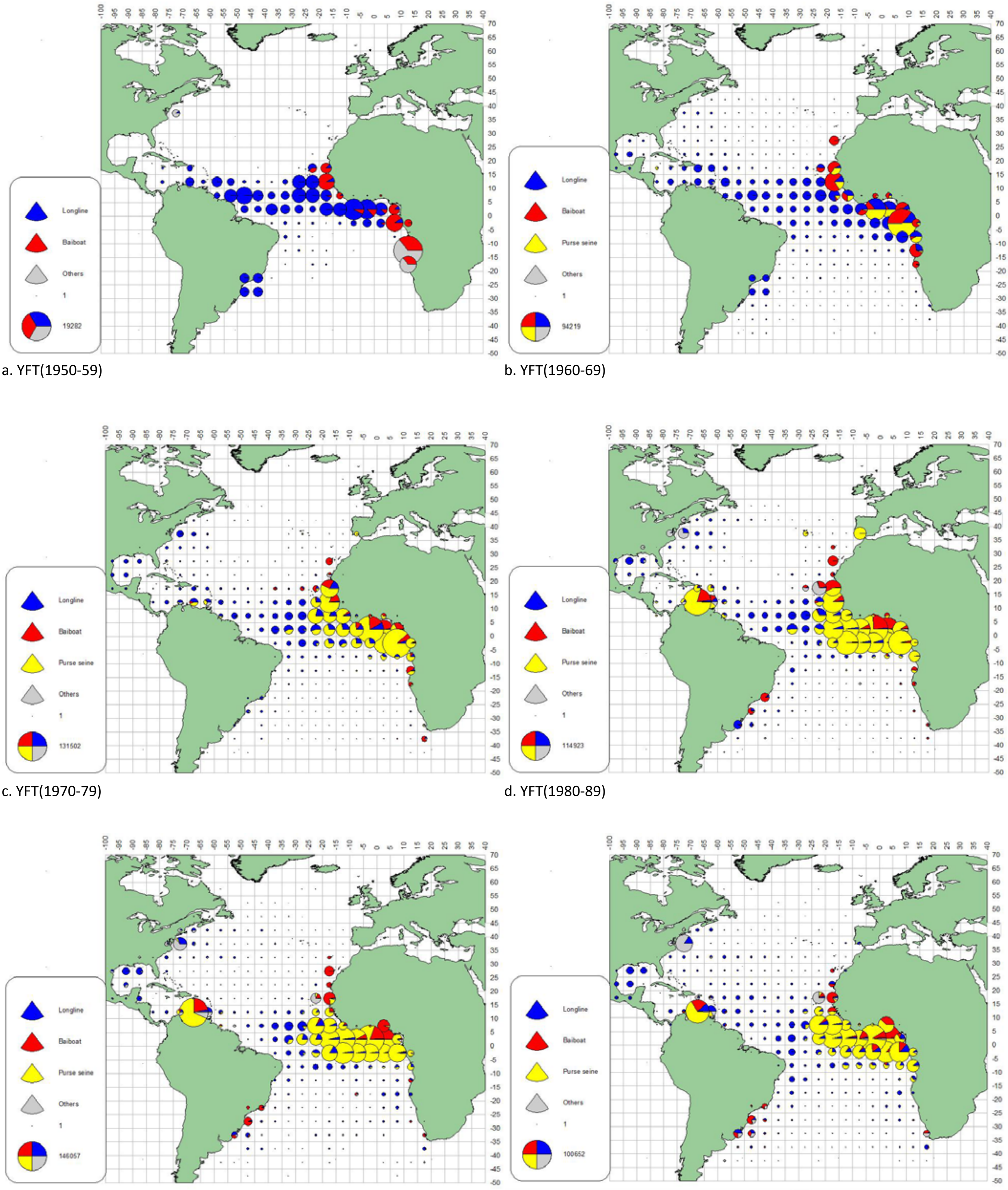
NOTE: $F_{current(2006)}$ refers to F_{2006} in the case of ASPIC, and the geometric mean of F across 2003-2006 in the case of VPA. As a result of the constant trend in recruitment estimated by the VPA model, F_{MAX} is used as a proxy for F_{MSY} for VPA results.

[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. Subsequent revisions have reduced reported catch levels slightly to 107,859 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 area, gear and flag.

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			156619	146673	145361	136265	162247	193536	166901	163762	162753	172584	153251	153043	137218	148566	140366	136249	164650	140279	125590	119972	107234	107859	99619	109097	118871
	ATE		113803	108839	113379	101671	125345	160805	130004	126050	124009	124369	117977	119987	104877	117647	109656	101730	124363	110619	100608	88735	81166	79587	75722	91096	97887
	ATW		42815	37834	31982	34594	36902	32731	36897	37712	38745	48215	35274	33056	32341	30919	30710	34519	40287	29660	24982	31238	26068	28272	23897	18000	20978
	MED		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Landings	ATE	Bait boat	16120	15301	16750	16020	12168	19648	17772	15095	18471	15652	13496	13804	12907	17330	19256	13267	19071	13432	11513	15354	12012	10434	8896	11721	10949
		Longline	9520	5779	6624	8956	7566	10253	9082	6518	8537	14638	13723	14236	10495	13872	13561	11369	7570	5790	9075	11442	7317	7219	13708	8496	7808
		Other surf.	1516	2296	2932	2646	2586	2175	3748	2450	2122	2030	1989	2065	2136	1674	1580	2424	2074	1826	2540	2928	3062	3615	2726	1623	2739
		Purse seine	86648	85464	87074	74049	103025	128729	99402	101987	94880	92050	88770	89882	79339	84771	75260	74670	95648	89572	77481	59011	58776	58319	50392	69256	76392
	ATW	Bait boat	5478	2421	5468	5822	4834	4718	5359	6276	6383	7094	5297	4560	4275	5511	5349	5649	5315	6009	3764	4868	3867	2695	2304	886	1331
		Longline	10193	18490	14291	19046	17128	18851	13667	16594	11439	11343	10059	11111	11554	11671	13326	15760	14872	11921	10166	16019	14449	14249	13287	13069	14992
		Other surf.	6150	7101	5557	3692	3293	2362	3457	3483	4842	10166	13580	6601	4801	4581	5345	5241	7027	3763	6445	7134	5118	6880	5959	1973	3281
		Purse seine	20994	9822	6665	6034	11647	6800	14414	11359	16081	19612	6338	10784	11710	9157	6523	7870	13072	7966	4607	3217	2634	4442	2341	2067	1365
	MED	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Discards	ATW	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	5	6	5	9
Landings	ATE	Angola	350	59	51	246	67	292	510	441	211	137	216	78	70	115	170	35	34	34	34	34	111	0	405	0	
		Belize	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	5	0	0	0	0	0	0	0	0	
		Benin	60	19	3	2	7	1	1	1	1	1	1	1	3	1	1	1	1	0	0	0	0	0	0	0	
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	
		Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cape Verde	1901	3326	2675	2468	2870	2136	1932	1426	1536	1727	1781	1448	1721	1418	1663	1851	1684	1802	1868	3236	7154	8112	4057	8413	3273
		Cayman Islands	0	0	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	139	156	200	124	84	71	1535	1652	586	262	1033	1030	1112	1056	1000	365	214
		Chinese Taipei	146	254	193	207	96	2244	2163	1554	1301	3851	2681	3985	2993	3643	3389	4014	2787	3363	4946	4145	2327	860	1707	930	1327
		Congo	11	20	15	15	21	22	17	18	17	14	13	12	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	1585	1332	1295	1694	703	798	658	653	541	238	212	257	269	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	2	0	0	673	213	99	302	565	175	482	216	626	90
		EU.España	66874	61878	66093	50167	61649	68603	53464	49902	40403	40612	38278	34879	24550	31337	19947	24681	31105	31469	24884	21414	11795	11606	13584	24409	32793
		EU.Estonia	0	0	0	0	0	0	234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	12304	17756	17491	21323	30807	45684	34840	33964	36064	35468	29567	33819	29966	30739	31246	29789	32211	32753	32429	23949	22672	18940	11330	16115	17261
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	
		EU.Latvia	0	0	0	0	0	0	255	54	16	0	55	151	223	97	25	36	72	334	334	334	334	334	0	0	
		EU.Lithuania	0	0	0	0	0	0	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	36	295	278	188	182	179	328	195	128	126	231	288	176	267	177	194	4	6	4	5	16	274	865	300	990
		EU.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	0	0
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
		Gabon	0	0	0	0	0	0	0	0	12	88	218	225	225	295	225	162	270	245	44	44	44	44	0	0	
		Gambia	0	0	0	0	0	2	16	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Georgia	0	0	0	0	0	0	25	22	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	12550	11821	10830	8555	7035	11988	9254	9331	13283	9984	9268	11720	15437	17657	25268	17662	33546	23674	18457	15054	17493	11931	15463	14250	18355
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2906	6560	3461	3736	2603
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	892
		Honduras	0	0	0	0	0	0	0	2	0	0	4	3	4	3	0	0	0	0	0	0	0	0	0	0	
		Japan	5765	3634	4521	5808	5882	5887	4467	2961	2627	4194	4770	4246	2733	4092	2101	2286	1550	1534	1999	5066	3088	4206	8496	5266	5087
		Korea Rep.	1668	965	1221	1248	1480	324	259	174	169	436	453	297	101	23	94	142	3	8	209	984	95	4	573	983	375
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	73	73	0	0	0	0	0	
		Maroc	2270	2266	1529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	108	95	183	95	102	0	**0**
		Mixed flags (FR+ES)	72	138	933	932	825	1056	2220	2455	2750	1898	1172	1166	981	1124	1369	1892	1427	599	992	1052	933	1063	655	626	459
		NEI (ETRO)	0	0	2077	3140	5436	12601	4856	10921	9875	8544	8970	9567	6706	7225	5418	5448	10205	8209	5396	4294	1781	219	0	0	
		NEI (Flag related)	76	150	285	206	280	1115	2310	1315	1157	2524	2975	3588	3368	5464	5679	3072	2090	133	466	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	35	14	72	69	3	147	59	165	89	139	85	135	59	28	11	1
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	3183	6082	6110	3962	5441	4793	4035	6185	4161	0	1939	1368	7351	6293
		Norway	0	813	418	493	1787	1790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	3100	1944	1858	1239	901	1498	7976	8338	10973	12066	13442	7713	4293	2111	1315	1103	574	1022	0	1887	6170	8557	9363	6175	5813
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	126	173	86	0	50	9	68	13	30	88	53	10
		Russian Federation	0	0	0	0	0	0	3200	1862	2160	1503	2936	2696	4275	4931	4359	737	0	0	0	0	4	42	211	0	33
		S. Tomé e Príncipe	180	180	178	298	299	164	187	170	181	125	135	120	109	124	114	122	122	122	122	134	145	137	0	0	
		Senegal	0	0	0	0	2	90	132	40	19	6	20	41	208	251	834	252	295	447	279	681	1301	1262	819	588	1279
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	11	0	0	0	0	0	0	
		South Africa	382	55	68	137	671	624	52	69	266	486	183	157	116	240	320	191	342	152	298	402	1156	1187	1063	351	303
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	14	0	101	209	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	3768	1851	1275	3207	4246	3615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	72	82	93	98	100	92	100	166	171	150	181	151	109	181	116	136	72	9	0	0	0	344	177	97	104
		Ukraine	0	0	0	0	0	0	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	145	483	450	331
		Venezuela	634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	44	23	18	66	33	23	34	1	0	0	0	0	0	0	0	0	0	0	0	327	327	0	0	0	
		Barbados	57	39	57	236	62	89	108	179	161	156	255	160	149	150	155	155	142	115	178	211	292	197	154	156	79
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	143	1164	1160	988
		Brasil	2947	1837	2266	2512	2533	1758	1838	4228	5131	4169	4021	2767	2705	2514	4127	6145	6239	6172	3503	6985	7223	3790	5468	2749	3313
		Canada	0	2	40	30	7	7	29	25	71	52	174	155	100	57	22	105	125	70	73	304	240	293	276	168	53
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	628	655	22	470	435	17	275	74	29	124	284	248
		Chinese Taipei	780	1156	709	1641	762	5221	2009	2974	2895	2809	2017	2668	1473	1685	1022	1647	2018	1296	1540	1679	1269	400	240	192	64
		Colombia	180	211	258	206	136	237	92	95	2404	3418	7172	238	46	46	46	46	46	46	46	46	46	46	0	0	
		Cuba	1906	2081	1062	98	91	53	18	11	1	14	54	40	40	15	15	0	0	65	65	65	65	65	0	0	
		Dominica	0	0	0	0	0	18	12	23	30	31	9	0	0	0	80	78	120	169	119	81	119	65	103	124	97
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	89	220	226	226	226	226	226	226	226	0	0	
		EU.España	1000	0	0	1	3	2	1462	1314	989	7	4	36	34	46	30	171	0	0	0	0	0	1	84	81	69
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.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
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	60	88	179	260
		Grenada	170	506	186	215	235	530	620	595	858	385	410	523	302	484	430	403	759	593	749	460	492	502	633	756	630
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	
		Japan	2169	2103	1647	2395	3178	1734	1698	1591	469	589	457	1004	806	1081	1304	1775	1141	571	755	1194	1159	437	541	986	3539
		Korea Rep.	1655	853	236	120	1055	484	1	45	11	0	0	84	156	0	0	0	0	0	0	0	580	279	0	10	52
		Mexico	562	658	33	283	345	112	433	742	855	1093	1126	771	826	788	1283	1390	1084	1133	1313	1208	1050	938	890	956	1211
		NEI (Flag related)	450	806	1012	2118	2500	2985	2008	2521	1514	1880	1227	2374	2732	2875	1730	2197	793	42	112	0	0	0	0	0	
		Netherlands Antilles	150	150	160	170	170	170	150	160	170	155	140	130	130	130	130	130	0	0	0	0	0	0	0	0	
		Panama	0	5278	3289	2192	1595	2651	2249	2297	0	0	0	0	0	0	5	0	0	0	0	0	0	2804	227	153	288
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	36	106	78	12	79	145	299	230	234	151	167	142
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	1	40	48	22	65	16	43	37	35	48	38	1989	1365	1160	568	4251	0	2680	2989	2547	2274
		Sta. Lucia	79	125	76	97	70	58	49	58	92	130	144	110	110	276	123	134	145	94	139	147	172	103	82	106	97
		Trinidad and Tobago	0	0	0	1	11	304	543	4	4	120	79	183	223	213	163	112	122	125	186	224	295	459	615	520	629
		U.S.A.	9735	9938	9661	11064	8462	5666	6914	6938	6283	8298	8131	7745	7674	5621	7567	7051	6703	5710	7695	6516	5568	7091	5529	2473	2802
		UK.Bermuda	42	44	25	23	22	15	17	42	58	44	44	67	55	53	59	31	37	48	47	82	61	31	30	15	41
		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	
		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	1	0	
		Uruguay	354	270	109	177	64	18	62	74	20	59	53	171	53	88	45	45	90	91	95	204	644	218	35	66	76
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	681	689	661	555	873	816
		Venezuela	20535	11755	11137	10949	15567	10556	16503	13773	16663	24789	9714	13772	14671	13995	11187	10558	18651	11421	7411	5774	5097	6514	3911	3272	3198
	MED	Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Discards	ATW	Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	5	9
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	0	0	0	



a. YFT(1950-59)

b. YFT(1960-69)

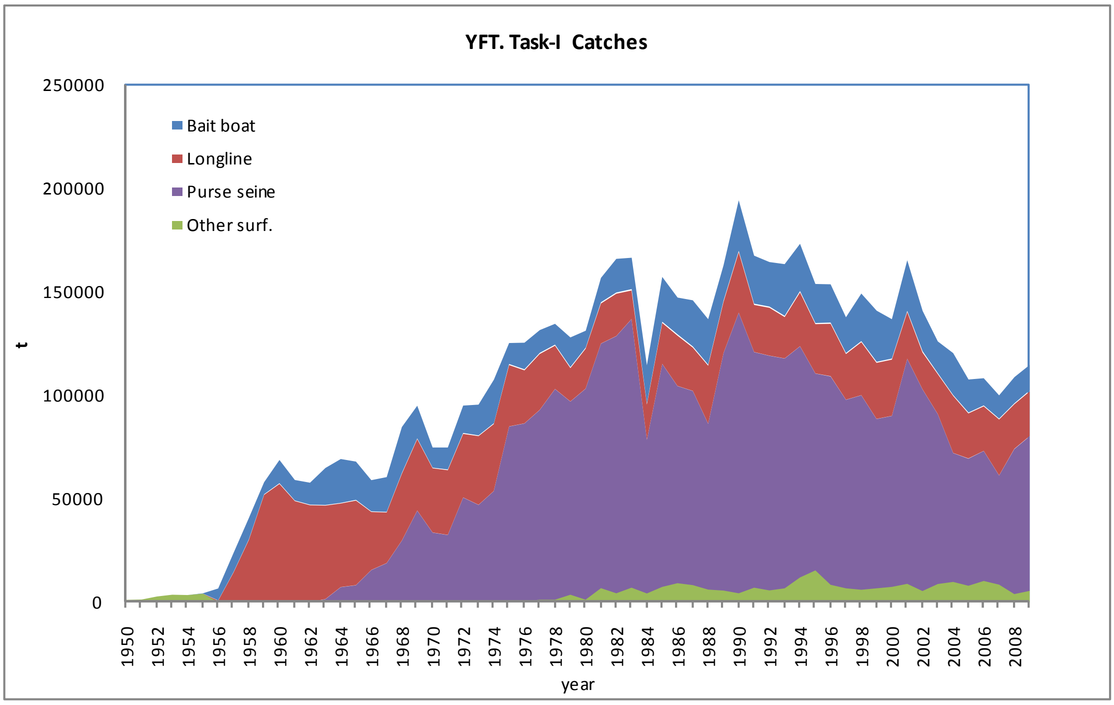
c. YFT(1970-79)

d. YFT(1980-89)

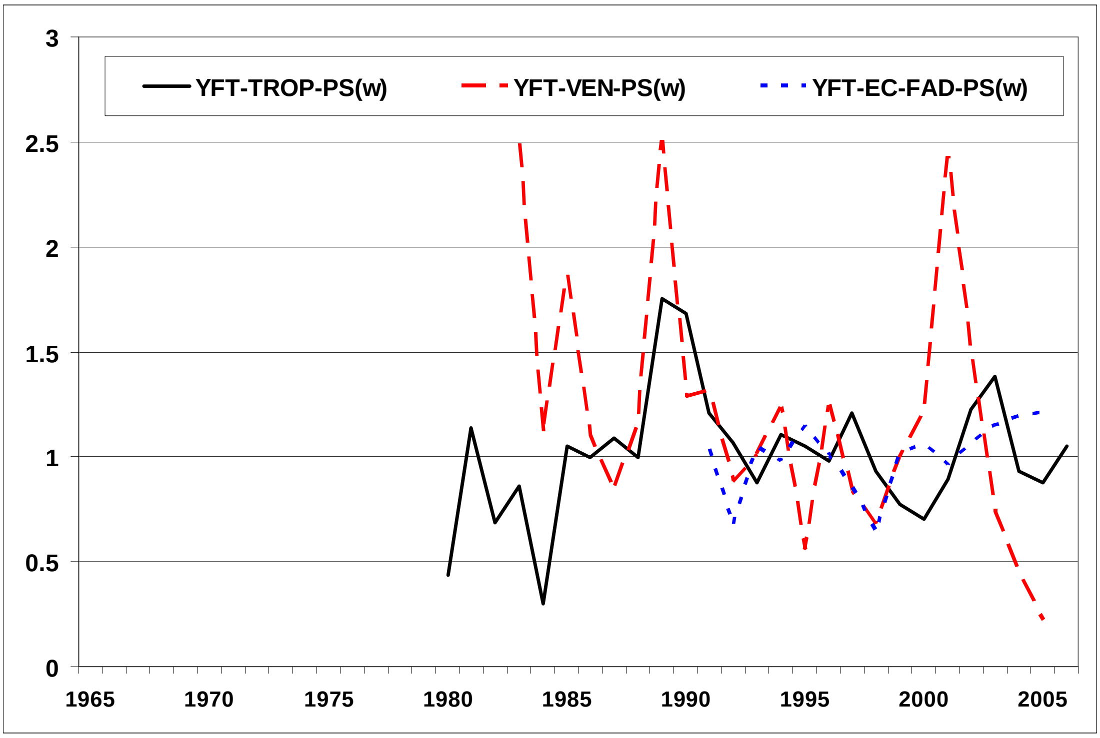
e. YFT (1990-99)

f. YFT (2000-08)

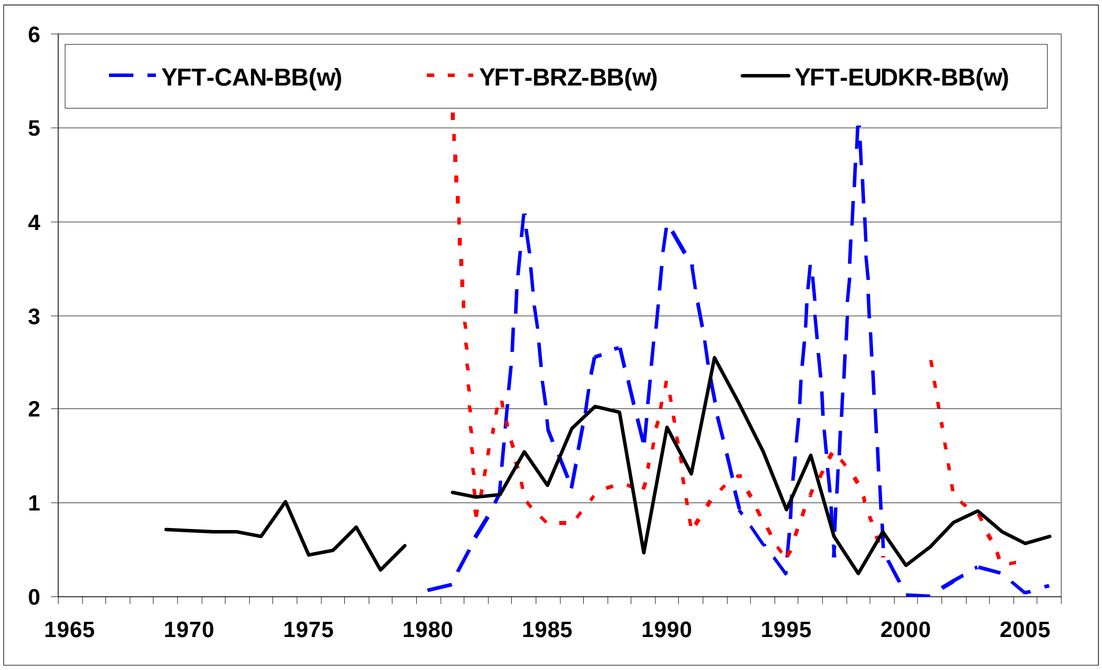
YFT-Figure 1 [a-f]. Geographical distribution of yellowfin tuna catches by major gears and decade.



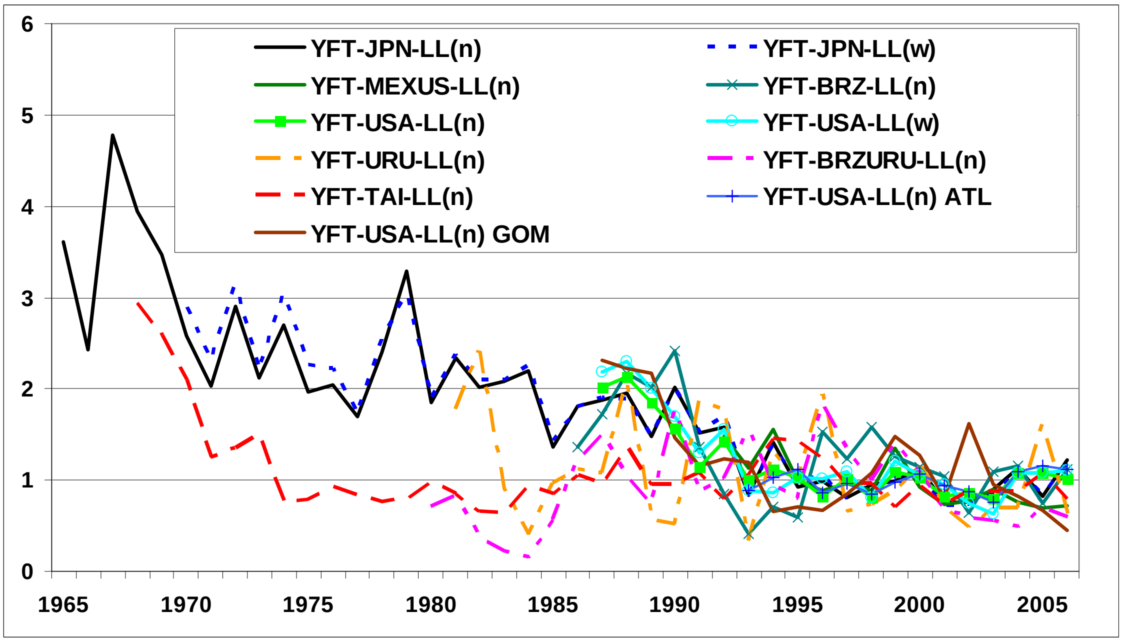
YFT-Figure 2. Estimated annual catch (t) of Atlantic yellowfin tuna by fishing gear, 1950-2009.



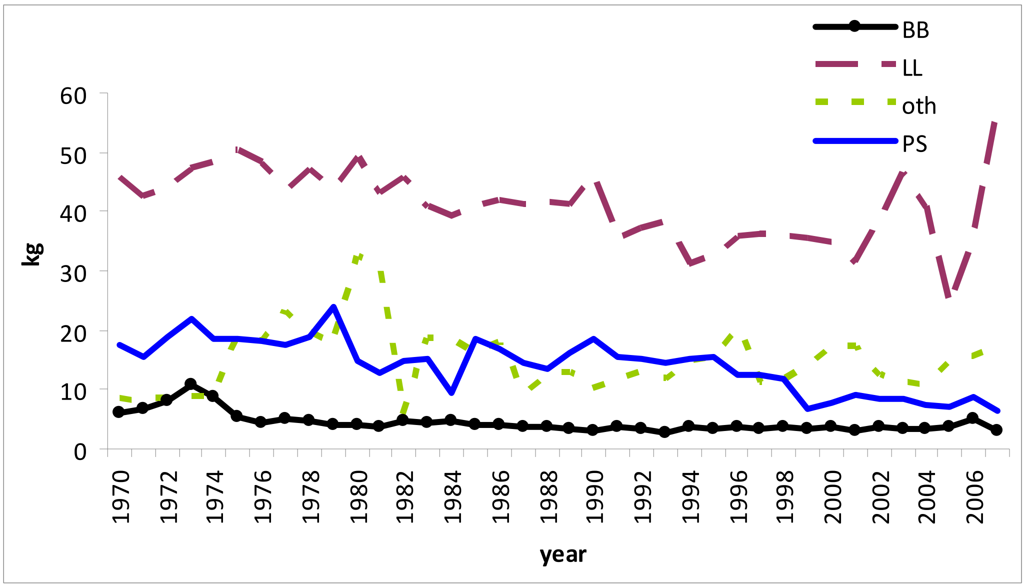
YFT-Figure 3. Yellowfin relative nominal catch rate trends from purse seine fleets, in weight. The Venezuelan trend (YFT-VEN-PS) reflects catches from the western Atlantic; the remaining two series YFT-TROP-PS (EU tropical) and YFT-EC-FAD-PS (EU tropical FAD sets) reflect catches in the eastern Atlantic.

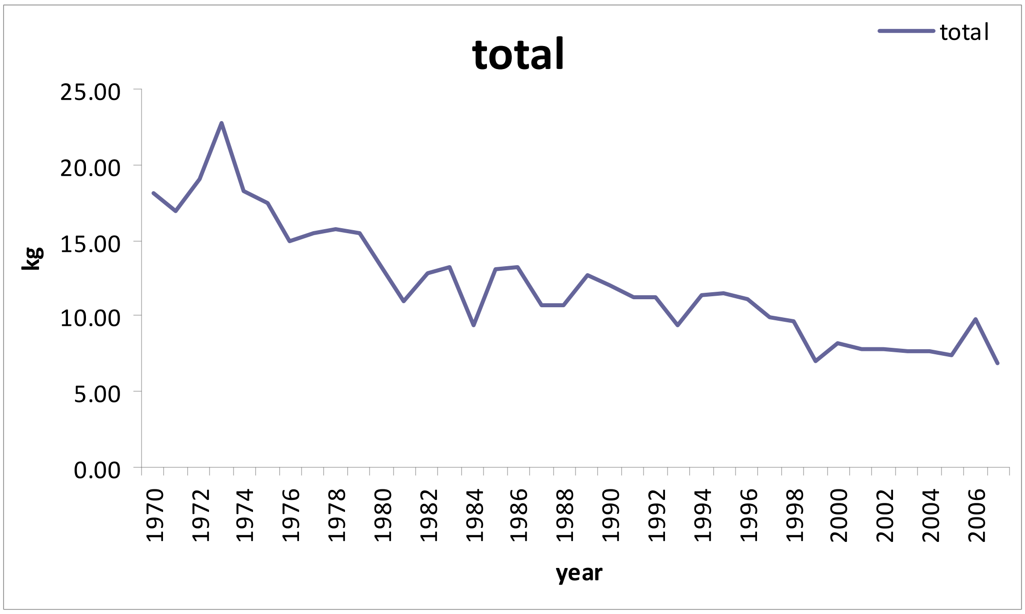


YFT-Figure 4. Yellowfin standardized catch rate trends from baitboat fleets, in weight. The Brazilian trend (YFT-BRZ-BB) reflects catches from the western Atlantic; the remaining two series YFT-CAN-BB (Canary Islands) and YFT-EUDKR-BB (EU Dakar based) reflect catches in the eastern Atlantic.

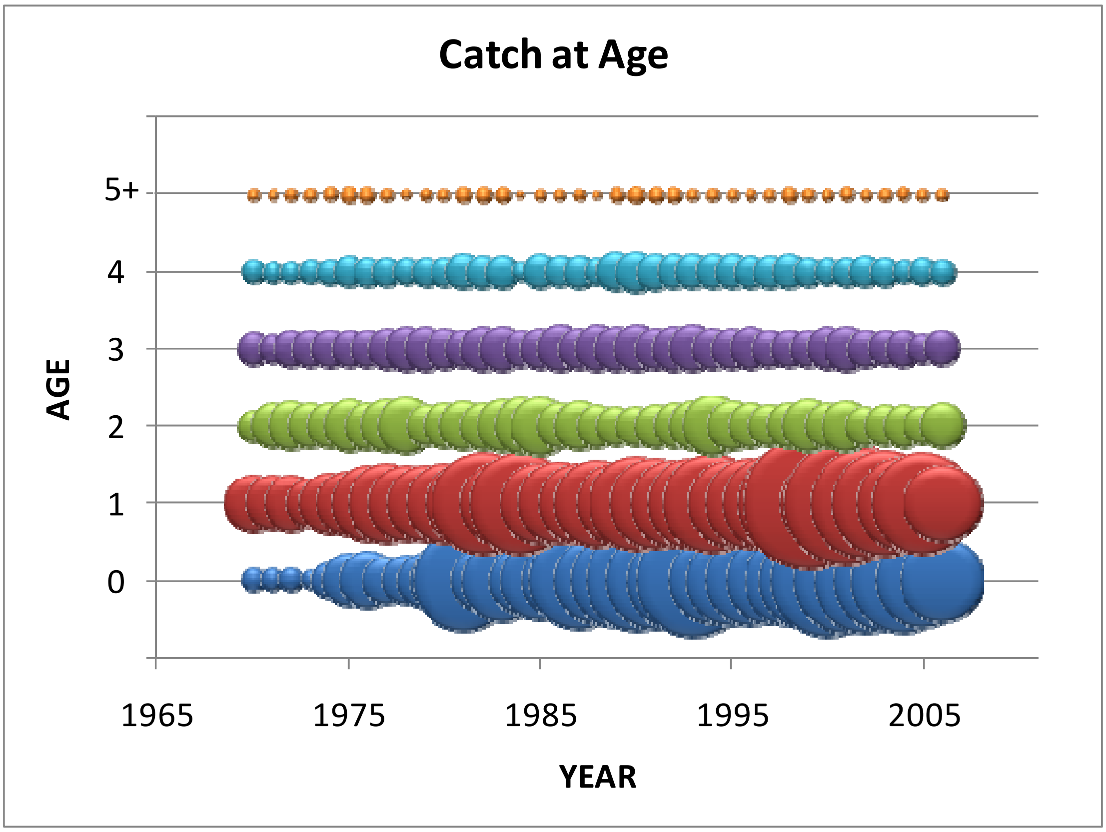


YFT-Figure 5. Yellowfin standardized catch rate trends from longline fleets, in weight and numbers. The Japanese (YFT-JPN-LL) and Chinese Taipei (YFT-TAI-LL) trends reflect catches from throughout the Atlantic; the remaining series reflect catches in the western Atlantic. Series are identified using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

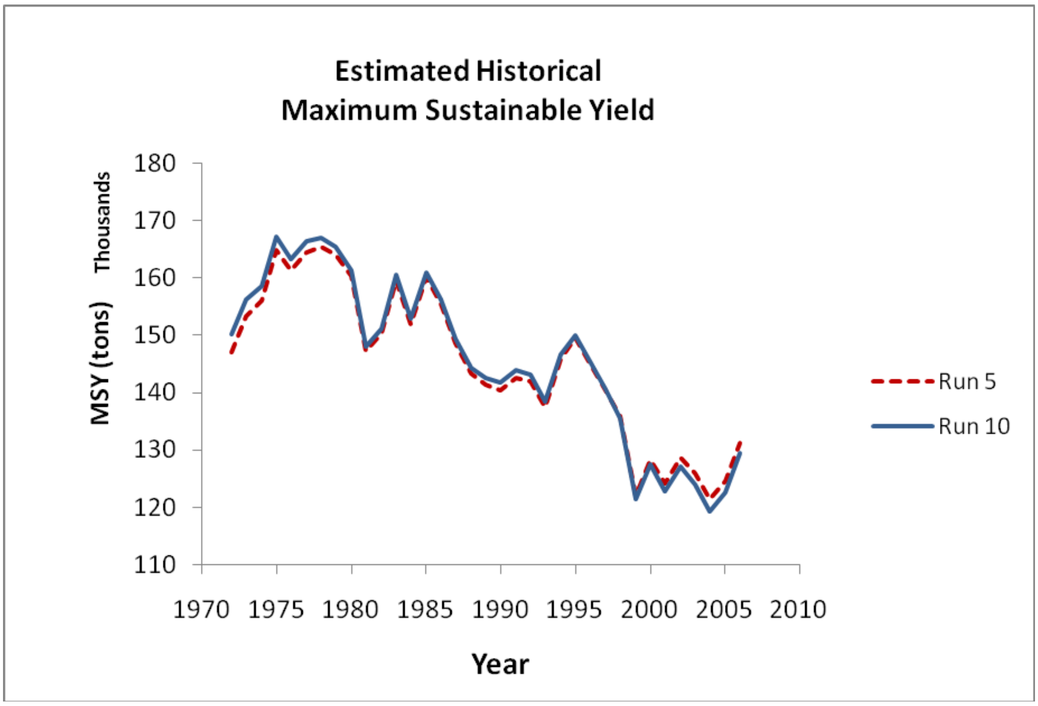




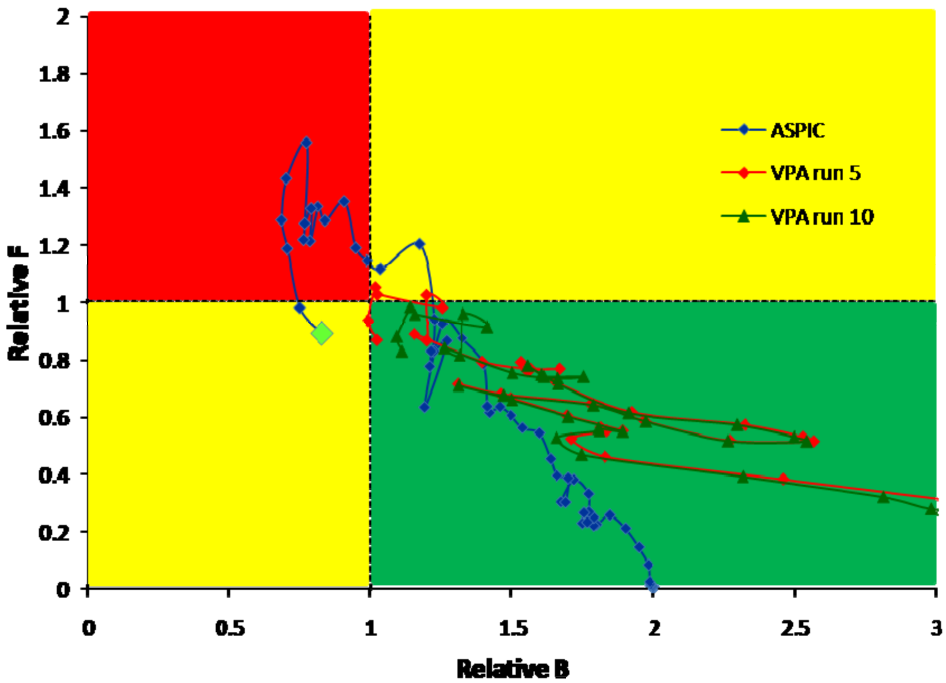
YFT-Figure 6. Trend in yellowfin tuna average weight by gear group (top) and total (bottom) calculated from available catch-at-size data. Purse seine averages are calculated across all set types (floating object and free school).



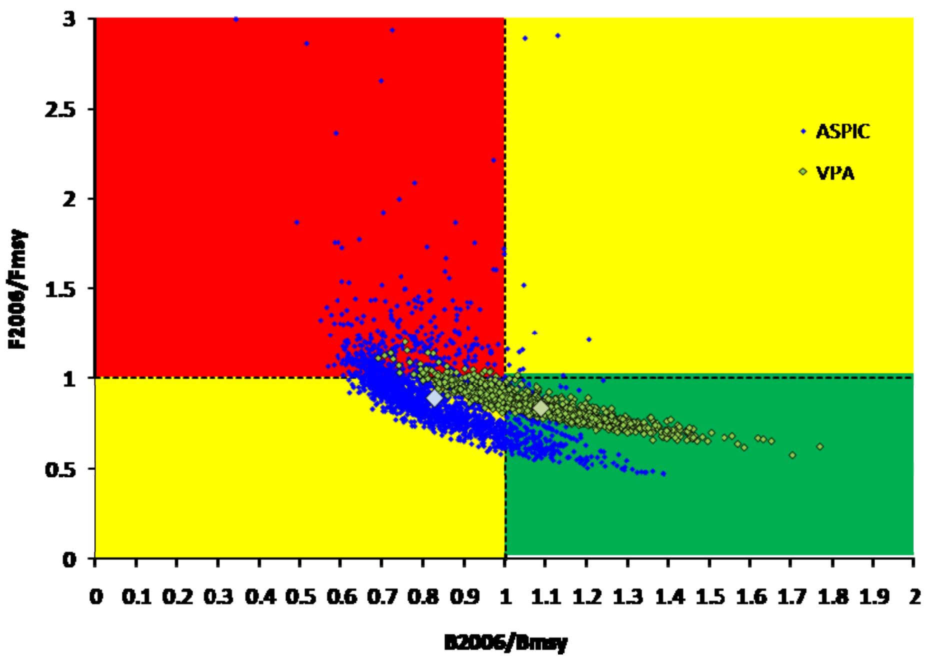
YFT-Figure 7. Relative distribution of Atlantic yellowfin catches by age (0-5+) and year (bubble size is proportional to total catches), in number.



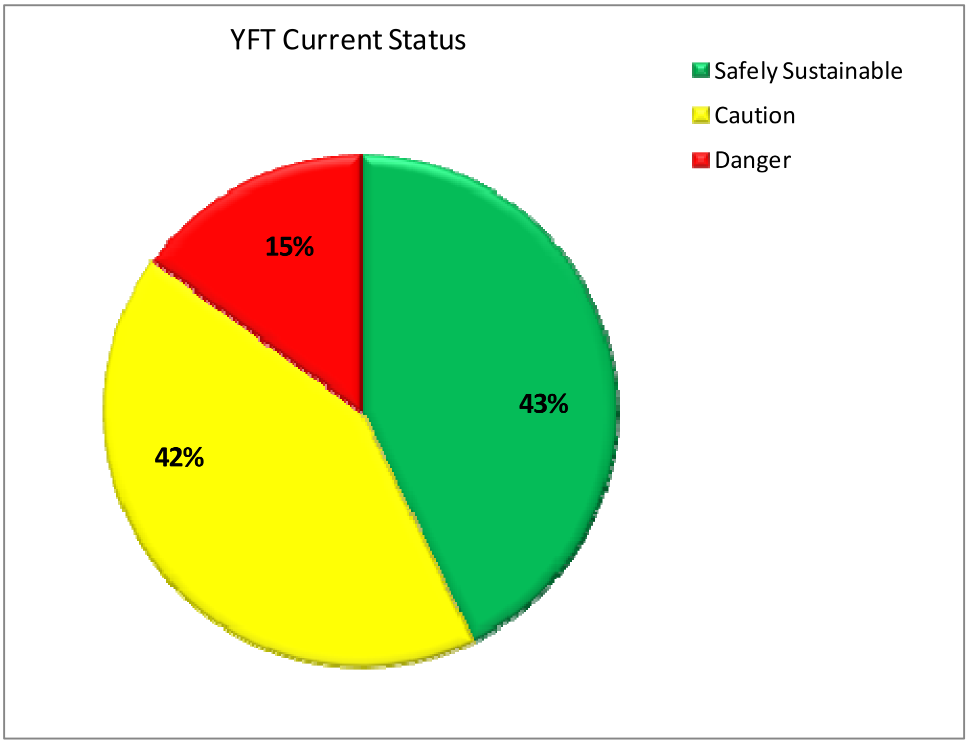
YFT-Figure 8. Estimates of historical MSY values for Atlantic yellowfin obtained through the age-structured model analysis, which considers the changes in selectivity that have occurred.



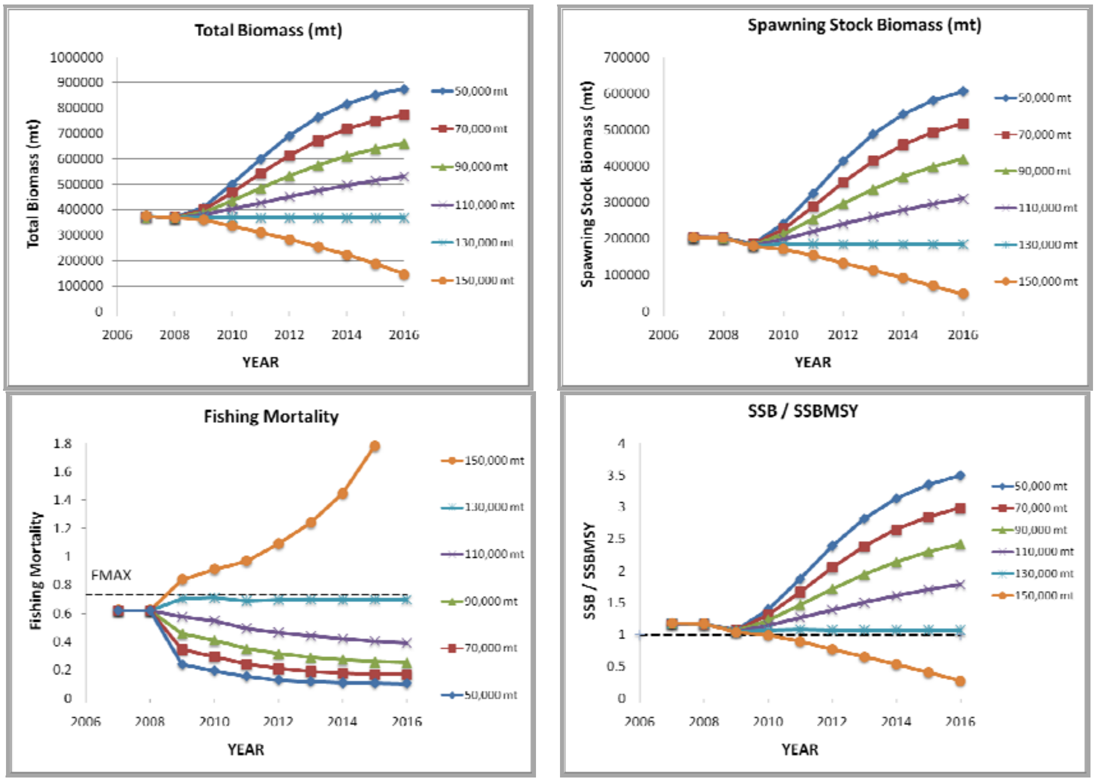
YFT-Figure 9. Stock status trajectories of B/B_{MSY} and F/F_{MSY} from age structured (VPA runs 5 and 10) and production model (ASPIC) analyses. VPA runs 5 and 10 estimate selectivity vectors for each abundance index using fleet-specific catch-at-age, differing only in that Run 5 estimates steeply dome-shaped selectivity patterns for longline and EU tropical PS indices and Run 10 fixes these as flat-topped patterns. 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.



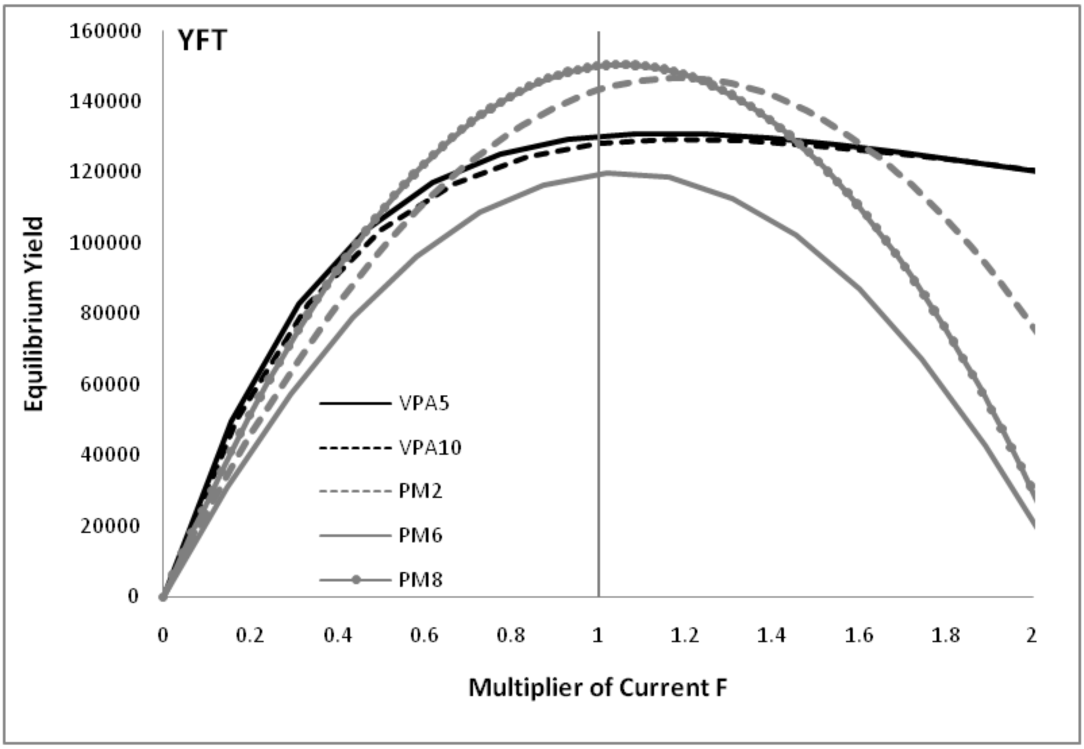
YFT-Figure 10. Current status of yellowfin tuna based on age structured and production models. The median point estimate for each model is shown as a large diamond and the clouds of symbols depict the bootstrap estimates of uncertainty for the most recent year.



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 for bigeye tuna was conducted in 2010 through a process that included a data preparatory meeting in April (SCRS/2011/011) and an assessment meeting in July (SCRS/2010/017). The last year fishery data used was 2009 but most indices of relative abundance stopped in 2008.

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 have 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 tuna are varied and prey organisms like fish, mollusks, and crustaceans are found in their stomach contents. Bigeye tuna exhibit relatively fast growth: about 105 cm fork length at age three, 140 cm at age five and 163 cm at age seven. Bigeye tuna over 200 cm are relatively rare. Bigeye tuna become mature at about 3.5 years old. Young fish form schools mostly mixed with other tunas such as yellowfin tuna and skipjack. These schools are often associated with drifting objects, whale sharks and sea mounts. This association appears to weaken as bigeye tuna grow larger. Estimated natural mortality rates for juvenile fish, 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.

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 and ICCAT has detailed data on the fishery for this stock since the 1950s. Scientific sampling at landing ports for purse seine vessels of the EU and associated fleets have been conducted since 1980 to estimate bigeye tuna catches **(BET-Figure 1, BET-Table 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.

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, EU-France, EU-Spain and others which are mostly managed by EC companies. In the western Atlantic the Venezuelan fleet dominates the purse-seine catch of bigeye tuna. 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. In the surface fishery, unlike yellowfin tuna, bigeye tuna are mostly caught while fishing on floating objects such as logs or man-made fish aggregating devices (FADs). During 2009, landings in weight of bigeye tuna caught by the longline fleets of Japan and Chinese Taipei, and the purse seine and baitboat fleets of the EU and Ghana represented 75 % of the total bigeye tuna catch.

The total annual Task I catch **(BET-Table 1**, **BET-Figure 2)** 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 133,000 t in 1994. Reported and estimated catch has been declining since then and fell below 100,000 t in 2001. This gradual decline in catch has continued, although with some fluctuations from year to year, until the most recent year of data 2009. The preliminary estimate for 2009 is 86,011 t, the highest value in the last five years. This estimate includes preliminary estimates made for a few fleets that have not yet provided data to ICCAT.

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 (longline) as well as decline in CPUE (longline and baitboat). The number of active purse seiners declined by more than half from 1994 until 2006, but then increased since 2007 as some vessels returned from the Indian Ocean to the Atlantic. The number of purse seiners operating in 2009 and 2010 was similar to the number operating in 2003-04 **(SKJ-Figure 6)**.

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 The Committee expressed concern that historical catches from illegal, unreported and unregulated (IUU) longliners that fly flags of convenience from the Atlantic might have been poorly estimated. The magnitude of this problem has not yet been quantified, because available statistical data collection mechanisms are insufficient to provide alternative means to calculate unreported catch.

Significant catches of small bigeye tuna continue to be channeled to local West African markets and sold as "*faux poissons*" in ways that make their monitoring and official reporting challenging. Monitoring of such catches has progressed in some countries but there is still a need for a coordinated approach that will allow ICCAT to properly account for these catches and thus increase the quality of the basic catch data available for assessments.

Mean average weight of bigeye tuna decreased prior to 1998 but has been relative stable, at around 10 kg during the last decade **(BET-Figure 3)**. This weight, however, is quite different according to the fishing gear, around 62 kg for longliners, 7 kg for bait boats, and 4kg for purse seiners. In the last ten years all longline fleets have shown increases in mean weight of bigeye tuna caught, with the average longline-caught fish increasing from 40 kg to 60 kg between 1999 and 2009. During the same period purse seine-caught bigeye tuna had weights between 3 kg and 4 kg, with the exception of 2009 when the average weight was 4.5 kg. Bigeye tuna caught since 2004 in free schools are significantly larger than in previous years. Since FAD catches began being identified separately in 1991 by EU and associated purse seine fleets, the majority (75%-80%) of bigeye tuna are caught in sets associated with FADs. Similarly baitboat-caught bigeye tuna weighted between 6 and 10 kg over the same period, showing greater interannual variability in fish weight than longline or purse seine caught fish.

BET-3. State of the stock

The 2010 stock assessment was conducted using similar assessment models to those used in 2007 (Anon. 2008a) but with updated data and a few new relative abundance indices and data. In general, data availability has continued to improve, notably with the addition of relative abundance indices for an increasing number of fleets. There are still missing data on detailed fishing and fish size from certain fleets. In addition, there are a number of data gaps on the activities of IUU fleets (e.g., size, location and total catch). All these problems forced the committee to assume catch-at-size for an important part of the overall catch.

Three types of indices of abundance were used in the assessment. A number of indices were directly developed by national scientists for selected fleets for which data was available at greater spatial and or temporal resolution to that available in the ICCAT databases. These indices represented data for seven different fleets, all of them longline fleets, except for one baitboat fleet **(BET-Figure 4)**. Other indices were estimated by the committee from data available within the ICCAT databases. These two types of indices were used for age-structured assessment models. Finally, a series of combined indices (**BET-Figure 5)** were calculated by the committee by synthesizing the information existing in individual indices for the seven fleets mentioned above. The later were used to fit production models.

Consistent with previous assessments of Atlantic bigeye tuna, the results from non-equilibrium production models are used to provide the basic characterization of the status of the resource. Results were sensitive to the combined abundance index trends assumed. As the relative likelihoods of each trend could not be estimated, results were developed from the joint distribution of model run results using each of three alternative combined indices. The plausible range of MSY estimated from the joint distribution using three types of abundance indices was between 78,700 and 101,600 tons (80% confidence limits) with a median MSY of 92,000 t. In addition, these estimates reflect the current relative mixture of fisheries that capture small or large bigeye tuna; MSY can change considerably with changes in the relative fishing effort exerted by surface and longline fisheries. Historical estimates show large declines in biomass and increases in fishing mortality, especially in the mid 1990s when fishing mortality exceeded F_{MSY} for several years. In the last five or six years there have been possible increases in biomass and declines in fishing mortality (**BET-Figure 6)**. The biomass at the beginning of 2010 was estimated to be at between 0.72 and 1.34 (80% confidence limits) of the biomass at MSY, with a median value of 1.01 and the 2009 fishing mortality rate was estimated to be between 0.65-1.55 (80% confidence limits) with a median of 0.95. The replacement yield for the year 2011 was estimated to be about MSY.

The Committee notes, as it did in previous assessments, that there is considerable uncertainty in the assessment of stock status and productivity for bigeye tuna. There are many sources of uncertainty including which method represents best the dynamics of the stock, which method is supported more by the available data, which relative abundance indices are appropriate to be used in the assessment, and what precision is associated with the measurement/calculation of each of the model inputs. In general, data availability has improved since 2007 but there is still a lack of information regarding detailed fishing effort and catch-at-size data from certain fleets. This, combined with the lack of detailed historical information on catch and fishing activities of IUU fleets (e.g., size, location and total catch), forces the Committee to make many assumptions about the catch-at-size for an important part of the overall catch. In order to represent this uncertainty the Committee decided to combine sensitivity runs from a range of method/data combinations. There are differences in the estimates of management benchmarks, including the estimates of the current biomass and fishing mortality, depending on both the method used as well as the input data used (**BET-Figure 7**).

BET-4. Outlook

The outlook for Atlantic bigeye tuna, considering the quantified uncertainty in the 2010 assessment, is presented in **BET-Table 2** and **BET-Figure 8**, which provide a characterization of the prospects of the stock achieving or being maintained at levels consistent with the Convention Objective, over time, for different levels of future constant catch. It is noteworthy that the modeled probabilities of the stock being maintained at levels consistent with the Convention Objective over the next five years are about 60% for a future constant catch of 85,000 t. Higher odds of rebuilding to and maintaining the stock at levels that could produce MSY are associated with lower catches and lower odds of success with higher catches than such constant catch (**BET-Figure 9**). It needs to be noted that projections made by the Committee assume that future constant catches represent the total removals from the stock, and not just the TAC of 85,000 t established by ICCAT [Rec. 09-01]. Catches made by other fleets not affected by [Rec. 09-01] need to be added to the 85,000 t for comparisons with the future constant catch scenarios contemplated in **BET-Table 2**. Furthermore, any future changes in selectivity due to changes in the ratios of relative mortality exerted by the different fleets - such as an increase in the relative mortality of small fish - will change and add to the uncertainty of these projections.

BET-5. Effects of current regulations

During the period 2005-2008 an overall TAC for major countries was set at 90,000 t. The TAC was later lowered [09-01] to 85,000 t. Estimates of catch for 2005-2009 **(BET-Table 1)** seem to have been always lower than the corresponding TAC.

Concern over the catch of small bigeye tuna partially led to the establishment of spatial closures to surface fishing gear in the Gulf of Guinea [Rec. 04-01 and 08-01] The Committee examined trends in average bigeye tuna weight as a broad indicator of the effects of such closures. Although there have been significant changes in the average size of bigeye tuna caught since 2004 by certain fleets, such as increases in average size of fish caught by purse seiners operating in free schools and by longliners, it cannot be quantified whether changes are the result of spatial closures. The Committee also analyzed the ICCAT conventional tag database for evidence of an effect of spatial closures. Again, this analysis failed to provide any conclusive evidence in support of the hypothesis that spatial closures led to a reduction in the fishing mortality of juvenile bigeye tuna.

BET-6. Management recommendations

Projections indicate that catches reaching 85,000 t or less will promote stock growth and further reduce the future chances that the stock will not be at a level that is consistent with the convention objectives. The Commission should be aware that if major countries were to take the entire catch limit set under Recommendations 04-01 and 09-1 and other countries were to maintain recent catch levels, then the total catch could well exceed 100,000 t. The Committee recommends that the Commission sets a TAC at a level that would provide a high probability of maintaining at or rebuilding to stock levels consistent with the Convention objectives. In considering the uncertainty in assessment results, the Committee believes that a future total catch of 85,000 t or less would provide such high probability.

The assessment and subsequent management recommendations are conditional on the reported and estimated history of catch for bigeye tuna in the Atlantic. The Committee reiterates its concern that unreported catches, including those part of the "*faux poisson*" category, from the Atlantic might have been poorly estimated. There is a need to expand current statistical data collection mechanisms to fully investigate any evidence of significant catches that have been unreported.

ATLANTIC BIGEYE TUNA SUMMARY	
Maximum Sustainable Yield	78,700-101,600 t (median 92,000 t) [1,2]
Current (2009) Yield[1]	86,011 t [2,3]
Replacement Yield (2011)	64,900 – 94,000 (median 86,000 t) [1,2]
Relative Biomass (B_{2009}/B_{MSY})	0.72-1.34 (median 1.01) [1,2]
Relative Fishing Mortality F_{2009}/F_{MSY}	0.65-1.55 (median 0.95)[1,2]
Conservation & management measures in effect:	[Rec. 09-01], para. 1 of [Rec. 06-01] and [Rec. 04-01]. − Total allowable catch for 2010 is set at 85,000 t for Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities. − 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 (67), Philippines (10). − Specific limits of number of purse seine boats; Panama (3). − No purse seine and baitboat fishing during November in the area encompassed by 0º-5ºN and 10º W-20ºW.

[1] Production model (Logistic) results represent median and 80% confidence limits based on catch data for (1950-2009) and the joint distribution of bootstraps using each of three alternative combined indices.
[2] 80% confidence limits, MSY and replacement yield rounded to 100 t.
[3] Reports for 2009 should be considered provisional.

BET-Table 1. Estimated catches (t) of bigeye tuna *(Thunnus obesus)* by area, gear and flag, used in the assessment (2009 catches in italics are estimations adopted by the Species Group).

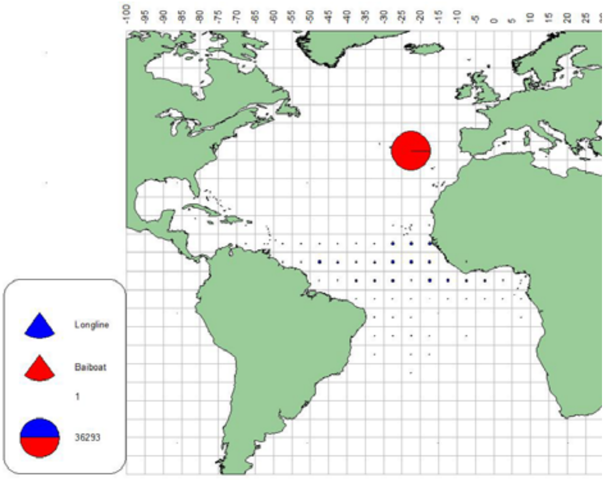
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*2008	*2009
TOTAL Atlantic	78241	65447	57141	66148	78376	84901	96074	99374	112572	133630	126778	121689	109289	110438	128304	103651	94291	77225	92106	87054	72353	65863	79664	69249	87927	69250	86011
Bait boat	17651	15618	13458	9710	12672	18280	17750	16248	16467	20290	25552	19059	21037	21377	25867	12634	15842	8756	13569	18940	15007	14671	15432	12359	14852	12359	14940
Longline	52595	39942	35570	47766	58389	56537	61556	62403	62871	79004	74877	74930	68310	71856	76527	71193	55265	46438	54466	48396	38035	34182	46232	41063	50228	41063	47932
Other surf.	415	550	626	474	644	293	437	607	652	980	567	357	536	434	1377	1226	1628	1138	1340	1301	716	552	447	218	189	218	267
Purse seine	7580	9336	7487	8198	6671	9791	16331	20116	32582	33355	25782	27343	19406	16771	24533	18599	21556	20894	22731	18417	18595	16457	17553	15609	22658	15610	22872
Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	476	75	0	0	0		0	
Argentina	100	41	72	50	17	78	22	0	0	0	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	24	17	18	18	6	11	16	19	27	18	14	14	7	14	7
Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	60	70	60	70	60
Benin	0	15	6	7	8	10	10	7	8	9	9	9	30	13	11	0	0	0	0	0	0	0	0	0		0	
Brasil	419	873	756	946	512	591	350	790	1256	601	1935	1707	1237	644	2024	2768	2659	2582	2455	1496	1081	1479	1593	958	958	958	1189
Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0		0	
Canada	0	11	144	95	31	10	26	67	124	111	148	144	166	120	263	327	241	279	182	143	187	196	144	130	111	130	111
Cape Verde	112	86	60	117	100	52	151	105	85	209	66	116	10	1	1	2	0	1	1	1	1092	1437	1147	1068	***820***	1069	827
China P.R.	0	0	0	0	0	0	0	0	70	428	476	520	427	1503	7347	6564	7210	5840	7890	6555	6200	7200	7399	5686	***7143***	5686	4973
Chinese Taipei	1220	1125	1488	1469	940	5755	13850	11546	13426	19680	18023	21850	19242	16314	16837	16795	16429	18483	21563	17717	11984	2965	12116	10418	13252	10418	13252
Congo	8	19	10	10	14	15	12	12	14	9	9	8	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	2	0	0	0	0	0	0	0	0		0	790
Cuba	239	171	190	151	87	62	34	56	36	7	7	5	0	0	0	0	0	16	16	0	0	0	0	0		0	
Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0		0	
EU.España	10340	10884	9702	8475	8263	10355	14705	14656	16782	22096	17849	15393	12513	7110	13739	11250	10133	10572	11120	8365	7618	7454	6675	7494	11907	7494	11966
EU.France	4615	4266	3905	4161	3261	5023	5581	6888	12719	12263	8363	9171	5980	5624	5529	5949	4948	4293	3940	2926	2816	2984	1629	1130	2205	1130	2206
EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	33	0	0	0		0	
EU.Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
EU.Portugal	6457	7428	5036	2818	5295	6233	5718	5796	5616	3099	9662	5810	5437	6334	3314	1498	1605	2590	1655	3204	4146	5071	5505	3422	5498	3422	5605
EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0		0	32
Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	8	0	0	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	21	0	28	6	0	2	3		3	
Gabon	0	0	0	0	0	0	0	0	1	87	10	0	0	0	184	150	121	0	0	0	0	0	0	0		0	
Ghana	1887	1720	1178	1214	2158	5031	4090	2866	3577	4738	5517	5805	9829	13370	17764	5910	12042	7106	13557	14901	13917	9141	13267	9269	10554	9269	10554
Grenada	0	0	0	0	0	0	65	25	20	10	10	0	1	0	0	0	0	0	0	0	0	0	10	31		31	
Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1003	923	836	998	***913***	998	913
Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	50	0	50
Honduras	0	0	0	0	0	0	0	44	0	0	61	28	59	20	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	1	0	0	0	0	0	0	0	0	0		0	
Japan	32103	23081	18961	32064	39540	35231	30356	34722	35053	38503	35477	33171	26490	24330	21833	24605	18087	15306	19572	18509	14026	15735	17993	16684	20793	16684	20793
Korea Rep.	10704	6084	4438	4919	7896	2690	802	866	377	386	423	1250	796	163	124	43	1	87	143	629	770	2067	2136	2599	***3265***	2599	2134
Liberia	0	0	0	0	206	16	13	42	65	53	57	57	57	57	57	57	57	57	57	0	0	0	0	0		0	
Libya	0	0	0	0	0	0	0	508	1085	500	400	400	400	400	400	400	31	593	593	0	0	4	0	0		0	
Maroc	30	0	8	0	0	0	0	0	0	0	0	0	0	0	700	770	857	913	889	929	519	887	700	802	***796***	802	795
Mexico	0	0	0	0	0	0	0	0	1	4	0	2	6	8	6	2	2	7	4	5	4	3	3	1		1	1
Mixed flags (FR+ES)	26	50	339	339	300	384	807	893	1000	690	426	424	357	409	498	688	519	218	361	383	339	386	238	228	***284***	228	381
Namibia	0	0	0	0	0	0	0	0	0	715	29	7	46	16	423	589	640	274	215	177	307	283	41	146	***157***	146	108
NEI (ETRO)	0	0	85	20	93	959	1221	2138	4594	5034	5137	5839	2746	1685	4011	2285	3027	2248	2504	1387	294	81	0	0		0	
NEI (Flag related)	354	758	1406	2155	4650	5856	8982	6151	4378	8964	10697	11862	16569	24896	24060	15092	8470	531	0	0	0	0	0	0		0	
NEI (UK.OT)	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	1893	2890	2919	3428	2359	2803	1879	2758	3343	0	416	252	1721	2348	1721	2348
Norway	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
Panama	4461	5173	5616	3847	3157	5258	7446	9991	10138	13234	9927	4777	2098	1252	580	952	89	63	0	1521	2310	2415	2922	2263	2405	2263	2405
Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	1154	2113	975	377	837	855	1854	1743	1816	2368	1874	1880	1874	1880
Russian Federation	0	0	0	0	0	0	0	0	0	0	0	13	38	4	8	91	0	0	0	0	1	1	26	73	43	73	86
S. Tomé e Príncipe	0	0	0	5	8	6	3	4	4	3	6	4	5	6	5	4	4	4	4	11	6	4	0	0		0	
Senegal	0	0	0	0	0	0	15	5	9	126	237	138	258	730	1473	1131	1308	565	474	561	721	1267	805	926	1041	926	1042
Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	162	0	0	0	0	0	0		0	
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	0	0		0	
South Africa	102	168	200	561	367	296	72	43	88	79	27	7	10	53	55	249	239	341	113	270	221	84	171	226	***157***	226	159
St. Vincent and Grenadines	0	0	0	0	0	0	0	1	3	0	0	4	2	2	1	1216	506	15	103	18	0	114	567	171	***284***	171	292
Sta. Lucia	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	2	0	2	0	0	0		0	
Togo	18	24	22	7	12	12	6	2	86	23	6	33	33	33	0	0	0	0	0	0	0	0	0	0		0	
Trinidad and Tobago	22	0	0	1	19	57	263	0	3	29	27	37	36	24	19	5	11	30	6	5	9	12	27	69	***69***	69	56
U.S.A.	639	1085	1074	1127	847	623	975	813	1090	1402	1209	882	1138	929	1263	574	1085	601	482	416	484	991	527	508	516	508	516
U.S.S.R.	870	1071	1887	1077	424	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*2008	*2009
UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0		0	0
UK.Sta Helena	0	0	5	1	1	3	3	10	6	6	10	10	12	17	6	8	5	5	0	0	0	25	18	28	17	28	17
Uruguay	597	177	204	120	55	38	20	56	48	37	80	124	69	59	28	25	51	67	59	40	62	83	22	27	201	27	201
Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	109	52	132	91	34	91	34
Venezuela	2918	1136	349	332	115	161	476	270	809	457	457	189	274	222	140	226	708	629	516	1060	243	261	318	122	159	122	229

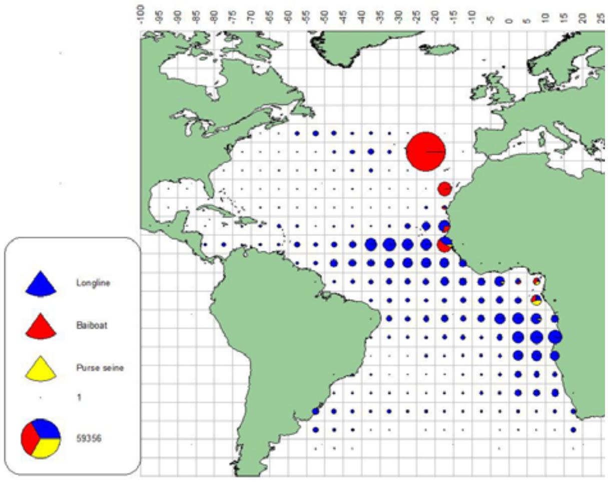
* Current Task I figures (2008 and 2009) where the shaded cells indicate which catches have changed since the assessment.

BET-Table 2. Estimated probabilities of the Atlantic bigeye tuna stock being above B_{MSY} and below F_{MSY} in a given year for TAC level ('000 t), based upon the 2010 assessment outcomes.

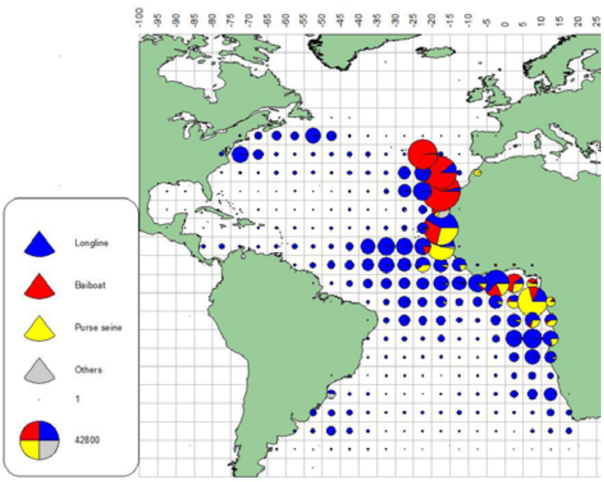
	Year									
TAC	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
60	54%	63%	71%	75%	79%	82%	84%	85%	86%	87%
70	54%	61%	67%	71%	74%	76%	77%	79%	80%	81%
80	54%	58%	62%	66%	68%	70%	71%	72%	73%	74%
90	54%	57%	58%	60%	61%	62%	62%	63%	63%	64%
100	53%	54%	54%	54%	54%	54%	54%	54%	55%	55%
110	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%



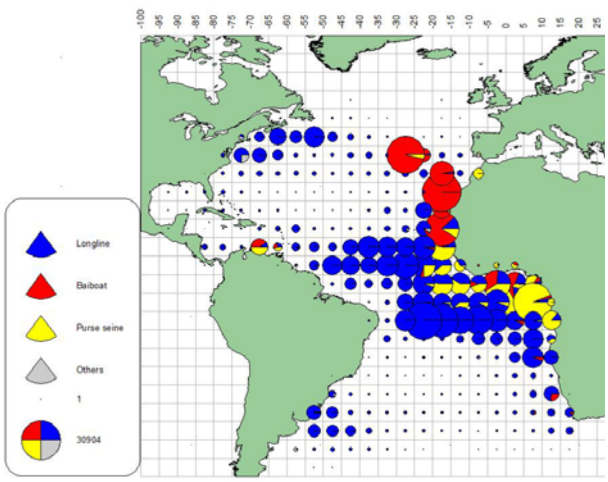
a. BET(1950-59)



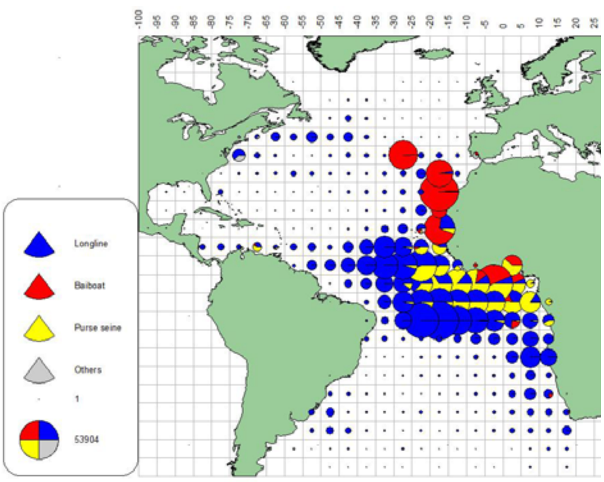
b. BET(1960-69)



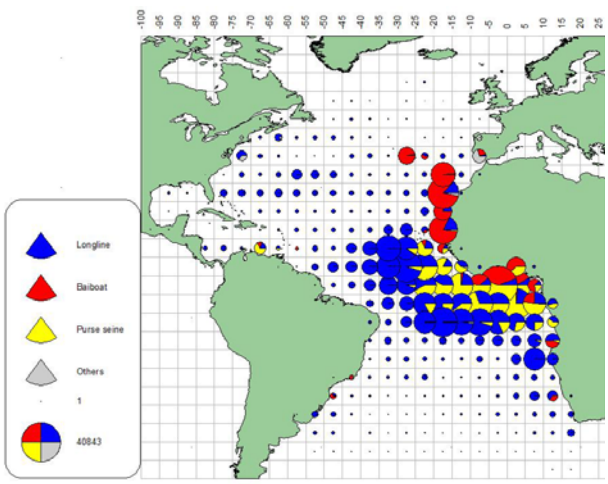
c. BET(1970-79)



d. BET(1980-89)

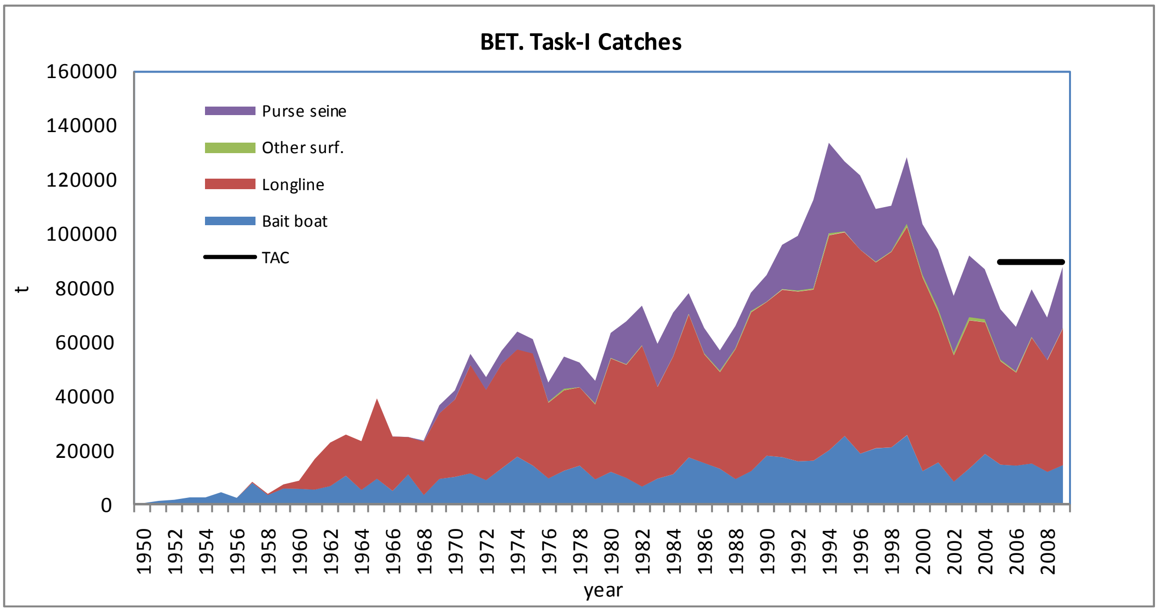


e. BET (1990-99)



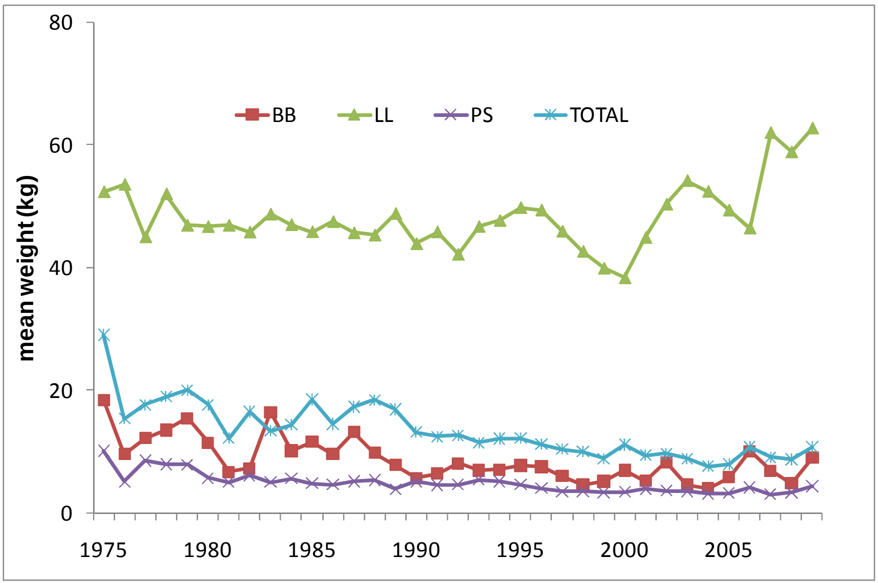
f. BET (2000-08)

BET-Figure 1 [a-f]. Geographical distribution of the bigeye tuna catch by major gears and decade.

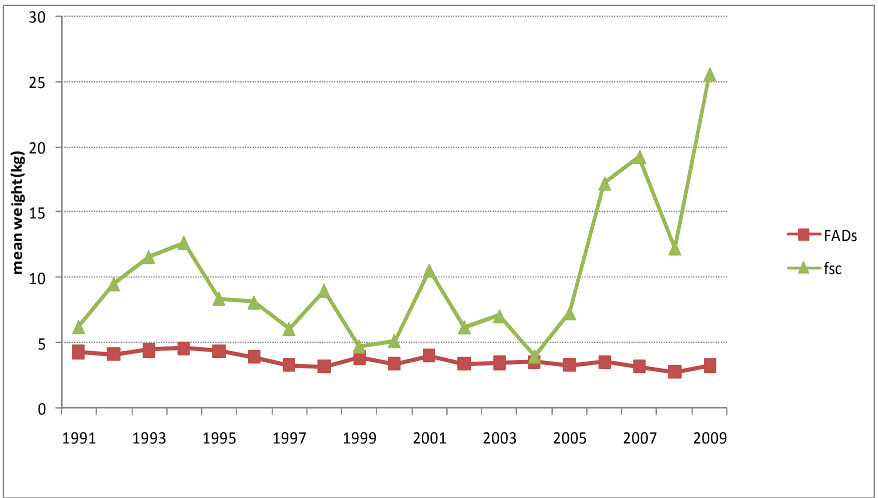


BET-Figure 2. Bigeye Task I catches for all the Atlantic stock, in tones. Value for 2009 includes estimates for a few fleets that had not yet reported data to ICCAT.

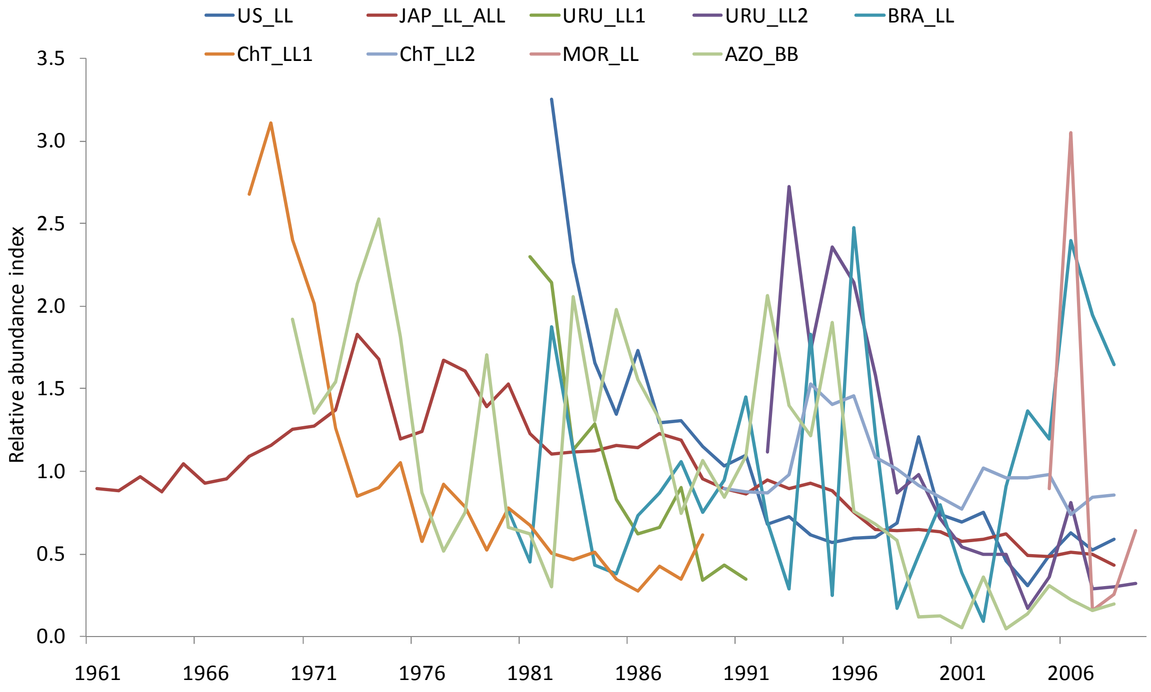
a)



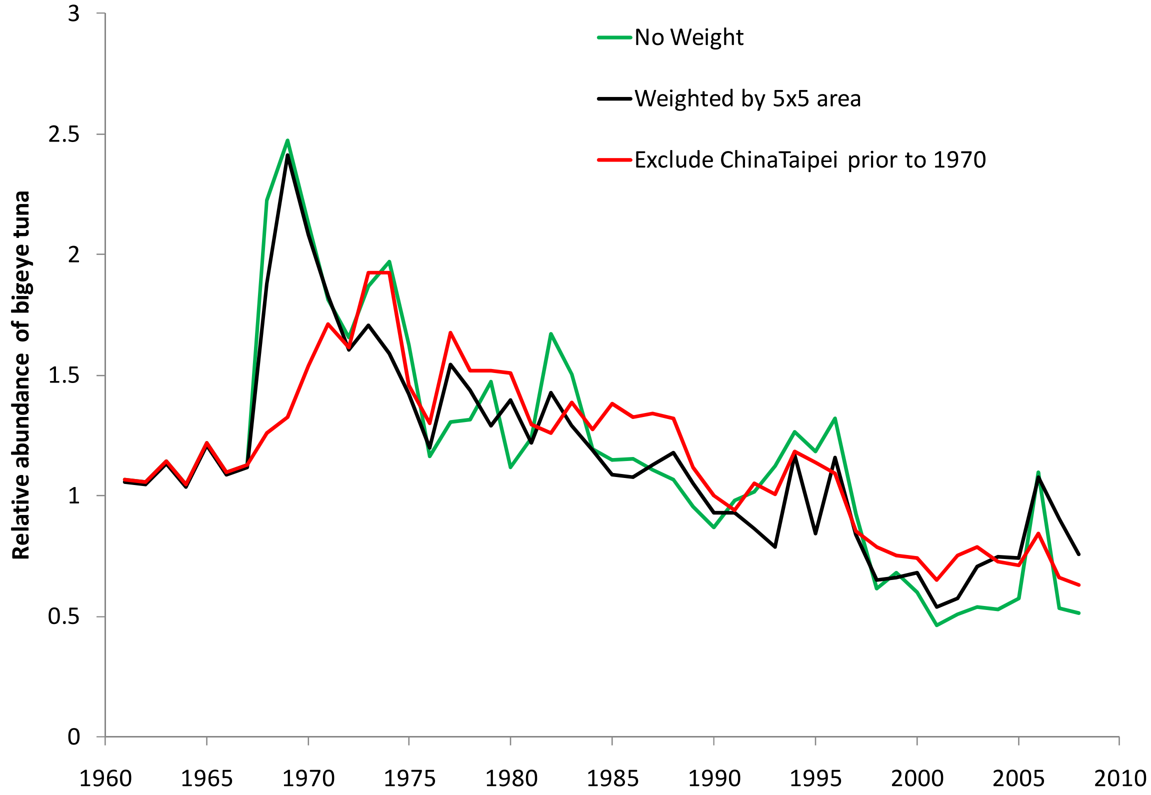
b)



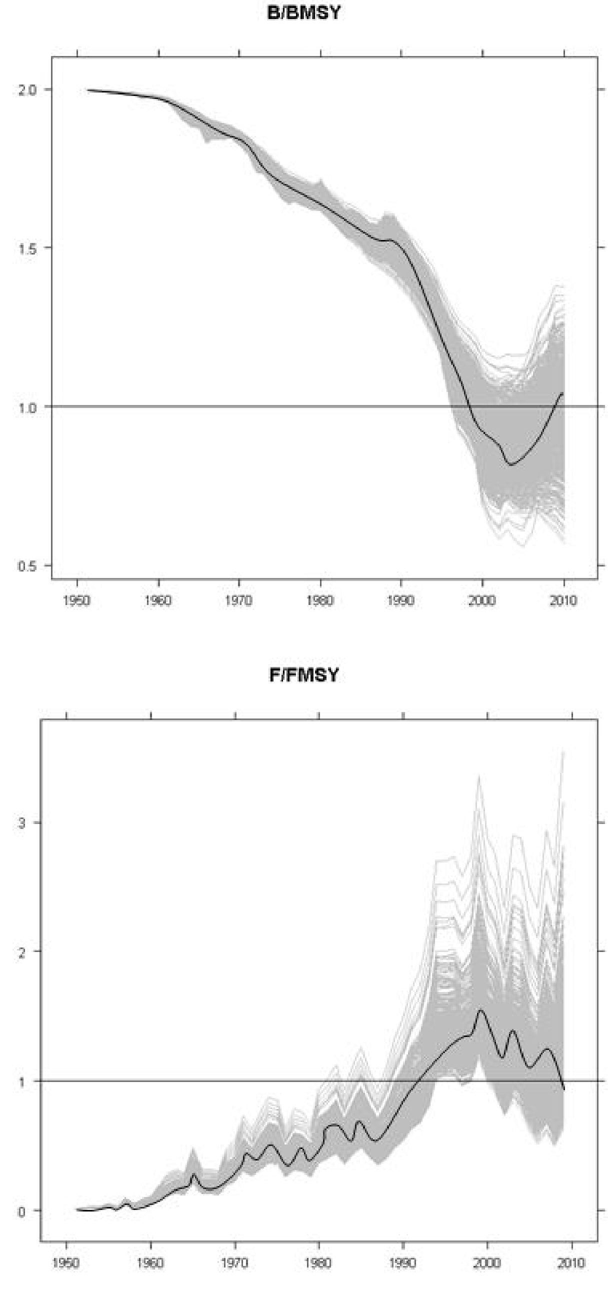
BET-Figure 3. Trend of mean weight for bigeye a) by major fisheries (1975-2009) based on the catch-at-size data, b) for European purse seiners separated between free schools (fsc) and FAD associated schools (1991-2009).



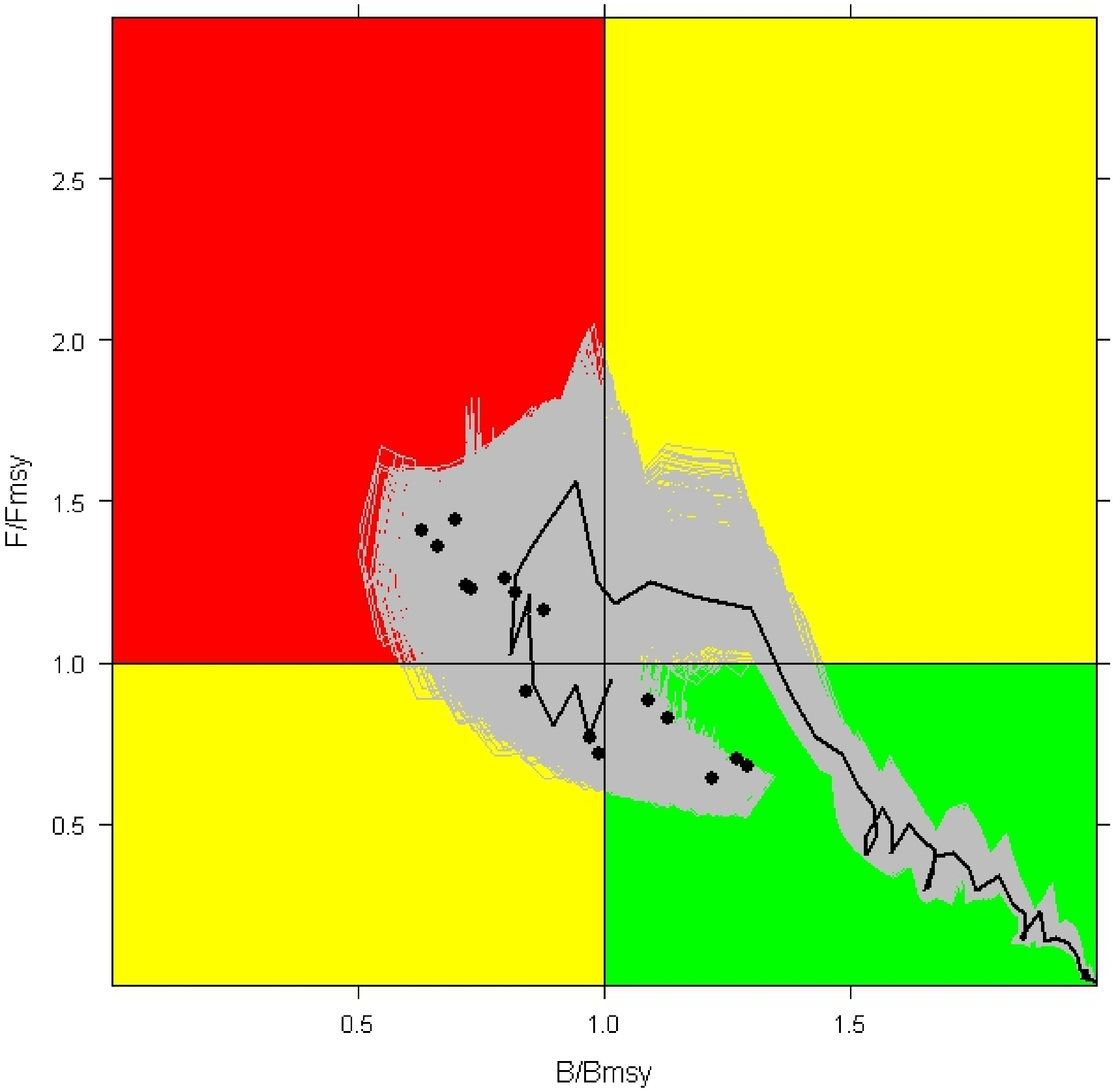
BET-Figure 4. Relative abundance indices for bigeye tuna. AZO_BB Azores Baitboat, BRA_LL, Brazil longline, ChT_LL2, Chinese Taipei longline 1968-1989, ChT_LL2 Chinese Taipei longline 1990-2008, JAP_LL Japanese longline, MOR_LL Morocco longline, UR_LL1 Uruguay longline 1981-1991, UR_LL2 Uruguay longline 1992-2008, US_LL USA longline.



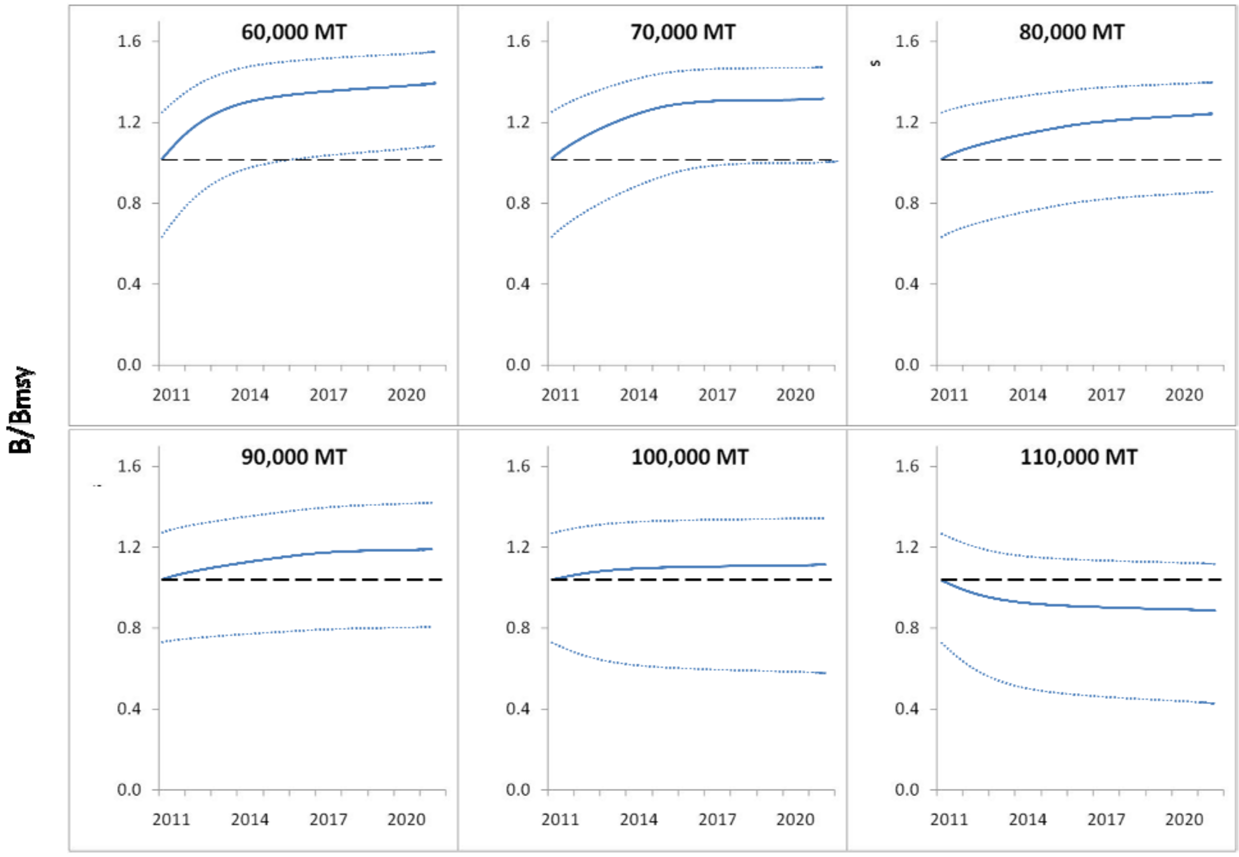
BET-Figure 5. Three alternative combined indices selected for the assessment with logistic non-equilibrium production models.



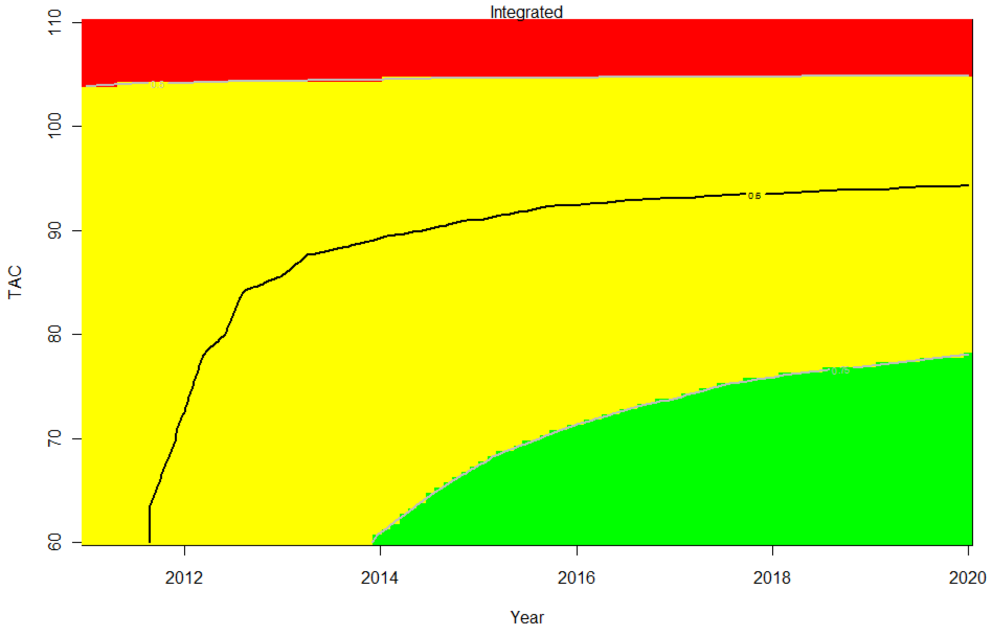
BET-Figure 6. Trajectories of B/B_{MSY} and F/F_{MSY} estimated from the logistic production model. Lines represent the 80 % percentile of bootstrap results and thicker line the median.



BET-Figure 7. Kobe plot from combined examinations of assessment models. Shaded lines shown represent the 80% confidence limits for the historical trajectory (1950-2009) and solid line represents the median estimated from the logistic production model. Points depict uncertainty in current status not considered by the bootstrapping of the logistic production model (estimates of F_{2009}/F_{MSY} and B_{2009}/B_{MSY} for each of the sensitivity trials from the other models considered in the assessment).



BET-Figure 8. Biomass projections (B/B_{MSY}) for bigeye tuna for 2011-2021. Each panel corresponds to a different level of future constant catch from 60,000 to 110,000 tons. Thick lines represent median of all combined runs and thinner lines the 10 and 90 percentiles.



BET-Figure 9. Kobe matrix plot showing probabilities of the stock being above B_{MSY} and fishing at levels below F_{MSY} in a given year for a future constant catch (TAC). Projections were calculated from results of the combination of the three logistic production model runs used as the basis of the assessment. The colors represent modeled probabilities: red, <50%, yellow, 50-75% and green, >75%. The 60% probability isopleth is also shown as a black line.

8.3 SKJ – SKIPJACK TUNA

Stock assessments for eastern and western Atlantic skipjack were conducted in 2008 (Anon. 2009a) using available catches to 2006. Skipjack had only been 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 the age of one 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 difference in the growth rate is not as great as that which had been previously estimated.

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 2009 in the entire Atlantic Ocean (including estimates of skipjack in the *faux-poisson* landed in Côte d'Ivoire by the EU-purse seiners) were close to 148,000 t **(SKJ-Table 1**, **SKJ-Figure 2)** which represents the catch average of the last five years.

The numerous changes that have occurred in the skipjack fishery since the early 1990s (such as the progressive use of FADs and the increase of the fishing area towards the west) have brought about an increase in skipjack catchability and in the biomass proportion that is exploited. At present, the major fisheries are the purse seine fisheries, particularly those of EU-Spain, Ghana, Panama, EU-France and Netherlands Antilles, followed by the baitboat fisheries of Ghana, EU-Spain, EU-Portugal and EU-France. The preliminary estimates of catches made in 2009 in the East Atlantic amounted to 122,000 t, that is, a catch on the order of the average of 2004-2008 **(SKJ-Figure 3)**. In recent years, the seasonal fishing by European purse seiners on free schools, off Senegal, has decreased sharply **(SKJ-Figure 1)** and consequently, the proportion of the catches on floating objects has continued to increase, reaching slightly more than 90% of the catches **(SKJ-Figure 4)**.

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 the two new studies 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 5**). The Committee integrated these estimates in the reported historical catches for the EU-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 2009 in the West Atlantic amounted to 26,000 t, i.e. a stable catch compared to the average observed for recent years **(SKJ-Figure 6)**.

It is difficult to estimate effective fishing effort for skipjack tuna in the East Atlantic. Nominal purse seine effort, expressed in terms of carrying capacity, has decreased regularly since the mid-1990s up to 2006. However, due to acts of piracy in the Indian Ocean, many European Union purse seiners have transferred their effort to the East Atlantic. This new situation, which added to the presence of three new purse seiners operating from Tema (Ghana), has considerably increased the carrying capacity of this fishing gear **(SKJ-Figure 7)**. The number of EU purse seiners in the East Atlantic follows this trend but seems to have stabilized in 2010, according to the preliminary estimates. On the other hand, baitboat nominal effort has remained stable for more than 20 years.

It is considered that the increase in fishing power linked to the introduction of innovation 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 an average 3% annual increase in skipjack catchability to account for these changes, a new analysis has been conducted by fixing MSY and K at levels that agree 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 technological changes only, or also in the availability of the fish (e.g., resulting from an expansion of the surface exploited over the years; **SKJ-Figure 8**). The recent increase in the area explored successfully which corresponds to the extension of the fishery towards the central West Atlantic and off Angola should also be noted.

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 the tag-recovery model, the catch curves by size and the average size observed in the yearly catches, supports this hypothesis. The change in the selectivity pattern observed for the purse seine fishery suggests that this fleet is mainly targeting juvenile 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 9**). 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 also observed for yellowfin) could be a consequence of the moratoria on floating objects which has mainly affected skipjack **(SKJ-Figure 10)**.

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

In all the oceans and consequently in all the tuna RFMOs, the traditional stock assessment models have been difficult to apply to skipjack because of their particular biological and fishery characteristics (on the one hand, continuous spawning, areal variation in growth and non-directed effort, and on the other, weak identified cohorts). 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. Several fishery indictors were also 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 11)**, the use of smaller stock units continues to be the envisaged working hypothesis.

Eastern stock

The Committee analyzed two standardized indices from the EU-purse seine fishery: An index accounts for skipjack caught in free school in the Senegalese area during the second quarter of the year and the second index characterizing small fish captured under FADs in the equatorial area (**SKJ-Figure 12**). 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 13**). 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 14**). 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 11**; *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 latitudinal limit).

A new Bayesian method, using only catch information (under a Schaefer-type model parameterization), estimated the MSY 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 non-equilibrium surplus biomass production models (a multi-fleets model and a Schaefer-based model) were applied for 8 time series of CPUEs, and for a combined CPUE index weighted by fishing areas. To account for the average increase in catchability of purse seine fisheries, a correction factor of 3% per year was applied to the CPUE series. As for the Bayesian model application that only uses catches, different working hypothesis were tested on the distribution of the priors of the two surplus production models (i.e., the growth rate, the carrying capacity, the catchability coefficient of each fleet, etc.). In general, the range of plausible MSY values estimated from these models (155,000-170,000 t) were larger than in the bayesian model based on catches. The Committee stated the difficulty to estimate MSY under the continuous increasing conditions of the exploitation plot of this fishery (one-way of the trajectory to substantially weaker effort values) and which as a result, the potential range distribution of some priors needs to be constrained (e.g., for growth rate, or for the shape parameter of the generalized model).

While caution is needed as regards to the generalization of the diagnosis on the stock status of the overall components of this stock 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 15)**.

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 16)**. This decrease, also observed in the CPUE time series for Venezuelan purse seine, 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.

The assessment model from catches 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 sensitivity analyses for 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, in the light of the information provided by the trajectories of B/B_{MSY} and F/F_{MSY}, it is unlikely that the current catch is larger than the current replacement yield **(SKJ-Figure 17)**.

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 EU 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 7,180 t (i.e., 7.5% of the total skipjack catch from the EU 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 (MSY)	Around 143,000-170,000 t	Around 30,000-36,000 t
Current (2009) Yield [1]	122,000 t	26,000 t
Current Replacement Yield	Somewhat higher than 122,000 t	Somewhat higher than 26,000 t
Relative Biomass (B_{2008}/B_{MSY})	Most likely>1	Most likely>1
Relative Fishing Mortality: (F_{2008}/F_{MSY})	Most likely<1	Most likely<1
Management measures in effect	Rec. 04-01 (effective 2005) [2]	None

[1]Reports for 2009 should be considered provisional.
[2]Although this time-area measure was implemented to reduce mortality on bigeye juvenile tuna, a total area closure has the expected effects on all the tropical tuna species.

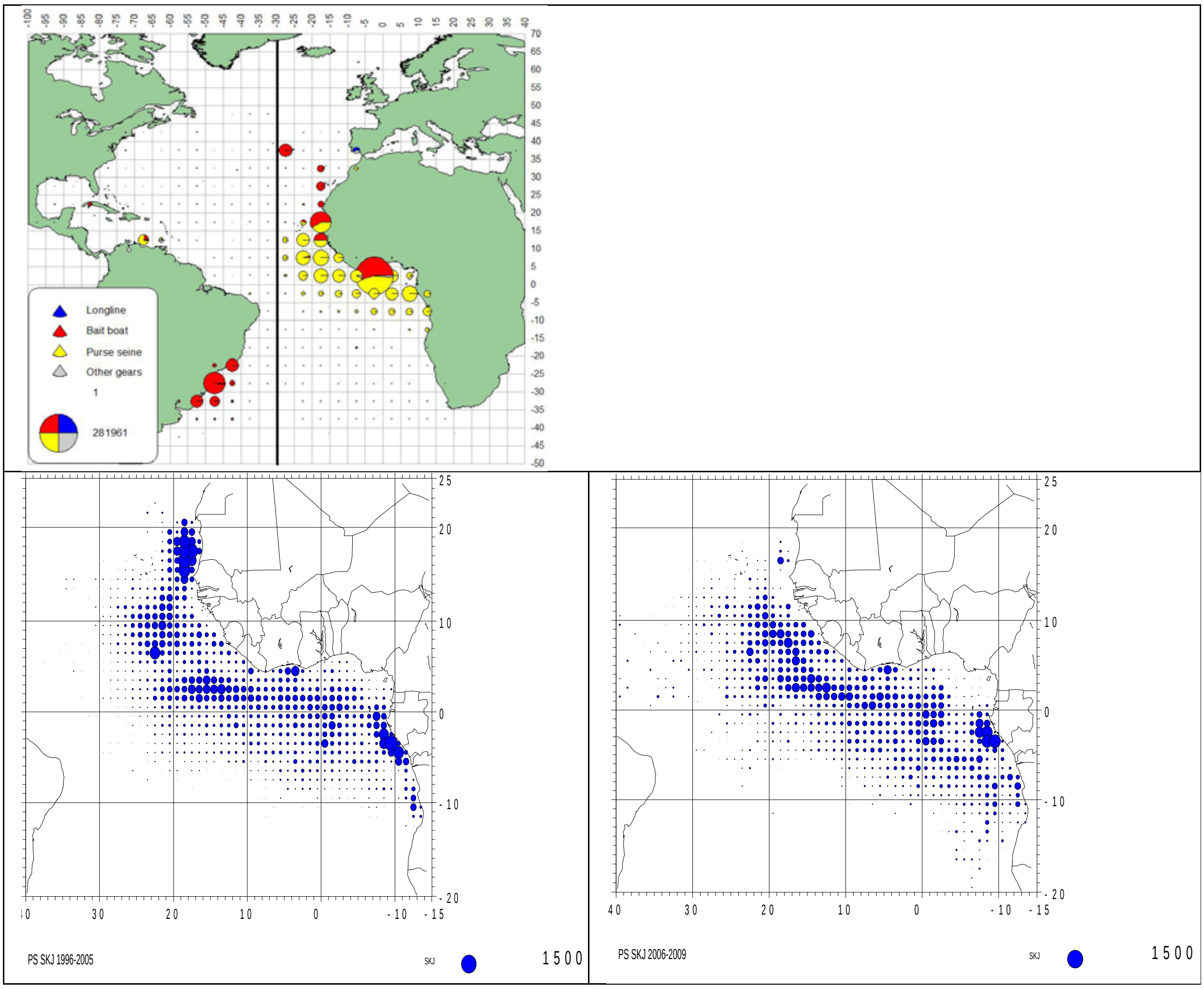
SKJ-Table 1. Estimated catches (t) of skipjack tuna *(Katsuwonus pelamis)* by area, gear and flag.

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			119071	122865	119229	144796	120419	144471	219733	170708	205685	185014	167381	154127	146082	151699	166488	148605	155767	116781	145293	158707	162240	142176	139127	149242	148222
	ATE		78786	90711	95052	121060	94037	118361	186330	140554	172462	155065	145479	126557	114367	122436	139079	119209	124239	95145	120412	131085	133596	115704	113580	127153	122470
	ATW		40272	32151	24164	23736	26382	26110	33404	30155	33221	29949	21860	27562	31712	29087	27356	29307	31451	21600	24749	27461	28517	26453	25443	22023	25747
	MED		13	2	13	0	0	0	0	0	2	0	43	9	4	176	53	90	77	37	132	161	127	20	104	67	5
Landings	ATE	Bait boat	29868	30009	38803	48015	41000	36922	41611	35660	31656	37817	33691	32047	37293	42045	37696	29974	46281	27591	29847	39539	43603	41175	29720	44106	33580
		Longline	6	19	6	4	9	0	5	3	2	10	3	7	47	85	42	48	53	56	66	316	458	2958	1599	1153	1559
		Other surf.	206	1638	1027	1506	1643	1357	2067	1602	1062	501	445	501	304	923	417	2423	764	681	551	816	1897	2402	2172	9419	4869
		Purse seine	48706	59045	55216	71535	51385	80082	142646	103288	139742	116737	111340	94002	76722	79383	100925	86763	77142	66817	89948	90414	87638	69170	80088	72473	82461
	ATW	Bait boat	28490	25278	18675	21057	23292	22246	23972	20852	19697	22645	17744	23741	26797	24724	23881	25754	25142	18737	21990	24082	26028	23749	22865	20617	22770
		Longline	24	8	6	9	25	23	33	29	20	16	34	19	12	21	58	22	60	349	95	206	207	286	52	50	20
		Other surf.	567	1657	518	355	600	600	872	764	710	1577	2023	452	556	516	481	467	951	398	367	404	316	372	1317	455	925
		Purse seine	11191	5208	4964	2315	2466	3241	8527	8509	12794	5712	2059	3349	4347	3826	2936	3063	5297	2116	2296	2769	1967	2045	1209	901	2032
	MED	Bait boat	0	0	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	3	17	21	13	8	39	40	1
		Other surf.	13	2	13	0	0	0	0	0	2	0	43	9	4	176	53	90	77	32	12	40	16	12	28	11	3
		Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	103	101	99	0	38	16	1
Landings	ATE	Angola	131	56	80	30	85	69	66	41	13	7	3	15	52	2	32	14	14	14	14	10	0	0	0	0	
		Benin	20	11	5	3	7	2	2	2	2	2	2	2	7	3	2	2	0	0	0	0	0	0	0	0	
		Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cape Verde	2030	877	2076	1456	971	806	1333	864	860	1007	1314	470	591	684	962	789	794	398	343	1097	7504	7930	6026	6010	4767
		Cayman Islands	0	0	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	4	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	4	0	0	1	3	0	5	3	2	10	3	5	47	73	39	41	24	23	26	16	10	9	14	18	5
		Congo	8	8	8	8	11	12	9	9	10	7	7	6	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	246	569	81	206	331	86	0	0	7	0	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	0	0	1173	259	292	143	559	1259	1565	1817	8998	2840
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	35100	41992	33076	47643	35300	47834	79908	53319	63660	50538	51594	38538	38513	36008	44520	37226	30954	25456	44837	38725	28139	22206	23670	35105	36694
		EU.Estonia	0	0	0	0	0	0	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	13645	13045	17114	16504	15211	17099	33271	21890	33735	32779	25188	23107	17023	18382	20344	18183	16593	16615	19899	21879	14850	7034	4168	4439	7615
		EU.Germany	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	14	0	0	8
		EU.Latvia	0	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Lithuania	0	0	0	0	0	0	221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	2409	5446	8420	14257	7725	3987	8059	7477	5651	7528	4996	8297	4399	4544	1810	1302	2167	2958	4315	8504	4735	11158	8995	6057	1084
		Gabon	0	0	0	0	0	0	0	0	1	11	51	26	0	59	76	21	101	0	0	0	0	0	0	0	
		Ghana	19082	22268	24347	26597	22751	24251	25052	18967	20225	21258	18607	19602	26336	34183	40216	28974	42489	30499	24597	25727	44671	30236	34572	37387	36064
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6389	5162	5546	6319	4036
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1224
		Japan	2098	2031	1982	3200	2243	2566	4792	2378	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	4
		Korea Rep.	153	5	6	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	1002	1220	1028	428	295	1197	254	559	310	248	4981	675	4509	2481	848	1198	268	280	523	807	1893	3779	1570	1291	2575
		Mixed flags (FR+ES)	358	692	4663	4660	4125	5280	11101	12273	13750	9492	5862	5831	4905	5621	6845	9461	7137	2995	4959	5262	4666	5313	3275	3128	2969
		NEI (ETRO)	590	540	791	2994	2263	10869	11335	12409	20291	17418	16235	16211	6161	6748	8893	7127	8122	8550	9688	11137	2873	629	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	2	15	0	1	0	0	0	8	0	0	0	0	0	0	0	71
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	7096	8444	8553	9932	10008	13370	5427	10092	8708	0	3042	1587	6436	9143
		Norway	0	0	581	738	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	8312	8719	13027	12978	14853	5855	1300	572	1308	1559	281	342	0	7126	11490	13468	18821	8253	8518
		Rumania	0	3	0	0	59	142	349	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	1175	1110	540	1471	1450	381	1146	2086	1426	374	0	0	0	0	0	392	1130	0	260
		S. Tomé e Príncipe	20	20	20	195	196	204	201	178	212	190	180	187	178	169	181	179	179	179	179	117	166	143	0	0	
		Senegal	0	0	0	0	47	134	652	260	95	59	18	163	455	1963	1631	1506	1271	1053	733	1333	4874	3534	2278	3661	4573
		South Africa	66	101	88	157	96	17	15	7	6	4	4	1	6	2	1	7	1	1	2	2	1	0	0	4	4
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	1404	1688	547	1822	1915	3635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	62	139	139	158	397	171	24	16	65	55	115	86	294	298	13	64	205	63	63	63	63	88	110	45	15
		Venezuela	358	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	101	138	90	7	111	106	272	123	50	1	0	1	0	2	0	1	0	0	0	30	0	0	0	0	
		Barbados	36	33	21	3	9	11	14	5	6	6	6	5	5	10	3	3	0	0	0	0	0	0	0	0	
		Brasil	25101	23155	16286	17316	20750	20130	20548	18535	17771	20588	16560	22528	26564	23789	23188	25164	24146	18338	20416	23037	26388	23270	24191	20846	23307
		Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Chinese Taipei	3	1	2	7	19	0	32	26	9	7	2	10	1	2	1	0	1	16	14	27	28	29	2	9	1
		Colombia	0	0	0	0	0	0	0	0	2074	789	1583	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	1632	1277	1101	1631	1449	1443	1596	1638	1017	1268	886	1000	1000	651	651	651	0	0	624	545	514	536	0	0	

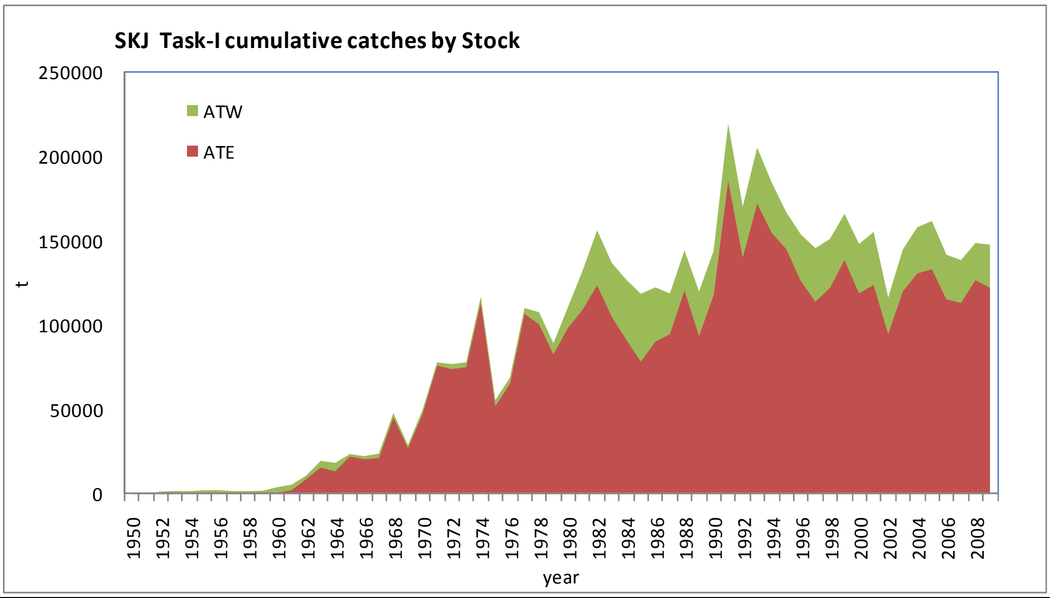
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Dominica	0	0	0	0	0	60	38	41	24	43	33	33	33	33	85	86	45	55	51	30	20	28	32	45	
	Dominican Republic	204	600	62	63	117	110	156	135	143	257	146	146	0	0	0	0	0	0	0	0	0	0	0	0	
	EU.España	500	0	0	0	0	0	1592	1120	397	0	0	0	0	0	1	1	0	0	0	0	0	0	5	11	
	EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	9	
	EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	3	3	5	21	11	0	6
	Grenada	7	9	5	22	11	23	25	30	25	11	12	11	15	23	23	23	15	14	16	21	22	15	26	20	
	Jamaica	0	0	0	0	0	0	0	0	0	0	0	62	0	0	0	0	0	0	0	0	0	0	0	0	
	Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Korea Rep.	20	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mexico	48	11	13	10	14	4	9	8	1	1	0	2	3	6	51	13	54	71	75	9	7	10	7	8	9
	Netherlands Antilles	40	40	40	40	40	40	40	40	45	40	35	30	30	30	30	30	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	0	0	0	0	0	0	0	0	
	St. Vincent and Grenadines	0	0	0	17	28	29	27	20	66	56	53	37	42	57	37	68	97	357	92	251	251	355	90	83	54
	Sta. Lucia	53	76	60	53	38	37	51	39	53	86	72	38	100	263	153	216	151	106	132	137	159	120	89	168	
	Trinidad and Tobago	1	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	U.S.A.	1814	1115	734	57	73	304	858	560	367	99	82	85	84	106	152	44	70	88	79	103	30	61	66	67	119
	UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
	Venezuela	10712	5690	5750	4509	3723	3813	8146	7834	11172	6697	2387	3574	3834	4114	2981	3003	6870	2554	3247	3270	1093	2008	921	757	2250
MED	Algerie	0	0	0	0	0	0	0	0	0	0	0	0	0	171	43	89	77	0	0	0	0	0	0	0	
	EU.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	26	10	15	44	12	0
	EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0
	EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102	99	99	0	0	0	
	EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	29	34	17	0	0	0	
	Maroc	13	2	13	0	0	0	0	0	2	0	43	9	4	5	10	1	0	1	1	2	1	5	22	18	5
	Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	36	

1) The estimation of Côte d'Ivoire corresponds to the average of the five previous years.

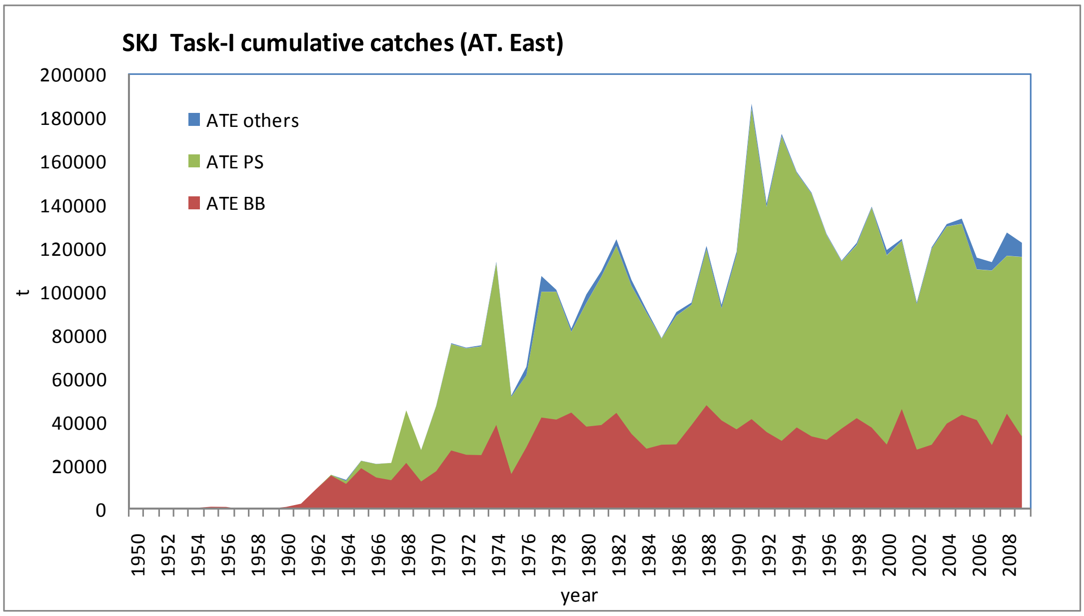
2) The estimation for mixed flag (Fra+Spa) corresponds to the faux poisson skipjack tuna catches for the two fleets only.



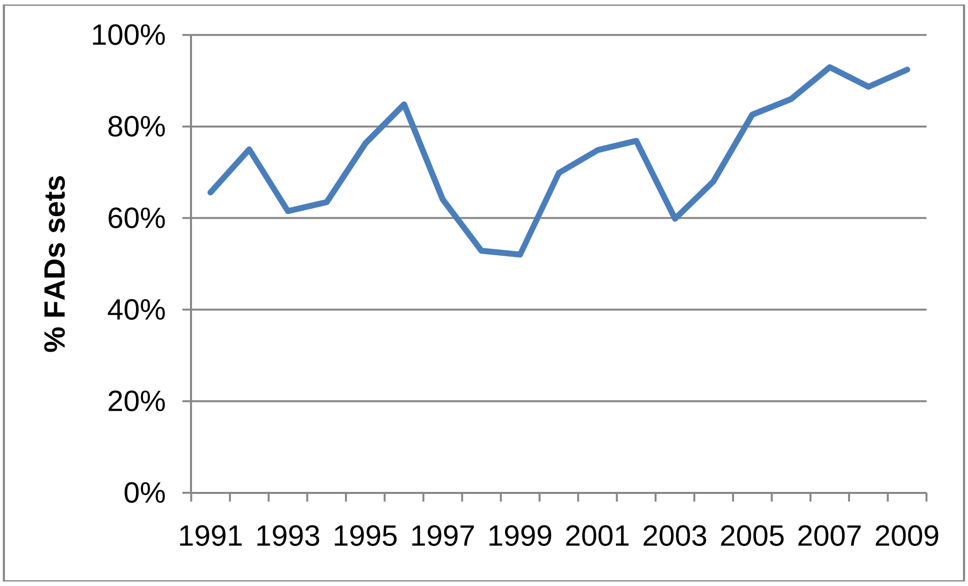
SKJ-Figure 1. (A) Distribution of skipjack catches in the Atlantic, by gear, for the period 2000-2008 (upper panel); The high catch shown in the Gulf of Guinea is due to the catches by Ghana that are taken in the same statistical area lack detailed information. (B) Skipjack catches made by European purse seiners (about 75% of the total catches) 1996-2005 (lower left panel) and 2006-2009 (lower right panel) showing the withdrawal from the Senegal zone due to non-renewal of the fishing agreements.



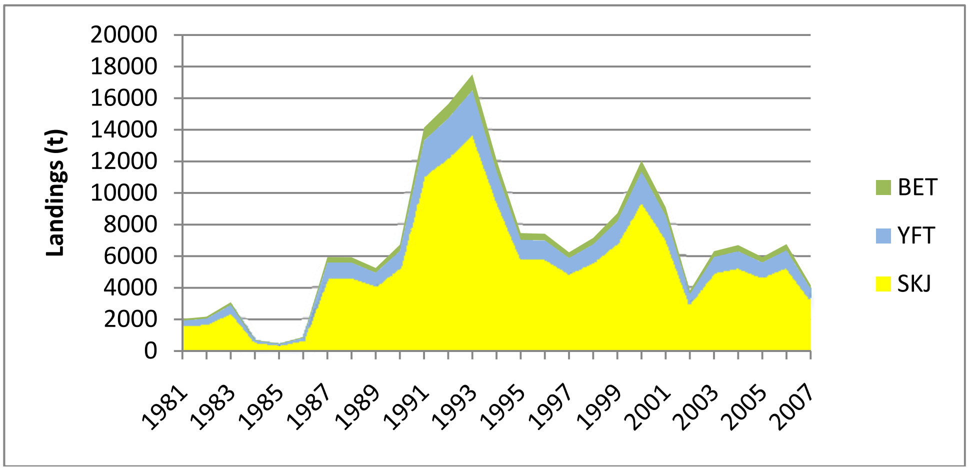
SKJ-Figure 2. Total catch (t) for skipjack tuna in the Atlantic Ocean and by stocks (East and West) between 1950 and 2009. Estimates of skipjack in the "*faux poissons*" landed in Côte d'Ivoire were included in the skipjack trade catches in the East Atlantic (only catches to 2006 were considered for the stock assessment).



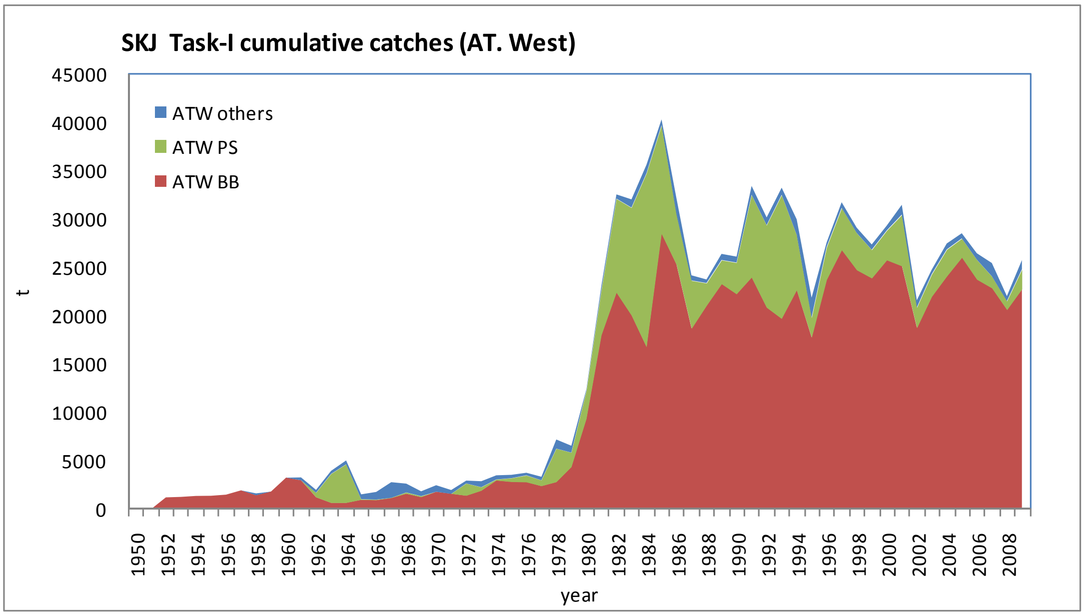
SKJ-Figure 3. Skipjack catches in the eastern Atlantic, by gear (1950-2009).



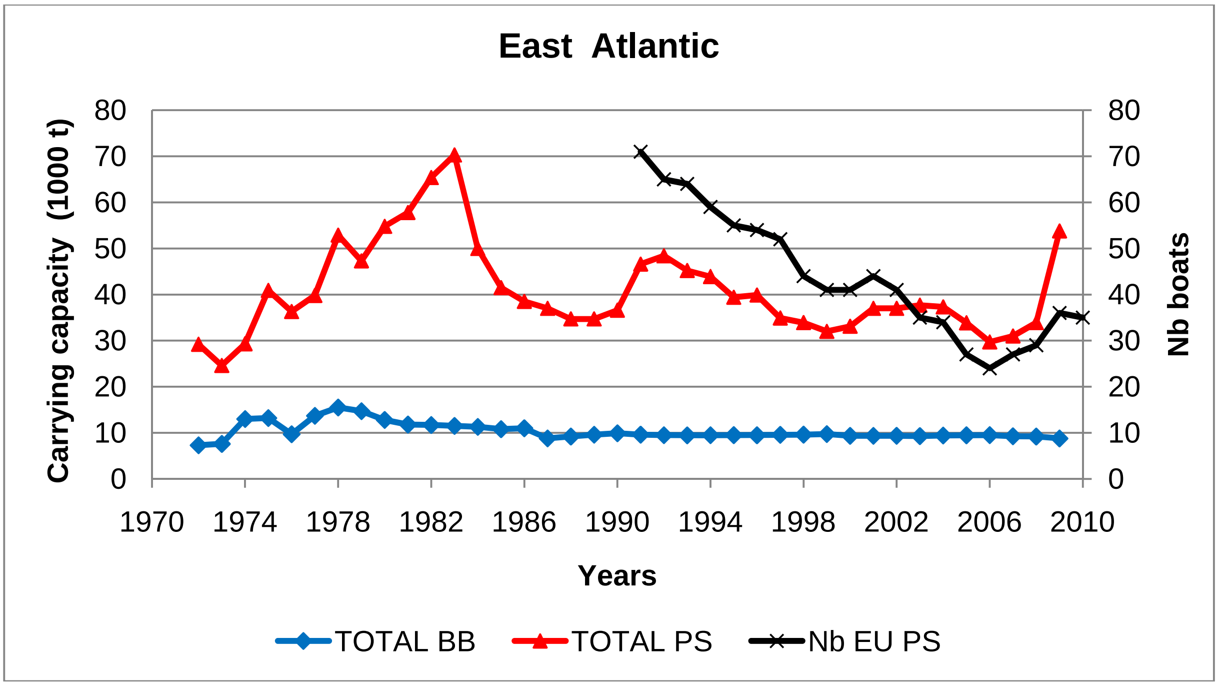
SKJ-Figure 4. Changes in the proportion of catches made by European purse seiners under FADs.



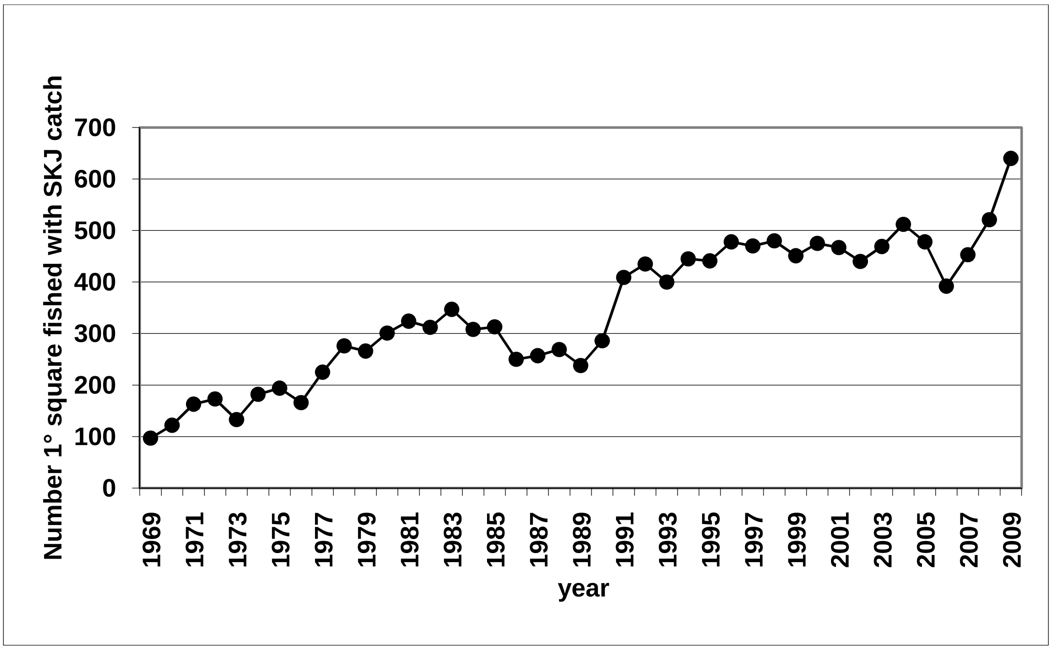
SKJ-Figure 5. Cumulative estimated landings of "*faux poissons*" for the three main species of tropical tunas in the local market of Abidjan (Côte d'Ivoire).



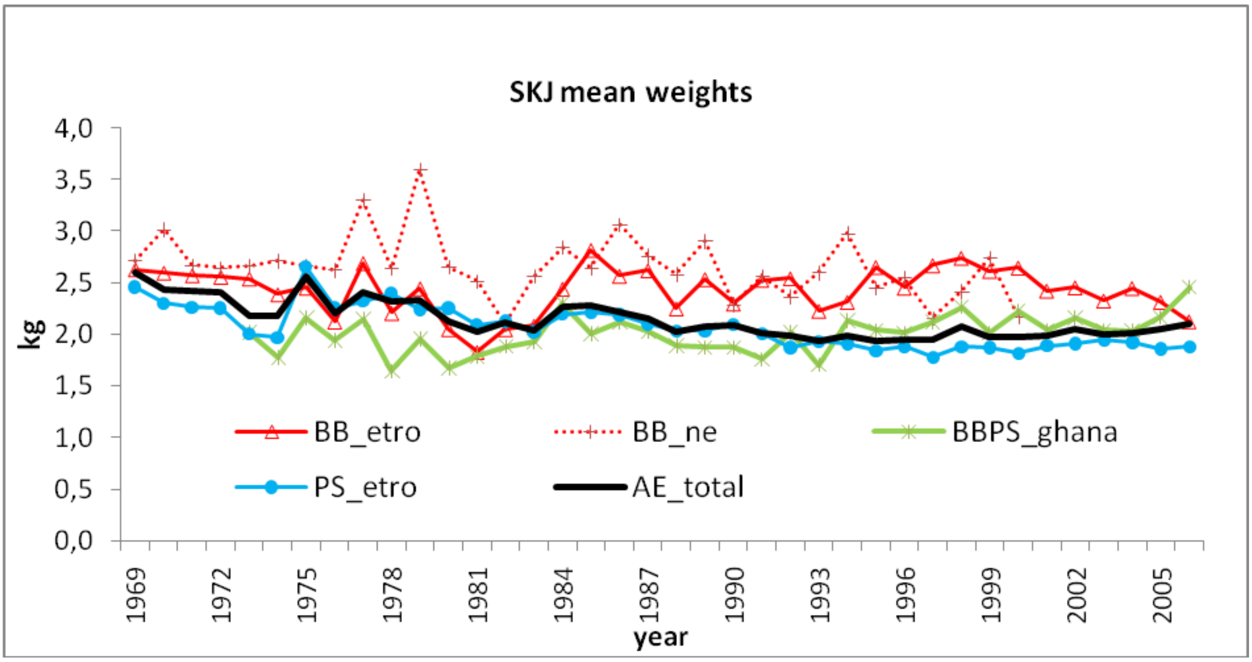
SKJ-Figure 6. Skipjack catches in the western Atlantic, by gear (1950-2009).



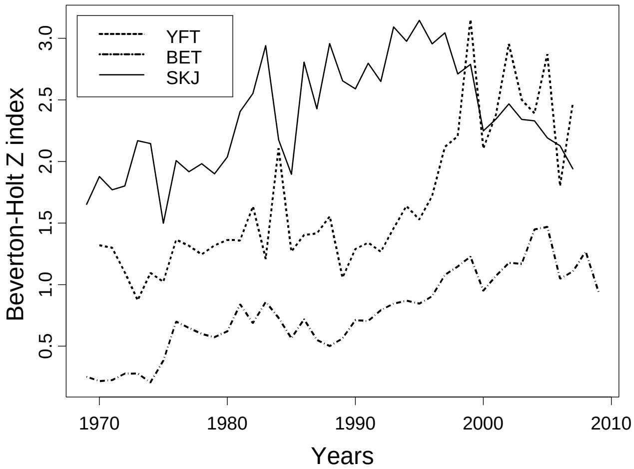
SKJ-Figure 7. Changes over time in the carrying capacity (corrected by time at sea) of purse seiners and baitboats operating in the eastern Atlantic (1971-2009) and in number of boats for the European purse seiners (value estimated for 2010).



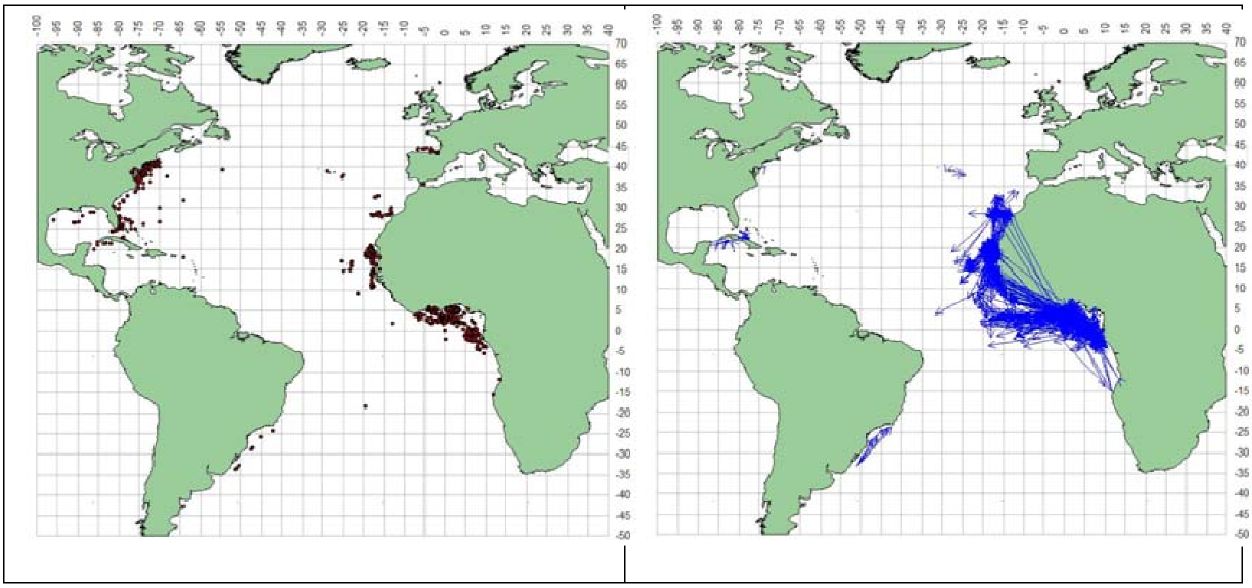
SKJ-Figure 8. Number of 1°x1° squares with catch of skipjack for the purse seiners operating in the eastern Atlantic (1969-2009). The increase observed in 1991 could be due to a modification of the species composition correction procedure of the catches implemented at this date (skipjack catches could have been attributed to squares which were not included until then). On the other hand, the recent increase in the area searched successfully corresponds to the extension of the fishery towards the western central Atlantic and off Angola.



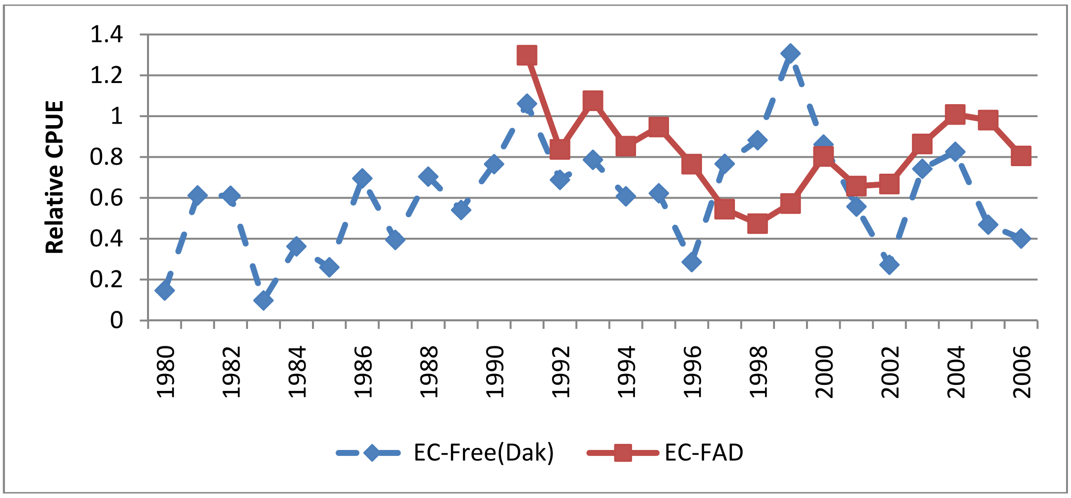
SKJ-Figure 9. Changes in time of the mean weight of the skipjack landed (non standardized) by major fisheries in the eastern Atlantic.



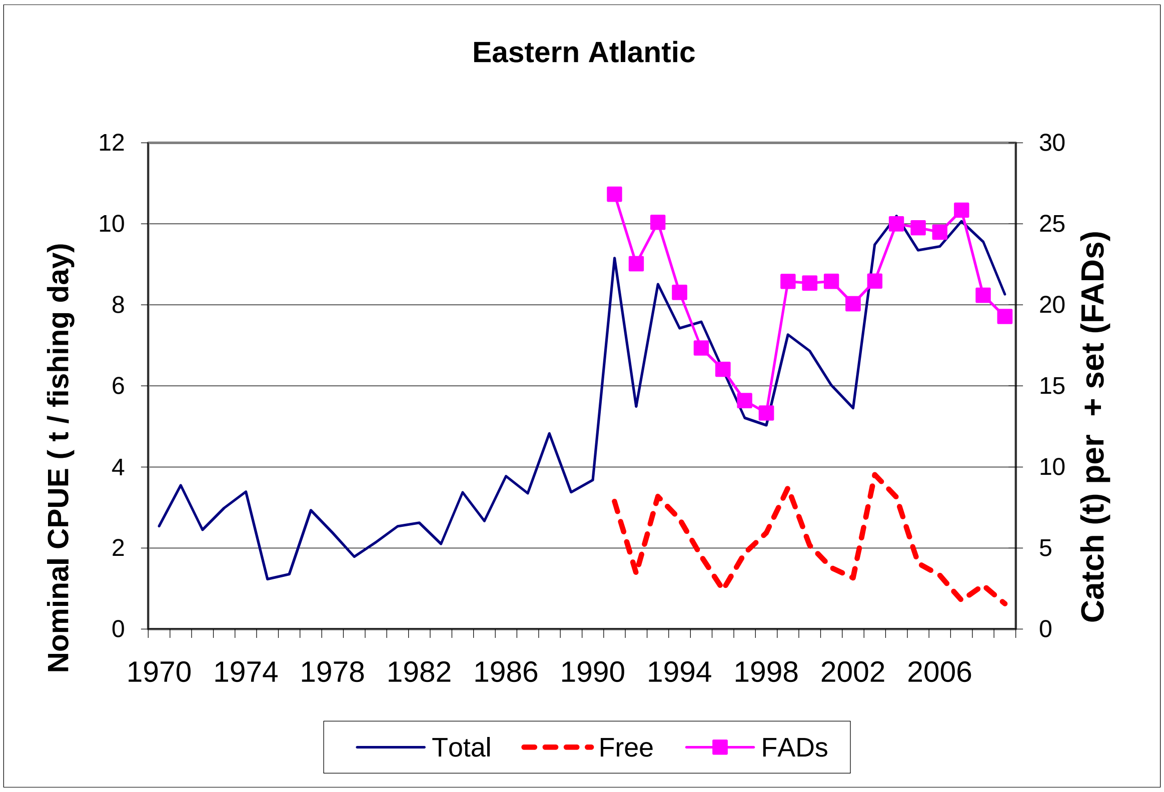
SKJ-Figure 10. Changes over time in the apparent total mortality *Z*, calculated based on Beverton and Holt's equation, for the three main tropical tuna species in the Atlantic Ocean. YFT = yellowfin, BET = bigeye, SKJ = Eastern skipjack. The size at which the fish are fully recruited was fixed at 50 cm (FL).



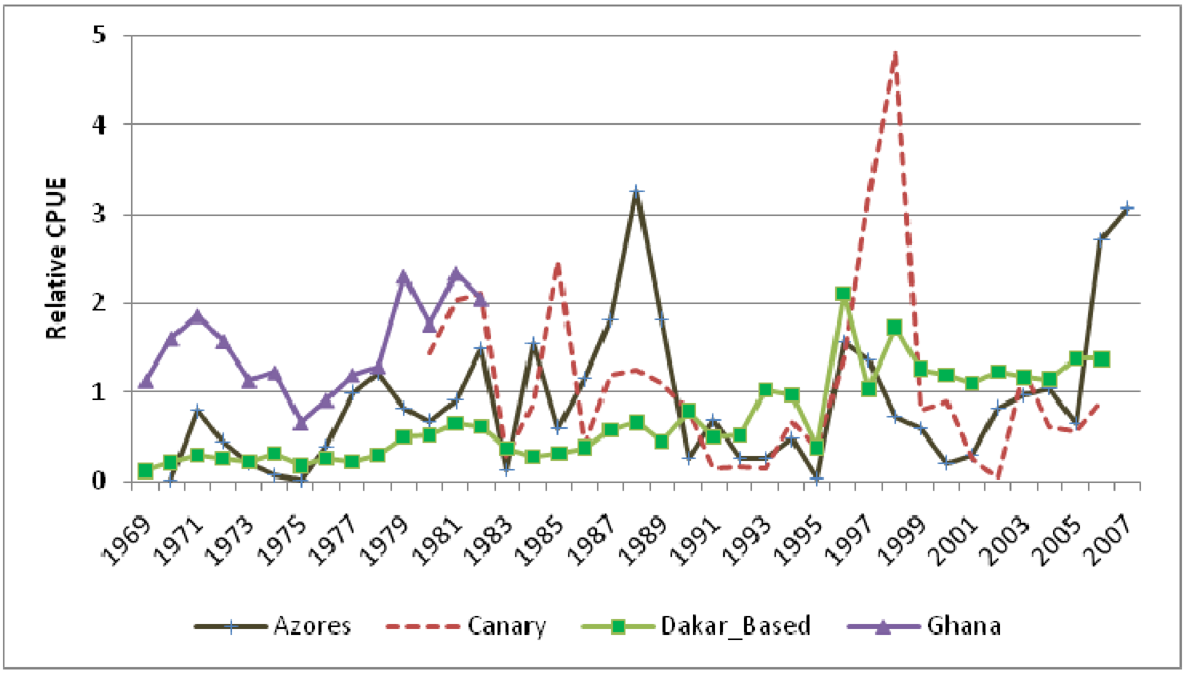
SKJ-Figure 11. Distribution of tagged and released SKJ (left panel) and apparent movements from geographic positions of recaptured fish (right panel).



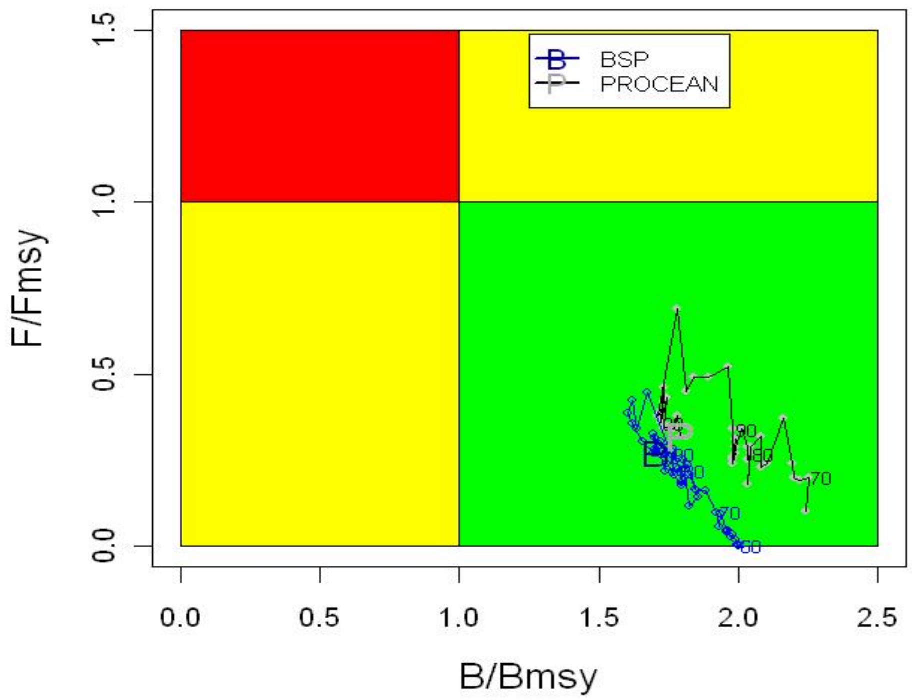
SKJ-Figure 12. Standardized skipjack CPUE for EU purse seiners in the eastern Atlantic Ocean. Free = free school off Senegal; FAD = schools associated with fish aggregating devices in the equatorial areas.



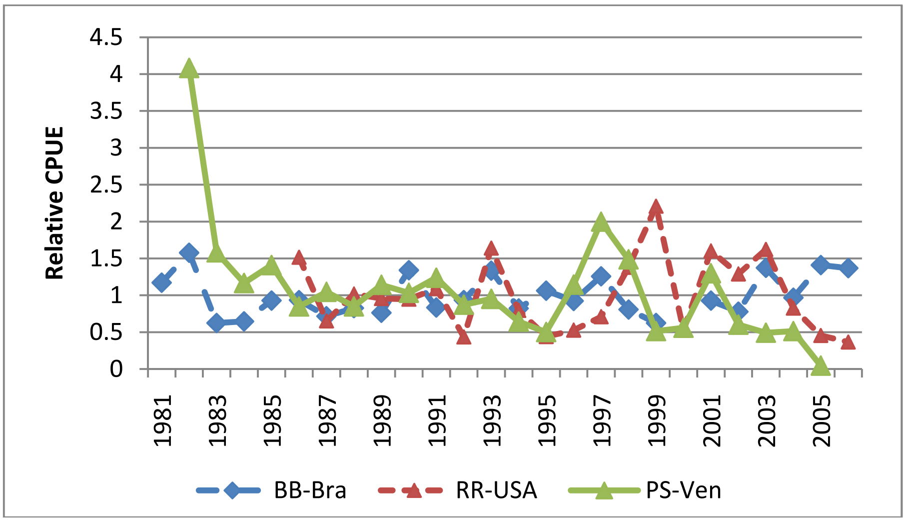
SKJ-Figure 13. Changes in nominal CPUE for the European purse seiners in the eastern Atlantic (1970-2009). Free = free schools (t / f. day) off Senegal; FADs = schools associated with fish aggregating devices (t / successful set) in the equatorial area.



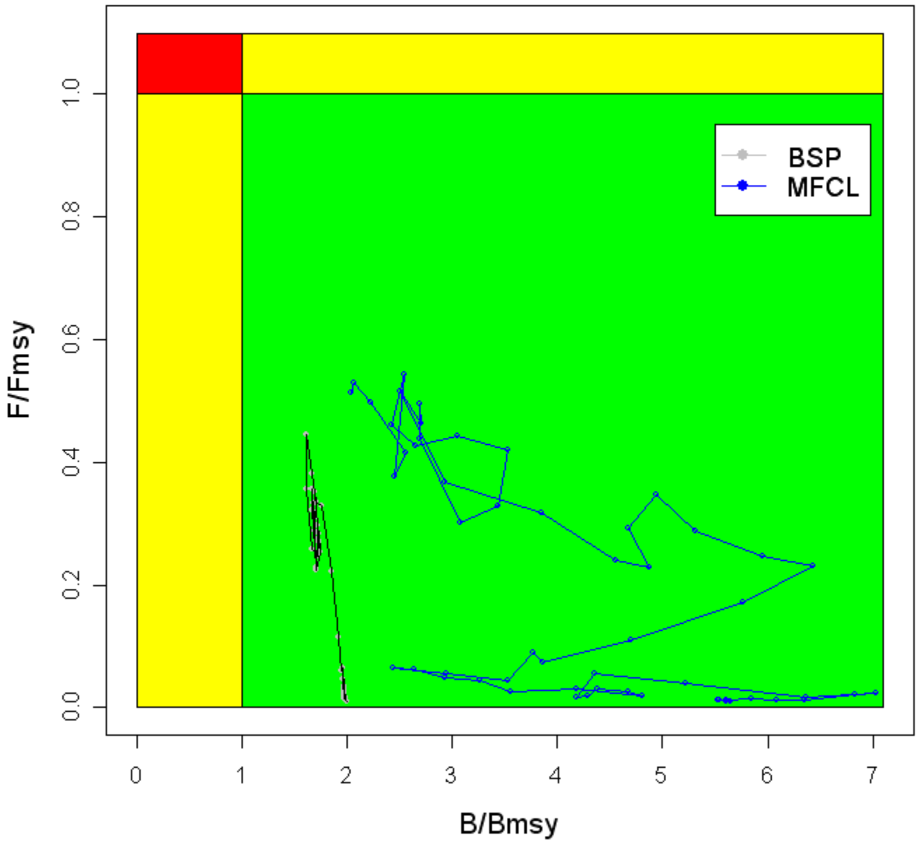
SKJ-Figure 14. Standardized CPUE for the main baitboat fleets operating in the eastern Atlantic Ocean: Azores, Canary islands (non standardized), Dakar and Ghana-based baitboats.



SKJ-Figure 15. Eastern skipjack stock status: 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 16. Standardized CPUEs of Brazilian baitboats, U.S. rod and reel recreational fleets and non-standardized CPUE of the Venezuelan purse seiners in the western Atlantic Ocean.



SKJ-Figure 17. Western skipjack stock status: trajectories of B/B_{MSY} and F/F_{MSY} from the Bayesian surplus production model (Schaefer type) and from Multifan-CL.

8.4 ALB – ALBACORE

The status of the North Atlantic albacore stock is based on the most recent analyses conducted in July 2009 by means of applying statistical modelling to the available data up to 2007. Complete information on the assessment can be found in the Report of the 2009 ICCAT Albacore Stock Assessment Session (Anon. 2010f).

The status of the South Atlantic albacore stock is based on the 2007 assessment using available data up to 2005. Complete information is found in the Report of the 2007 ICCAT Albacore Stock Assessment Session (Anon. 2008b).

This year a Mediterranean Albacore Data Preparatory Meeting was held, following the 2009 recommendations of the Albacore Species Group. However, no assessment was conducted. Complete information is found in document SCRS/2010/016.

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)**. However, the hypothesis that various sub populations of albacore have been exploited in the North Atlantic (Aloncle & Delaporte 1973) remains of potential interest in the stock assessment. Likewise, there is likely intermingling of Indian Ocean and South Atlantic immature albacore which needs further research.

Scientific studies on albacore stocks, in the North Atlantic as well as in the North Pacific, have been showing that trends in environmental variability may have a serious potential impact on albacore stocks, affecting fisheries by changing the fishing grounds as well as recruitment levels and potential MSY of the stocks. Those unexplored aspects might explain changes in fisheries and the apparent decline in the estimated recruitment which are demanding focussed research.

The expected life-span for albacore is around 15 years. While albacore is a temperate species, spawning occurs in tropical waters. A new weight-at-length relationship for the western Atlantic fishery was presented that showed to be different from that presently used for the northern stock. Present available knowledge on habitat distribution according to size, spawning areas and maturity estimates of Atlantic albacore is based on limited studies from past decades.

An exception is a revised, new growth equation for the South stock. For Mediterranean albacore, the available biological knowledge has not yet been fully analyzed by the Albacore Species Group. More information on albacore biology and ecology is published in the *ICCAT Manual*.

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 (50 cm to 90 cm FL) and longline fisheries targeting immature and adult albacore (60 cm to 130 cm FL). The main surface fisheries are carried out by EU 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 autumn. The main longline fleet is the Chinese Taipei fleet which operates in the central and western North Atlantic year round. However, Chinese Taipei fishing effort decreased in late 1980s due to a shift towards targeting on tropical tuna, then continued at this lower level to the present. 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. 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 (troll and baitboat) and longline fisheries (**ALB-Table 1**; **ALB-Figure 2a**). Some stabilization was observed in the 1990s, mainly due to increased effort and catch by new surface fisheries (driftnet and mid-water pair pelagic trawl) with a maximum catch in 2006 at 36,989 t and since then a decreasing trend of catch is observed in the North Atlantic.

The total catch in 2009 was 15,364 t, representing a decrease of 25% compared to the 2008 yield and a larger decrease from the 2006 peak catch (36,989 t). The catch in 2009 was the lowest recorded in the time series since 1950.

The surface fisheries accounted for the bulk of the total catch with 12,911 t reported in 2009 (81%) **(ALB-Table 1)**. The reported catch for EU-France in 2009 was 1,122 t, a decrease from 2008. The reported catch for EU-Spain in 2009 was 9,376 t from the troll fleet and baitboat fleets in the summer Cantabrian Sea fishery (SCRS/2010/145) and the baitboat fishery in the Canary Islands (SCRS/2010/144). It represents a decrease from the 2008 catch. In contrast, EU-Ireland 2009 reported catches had increased compared to 2008 and by two and a half fold from 2007. The EU-Portugal catch from the baitboat fishery in 2009 was 108 t, a five-fold decrease from 2008.

Standardized catch rates of fish ages 1 to 4 from the Spanish troll fleet were updated to 2009 (SCRS/2010/146). Albacore age 1 showed an increasing trend peaking in 2005 and 2006, fluctuating since then and a decrease in 2009. Age 2 albacore showed an increasing trend since 2004 with peaks in 2006 and 2008 and a decreasing trend in 2009. In the case of age 3, there is a continued upward trend from 2007 to 2009. Catch rates of the Irish mid-water pelagic trawl fleet showed a steep decline in 2007 compared to the higher estimates for 2005 and 2006.

In total, the 2009 longline catches were similar to 2007. The Chinese Taipei catch in 2009 was 863 t, a decrease of 244 t as compared with that of 2008. The decrease in catch mainly stemmed from a reduction in fishing effort. Japan takes albacore as by-catch with longline gear. The Japanese longline catch reached 285 t in 2009, which represented a 30% decrease from 2008. The catch fluctuated from around 300 t to 1,300 t in the last decade. Recent catch rates from the Chinese Taipei longline fishery in 2008 showed the same level as in 2007 (Hsieh, *et al.* 2010).

The trend in mean weight for all surface fleets (baitboat, troll, mid-water, pair pelagic and other surface) from 1975 to 2007 showed a stable trend with an average of 7 kg (range:4-10). For longline fleets from 1975 to 2005 the mean weight was also relatively stable with an average of 18.8 kg (range: 13.4-25.7 kg) (**ALB-Figure 3a)**.

South Atlantic

The recent total annual South Atlantic albacore landings were largely attributed to four fisheries, namely the surface baitboat fleets of South Africa and Namibia, and the longline fleets of 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 cm to 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 5ºS and 20ºS, 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 cm to 120 cm FL) than the surface fleets.

Total reported albacore landings for 2009 were 22,856 t an increase of about 21% from 2008 catch. The Chinese Taipei catch in 2009 was 8,678 t, a decrease of 1,288 t as compared to that of 2008. This decrease mainly stemmed from a decrease in fishing effort targeting albacore. Chinese Taipei longliners (including boats flagged Belize and St. Vincent and the Grenadines) stopped fishing for Brazil in 2003, which resulted in albacore only being caught as by-catch in tropical tuna-directed longline fisheries. Albacore is only caught as by-catch in Brazilian tropical tuna-directed longline and baitboat fisheries. In 2009, the catch of the Brazilian fishery was 202 t, showing a decrease of about 50% compared to 2008. The average catch of about 4,287 t during the period 2000-2003 was obtained by the longline Brazilian fleet when albacore was a target species. In 2009, Uruguay reported 685 t, which represent an extremely high increase from previous reported years.

In 2009, South Africa estimated the total annual catch taken by the baitboat fleet was 5043 t, which represented an increase of about 45% from 2008. In addition, in 2009 the Namibian total reported catch by the baitboat fleet was 4,936 t, an increase of two and a half fold from 2008. Japan takes albacore as by-catch using longline gear. In 2009, the Japanese longline catch was 949 t, a decrease from 2008. The relatively large increase from 238 t in 2007 was due to an increase in fishing effort in the waters off southern Africa (20-40˚S). Recent CPUEs from the Chinese Taipei longline fishery in 2008 showed the same level as in 2007 (Chang and Yeh, 2010).

The trend in mean weight for all surface fleets (baitboat and other surface fleets) from the 1975 to 2005 period is shown in **ALB-Figure 3b.** From 1981 onwards a stable trend is identified with an average of 13.4 kg and maximum and minimum weight of 17.6 kg and 11 kg, respectively. While the trend in mean weight for longline fisheries showed an increase after 1996.

Mediterranean

In 2009, the reported landings were 4,021 t, an increase from 2,970 t taken in 2008 (**ALB-Table 1** and **ALB-Figure 2c**). The majority of the catch came from longline fisheries.

ALB-3. State of stocks

A thorough revision of North Atlantic Task I and Task II data was conducted and a more robust method for catch-at-size analyses was implemented for the 2009 assessment session similar to that used in the 2007 assessment. In addition, catch rate analyses were improved and updated with new information for the northern albacore fisheries and 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 analyzed data through 2007.

North Atlantic

The CPUE trends for the various surface fleets, based upon the most recent available 2007 data showed somewhat different patterns from each other. This was also the case for the different longline fleets (**ALB-Figure 4**). The Spanish age two troll CPUE series showed evidence of a relatively strong 2003 year class entering the fishery. For the Spanish age three troll CPUE series, the age signal is not as strong, 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.

The data sets used for the analyses from 1930 to 2007 were compiled during the July 2009 stock assessment meeting. The data was classified into 10 fisheries units using the same definitions as those used in the 2007 stock assessment. The basic input data, catch, effort and catch-at-size were revised due to updates in the ICCAT Task I (**Table 1**) and Task II database. Model specification for the base case was identical to the 2007 assessment and described in detail in de Bruyn, *et al.*, (2010). However, the model was run using the latest version of the software. Different hypothesis on the dynamics of the northern albacore stock were tested and those with clearly unrealistic outputs were discarded.

Based on the present assessment which considers catch and effort since the 1930s and size frequency since 1959, the view of the northern albacore resource status is that spawning stock size has declined and in 2007 was about one third 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 2007. The most recent recruitment is estimated to be the lowest for all the years of the evaluation although the magnitude of this year-class is highly uncertain in the latest year (**ALB-Figure 5**). The 2009 current assessment indicated that the stock has remained below B_{MSY} (current SSB_{2007} is approximately 62% of SSB at MSY) (**ALB-Figure 5**) since the late 1960. Corresponding fishing mortality rates have been above F_{MSY} (current ratio F_{2007}/F_{MSY} is 1.05 which is only slightly higher than F_{MSY}. (**ALB-Figure 6**).

The trajectory of fishing mortality and spawning stock biomass relative to MSY reference points, from the assessment model is shown in **ALB-Figure 6**. As the majority of the time series is in the top left quadrant (F/F_{MSY} >1 and, SSB/SSB_{MSY} <1) this could indicate the northern albacore stock has been overfished (SSB/SSB_{MSY} <1) since the mid-1980s. Uncertainty around the estimates of current F_{2007}/F_{MSY} and SSB_{2007}/SSB_{MSY} is shown in (**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.

The southern CPUE trends, mainly based on an updated longline standardized CPUE series up to 2007 which harvest 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

In 2010, Mediterranean albacore Task I and Task II data were reviewed. As a result, deficiencies and a lack of information were identified on statistics from major fleets. The detailed information is presented in report SCRS/2010/016. In order to asses the status of this stock, the CPCs should provide revised and complete data for this purpose.

ALB-4. Outlook

North Atlantic

Using the reference points calculated by the current base case assessment model done in 2009, projections (Kell, *et al.*, 2010) indicate that constant catches above 28,000 t will not result in stock rebuilding to Convention standards by 2020 (**ALB-Figure 11**). In 2008 and 2009 catches were lower than 28,000 t.

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. Since then catches had been lower than 29,000 t **(ALB-Figure 9)**

ALB-5. Effects of current regulations

North Atlantic

In 2007, the Commission established a new TAC for 2008 and 2009 of 30,200 t [Rec. 07-02], but included several provisions that allow the catch to exceed this level.

Furthermore, a 1998 recommendation that limits fishing capacity to the average of 1993-1995, remains in force.

The Committee noted that the reported catches of 20,449 t in 2008 were below the recommended TAC and in 2009 the total catch of 15,364 t was again lower than the TAC **(ALB-Table 1)**.

South Atlantic

In 2007 the Commission established a new TAC from 2008 to 2011 of 29,900 t [Rec. 07-03]. The Committee noted that reported catches in 2008 and 2009 were well below the TAC **(ALB-Table 1)**.

Mediterranean

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

ALB-6. Management recommendations

North Atlantic

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 reiterated that the fishing opportunities provided in [Rec. 07-02] allow the potential catch to exceed the TAC (**ALB-Figure 2a**). In view of the 2009 assessment, in order to achieve the Commission management objective by 2020, a level of catch of no more than 28,000 t will be required. The Commission recommended the establishment of a Total Allowable Catch (TAC) of 28,000 t for 2010 and 2011 [Rec. 09-05].

South Atlantic

In the case of the southern stock, the present TAC is 29,900 t. Recent catches were below the TAC level. The 2007 assessment showed that the southern stock was overfished and model projections indicated that catches, at about the 2006 level (24,452 t), will recover the stock.

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. The Commission recommended updating the southern albacore stock assessment in 2011 [Rec. 07-03].

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY

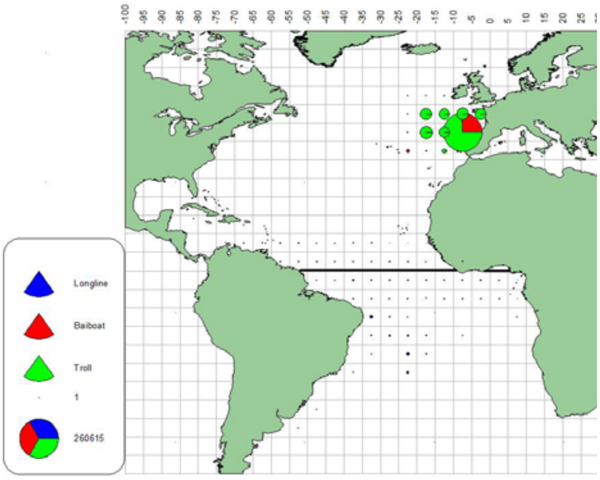
	North Atlantic	**South Atlantic**	**Mediterranean**
Current (2009) Yield	15,364 t	22,856 t	4,021 t
Maximum Sustainable Yield	29,000 t	33,300 t (29,900-36,700) [1]	Unknown
Replacement Yield (2009)	Not estimated	28,800 t (25,800-29,300)[1]	Not estimated
SSB_{2007}/SSB_{MSY} [2]	0.62 (0.45-0.79)[2]		Not estimated
SSB_{2005}/SSB_{MSY} [1]		0.91 (0.71-1.16)[1]	
Relative Fishing Mortality			
F_{2007}/F_{MSY} [2]	1.045 (0.85-1.23) [2]		Not estimated
F_{2005}/F_{MSY} [1]		0.63 (0.47-0.9)[1]	
Management measures in effect	[Rec. 98-08]: Limit	[Rec. 07-03]: Limit	None
	No. of vessels to 1993-1995 average TAC: 30,200 t [Rec. 07-02] for 2008 and 2009. TAC: 28,000 t [Rec. 09-05] for 2010 and 2011.	Catches to 29,900 t until 2011	

[1] Reference points estimates based on 2007 assessment. Approximately 95% confidence bounds in the South stock.
[2] Reference points estimates based on 2009 assessment. 95% CI around the reference points were based on estimated 2007 standard errors in the North stock.

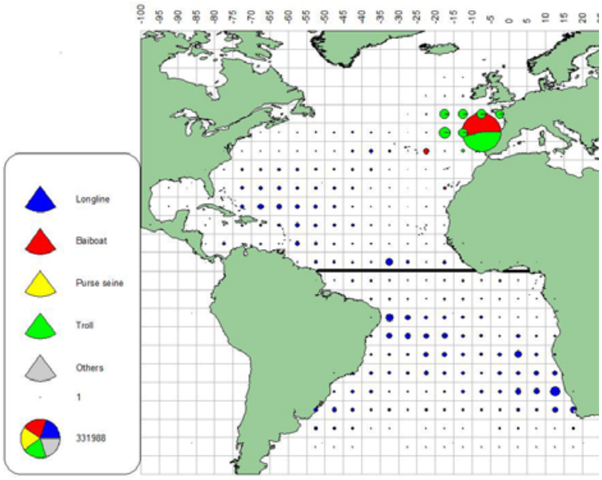
ALB-Table 1. Estimated catches (t) of albacore *(Thunnus alalunga)* by area, gear and flag.

			1985	1986		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			76052	88568	82778	67295	63342	67492	56344	69627	73086	71812	67517	60379	59585	59039	67058	71165	69916	60094	61539	53378	57728	67389	48827	42310	42241
	ATN		40826	47568	38153	33059	32071	36882	27949	30863	38135	35163	38377	28803	29023	25746	34551	34200	26254	22741	25644	25960	35318	36989	21991	20449	15364
	ATS		31097	37288	40630	30173	27212	28714	26016	36562	32813	35300	27552	28426	28022	30595	27656	31387	38796	31746	28002	22543	18881	24452	20269	18891	22856
	MED		4129	3712	3996	4063	4060	1896	2379	2202	2138	1349	1587	3150	2541	2698	4851	5577	4866	5608	7893	4874	3529	5947	6566	2970	4021
Landings	ATN	Bait boat	12589	15217	18794	15933	15374	18625	8985	12448	15646	11967	16411	11338	9821	7562	8780	12148	6104	6638	7918	8128	10458	14273	8497	7932	4994
		Longline	17413	21232	7296	3013	2239	2683	5315	3152	7093	7309	4859	4641	4051	4035	6710	7321	7372	6180	7699	6917	6911	5223	3237	2588	2603
		Other surf.	108	213	343	994	1652	3865	3999	5173	7279	7506	3555	3337	4378	6846	6817	5971	2828	422	551	697	624	625	525	274	427
		Purse seine	59	60	1	97	12	1	222	139	229	292	278	263	26	91	56	191	264	118	211	348	99	188	198	95	89
		Trawl	2	0	262	1693	2240	1033	469	2603	1779	2131	3049	2571	2877	1318	5343	3547	5374	5376	3846	2369	7001	6385	3429	4321	2811
		Troll	10654	10847	11457	11329	10554	10675	8959	7348	6109	5959	10226	6652	7870	5894	6845	5023	4312	4007	5419	7501	10224	10296	6105	5239	4440
	ATS	Bait boat	7909	6829	8181	7696	7393	5981	3454	6490	7379	8947	7091	6960	8110	10353	6709	6873	10355	9712	6973	7475	5084	5876	3374	4346	9777
		Longline	22672	29815	30964	21894	19407	21590	22008	27162	23947	24806	20040	21000	19547	19799	20640	24398	28039	21671	20626	14735	12977	17740	15087	13276	12723
		Other surf.	334	400	537	398	411	1139	137	393	39	483	10	209	127	0	73	58	377	323	82	299	288	395	1762	1219	211
		Purse seine	182	244	948	185	0	4	416	2517	1448	1064	412	257	117	434	183	58	25	39	309	16	533	441	45	50	145
		Trawl	0	0	0	0	0	0	0	0	0	0	0	0	120	9	52	0	0	0	12	18	0	0	0	0	
	MED	Bait boat	243	0	0	0	0	83	499	171	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0	0	
		Longline	375	324	164	168	165	624	524	442	410	350	87	391	348	194	417	2800	2597	3706	4248	2345	2012	3010	4119	2695	3175
		Other surf.	2973	3068	3782	3879	3879	1098	1198	1533	879	766	1031	2435	1991	2426	4265	2689	2193	1755	3166	2176	1200	134	1401	250	820
		Purse seine	274	10	50	16	16	91	110	6	559	23	0	0	0	0	0	0	0	1	478	353	317	2803	1046	24	25
		Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Troll	264	310	0	0	0	0	48	50	59	129	306	119	202	45	73	0	0	117	0	0	0	0	0	0	1
	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	5	8	10	13	9	7	7	4
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	26	39
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	
		Canada	0	1	21	47	22	6	5	1	9	32	12	24	31	23	38	122	51	113	56	27	52	27	25	33	11
		Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
		China P.R.	0	0	0	0	0	0	0	0	0	14	8	20	0	0	21	16	57	196	155	32	112	202	59	24	27
		Chinese Taipei	14899	19646	6636	2117	1294	3005	4318	2209	6300	6409	3977	3905	3330	3098	5785	5299	4399	4330	4557	4278	2540	2357	1297	1107	863
		Cuba	20	31	15	4	1	2	0	0	0	0	0	0	0	0	0	0	0	1	322	435	424	527	0	0	
		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	0	0	25
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	323	121	73	95	0	0	0	0	0	0	0	0	
		EU.España	20672	24387	28206	26738	25424	25792	17233	18175	18380	16998	20197	16324	17295	13285	15363	16000	9177	8952	12530	15379	20447	24538	14582	12750	9617
		EU.France	1860	1200	1921	2805	4050	3625	4123	6924	6293	5934	5304	4694	4618	3711	6888	5718	6006	4345	3456	2448	7266	6585	3179	3009	1122
		EU.Ireland	0	0	0	0	0	40	60	451	1946	2534	918	874	1913	3750	4858	3464	2093	1100	755	175	306	521	596	1517	1997
		EU.Portugal	657	498	433	184	169	3185	709	1638	3385	974	6470	1634	395	91	324	278	1175	1953	553	513	556	119	184	614	108
		EU.United Kingdom	0	0	0	0	0	0	0	59	499	613	196	49	33	117	343	15	0	0	0	0	6	19	30	50	67
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	7	2	0	3	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	2	1	6	7	6	12	21	23	46	25	29	19	20	15	
		Iceland	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	844	470	494	723	764	737	691	466	485	505	386	466	414	446	425	688	1126	711	680	893	1336	781	288	402	285
		Korea Rep.	390	373	18	16	53	34	1	0	8	0	2	2	1	0	0	0	0	0	0	0	59	45	12	0	82
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	81	120	178	98	96	99	130
		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	
		NEI (Flag related)	0	0	0	0	0	0	11	19	13	10	8	11	3	8	12	0	0	0	0	0	0	0	0	0	
		Panama	601	525	44	0	0	0	0	29	60	117	73	11	5	0	0	0	0	0	0	0	0	96	298	113	51
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	151	4	0	0	0	0	0	9	0	8	19	54
		Sierra Leone	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	704	1370	300	1555	89	802	76	263	130	135
		Sta. Lucia	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	1	3	2	10	0	2	2	2	2	
		Trinidad and Tobago	318	0	0	0	0	4	0	247	0	0	0	0	2	1	1	2	11	9	12	12	9	12	18	32	17
		U.S.A.	98	251	301	288	243	357	479	438	509	741	545	472	577	829	315	406	322	480	444	646	488	400	532	257	188
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	2	0	0	1	1	0	0	0	0
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	414	507	235	95	20	140
		Venezuela	467	187	64	137	41	95	319	205	246	282	279	315	75	107	91	1375	349	162	424	457	175	321	375	222	398
	ATS	Argentina	153	356	469	344	354	151	60	306	0	2	0	0	120	9	52	0	0	0	12	18	0	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	2	0	0	0	8	2	0	0	0	0	0	54	32	31	213
		Brasil	382	520	395	421	435	514	1113	2710	3613	1227	923	819	652	3418	1872	4411	6862	3228	2647	522	556	361	535	487	202
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	

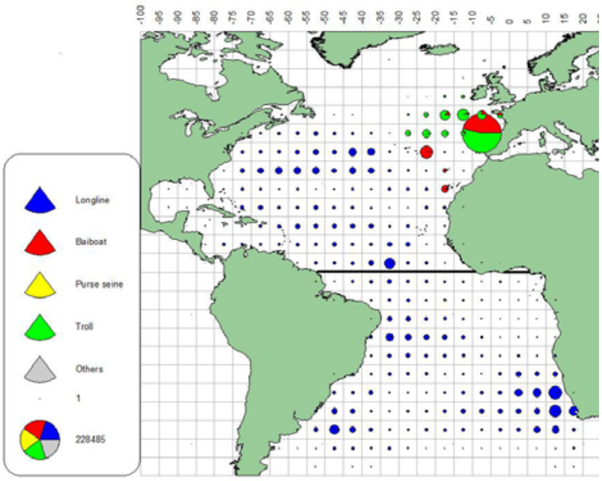
		1985	1986		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	89	26	30	26	112	95	100	35	25	89
	Chinese Taipei	19643	27592	28790	20746	18386	21369	19883	23063	19400	22573	18351	18956	18165	16106	17377	17221	15833	17321	17351	13288	10730	12293	13146	9966	8678
	Cuba	27	24	10	2	1	2	17	5	3	0	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	0	0	0	0	0	0	0	0	0	0	0	47
	EU.España	155	200	807	185	0	0	280	1943	783	831	457	184	256	193	1027	288	573	836	376	81	285	367	758	908	1061
	EU.France	18	35	100	0	0	0	50	449	564	129	82	190	38	40	13	23	11	18	63	16	478	347	12	50	60
	EU.Portugal	1357	1029	899	1153	557	732	81	184	483	1185	655	494	256	124	232	486	41	433	415	9	43	8	13	49	254
	EU.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	0	1
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	
	Honduras	0	0	0	0	0	0	0	29	0	0	2	0	7	1	6	0	0	0	0	0	0	0	0	0	
	Japan	623	739	357	405	450	587	654	583	467	651	389	435	424	418	601	554	341	231	322	509	312	316	238	1370	949
	Korea Rep.	511	321	383	180	54	19	31	5	20	3	3	18	4	7	14	18	1	0	5	37	42	66	56	147	374
	Maroc	0	0	41	0	0	0	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	4	8	122	68	55	63	41	5	27	0	0	10	14	53	0	15	46	15	0	
	NEI (Flag related)	0	0	0	0	0	0	149	262	146	123	102	169	47	42	38	0	0	0	0	0	0	0	0	0	
	Namibia	0	0	0	0	0	0	0	0	0	1111	950	982	1199	1429	1162	2418	3419	2962	3152	3328	2344	5100	1196	1958	4936
	Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	9	192	0	2	0	0	0	0	0	0	0	0	21
	Panama	0	280	924	0	0	0	240	482	318	458	228	380	53	60	14	0	0	0	0	0	17	0	87	5	
	Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	52	0	13	79	45
	Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	South Africa	6697	5930	7275	6636	6890	5280	3410	6360	6881	6931	5214	5634	6708	8412	5101	3610	7236	6507	3469	4502	3198	3735	3797	3468	5043
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2116	4292	44	0	0	0	65	160	71	51
	U.S.A.	0	0	0	0	0	0	0	0	0	0	0	1	5	1	1	1	2	8	2	1	0	0	0	0	
	U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UK.Sta Helena	0	0	2	1	1	1	5	28	38	5	82	47	18	1	1	58	12	2	0	0	0	62	46	94	81
	Uruguay	1531	262	178	100	83	55	34	31	28	16	49	75	56	110	90	90	135	111	108	120	32	93	34	53	685
	Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	1400	96	131	64
MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	12	30	255	425	507	712	209	223
	EU.España	531	0	3	3	0	84	548	227	298	218	475	429	380	126	284	152	200	209	1	138	189	382	516	238	204
	EU.France	250	20	60	31	31	121	140	11	64	23	3	0	5	5	0	0	0	1	0	0	0	0	2	1	0
	EU.Greece	0	484	500	500	500	500	500	500	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448	191	116
	EU.Italy	3348	3208	3433	3529	3529	1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6912	3671	2248	4584	4017	2104	2724
	EU.Malta	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	0	2	0	10	15	0	1	5	1
	EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Maroc	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
	NEI (MED)	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	14	
	Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	30	73	852	208	631
	Yugoslavia Fed.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



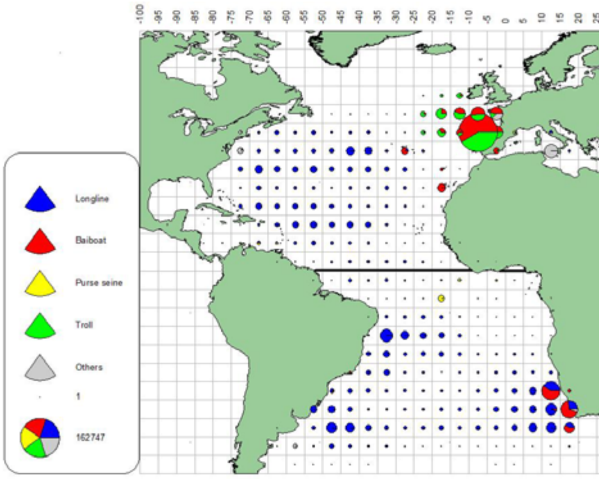
a. ALB(1950-59). Average catch: 39,958 t.



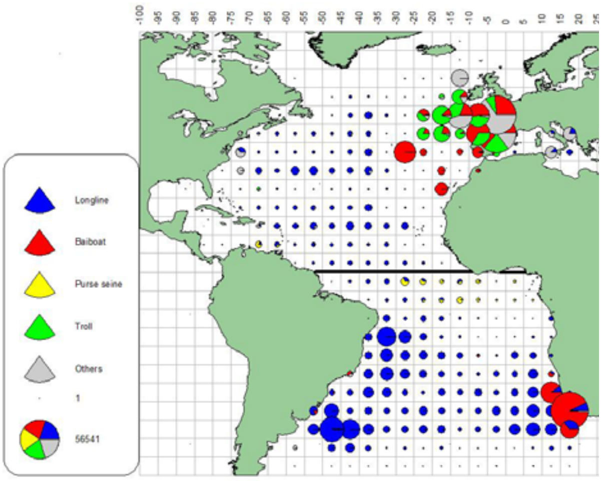
b. ALB(1960-69). Average catch: 75,197 t.



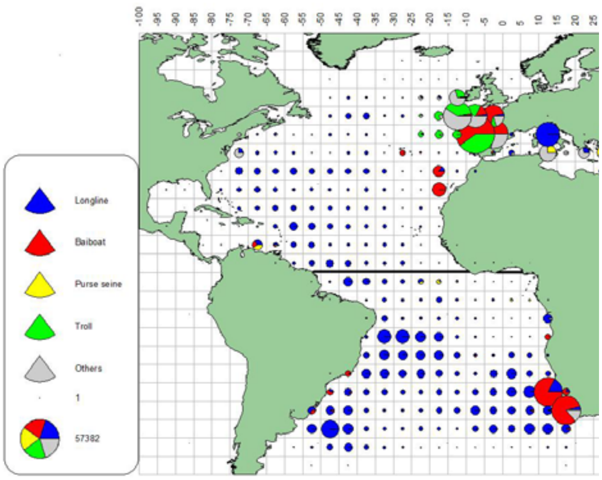
c. ALB(1970-79). Average catch: 74,110 t.



d. ALB(1980-89). Average catch: 70,135 t.



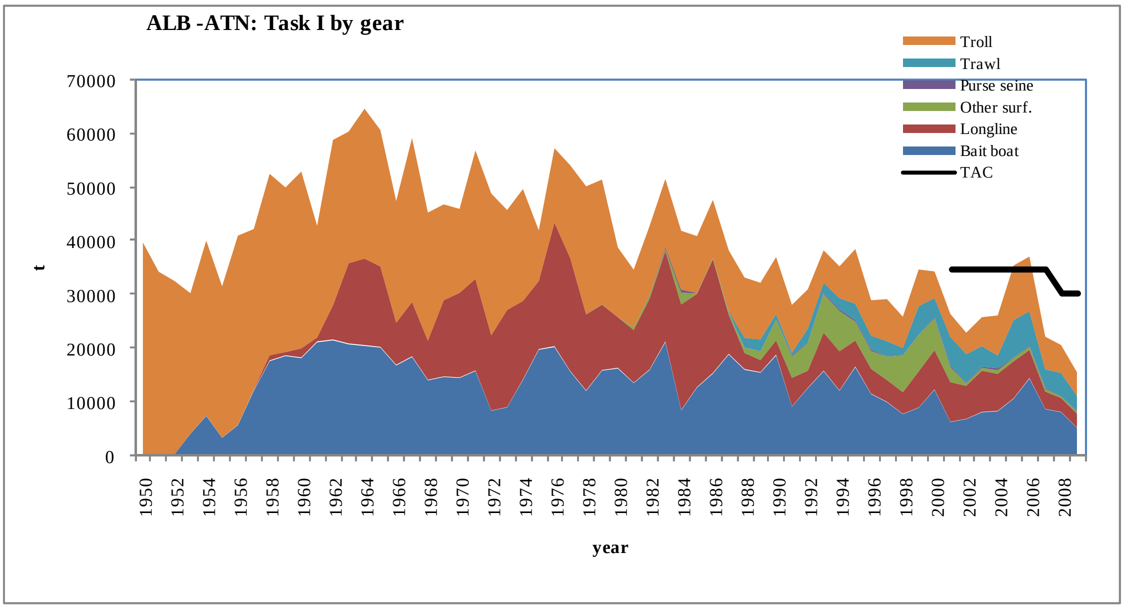
e. ALB (1990-99). Average catch: 65,194 t.



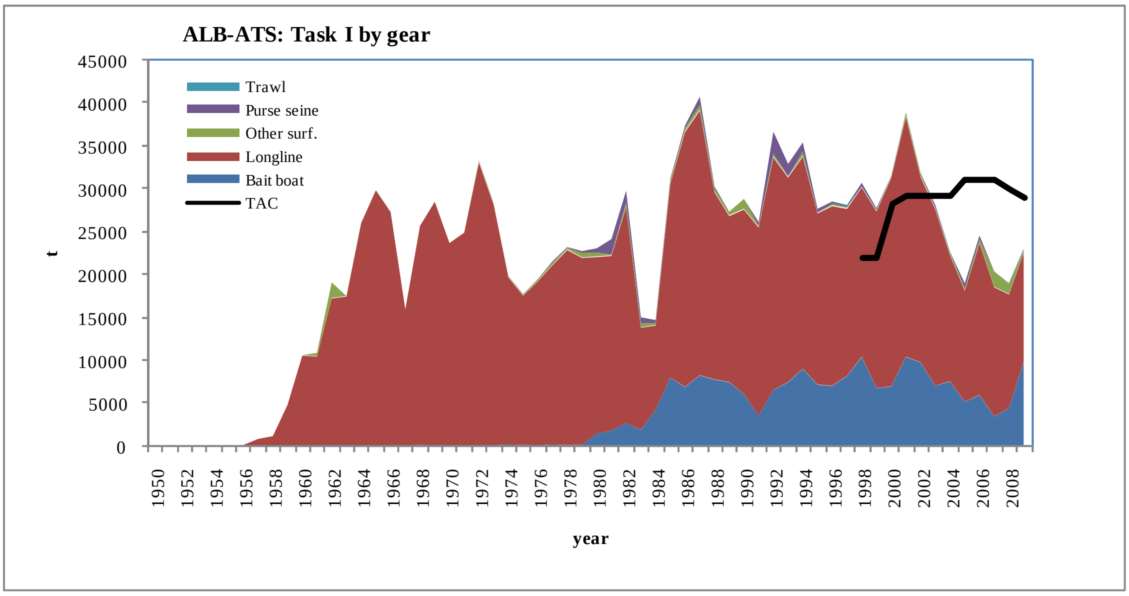
f. ALB (2000-08). Average catch: 59,120 t.

ALB-Figure 1. Geographic distribution of albacore accumulated catch by major gears and decade (1950-2008). Baitboat and troll catches are aggregated by 5ºx5º degrees in the Bay of Biscay thus the spatial representation of catch is concentrated on this area. (See Figures 2a,b and c for total catch values by gear).

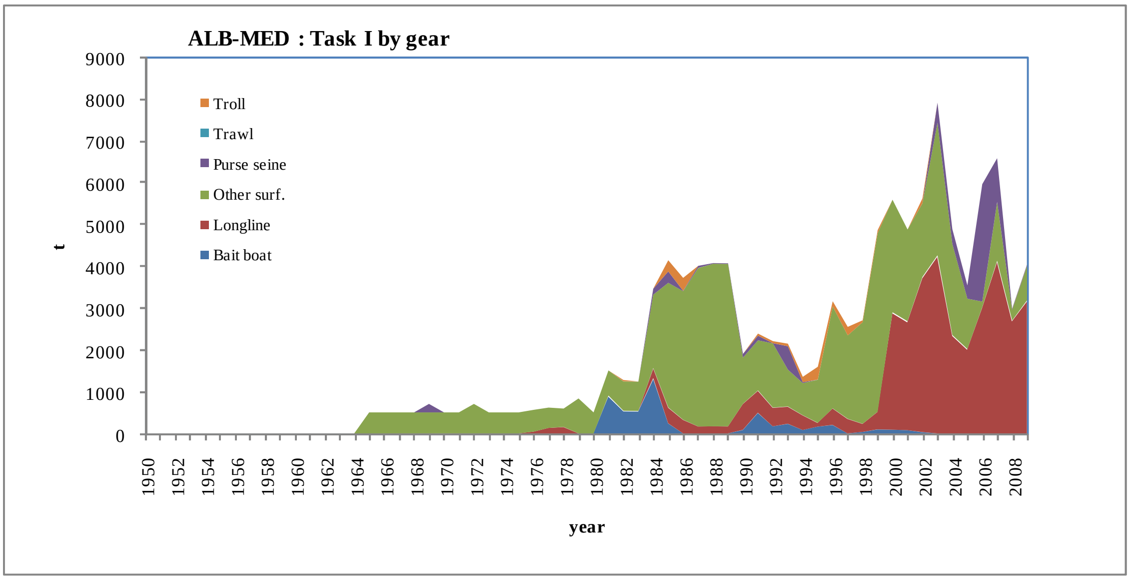
a)



b)

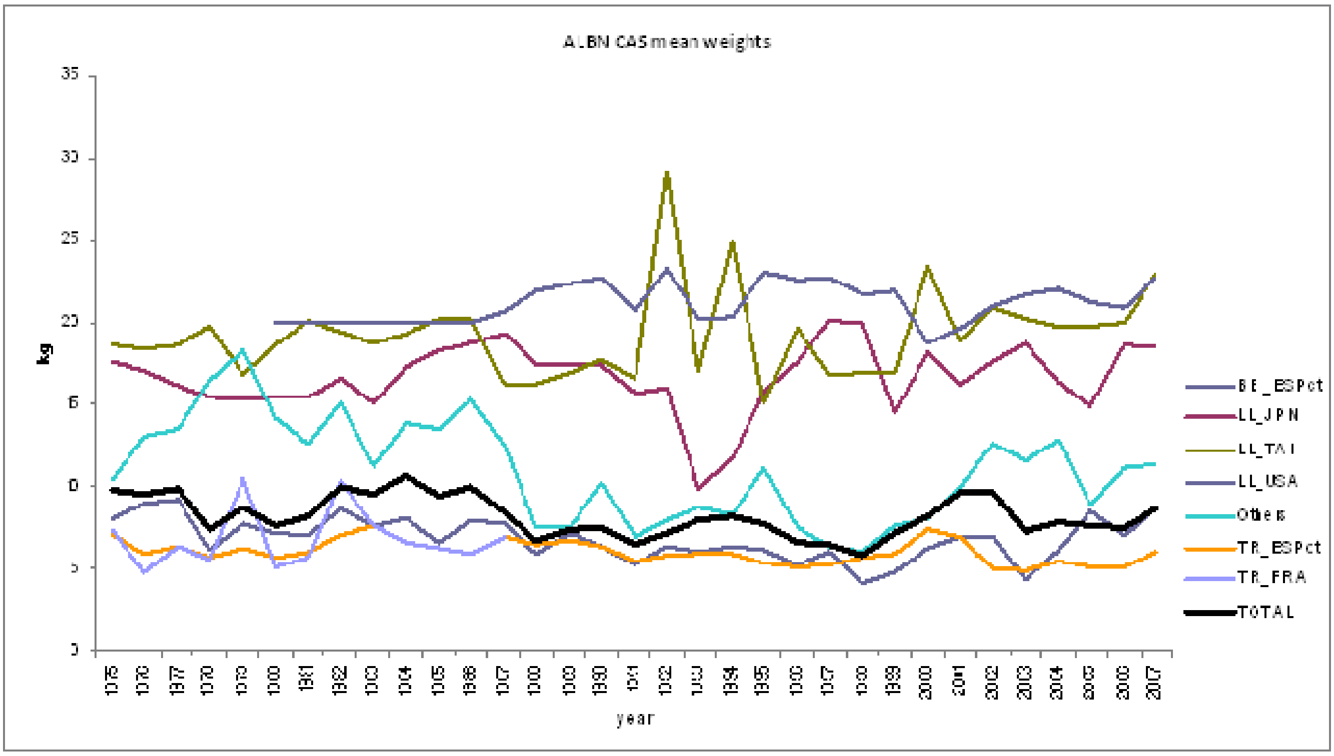


c)

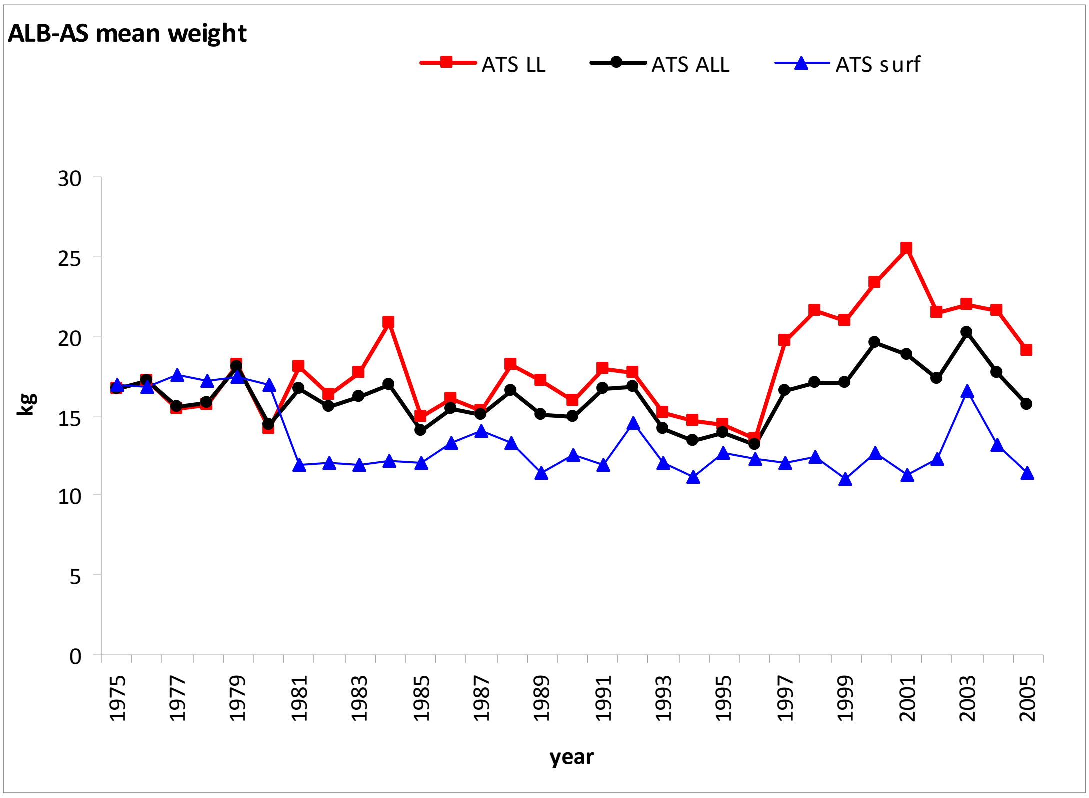


ALB-Figure 2a, b, c. Total albacore catches reported to ICCAT (Task I) by gear for the northern, southern Atlantic stocks including TAC, and the Mediterranean stock.

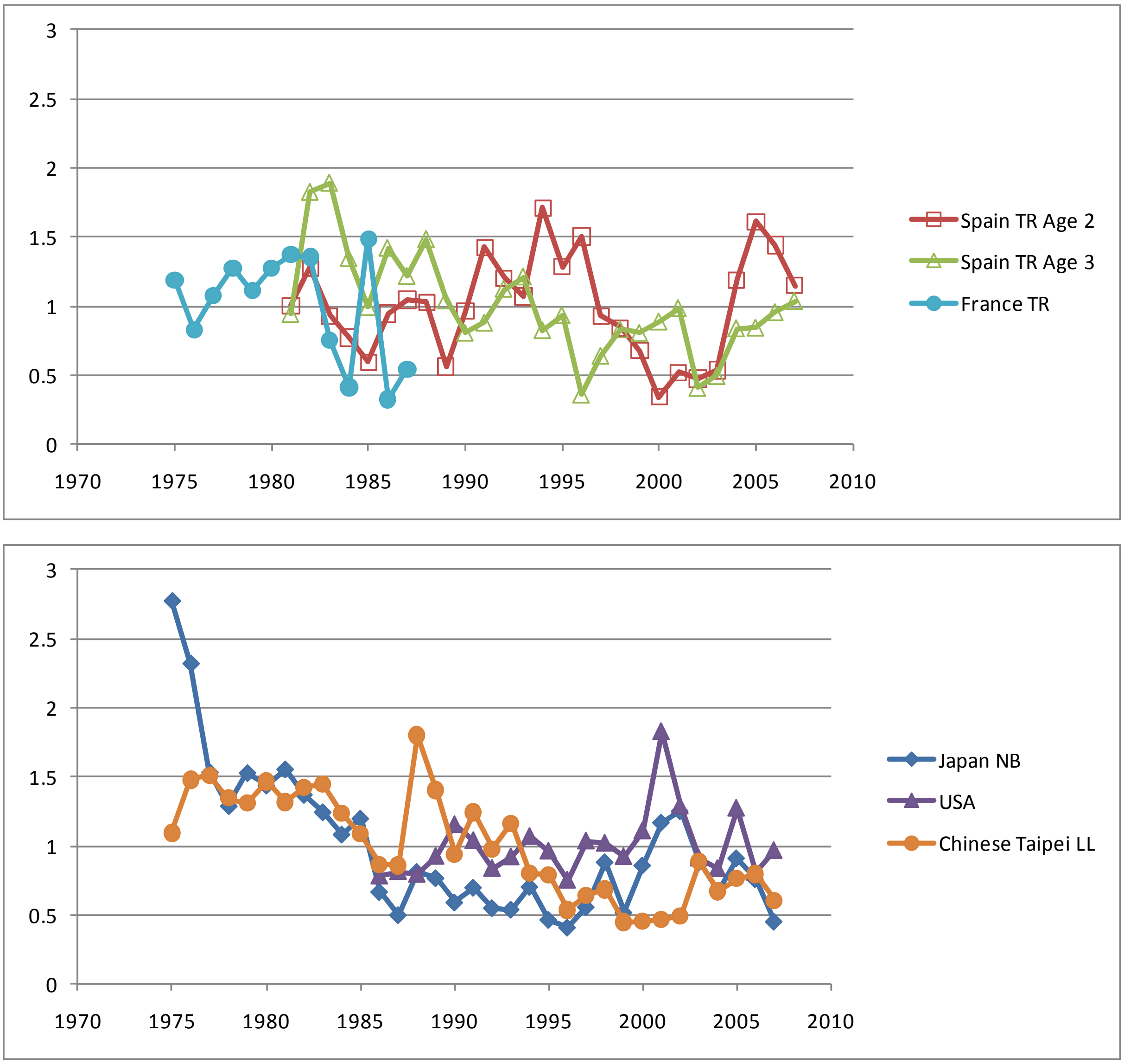
a)



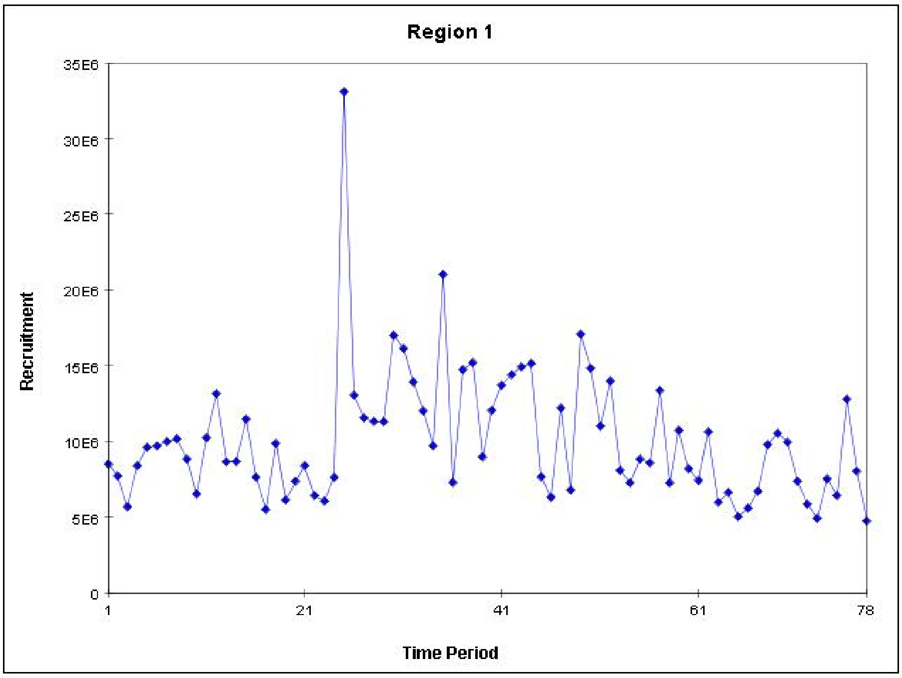
b)

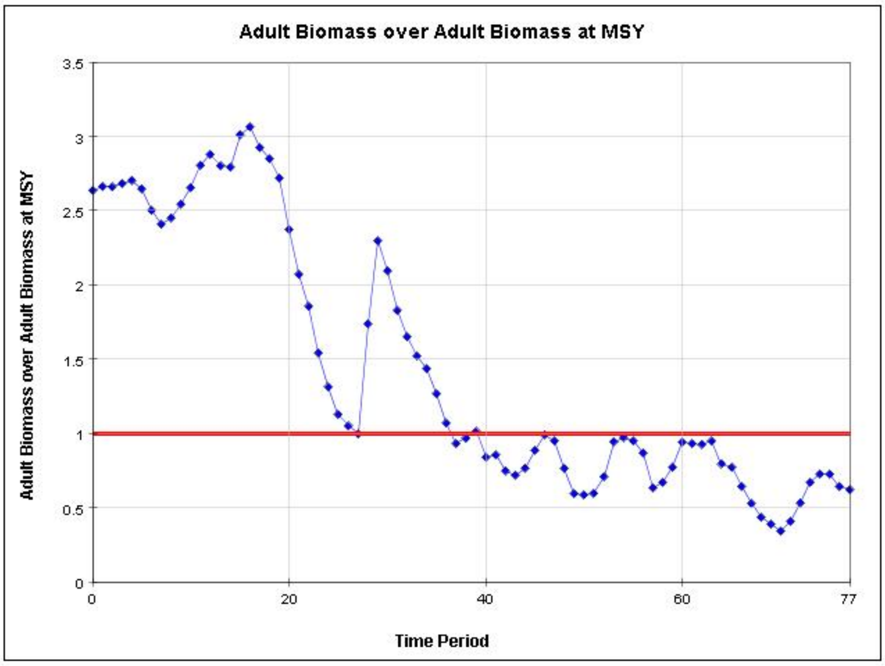


ALB-Figure 3a, b. Mean weight trend by surface and longline fisheries in North and South Atlantic stocks.

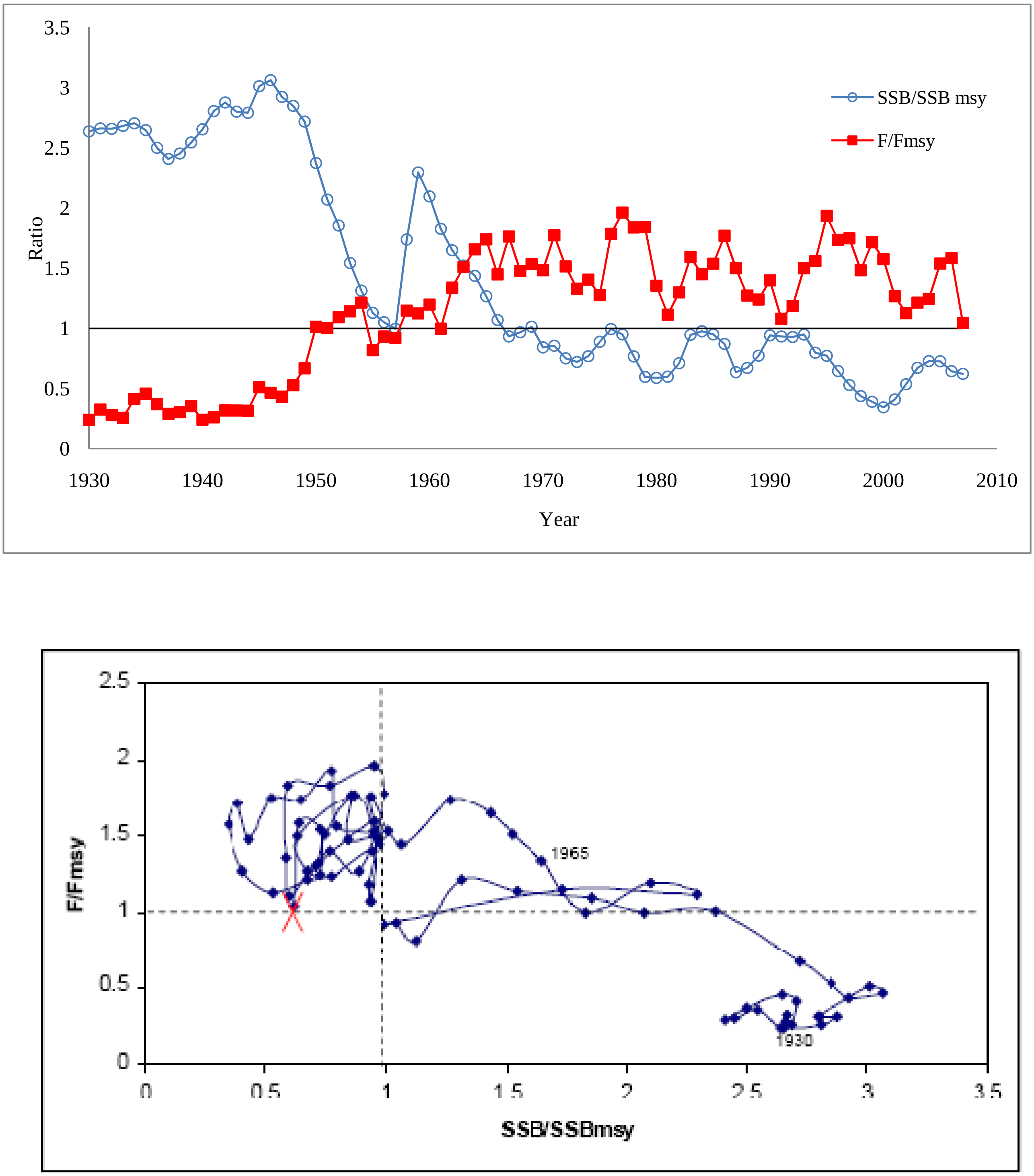


ALB-Figure 4. Standardized catch rate indices used in the 2009 northern albacore stock assessment from the surface fisheries (upper panel), which take mostly juvenile fish, and from the longline fisheries (lower panel), which take mostly adult fish.

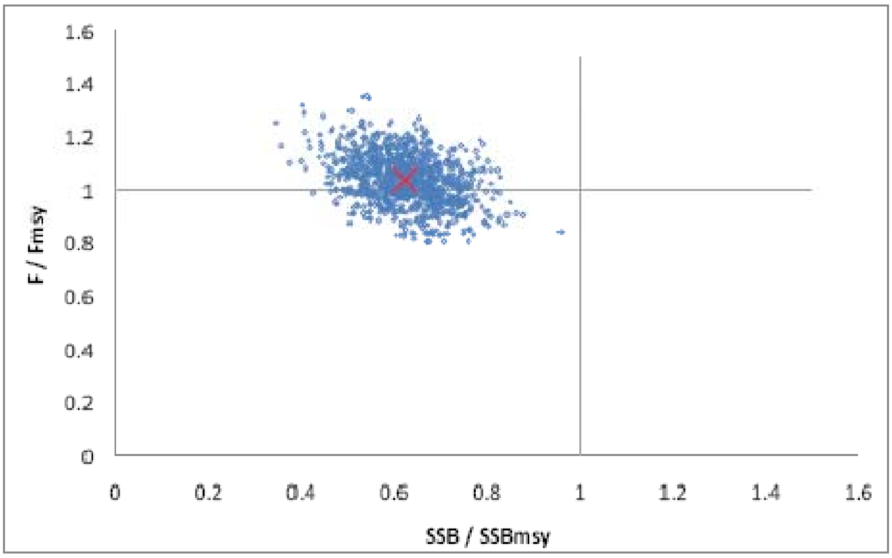




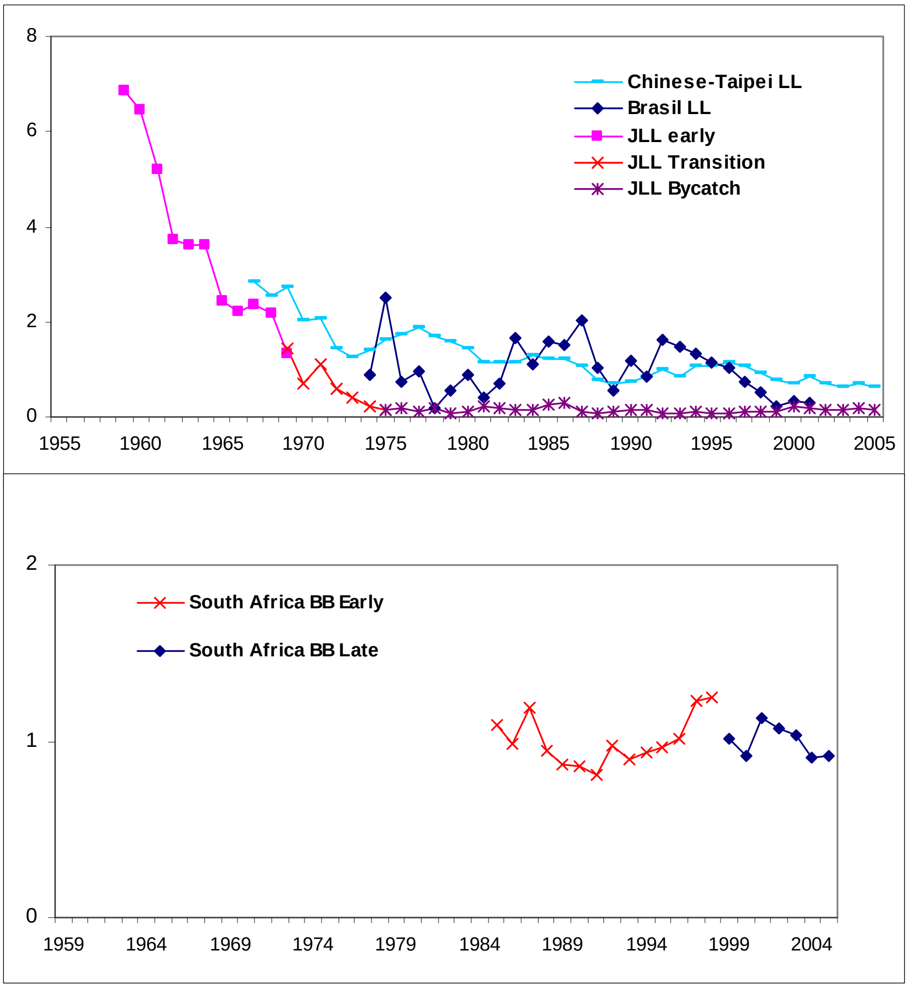
ALB-Figure 5. Estimates of northern Atlantic albacore recruitment (age 1) and spawning stock size from 1930-2007 from Multifan-CL model assessment. Uncertainty in the estimates has not been characterized, but the uncertainty in recent recruitment levels is considered to be higher than in the past.



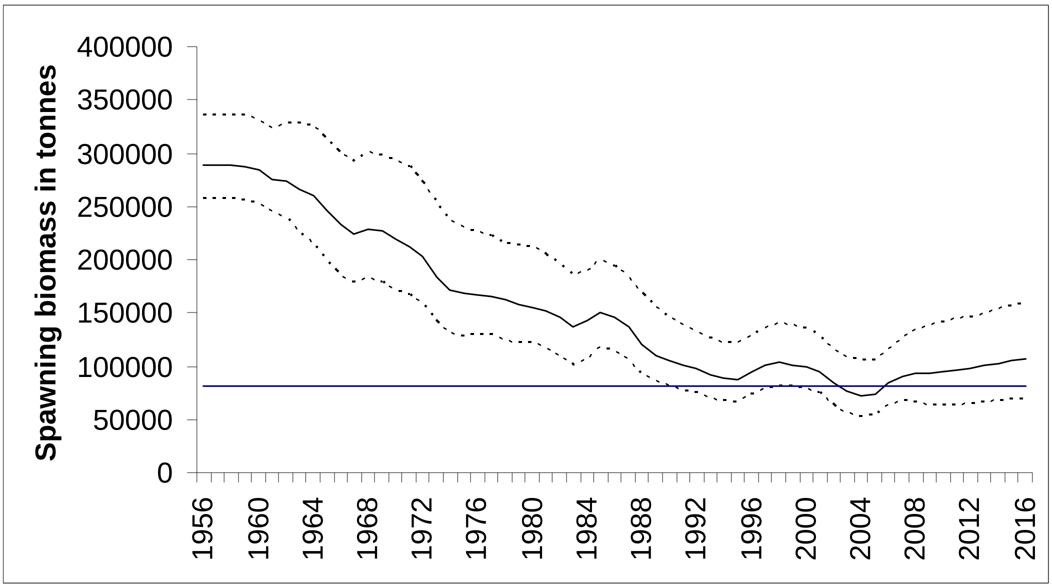
ALB-Figure 6. Stock status of northern albacore, estimated with Multifan-CL. Top: Relative biomass (SSB/SSB_{MSY}) and relative fishing mortality (F/F_{MSY}) trajectories over time. Bottom: joint trajectories of SSB/SSB_{MSY} and F/F_{MSY}. The red X cross in the lower panel represents the stock status in 2007.

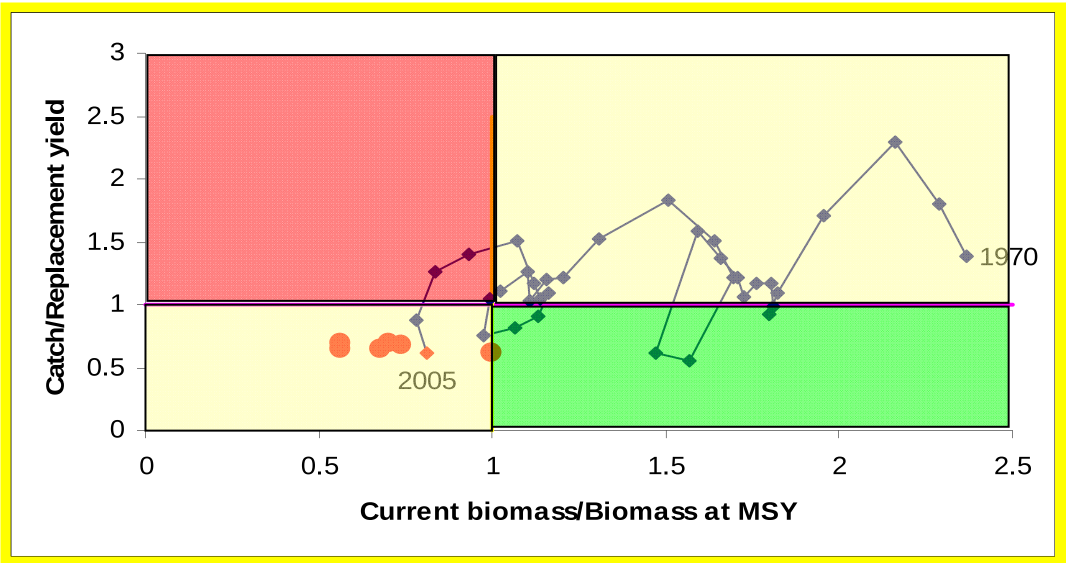


ALB-Figure 7. Uncertainty in current stock status for northern albacore, as estimated from the Multifan base case model. The X represents the current (2007) estimates of fishing mortality and spawning biomass ratios, and the scatter of points depicts uncertainty in that estimate.

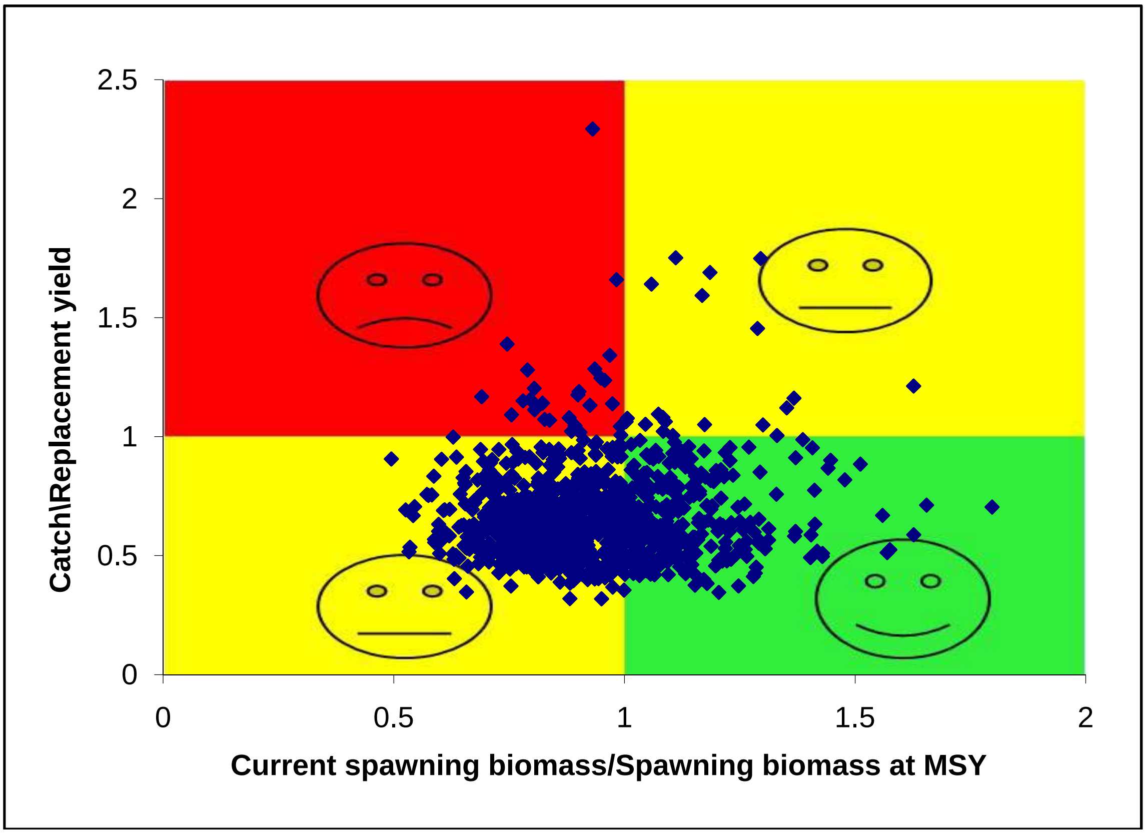


ALB-Figure 8. Standardized catch rates indices used in the 2007 southern albacore stock assessment from the longline fisheries (upper panel), which take mostly mature fish, and from the surface fisheries (lower panel), which take mostly juvenile fish.

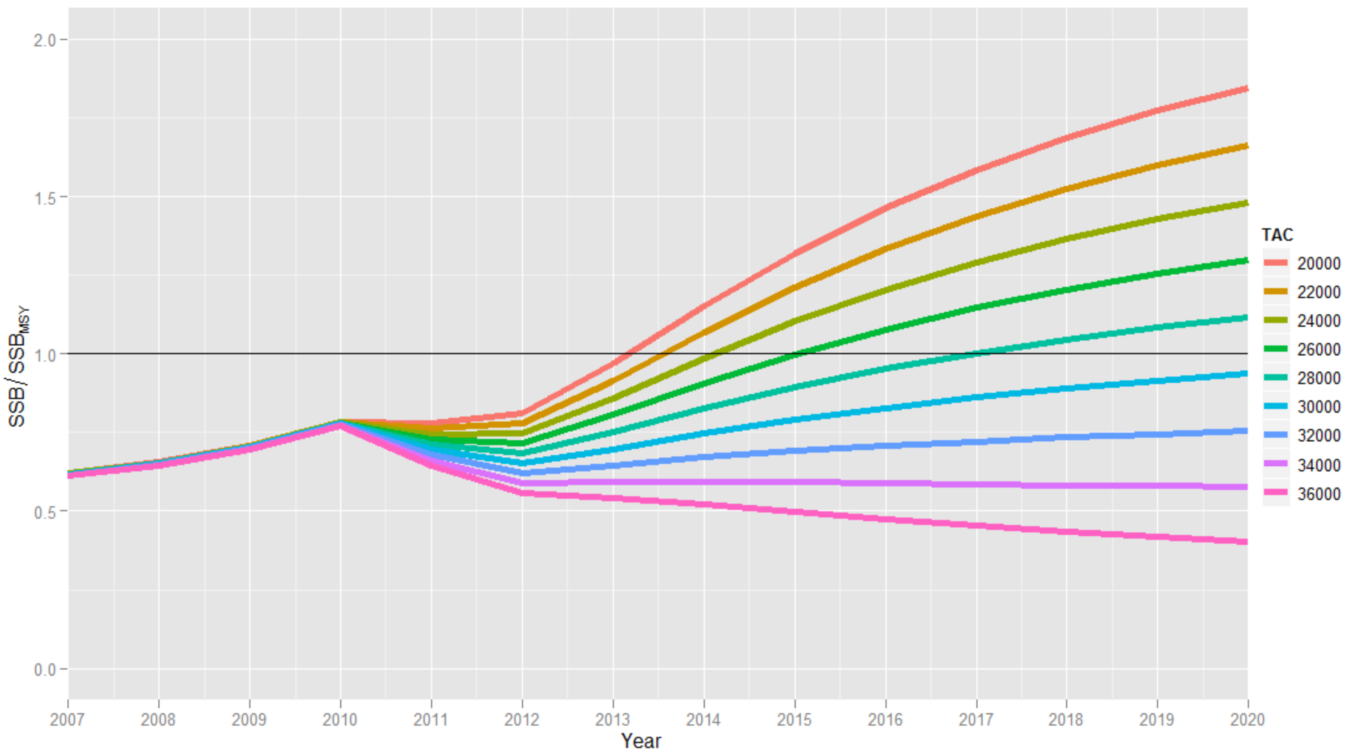




ALB-Figure 9. The upper plate indicates southern albacore spawning biomass over time, projections with a constant catch of 25,000 t over the next years and the reference SSB_{MSY} level with 80% confidence bounds. The lower plate indicates catch relative to replacement yield vs. current biomass relative 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 (20,000-36,000 t) assuming average recent year-class strengths for the North Atlantic albacore stock. Projections assumed a catch of 30,200 t in 2008 and 2009.

8.5 BFT – ATLANTIC BLUEFIN TUNA

The SCRS conducted a comprehensive assessment of bluefin tuna in the Atlantic and the Mediterranean in 2010 (SCRS/2010/018). In the assessment, the available data included catch, effort and size statistics through 2009. As previously discussed, there are considerable data limitations for the eastern stock up to 2007. While data reporting for the eastern and Mediterranean fisheries has substantially improved since 2008 and some historical statistical data have been recovered, most of the data limitations that have plagued previous assessments remain and new approaches will be required in order to improve the scientific advice the Committee can offer.

The Atlantic-wide Bluefin Tuna Research Program (GBYP) research plan outlined the research necessary for improving the scientific advice that the Committee provides to the Commission. This plan was presented to and approved by the Commission and the GBYP was started in 2010. The Committee continues to strongly and unanimously support the GBYP, and welcomes the Commission’s continued commitment to the Program. In the absence of such a significant and sustained effort, it remains highly unlikely that the Committee will improve its scientific diagnosis and management advice in the foreseeable future.

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 a stable internal body temperature. Until recently, it was assumed that bluefin tuna preferentially occupy 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, conventionally 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 approximately 25 kg (age 4) in the Mediterranean and at approximately 145 kg (age 9) in the Gulf of Mexico. Juvenile and adult bluefin tuna are opportunistic feeders (as are most predators). 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 200 cm and 170 kg and reaches about 270 cm and 400 kg at 20 years. Bluefin tuna is a long lived species, with a lifespan of about 40 years, as indicated by recent studies from radiocarbon deposition.

The information on natal origin derived from otolith microchemistry received by the SCRS, which was based on limited samples, indicated that the contribution of eastern origin fish to the western fisheries decreases with size (i.e. up to 62% for fish in the 69-119 cm size class, but negligible for fish greater than 250 cm). 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 stocks to the different fisheries over time, an issue that can hardly be resolved without better understanding of Atlantic bluefin tuna population structure.

In 2009, the SCRS received considerable new information on maturity, growth, and the spatial dynamics of Atlantic and Mediterranean bluefin (see Anon. 2010i). Following key developments are summarized below.

The SCRS had extensive discussions concerning the choice of maturity schedules for both the eastern and western stocks. Uncertainty in age at maturity remained a significant issue for the stock assessment, and obliged the Group to consider alternative scenarios during their modeling work. Improving current understanding of the maturity schedules for bluefin tuna should be a priority area for research within the GBYP and other collaborative research programs with the SCRS.

The SCRS implemented a new growth curve for western stock that was derived from advanced analytical techniques. The adoption of the new growth curve that is nearly identical to that for the eastern stock has resulted in significant changes to some of the benchmark for the western stock and consequently management advice. For the eastern Atlantic and Mediterranean stock, new information indicated that for farming operations, when applying the weight gain rates adopted by SCRS in 2009, the back calculated fish weights at initial capture seemed to show unrealistic size distributions, in that more fish of a smaller size are calculated as having been caught than would be expected given existing controls.

The SCRS also received several contributions related to electronic tagging within the Eastern Atlantic and Mediterranean stock. While most of the new studies are reporting work in progress, the new information appears to indicate a greater level of complexity in the migratory patterns of the eastern fish than was previously understood, as a significant fraction of the eastern fish (juveniles and spawners) seem to stay within the Mediterranean all year long.

BLUEFIN TUNA − EAST

BFTE-2. Fishery trends and indicators

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 was 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)**. For 2006-2009, declared catch was, at the time of the meeting, 30,689 t, 34,516 t, 24,057 t and 20,228 t for the East Atlantic and Mediterranean, of which 23,154 t, 26,479 t, 16,409 t and 13,527 t were declared for the Mediterranean for those same years **(BFT-Table 1)**.

Information available has demonstrated that catches of bluefin tuna from the East Atlantic and Mediterranean were seriously under-reported between the mid-1990s through 2007. The Committee views this lack of compliance with TAC and underreporting of the catch as having undermined conservation of the stock. The Committee has estimated that realized catches during this period could have been on the order of 50,000 t to 61,000 t per year based on the number of vessels operating in the Mediterranean Sea and their respective catch rates. Estimates for 2008 and 2009 using updated vessel capacity and performance statistics from the various reports submitted to ICCAT under [Rec. 08-05] results in estimates that are significantly lower than the corresponding reported Task I data (see Bluefin tuna Data Preparatory Meeting). Although care is needed considering estimates of catch using these capacity measures, the Committee's interpretation is that a substantial decrease in the catch occurred in the eastern Atlantic and Mediterranean Sea in 2008 and 2009.

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. However, aerial survey results conducted in 2009 indicated a higher abundance or higher concentration of small bluefin in the northwestern Mediterranean than found in surveys conducted in 2000-2003. Indicators from Japanese longliners and Spanish and Moroccan 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**)**.** Indicators from longliners targeting medium to large fish in the northeast Atlantic were available since 1990 and showed an increasing trend in the recent years (**BFTE-Figure 2**). This index becomes more valuable since the major part of Japanese catch come from this fishing ground in recent years**,** while the activities of longliners in the East Atlantic (south of 40^{o}N) and Mediterranean Sea were reduced**.** Two historical indicators before 1980 in the Bay of Biscay were also available. The Group recognized that the recent compliance to the regulatory measures affect significantly the CPUE values (e.g. Spanish baitboat and Japanese longline indices) through the change of operational pattern and target sizes. Recent tendency in indicators are likely to reflect positive outcomes from recent management measures. However, the Committee found it difficult to derive any clear conclusion from fisheries indicators over such a short period after the implementation of new regulations and in the absence of more precise information about the catch composition, effort and spatial distribution of the purse seine fisheries. Fisheries-independent indicators (scientific surveys) and a large scale tagging program are needed to provide more reliable stock status indicators. The Committee reaffirmed the importance of pursuing these research elements under the now-funded GBYP.

BFTE-3. State of the stock

In spite of improvements in the data quantity and quality for the past few years, there remain considerable data limitations for the 2010 assessment of the stock. These included 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 was also evident, especially during 1998-2007. Nevertheless, the Committee assessed the stock in 2010 as requested by the Commission mainly applying the methodologies and hypotheses adopted by the Committee in previous assessments and further tried alternative approaches. The Committee believes that while substantial improvements can be made for in catch and effort statistics into the future, it appears unlikely that such substantial improvements can be made regarding historical fishery performance. Because of this, the Committee believes that assessment methodologies applied in the past must be modified to better accommodate the substantial uncertainties in the historical total catch, catch-at-age and effort data from the main fleets harvesting bluefin. This process has been initiated, but will require at least three years to complete in terms of robustness testing of the methodologies envisioned. The Commission should take this into account in establishing management controls (cf. a TAC for three years). 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 and our ability to quantify recent management impacts on stock status are limited due to variability in stock status indicators in the most recent years.

The assessment results upon which the Committee's main advice is provided indicated that the spawning stock biomass (SSB) had been mostly declining since the 1970s. The recent SSB tendency has shown signs of increase/stabilization in some runs while it continues to decline for others, depending on the models specifications and data used (see SCRS/2010/018, **BFTE-Figure 3)**. Trend in fishing mortality (F) displayed a continuous increase over the time period for the younger ages (ages 2-5) while for oldest fish (ages 10+) it had been decreasing during the first 2 decades and then rapidly increased during the 1990s. Fishing mortalities have declined on the oldest fish in recent years, but these for younger (ages 2-5) are more uncertain and display higher variability (**BFTE-Figure 3**). General trends in F or N were not strongly affected by the historical catches assumptions (i.e. reported *versus* inflated), except in recent years. These analyses indicated that recent (2007-2009) SSB is about 57% of the highest estimated SSB levels (1957-1959). Recent recruitment levels remain very uncertain due to the lack of information about incoming year class strength and high variability in the indicators used to track recruitment and the low recent catches of fish less than the minimum size. The absolute values estimated for F and SSB remained sensitive to the assumptions of the analysis and could lead to a different perception in the whole trend in SSB. However, it is noteworthy that the historical Fs for older fish were consistent between different types of models which made use of different assumptions. For the years 1995-2007, Fs for older fish are also consistent with a shift in targeting towards larger individuals destined for fattening and/or farming.

Estimates of current stock status relative to MSY benchmarks are uncertain, but lead to the conclusion that although the recent Fs have probably declined, these values remain too high and recent SSB too low to be consistent with the Convention objectives. Depending on different assumed levels of resource productivity current F show signs of decline reflecting recent catch reductions, but remained larger than that which would result in MSY and SSB remained most likely to be about 35% (from 19% to 51% depending on the recruitment levels) than the level needed to support MSY **(BFTE-Figure 4)**.

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. Progress has been made over the last years, but current information that consists in individual weight after fattening remain too uncertain to be used within stock assessment models. Therefore, real size samples at time of the catch are still required and the SCRS strongly encourages the use of dual camera system or other technology that could provide sizes of fish entering into cages.

The shift towards larger fish should result in improved yield-per-recruit levels in the long-term if F were reduced to $F_{0.1}$. However, such changes would take several 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 levels.

Even considering uncertainties in the analyses, the outlook derived from the 2010 assessment has improved in comparison to previous assessments, as F for older fish seem to have significantly declined during the last two years. However, estimates in the last years are known to be more uncertain and this decline (as the Fs for younger ages which remains more variable) needs to be confirmed in future analyses. Nonetheless, F_{2009} still remains largely above the reference target $F_{0.1}$ (a reference point more robust to uncertainties than F_{MAX}, as used in the past) while SSB is only about 35% of the biomass that is expected under a MSY strategy (**BFTE-Figure 4)**.

The Committee also evaluated the potential effects of [Rec. 09-06]. Acknowledging that there is insufficient scientific information to determine precisely the productivity of the stock (i.e. the steepness of the stock-recruitment relationship), the Committee agreed to perform the projections with three recruitment levels while taking into account for year-to-year variations. These levels correspond to the ‘low’ and ‘high’ scenarios as defined in the 2008 assessment plus a ‘Medium’ scenario that corresponds to the geometric mean of the recruitment over the 1950-2006 years. For the projections, the group investigated 24 scenarios (see bluefin tuna detailed report) which were assessed against the range of constant catch from 0 to 20,000 t. The results indicated that the stock is increasing in all the cases, but the probability to achieve $SSB_{F0.1}$ (i.e. the equilibrium SSB resulting in fishing at $F_{0.1}$) by the end of 2022 depend on the scenarios (run 13 leads to slower rebuilding than run 15 while the recruitment levels affect both the speed of rebuilding and the level of overfishing, see BFT detailed report). Overall, the SSB would be equal or greater than $SSB_{F0.1}$ by the end of 2022 for a catch = 0 to 13,500 t, but not when the catch is greater than 14,000 t (**BFTE-Table 2, BFTE-Figure 6**). It is finally worth noting that a $F_{0.1}$ strategy starting in 2011 would not allow the rebuilding of the stock to $SSB_{F0.1}$ by 2022, but later on.

Projections are known to be impaired by various sources of uncertainties that have not yet been quantified. Although the situation has improved regarding recent catch, there are still uncertainties about stock status in 2009, population structure and migratory rates as well as a lack of knowledge about the level of IUU catch and key modeling parameters on bluefin tuna productivity. Acknowledging these limitations, the overall evaluation of [Rec. 09-06] indicated that the rebuilding of eastern Atlantic and Mediterranean bluefin tuna at $SSB_{F0.1}$ level with a probability of at least 60% could be achieved by 2019 with zero catch and by 2022 with catch equal to current TAC (i.e. 13,500 t). However, this 60% probability level is unlikely to be attained by the end of 2022 with a catch greater than 14,000 t. Finally, it should be noted that the incorporation of additional uncertainties into the overall analysis could change the estimates of rebuilding probability.

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]. Subsequently, [Rec. 08-05] established TACs for 2009, 2010, and 2011 at 22,000 t, 19,950 t, and 18,500 t, respectively. However, the 2010 TAC was revised to 13,500 t by [Rec. 09-06] which also established a framework to set future (2011 and beyond) TAC at levels sufficient to rebuild the stock to B_{MSY} by 2022 with at least 60% probability.

The reported catches for 2003, 2004 and 2006 were about TAC levels, but those for 2005 (35,845 t) and 2007 (34,516 t) were notably higher than TAC. However, the Committee strongly believes, based on the knowledge of the fisheries and trade statistics, that substantial under-reporting was occurring and that actual catches up to 2007 were well above TAC. The SCRS estimates since the late-1990s, catches were close to the levels reported in the mid-1990s, but for 2007, the estimates were higher *i.e.* about 61,000 t in 2007 for both the East Atlantic and Mediterranean Sea. As noted, reported catch levels for 2008 (24,057 t) and 2009 (20,228 t) appear to largely reflect the removals from the stock when comparing estimates of catch using vessel capacity measures, although the utility of this method has diminished for estimating catch. The reported catches for 2008 and 2009 are 10,000 t to 15,000 t lower than the 2003-2007 reported catches (**BFTE-Table 1, BFTE-Figure 1**). Although care is needed considering estimates of catch using capacity measures, the Committee's interpretation is that a substantial decrease in the catch occurred in the eastern Atlantic and Mediterranean Sea through implementation of the rebuilding plan and through monitoring and enforcement controls. While current controls appear sufficient to constrain the fleet to harvests at or below TAC, should it not be the case, the Committee remains concerned about substantial excess capacity remains which could harvest catch volumes well in excess of the rebuilding strategy adopted by the Commission.

Recent analyses of the size and age composition of reported catches show important changes in selectivity patterns over the last three years for several fleets operating in the Mediterranean Sea or the East Atlantic. This partly results from the enforcement of minimum size regulations under [Rec. 06-05] which led to much lower reported catch of small fish and subsequently a steep increase in the annual mean-weight in the catches since 2007 (**BFTE-Figure 5**). Additionally, higher abundance or higher concentration of small bluefin tuna in the northwest Mediterranean detected from aerial surveys could also reflect positive outcomes from increase minimum size regulation.

While several fishery indicators have shown some positive tendency in the most recent fishing seasons, the available catch effort statistics are not yet sufficient to permit the Committee to quantify the extent of impact of the recent regulations on the overall stock with precision. The Committee's view is that it will take additional years under constrained fishing before to measure it more precisely.

BFTE-6. Management Recommendations

In [Rec. 09-06] the Commission established a total allowable catch for eastern Atlantic and Mediterranean bluefin tuna at 13,500 t in 2010. Additionally, in [Rec. 09-06] the Commission required that the SCRS provide the scientific basis for the Commission to establish a three-year recovery plan for 2011-2013 with the goal of achieving B_{MSY} through 2022 with at least 60% of probability.

A Kobe II strategy matrix reflecting recovery scenarios of eastern Atlantic and Mediterranean bluefin tuna in accordance with the multiannual recovery plan is given in **BFTE-Table 1** and **BFTE-Figure 6.**

The implementation of recent regulations through [Rec. 09-06, and previous recommendations] has clearly resulted in reductions in catch and fishing mortality rates. But, since the fishery is currently adapting to these new management measures, the Committee is unable to fully understand the implications of the measures on the stock. The Commission might consider a probability of rebuilding standard different from that envisaged in [Rec. 09-06] considering the unquantified uncertainties. However, the Committee notes that maintaining catches at the current TAC (13,500 t) or less under the current management scheme, for 2011-2013, will likely allow the stock to increase during that period and is consistent with the goal of achieving F_{MSY} and B_{MSY} through 2022 with at least 60% of probability, given the quantified uncertainties.

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY		
Current (2009) Yield[1]	Reported: 19,701 t	SCRS estimate: 18,308 t
Short-term Sustainable Yield according to Rec.[09.06]	13,500 t or less	
Long-term Potential Yield [2]	about 50,000 t	
$SSB_{2009}/SSB_{F0.1}$ (SSB_{2009}/SSB_{FMAX})[3]		
Medium recruitment (1950-2006)	0.35 (0.62)	
Low recruitment (1970s)	0.51 (0.88)	
High recruitment (1990s)	0.19 (0.33)	
$F_{2009}/F_{0.1}$ (F_{2009}/F_{MAX})[4]		
Reported and inflated catches	2.9 (1.53)	
TAC (2009 - 2010)	19,950 t - 13,500 t	

[1] Corresponds to the reported catches on 7 October 2010. SCRS estimate is based on updated vessel capacity and vessel catch rates information (see Bluefin Tuna Data Preparatory Meeting Report, SCRS/2010/014). Note that the 2009 catch estimate used in the 2010 stock assessment was 20,228 t due to estimations of missing reports at the date of the meeting (see **BFT-Table 1**).

[2] Approximated as the average of long-term yield at $F_{0.1}$ that was 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).

[3] The Committee decided, on the basis of current published literature, to adopt $F_{0.1}$ as the proxy for F_{MSY} instead of F_{MAX}. $F_{0.1}$ has been indeed shown to be more robust to observation errors and uncertainty about the true dynamics of the stock than F_{MAX}. However, references to F_{MAX} are also given in parentheses for comparison purposes.

[4] The recruitment levels do not impact $F_{2009}/F_{0.1}$ or F_{2009}/F_{MAX}.

BLUEFIN TUNA - WEST

BFTW-2. Fishery indicators

The total catch for the West Atlantic peaked at 18,671 t in 1964, mostly due to the Japanese longline fishery for large fish off Brazil and the U.S. purse seine fishery for juvenile fish **(BFT-Table 1, BFTW-Figure1)**. Catches dropped sharply thereafter with the collapse of the bluefin tuna by-catch longline fishery off Brazil in 1967 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 declined steadily to a low of 1,638 t in 2007 and then increased in 2008 to 2,000 t. and slightly decreased in 2009 to 1,935 t **(BFTW-Figure 1).** The decline through 2007 was primarily due to considerable reductions in catch levels for U.S. 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. The 2009 Canadian catch was 530 t. Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons. However, Japanese landings for 2009 corresponded to only 162 t.

The average weight of bluefin tuna taken by the combined fisheries in the West Atlantic were historically low during the 1960s and 1970s **(BFTW-Figure 2)**, for instance showing an average weight of only 33 kg during the 1965-1975 period. However, since 1980 they have been showing a quite stable trend and at a quite high average weight of 93 kg.

The overall number of Japanese vessels engaged in bluefin fishing has declined from more than 100 vessels to currently less than 10 vessels 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 2004-2008 with catches of 1,066, 848, 615, 858 and 922 t, respectively. However, in 2009 the United States fully realized its base quota with total catches (landings including dead discards) of 1,228 t.

The indices of abundance used in this year's assessment were updated through 2009 **(BFTW-Figure 3)**. The catch rates of juvenile bluefin tuna in the U.S. rod and reel fishery fluctuate with little apparent long-term trend, but exhibit a pattern that is consistent with the strong year-class estimated for 2003. The catch rates of adults in the U.S. rod and reel fishery continue to remain low, increasing only slightly in 2008 and decreasing once again in 2009. The catch rates of the Japanese longline fishery increased markedly in 2007, decreased in 2008 back to the levels observed in 2005 and 2006 and it increased once again in 2009. The catch rates from the U.S. Gulf of Mexico longline fishery continue to show a gradual increasing trend, whereas the Gulf of Mexico larval survey continues to fluctuate around the low levels observed since the 1980s. The catch rates in the Gulf of St. Lawrence have increased rapidly since 2004 and the catch rates in is the highest in the time series. The catch rates in southwest Nova Scotia have continued to follow a slightly increasing trend since 2000, with catch rates in 2009 being amongst the highest since the early 1990s.

BFTW-3. State of the stock

A new assessment was conducted this year, including information through 2009. The most influential change since the 2008 assessment was the use of a new growth curve that assigns fish above 120 cm to older ages than did the previous growth curve. As a result, the base model estimates lower fishing mortality rates and higher biomasses for spawners, but also less potential in terms of the maximum sustainable yield. The trends estimated during the 2010 assessment are consistent with previous analyses in that spawning stock biomass (SSB) declined steadily from 1970 to 1992 and has since fluctuated between 21% and 29% of the 1970 level (**BFTW-Figure 4**). In recent years, however, there appears to have been a gradual increase in SSB from the low of 21% in 2003 to an estimated 29% in 2009. The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets (**BFTW-Figure 4**). Fishing mortality on spawners (ages 9 and older) declined markedly after 2003.

Estimates of recruitment were very high in the early 1970s (**BFTW-Figure 4**), 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 with the exception of a strong year-class in 2003. The 2003 year-class is estimated to be the largest since 1974, but not quite as large as those prior to 1974. The 2003 year class is expected to begin to contribute to an increase in spawning biomass after several years. The Committee expressed concern that the year-class estimates subsequent to 2003, while less reliable, are the lowest on record.

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 (2006-2008) is 70% of the MSY level and SSB_{2009} is about 10% higher than the MSY level (**BFTW-Figure 5**). Estimates of stock status are more pessimistic if a high recruitment scenario is considered (F/F_{MSY}=1.9, B/B_{MSY}=0.15).

One important factor in the recent decline of fishing mortality on large bluefin is that the TAC had not been taken during this time period until 2009, due primarily to a shortfall by the United States fisheries (until 2009). 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) by virtue of the estimated increase in SSB. The decrease indicated by the U.S. catch rate of large fish is matched by an increase in several other large fish indices (**BFTW-Figure 3**). 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 in 2008, but little new information was available in 2010. Based on earlier work, the estimates of stock status can be expected to vary considerably depending on the type of data used to estimate mixing (conventional tagging or isotope signature samples) and modeling assumptions made. 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). Improved knowledge of maturity at age will also affect the perception of changes in stock size. Finally, the lack of representative samples of otoliths requires determining the catch at age from length samples, which is imprecise for larger bluefin tuna.

BFTW-4. Outlook

A medium-term (10-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 1976-2006 (85,000 recruits, the low recruitment scenario) and (ii) levels that increase as the stock rebuilds (MSY level of 270,000 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 6**) is more optimistic with respect to current stock status than that from the 2008 assessment (owing to the use of improved information on the growth of bluefin tuna). A total catch of 2,500 t is predicted to have at least a 50% chance of achieving the convention objectives of preventing overfishing and maintaining the stock above the MSY level. The outlook under the high recruitment scenario (**BFTW-Figure 6**) is more pessimistic than the low recruitment scenario since the rebuilding target would be higher; a total catch of less than 1,250 t is predicted to maintain F below F_{MSY}, 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 the stock is above the MSY level with greater than 60% probability and catches of 2,500 t or lower will maintain it above the MSY level. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,100 t or less are predicted to have a 60% chance to immediately end overfishing and initiate rebuilding.

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

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. This statement is also true for Recommendation 08-04, which was implemented in 2009. Some of the available fishery indicators **(BFTW-Figure 3)** as well as the current assessment suggest the spawning biomass of western bluefin tuna may be slowly rebuilding.

BFTW-6. Management recommendations

In 1998, the Commission initiated a 20-year rebuilding plan designed to achieve B_{MSY} with at least 50% probability. In response to recent assessments, in 2008 the Commission recommended a total allowable catch (TAC) of 1,900 t in 2009 and 1,800 t in 2010 [Rec. 08-04].

The current (2010) assessment indicates similar historical trends in abundance as in previous assessments. The strong 2003 year class has contributed to stock productivity such that biomass has been increasing in recent years.

Future stock productivity, as with prior assessments, is based upon two hypotheses about future recruitment: a ‘high recruitment scenario” in which future recruitment has the potential to achieve levels that occurred in the early 1970’s and a “low recruitment scenario” in which future recruitment is expected to remain near present levels. Results in previous assessments have shown that long term implications of future biomass are different between the two hypotheses and this research question remains unresolved. However, the current (2010) assessment is also based on new information on western bluefin growth rates that has modified the Committee’s perception of the ages at which spawning and maturity occur. Maturity schedules remain very uncertain, and, thus, the application of the new information in the current (2010) assessment accentuates the differences between the two recruitment hypotheses.

Probabilities of achieving B_{MSY} within the Commission rebuilding period were projected for alternative catch levels **(BFTW-Table 1, BFTW-Figure 7)**. The "low recruitment scenario" suggests that biomass is currently sufficient to produce MSY, whereas the "high recruitment scenario" suggests that B_{MSY} has a very low probability of being achieved within the rebuilding period. Despite this large uncertainty about the long term future productivity of the stock, under either recruitment scenario current catches (1,800 t) should allow the biomass to continue to increase. Also, catches in excess of 2,500 t will prevent the possibility of the 2003 year class elevating the productivity potential of the stock in the future.

The SCRS notes that the 2010 assessment is the first time that this strong 2003 year-class has been clearly demonstrated, likely as a result of age assignment refinements resulting from the growth curve and additional years of data; more observations from the fishery are required to confirm its relative strength. A further concern is that subsequent year-classes, although even less well estimated, are the lowest observed values in the time series. The Commission may wish to protect the 2003 year class until it reaches maturity and can contribute to spawning. Maintaining catch at current levels (1,800 t) may offer some protection.

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 (2009) Catch (including discards)	1,935 t
Assuming Low Potential Recruitment	
Maximum Sustainable Yield (MSY)	2,585 (2,409-2,766)[1]
Relative Spawning Stock Biomass:	
B_{2009}/B_{MSY}	1.1 (0.89-1.35)[1]
Relative Fishing Mortality[2]:	
$F_{2006-2008}/F_{MSY}$	0.73 (0.59-0.91)[1]
$F_{2006-2008}/F_{0.1}$	1.11 (0.91-1.31)[1]
$F_{2006-2008}/F_{max}$	0.57 (0.48-0.68)[1]
Assuming High Potential Recruitment	
Maximum Sustainable Yield (MSY)	6,329 (5,769-7,074)[1]
Relative Spawning Stock Biomass:	
B_{2009}/B_{MSY}	0.15 (0.10-0.22)[1]
Relative Fishing Mortality[2]:	
$F_{2006-2008}/F_{MSY}$	1.88 (1.49-2.35)[1]
$F_{2006-2008}/F_{0.1}$	1.11 (0.91-1.31)[1]
$F_{2006-2008}/F_{max}$	0.57 (0.48-0.68)[1]
Management Measures:	[Rec. 08-04] TAC of 1,900 t in 2009 and 1,800 t in 2010, including dead discards.

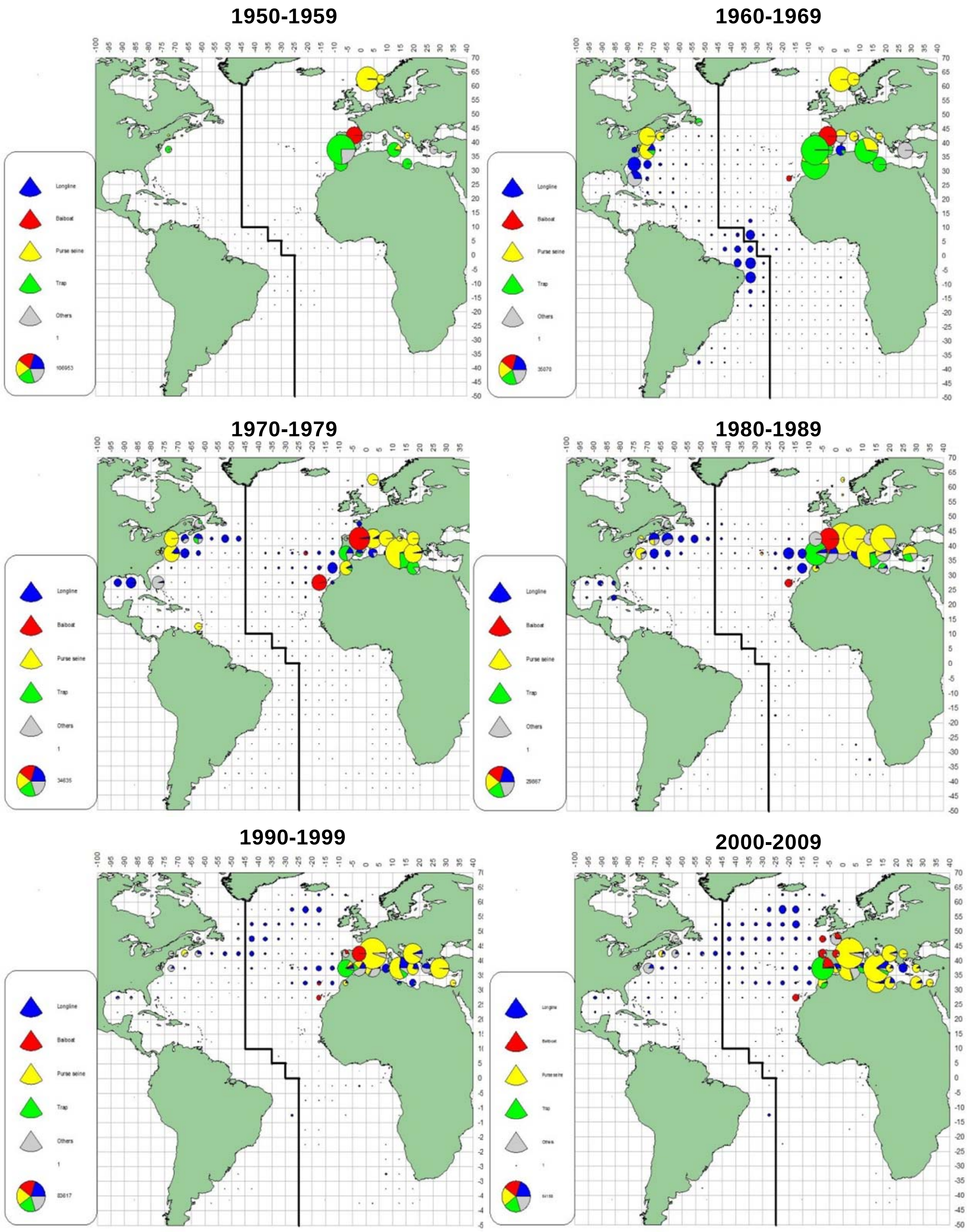
[1] Median and approximate 80% confidence interval from bootstrapping from the assessment.
[2] $F_{2006-2008}$ refers to the geometric mean of the estimates for 2006-2008 (a proxy for recent F levels).

BFT-Table 1. Estimated Catches (t) of Northern bluefin tuna *(Thunnus thynnus)* by area, gear and flag, used in the assessment (2008 and 2009 catches in ItalicS are estimations adopted by the Species Group).

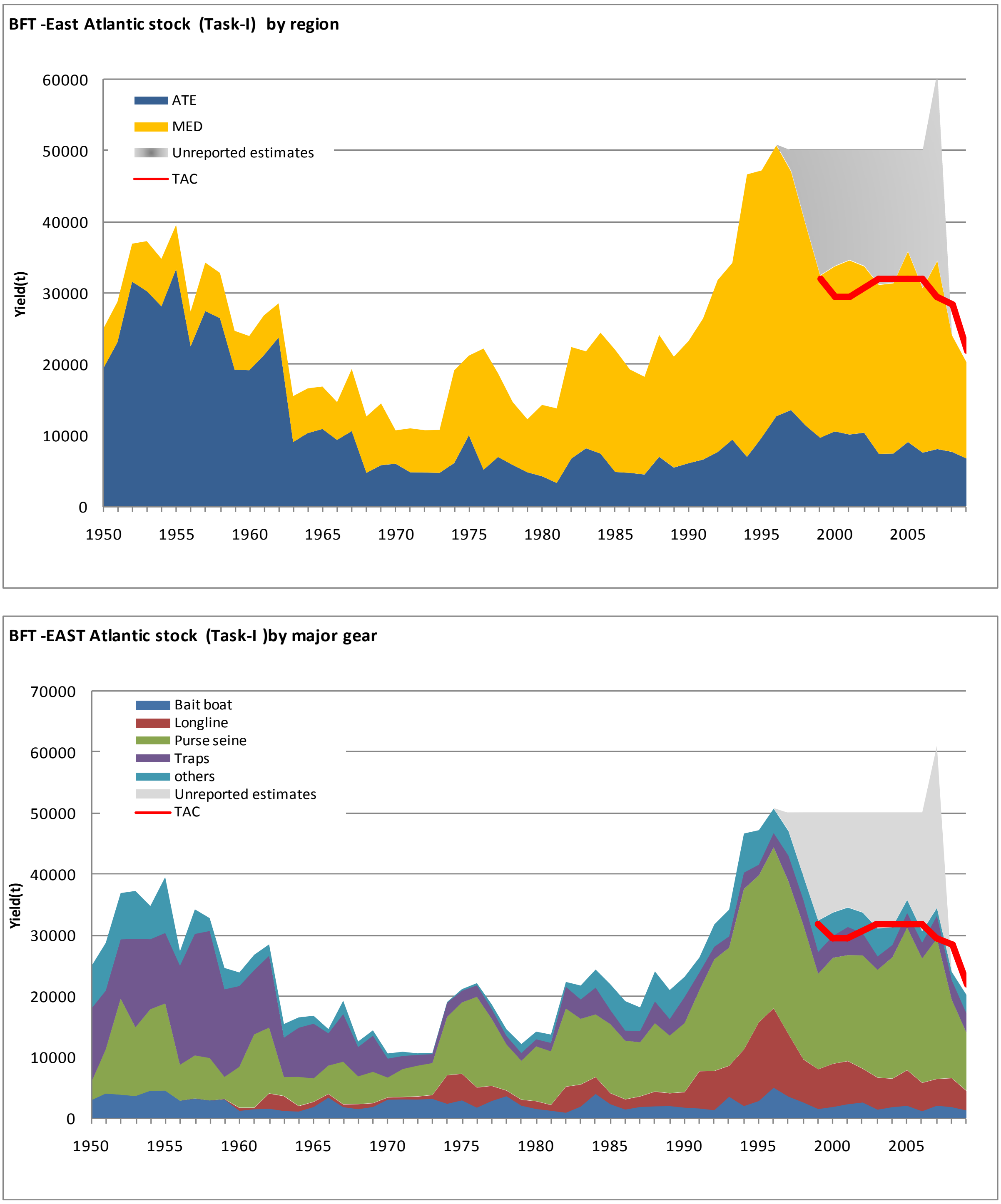
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*2008	*2009
TOTAL			24695	21570	20723	27016	23819	26027	29350	34131	36636	48853	49714	53320	49489	42375	35228	36541	37390	37089	33469	33505	37602	32501	36154	***26053***	***22163***	25849	21636
ATE+MED			22010	19247	18220	24118	21061	23247	26429	31849	34268	46740	47291	50807	47155	39718	32456	33766	34605	33770	31163	31381	35845	30689	34516	***24054***	***20228***	23849	19701
ATE			4807	4687	4456	6951	5433	6040	6556	7619	9367	6930	9650	12663	13539	11376	9628	10528	10086	10347	7362	7410	9036	7535	8037	7645	***6701***	7645	6684
MED			17203	14560	13764	17167	15628	17207	19872	24230	24901	39810	37640	38144	33616	28342	22828	23238	24519	23424	23801	23971	26810	23154	26479	***16409***	***13527***	16205	13016
ATW			2685	2322	2503	2898	2759	2780	2921	2282	2368	2113	2423	2514	2334	2657	2772	2775	2784	3319	2306	2125	1756	1811	1638	2000	1935	2000	1936
Landings	ATE	Bait boat	2004	1414	1821	1936	1971	1693	1445	1141	3447	1980	2601	4985	3521	2550	1492	1822	2275	2567	1371	1790	2018	1116	2032	1794	1260	1794	1260
		Longline	551	967	924	1169	962	1496	3197	3817	2717	2176	4392	4788	4534	4300	4020	3736	3303	2896	2750	2074	2713	2448	1706	2491	***1955***	2491	1960
		Other surf.	536	972	668	1221	1020	562	347	834	1548	932	1047	646	511	621	498	703	712	701	560	402	1014	1047	502	187	***366***	187	298
		Purse seine	86	276	0	0	0	54	46	462	24	213	458	323	828	692	726	1147	150	884	490	1078	871	332	0	0	0	0	0
		Sport (HL+RR)	1	1	3	1	2	1	0	0	0	0	0	0	162	28	33	126	61	63	109	87	11	4	10	6	2	6	2
		Traps	1630	1057	1040	2624	1478	2234	1522	1365	1631	1630	1152	1921	3982	3185	2859	2996	3585	3235	2082	1978	2408	2588	3788	3166	***3118***	3166	3164
	MED	Bait boat	278	0	0	0	0	25	148	158	48	0	206	5	4	11	4	0	0	1	9	17	5	0	0	0	0	0	
		Longline	1228	678	799	1227	1121	1026	2869	2599	2342	7048	8475	8171	5672	2749	2463	3317	3750	2614	2476	2564	3101	2202	2656	***2249***	***1211***	2254	1213
		Other surf.	3211	3544	2762	2870	3289	1212	1401	1894	1607	3218	1043	1197	1037	1880	2976	1067	1096	990	2536	1106	480	301	699	1022	***2566***	1022	169
		Purse seine	11219	9333	8857	11198	9450	11250	13245	17807	19297	26083	23588	26021	24178	21291	14910	16195	17174	17656	17167	18785	22475	20020	22952	***12858***	***9468***	12641	11345
		Sport (HL+RR)	507	322	433	838	457	1552	738	951	1237	2257	3556	2149	2340	1336	1622	1921	1321	1647	1392	1340	634	503	78	***128***	***139***	137	146
		Traps	760	683	913	1034	1311	2142	1471	821	370	1204	772	601	385	1074	852	739	1177	515	221	159	115	129	95	152	144	152	144
	ATW	Longline	1245	764	1138	1373	698	739	895	674	696	539	466	547	382	764	914	858	610	730	186	644	425	565	420	606	***364***	606	366
		Other surf.	293	166	156	425	755	536	578	509	406	307	384	432	293	342	281	284	202	108	140	97	89	85	63	82	***122***	82	121
		Purse seine	377	360	367	383	385	384	237	300	295	301	249	245	250	249	248	275	196	208	265	32	178	4	28	0	11	0	11
		Sport (HL+RR)	750	518	726	601	786	1004	1083	586	854	804	1114	1029	1181	1108	1124	1120	1649	2035	1398	1139	924	1005	1023	1130	1251	1130	1251
		Traps	20	0	17	14	1	2	0	1	29	79	72	90	59	68	44	16	16	28	84	32	8	3	4	23	23	23	23
Discards	ATW	Longline	0	514	99	102	119	115	128	211	88	83	138	167	155	123	160	222	105	211	232	181	131	149	100	159	163	159	163
		Other surf.	0	0	0	0	14	0	0	0	0	0	0	4	0	0	0	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	14	3	0	0	6	0	0	0	0	0	0	0	0	0	
Landings	ATE	Cape Verde	0	0	0	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	85	103	80	68	39	19	41	24	42	72	119	42	119	42
		Chinese Taipei	16	197	20	0	109	0	0	0	6	20	8	61	226	350	222	144	304	158	0	0	10	4	0	0	0	0	
		EU.Denmark	37	0	0	1	0	0	0	0	37	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	3628	2876	2479	4567	3565	3557	2272	2319	5078	3137	3819	6174	6201	3800	3360	3474	3633	4089	2138	2801	3102	2033	3276	2938	2409	2938	2409
		EU.France	490	348	533	724	460	510	565	894	1099	336	725	563	269	613	588	542	629	755	648	561	818	1218	629	253	366	253	366
		EU.Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	14	21	52	22	8	15	3	1	1	2	1	1	1	1	1
		EU.Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		EU.Portugal	29	193	163	48	3	27	117	38	25	240	35	199	712	323	411	441	404	186	61	27	79	97	29	36	***60***	36	53
		EU.Sweden	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	1	0	1	1	12	0	0	0	0	0	0	0	0	0	***10***	0	1
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	67	104	118	0	0	0	0	0	0	0	0	0	0	
		Guinée Conakry	0	0	0	0	0	0	0	0	0	330	0	0	0	0	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	2	27	0	0	1	0	0	0	0	0	0	0	0	
		Japan	420	739	900	1169	838	1464	2981	3350	2484	2075	3971	3341	2905	3195	2690	2895	2425	2536	2695	2015	2598	1896	1612	2351	1904	2351	1904
		Korea Rep.	77	0	0	0	0	0	0	0	0	4	205	92	203	0	0	6	1	0	0	3	0	1	0	0	0	0	
		Libya	0	0	0	0	0	0	0	312	0	0	0	576	477	511	450	487	0	0	0	0	0	47	0	0	0	0	
		Maroc	86	288	356	437	451	408	531	562	415	720	678	1035	2068	2341	1591	2228	2497	2565	1797	1961	2405	2196	2418	1947	1909	1947	1909
		NEI (ETRO)	3	4	0	5	6	74	4	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	85	144	223	68	189	71	208	66	0	0	0	0	0	0	0	0	0	0	0	0	
		Norway	0	31	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	
		Panama	22	11	4	0	0	0	0	0	0	1	19	550	255	0	13	0	0	0	0	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	2	0	0	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	118	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
	MED	Albania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	***50***	0	
		Algerie	260	566	420	677	820	782	800	1104	1097	1560	156	156	157	1947	2142	2330	2012	1710	1586	1208	1530	1038	1511	1311	***262***	1311	
		China P.R.	0	0	0	0	0	0	0	0	0	97	137	93	49	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	0	0	0	0	0	0	0	0	328	709	494	411	278	106	27	169	329	508	445	51	267	5	0	0	0	0	
		Croatia	0	0	0	0	0	0	1418	1076	1058	1410	1220	1360	1105	906	970	930	903	977	1139	828	1017	1022	825	***927***	***767***	834	619
		EU.Cyprus	10	10	10	10	10	10	10	10	14	10	10	10	10	21	31	61	85	91	79	105	149	110	1	132	2	132	2
		EU.España	1460	701	1178	1428	1645	1822	1392	2165	2018	2741	4607	2588	2209	2000	2003	2772	2234	2215	2512	2353	2758	2689	2414	2465	1769	2465	1769
		EU.France	5430	3490	4330	5780	4434	4713	4620	7376	6995	11843	9604	9171	8235	7122	6156	6794	6167	5832	5859	6471	8638	7663	10157	2670	3087	2670	3087
		EU.Greece	11	131	156	159	182	201	175	447	439	886	1004	874	1217	286	248	622	361	438	422	389	318	255	285	350	373	350	373
		EU.Italy	7199	7576	4607	4201	4317	4110	3783	5005	5328	6882	7062	10006	9548	4059	3279	3845	4377	4628	4973	4686	4841	4695	4621	2234	2735	2234	2735
		EU.Malta	21	41	36	24	29	81	105	80	251	572	587	399	393	407	447	376	219	240	255	264	346	263	334	296	263	296	263
		EU.Portugal	0	0	0	0	0	0	278	320	183	428	446	274	37	54	76	61	64	0	2	0	0	11	0	0	0	0	

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*2008	*2009
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	50	
		Israel	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	1006	341	280	258	127	172	85	123	793	536	813	765	185	361	381	136	152	390	316	638	378	556	466	80	18	80	18
		Korea Rep.	0	0	0	0	0	0	0	0	0	684	458	591	410	66	0	0	0	0	0	700	1145	26	276	335	102	335	102
		Libya	300	300	300	300	84	328	370	425	635	1422	1540	812	552	820	745	1063	1941	638	752	1300	1091	1280	1358	1318	1082	1318	1082
		Maroc	12	56	116	140	295	1149	925	205	79	1092	1035	586	535	687	636	695	511	421	760	819	92	190	641	531	369	531	369
		NEI (Flag related)	0	0	0	0	0	0	0	0	0	427	639	171	1066	825	140	17	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	0	168	183	633	757	360	1799	1398	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (combined)	0	0	0	0	0	0	0	0	0	773	211	0	101	1030	1995	109	571	508	610	709	0	0	0	0	0	0	
		Panama	0	0	72	67	0	74	287	484	467	1499	1498	2850	236	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	
		Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	41	***50***	41	
		Tunisie	369	315	456	624	661	406	1366	1195	2132	2773	1897	2393	2200	1745	2352	2184	2493	2528	791	2376	3249	2545	2622	2679	1932	2679	1932
		Turkey	41	69	972	1343	1707	2059	2459	2817	3084	3466	4220	4616	5093	5899	1200	1070	2100	2300	3300	1075	990	806	918	***990***	665	879	665
		Yugoslavia Fed.	1084	796	648	1523	560	940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	6	0	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	1	0	2	0	2	1	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	
		Canada	142	73	83	393	619	438	485	443	459	392	576	597	503	595	576	549	524	604	557	537	600	733	491	575	530	575	530
		Chinese Taipei	3	3	4	0	20	0	0	0	0	0	0	0	2	0	0	0	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	0	0	74	11	19	27	19	0	0	0	0	
		EU.Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.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	0	0	0	
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	10	5	0	4	3	2	3	2
		Japan	1092	584	960	1109	468	550	688	512	581	427	387	436	322	691	365	492	506	575	57	470	265	376	277	492	162	492	162
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	52	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	4	0	19	2	8	14	29	10	12	22	9	10	14	7	7	10	7	10
		NEI (ETRO)	0	0	0	0	30	24	23	17	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	0	0	0	2	0	0	429	270	49	0	0	0	0	0	0	0	0	0	
		Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		Panama	0	0	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	1	3	2	14	14	14	2	43	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Trinidad and Tobago	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		U.S.A.	1424	1142	1352	1289	1483	1636	1582	1085	1237	1163	1311	1285	1334	1235	1213	1212	1583	1840	1426	899	717	468	758	764	1068	764	1068
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0.3
		Uruguay	16	6	0	2	0	0	1	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
Discards	ATW	Canada	0	0	0	0	14	0	0	0	0	0	0	0	6	16	11	46	13	37	14	15	0	2	0	1	3	1	3
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	514	99	102	119	115	128	211	88	83	138	171	155	110	149	176	98	174	218	167	131	147	100	158	160	158	160

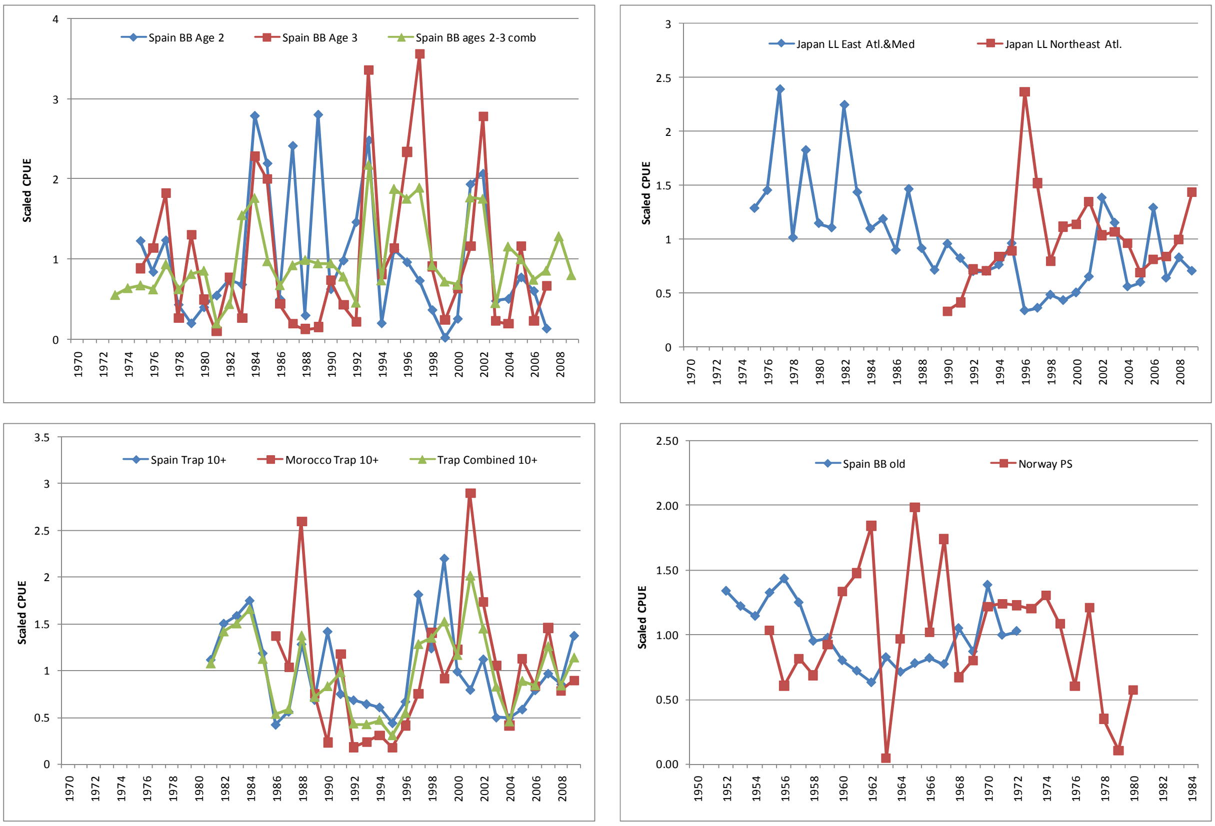
* Current Task I figures (2008 and 2009) where the shaded cells indicate which catches have changed since the assessment.



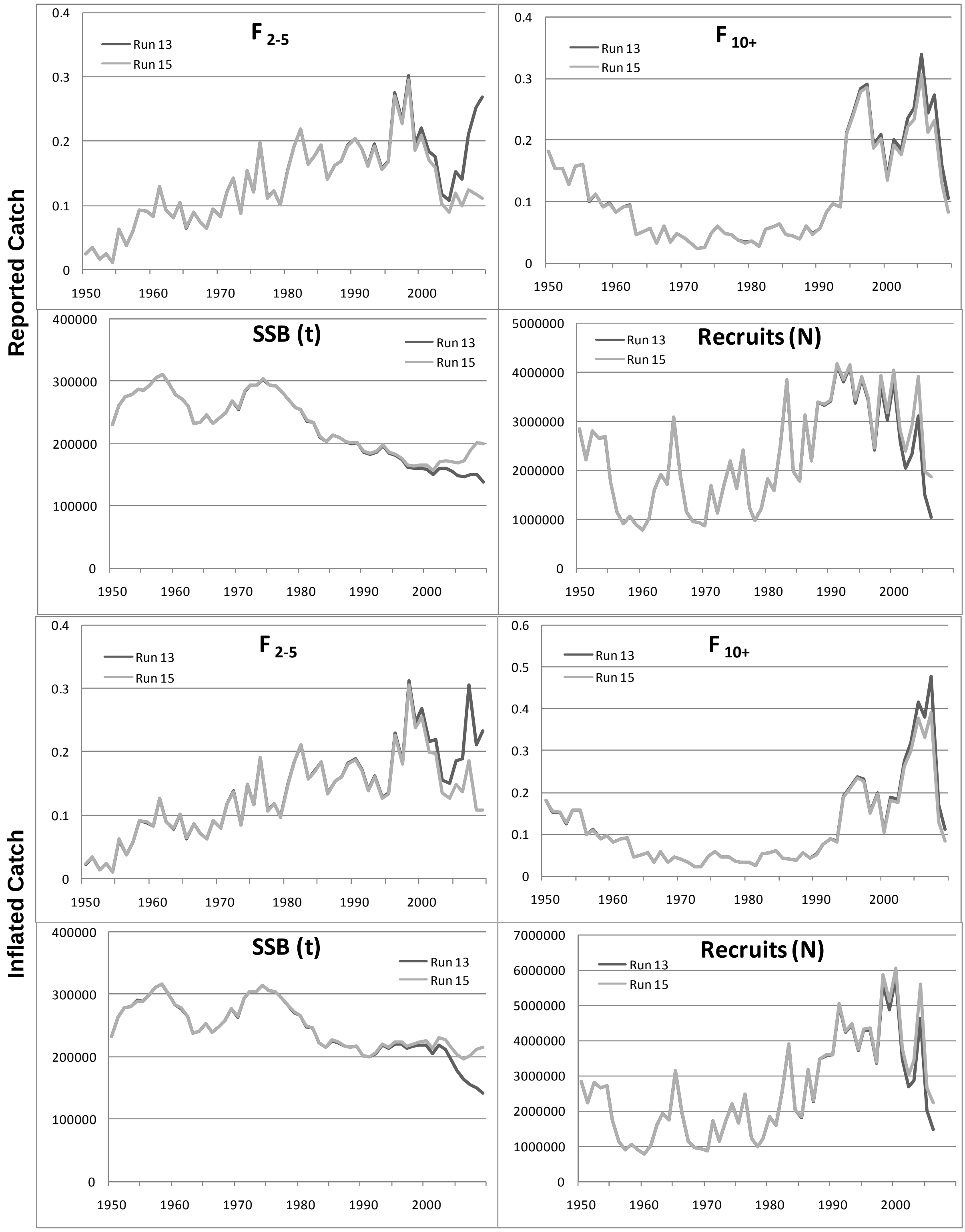
BFT-Figure 1. Geographic distribution of bluefin tuna catches per 5x5 degrees and per main gears.



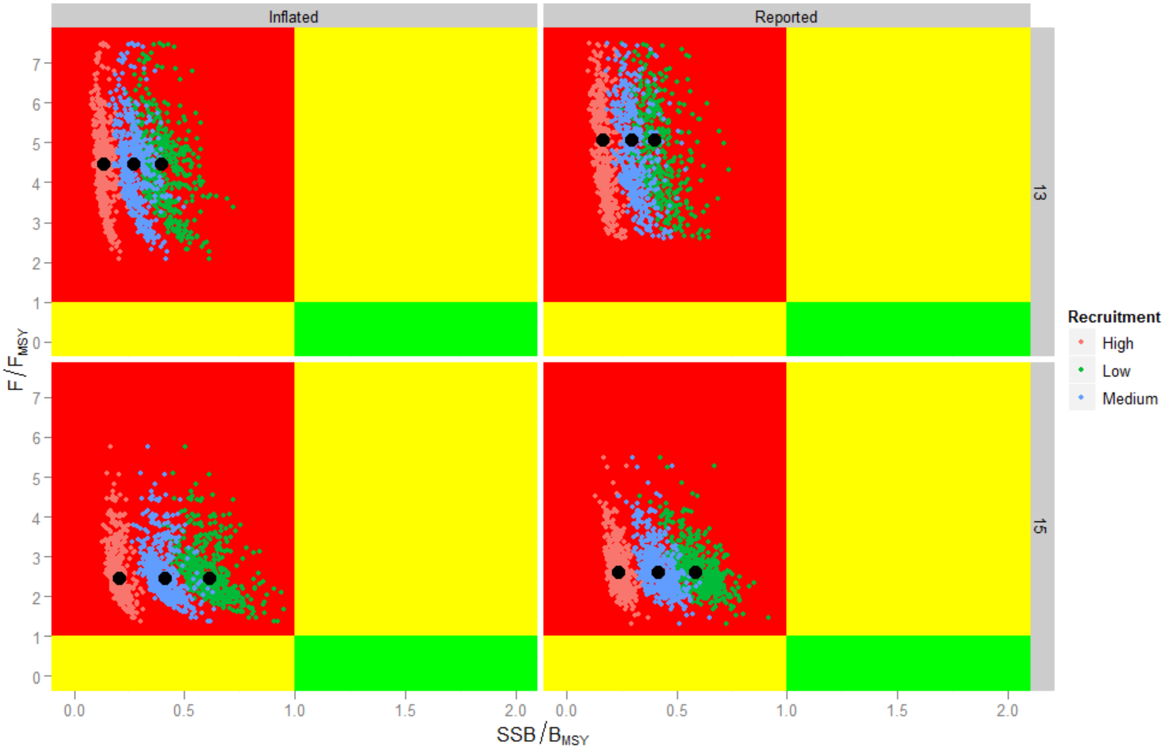
BFTE-Figure 1. Reported catch for the East Atlantic and Mediterranean from Task I data from 1950 to 2009 split by main geographic areas (top panel) and by gears (bottom panel) together with unreported catch estimated by the Committee (using from fishing capacity and mean catch rates over the last decade) and TAC levels since 1998.



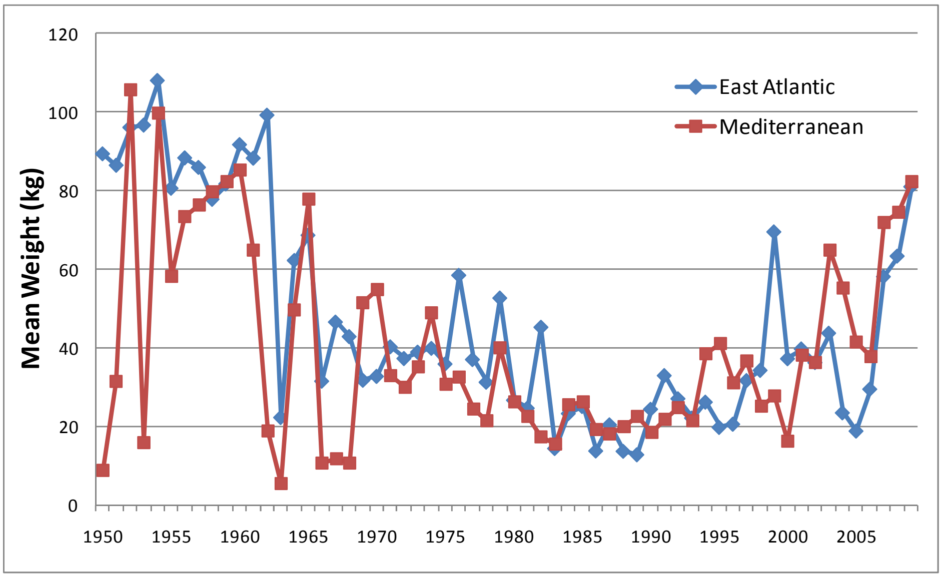
BFTE-Figure 2. Time series of fishery indicators (CPUE) for the East Atlantic and Mediterranean bluefin tuna stock. All the CPUE series are standardized except the nominal Norway PS series.



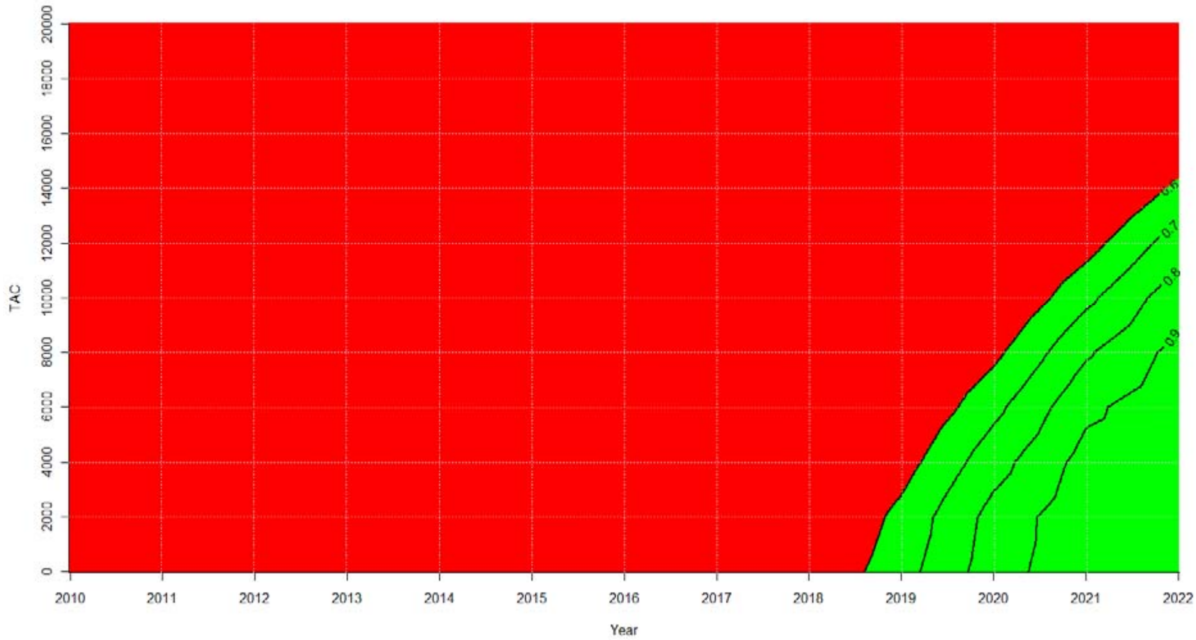
BFTE-Figure 3. Fishing mortality (for ages 2 to 5 and 10+), spawning stock biomass (in tons) and recruitment (in number of fish) estimates from VPA runs 13 and 15. Top panel: reported catch; bottom panel: inflated catch.



BFTE-Figure 4. Stock status in the terminal year (2009) estimated from VPA runs 13 and 15 with reported and inflated catch and considering low, medium and high recruitment levels. Clouds of symbols represent the distribution of the terminal year obtained through bootstrapping.



BFTE-Figure 5. Plots of the annual mean weight from the catch-at-size data per main area from 1950 to 2009.



BFTE-Figure 6. Probabilities plot of stock rebuilding at $SSB_{F0.1}$ by years and TAC levels (the probabilities combine the results obtained from the stochastic runs after the 24 scenarios investigated). According to Rec. [09-06], red area corresponds to probabilities < 60% while green area corresponds to probabilities > 60%. Contours for 60%, 70%, 80% and 90% probabilities are further displayed by black lines.

BFTE-Table 1. Probabilities of stock rebuilding at $SSB_{F0.1}$ by years and TAC levels (the probabilities combined the results obtained from the stochastic runs over the 24 scenarios being investigated). The difference in grey colour underlines the catch (TAC) at which the 60% probability would not be anymore achieved.

TAC	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	0%	0%	0%	2%	6%	14%	25%	38%	52%	69%	89%	98%	99%
2000	0%	0%	0%	1%	5%	12%	21%	33%	46%	62%	83%	97%	99%
4000	0%	0%	0%	1%	4%	9%	18%	28%	40%	55%	75%	93%	99%
6000	0%	0%	0%	1%	3%	7%	14%	23%	34%	47%	66%	86%	97%
8000	0%	0%	0%	0%	2%	6%	11%	19%	29%	40%	56%	77%	92%
10000	0%	0%	0%	0%	2%	4%	9%	15%	23%	33%	46%	65%	84%
12000	0%	0%	0%	0%	1%	3%	6%	11%	18%	26%	37%	53%	73%
13500	0%	0%	0%	0%	1%	2%	5%	9%	14%	21%	30%	45%	63%
14000	0%	0%	0%	0%	1%	2%	4%	8%	13%	20%	28%	42%	59%
16000	0%	0%	0%	0%	0%	1%	3%	6%	9%	14%	20%	31%	46%
18000	0%	0%	0%	0%	0%	1%	2%	4%	6%	10%	15%	22%	34%
20000	0%	0%	0%	0%	0%	0%	1%	2%	4%	6%	10%	15%	24%

BFTW-Table 1. Kobe II matrices giving the probability that the spawning stock biomass (SSB) will exceed the level that will produce MSY in any given year for various constant catch levels under the low recruitment, high recruitment, and combined scenarios.

Low recruitment scenario (two-line)

TAC	2011	2012	2013	2014	2015	2016	2017	2018	2019
0 mt	67.8%	98.4%	99.4%	99.4%	99.8%	100.0%	100.0%	100.0%	100.0%
250 mt	66.8%	98.2%	98.8%	98.8%	99.8%	99.8%	100.0%	100.0%	100.0%
500 mt	66.0%	98.0%	98.8%	98.8%	99.0%	99.8%	99.8%	100.0%	100.0%
750 mt	65.6%	97.4%	98.4%	98.0%	98.8%	99.0%	99.4%	99.6%	100.0%
1000 mt	64.6%	97.0%	97.6%	97.0%	98.2%	98.8%	99.0%	99.0%	99.4%
1250 mt	63.8%	96.4%	97.0%	96.2%	97.8%	98.2%	98.4%	98.4%	98.8%
1500 mt	63.2%	96.2%	96.4%	95.2%	95.8%	97.0%	97.6%	97.4%	97.6%
1750 mt	61.6%	95.2%	95.4%	93.2%	93.6%	94.0%	94.4%	95.0%	95.8%
2000 mt	60.6%	94.8%	94.6%	90.4%	91.0%	91.8%	92.0%	92.4%	92.6%
2250 mt	59.6%	94.4%	93.2%	87.4%	87.8%	86.8%	86.4%	86.6%	86.2%
2500 mt	58.8%	93.2%	91.4%	84.2%	81.8%	81.2%	81.2%	78.6%	78.2%
2750 mt	57.6%	92.8%	88.6%	78.4%	76.4%	74.0%	73.4%	69.6%	68.0%
3000 mt	56.4%	91.2%	86.4%	74.0%	69.0%	66.2%	62.4%	59.8%	56.8%
3250 mt	54.6%	89.6%	83.2%	68.2%	62.2%	57.4%	53.0%	48.2%	44.0%
3500 mt	54.2%	87.2%	79.0%	61.4%	55.4%	49.0%	43.6%	38.2%	34.0%

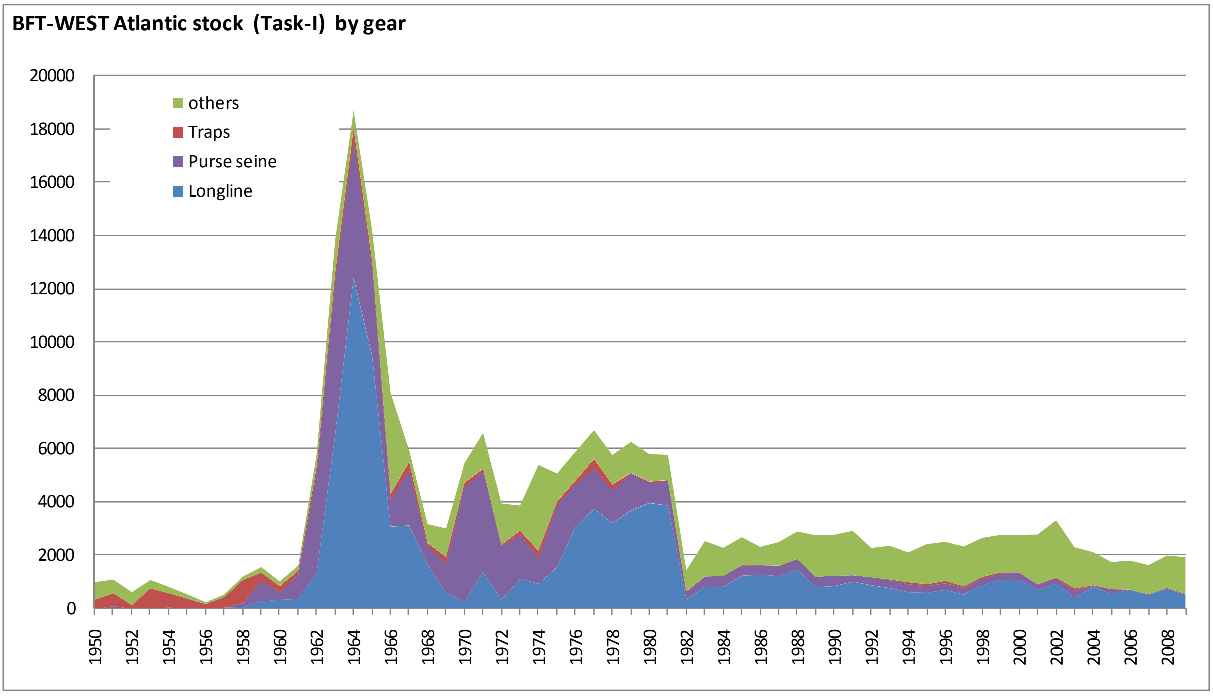
High recruitment scenario (Beverton-Holt)

TAC	2011	2012	2013	2014	2015	2016	2017	2018	2019
0 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
250 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
500 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
750 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1000 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1250 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1500 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1750 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2000 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2250 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2500 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2750 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3000 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3250 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3500 mt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

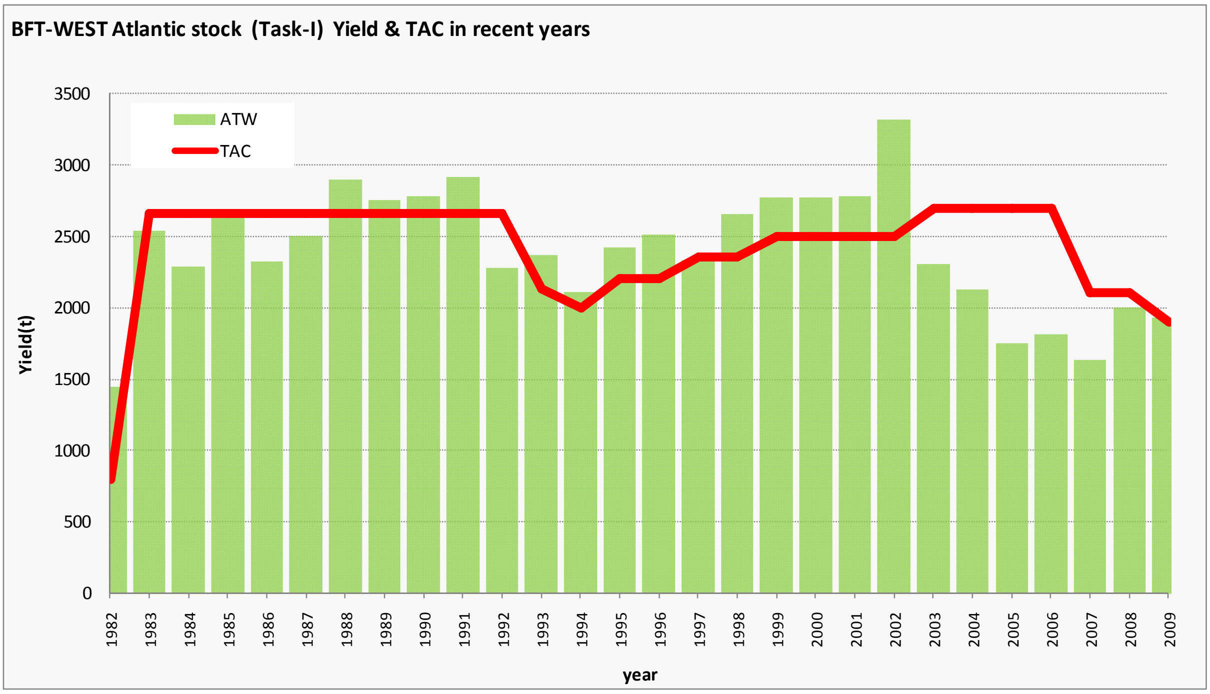
Combined recruitment scenarios (low and high equally probable)

TAC	2011	2012	2013	2014	2015	2016	2017	2018	2019
0 mt	33.9%	49.2%	49.7%	49.7%	49.9%	50.0%	50.0%	50.0%	50.0%
250 mt	33.4%	49.1%	49.4%	49.4%	49.9%	49.9%	50.0%	50.0%	50.0%
500 mt	33.0%	49.0%	49.4%	49.4%	49.5%	49.9%	49.9%	50.0%	50.0%
750 mt	32.8%	48.7%	49.2%	49.0%	49.4%	49.5%	49.7%	49.8%	50.0%
1000 mt	32.3%	48.5%	48.8%	48.5%	49.1%	49.4%	49.5%	49.5%	49.7%
1250 mt	31.9%	48.2%	48.5%	48.1%	48.9%	49.1%	49.2%	49.2%	49.4%
1500 mt	31.6%	48.1%	48.2%	47.6%	47.9%	48.5%	48.8%	48.7%	48.8%
1750 mt	30.8%	47.6%	47.7%	46.6%	46.8%	47.0%	47.2%	47.5%	47.9%
2000 mt	30.3%	47.4%	47.3%	45.2%	45.5%	45.9%	46.0%	46.2%	46.3%
2250 mt	29.8%	47.2%	46.6%	43.7%	43.9%	43.4%	43.2%	43.3%	43.1%
2500 mt	29.4%	46.6%	45.7%	42.1%	40.9%	40.6%	40.6%	39.3%	39.1%
2750 mt	28.8%	46.4%	44.3%	39.2%	38.2%	37.0%	36.7%	34.8%	34.0%
3000 mt	28.2%	45.6%	43.2%	37.0%	34.5%	33.1%	31.2%	29.9%	28.4%
3250 mt	27.3%	44.8%	41.6%	34.1%	31.1%	28.7%	26.5%	24.1%	22.0%
3500 mt	27.1%	43.6%	39.5%	30.7%	27.7%	24.5%	21.8%	19.1%	17.0%

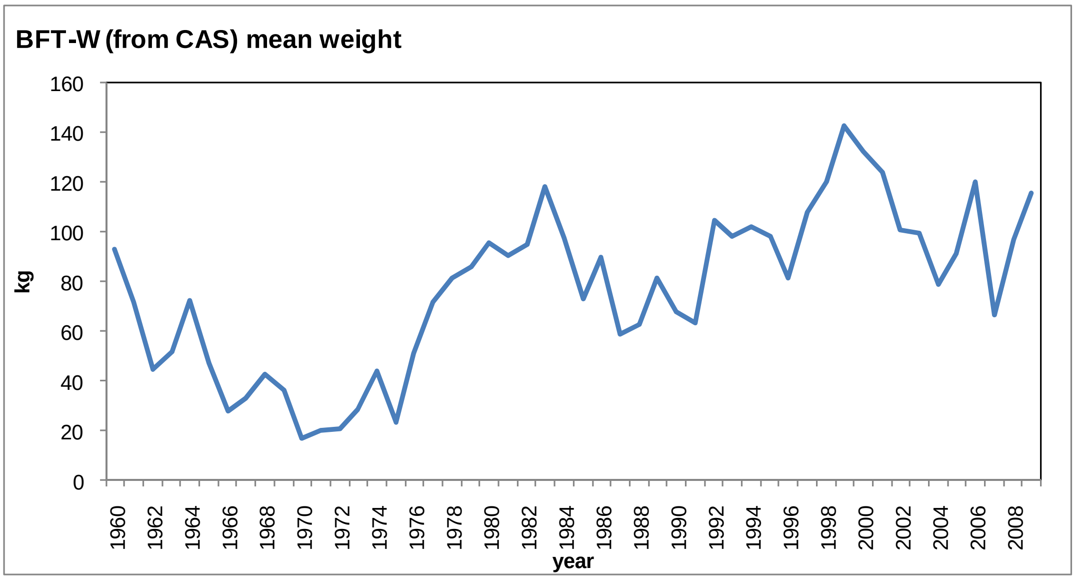
(a)



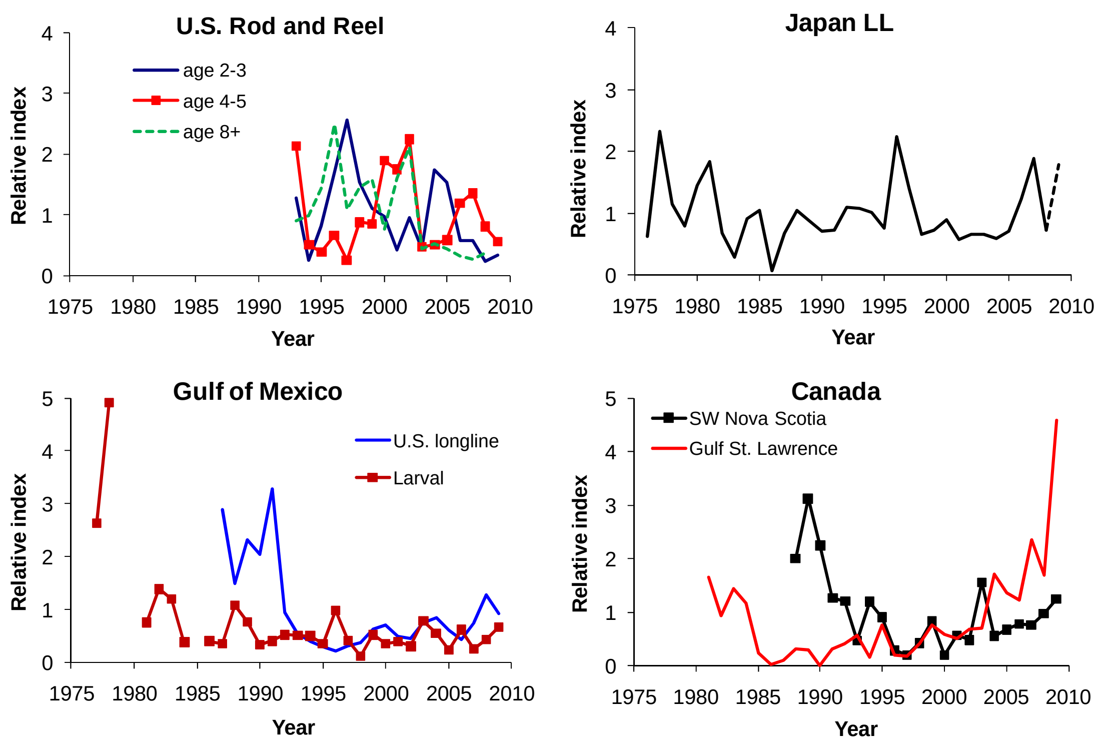
(b)



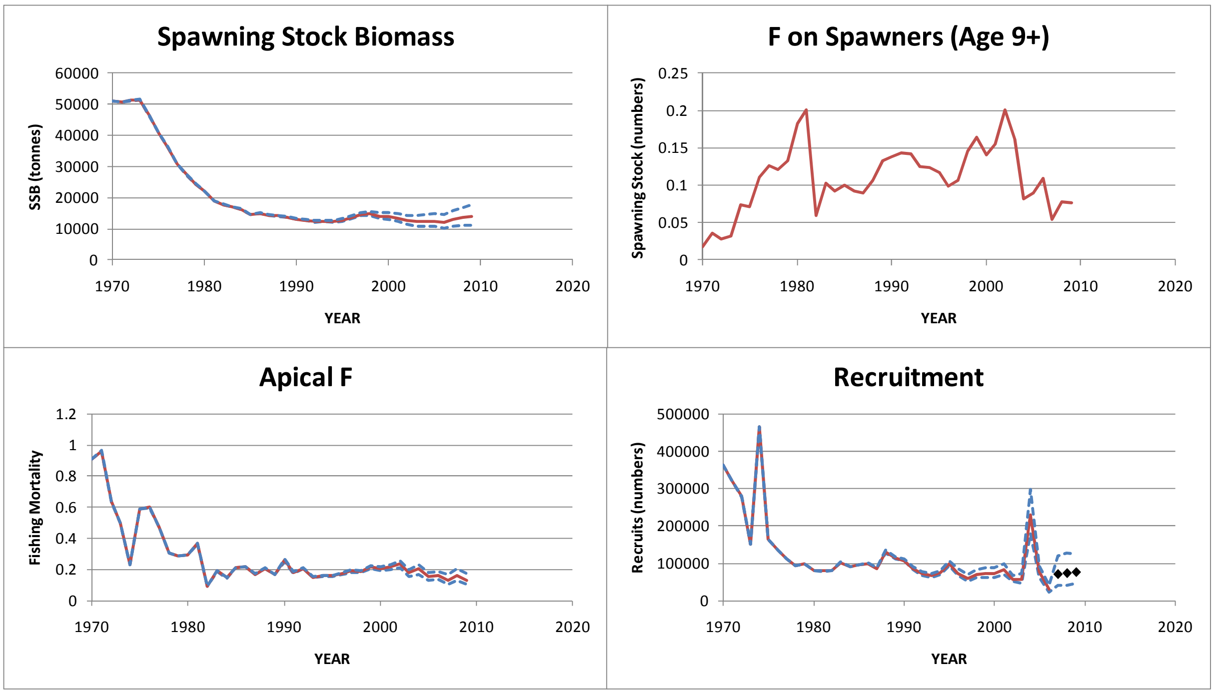
BFTW-Figure 1. Historical catches of western bluefin tuna: (a) by gear type and (b) in comparison to TAC levels agreed by the Commission.



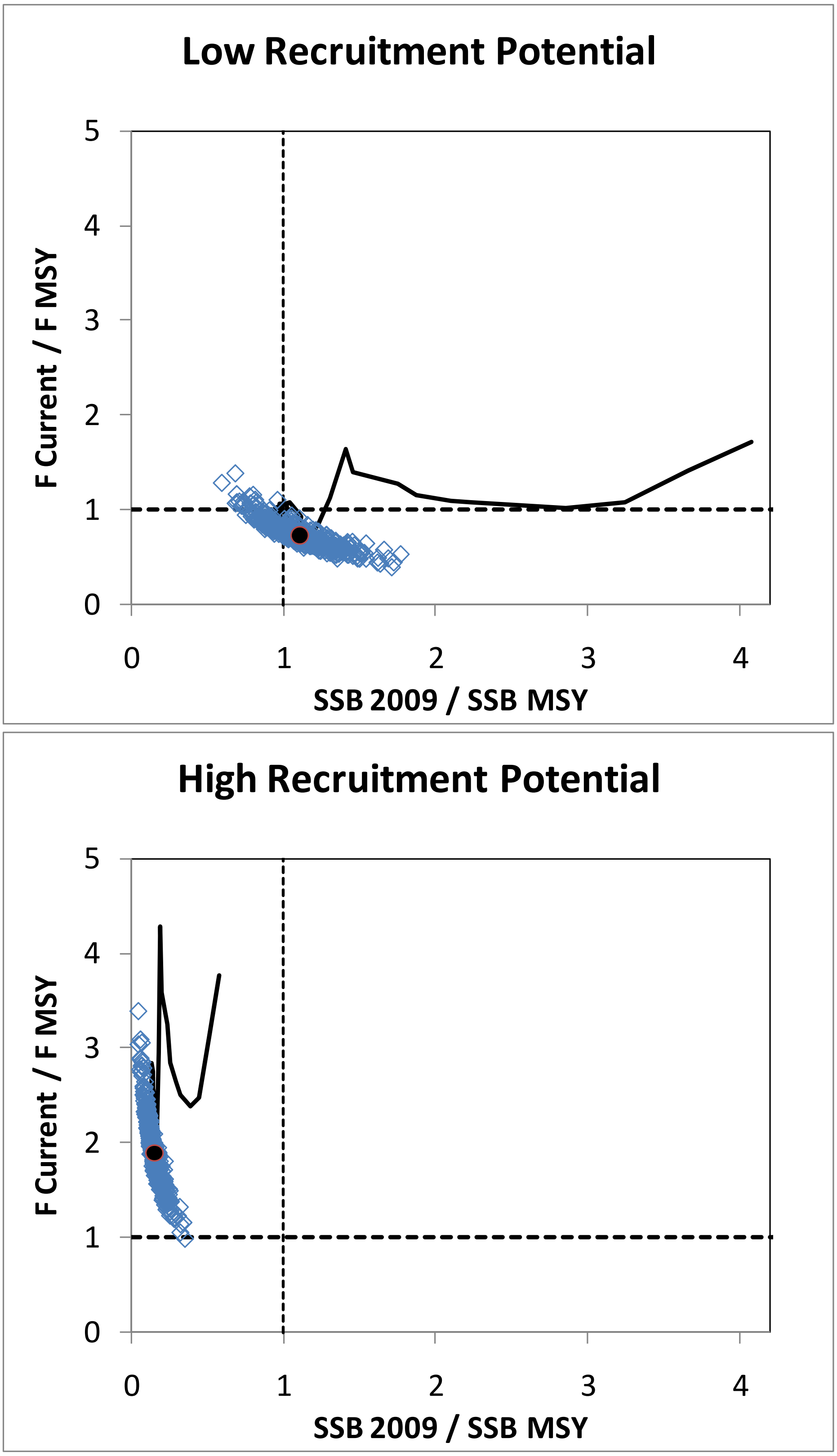
BFTW-Figure 2. Historical average weight of bluefin tuna caught by fisheries operating in the western management area.



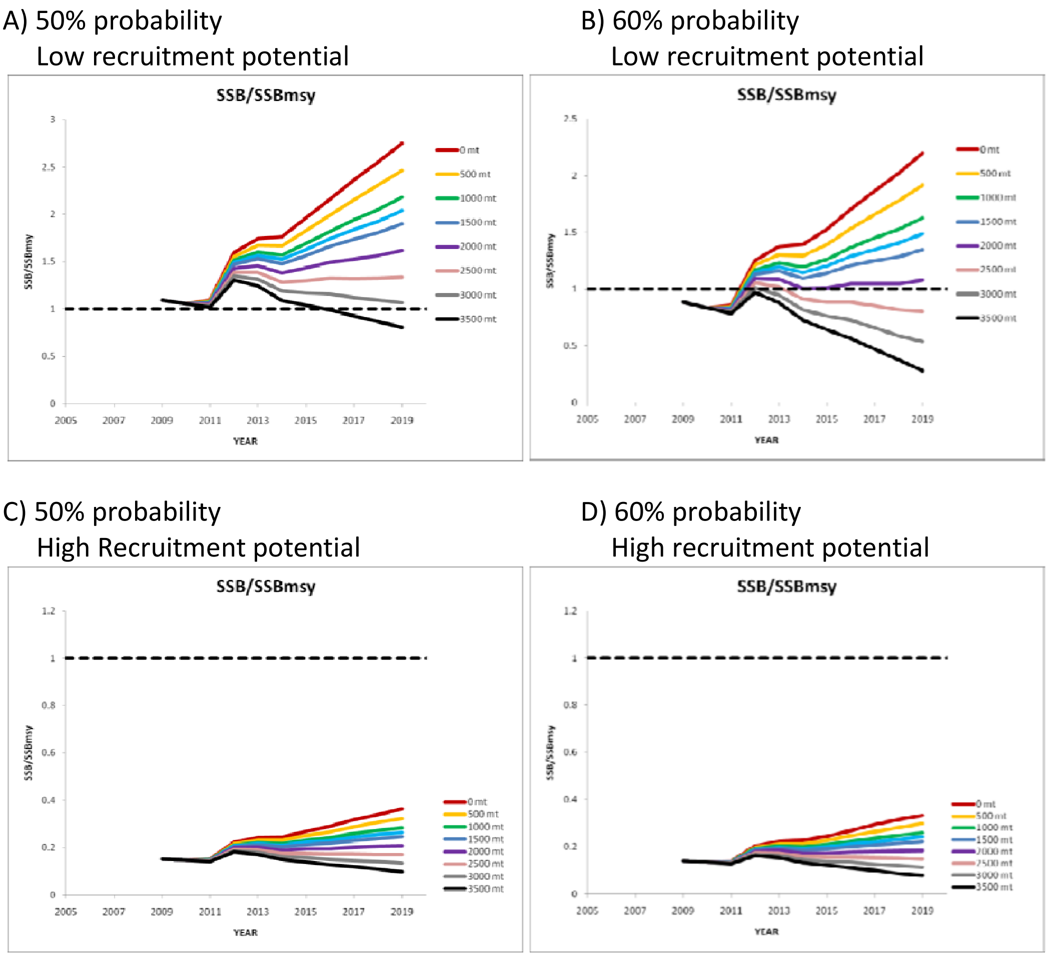
BFTW-Figure 3. Updated indices of abundance for western bluefin tuna. The dashed portion of the Japanese longline series represents the trend estimated in 2009, which was considered unreliable by the 2010 SCRS.



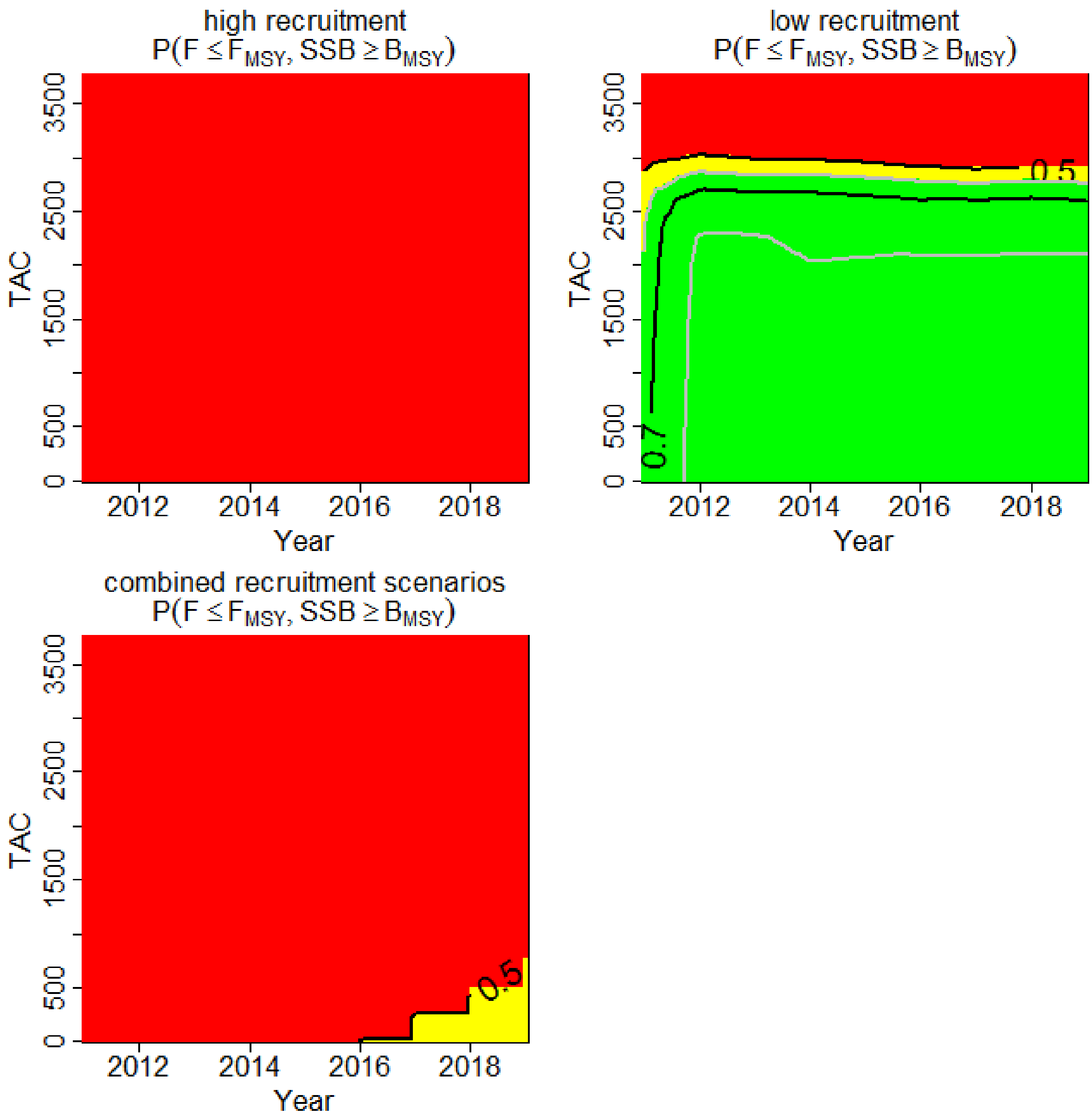
BFTW-Figure 4. Median estimates of spawning biomass (age 9+), fishing mortality on spawners, apical fishing mortality (F on the most vulnerable age class) and recruitment for the base VPA model. The 80% confidence intervals are indicated with dotted lines. The recruitment estimates for the last three years of the VPA are considered unreliable and have been replaced by the median levels corresponding to the low recruitment scenario.



BFTW-Figure 5. Estimated status of stock relative to the Convention objectives (MSY) by year (1970 to 2009). The lines give the time series of point estimates for each recruitment scenario and the cloud of symbols depicts the corresponding bootstrap estimates of uncertainty for the most recent year. The large black circle represents the status estimated for 2009.



BFTW-Figure 6. Projections of spawning stock biomass (SSB) for the Base Case assessment under low recruitment potential (top panels) and high recruitment potential (bottom panels) and various levels of constant catch. The labels "50%" and "60%" refer to the probability that the SSB will be greater than or equal to the values indicated by each curve. The curves corresponding to each catch level are arranged sequentially in the same order as the legends. A given catch level is projected to have a 50% or 60% probability of meeting the convention objective (SSB greater than or equal to the level that will produce the MSY) in the year that the corresponding curve meets the dashed horizontal line.



BFTW-Figure 7. Kobe II matrices giving the chance that the spawning stock biomass (SSB) will exceed the level that will produce MSY in any given year under various constant catch levels for the Base Case assessment under the low recruitment, high recruitment, and combined scenarios. The red, yellow and green regions represent chances of less than 50%, 50-59% and 60% or better, respectively.

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. Ovaries of female blue marlin caught by artisanal vessel in Côte d'Ivoire show evidence of pre-spawning and post-spawning, but not of spawning. In this area females are more abundant than males (4:1 female/male ratio). 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 (25º to 26ºS and 45º to 45ºW) in the same area where blue marlin spawn. In this area blue marlin spawn from April to June and white marlin spawn from December to March. In the northwest Atlantic white marlin have been reported spawning 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.

Atlantic blue marlin inhabit the upper parts of the open ocean. Although they spend much of the time on the upper mixed layer they dive regularly to maximum depths of around 300 m, with some vertical excursions down to 800m. They do not confine themselves to a narrow range of temperatures but most tend to be found in waters warmer than 17°C. The distributions of times at depth are 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 are typically below the surface, often at 40 to 100+ m. These patterns, however, can be highly variable between individuals and also vary depending on the temperature and dissolved oxygen of the surface mixed layer. This variability in the use of habitat by marlins indicates that simplistic assumptions about habitat usage made during the standardization of CPUE data may be inappropriate.

All biological material sampled to date from white marlin, prior to the confirmation of the existence of roundscale spearfish (*T. georgii*) in 2006, contains unknown mixture of the round scale spearfish and white marlin. Therefore reproductive parameters, growth curves and other biological studies previously thought to describe white marlin may not exclusively represent this species.

BUM/WHM-2. Fishery indicators

It has now been confirmed that white marlin landings reported to ICCAT include roundscale spearfish in significant numbers, so that historical statistics of white marlin include a mixture of two species. Studies of white marlin/roundscale spearfish ratios have been conducted, with overall estimated ratios between 23-27%. Previously, these were thought to represent only white marlin. In some areas however only one species is present in these samples.

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 **(BUM/WHM-Figure 2)**. 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. Estimates of total removals since 2005 only represent task I data.

During the 2006 marlin assessment (Anon. 2007) it was noted that catches of blue marlin and white marlin continued to decline through 2004. Over the last 15 years, Antillean artisanal fleets have increased the use of Moored Fish Aggregating Devices (MFADs) 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. Recent reports from purse seine fleets in West Africa suggest that blue marlin is more commonly caught with tuna schools associated with FADs than with free tuna schools. Task I catches of blue marlin (**BUM/WHM-Table 1)** in 2009 were - 2,863 t. In 2008, Task I catches of blue marlin were 4,138 t. Task I catches of white marlin in 2008 and 2009 were 374 t and 406 t, respectively (**BUM/WHM-Table 2)**. Task I catches of white marlin and blue marlin for 2009 are preliminary. Historical reports of unclassified billfish remain an important issue in the estimation of historical removals from marlin stocks.

A number of relative abundance indices were estimated during the blue marlin 2010 data preparatory Meeting. 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. Trends in white marlin may also inadvertently reflect trends in the abundance of roundscale spearfish. 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. Relative abundance indices recently developed for blue marlin from CPUE data for a sport fishery in southeastern Brazil, and for the artisanal fishery off Côte d'Ivoire do not appear to conflict with the conclusions of the assessment of blue marlin made in 2006.

BUM/WHM-3. State of the stocks

Blue marlin

No new information on stock status has been provided since the 2006 assessment (Anon. 2007). 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. During the 2010 ICCAT Blue Marlin Data Preparatory Meeting, catch rate information was updated by the presentation of five new standardized catch rate indices, and the inclusion of a historical catch rate index from the sport fishery from Venezuela (**BUM-WHM-Figure 3**). The 2011 stock assessment, might confirm if these recent apparent changes in trend have continued.

White marlin

No new information on stock status has been provided since the 2006 assessment (Anon. 2007). The biomass for 2000-2004 most likely remained well below the B_{MSY} estimated in the 2002 assessment (Anon. 2003). 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. The next stock assessment, might confirm if these recent apparent changes in trend have continued. However, this will require developing a mechanism to separate landings of white marlin from roundscale spearfish. All historical indices of abundance of white marlin may inadvertently have included an unknown quantity of roundscale spearfish.

BUM/WHM-4. Outlook

No new information on the recovery/outlook for marlins has been provided since the 2006 assessment (Anon. 2007). 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.

The last stock assessment suggested that the recovery of blue marlin stock might proceeded faster than would have been estimated at the 2000 assessment (Anon. 2001), 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), although recent information suggests that these data may inadvertently have included roundscale spearfish.

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[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 are needed.

The presence of unknown quantities of roundscale spearfish in the biological parameters, historical landings and relative abundance estimates of white marlin make the stock status and outlook for this species more uncertain.

BUM/WHM-5. 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, 97% of all longline caught blue marlin and 93% of all longline caught white marlin for the period 1990-2007. 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 4)**. 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.

Some fisheries/fleets are using circle hooks, which can minimize deep hooking and increase the survival of marlins hooked on longlines and recreational gear. 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-6. 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.

− The Commission should consider requiring the reporting of roundscale spearfish catches separate from white marlin.

− 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 that reduce the likelihood of deep hooking. Depending on the fisheries/fleets, such reductions may be achievable by making changes in hook type, bait type or a combination of the two,
  - 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}	< 1.0	< 1.0
Recent Abundance Trend (2001-2004)	Slightly upward	Possibly stabilizing
$F_{2004} > F_{replacement}$	No	Possibly
F_{2004} > [1]F_{MSY}	Possibly > 1.0	> 1.0
[2]$Catch_{recent}/Catch_{1996}$ Longline and Purse seine	0.47	0.52
[3]$Catch_{2004}$	610 t	2,916 t
Catch 2009	406 t	2,863 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. 2003) assessments.
[2] Catch $_{recent}$ is the average longline catch for 2000-2004.
[3] Estimate of total removals obtained by the Committee.
[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 t.

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

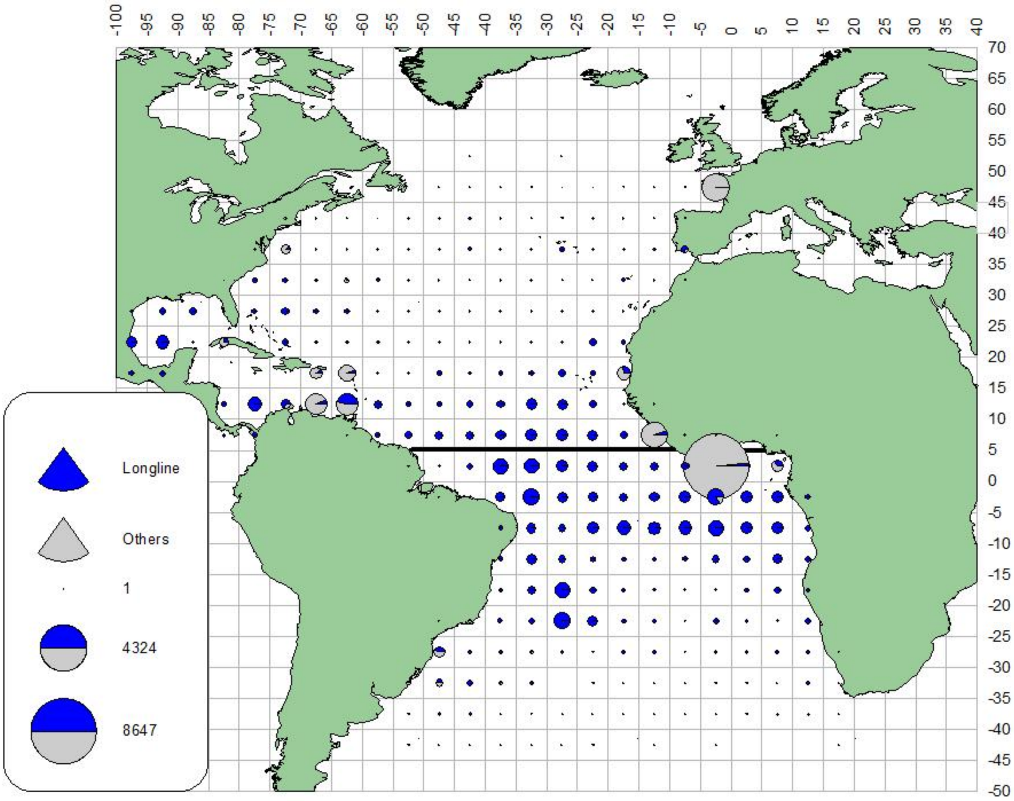
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			3311	2018	2144	2808	4219	4547	4151	2989	3044	4124	4062	5198	5463	5458	5086	4855	3683	2899	3556	2142	3445	2173	3168	4138	2863
	ATN		1566	1095	927	954	1525	1952	1410	1084	1071	1537	1560	1961	2011	2494	2017	2066	1072	791	1010	702	1555	754	967	1972	1412
	ATS		1745	924	1217	1855	2693	2595	2741	1905	1974	2587	2502	3237	3452	2963	3069	2789	2611	2108	2547	1439	1891	1420	2200	2166	1451
Landings	ATN	Longline	1222	720	418	459	995	1607	982	625	613	1088	991	1339	1413	1300	1078	919	462	413	467	518	561	462	532	783	785
		Other surf.	174	160	190	184	197	137	225	223	217	220	343	363	440	1088	820	1051	489	240	502	119	951	193	273	954	492
		Sport (HL+RR)	169	214	181	186	143	49	62	90	113	118	73	64	60	56	38	36	97	89	22	31	18	62	120	197	95
	ATS	Longline	1362	661	964	1530	2017	1958	2286	1490	1419	1764	1679	2193	2519	2068	1977	1775	1446	896	1212	844	1002	750	1254	942	796
		Other surf.	382	262	253	324	675	634	453	414	553	821	822	1041	863	893	1090	1014	1165	1212	1334	595	887	666	938	1224	655
		Sport (HL+RR)	1	1	0	1	1	2	1	0	1	2	2	2	28	0	0	0	0	0	0	0	2	1	9	1	1
Discards	ATN	Longline	0	0	138	124	191	159	142	146	127	111	153	196	97	49	81	60	22	37	19	34	24	36	42	37	38
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	11	0	1	1	0	0	1	2
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	2	0	0	
Landings	ATN	Barbados	10	14	13	46	3	18	12	18	21	19	31	25	30	25	19	19	18	11	11	0	0	25	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	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	
		Canada	0	0	1	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	41	48	41	51	79	133	9	31	15	17	10	49	0	4	2	26
		Chinese Taipei	148	117	52	26	11	937	716	336	281	272	187	170	355	80	44	64	65	48	66	104	38	35	30	15	28
		Cuba	246	103	68	94	74	112	127	135	69	39	85	43	53	12	38	55	56	34	3	4	7	7	0	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	69	75	36	44	55	58	106	73
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	41	71	29	19	23	0	207	0	0	0	0	0	
		EU.España	4	1	0	8	7	5	1	6	7	6	2	25	5	36	15	25	8	1	6	27	12	23	14	23	6
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	776	0	0	753	319
		EU.Portugal	8	12	8	2	1	1	4	2	15	11	10	7	3	47	8	15	17	1	31	27	24	36	56	56	25
		Grenada	11	36	33	34	40	52	64	52	58	52	50	26	47	60	100	87	104	69	72	45	42	33	49	54	45
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	
		Japan	409	174	78	206	593	250	145	193	207	532	496	798	625	656	427	442	155	125	148	174	251	199	221	486	480
		Korea Rep.	154	36	13	14	252	240	34	11	2	16	16	41	16	0	0	0	0	0	0	0	3	14	30	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	87	148	148	701	420	712	235	158	115	0	0	0	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	**0**
		Mexico	0	0	0	0	0	0	0	0	3	13	13	13	13	27	35	68	37	50	70	90	86	64	91	81	93
		NEI (ETRO)	0	0	0	0	0	0	0	0	71	134	149	178	225	330	312	202	112	7	6	0	0	0	0	0	
		Netherlands Antilles	50	50	50	50	50	50	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	5	38	38	0	0	0	0	0	0	0	1	**0**
		Senegal	0	0	0	0	1	1	4	8	0	9	0	2	5	0	0	0	11	24	32	11	1	5	91	114	61
		St. Vincent and Grenadines	0	0	0	0	1	0	0	1	2	2	2	0	1	0	0	0	0	19	0	0	0	0	1	3	2
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	10	5	0	18	17	21	53	46	70	72
		Trinidad and Tobago	3	43	93	45	13	11	6	1	2	16	28	14	49	15	20	51	17	16	9	11	7	14	16	34	26
		U.S.A.	295	273	291	221	124	29	33	51	80	88	43	43	46	50	37	24	16	17	19	26	16	17	9	13	6
		U.S.S.R.	0	7	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	9	11	6	8	15	17	18	19	11	15	15	15	3	5	1	2	2	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	1	0	0	
		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	2	0	0	
		Ukraine	0	0	0	0	0	0	15	0	0	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	2	1	0	0	0	
		Venezuela	219	218	60	76	149	70	49	66	74	122	106	137	130	205	220	108	72	76	84	83	138	131	206	120	107
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		Benin	10	7	4	12	0	6	6	6	6	5	5	5	5	5	5	5	0	0	0	0	0	0	0	0	
		Brasil	33	46	51	74	60	52	61	125	147	81	180	331	193	486	509	452	780	387	577	195	612	298	262	160	149
		China P.R.	0	0	0	0	0	0	0	0	0	21	25	21	27	41	68	15	61	73	72	49	47	0	61	11	51
		Chinese Taipei	165	98	265	266	462	767	956	488	404	391	280	490	1123	498	442	421	175	246	253	211	113	64	203	133	167
		Cuba	205	111	137	191	77	90	62	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	100	100	100	130	82	88	105	79	139	212	177	157	222	182	275	206	196	78	109	115	107	178	150	991	463
		EU.España	0	0	0	0	15	0	12	40	37	49	38	133	117	159	110	115	86	27	6	24	12	68	25	32	54
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	1	0	24	69	79	102	81
		Gabon	0	0	0	0	0	0	0	0	1	2	0	304	5	0	0	0	1	0	3	0	0	0	0	0	
		Ghana	150	16	5	7	430	324	126	123	236	441	471	422	491	447	624	639	795	999	415	470	759	405	683	191	140
		Japan	691	335	362	617	962	967	755	824	719	991	913	881	724	529	363	441	180	142	294	366	191	290	699	539	338
		Korea Rep.	262	60	139	361	437	84	503	13	11	40	40	103	40	2	3	1	1	0	0	1	4	19	33	0	8
		Mixed flags (FR+ES)	122	135	132	137	144	199	137	116	146	133	126	96	82	80	83	79	0	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	103	192	214	256	323	474	449	290	162	10	8	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	2	33	0	0	0	0	0	0	0	0	7	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		S. Tomé e Príncipe	0	0	0	28	19	17	18	21	25	28	33	36	35	33	30	32	32	32	32	9	21	26	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	2	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	23	0	73	53	141	103	775	0	0	0	0	0	
		U.S.S.R.	7	16	22	32	5	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	0	0	0	0	0	0	
		Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	23	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	0	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	138	124	191	159	142	146	127	111	153	196	97	50	81	60	25	49	19	35	25	36	42	38	40
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	0	0	0	

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

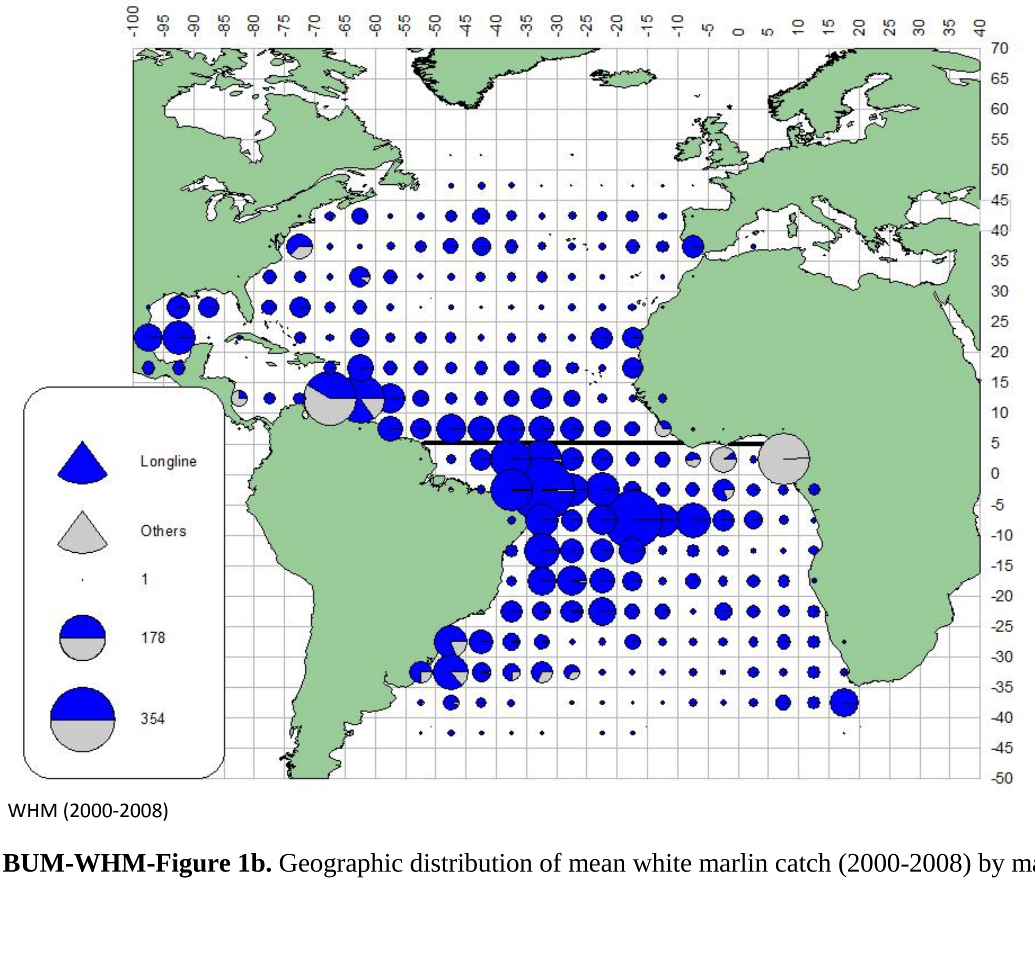
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			1729	1638	1551	1395	1828	1659	1627	1462	1544	2111	1760	1572	1406	1682	1569	1329	888	889	680	594	597	390	418	374	406
	ATN		861	933	648	435	376	407	239	610	543	660	639	669	483	529	492	448	353	287	242	252	258	184	146	115	186
	ATS		867	705	904	960	1453	1252	1388	853	1002	1451	1121	904	922	1152	1077	881	534	602	438	342	339	206	273	259	220
Landings	ATN	Longline	790	840	494	196	241	266	108	466	413	531	473	554	431	475	399	375	308	226	196	204	226	151	109	87	149
		Other surf.	29	61	54	150	11	40	21	35	34	57	48	31	10	17	29	31	24	22	28	20	14	21	28	17	20
		Sport (HL+RR)	43	32	38	29	16	21	19	21	30	30	18	20	9	6	6	2	4	6	1	1	1	2	1	2	3
	ATS	Longline	825	654	870	832	1333	1152	1328	805	950	1417	1086	859	828	979	1021	827	471	496	394	318	304	171	245	245	194
		Other surf.	42	51	34	128	119	96	60	48	52	33	31	40	57	173	55	54	63	107	44	23	35	34	9	13	26
		Sport (HL+RR)	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	ATN	Longline	0	0	62	60	107	81	90	88	66	42	100	64	33	31	57	41	16	29	17	27	17	9	8	9	12
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	0	2
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	2	19	1	
Landings	ATN	Barbados	0	0	0	117	11	39	17	24	29	26	43	15	41	33	25	25	24	15	15	0	0	33	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
		Canada	0	0	1	0	0	0	0	0	0	4	4	8	8	8	5	5	3	2	1	2	5	3	2	0	1
		China P.R.	0	0	0	0	0	0	0	0	0	6	7	6	7	10	20	1	7	4	2	1	4	1	0	1	3
		Chinese Taipei	128	319	153	0	4	85	13	92	123	270	181	146	62	105	80	59	68	61	15	45	19	16	1	1	5
		Costa Rica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	14	0	0	1	0	0	0	0	0	
		Cuba	296	225	30	13	21	14	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	
		EU.España	14	0	0	61	12	12	9	18	15	25	17	97	89	91	74	118	43	4	19	19	48	28	32	10	8
		EU.France	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
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	11	30	3	2	0	1
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	8	14	33	10	12	11	17	14
		Japan	45	56	60	68	73	34	45	180	33	41	31	80	29	39	25	66	15	10	21	23	28	27	10	22	28
		Korea Rep.	147	37	2	2	82	39	1	9	4	23	3	7	5	0	0	0	0	0	0	0	4	0	0	0	8
		Liberia	0	0	0	0	0	0	0	0	0	0	0	1	1	3	8	4	3	4	3	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	2	8	8	3	5	6	11	18	44	15	15	28	25	16	13	14	19
		NEI (ETRO)	0	0	0	0	0	0	0	0	23	43	47	57	72	105	100	64	36	2	2	0	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	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Trinidad and Tobago	2	28	61	29	7	6	3	0	1	11	18	8	32	10	13	4	2	5	12	6	6	5	12	10	11
		U.S.A.	75	116	124	42	10	17	13	11	19	13	7	12	8	5	5	1	3	6	1	1	1	1	0	2	3
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0
		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	
		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	
		Venezuela	155	151	154	42	47	79	47	187	226	148	171	164	90	80	61	25	72	110	55	55	60	26	52	26	70
	ATS	Argentina	4	4	0	0	8	9	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	
		Brasil	87	143	93	149	204	205	377	211	301	91	105	75	105	217	158	105	172	407	266	80	244	90	52	47	52
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	3	4	3	4	5	10	1	13	19	6	6	4	5	10	3	5
		Chinese Taipei	172	196	613	565	979	810	790	506	493	1080	726	420	379	401	385	378	84	117	89	127	37	28	53	37	23
		Cuba	216	192	62	24	22	6	10	10	0	0	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	1	2	1	5	1	2	2	3	1	1	1	1	3	2
		EU.España	0	0	0	1	1	0	17	6	12	2	19	54	4	10	45	68	18	2	3	45	10	23	14	21	8
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	19	0	35	39
		Gabon	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	15	22	6	88	68	31	17	14	22	1	2	1	3	7	6	8	21	2	1	1	1	0	0	4	4
		Honduras	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	81	73	74	76	73	92	77	68	49	51	26	32	29	17	15	17	41	5	12	13	6	11	11	12	17
		Korea Rep.	225	34	25	17	53	42	56	1	4	20	20	52	18	0	0	0	0	0	11	40	3	0	113	96	70

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		Mixed flags (FR+ES)	23	25	25	25	27	37	11	10	12	11	9	7	7	9	8	7	0	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	91	171	190	228	288	421	399	258	144	9	7	0	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	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	1	
		S. Tomé e Príncipe	0	0	0	14	16	19	26	24	17	21	21	30	45	40	36	37	37	37	37	21	33	29	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	2	0	0	0	0	0	
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Uruguay	44	16	6	1	1	1	1	3	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	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	62	60	107	81	90	88	66	42	100	64	33	32	57	41	17	33	17	27	17	10	8	10	14
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	19	1	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	0	0	0	



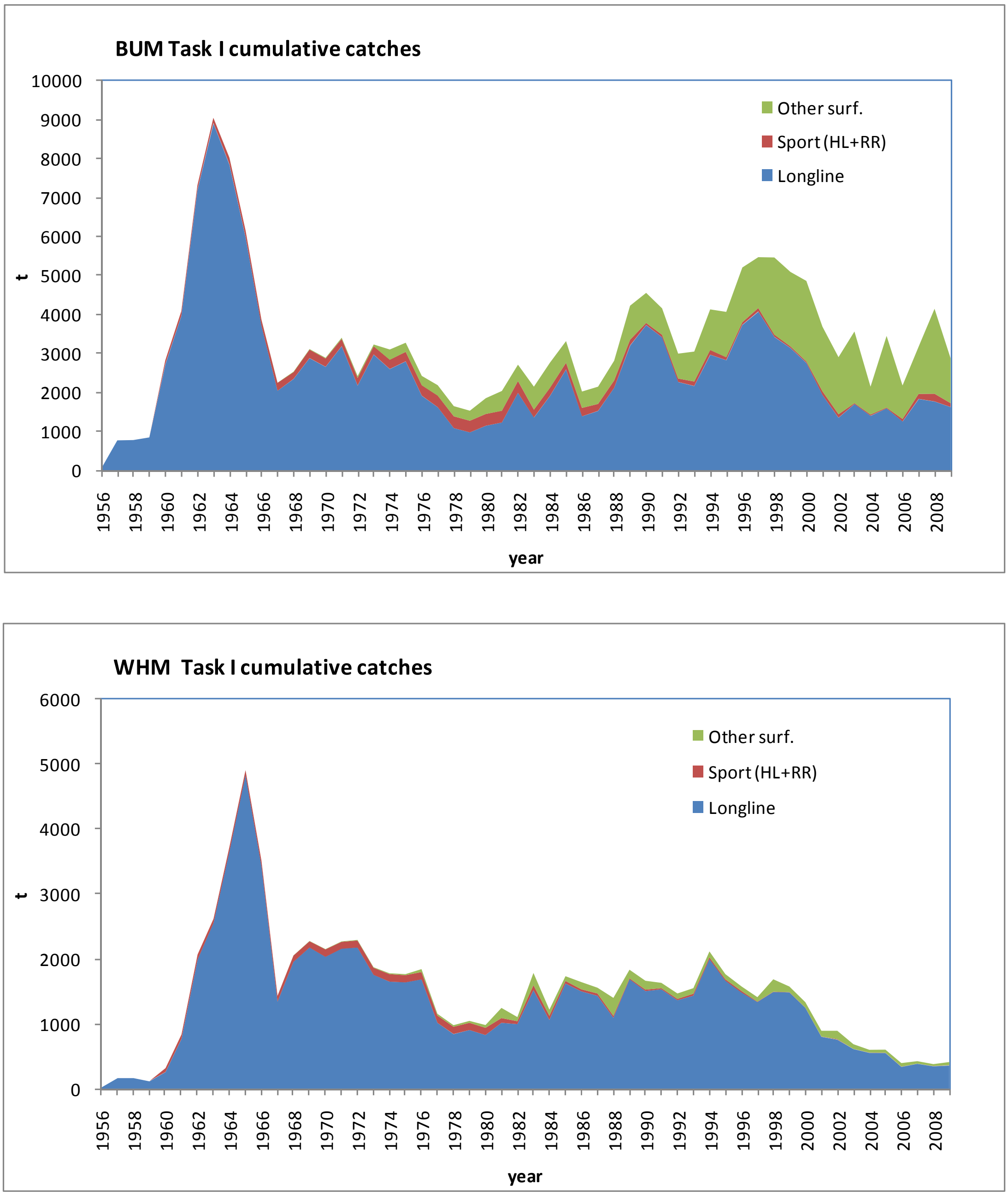
BUM (2000-2008)

BUM-WHM-Figure 1a. Geographic distribution of mean blue marlin catch (2000-2008) by major gears. This does not include provisional 2009 data, including the large artisanal landing from the FAD fishery off Martinique and Guadalupe, France. For details, see **BUM-WHM-Table 1**.

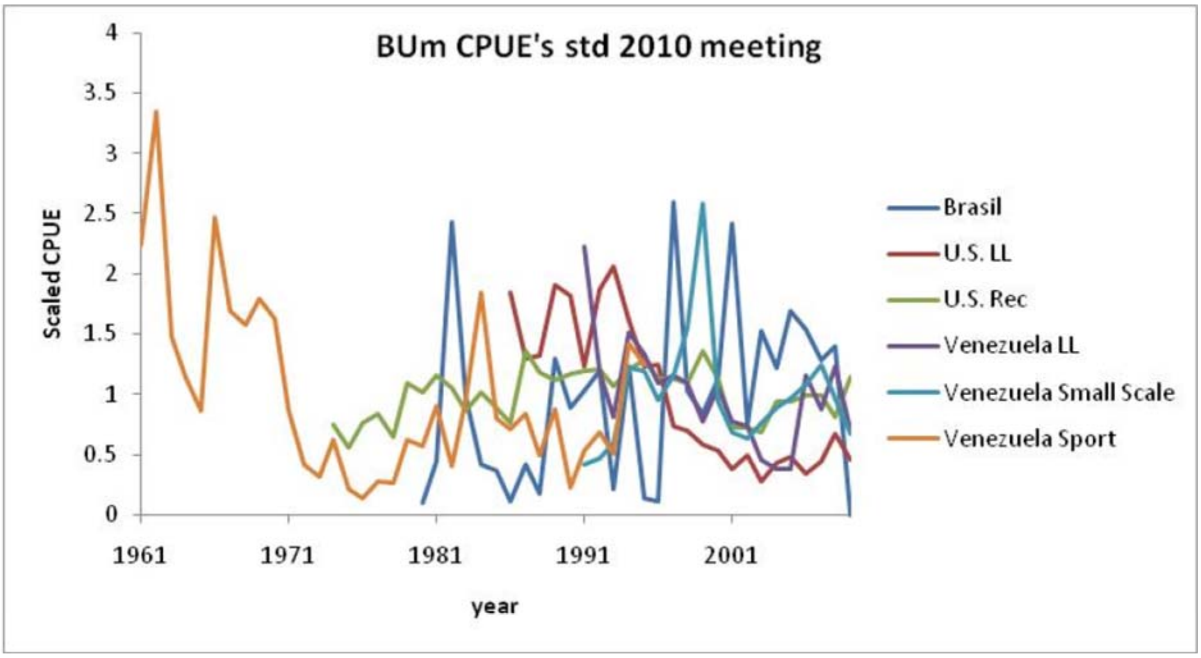


WHM (2000-2008)

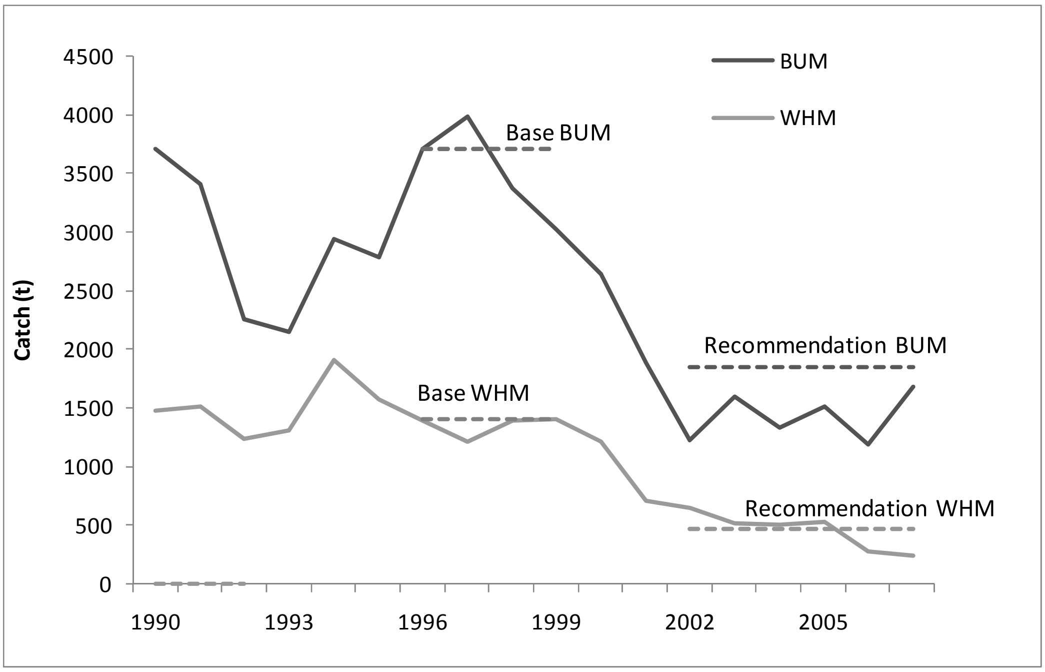
BUM-WHM-Figure 1b. Geographic distribution of mean white marlin catch (2000-2008) by major gears.



BUM-WHM-Figure 2. Total catch of blue marlin and white marlin reported in Task I.



BUM-WHM-Figure 3. Blue marlin standardized CPUEs presented during the blue marlin data preparatory meeting. Some of the major offshore longline fleets are not included (i.e., Japan, Korea, and Chinese Taipei).



BUM-WHM-Figure 4. 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

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)**. The first successful assessment that estimated reference points for eastern and western sailfish stocks was conducted in 2009 (Anon. 2010c).

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. A study undertaken in the Strait of Florida and the southern Gulf of Mexico indicated that habitat preferences from satellite tagged sailfish were primarily within the upper 20~50 m of the water column. The tag data also indicated common short-term movements to depths in excess of 100 m, with some dives as deep as 350 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. In the North, evidence of spawning has been detected in the Straits of Florida, and off the Venezuelan, Guyanese 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 between regions. From the Florida Straits to the areas off Guyana sailfish spawn in the second semester of the year, whist in the southwestern Atlantic and the tropical eastern Atlantic they spawn late and early in the year.

SAI-2. Description of the fisheries

Sailfish are targeted by coastal artisanal and recreational fleets and, to a less extent, are caught as by-catch in longline and purse seine fisheries **(SAI-Figure 1)**. Historically, catches of sailfish were reported together with spearfish by many longline fleets. In 2009 these catches were separated by the Species Group **(SAI-Table 1)**. Historical catches of unclassified billfish continue to be reported to the Committee making the estimation of sailfish catch difficult. Catch reports from countries that have historically been known to land sailfish continue to suffer from gaps and there is increasing ad-hoc evidence of un-reported landings in some other countries. These considerations provide support to the idea that the historical catch of sailfish has been under-reported, especially in recent times where more and more fleets encounter sailfish as by-catch or target them.

Reports to ICCAT estimate that the Task I catch for 2009 was 1,640 t and 1,415 t for the east and west stocks, respectively **(SAI-Figure 3)**. Task I catches of sailfish for 2009 are preliminary because they do not include reports from all fleets.

SAI-3. State of the stocks

ICCAT recognizes the presence of two stocks of sailfish in the Atlantic, the eastern and western stocks. There is increasing evidence that an alternative stock structure with a north western stock and a south/eastern stock should be considered. Assessments of stocks based on the alternative stock structure option have not been done to date, however, conducting them should be a priority for future assessments.

In 2009 ICCAT conducted a full assessment of both Atlantic sailfish stocks (Anon. 2010c) through a range of production models and by using different combinations of relative abundance indices **(SAI-Figure 4)**. It is clear that there remains considerable uncertainty regarding the stock status of these two stocks, however, many assessment model results present evidence of overfishing and evidence that the stocks are overfished, more so in the east than in the west. Although some of the results suggest a healthy stock in the west, few suggest the same for the east. The eastern stock is also assessed to be more productive than the western stock, and probably able to provide a greater MSY. The eastern stock is likely to be suffering stronger overfishing and most probably has been reduced further below the level that would produce the MSY than the western stock. Reference points obtained with other methods reach similar conclusions.

Examination of recent trends in abundance suggests that both the eastern and western stocks suffered their greatest declines in abundance prior to 1990. Since 1990, trends in relative abundance conflict between different indices, with some indices suggesting declines, other increases and others not showing a trend **(SAI-Figure 4)**. Examination of available length frequencies for a range of fleets show that average length and length distributions do not show clear trends during the period where there are observations. A similar result was obtained in the past for marlins. Although it is possible that, like in the case of the marlins, this reflects the fact that mean length is not a good indicator of fishing pressure for billfish it could also reflect a pattern of high fishing pressure over the period of observation.

SAI-4. Outlook

Both the eastern and western stocks of sailfish may have been reduced to stock sizes below B_{MSY}. There is considerable uncertainty on the level of reduction, particularly for the west, as various production model fits indicated the biomass ratio B_{2007}/B_{MSY} both above and below 1.0. The results for the eastern stock were more pessimistic than those for the western stock in that more of the results indicated recent stock biomass below B_{MSY}. Therefore there is particular concern over the outlook for the eastern stock.

SAI-5. Effect of current regulations

No ICCAT regulations for sailfish are in effect, however, some countries have established domestic regulations to limit the catch of sailfish. Among these regulations are: requirement of releasing all billfish from longline vessels, minimum size restrictions, circle hooks and catch and release strategies in sport fisheries.

SAI-6. Management recommendations

The Committee recommends that catches for the eastern stock should be reduced from current levels. It should be noted, however, that artisanal fishermen harvest a large part of the sailfish catch along the African coast.

The Committee recommends that catches of the western stock of sailfish should not exceed current levels. Any reduction in catch in the West Atlantic is likely to help stock re-growth and reduce the likelihood that the stock is overfished. It should be noted, however, that artisanal fishermen harvest a large part of the sailfish catch of the western sailfish stock.

The Committee is concerned about the incomplete reporting of sailfish catches, particularly for the most recent years, because it increases uncertainty in stock status determination. The Committee recommends all countries landing or having dead discards of sailfish, report these data to the ICCAT Secretariat.

ATLANTIC SAILFISH SUMMARY

	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	600-1,100[1] t	1,250-1,950[1] t
2009 Catches (Provisional)	1,415 t	1,640 t
B_{2007}/B_{MSY}	Possibly < 1.0	Likely < 1.0
F_{2007}/F_{MSY}	Possibly > 1.0	Likely > 1.0
2008 Replacement Yield	not estimated	not estimated
Management Measures in Effect	None[2]	None[2]

[1] Results from Bayesian production model with informative priors. These results represent only the uncertainty in the production model fit. This range underestimates the total uncertainty in the estimates of MSY.
[2] Some countries have domestic regulations.

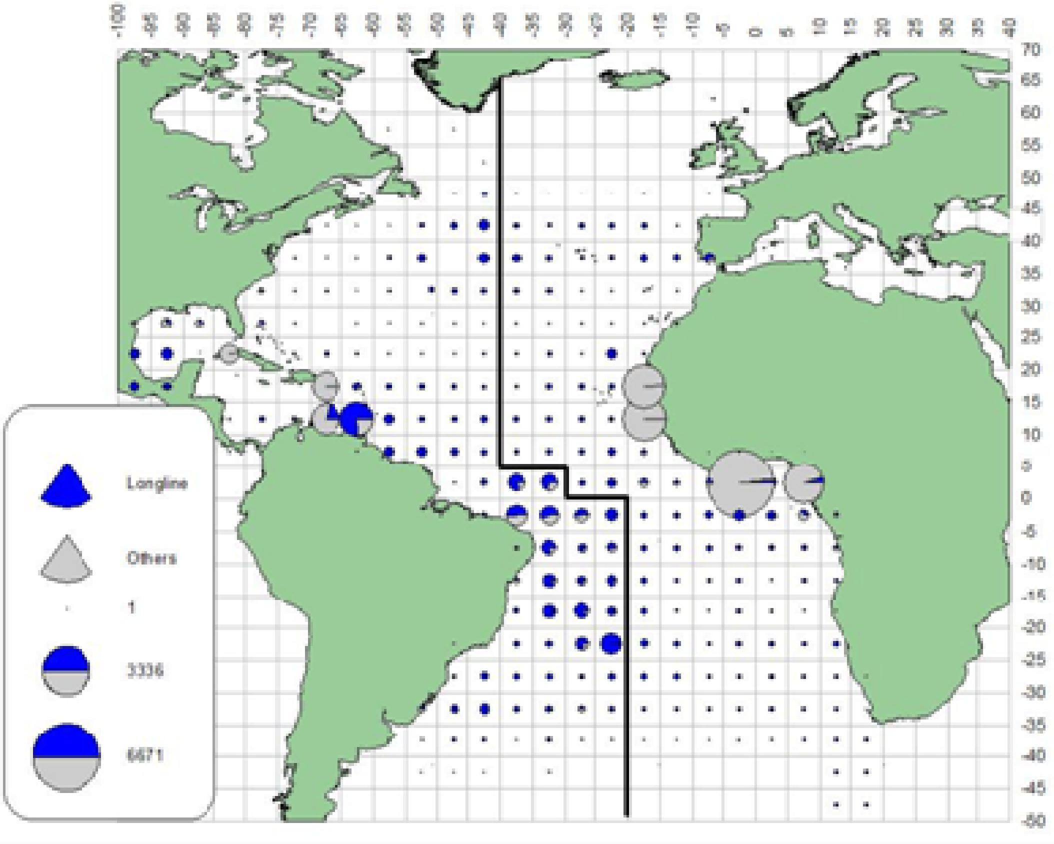
SAI-Table 1. Estimated catches (t) of Atlantic sailfish *(Istiophorus albicans*) by area, gear and flag.

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			3274	3276	3699	3180	2673	3475	2591	3105	3093	2231	2358	2923	2500	2709	2724	3217	3587	3560	3359	3633	3399	2582	3544	3053	3055
	ATE		2269	2065	2553	2109	1710	2315	1476	1780	1815	1172	1234	1881	1337	1362	1342	1694	2136	1579	2043	2237	1964	1553	2395	1794	1640
	ATW		1004	1212	1146	1071	963	1160	1115	1325	1278	1059	1124	1041	1163	1346	1382	1523	1451	1981	1316	1396	1435	1028	1149	1258	1415
Landings	ATE	Longline	89	99	99	93	112	109	47	104	256	151	189	196	206	275	273	167	255	311	270	259	294	461	577	559	560
		Other surf.	1940	1394	1870	1479	1153	1249	1000	983	1111	954	910	1504	644	859	883	976	1114	1170	1491	1758	1527	1047	1629	1128	505
		Sport (HL+RR)	240	571	584	537	445	957	429	692	448	67	135	182	488	228	186	551	767	98	282	219	143	46	189	108	575
	ATW	Longline	417	420	425	334	316	316	159	357	484	346	338	260	323	499	533	800	978	1265	871	747	1062	646	684	975	943
		Other surf.	274	295	187	208	238	514	521	599	498	468	410	482	433	553	615	602	401	603	440	642	368	374	452	267	458
		Sport (HL+RR)	313	496	491	472	352	267	371	333	233	217	348	230	350	267	163	76	60	106	0	0	0	2	6	7	5
Discards	ATW	Longline	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	3	5	8	9	9
		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	1
Landings	ATE	Benin	50	25	32	40	8	21	20	21	20	20	20	19	6	4	5	5	12	2	2	5	3	3	4	0	
		Cape Verde	0	0	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	3	3	3	3	5	9	4	5	11	4	4	8	16	8	1	4
		Chinese Taipei	3	0	1	2	3	5	4	80	157	38	58	24	56	44	66	45	50	62	49	15	25	36	109	104	65
		Cuba	19	55	50	22	53	61	184	200	77	83	72	533	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	40	40	40	66	55	58	38	69	40	54	66	91	65	35	80	45	47	65	121	73	93	78	52	448	74
		EU.España	7	9	19	28	14	0	13	3	42	8	13	42	38	15	20	8	150	210	183	148	177	200	257	206	280
		EU.Portugal	0	0	0	0	0	0	0	1	2	1	2	1	2	27	53	11	3	8	13	19	31	136	43	49	103
		EU.United Kingdom	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
		Gabon	0	0	0	0	0	0	0	0	3	3	110	218	2	0	0	0	0	0	4	0	0	0	0	0	
		Ghana	1485	925	1392	837	465	395	463	297	693	450	353	303	196	351	305	275	568	592	566	521	542	282	420	342	358
		Honduras	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	41	32	16	26	26	31	6	15	27	45	52	47	19	58	16	26	6	20	21	70	50	62	144	199	125
		Korea Rep.	20	2	8	11	12	12	22	2	2	5	5	11	4	0	0	0	0	0	0	0	0	0	0	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	33	85	43	136	122	154	56	133	127	106	122	118	115	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	**0**
		Mixed flags (FR+ES)	364	403	394	408	432	595	174	150	182	160	128	97	110	138	131	98	44	39	44	41	35	32	36	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	27	51	57	69	86	127	120	77	43	3	2	16	7	8	10	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	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		S. Tomé e Príncipe	0	0	0	78	86	97	84	78	81	88	92	96	139	141	141	136	136	136	136	515	346	292	384	0	
		Senegal	241	572	596	587	552	1040	466	860	462	162	167	240	560	260	238	786	953	240	673	567	463	256	737	446	630
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	5	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	9	22	36	23	62	55	95	135	47	31	71	0	
		U.S.A.	0	0	0	0	0	0	2	4	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	0	2	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Aruba	30	30	23	20	16	13	9	5	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0	
		Barbados	0	0	0	0	69	45	29	42	50	46	74	25	71	58	44	44	42	26	27	26	42	58	42	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	12	0	
		Brasil	187	292	174	152	147	301	90	351	243	129	245	310	137	184	356	598	412	547	585	534	416	139	123	222	432
		China P.R.	0	0	0	0	0	0	0	0	0	3	3	3	3	3	9	4	3	1	0	1	0	0	0	1	2
		Chinese Taipei	12	20	9	92	86	42	37	17	112	117	19	19	2	65	17	11	33	31	13	8	21	5	14	28	8
		Cuba	130	50	171	78	55	126	83	70	42	46	37	37	40	28	196	208	68	32	18	50	72	47	56	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	1	0	3	3	4	3
		Dominican Republic	46	18	40	44	44	40	31	98	50	90	40	40	101	89	27	67	81	260	91	144	165	133	147	0	
		EU.España	0	0	0	0	0	0	8	13	13	19	36	5	30	42	7	14	354	449	196	181	113	148	184	393	451
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	2	12	12	110	19	53	101	48
		Grenada	164	211	104	114	98	218	316	310	246	151	119	56	83	151	148	164	187	151	171	112	147	159	174	216	183
		Japan	16	8	2	5	12	12	27	0	1	8	2	4	17	3	10	12	3	3	8	5	22	4	1	33	42
		Korea Rep.	33	10	1	1	12	16	1	2	3	4	4	12	4	0	0	0	0	0	0	0	0	0	0	0	

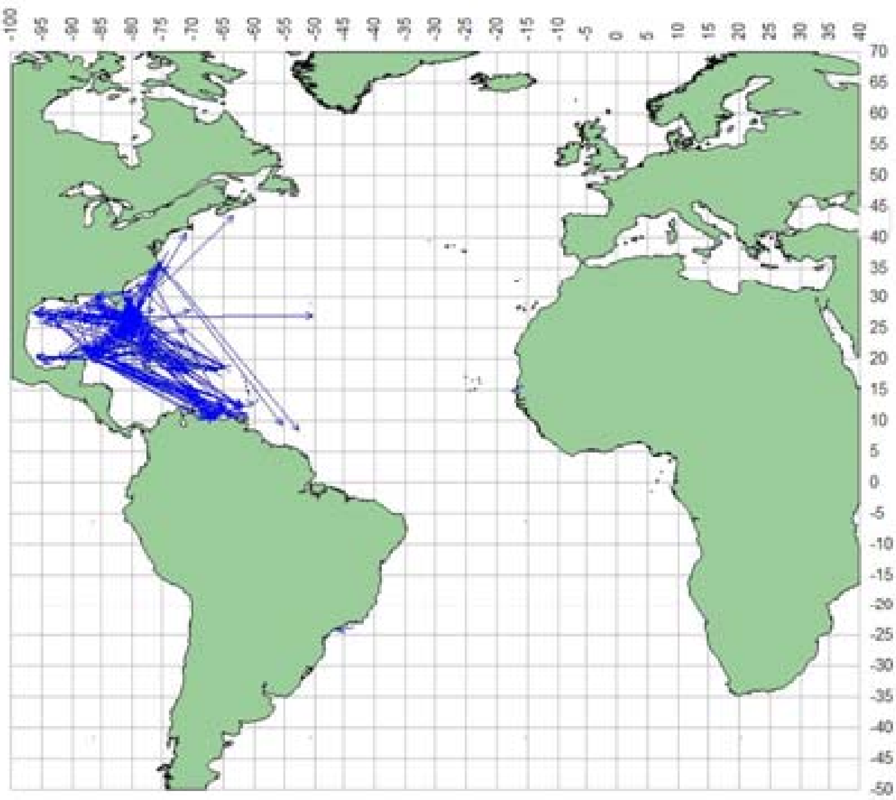
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		Mexico	0	0	0	0	0	0	0	0	2	19	19	10	9	65	40	118	36	34	45	51	55	41	46	45	48
		NEI (ETRO)	0	0	0	0	0	0	0	0	15	27	30	36	46	67	64	41	23	1	1	9	4	4	6	0	
		Netherlands Antilles	10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15	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	0	0	0	0	0	0	0	0	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	2	1	4	4	4	2	1	3	0	1	0	2	164	3	86	73	59	18	13	8
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
		Trinidad and Tobago	14	25	35	24	10	7	3	3	1	2	1	4	10	25	37	3	7	6	8	10	9	17	13	32	16
		U.S.A.	282	462	454	451	324	242	343	294	202	179	345	231	349	267	163	76	58	103	0	0	0	0	0	3	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	0	0	0	
		Venezuela	81	77	80	22	24	24	65	71	206	162	93	155	175	248	169	83	126	159	133	158	178	184	248	154	162
Discards	ATW	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	4	5	7	10	10

SPF-Table 1. Estimated catches (t) of longbill spearfish *(Tetrapturus pfluegeri)* by area, gear and flag.

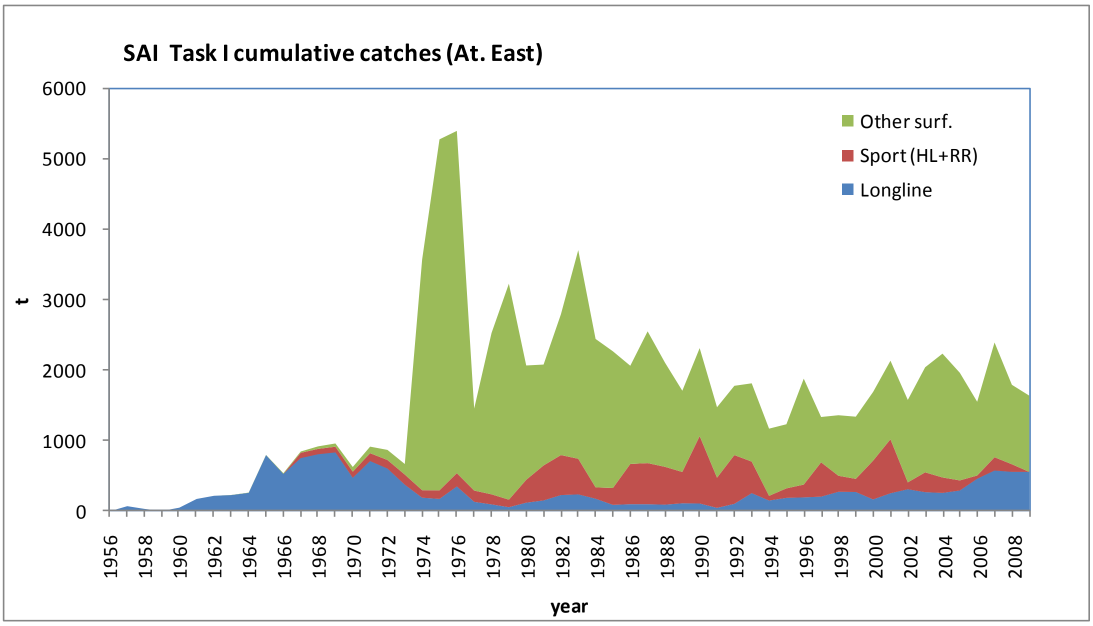
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			375	415	384	532	418	481	214	273	540	320	240	165	201	266	306	278	189	180	132	188	218	340	168	197	154
	ATE		287	293	284	295	310	417	131	255	419	198	207	128	194	192	255	178	80	69	25	15	77	51	30	72	62
	ATW		89	123	100	236	108	64	83	19	121	122	33	37	7	74	51	100	110	83	44	96	43	197	77	125	92
	UNK		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	63	77	98	92	61	0	
Landings	ATE	Longline	59	41	37	39	40	44	24	163	307	100	129	69	126	106	174	118	79	69	25	15	58	51	30	72	62
		Other surf.	228	252	247	256	270	373	107	92	112	98	78	59	68	86	81	60	0	0	0	0	17	0	0	0	
		Sport (HL+RR)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
	ATW	Longline	89	123	100	236	108	64	83	19	121	122	26	34	7	74	51	100	110	83	44	96	43	197	77	125	92
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	2	0	0	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	0	0	0	0	0	0	0	0	0	0	
	UNK	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	63	77	98	92	61	0	
Discards	ATW	Longline	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	
Landings	ATE	China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	6	1	4	4	4	8	6	135	263	63	97	41	94	73	112	75	52	62	25	15	25	37	22	18	13
		EU.España	0	0	0	0	0	0	0	0	12	0	5	1	1	9	29	14	8	7	0	0	3	0	0	2	7
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	8	2	6
		Japan	43	39	21	31	31	32	10	27	31	36	26	25	30	22	33	29	20	0	0	0	0	0	0	49	36
		Korea Rep.	9	0	12	4	5	4	8	1	1	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	
		Mixed flags (FR+ES)	228	252	247	256	270	373	107	92	112	98	78	59	68	86	81	60	0	0	0	0	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	0	0	0	0	
	ATW	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	56	39	3	0	0	5	4	0	**0**
		Chinese Taipei	27	44	22	208	85	41	36	16	111	116	19	18	2	64	16	11	24	39	12	11	20	17	20	15	11
		EU.España	0	0	0	0	0	0	0	0	5	0	1	0	0	0	24	50	22	5	25	0	5	0	0	2	5
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	15	44	10
		Japan	22	20	4	17	10	13	46	1	1	2	3	4	1	8	11	11	3	0	0	0	0	0	0	49	45
		Korea Rep.	39	4	0	2	5	9	0	1	2	4	4	10	4	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	1	0	0	0	0	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	82	0	135	23	13	7
		Trinidad and Tobago	0	54	75	10	7	1	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	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
		Venezuela	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	4	0	3	3	17	5	15	3	14
	UNK	EU.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	63	77	98	74	61	0	
Discards	ATW	U.S.A.	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	

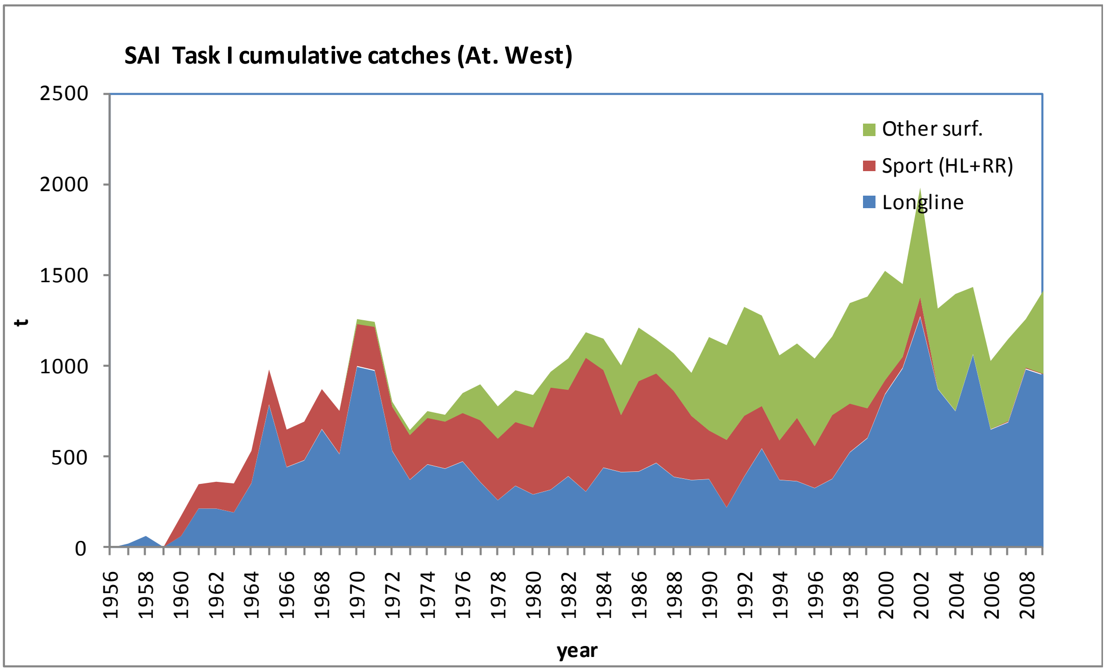


SAI-Figure 1. Geographic distribution of the mean sailfish catch (2000-2008) by major gears.

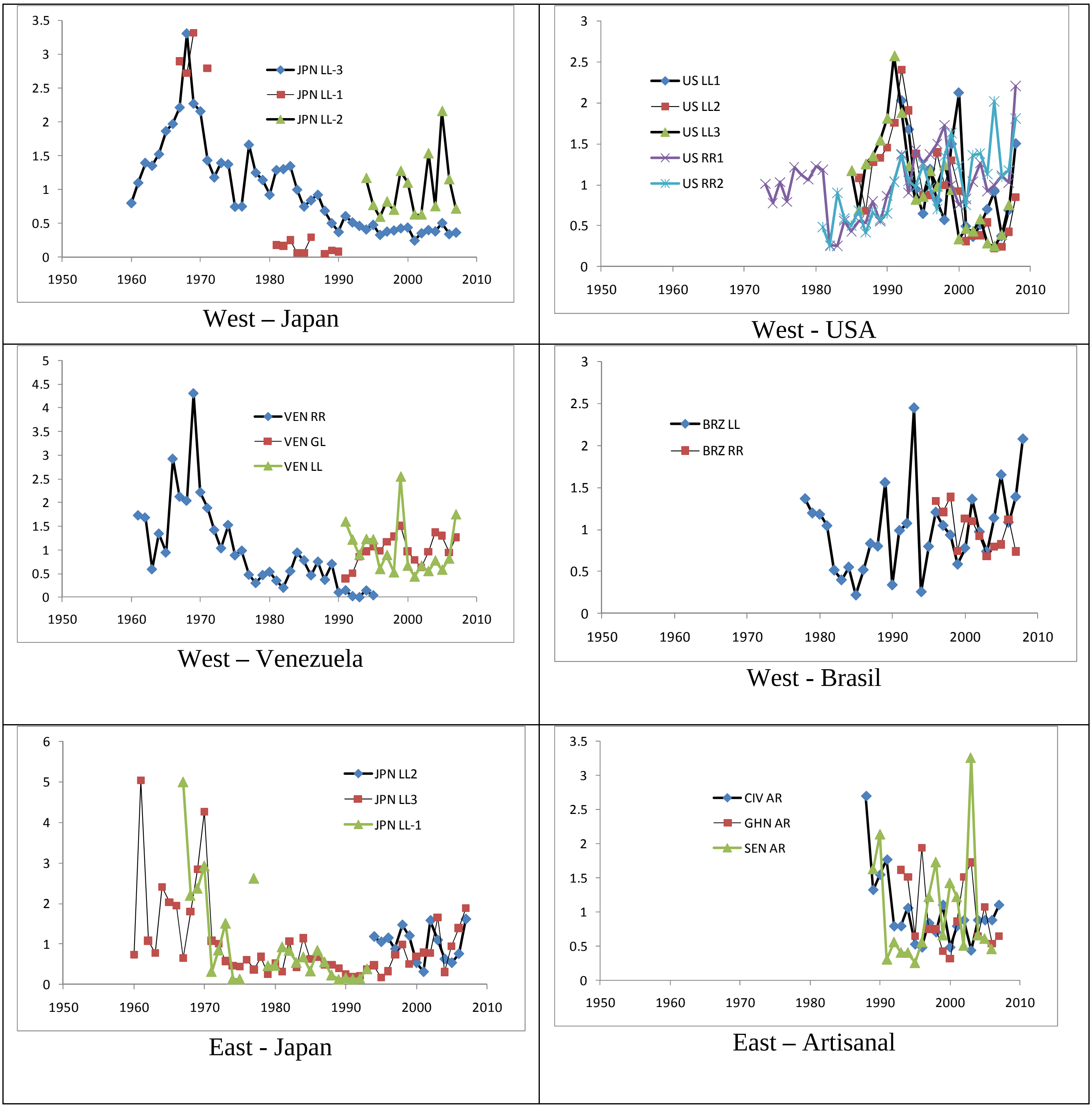


SAI-Figure 2. Conventional tag returns for Atlantic sailfish. Lines join the locations of release and recapture.





SAI-Figure 3. Task I catches of sailfish for each of the two Atlantic stocks, East and West.



SAI-Figure 4. Relative abundance indices obtained by standardizing CPUE data for various fleets. All indices were scaled to the mean of each series prior to graphing.

8.8 SWO-ATL-ATLANTIC SWORDFISH

The last assessment for Atlantic swordfish was conducted in 2009 (Anon. 2010g). 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 15.

SWO-ATL-1. Biology

Swordfish *(Xiphias gladius)* are members of the family *Xiphiidae* and are in the suborder *Scombroidei.* They can reach a maximum weight in excess of 500 kg. They are distributed widely in the Atlantic Ocean and Mediterranean Sea. In the ICCAT convention area, the management units of swordfish 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 from recent electronic tagging studies, 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.

SWO-ATL-2. Fishery indicators

Due to the broad geographical distribution of 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 **(SWO ATL-Figure 2)**. Directed longline fisheries from Canada, EU-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, EU-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 EU-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 (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2009 (25,103 t) represented a slight increase from that in 2008 (23,551 t). As a small number of countries have not yet reported their 2009 catches and because of unknown unreported catches, this value should be considered provisional and subject to further revision.

In an effort to quantify possible unreported catches in the Convention area during the 2009 stock assessment, the ICCAT Statistical Document data base was examined. The use of this information was complicated because of the lack of conversions factors available for products such as loin, fillet, and gilled/gutted swordfish. The comparison between the swordfish Statistical Document System (s.SDS) data from 2003 through 2007 and the reported Task I by flag indicates that Task I catches might not represent the total landed catch of Convention area swordfish, although the extent to which this occurs was highly uncertain. The largest discrepancy between the data sources is for flags with an unknown area of capture, and amounts to nearly 21,000 t over the 2003-2007 time period. Considering only the s.SDS data classified as coming from the Convention area, the discrepancy amounts to an estimate of less than 1,000 t over the time period. The comparison implies that international trade of Convention Area landed swordfish might represent less than 13% of the landed catch recorded in Task I and that a surprisingly low number of Contracting Parties engage in export of Convention area swordfish.

North Atlantic

For the past decade, the North Atlantic estimated catch (landings plus dead discards) has averaged about 11,332 t per year (**SWO-ATL-Table 1** and **SWO-ATL-Figure 3**). The catch in 2009 (12,655 t) represents a 37% decrease since the 1987 peak in North Atlantic landings (20,236 t). These reduced landings have been attributed to ICCAT regulatory recommendations and shifts in fleet distributions, including the movement of some vessels in certain years to the South Atlantic or out of the Atlantic. In addition, some fleets, including at least the United States, EU-Spain, EU-Portugal and Canada, have changed operating procedures to opportunistically target tuna and/or sharks, taking advantage of market conditions and higher relative catch rates of these species previously considered as by-catch in some fleets. Recently, socio-economic factors may have also contributed to the decline in catch.

Trends in nominal catch rates by fleets contributing to the production model are shown in **SWO-ATL-Figure 4**. Most of the series have an increasing trend since the late 1990s, but the U.S. catch rates remained relatively flat. There have been some recent changes in United States regulations that may have impacted catch rates, but these effects remain unknown.

The 2010 Swordfish Species Group reviewed new information from Canada, which updated its nominal catch rate series for the pelagic longline fishery (SCRS/2010/139). The nominal CPUE increased from 2008 to 2009, continuing the increasing trend that commenced in 1996. The Group agreed with the authors' view that more work was needed to reflect changes in management and targeting practices. It was suggested that since the switch from a competitive fishery to an Individual Transferable Quota based-system occurred in 2002, sufficient time has passed to consider breaking the time series into two, reflecting the two periods of contrasting management approaches.

The most frequently occurring ages in the catch include ages 2 and 3 (**SWO-ATL-Figure 5**). There are reports of increasing average size of the catch in some North Atlantic fisheries, including United States and Canada.

South Atlantic

The historical trend of catch (landings plus dead 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 21,930 t in 1995, levels that are comparable to 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 partly due to a shift to other oceans and target species. In 2009, the 12,448 t reported catches were about 44% lower than the 1995 reported level (**SWO-ATL-Figure 3**).

The SCRS noted that there was a considerable decline in the magnitude of the catch by Namibia in 2009 compared with 2008 (25 and 518 t, respectively) that appeared inconsistent with recent developments in capacity. Namibian authorities will be contacted with a request for an explanation for this apparent anomaly.

As observed in the 2006 assessment, the CPUE trend from targeted and non-targeted fisheries show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock (**SWO-ATL-Figure 6**). 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 dead discards (see **SWO-ATL-Table 1**). The volume of Atlantic-wide reported discards since then has ranged from 151 t to 1,139 t per year. Reported annual dead discards have been declining in recent years.

SWO-ATL-3. State of the stocks

North Atlantic

Results from the base case production model are shown in **SWO-ATL-Figure 7.** The estimated relative biomass trend shows a consistent increase since 2000. The current results indicate that the stock is at or above B_{MSY}. The relative trend in fishing mortality shows that the level of fishing peak in 1995, followed by a decrease until 2002, followed by small increase in the 2003-2005 period and downward trend since then. Fishing mortality has been below F_{MSY} since 2005. The results suggest that there is greater than 50% probability that the stock is at or above B_{MSY}, and thus the Commission's rebuilding objective [Rec. 99-02] has been achieved (**SWO-ATL-Figure 8**). However, it is important to note that since 2003 the catches have been below the TAC's greatly increasing the chances for a fast recovery. Overall, the stock was estimated to be somewhat less productive than the previous assessment, with the intrinsic rate of increase, *r*, estimated at 0.44 compared to 0.49 in 2006.

Other analyses conducted by the SCRS (Bayesian surplus production modeling, and Virtual Population Analyses) generally support the results described for the base case surplus production model above.

South Atlantic

The results of the base case production model indicated that there were conflicting signals for several of the indices used. The model estimated overall index was relatively stable until the early 1980s when it started declining until the late 1990s and it reversed that trend about 2003. Estimated relative fishing mortality (F_{2008}/F_{MSY}) was 0.75 indicating that the stock is not being overexploited. Estimated relative biomass (B_{2009}/B_{MSY}) was 1.04 (**SWO-ATL-Figure 9**), indicating that the stock was not overexploited.

Because of the high level of uncertainty associated with the south Atlantic production models results, the SCRS conducted catch-only modeling analysis, including two explorations using different assumptions concerning the intrinsic rate of population increase. The distribution for MSY was skewed for both runs (**SWO-ATL-Figure 10)**. The median of MSY estimated for RUN 1 was 18,130 t and for RUN 2 was 17,934 t. **SWO-ATL-Figure 11** summarizes recent stock status, as determined from the catch-only model.

SWO-ATL-4. Outlook

North Atlantic

The base production model was projected to the year 2018 under constant TAC scenarios of 10, 11, 12, 13, 14 and 15 thousand tones. Catch in year 2009 was assumed to be the average of the last three years (2006-08) (11,515 t). The actual reported landings in 2009 were 12,655 t. Median trajectories for biomass and fishing mortality rate for all of the future TAC scenarios are plotted in **SWO-ATL-Figure 12**.

Future TACs above MSY are projected to result in 50% or lower probabilities of the stock biomass remaining above B_{MSY} over the next decade (**SWO-ATL-Figure 13**) as the resulting probability of F exceeding F_{MSY} for these scenarios would trend above 50% over time. A TAC of 13,000 t would provide approximately a 75% probability of maintaining the stock at a level consistent with the Convention objective over the next decade.

South Atlantic

Projections for the base case production model were performed for catch levels from 10,000 t to 16,000 t by increments of 1,000 t for 2010-2020. For 2009, all projection scenarios assumed a catch equal to the average catch for 2006-2008 (13,658 t). **SWO-ATL-Figure 14** shows the results of the projections. Because the SCRS considers that the production model estimated benchmarks are poorly estimated, the projections are shown as biomass changes rather than relative biomass. In general, catches of 14,000 t or less will result in increases in the biomass of the stock; catches on the order of 15,000 will maintain the biomass of the stock at approximately stable levels during the period projected. Catches on the order of 16,000 t or more will result in biomass decrease. The current TAC is 17,000 t.

For the catch only model projections, constant catch scenarios were evaluated ranging from 10,000 to 17,000 t, incremented by 1,000 t for a period of 10 years. For 2009, all projection scenarios assumed a catch equal to the average catch for 2006-2008 (13,658 t). In general, catches of 15,000 t will result in the biomasses being higher than B_{MSY} 80% of the time. **SWO-ATL-Figure 15** summarizes the probability of $B>B_{MSY}$ and $F<F_{MSY}$ for the constant catch scenarios indicated over time. Catches on the order of 17,000 will result in a probability of 0.67 of the biomass being above B_{MSY} in ten years.

SWO-ATL-5. Effects of current regulations

In 2006, the Committee provided information on the effectiveness of existing minimum size regulations. New catch regulations were implemented on the basis of Rec. 06-02, which entered into effect in 2007 (Rec. 08-02 extended the provisions of Rec. 06-02 to include 2009). Finally, Rec. 09-02 came into effect in 2010 and extended most of the provisions of Rec. 06-02 for one year only.

Catch limits

The total allowable catch in the North Atlantic during the 2007 to 2009 period was 14,000 t per year. The reported catch during that period averaged 12,096 t and did not exceed the TAC in any year. Reports for 2009 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. The reported catch during that period averaged 13,455 t, and did not exceed the TAC in any year. Reports for 2009 are considered provisional and subject to change.

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.

For the 2006-2008 period, the estimate of the percentage of swordfish reported landed (throughout the Atlantic) less than 125 cm LJFL was about 24% (in number) overall for all nations fishing in the Atlantic (28% in the northern stock and 20% in southern stock). If this calculation is made using reported landings plus estimated dead discards, then the percentage less than 125 cm LJFL would be of the same order given the relatively small amount of discards reported. These estimates are based on the overall catch at size, which have high levels of substitutions for a significant portion of the total catch.

Other implications

The Committee is concerned that in some cases national regulations have resulted in the unreported discarding 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 these 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

Consistent with the goal of the Commission's swordfish rebuilding plan [Rec. 96-02], in order to maintain the northern Atlantic swordfish stock at a level that could produce MSY, with greater than 50% probability, the Committee recommended reducing catch limits allowed by Rec. 06-02 (15,345 t) to no more than 13,700 t, which reflects the current best estimate of maximum yield that could be harvested from the population under existing environmental and fishery conditions. Should the Commission wish to have greater assurance that future biomass would be at or above B_{MSY} while maintaining F at or below F_{MSY}, the Commission should select a lower annual TAC, depending on the degree of precaution the Commission chooses to apply in management.

The Committee noted that allowable catch levels agreed in [Recs. 06-02 and 08-02] exceeded scientific recommendations. The successful rebuilding of this stock could have been compromised if recent catches had been higher than realized.

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 emphasizes that annual catch should not exceed the provisionally estimated MSY (15,000). Considering the unquantified uncertainties and the conflicting indications for the stock, the Committee recommends a more precautionary Fishery Management approach, to limit catches to the recent average level (~15,000 t), which are expected to maintain the catch rates at about their current level.

ATLANTIC SWORDFISH SUMMARY

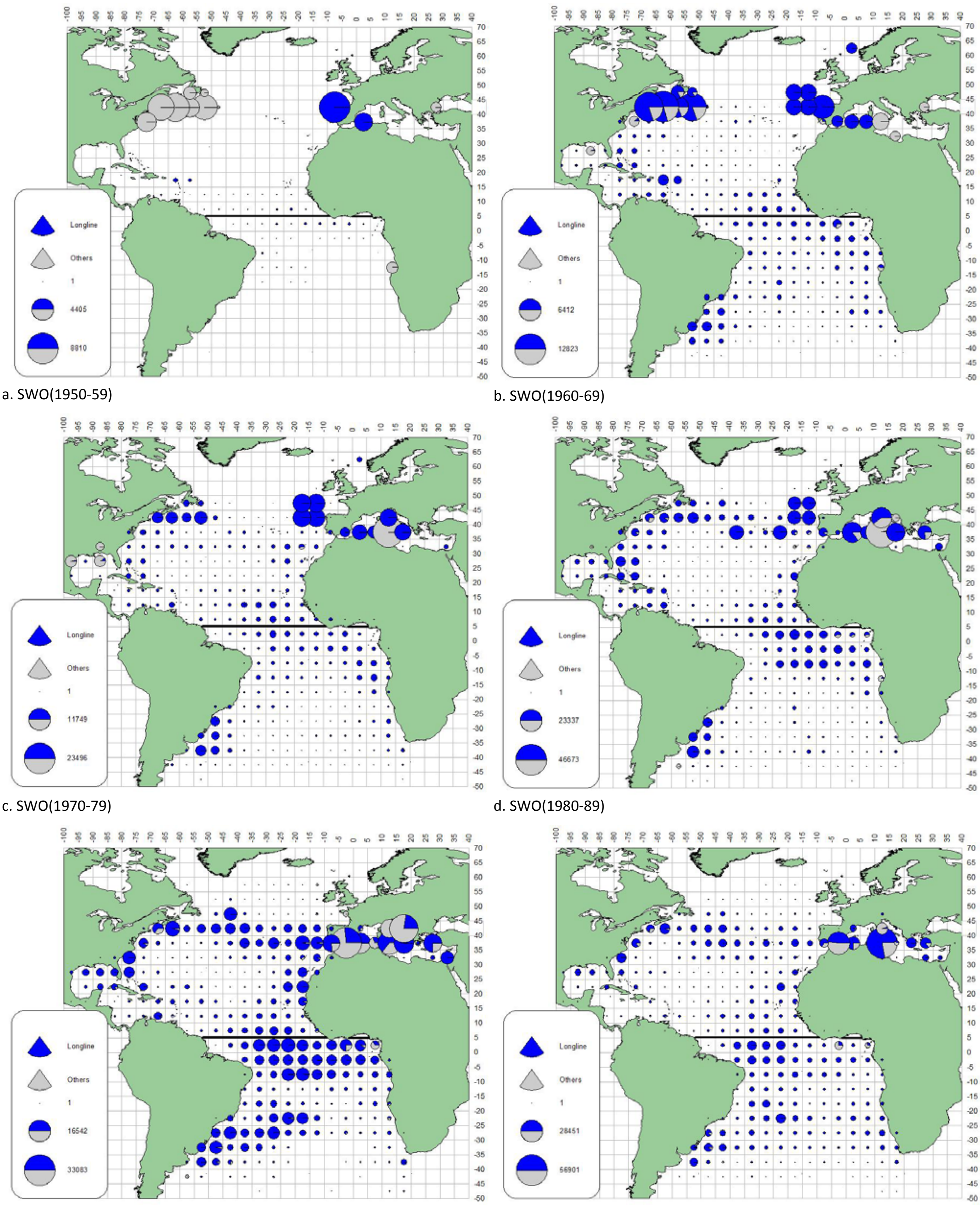
	North Atlantic	**South Atlantic**
Maximum Sustainable Yield[1]	13,730 t (13,020-14,182)[3]	~15,000 t
Current (2009) TAC	14,000 t	15,000 t
Current (2009) Yield[2]	12,655 t	12,448 t
Yield in last year used in assessment (2008)	11,188 t[5]	12,363 t[5]
B_{MSY}	61,860 (53,280-91,627)	47,700
F_{MSY}	0.22 (0.14-0.27)	0.31
Relative Biomass (B_{2009}/B_{MSY})	1.05 (0.94-1.24)	1.04 (0.82-1.22)
Relative Fishing Mortality (F_{2008}/F_{MSY}[1])	0.76 (0.67-0.96)	0.75 (0.60-1.01)
Stock Status	Overfished: NO Overfishing: NO	Overfished: NO Overfishing: NO
Management Measures in Effect:	Country-specific TACs [Recs. 06-02, 08-02 and 09-02]; 125/119cm LJFL minimum size	Country-specific TACs [Rec. 06-03 and 09-03]; 125/119cm LJFL minimum size

1 Base Case production model (Logistic) results based on catch data 1950-2008.
2 Provisional and subject to revision.
3 80% bias corrected confidence intervals are shown.
4 Provisional and preliminary, based on production model results that included catch data from 1970-2008.
5 As of 29 September 2010.

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

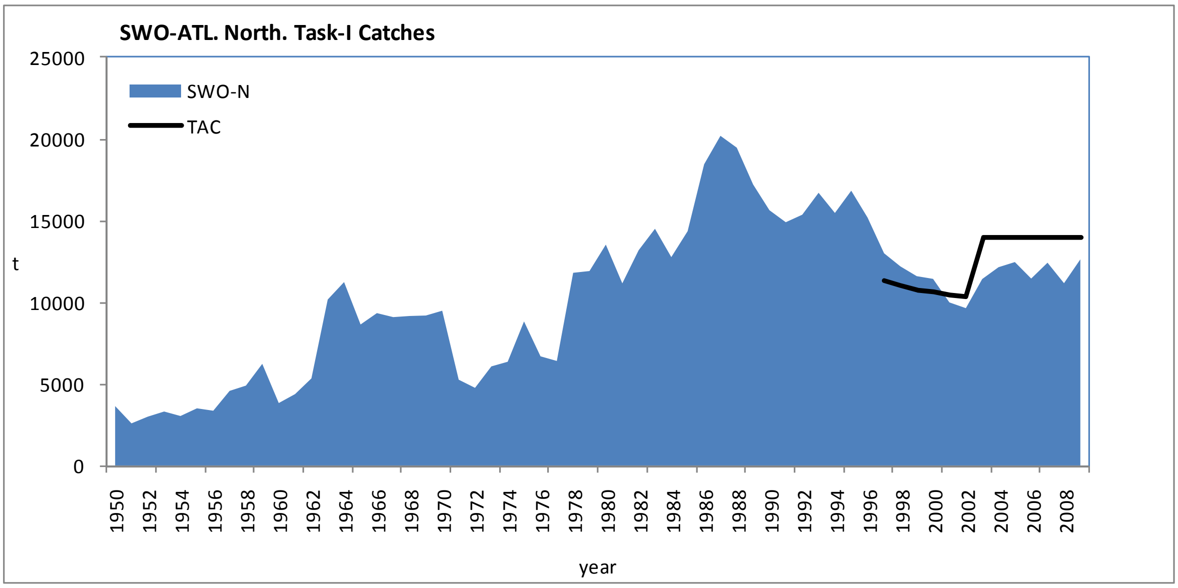
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			23969	24380	26266	32685	34305	32976	28826	29207	32868	34459	38803	33511	31567	26251	27123	27180	25139	23758	24075	25252	25643	25718	27997	23551	25103
	ATN		14383	18486	20236	19513	17250	15672	14934	15394	16738	15501	16872	15222	13025	12223	11622	11453	10011	9654	11442	12175	12480	11473	12444	11188	12655
	ATS		9586	5894	6030	13172	17055	17304	13893	13813	16130	18958	21930	18289	18542	14027	15502	15728	15128	14104	12633	13077	13162	14245	15553	12363	12448
Landings	ATN	Longline	14240	18269	20022	18927	15348	14026	14208	14288	15641	14309	15764	13808	12181	10778	10449	9642	8425	8664	9997	11406	11527	10840	11617	10473	11724
		Other surf.	143	217	214	586	1902	1646	511	723	689	484	582	826	393	961	643	672	685	374	822	449	620	409	546	471	780
	ATS	Longline	8863	4951	5446	12404	16398	16705	13287	13176	15547	17387	20806	17799	18239	13748	14823	15448	14302	13576	11712	12485	12915	13723	14890	11623	12062
		Other surf.	723	943	584	768	657	599	606	637	583	1571	1124	489	282	269	672	278	825	527	920	591	248	522	572	734	386
Discards	ATN	Longline	0	0	0	0	0	0	215	383	408	708	526	562	439	476	525	1137	896	607	618	313	323	215	273	235	145
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	26	12	9	4	1	6	8	5	7	10	8	8	9	6
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	91	6	
		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	
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	0	33	16	16	12	13	19	10	21	25	44	39	27	39	20
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	112
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	0	
		Canada	585	1059	954	898	1247	911	1026	1547	2234	1676	1610	739	1089	1115	1119	968	1079	959	1285	1203	1558	1404	1348	1334	1300
		China P.R.	0	0	0	0	0	0	0	0	73	86	104	132	40	337	304	22	102	90	316	56	108	72	85	92	92
		Chinese Taipei	152	157	52	23	17	270	577	441	127	507	489	521	509	286	285	347	299	310	257	30	140	172	103	82	89
		Cuba	162	636	910	832	87	47	23	27	16	50	86	7	7	7	7	0	0	10	3	3	2	2	0	0	
		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	0	0	25
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		EU.Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	7441	9719	11135	9799	6648	6386	6633	6672	6598	6185	6953	5547	5140	4079	3996	4595	3968	3957	4586	5376	5521	5448	5564	4366	4949
		EU.France	4	4	0	0	0	75	75	75	95	46	84	97	164	110	104	122	0	74	169	102	178	92	46	14	15
		EU.Ireland	0	0	0	0	0	0	0	0	7	0	0	15	15	132	81	35	17	5	12	1	1	3	2	2	1
		EU.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	
		EU.Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	22	468	994	617	300	475	773	542	1961	1599	1617	1703	903	773	777	732	735	766	1032	1320	900	949	778	747	898
		EU.United Kingdom	0	0	0	0	0	0	0	0	2	3	1	5	11	0	2	1	0	0	0	0	0	0	0	0	2
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	36	48	0	82	48	17
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	
		Grenada	0	0	0	56	5	1	2	3	13	0	1	4	15	15	42	84	0	54	88	73	56	30	26	43	
		Iceland	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	921	807	413	621	1572	1051	992	1064	1126	933	1043	1494	1218	1391	1089	161	0	0	0	575	705	656	889	935	1197
		Korea Rep.	160	68	60	30	320	51	3	3	19	16	16	19	15	0	0	0	0	0	0	0	51	65	175	157	3
		Liberia	24	16	30	19	35	3	0	7	14	26	28	28	28	28	28	0	0	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	2	0	0	
		Maroc	137	181	197	196	222	91	110	69	39	36	79	462	267	191	119	114	523	223	329	335	334	341	237	430	724
		Mexico	0	0	0	0	0	0	0	0	6	14	0	22	14	28	24	37	27	34	32	44	41	31	35	34	32
		NEI (ETRO)	0	0	0	76	112	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	0	14	3	131	190	185	43	35	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	44	5	0	8	0	22	28
		Rumania	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		Senegal	0	0	0	0	1	0	6	6	0	0	0	0	0	0	0	0	0	0	0	108	108	0	180	138	223
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	3	0	3	23	0	4	3	1	0	1	0	22	22	7	7	7	0	51	7	34
		Sta. Lucia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0	2	0
		Trinidad and Tobago	6	45	151	42	79	66	71	562	11	180	150	158	110	130	138	41	75	92	78	83	91	19	29	48	30
		U.S.A.	4705	5210	5247	6171	6411	5519	4310	3852	3783	3366	4026	3559	2987	3058	2908	2863	2217	2384	2513	2380	2160	1873	2463	2387	2697
		U.S.S.R.	13	18	4	0	0	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	1	1	5	5	3	3	2	0	0	1	1	0	3	4	3
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	7	0	3	

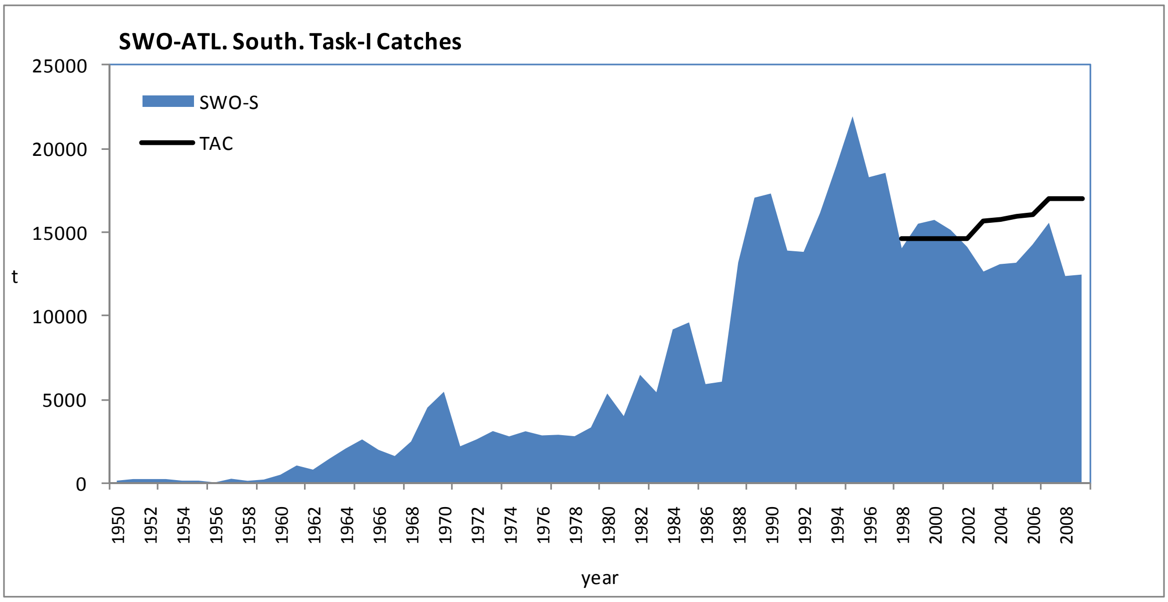
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	29	14	0	0	
		Venezuela	51	84	86	2	4	9	75	103	73	69	54	85	20	37	30	44	21	34	45	53	55	22	30	11	13
	ATS	Angola	228	815	84	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
		Argentina	361	31	351	198	175	230	88	88	14	24	0	0	0	0	38	0	5	10	8	0	0	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	1	0	0	0	17	8	0	0	0	0	0	0	120	32	111
		Benin	90	39	13	19	26	28	28	26	28	25	24	24	10	0	3	0	0	0	0	0	0	0	0	0	
		Brasil	562	753	947	1162	1168	1696	1312	2609	2013	1571	1975	1892	4100	3847	4721	4579	4082	2910	2920	2998	3785	4430	4153	3407	3386
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	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	29	534	344	200	423	353	278	91	300	473	470	291
		Chinese Taipei	280	216	338	798	610	900	1453	1686	846	2829	2876	2873	2562	1147	1168	1303	1149	1164	1254	745	744	377	671	727	612
		Cuba	1301	95	173	159	830	448	209	246	192	452	778	60	60	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	10	10	10	12	7	8	18	13	14	20	19	26	18	25	26	20	19	19	43	29	31	39	17	159	100
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	0	66	0	4393	7725	6166	5760	5651	6974	7937	11290	9622	8461	5832	5758	6388	5789	5741	4527	5483	5402	5300	5283	4073	5183
		EU.Lithuania	0	0	0	0	0	0	0	0	0	794	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	1	0	0	380	389	441	384	381	392	393	380	354	345	493	440	428	271	367
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	0	0	3
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	
		Ghana	25	13	123	235	156	146	73	69	121	51	103	140	44	106	121	117	531	372	734	343	55	32	65	177	132
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	
		Honduras	0	0	0	0	0	0	0	3	0	0	6	4	5	2	8	0	0	0	0	0	0	0	0	0	
		Japan	4613	2913	2620	4453	4019	6708	4459	2870	5256	4699	3619	2197	1494	1186	775	790	685	833	924	686	480	1090	2155	1600	1491
		Korea Rep.	917	369	666	1012	776	50	147	147	198	164	164	7	18	7	5	10	0	2	24	70	36	94	176	223	10
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	856	439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	22	0	0	0	0	730	469	751	504	191	549	832	1118	1038	518	25
		Nigeria	0	0	0	0	0	0	0	3	0	0	0	9	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	29	105	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	8	1	1	4	58	41	49
		S. Tomé e Príncipe	0	0	0	216	207	181	179	177	202	190	178	166	148	135	129	120	120	120	120	126	147	138	138	138	
		Seychelles	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	8	5	5	4	0	0	5	9	4	1	4	1	1	240	143	328	547	649	293	295	199	186	207	142	170
		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	10	7	16
		Togo	6	32	1	0	2	3	5	5	8	14	14	64	0	0	0	0	0	0	0	9	10	2	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	171	396	160	179	142	43	200	21	15	0	0	0	0	
		U.S.S.R.	60	0	0	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	20	4	0	0	0	0	0	0	
		Uruguay	1125	537	699	427	414	302	156	210	260	165	499	644	760	889	650	713	789	768	850	1105	843	620	464	370	501
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	26	6	3	
Discards	ATN	Canada	0	0	0	0	0	0	0	0	0	0	0	0	5	52	35	50	26	33	79	45	106	38	61	39	9
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	598	567	319	263	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	0	0	0	0	215	383	408	708	526	588	446	433	494	490	308	263	282	275	227	185	220	205	142
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	6	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	0	0	



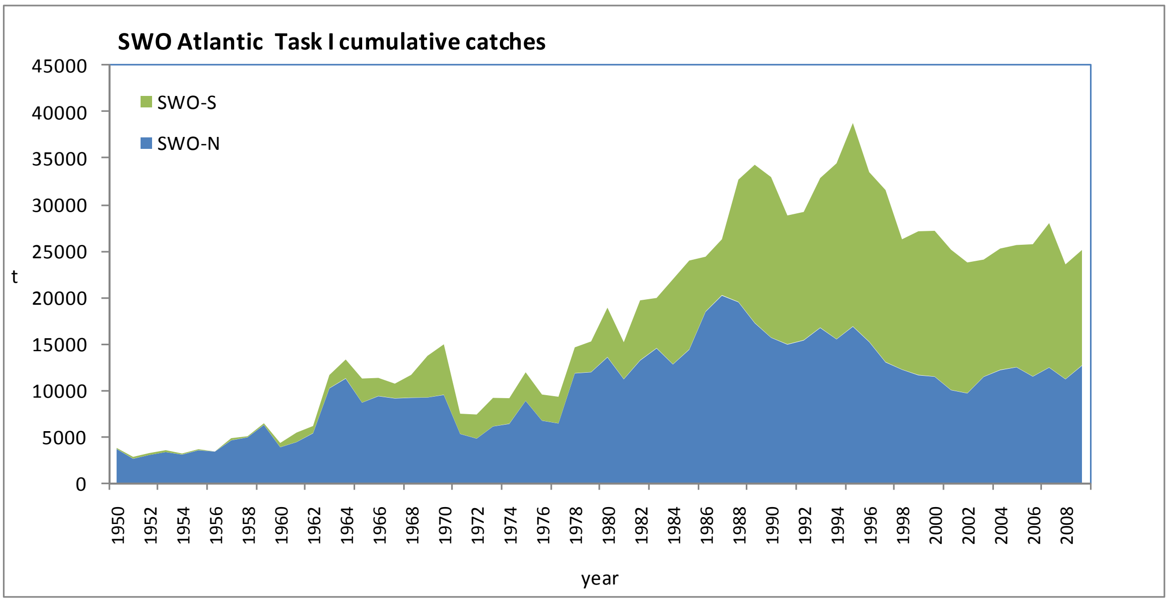
a. SWO(1950-59)
b. SWO(1960-69)
c. SWO(1970-79)
d. SWO(1980-89)
e. SWO (1990-99)
f. SWO (2000-08)

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 2008) is shown on the bottom right.

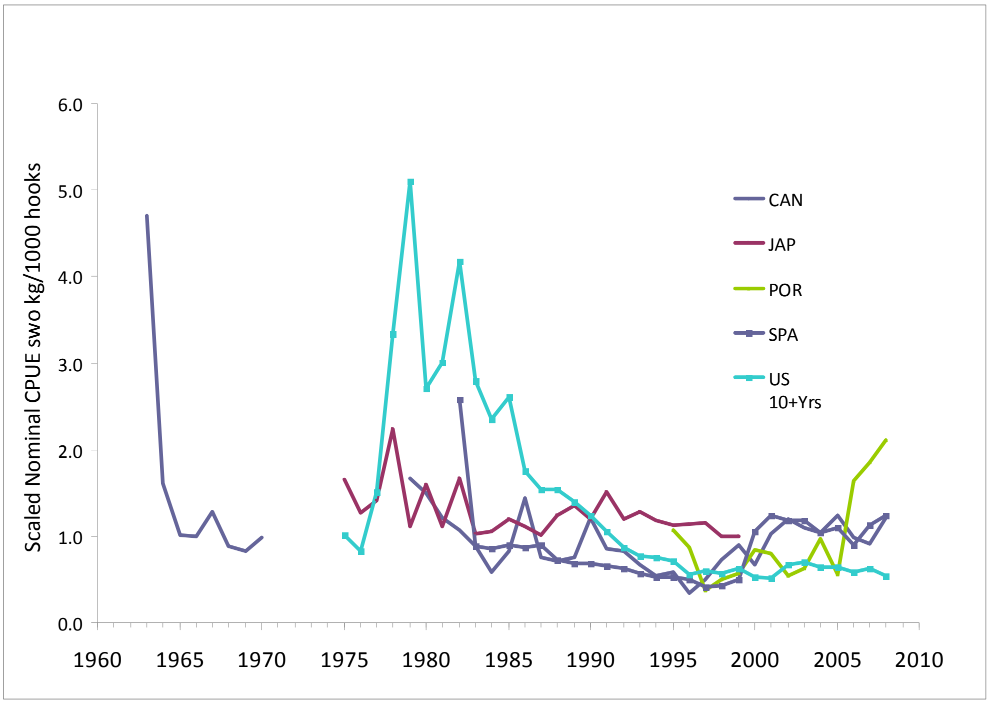




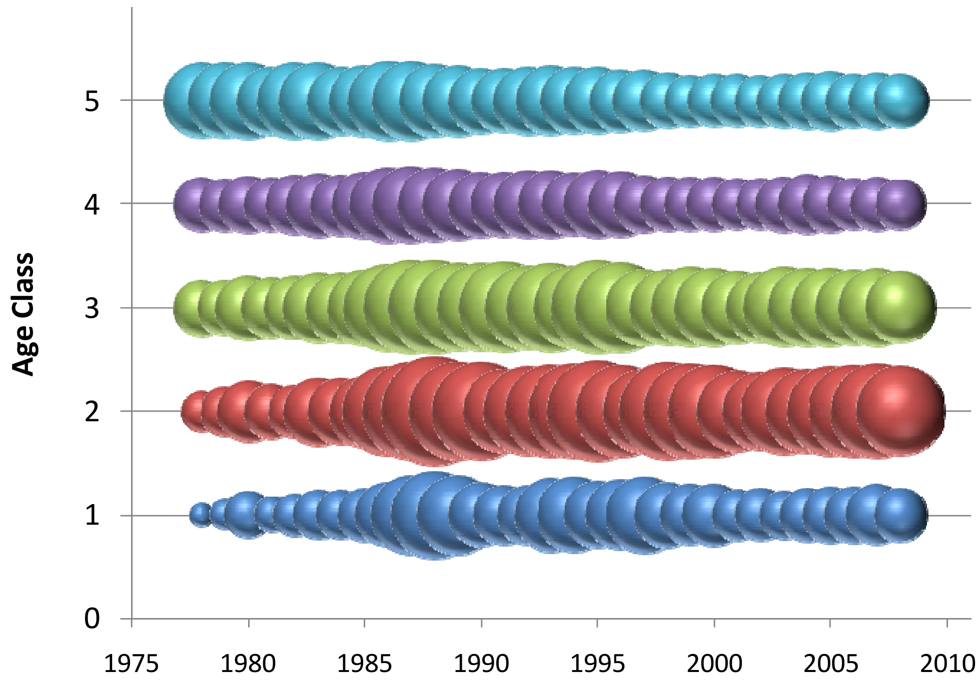
SWO-ATL-Figure 2. North and South Atlantic swordfish catch (t) by flag.



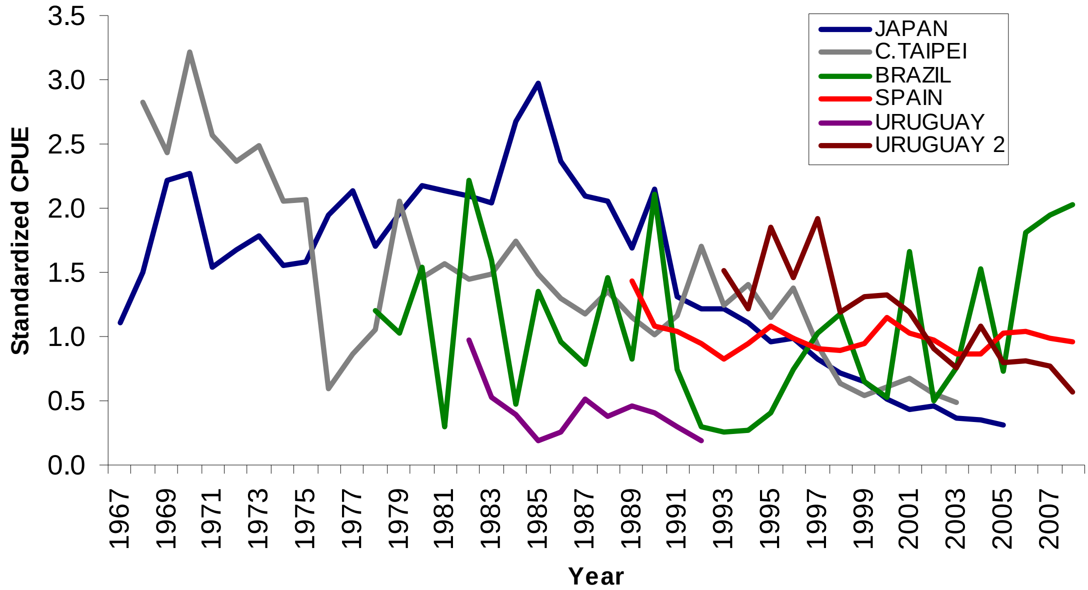
SWO-ATL-Figure 3. Swordfish reported catches (t) for North and South Atlantic, for the period 1950-2009 and the corresponding TAC.



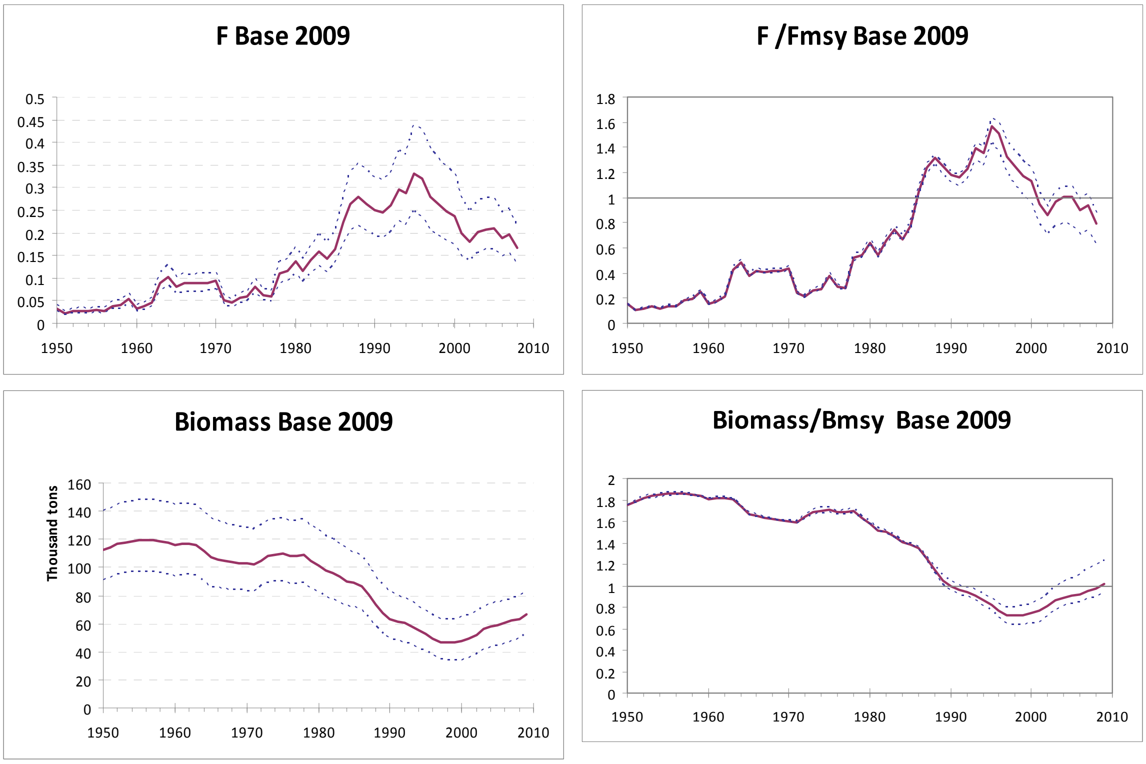
SWO-ATL-Figure 4. North Atlantic swordfish scaled nominal catch rate series used as input in the combined index of the base production model.



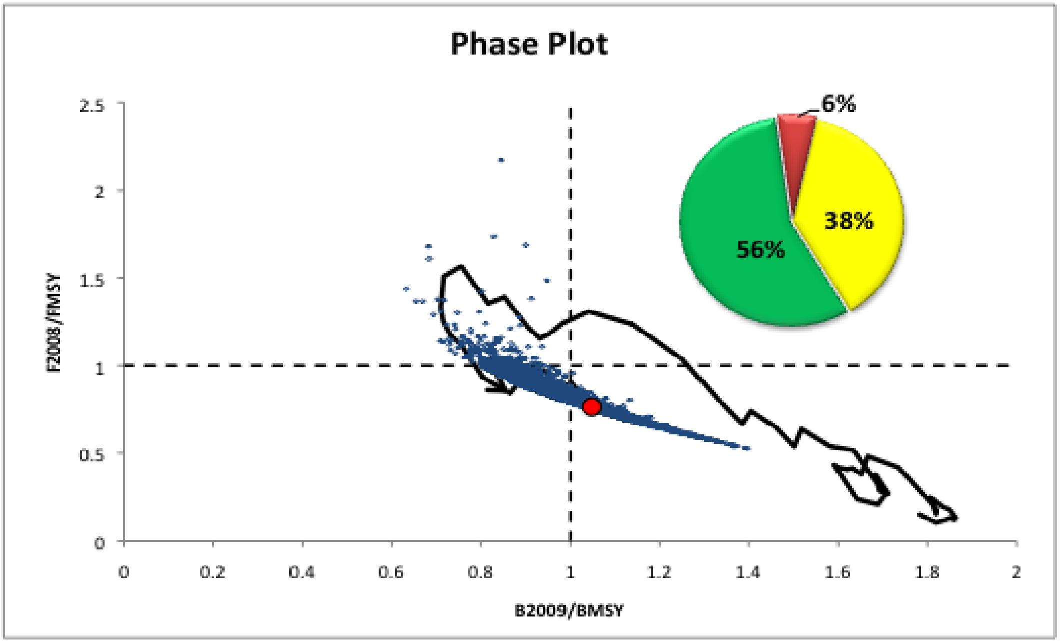
SWO-ATL-Figure 5. North Atlantic swordfish, catch at age (numbers) converted from catch at size. The area of the filled circle shows the proportional catch at age. Note: Age 5 is a plus group.



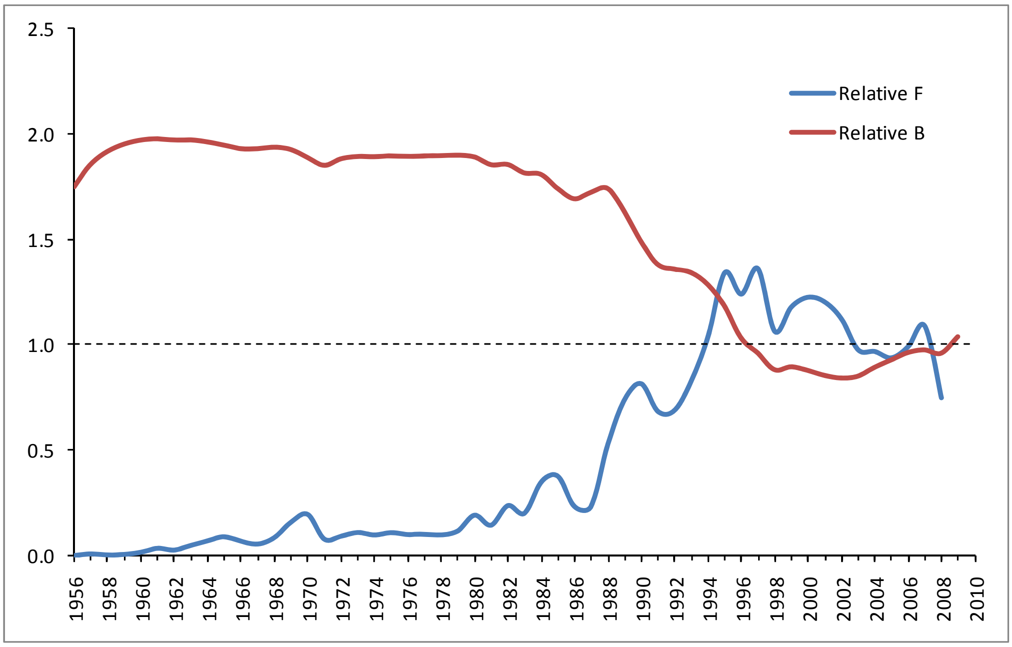
SWO-ATL-Figure 6. South Atlantic swordfish, standardized CPUE series for the production model (ASPIC) for characterizing the status of southern Atlantic swordfish (Scaled relative to mean of overlap).The series for Uruguay was treated as two series.



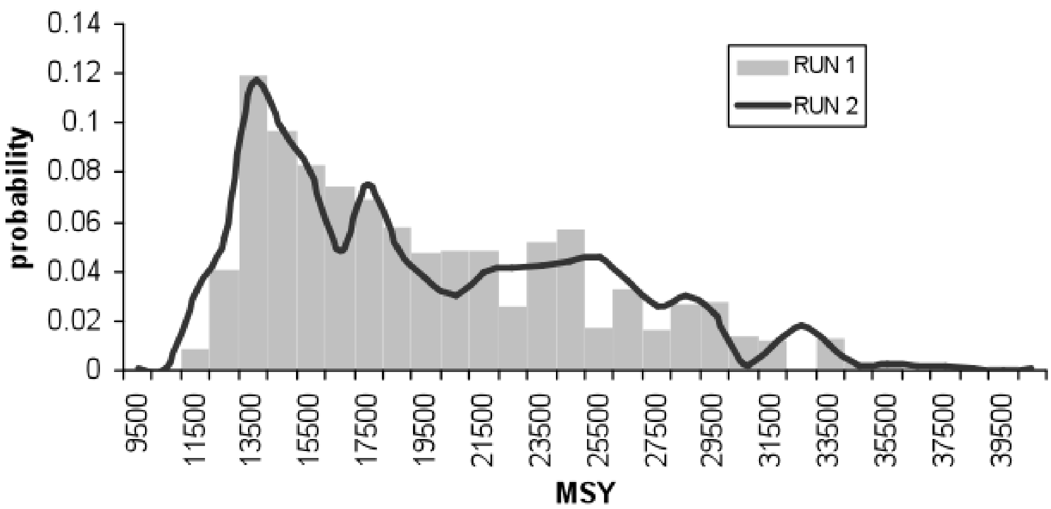
SWO-ATL-Figure 7. North Atlantic swordfish, biomass, fishing mortality and relative ratio trends for the base production model. The solid lines represent point estimates and broken lines represent estimated 80% bias corrected confidence intervals.



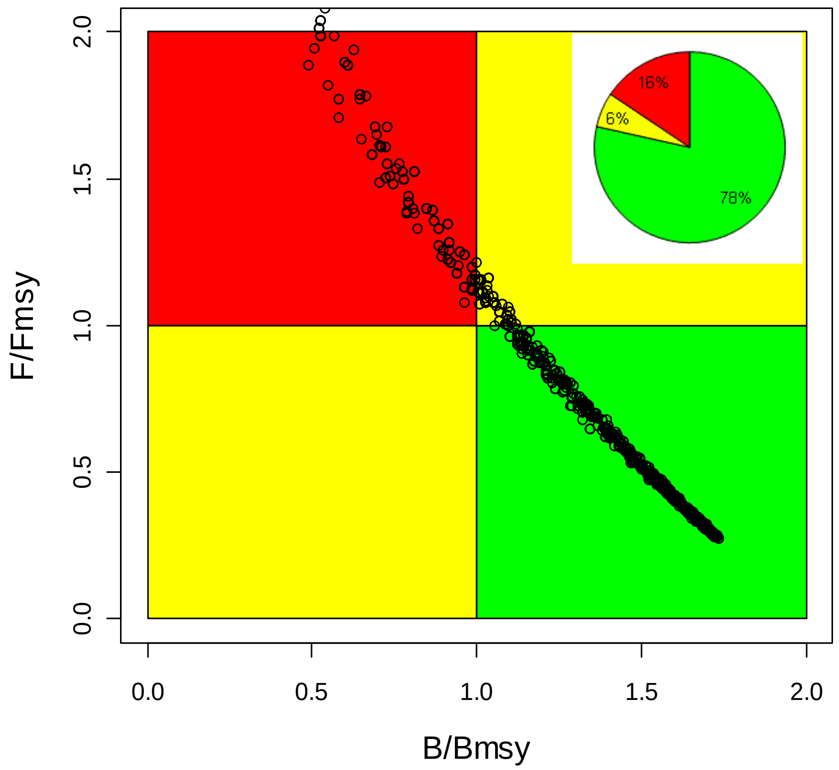
SWO-ATL-Figure 8. Summary figure of the current northern Atlantic swordfish stock status which includes different representation of the bootstraps results of the base ASPIC model: percentage, phase-plots (marked dot corresponds to the deterministic result) and stock status trajectories for the period 1950-2008. The x-axis represents relative biomass, and the y-axis relative exploitation rate.



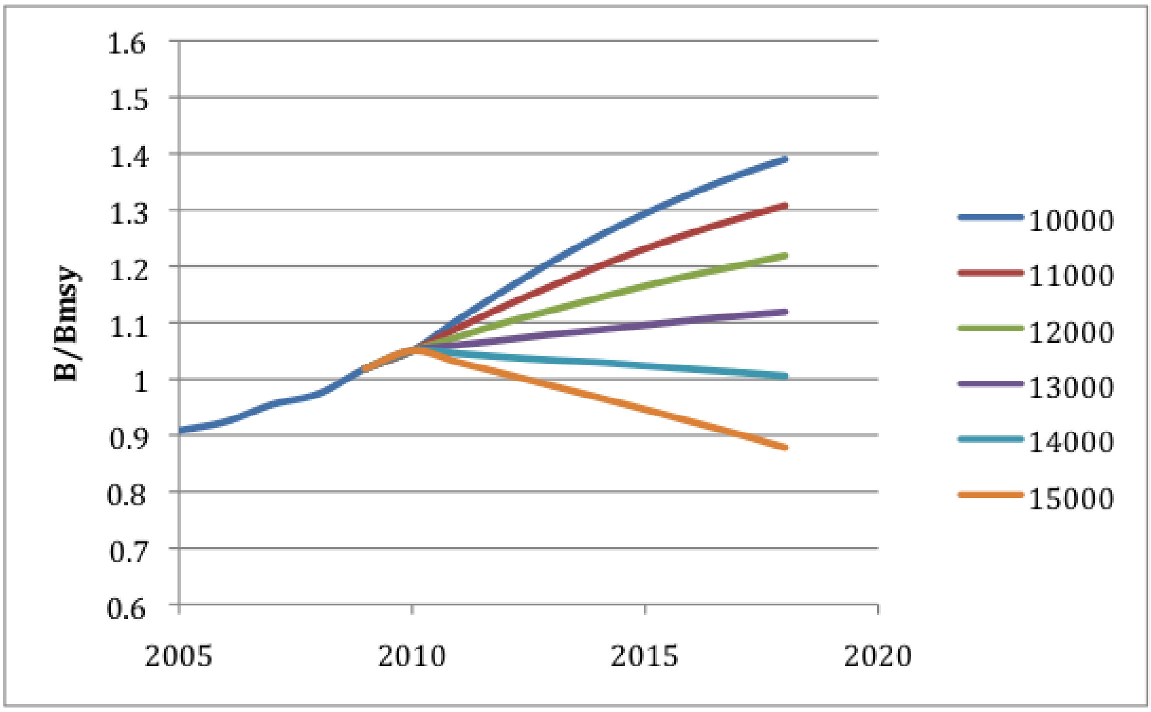
SWO-ATL Figure 9. South Atlantic, relative biomass (B/B_{MSY}) and relative fishing mortality (F/F_{MSY}) trajectories estimated by the base case production model.

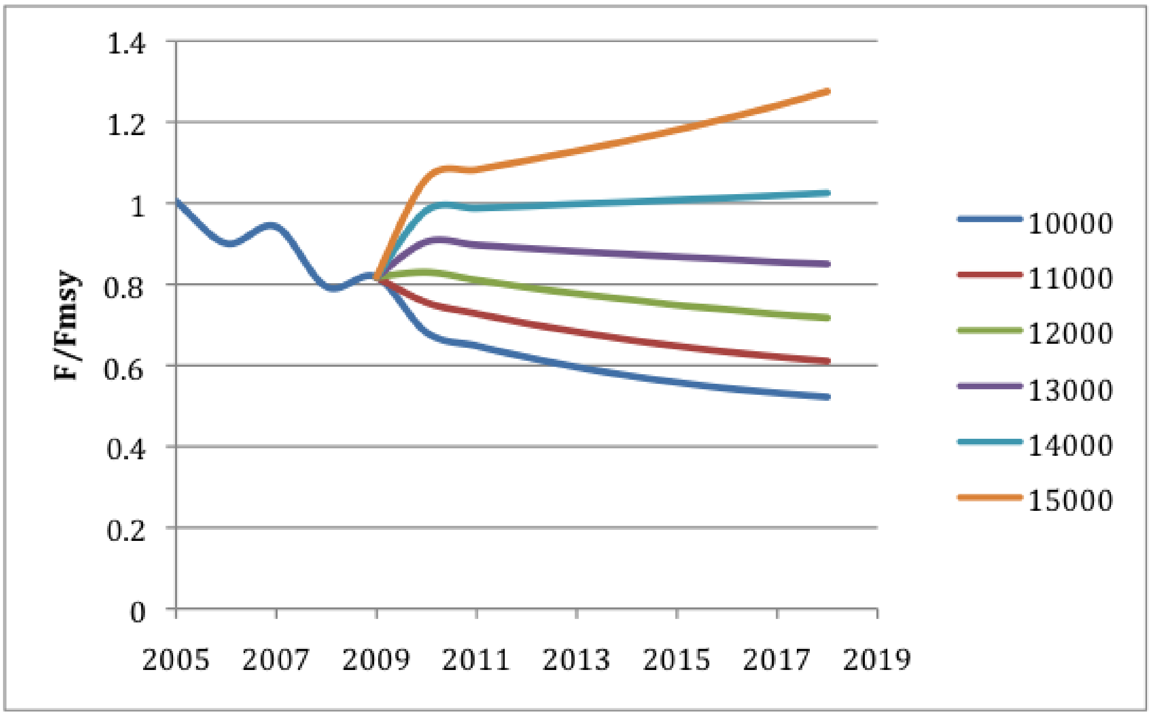


SWO-ATL-Figure 10. Posterior probability density estimates of MSY for South Atlantic swordfish from the catch-only model fitted to catch data from 1950 to 2009. Run 1 and 2 refer to two scenarios with different assumptions for the intrinsic rate of population increase.

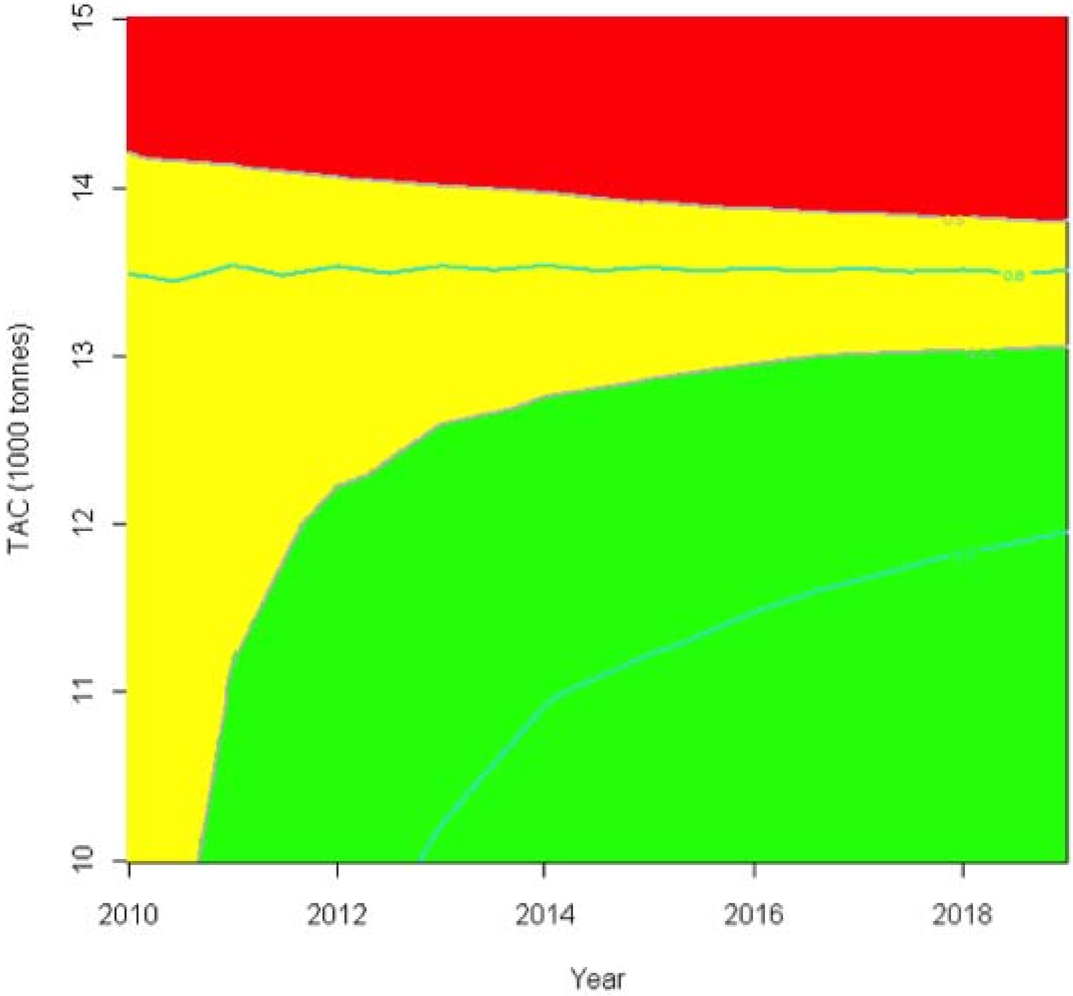


SWO-ATL-Figure 11. Summary figure of the current southern Atlantic swordfish stock status which includes the level of uncertainty on the knowledge of the state of the stock. Conditioned only on the catches**,** the model estimated a probability of 0.78 that the stock is not overfished and it is not undergoing overfishing.

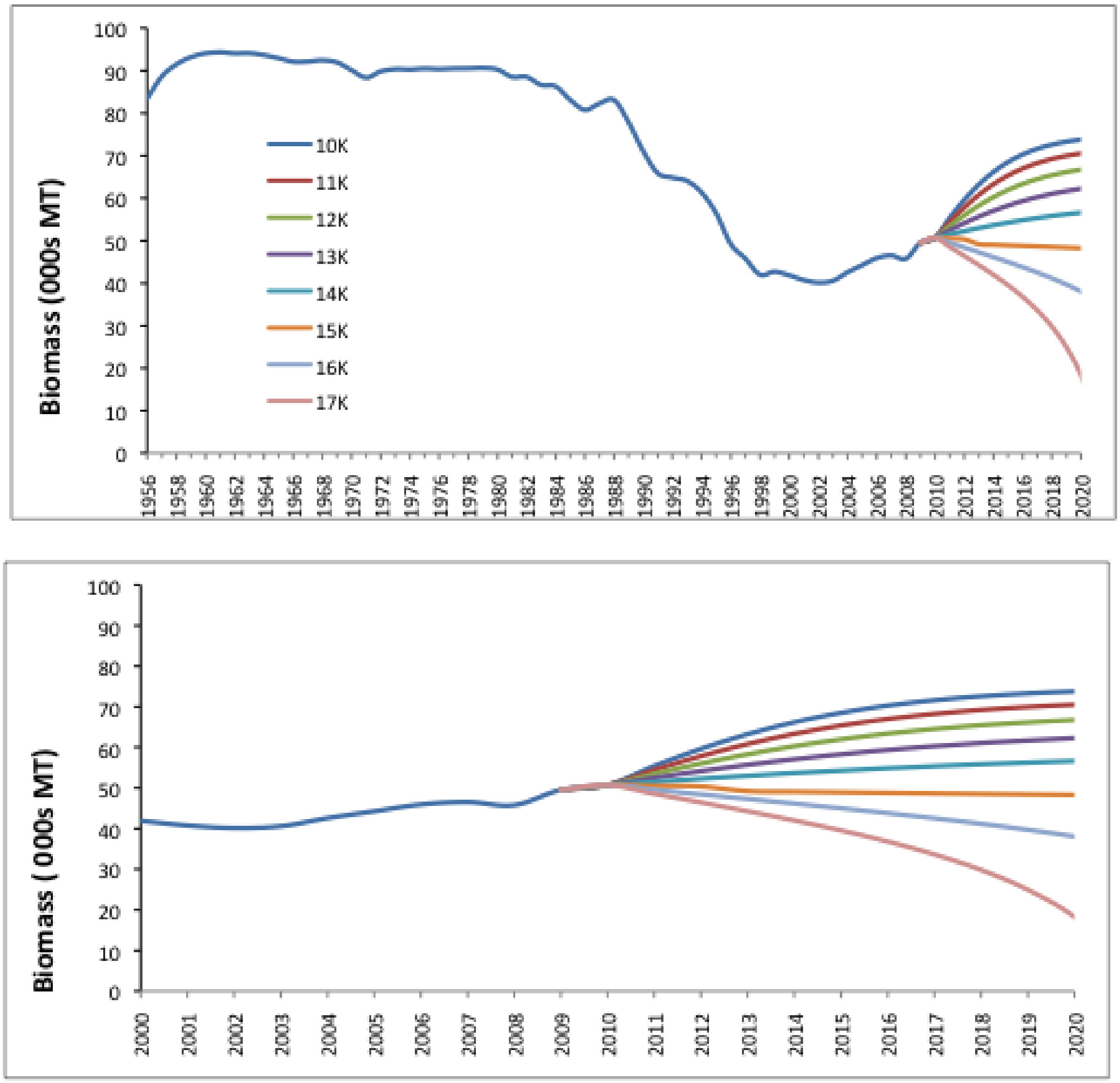




SWO-ATL-Figure 12. Projections of median relative North Atlantic swordfish stock biomass and F from the base ASPIC model under different constant catch scenarios (10\15 thousand tons) North Atlantic swordfish stock.



SWO-ATL-Figure 13. North Atlantic swordfish, probability contours of $B \geq B_{MSY}$ and $F \leq F_{MSY}$ for the constant catch scenarios indicated over time. Red areas represent probabilities less than 50%, yellow from 50-75%, and green above 75%. The 90th, 75th, 60th, and 50th probability contours are also depicted.



SWO-ATL-Figure 14. South Atlantic, projected biomass levels under various catch scenarios. The bottom panel provides the details of the projections over a reduced time interval.

SWO-ATL-Figure 15. South Atlantic swordfish, probability contours of $B>B_{MSY}$ and $F<F_{MSY}$ (from the catch only model, both runs combined) for the constant catch scenarios indicated over time. Yellow areas represent probabilities from 50-75%, and green above 75%. The 90th, 75th, probability contours are also depicted. No probabilities were below 50%.

8.9 SWO-MED-MEDITERRANEAN SWORDFISH

In the last 15 years Mediterranean swordfish production fluctuates without any specific trend at levels higher than those observed for bigger areas such as the North and South Atlantic. The most recent assessment was conducted in 2010 (Anon. 2010g), making use of catch and effort information through 2008. 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 latest stock assessment session.

SWO-MED-1. Biology

Research results based on genetic studies have demonstrated that Mediterranean swordfish compose a unique stock separated from the Atlantic ones, 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 than in the Atlantic, although more recent information for the Atlantic indicates that these differences may 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 140 cm. According to the growth curves used by 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 instantaneous fishing at age 6, while current catches are dominated, in terms of number, by fish less than 4 years old.

SWO-MED-2. Fishery indicators

Annual catch levels fluctuate between 12,000-16,000 t. in the last 15 years without any specific trend. 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 than in 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 2008 catch was 11,153 t (the 2010 assessment reported 12,164 t, which included some unofficial estimates), a reduction of about 15% when compared with 2007 and also with the most recent years. Catch data for 2009 are incomplete. The biggest producers of swordfish in the Mediterranean Sea in recent years are EU-Italy, Morocco, EU-Spain and EU-Greece. Also, Algeria, EU-Cyprus, EU-Malta, EU-Portugal, Tunisia and Turkey have fisheries targeting swordfish in the Mediterranean. Minor catches of swordfish have also been reported by Albania, Croatia, EU-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, but 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 fluctuating mostly between 12,000 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 experimental fishing surveys 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 longline captures less juvenile fish than the traditional Mediterranean longline gear, while a significant reduction of swordfish catches was found when using circle hooks.

A study based on fisheries data from the eastern Mediterranean presented during the 2009 SCRS suggested that there are no major differences in the age selection pattern among American and traditional longlines and confirmed previous findings regarding the higher catch efficiency of the American gear. It has been noted, however, that further studies in other Mediterranean areas are needed to verify that the estimated selection curves are independent of the stock distribution pattern.

Standardised CPUE series from the main longline and gillnet fisheries targeting swordfish, which were presented during the 2010 stock assessment session (Spanish longliners, Italian longliners, Greek longliners and Moroccan gillnetters), did not reveal any trend over time (**SWO-MED-Figure 2)**. CPUE series, however, covered only the last 10-20 years and not the full time period of reported landings. Similarly to CPUE, not any trend over the past 20 years was identified regarding the mean fish weight in the catches (**SWO-MED-Figure 3)**.

SWO-MED-3. State of the stocks

Two forms of assessment (production modelling and age-structured analysis-XSA), indicated that current SSB levels are much lower than those in the early 1980s, although not any trend appears in the last 15 years. The extent of the decline differ among models, with the production model suggesting a decline of about 30%, while XSA results indicate that current SSB level is about 1/4 of that in the mid-1980s **(SWO-MED-Figure 4)**. Results indicate that the fishery underwent a rapid expansion in the late 1980s resulting in Fs and catches above those that could support MSY. Estimates of population status from production modeling indicated that current stock level is slightly lower (~5%) to the optimum needed to achieve the ICCAT Convention objective, but these estimates have a high degree of uncertainty (CV~30%). Additionally, it should be noted that production model biomass estimates are very sensitive to the assumption made about the initial stock biomass ratio. In general, the low contrast in the available catch-effort series affects the reliability of biomass estimates, as well as, the predictions of effort changes on future catch levels.

Results of yield-per-recruit analyses based on the analytical age-structured assessment in which we have more confidence indicated that the stock is in overfished condition and slight overfishing is taking place. Current (2008) SSB is 46% lower than the value that would maximize yield per-recruit. Current F is slightly higher to the estimated F_{MSY} **(SWO-MED-Figure 5)**. Note, however, that these conclusions are based on deterministic analyses of the available data. The level of uncertainty in these estimates has not been evaluated.

The Committee again 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 three 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 6)**. 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 slightly exceeds $F_{MSY.}$ Overall results suggest that 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 could allow a rapid stock decline. A reduction of current F to the $F_{0.1}$ level would result to a substantial (about 40%) long-term increase in SSB **(SWO-MED-Figure 7)**.

Seasonal closure projections based on highly-aggregated data derived from the age-structured assessment and which assume no compensation in effort, no interaction with other management actions in place, and an improvement in recruitment with increasing spawning stock biomass (SSB), are forecast to be beneficial in moving the stock condition closer to the Convention objective, resulting in increased catch levels in the medium term, and reductions in the volume of juvenile catches. Although simulations suggest that the stock can be rebuild to the mid-1980s SSB levels only in the case of six month closures, SSB increases up to the optimum levels suggested by the yield-per-recruit analysis can be achieved within 2-3 generations (8-12 years) even under the current management status (two-month closure), provided that fishing mortality is kept on 2008 levels, which were quite lower than the previous years. Risk analysis, however, indicates that a small probability (<5%) of stock collapse still exists in this case. Benefits from seasonal closures would be diminished if closure is applied in months of low fishing activity (December-January). It should be noted that seasonal closures, especially the longer ones, would result in significant catch reductions within the first few years after their application. Capacity reductions of 20% assuming no compensation in effort, or quotas equal to the 80% of the mean yield of the last decade assuming no change in the selection pattern, could also result to stock rebuilt to optimum SSB levels. Results of the seasonal closure projections are summarized in **SWO-MED-Figure 8**.

SWO-MED-5. Effects of current regulations

ICCAT imposed a Mediterranean-wide one month fishery closure for all gears targeting swordfish in 2008, followed by a two-month closure since 2009. Several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems. The EU 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 past meetings, the Committee has reviewed the various measures taken by Contracting Parties 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 which ensures that the stock will be rebuilt and kept in levels that are consistent with the ICCAT Convention objective. Given the uncertainties on optimum SSB level estimates and the rapid fishery expansion in the 1980s, which resulted in severe stock biomass declines, the SSB levels in the late 1980s may be also considered as a good proxy for the stock. These levels are around to 60,000-70,000 t, not very far, however, from the currently estimated B_{MSY} value (~62000 t). Analysis has suggested that the seasonal closures have beneficial effects and can move the stock condition to the level which will support MSY, but the effect of the recently employed two-month closure could not be evaluated due to incomplete 2009 data.

Following the results from recent studies (SCRS/2006/163), technical modifications of the longline fishing gears, as well as, the way they are operated can be considered as an additional technical measure in order to reduce the catch of juveniles. The Committee recommends this type of measures be considered as part of a Mediterranean swordfish management plan. Given that the current capacity in the Mediterranean swordfish fishery exceeds that needed to efficiently extract MSY, management measures aimed at reducing this capacity should also be considered part of a Mediterranean swordfish management plan adopted by the Commission.

MEDITERRANEAN SWORDFISH SUMMARY

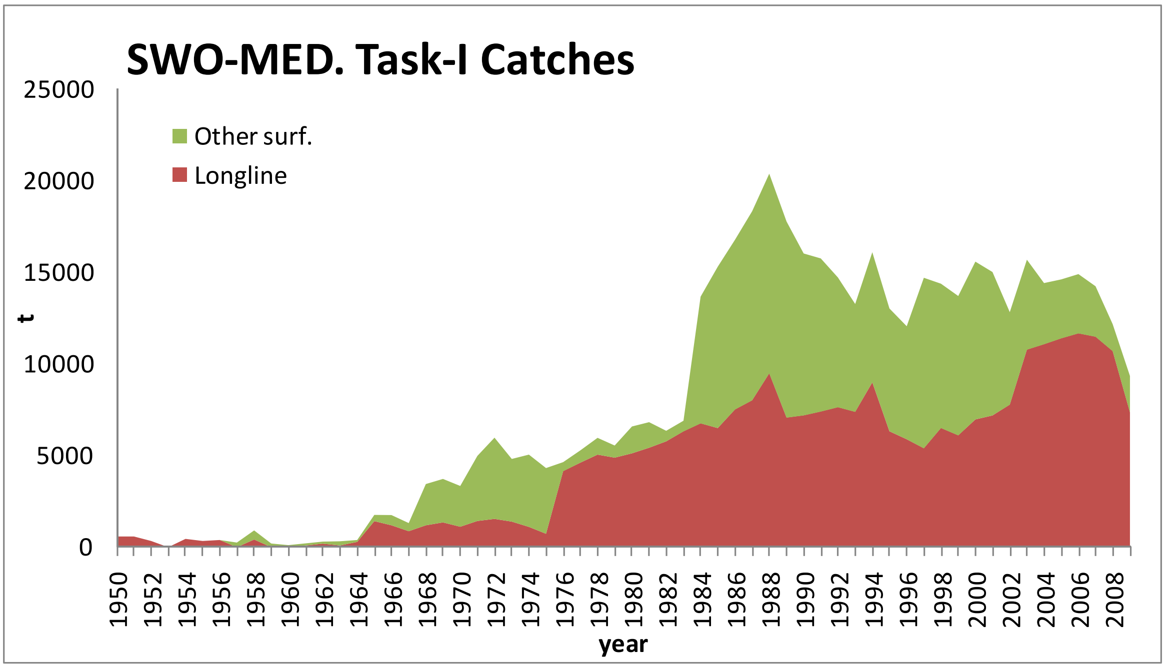
Maximum Sustainable Yield	~14,600[1]
Current (2008) Yield[2]	12,164 t
Current (2008) Replacement Yield	~12,100 t[1]
Relative Biomass (B_{2008}/B_{MSY})	0.54[1]
Relative Fishing Mortality	
F_{2008}/F_{MSY}	1.03[1]
F_{2008}/F_{MAX}	0.91[1]
$F_{2008}/F_{0.1}$	1.52[1]
$F_{2008}/F_{30\%SPR}$	1.32[1]
Management measures in effect	Driftnet ban [Rec. 03-04]
	Two-month fishery closure[3]

[1]Based on the age-structured analysis.
[2]The 2009 reported catch is considered incomplete and too provisional to use in this table.
[3]Various technical measures, such as closed areas, minimum size regulations and effort controls are implemented at the national level.

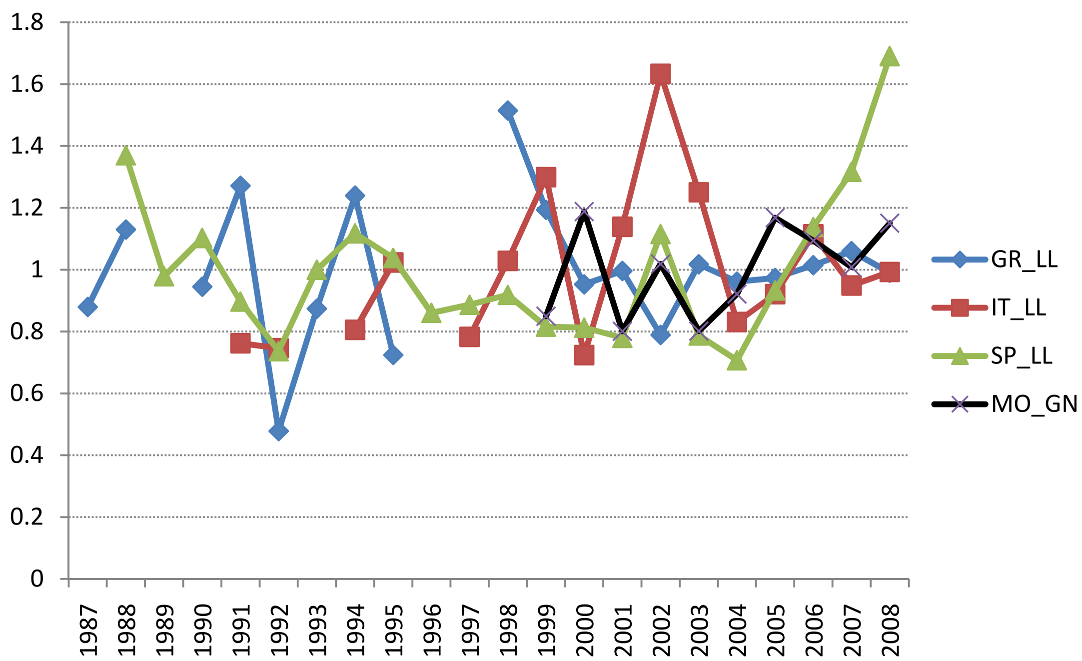
SWO-MED-Table 1. Estimated catches (t) of swordfish *(Xiphias gladius)* in the Mediterranean by gear and flag, used in the assessment (2009 catches in italics are estimations adopted by the Species Group).

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*2008	*2009
TOTAL	MED	15292	16765	18320	20365	17762	16018	15746	14709	13265	16082	13015	12053	14693	14369	13699	15569	15006	12814	15674	14405	14600	14893	14227	12164	9336	11153	10360
Landings	Longline	6493	7505	8007	9476	7065	7184	7393	7631	7377	8985	6319	5884	5389	6496	6097	6963	7180	7767	10765	11053	11273	11638	11451	10662	7348	9652	9541
	Other surf.	8799	9260	10313	10889	10697	8834	8353	7078	5888	7097	6696	6169	9304	7873	7602	8606	7826	5047	4909	3343	3214	3239	2756	1474	1988	1474	819
Discards	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27		27	
Landings	Albania	0	0	0	0	0	0	0	0	0	0	0	13	13	13	13	0	0	0	0	0	0	0	0	0		0	
	Algerie	890	847	1820	2621	590	712	562	395	562	600	807	807	807	825	709	816	1081	814	665	564	635	702	601	802		802	
	Chinese Taipei	0	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	***0***	0	
	Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	0	0	0	0	0	4	3	4	3
	EU.Cyprus	71	154	84	121	139	173	162	56	116	159	89	40	51	61	92	82	135	104	47	49	53	43	67	67	38	67	38
	EU.España	1227	1337	1134	1762	1337	1523	1171	822	1358	1503	1379	1186	1264	1443	906	1436	1484	1498	1226	951	910	1462	1697	2095	***1130***	2095	2000
	EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	27	0	19	0	0	14	14	15	14	16
	EU.Greece	1036	1714	1303	1008	1120	1344	1904	1456	1568	2520	974	1237	750	1650	1520	1960	1730	1680	1230	1120	1311	1358	1887	962	1132	962	1132
	EU.Italy	10863	11413	12325	13010	13009	9101	8538	7595	6330	7765	7310	5286	6104	6104	6312	7515	6388	3539	8395	6942	7460	7626	6518	4549	5016	4549	5016
	EU.Malta	172	144	163	233	122	135	129	85	91	47	72	72	100	153	187	175	102	257	163	195	362	239	213	260	266	260	266
	EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	115	8	1	120	14	16	0	0	***0***	0	
	Japan	14	7	3	4	1	2	1	2	4	2	4	5	5	7	4	2	1	1	0	2	4	0	3	1	1	1	1
	Korea Rep.	0	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
	Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	8	6	0	10	2	0	14	0	0		0	
	Maroc	38	92	40	62	97	1249	1706	2692	2589	2654	1696	2734	4900	3228	3238	2708	3026	3379	3300	3253	2523	2058	1722	1957	1735	1957	1587
	NEI (MED)	730	767	828	875	979	1360	1292	1292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
	Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	28		28	
	Tunisie	61	64	63	80	159	176	181	178	354	298	378	352	346	414	468	483	567	1138	288	791	791	949	1024	***1011***			
	Turkey	190	226	557	589	209	243	100	136	292	533	306	320	350	450	230	370	360	370	350	386	425	410	423	386		386	301
Discards	EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27		27	

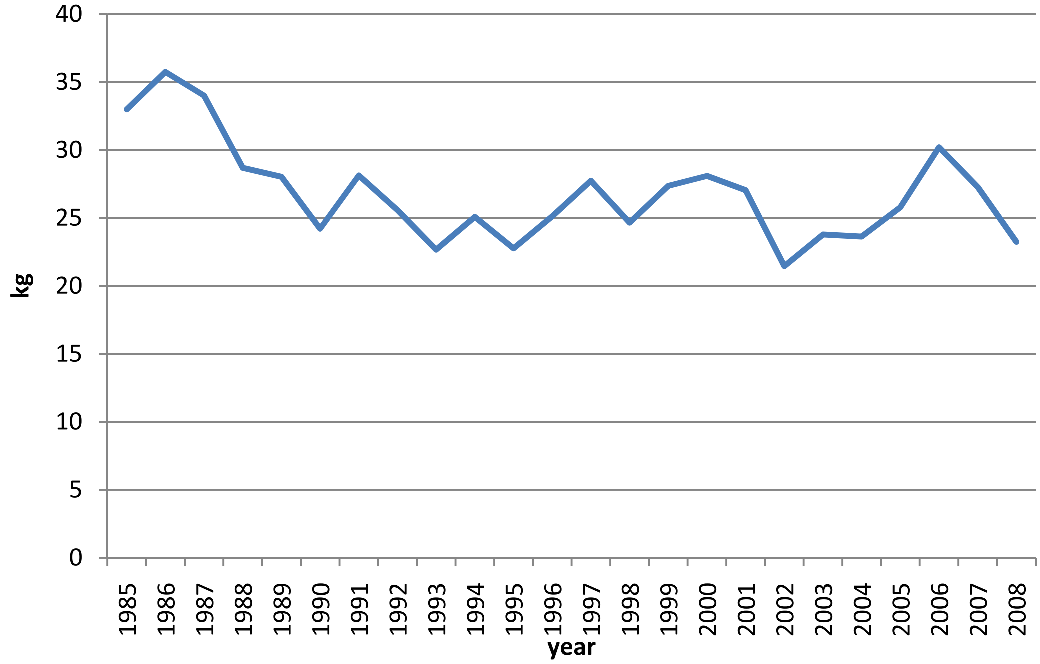
* Current Task I figures (2008 and 2009) where the shaded cells indicate which catches have changed since the assessment.



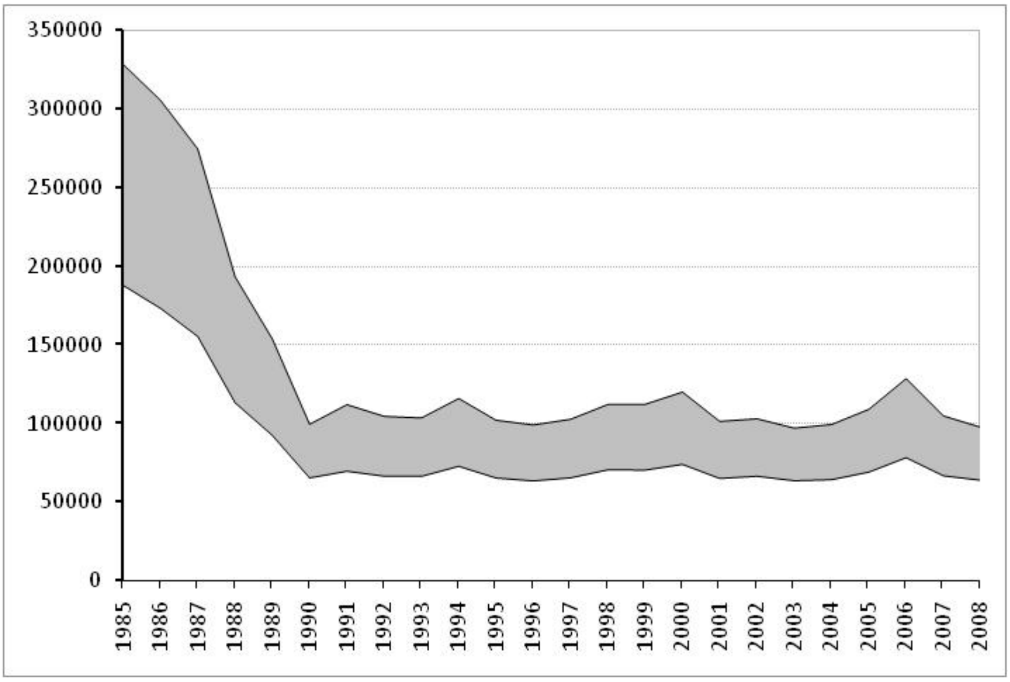
SWO-MED-Figure 1. Cumulative estimates of swordfish catches (t) in the Mediterranean by major gear types, for the period 1950-2009 (the 2009 data are provisional).



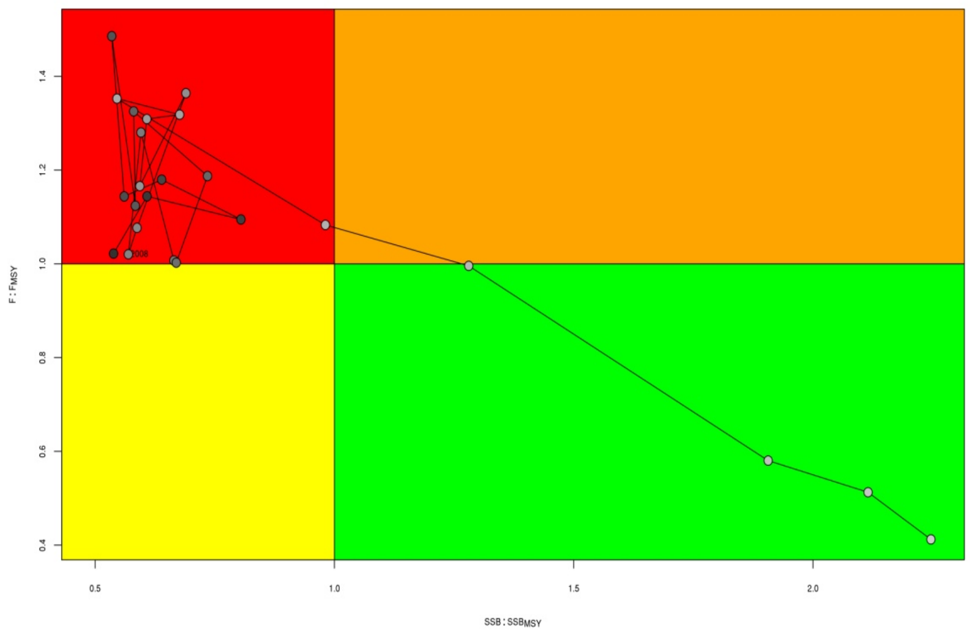
SWO-MED-Figure 2. Time series of standardized CPUE rates scaled to the corresponding mean value for the Spanish longliners (SP_LL), Italian longliners (IT_LL), Greek longliners (GR_LL), and Moroccan gillnetters (MO_GN).



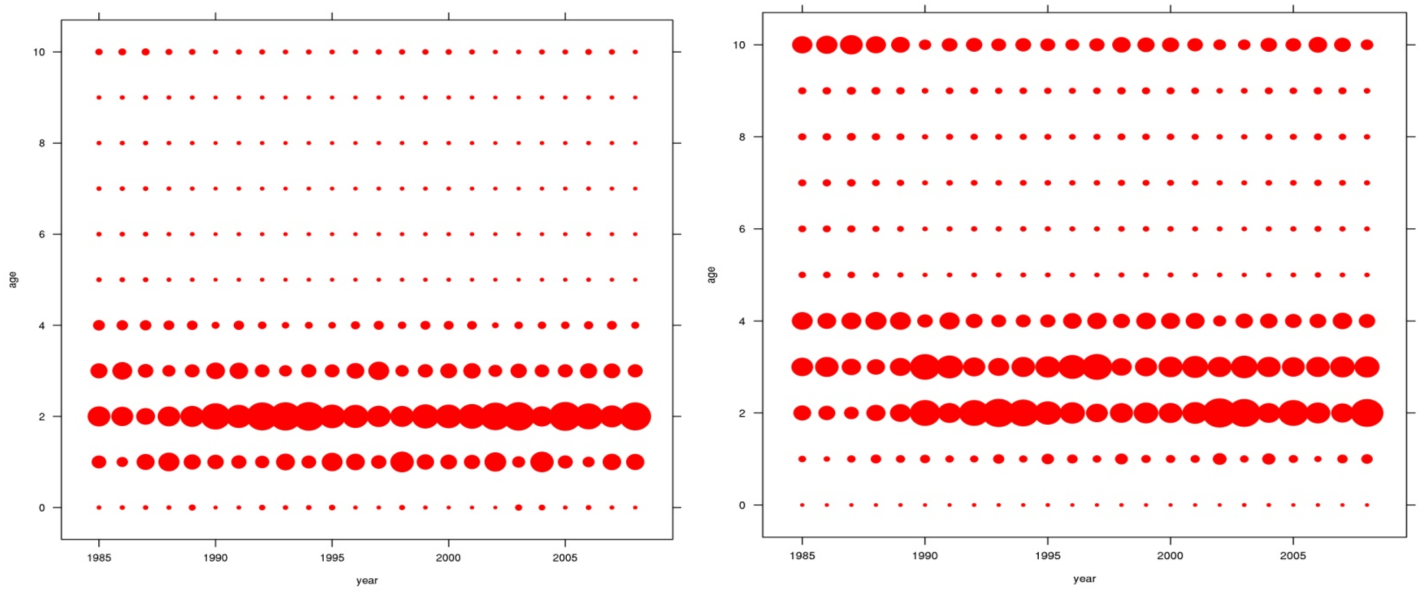
SWO-MED-Figure 3. Time series of mean fish weight in the catches.



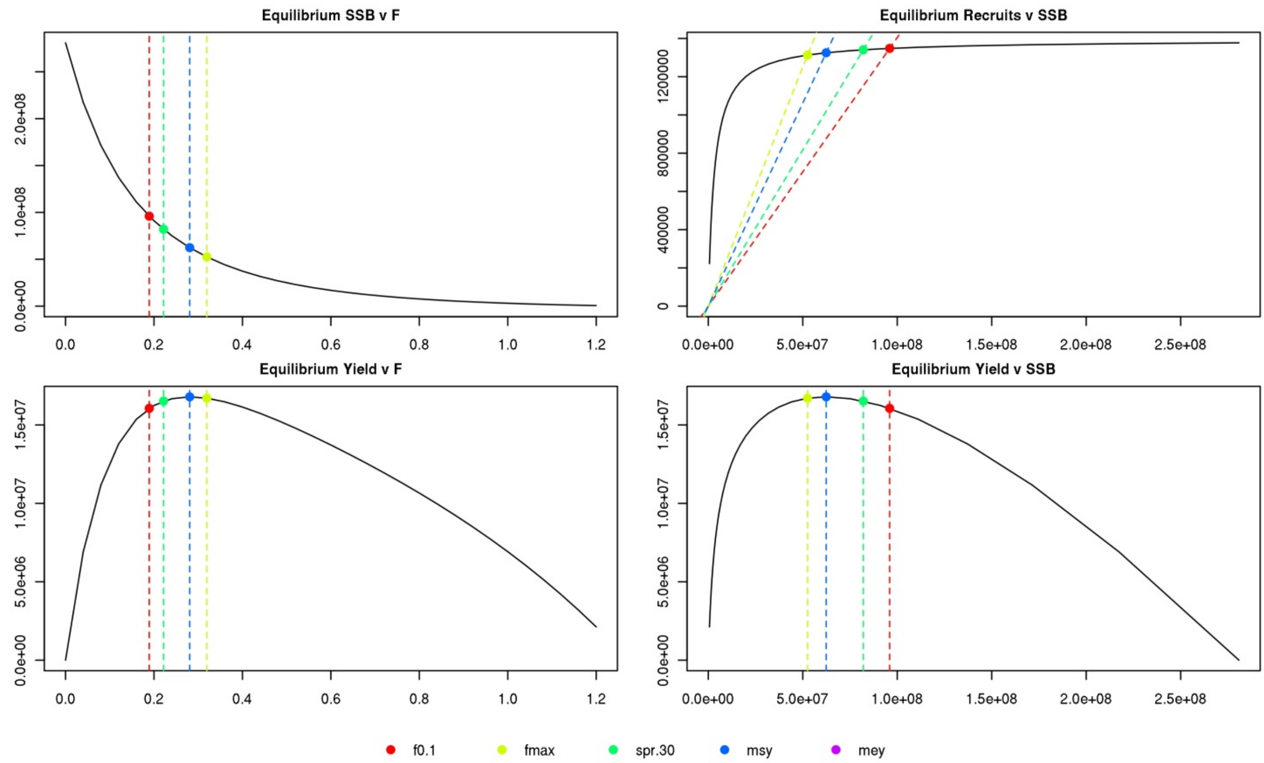
SWO-MED-Figure 4. Total and spawning stock biomass (SSB) estimates (grey color) obtained from the age-structured analysis.



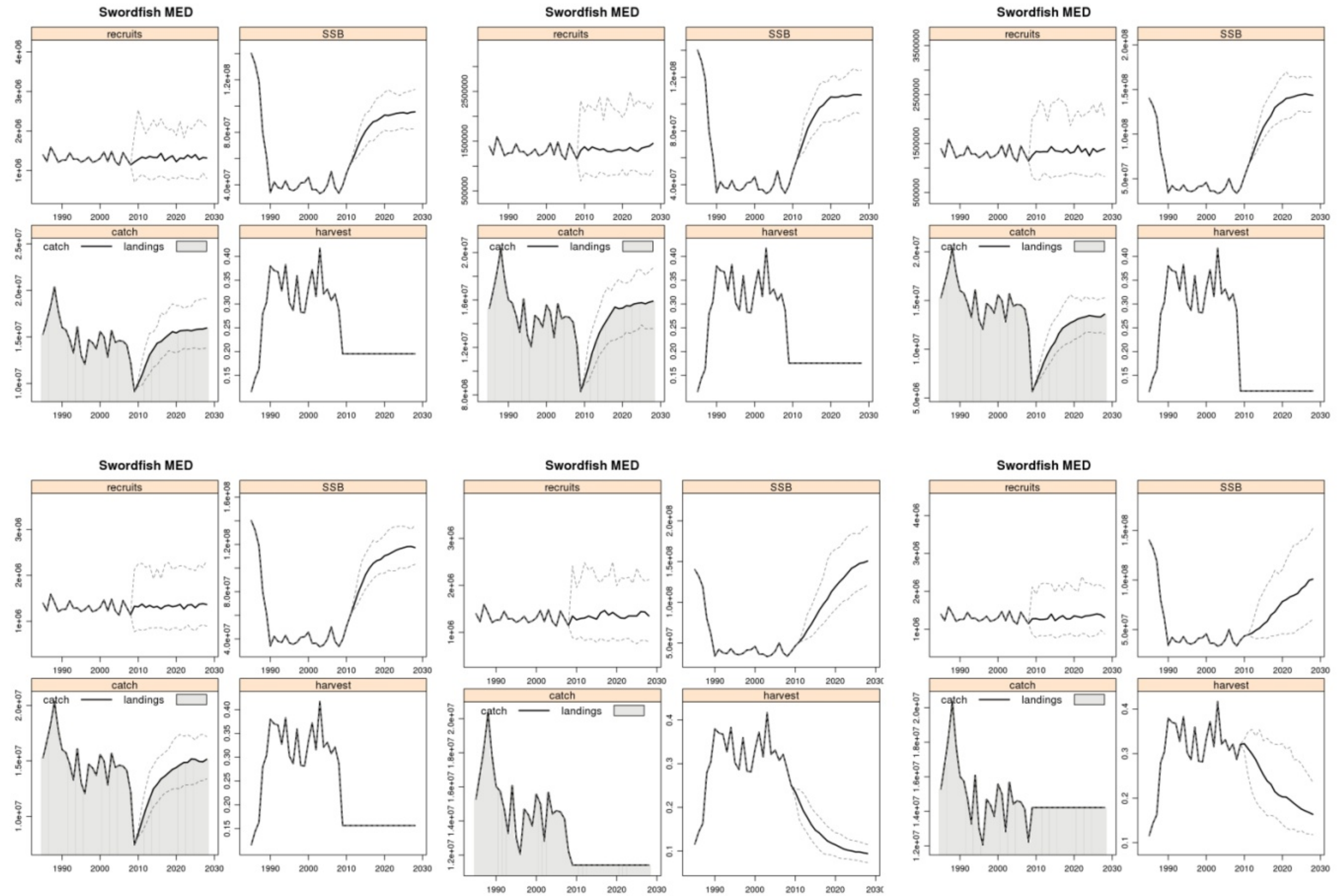
SWO-MED-Figure 5. Time trends for stock status (B/B_{MSY} and F/F_{MSY}) derived from the age-structured analysis.



SWO-MED-Figure 6. Proportion of catch numbers (left) and catch weight (right) at age by year.



SWO-MED-Figure 7. Equilibrium curves estimated from the yield per recruit analysis.



SWO-MED-Figure 8. Scenario estimates assuming a Beverton/Holt stock/recruitment model. From left to right and top to bottom: current management, 4-month closure, 6-month closure, 20% capacity reduction, quota equal to 80% of the mean catch of the last decade, quota equal to the mean catch of the last decade.

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 from CCSBT.

8.11 SMT - SMALL TUNAS

SMT-1. Generalities

Small tunas include the following species:

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

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 (SCRS/2009/147). The amount caught is rarely reported in logbooks; however observer programs from purse seine fleets have recently provided estimates of catches of small tunas (SCRS/2009/146).

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.

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. Many of these species are also prey of large tunas, marlins and sharks. 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.

New information regarding the reproductive biology of Atlantic bonito (*Sarda sarda*) and wahoo (*Acanthocybium solandri*) was submitted to the Group. In addition, information regarding wahoo and slender tuna (*Allothunnus fallai*) as by-catch species of the Brazilian longline fishery and Brazilian artisanal beach seine fishery, respectively, was also reported.

Although there is a general lack of information on biological parameters for these species, the need for information is especially critical for West Africa and the Caribbean and South America.

The small tuna species identification sheets have already been completed and are available from the Secretariat.

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.

SMT-Table 1 shows historical landings of small tunas for the 1980 to 2009 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 bullet tuna *(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 147,202 t in 1988 **(SMT-Figure 1)**. Reported landings for the 1989-1995 period decreased to approximately 91,907 t, and then an oscillation in the values in the following years, with a minimum of 72,460 t in 2003 and a maximum of 129,353 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 2009 is 50,873 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 1980-2008.

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. Assessments of stocks of small tunas are also important because of their position in the trophic chain where they are the prey of large tunas, marlins and sharks and they are predators of smaller pelagic. It may therefore be best to approach assessments of small tunas from the ecosystem perspective.

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. Reported landings (t) of small tuna species, by area and flag.

				1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
BLF	TOTAL			1403	2822	3462	3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2358	4034	4756	1303	1926	1031	1937	1927	1793	942
		A+M	Brasil	133	172	254	229	120	335	130	49	22	38	153	649	418	55	55	38	149	1669	1	118	91	242	233	266	10
			Cuba	157	486	634	332	318	487	318	196	54	223	156	287	287	0	0	0	0	0	0	0	0	0	0	0	
			Dominica	0	0	0	1	4	19	10	14	15	19	30	0	0	0	79	83	54	78	42	20	38	47	29	37	
			Dominican Republic	90	123	199	4	564	520	536	110	133	239	892	892	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.España	0	0	0	0	0	0	0	307	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	755	729	669	816	855	865	1210	1170	1140	1330	1370	1040	1040	1040	1040	1040	1040	1040	0	0	0	0	0	0	0
			Grenada	193	256	141	220	134	293	195	146	253	189	123	164	126	233	94	164	223	255	335	268	306	371	291	290	
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	148	0	0	0	0	0	0	0	0	0	0	0	0	
			Liberia	0	0	0	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	10	9	10	10	12	6	7
			NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
			Netherlands Antilles	55	60	60	70	70	70	60	60	65	60	50	45	45	45	45	45	45	45	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	124	
			St. Vincent and Grenadines	0	0	0	19	15	38	11	7	53	19	20	18	22	17	15	23	24	24	0	0	0	0	0	0	
			Sta. Lucia	0	0	2	1	1	17	14	13	16	82	47	35	40	100	41	45	108	96	169	96	126	182	151	179	
			Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5
			U.S.A.	11	32	44	154	87	81	112	127	508	492	582	447	547	707	617	326	474	334	414	675	225	831	422	649	620
			UK.Bermuda	9	17	11	7	14	13	8	6	5	7	4	5	4	6	6	5	4	5	9	4	5	8	7	6	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	3	0	0	
			Venezuela	0	947	1448	1240	652	1150	1598	2148	1224	21	624	758	498	1034	1192	589	1902	1210	319	732	225	237	777	231	293
BLT	TOTAL			5240	5059	3740	6483	7110	11994	8777	5715	3421	5300	4301	5909	3070	3986	2646	3924	5819	6049	3798	6217	4438	4079	5701	6279	3584
		A+M	Algerie	0	0	0	0	0	0	174	270	348	306	230	237	179	299	173	225	230	481	0	391	547	586	477	1134	
			Croatia	0	0	0	0	0	0	24	21	52	22	28	26	26	26	26	0	0	0	0	0	0	0	0	0	
			EU.España	2047	1555	631	2669	2581	2985	2226	1210	648	1124	1472	2296	604	487	669	1024	861	493	495	1009	845	1101	3083	3265	
			EU.France	0	0	0	0	0	0	8	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			EU.Greece	1419	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1426	1426	0	0	196	125	120	246	226	180	274	157	186	152
			EU.Italy	1344	1344	906	609	509	494	432	305	379	531	531	229	229	229	462	462	462	2452	1463	1819	866	0	0	342	732
			EU.Malta	1	13	5	8	18	21	20	11	10	1	2	3	6	6	3	1	0	0	0	0	0	0	4	12	7
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	28	263	494	208	166	231	300	791	867	849	322	436
			Maroc	48	175	178	811	1177	2452	1289	1644	170	1726	621	1673	562	1140	682	763	256	621	246	326	50	199	35	83	336
			Russian Federation	0	0	0	0	0	0	2171	814	70	100	0	0	0	1672	0	420	1053	468	128	102	139	22	5	23	48
			Serbia & Montenegro	0	0	0	0	0	0	13	1	0	0	2	6	6	6	7	8	8	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	0	0	0	0	0	0	0	0
			Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	75	
			Tunisie	367	538	606	588	660	985	985	35	20	13	14	13	32	93	45	15	2300	932	989	1760	0	0	0	0	
			Turkey	0	0	0	0	0	0	35	0	324	77	0	0	0	0	316	316	316	316	0	284	1020	1031	993	836	1873
			U.S.A.	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			U.S.S.R.	0	0	0	357	723	3634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Yugoslavia Fed.	14	32	14	41	42	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BON	TOTAL			24905	21320	29712	46382	29721	28908	33334	21992	30595	21719	21219	25134	24519	45253	35702	27151	27637	24580	14424	15828	78766	38531	14165	14713	18643
		ATL		6946	5892	7395	22354	17766	6811	8079	6881	4598	6037	6030	7939	10441	15523	7532	5179	5400	8864	3307	4580	4391	6790	5533	4671	9598
		MED		17959	15428	22317	24028	11955	22097	25255	15111	25997	15682	15189	17195	14078	29730	28170	21972	22236	15716	11117	11247	74375	31740	8632	10042	9045
		ATL	Angola	120	101	144	180	168	128	102	4	49	20	9	39	32	0	2	118	118	118	0	0	138	0	931	0	1979
			Argentina	1399	699	1607	2794	1327	1207	1794	1559	434	4	138	108	130	12	68	19	235	1	129	269	110	0	0	0	
			Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0	0	
			Benin	30	6	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	179	523	345	214	273	226	71	86	142	142	137	0	0	0	0	0	0	0	0	0	90	0	0	0	
			Cuba	0	0	23	173	26	28	0	0	0	0	0	0	0	230	0	0	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	6	16	16	9	
			EU.Bulgaria	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.España	398	145	41	91	57	18	8	39	5	3	2	2	1	0	12	12	10	5	23	9	2	15	14	13	36
			EU.Estonia	0	0	0	668	859	187	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	492	431	331	395	427	430	820	770	1052	990	990	610	610	610	24	32	0	18	0	0	0	0	122	59	25
			EU.Germany	0	0	0	0	0	53	0	0	0	0	0	714	0	0	0	0	0	38	0	0	0	0	0	0	
			EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	56
			EU.Latvia	0	0	0	1191	1164	221	7	4	0	3	19	301	887	318	0	416	396	639	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	1041	762	162	11	10	0	0	0	0	0	0	0	0	0	793	0	0	0	0	0	0	
			EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344	539	539
			EU.Poland	0	0	0	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	0	0	

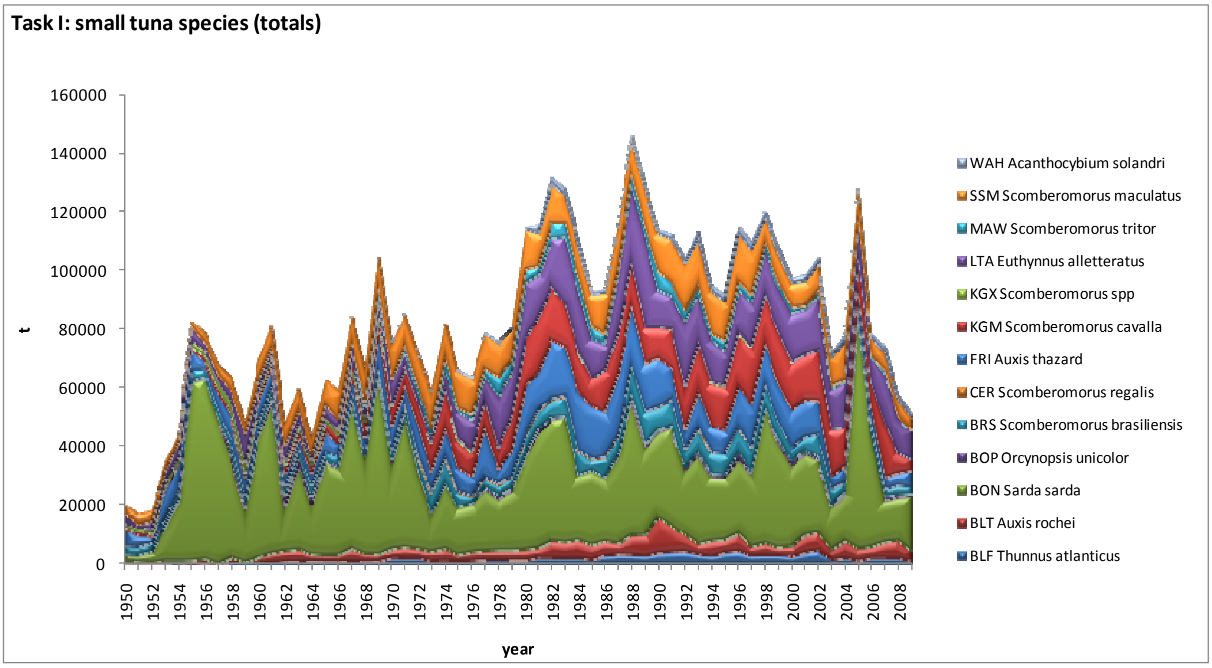
				1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			EU.Portugal	50	168	371	377	80	202	315	133	145	56	78	83	49	98	98	162	47	61	40	50	38	318	439	212	124
			EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	287	0	0	0	0	0	0	0	0	0	35	0	0	30
			Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	0	0	0	0	0	
			Georgia	0	0	0	39	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Germany Democratic Rep.	40	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	10	0	943	0	0	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	24	6	14	16	7	10	10	0	0	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	24	0	0	
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	268	251	241	589	566	492	794	1068	1246	584	699	894	1259	1557	1390	2163	1700	2019	928	989	1411	1655	1053	1419	2523
			Mexico	212	241	391	356	338	215	200	657	779	674	1144	1312	1312	1632	1861	1293	1113	1032	1238	1066	654	1303	1188	1113	1063
			Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	
			Rumania	32	71	3	255	111	8	212	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Russian Federation	0	0	0	0	0	0	948	29	0	0	0	0	0	4960	0	0	574	1441	461	16	79	316	259	52	368
			Senegal	495	510	463	2066	869	525	597	345	238	814	732	1012	1390	2213	948	286	545	621	195	182	484	729	1020	1154	2545
			Sierra Leone	10	10	10	10	10	10	4	6	0	0	0	0	0	0	0	11	245	44	0	0	0	0	0	0	
			South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	18	0	16	23	27	15
			Sta. Lucia	0	0	0	1	0	3	3	3	4	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	
			Togo	254	138	245	400	256	177	172	107	311	254	145	197	197	197	197	0	0	0	0	1583	1215	2298	0	0	
			Trinidad and Tobago	0	0	0	0	0	0	0	0	17	703	169	266	220	30	117	117	56	452	188	280	81	7	7	16	208
			U.S.A.	110	84	130	90	278	299	469	498	171	128	116	156	182	76	83	142	120	139	44	70	68	40	97	47	50
			U.S.S.R.	2073	1085	1083	8882	7363	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			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	0	
			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	
			Ukraine	0	0	0	1385	985	0	0	25	0	0	0	342	2786	1918	1114	399	231	1312	30	0	0	0	0	0	
			Uruguay	0	3	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Venezuela	774	1401	1020	1153	1783	1514	1518	1454	5	1661	1651	1359	1379	1659	1602	2	0	61	13	0	16	18	19	12	38
		MED	Albania	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	
			Algerie	880	459	203	625	1528	1307	261	315	471	418	506	277	357	511	475	405	350	597	0	609	575	684	910	1042	
			Croatia	0	0	0	0	0	0	49	128	6	70	0	0	0	25	120	0	0	0	0	0	0	0	0	0	
			EU.Bulgaria	1	0	13	0	0	17	17	20	8	0	25	33	16	51	20	35	35	35	0	0	0	0	0	0	
			EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	10	10	6	4	3	0	0	
			EU.España	1045	729	51	962	609	712	686	228	200	344	632	690	628	333	433	342	349	461	544	272	215	429	531	458	247
			EU.France	0	0	0	10	0	1	10	5	6	0	0	0	0	0	0	0	0	27	0	0	0	0	15	34	20
			EU.Greece	1321	1027	1848	1254	2534	2534	2690	2690	2690	1581	2116	1752	1559	945	2135	1914	1550	1420	1538	1321	1390	845	1123	587	476
			EU.Italy	1437	1437	2148	2242	1369	1244	1087	1288	1238	1828	1512	2233	2233	2233	4159	4159	4159	4579	2091	2009	1356	0	0	1323	1131
			EU.Malta	0	0	0	0	0	0	0	0	0	0	0	2	7	2	2	1	0	0	0	0	0	0	2	7	5
			Egypt	62	68	35	17	358	598	574	518	640	648	697	985	725	724	1442	1442	1128	1128	0	0	0	0	0	0	
			Libya	0	0	0	0	0	0	0	71	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	57	51	127	108	28	69	69	31	25	93	37	67	45	39	120	115	5	61	85	78	38	89	87	142	131
			NEI (MED)	359	359	537	561	342	311	311	311	300	300	300	300	75	0	0	0	0	0	0	0	0	0	0	0	
			Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Serbia & Montenegro	0	0	0	0	0	0	45	0	3	2	6	10	12	12	14	17	17	0	0	0	0	0	0	0	
			Tunisie	482	504	500	600	422	488	305	643	792	305	413	560	611	855	1350	1528	1183	1112	848	1251	0	0	0	0	
			Turkey	12281	10756	16793	17613	4667	14737	19151	8863	19548	10093	8944	10284	7810	24000	17900	12000	13460	6286	6000	5701	70797	29690	5965	6448	7036
			U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Yugoslavia Fed.	34	38	62	36	98	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BOP	TOTAL			133	87	564	1482	1116	473	608	641	630	791	703	2196	481	177	868	1207	1012	923	736	581	217	32	1047	533	449
		ATL		124	86	538	1474	1109	436	507	465	378	615	588	2064	254	47	651	1062	858	786	713	573	215	32	875	426	442
		MED		9	1	26	8	7	37	101	176	252	176	115	132	227	130	217	145	154	137	23	8	2	0	172	107	6
		ATL	Benin	1	3	1	2	1	1	1	1	1	1	1	1	3	1	1	0	0	0	0	0	0	0	0	0	
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	1	2	11
			Maroc	83	33	487	1422	1058	369	486	423	348	598	524	2003	246	28	626	1048	830	780	706	503	132	0	634	391	273
			Mauritania	40	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Senegal	0	0	0	0	0	16	20	41	29	16	63	60	5	18	24	14	28	6	7	70	78	29	240	33	158
		MED	Algerie	0	0	0	0	0	0	87	135	198	153	92	119	224	128	216	135	145	128	0	0	0	0	0	0	
			EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
			Libya	0	0	0	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	9	1	26	8	7	37	14	1	14	23	23	13	3	2	1	10	9	9	20	7	1	0	172	107	6
			Tunisie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	
BRS	TOTAL	A+M		3501	6549	6212	9510	10778	7698	8856	6051	8049	7161	7006	8435	8004	7923	5754	4785	4553	7750	5137	3410	3712	3587	2618	3247	2515

				1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			Brasil	1504	5011	4741	5063	5927	2767	1437	1149	842	1149	1308	3047	2125	1516	1516	988	251	3071	2881	814	471	1432	563	1521	
			EU.France	0	0	0	0	0	0	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	1	1	1	0	0	0	0	0	0	0	0	
			Guyana	0	0	0	0	0	0	0	0	0	0	0	211	571	625	1143	308	329	441	389	494	521	377	277	312	
			Trinidad and Tobago	0	0	0	2704	2864	2471	2749	2130	2130	2130	1816	1568	1699	2130	1328	1722	2207	2472	1867	2103	2720	1778	1778	1414	2514
			Venezuela	1997	1538	1471	1743	1987	2460	4670	2772	5077	3882	3882	3609	3609	3651	1766	1766	1766	1766	0	0	0	0	0	0	
CER	TOTAL	A+M		574	500	392	219	234	225	375	390	450	490	429	279	250	250	0	3	5	1	2	1	1	1	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	1	0	0	
			Dominican Republic	63	52	48	57	59	50	45	79	50	90	29	29	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	511	448	344	162	175	175	330	310	400	400	400	250	250	250	0	0	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	1	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	0	0	3	5	1	2	0	1	0	0	0	0
FRI	TOTAL			17753	15476	21193	20573	16411	16738	10356	6367	12678	8407	7535	13809	14954	14197	13004	12910	12762	11627	4521	5451	4247	5009	4079	4333	5729
		ATL		17753	15476	21193	20573	16411	16738	10356	6367	12678	8407	7535	13809	14954	14197	13004	12910	12762	11627	4521	5451	4247	5009	4079	3776	4649
		MED		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	557	1080
		ATL	Angola	90	21	115	20	70	28	1	0	4	6	21	29	12	31	2	38	38	38	0	0	0	0	95	0	46
			Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Benin	50	1	3	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	623	941	1260	1904	700	592	746	291	608	906	558	527	215	162	166	106	98	1117	860	414	532	603	202	149	313
			Cape Verde	0	0	2	86	105	75	135	82	115	86	13	6	22	191	154	81	171	278	264	344	167	404	197	832	940
			Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	170	135	0	
			EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.España	3702	3164	4538	3938	1877	2240	541	228	362	297	386	947	581	570	23	17	722	438	635	34	166	73	278	631	1094
			EU.Estonia	0	0	0	0	0	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	416	1904	3392	3392	3008	3872	0	121	63	105	126	161	147	146	0	91	127	91	0	168	47	6	98	24	24
			EU.Latvia	0	0	0	0	0	0	243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Portugal	30	32	2	2	4	26	3	0	0	0	0	0	1	31	5	9	28	5	4	6	0	3	3	1	0
			EU.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	0	6
			Germany Democratic Rep.	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	4500	3256	4689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	0	0	
			Grenada	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	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	74	81
			Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
			Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	424	302	465	194	599	1045	1131	332	274	122	645	543	2614	2137	494	582	418	441	184	542	61	48	135	179	9
			Mixed flags (FR+ES)	117	227	1526	1525	1350	1728	3633	4017	9674	3107	1919	7177	6063	6342	8012	9864	9104	7748	1623	1722	1527	1739	1072	614	1131
			NEI (ETRO)	0	0	17	381	155	237	1	4	32	68	70	180	120	309	491	291	420	186	71	180	297	149	238	0	
			Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	590	1157	1030	1159	1122	989	710	505	474	0	150	106	485	364
			Panama	0	0	0	0	0	0	243	57	118	341	328	240	91	0	0	0	0	0	0	394	975	970	1349	411	439
			Rumania	0	51	15	0	0	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	1078	627	150	405	456	46	500	761	477	0	0	300	50	56	63	6	1	12	113
			S. Tomé e Príncipe	0	0	0	23	32	35	41	39	33	37	48	79	223	197	209	200	200	200	200	234	215	290	0	0	
			Senegal	0	0	0	810	784	1084	311	201	342	319	309	0	0	0	7	0	4	0	13	288	151	83	119	315	15
			Trinidad and Tobago	0	0	0	0	0	0	0	0	17	0	56	199	368	127	138	245	0	0	0	414	0	0	0	0	
			U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			U.S.S.R.	6055	3465	2905	5638	5054	2739	0	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	0	0	0	0	0	36	48	0	43	0	0	0	0	0	0	
			Venezuela	1746	2109	2264	2654	2670	3037	1762	368	886	2609	2601	3083	2839	2164	1631	215	444	32	113	182	42	165	52	48	54
		MED	EU.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124	726
			EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	434	354
KGM	TOTAL	A+M		9964	13990	13792	14331	12153	10420	13241	14691	16331	14777	14930	17782	19660	16394	17717	16161	15360	17258	15863	12830	11766	8185	18031	6868	3512
			Antigua and Barbuda	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	806	2890	2173	2029	2102	2070	962	979	1380	1365	1328	2890	2398	3595	3595	2344	1251	2316	3311	247	202	316	33	0	
			Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	35	2	0	0	0	0	0	0	0	
			Dominican Republic	0	0	0	20	29	33	34	47	52	0	0	0	589	288	230	226	226	226	0	0	0	0	0	0	
			Grenada	0	0	0	0	0	0	0	0	0	0	0	2	4	28	14	9	4	5	0	0	0	0	0	0	
			Guyana	0	0	0	0	0	0	0	0	0	0	0	0	270	440	398	214	239	267	390	312	245	168	326	174	
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	
			Mexico	2303	2643	3067	3100	2300	2689	2147	3014	3289	3097	3214	4661	4661	3583	4121	3688	4200	4453	4369	4564	3447	4201	3526	3113	3186
			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	7

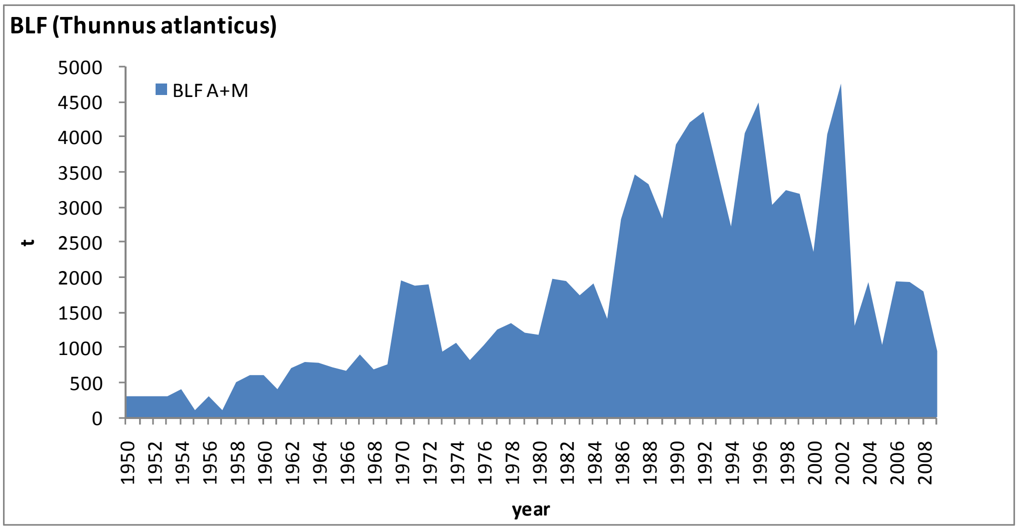
				1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	9	1	1	0	1	1	1	2	0	1
			Trinidad and Tobago	11	38	82	752	541	432	657	0	1192	0	471	1029	875	746	447	432	410	1457	802	578	747	661	661	567	318
			U.S.A.	6011	7486	7530	7100	5681	4127	8213	9344	9616	7831	7360	7058	8720	7373	6453	6780	6603	6061	6991	7129	7123	2837	13482	3013	
			UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
			Venezuela	833	933	940	1330	1500	1069	1228	1308	801	2484	2558	2140	2139	340	2424	2424	2424	2424	0	0	0	0	0	0	
KGX	TOTAL	A+M		22	149	261	491	105	131	225	266	301	508	512	824	156	251	1	229	48	0	15	0	1	26	16	0	2
			Barbados	0	138	159	332	68	51	45	51	55	36	42	49	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Colombia	22	11	102	159	37	25	7	12	21	148	111	539	0	0	0	0	0	0	0	0	0	0	0	0	
			Cuba	0	0	0	0	0	0	0	0	0	0	0	0	0	236	0	0	0	0	0	0	0	0	0	0	
			EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	26	16	0	2
			Gabon	0	0	0	0	0	0	0	0	0	140	145	79	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	0	0	0	0	0	0	0	0	0	0	0	
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	155	0	0	44	48	0	0	0	0	0	0	0	
			Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Puerto Rico	0	0	0	0	0	0	0	53	84	86	134	106	0	0	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	14	0	0	0	0	15	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	138	0	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	55	79	150	141	98	80	50	0	0	0	48	0	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	0	0	0	0	0	0	0	0	
			Ukraine	0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LTA	TOTAL			12974	8960	20759	26182	30791	12622	11214	22045	16562	14182	11701	14257	15099	15750	15382	16483	15347	18392	13747	15785	12188	8849	17354	12140	9508
		ATL		10934	6794	18335	23777	28756	10005	8891	20289	15296	12977	9799	12138	13495	12836	12506	13189	12484	15750	13065	14347	11148	7248	15668	9881	7929
		MED		2040	2166	2424	2405	2035	2617	2323	1756	1266	1205	1902	2119	1604	2914	2875	3294	2863	2642	682	1438	1040	1602	1686	2259	1579
		ATL	Angola	1433	1167	1345	1148	1225	285	306	14	175	121	117	235	75	406	118	132	132	132	0	0	2	0	4365	0	1644
			Argentina	11	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Benin	30	90	14	7	43	66	61	49	53	60	58	58	196	83	69	69	69	69	0	0	0	0	0	0	
			Brasil	785	479	187	108	74	685	779	935	985	1225	1059	834	507	920	930	615	615	615	0	320	280	0	0	0	
			Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Cape Verde	160	29	14	1	18	65	74	148	17	23	72	63	86	110	776	491	178	262	143	137	40	160	348	518	498
			Cuba	16	24	55	53	113	88	63	33	13	15	27	23	23	0	0	0	0	0	0	0	0	0	0	0	
			Côte D'Ivoire	0	20	5300	38	4900	2800	100	142	339	251	253	250	114	108	0	108	0	0	0	0	270	298	404	1677	
			Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.España	34	12	11	7	11	55	81	1	0	0	10	55	27	110	6	2	22	8	1	489	50	16	0	38	35
			EU.Estonia	0	0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	0	0	0	0	195	0	74	13	8	54	59	22	215	21	696	631	610	613	0	10	27	12	0	1	50
			EU.Germany	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Latvia	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	69	8
			EU.Poland	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Portugal	0	80	21	86	91	2	61	73	45	72	72	218	320	171	14	50	0	2	16	19	21	24	43	10	6
			EU.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	0	7
			Gabon	0	0	0	0	0	0	0	0	0	0	0	182	0	18	159	301	213	57	173	0	0	0	0	0	
			Germany Democratic Rep.	40	10	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	901	649	5551	11588	12511	323	201	11608	359	994	513	113	2025	359	306	707	730	4768	8541	7060	5738	216	4449	3188	1497
			Israel	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	447	47	108	49	14	367	57	370	44	43	230	588	195	189	67	101	87	308	76	91	33	0	40	2	63
			Mauritania	60	50	50	50	50	50	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mixed flags (FR+ES)	78	151	1017	1017	900	1152	2422	2678	4975	2071	1279	3359	2836	2936	3846	4745	4238	3334	1082	1148	1018	1159	715	410	1181
			NEI (ETRO)	0	0	0	0	0	0	0	0	8	20	0	0	0	0	0	0	0	33	2	0	22	0	0	0	
			Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	
			Panama	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Rumania	126	81	7	88	0	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	617	306	265	189	96	49	0	88	0	0	0	74	13	0	0	0	0	0	
			S. Tomé e Príncipe	0	0	0	30	36	52	46	48	41	40	43	40	50	39	37	33	33	33	33	178	182	179	0	0	
			Senegal	4566	2392	2985	6343	6512	1834	1603	1854	4723	4536	2478	1972	2963	2910	1607	1746	1857	1806	1430	3507	2694	3825	3885	2972	1691
			South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	1	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	2	2	2	0	1	10	1	0	0	1	0	0	0

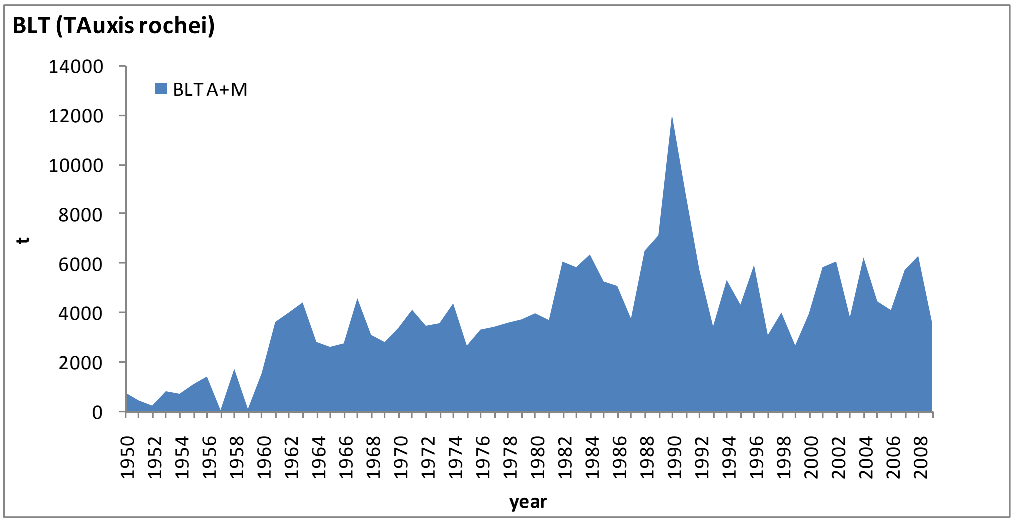
				1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			U.S.A.	74	104	118	204	129	173	228	597	1286	1142	1312	2230	2015	1546	1623	1209	1451	1366	1492	1382	765	1351	1401	963	1245
			U.S.S.R.	1040	271	61	1707	543	667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			UK.Bermuda	7	13	13	17	14	8	10	11	5	6	6	7	6	5	4	2	1	5	4	5	7	5	5	4	3
			Venezuela	1050	1123	1467	1236	1374	1294	1963	1409	1889	2115	2115	1840	1840	2815	2247	2247	2247	2254	50	0	0	0	0	30	
		MED	Algerie	0	0	0	0	0	0	522	585	495	459	552	554	448	384	562	494	407	148	0	158	116	187	96	142	
			Croatia	0	0	0	0	0	0	2	3	2	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Cyprus	32	13	25	41	20	23	25	21	11	23	10	19	19	19	16	19	19	19	0	0	0	0	6	5	4
			EU.España	12	5	0	5	0	0	0	0	0	0	15	18	9	15	0	8	82	32	0	41	262	116	202	212	86
			EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	112	69	72	183	148
			EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	24	38	34	0	0	486	
			EU.Malta	0	0	0	0	0	0	8	1	8	8	8	3	3	0	0	0	0	0	0	0	0	0	1	5	8
			Israel	259	284	273	135	124	129	108	126	119	119	215	119	119	119	119	119	119	119	0	0	0	0	0	0	
			Libya	0	0	0	0	0	0	0	0	0	0	0	0	45	52	0	5	4	4	0	0	0	0	0	0	
			Maroc	0	0	0	12	0	16	0	0	0	0	1	0	1	14	8	0	0	3	1	0	9	0	331	19	24
			NEI (MED)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	0	0	0	0	0	0	0	0	0	
			Palestina	0	0	0	0	0	0	0	0	0	0	0	90	59	61	60	60	60	129	0	0	0	0	0	0	
			Serbia & Montenegro	0	0	0	0	0	0	5	0	28	21	35	22	18	20	18	16	16	0	0	0	0	0	0	0	
			Syria Rep.	95	73	121	99	121	127	110	156	161	156	155	270	350	417	390	370	370	330	0	0	0	0	193	133	
			Tunisie	1441	1590	1803	1908	1566	2113	1343	664	242	204	696	824	333	1113	752	1453	1036	960	657	633	0	0	0	0	
			Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	500	750	750	750	750	0	568	507	1230	785	1074	1309
			Yugoslavia Fed.	1	1	2	5	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MAW	TOTAL	A+M		3989	3292	1799	3921	2938	6626	4160	3648	2741	2070	3414	2829	2249	2001	1397	1995	1236	1927	1072	528	824	389	845	190	305
			Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Benin	50	104	17	13	334	211	214	202	214	194	188	188	362	511	205	205	205	205	0	0	0	0	0	0	
			EU.Estonia	0	0	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Latvia	0	0	0	0	0	208	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	0	0	0	52	4	0	0	0	0	0	0	0	0	0	298	0	0	0	0	0	0	
			EU.Netherlands	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
			Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0	0	
			Germany Democratic Rep.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	3000	1453	0	1457	1457	1500	2778	899	466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Russian Federation	0	0	0	143	195	1032	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
			S. Tomé e Príncipe	0	0	0	6	4	6	5	3	5	6	6	8	7	8	5	6	6	6	6	21	12	13	0	0	
			Senegal	732	1516	1754	2159	753	2429	1028	2450	2038	1870	3220	2633	1880	1397	1187	1763	1025	1376	1054	506	812	375	845	189	304
			U.S.S.R.	206	219	28	143	195	1240	0	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	90	0	0	0	0	0	0	0	21	0	42	12	0	0	0	0	0	
SSM	TOTAL	A+M		11590	14207	14461	12671	13845	12782	15318	16285	16317	14490	13697	16571	15403	8641	9837	8220	8383	9414	9793	13449	10470	6282	6102	5900	4251
			Colombia	101	81	72	151	112	76	37	95	58	69	69	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Cuba	443	621	1606	803	746	665	538	611	310	409	548	613	613	0	0	0	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	0	0	
			Dominican Republic	1267	1271	1321	1415	1401	1290	728	735	739	1330	2042	2042	231	191	125	158	158	158	0	0	0	0	0	0	
			EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	265	0	0	0	0	0	0	
			Grenada	4	17	0	0	1	3	0	0	1	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	
			Mexico	5789	6170	6461	5246	7242	8194	8360	9181	10066	8300	7673	11050	11050	5483	6431	4168	3701	4350	5242	3641	5723	3856	3955	4155	4251
			Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5330	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	27	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	0	0	0	0	0	0	0	0	
			U.S.A.	3986	6047	5001	5056	4343	2554	5655	5663	5143	4380	3363	2866	3509	2968	3282	3893	4524	4613	4552	4477	4747	2425	2147	1746	
WAH	TOTAL	A+M		920	1151	1235	1635	1527	1498	1721	1834	2670	2143	2408	2515	3085	2488	2957	2020	2296	2202	2049	2580	1692	1611	2202	1914	1436
			Antigua and Barbuda	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Aruba	115	120	90	80	80	70	60	50	50	125	40	50	50	50	50	50	50	50	0	0	0	0	0	0	
			Barbados	120	138	159	332	51	51	60	51	91	82	42	35	52	52	41	41	0	0	34	45	26	41	36	27	17
			Benin	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	21	141	133	58	92	52	64	71	33	26	1	16	58	41	0	0	0	0	405	519	449	111	75	76	70
			Cape Verde	142	205	306	340	631	458	351	350	326	361	408	503	603	429	587	487	578	500	343	458	45	537	454	811	273
			Dominica	0	0	0	0	0	38	43	59	59	59	58	58	58	58	50	46	11	37	10	6	8	15	14	16	
			Dominican Republic	0	0	0	1	3	6	9	13	7	0	0	0	325	112	31	35	35	35	0	0	0	0	0	0	
			EU.España	4	9	9	32	18	23	28	32	22	20	15	25	25	29	28	32	38	46	48	305	237	110	66	38	73
			EU.France	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
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	4	3

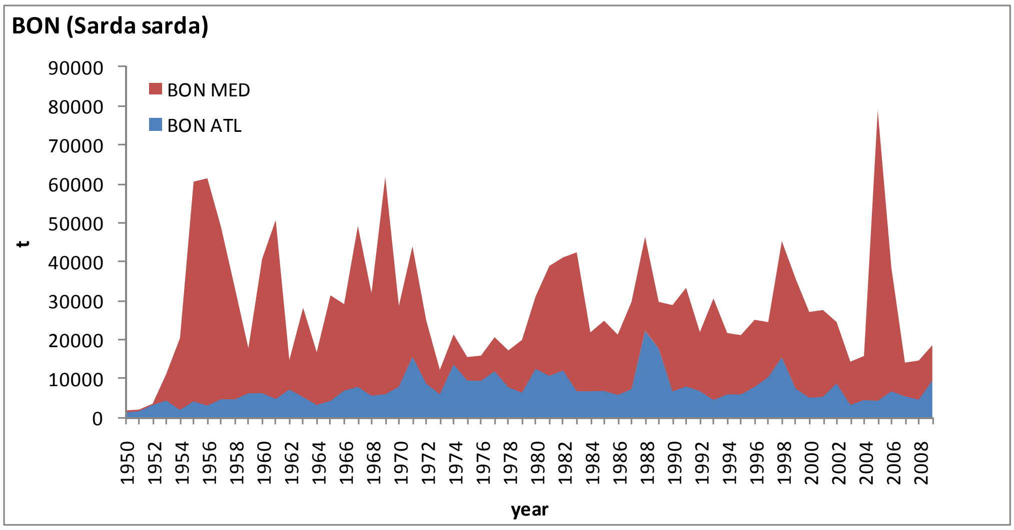
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Grenada	51	82	54	137	57	54	77	104	96	46	49	56	56	59	82	51	71	59	44	0	0	0	0	0	
Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	
Netherlands Antilles	245	250	260	280	280	280	250	260	270	250	230	230	230	230	230	230	230	230	0	0	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	91	240	120	86
S. Tomé e Príncipe	0	0	0	23	20	28	34	27	36	39	46	80	52	56	62	52	52	52	52	94	88	76	0	0	
Saint Kitts and Nevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	7	0	0	0	
Senegal	0	0	0	0	0	0	0	0	64	0	0	1	0	0	5	0	0	0	5	0	1	1	0	0	2
St. Vincent and Grenadines	0	0	0	4	4	28	33	33	41	28	16	23	10	65	52	46	311	17	40	60	0	241	29	24	31
Sta. Lucia	0	0	0	0	0	77	79	150	141	98	80	221	223	223	310	243	213	217	169	238	169	187	0	171	195
Trinidad and Tobago	0	0	0	0	0	0	118	1	0	0	0	0	1	1	1	2	1	9	7	6	6	7	7	5	6
U.S.A.	13	13	57	128	110	82	134	203	827	391	764	608	750	614	858	640	633	846	789	712	558	89	1123	495	522
UK.Bermuda	46	65	43	61	63	74	67	80	58	50	93	99	105	108	104	61	56	91	87	88	83	86	124	117	101
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	3	0	0	
UK.Sta Helena	15	15	18	18	17	18	12	17	35	26	25	23	0	0	0	0	0	0	0	0	0	0	0	0	29
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	
Venezuela	147	113	106	141	101	159	302	333	514	542	540	487	488	360	467	4	17	13	9	7	16	13	33	9	25

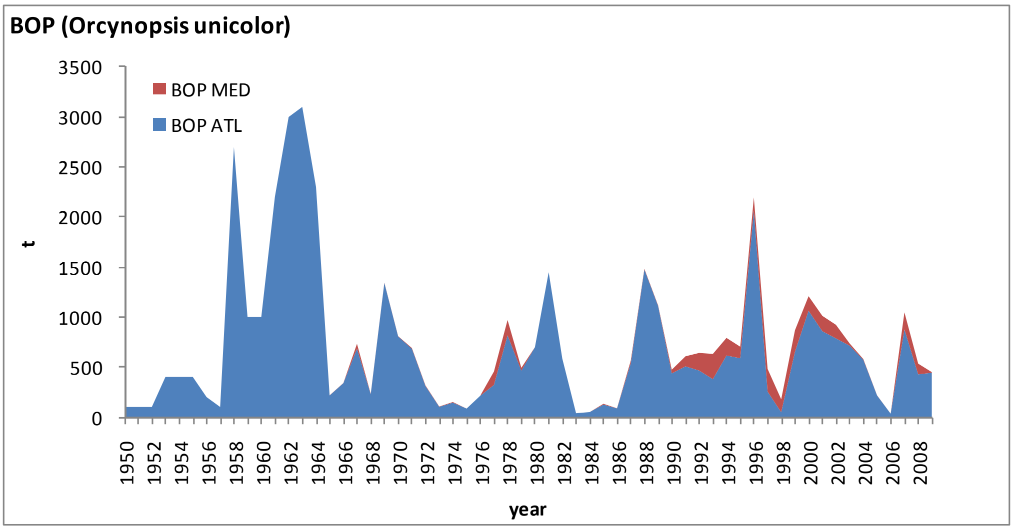


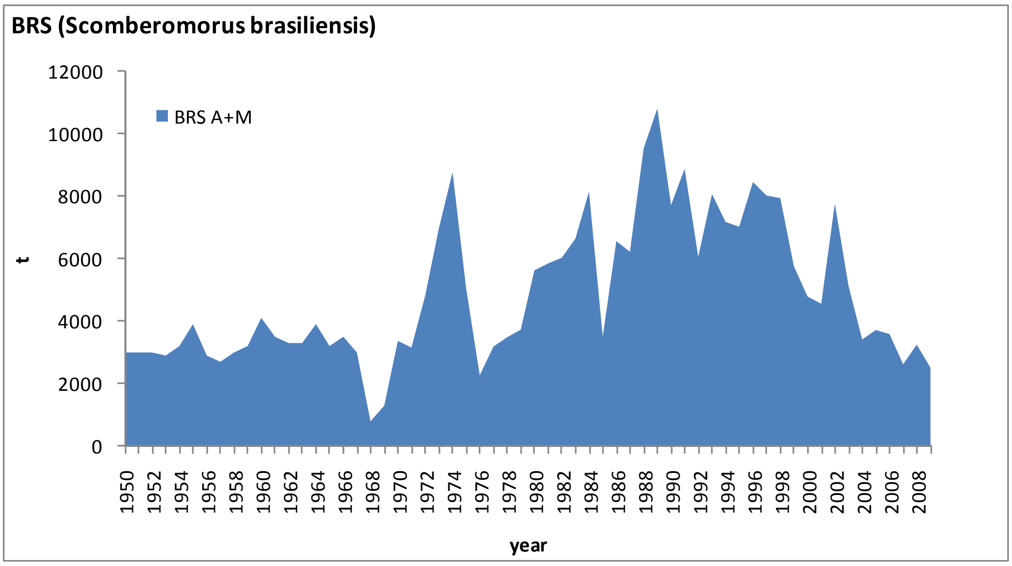
SMT-Figure 1. Estimated landings (t) of small tunas (combined) in the Atlantic and Mediterranean, 1950-2009. The data for the last years are incomplete.

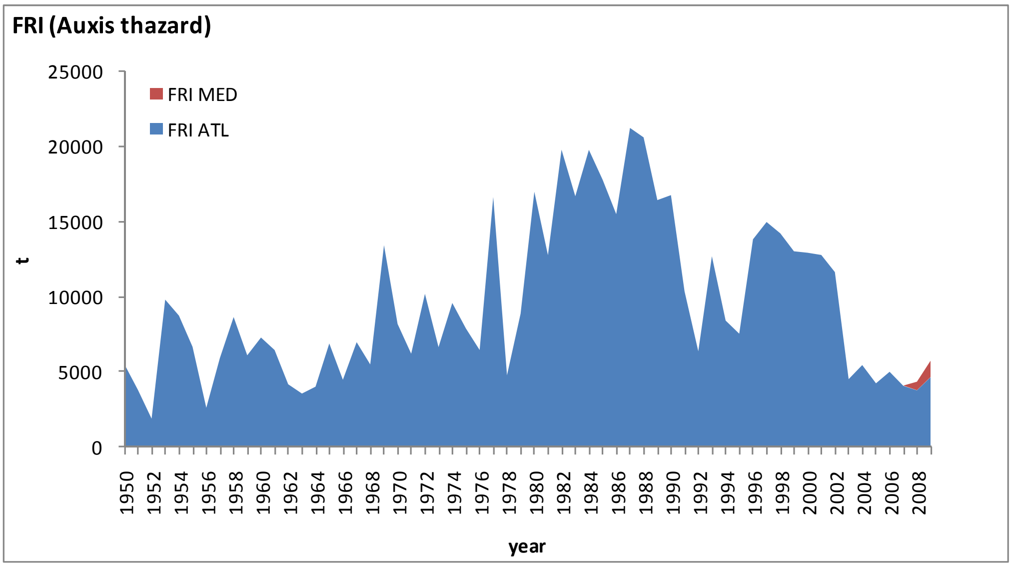

BLF (Thunnus atlanticus)
BLF A+M
t
year


BLT (TAuxis rochei)
BLT A+M
t
year


BON (Sarda sarda)
BON MED
BON ATL
t
year


BOP (Orcynopsis unicolor)
BOP MED
BOP ATL
t
year
0
500
1000
1500
2000
2500
3000
3500
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008


BRS (Scomberomorus brasiliensis)
BRS A+M
t
year
0
2000
4000
6000
8000
10000
12000
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008


FRI (Auxis thazard)
FRI MED
FRI ATL
t
year
0
5000
10000
15000
20000
25000
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
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1980
1982
1984
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1988
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1992
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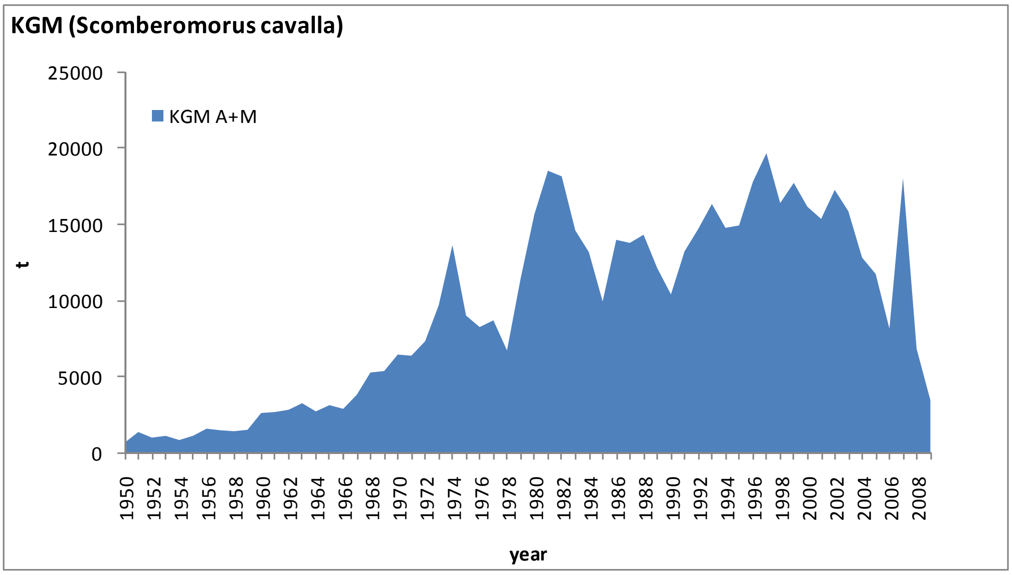
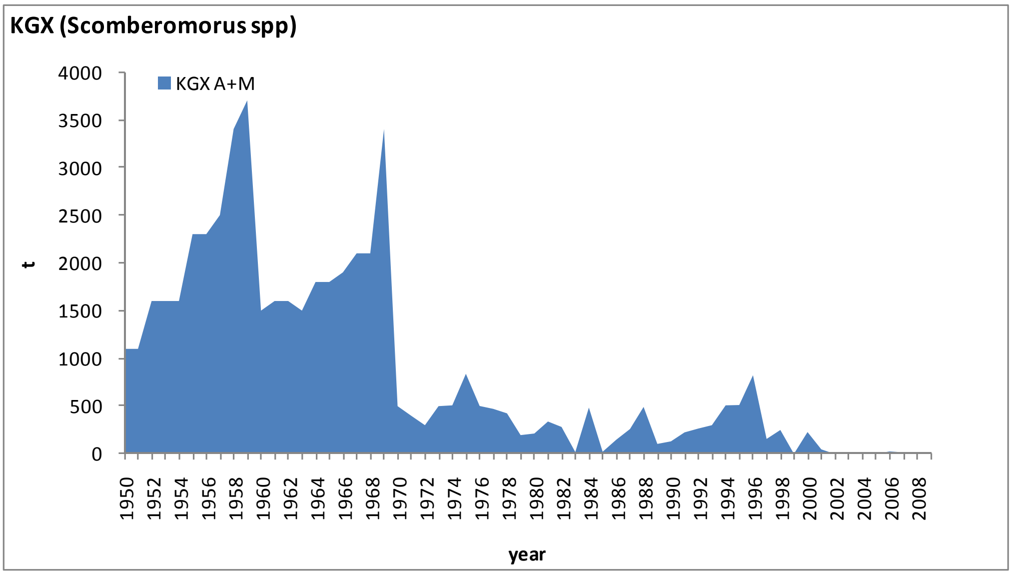
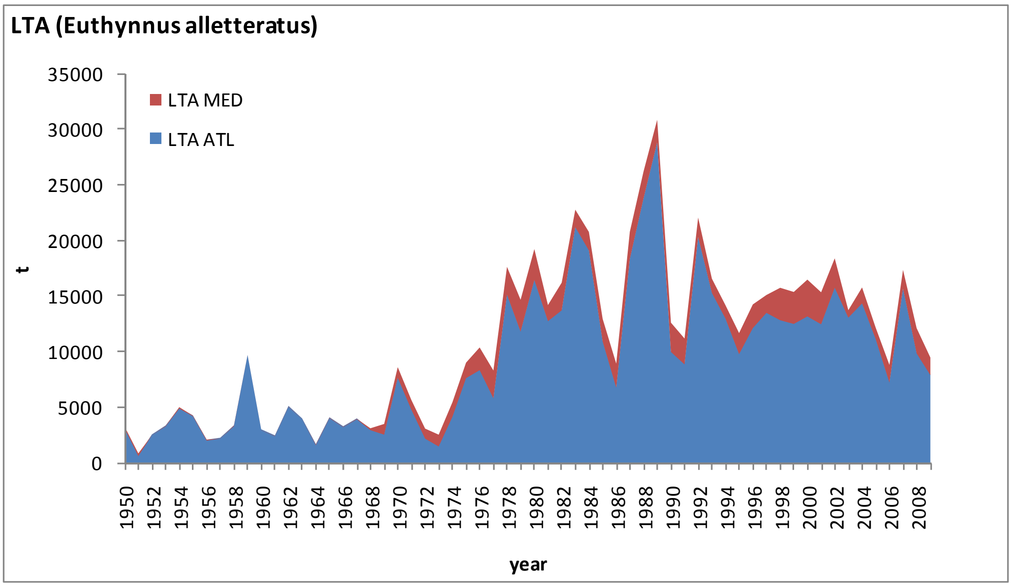
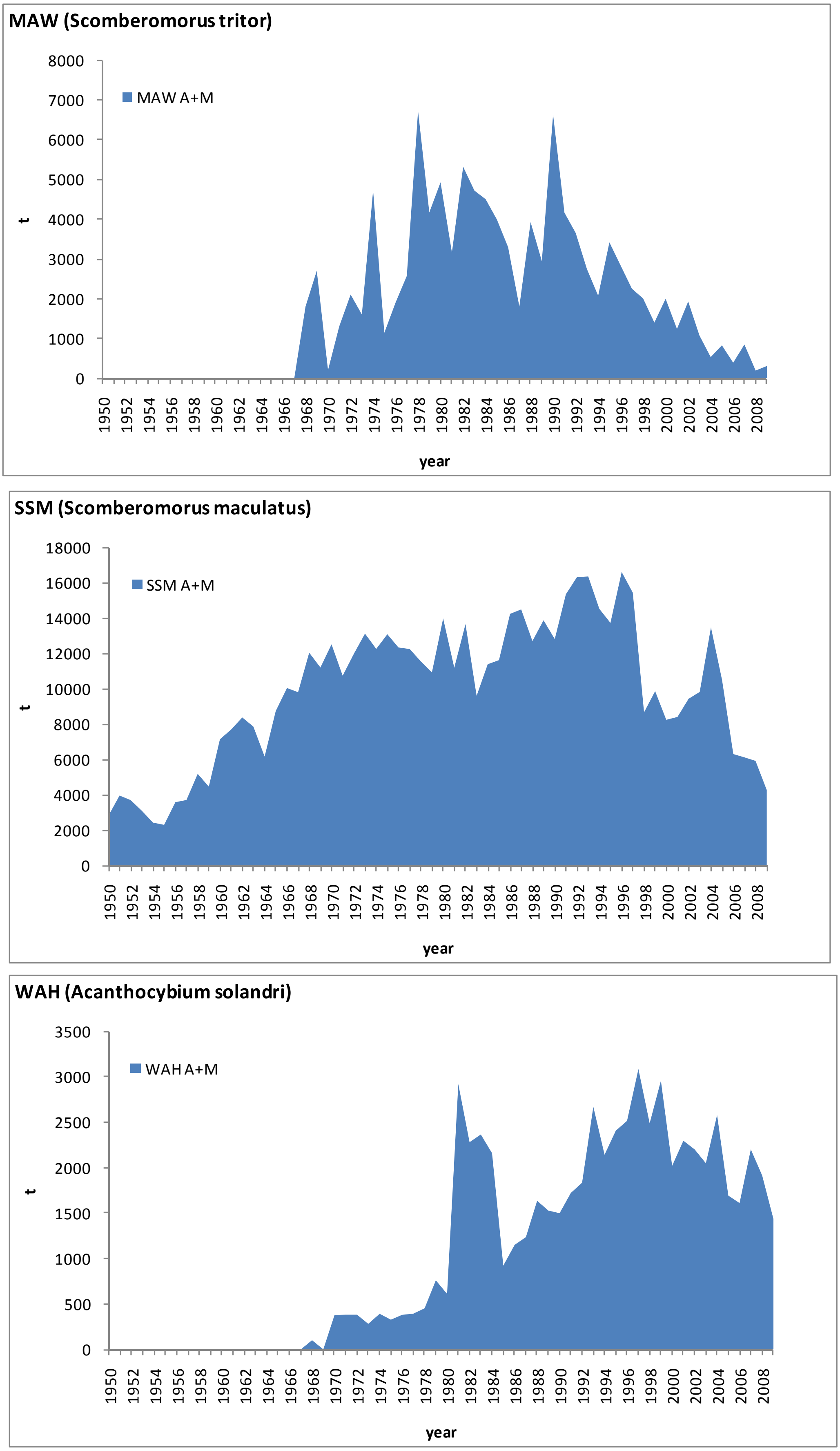
1996
1998
2000
2002
2004
2006
2008


KGM (Scomberomorus cavalla)
KGM A+M
t
year


KGX (Scomberomorus spp)
KGX A+M
t
year


LTA (Euthynnus alletteratus)
LTA MED
LTA ATL
t
year



SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2009. The data for the last years are incomplete.

8.12 SHK - SHARKS

In response to the *Supplemental 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*). In 2009, an assessment of porbeagle stocks was conducted jointly with ICES, in response to the *Resolution by ICCAT on Porbeagle Shark* [Rec. 08-08].

The quantity and quality of the data available (e.g., historical catches and CPUE information) to conduct stock assessments have increased with respect to those available in the first (2004) shark assessments (Anon. 2005c) conducted by ICCAT. However, 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 all pelagic shark 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 2008 (Anon. 2009b) and 2009 (Anon. 2010e) 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 in 2008 assuming the existence of three separate stocks: North, South and Mediterranean. However, the data available to the Committee for the Mediterranean were considered insufficient to conduct quantitative assessments for these species. The assessment results presented high levels of uncertainty due to data limitations. Similarly, the Committee assessed in 2009 porbeagle sharks assuming the existence of four separate stocks: Northwest, Northeast (including the Mediterranean, for which only limited information is available), Southwest and Southeast. The assessment results for the southern porbeagle stocks also presented high levels of uncertainty due to data limitations.

Increased research and data collection are required to enable the Committee to improve the advice it can offer.

SHK-1. Biology

A great variety of shark species are found within the ICCAT Convention area, from coastal to oceanic species. Biological strategies of these sharks are very diverse and are adapted to the needs within their respective ecosystems where they occupy a very high position in the trophic chain as active predators. Therefore, generalization as regards to the biology of these very diverse species results in inevitable inaccuracies, as would occur for teleosts. To date, ICCAT has prioritized the biological study and assessment of the major sharks of the epipelagic system as these species are more susceptible of being caught as by-catch by oceanic fleets targeting tuna and tuna-like species. Among these shark species there are some of special prevalence and with an extensive geographical distribution within the oceanic-epipelagic ecosystem, such as the blue shark and shortfin mako shark, and others with less or even limited prevalence, such as porbeagle, hammerhead sharks, thresher sharks, white sharks, etc.

Blue shark and shortfin mako sharks show a wide geographical distribution, most often between 50ºN and 50ºS latitude. On the contrary, porbeagle show a distribution that is restricted to cold-temperate waters, preferably close to the continental shelf of both hemispheres where this species rarely overlaps with the fishing activity directed at tunas and tuna-like species. These three species have an ovoviviparous reproductive strategy, which increases the probability of survival of their young, with litters from only a few individuals in the case of shortfin mako and porbeagle, to abundant litters of about 40 pups in the case of blue shark. Their growth rates differ between sexes and among these three species. Females often reach first maturity at a large size. A characteristic of these species is usually their tendency to segregate temporally and spatially by size-sex, according to their respective processes of feeding, mating-reproduction, gestation and birth. Numerous aspects of the biology of these species are still poorly understood or completely unknown, particularly for some regions, which contributes to increased uncertainty in quantitative and qualitative assessments.

SHK-2. 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 database 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 to 4)** 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 in 2008 and porbeagle in 2009.

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 5** presents the central tendency of the available series for the four stocks of these species.

Considering the quantitative and qualitative limitations of the information available to the Committee, the results presented in 2008, as those of the 2004 assessment (Anon. 2005c), are not conclusive. During the porbeagle assessment in 2009 (Anon. 2010e), standardized CPUE data were presented for three of the four stocks (NE, NW and SW; **SHK-Figure 6)**. These series when referring to fisheries targeting porbeagle could fail to reflect the global abundance of the stock and where they refer to sharks caught as by-catch they could be highly variable.

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-3. State of the Stocks

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 2** provides a productivity ranking of the species considered. ERAs should be updated with improved information on the productivity and susceptibility of these species.

SHK-3.1 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 in the 2008 assessment (Anon. 2009c) 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 (Anon. 2005), the weight of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective (**SHK-Figure 7**).

SHK-3.2 Shortfin mako shark

Estimates of stock status for the North Atlantic shortfin mako obtained with the different modeling approaches applied in 2008 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 7**). 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-3.3 Porbeagle shark

In 2009, the Committee attempted an assessment of the four porbeagle stocks in the Atlantic Ocean: Northwest, Northeast, Southwest and Southeast (Anon. 2010e). In general, data for southern hemisphere porbeagle are too limited to provide a robust indication on the status of the stocks. For the Southwest, limited data indicate a decline in CPUE in the Uruguayan fleet, with models suggesting a potential decline in porbeagle abundance to levels below MSY and fishing mortality rates above those producing MSY (**SHK-Figure 8**). But catch and other data are generally too limited to allow definition of sustainable harvest levels. Catch reconstruction indicates that reported landings grossly underestimate actual landings. For the Southeast, information and data are too limited to assess their status. Available catch rate patterns suggest stability since the early 1990s, but this trend cannot be viewed in a longer term context and thus are not informative on current levels relative to B_{MSY}.

The northeast Atlantic stock has the longest history of commercial exploitation. A lack of CPUE data for the peak of the fishery adds considerable uncertainty in identifying the current status relative to virgin biomass. Exploratory assessments indicate that current biomass is below B_{MSY} and that recent fishing mortality is near or above F_{MSY} (**SHK-Figure 9**). Recovery of this stock to B_{MSY} under no fishing mortality is estimated to take ca. 15-34 years. The current EU TAC of 436 t in effect for the Northeast Atlantic may allow the stock to remain stable, at its current depleted biomass level, under most credible model scenarios. Catches close to the current TAC (e.g. 400 t) could allow rebuilding to B_{MSY} under some model scenarios, but with a high degree of uncertainty and on a time scale of 60 (40-124) years.

An update of the Canadian assessment of the northwest Atlantic porbeagle stock indicated that biomass is depleted to well below B_{MSY}, but recent fishing mortality is below F_{MSY} and recent biomass appears to be increasing. Additional modelling using a surplus production approach indicated a similar view of stock status, i.e., depletion to levels below B_{MSY} and current fishing mortality rates also below F_{MSY} (**SHK-Figure 10**). The Canadian assessment projected that with no fishing mortality, the stock could rebuild to B_{MSY} level in approximately 20-60 years, whereas surplus-production based projections indicated 20 years would suffice. Under the Canadian strategy of a 4% exploitation rate, the stock is expected to recover in 30 to 100+ years according to the Canadian projections.

SHK-4. Management Recommendations

Precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible.

For species of high concern (in terms of overfishing), and for which a high survivorship is expected in fishing gears after release, the Committee recommends that the Commission prohibits retention and landings of the species to minimize fishing mortality. The Committee recognizes that the difficulty in identifying look-alike species may complicate compliance with management measures adopted for those species

For all the species, but particularly for those which can be easily misidentified, it is essential that the Committee advances data collection, and research on life history, together with the interactions with tuna fisheries, with the final objective of assessing the status of the stocks. Until such information is made available, the Commission should consider taking effective measures to reduce the fishing mortality of these stocks. These measures may include minimum or maximum size limits for landing (for protection of juveniles or the breeding stock, respectively); and any other technical mitigation measures such as gear modifications, time-area restrictions, or others as appropriate. Such management actions should be combined with research activities, in order to provide information of their effectiveness.

Both porbeagle stocks in the northwest and northeast Atlantic were estimated to be overfished, with the northeastern stock being more highly depleted. The main source of fishing mortality on these stocks is from directed porbeagle fisheries which are not under the Commission's direct mandate. Those fisheries are managed mostly by ICCAT Contracting Parties through national legislation which include quotas and other management measures.

The Committee also recommends that countries initiate research projects to investigate means to minimize by-catch and discard mortality of sharks, with a particular view to recommending to the Commission complementary measures to minimize porbeagle by-catch in fisheries for tuna and tuna-like species. For porbeagle sharks, the Committee recommends that the Commission work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs to ensure recovery of North Atlantic porbeagle stocks and prevent overexploitation of South Atlantic stocks. In particular, porbeagle fishing mortality should be kept to levels in line with scientific advice and with catches not exceeding current level. New targeted porbeagle fisheries should be prevented, porbeagles retrieved alive should be released alive, and all catches should be reported. Management measures and data collection should be harmonized as much as possible among all relevant RFMOs dealing with these stocks, ICCAT should facilitate appropriate communication.

The Committee recommends that joint work with the ICES Working Group on Elasmobranch Fishes should be continued. In light of the changing methods in the provision of ICES advice, from the Precautionary Approach to F_{MSY}, the 2009 joint ICCAT/ICES porbeagle (*Lamna nasus*) assessment should be revisited. Representatives of the Committee should attend the 2011 WGEF meeting (Copenhagen, June 2011), to update the NE Atlantic porbeagle assessment with recent data, in preparation for a full assessment in 2012. In addition, stocks of mutual interest and areas of overlap, particularly species occurring in the Mediterranean Sea, should be discussed.

Considering that (a) the oceanic whitetip shark (*Carcharhinus longimanus*), as in the case of bigeye thresher (*Alopias superciliosus*), has been ranked as one of the five species with the highest degree of risk in an ecological risk assessment performed by the SCRS in 2008 for sharks, due to the lack of the provision of data; (b) that it has high at-vessel survival and constitutes a small portion of the shark catch; (c) that it is one of the easiest shark species to identify, particularly by their characteristic fins; and (d) that a significant proportion of the species catch is composed of juvenile individuals; the group recommends invocation of a precautionary approach in suggesting a minimum size in total length be established for the species. Therefore, the Committee recommends the adoption of a minimum size of 200 cm total length which would allow protection of the first reproductive ages. The Committee further recommends that research be conducted to better determine what life stages are more important for the productivity of the stock.

The Committee should conduct a Data Preparatory Meeting in 2011 with the purpose of generating a larger and better database to update in 2012 the Ecological Risk Assessment conducted in 2008. To that end, national scientists should assemble and present all available information on fisheries operations and pelagic shark life history. Of special interest is any information on fisheries operations gathered by national observer programs related to overlap of fisheries with geographic distribution of pelagic sharks, overlap of gear with vertical distribution of individual species (particularly information collected with satellite tags), as well as status, disposition and size of animals brought to the vessel.

NORTH ATLANTIC BLUE SHARK SUMMARY

2007 Yield		61,845 t[1]
Provisional Yield (2009)		33,208 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	1.87-2.74[3]
	B_{2007}/B_0	0.67-0.93[4]
Relative Fishing Mortality:	F_{MSY}	0.15[5]
	F_{2007}/F_{MSY}	0.13-0.17[6]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] 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}.
[4] Range obtained from BSP (high), CFASP and Age-Structured Production Model (ASPM) (low) models.
[5] From BSP and CFASP models (same value). CV is from CFASP model.
[6] Range obtained from BSP (high) and CFASP (low) models.

SOUTH ATLANTIC BLUE SHARK SUMMARY

2007 Yield		37,075 t[1]
Provisional Yield (2009)		22,439 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	1.95-2.80[3]
	B_{2007}/B_0	0.86-0.98[4]
Relative Fishing Mortality:	F_{MSY}	0.15-0.20[5]
	F_{2007}/F_{MSY}	0.04-0.09[6]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is $SSB/SSB_{MSY.}$
[4] Range obtained from BSP (high) and CFASP (low) models. Value from CFASP is SSB/SS_{B0}.
[5] Range obtained from BSP (low) and CFASP (high) models.
[6] Range obtained from BSP (low) and CFASP (high) models.

NORTH ATLANTIC SHORTFIN MAKO SUMMARY

2007 Yield		5,996 t[1]
Provisional Yield (2009)		3,844 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	0.95-1.65[3]
	B_{2007}/B_0	0.47-0.73[4]
Relative Fishing Mortality:	F_{MSY}	0.007-0.05[5]
	F_{2007}/F_{MSY}	0.48-3.77[6]
Management measures in effect		[Rec. 04-10], [Rec. 07-06]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is $SSB/SSB_{MSY.}$
[4] Range obtained from BSP (low), AS, and CFASP (high) models. Value from CFASP is SSB/SS_{B0}.
[5] Range obtained from BSP (low) and CFASP (high) models.
[6] Range obtained from BSP (high) and CFASP (low) models.

NORTHWEST ATLANTIC PORBEAGLE SUMMARY

Current Yield (2008)		144.3 t[1]
Relative Biomass:	B_{2008}/B_{MSY}	0.43-0.65[2]
Relative Fishing Mortality:	F_{MSY}	0.025-0.075[3]
	F_{2008}/F_{MSY}	0.03-0.36[4]
Management measures in effect		TAC of 185, 11.3 t[5]

[1] Estimated catch allocated to the northwest stock area.
[2] Range obtained from age-structured model (Canadian assessment; low) and BSP model (high). Value from Canadian assessment is in numbers; value from BSP in biomass. All values in parentheses are CVs.
[3] Range obtained from BSP model (low) and age-structured model (high).
[4] Range obtained from BSP model (low) and age-structured model (high).
[5] The TAC for the Canadian EEZ is 185 t (MSY catch is 250 t); the TAC for the USA is 11.3 t.

SOUTHWEST ATLANTIC PORBEAGLE SUMMARY

Current Yield (2008)		164.6 t[1]
Relative Biomass:	B_{2008}/B_{MSY}	0.36-0.78[2]
Relative Fishing Mortality:	F_{MSY}	0.025-0.033[3]
	F_{2008}/F_{MSY}	0.31-10.78[4]
Management measures in effect		None

[1] Estimated catch allocated to the Southwest stock area.
[2] Range obtained from BSP (low and high) and CFASP models. Value from CFASP model (SSB/SSB_{MSY}) was 0.48 (0.20).
[3] Range obtained from BSP (low) and CFASP (high) models.
[4] Range obtained from BSP (low and high) and CFASP models. Value from CFASP model was 1.72 (0.51).

NORTHEAST ATLANTIC PORBEAGLE SUMMARY

Current Yield (2008)		287 t[1]
Relative Biomass:	B_{2008}/B_{MSY}	0.09-1.93[2]
Relative Fishing Mortality:	F_{MSY}	0.02-0.03[3]
	F_{2008}/F_{MSY}	0.04-3.45[4]
Management measures in effect		TAC of 436 t[5]
		Maximum landing length of 210 cm FL[5]

[1] Estimated catch allocated to the Northeast stock area.
[2] Range obtained from BSP (high) and ASPM (low) models. Value from ASPM model is SSB/SSB_{MSY}. The value of 1.93 from the BSP corresponds to a biologically unrealistic scenario; all results from the other BSP scenarios ranged from 0.29 to 1.05.
[3] Range obtained from the BSP and ASPM models (low and high for both models).
[4] Range obtained from BSP (low) and ASPM (high) models. The value of 0.04 from the BSP corresponds to a biologically unrealistic scenario; all results from the BSP scenarios ranged from 0.70 to 1.26.
[5] In the European Union.

BSH-Table 1. Estimated catches (t) of blue shark *(Prionace glauca)* by area, gear and flag.

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			380	1482	1614	1835	1810	3028	4307	3643	9577	9562	9634	9560	37610	33809	35093	39101	34447	32735	35572	36304	43071	40351	47044	54231	55832
	ATN		380	1482	1614	1835	1810	3028	4299	3536	9566	8084	8285	7258	29053	26510	25741	27965	21022	20037	22911	21740	22357	23215	26925	30879	33208
	ATS		0	0	0	0	0	0	8	107	10	1472	1341	2301	8409	7238	9332	11091	13378	12682	12650	14438	20642	16957	20068	23272	22439
	MED		0	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	125	72	178	51	80	185
Landings	ATN	Longline	0	0	0	0	0	1387	2257	1583	5734	5880	5871	5467	27618	25288	24405	26473	20013	18426	21936	20304	21033	22090	25966	30600	32443
		Other surf.	380	1482	1088	1414	1330	900	1270	1768	2696	1632	1793	1086	1255	1030	1228	1355	904	1543	975	1372	1258	1080	905	150	664
	ATS	Longline	0	0	0	0	0	0	8	107	10	1472	1341	2294	8398	7231	9305	11091	13376	12678	12645	14339	20638	16898	19998	22883	22433
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	1	4	6	99	3	59	10	375	6
	MED	Longline	0	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	44	72	83	49	79	18
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	0	95	2	1	167
Discards	ATN	Longline	0	0	526	421	480	741	772	184	1136	572	621	602	180	170	104	137	105	68	0	63	66	45	53	129	100
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	103	0	22	4	0	0	0	0	1	0	0	0	1	1
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	60	14	
		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	
Landings	ATN	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	114
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	
		Canada	0	320	147	968	978	680	774	1277	1702	1260	1494	528	831	612	547	624	581	836	346	965	1134	977	843	0	0
		Cape Verde	0	0	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	0	185	104	148	0	0	0	367	109	88
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	206	240	588	292	112	94
		EU.Denmark	0	0	0	0	2	2	1	1	0	1	2	3	1	1	0	2	1	13	5	1	0	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	24497	22504	21811	24112	17362	15666	15975	17314	15006	15464	17038	20788	24465
		EU.France	39	50	67	91	79	130	187	276	322	350	266	278	213	163	399	395	207	221	57	106	120	99	167	119	84
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	31	66	11	2	0	0	0	0	0	0
		EU.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
		EU.Portugal	0	0	0	0	0	1387	2257	1583	5726	4669	4722	4843	2630	2440	2227	2081	2110	2265	5643	2025	4027	4338	5283	6167	6252
		EU.United Kingdom	0	0	0	0	0	1	0	0	0	0	12	0	0	1	0	12	9	6	4	6	5	3	6	6	96
		FR.St Pierre et Miquelon	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
		Japan	0	0	0	0	0	0	0	0	0	1203	1145	618	489	340	357	273	350	386	558	1035	1729	1434	1921	2686	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	254	892	613	1575
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	0	0	0	0	43	134	255
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	2	1	1	0	2	8
		U.S.A.	341	1112	874	355	271	87	308	215	680	29	23	283	211	255	217	291	39	0	0	7	2	2	1	8	3
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	26	10	18	7	71
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	259	0	236	109	
		Benin	0	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	0	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	743	1103	0	179	1683	2173	1971	2166	1667	2523	2591	2258	1986	1274
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	565	316	452	0	0	0	585	40	109
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521	800	866	1805	2177	1862	1318
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	5272	5574	7173	6951	7743	5368	6626	7366	6410	8724	8942	9615	13099
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	847	867	1336	876	1110	2134	2562	2324	1841	1863	3184	2751	4493	4866	5358
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	239	0	0	14
		Japan	0	0	0	0	0	0	0	0	0	1388	437	425	506	510	536	221	182	343	331	209	236	525	896	1945	
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2213	0	1906	6616	0	0	1829	207
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168	22	0	0	0	0	0	0	0	521	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	23	21	0	83	63	232	128	154	90	82	126	119
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	
		Uruguay	0	0	0	0	0	0	8	107	10	84	57	259	180	248	118	81	66	85	480	462	376	232	337	359	942
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	6	5	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	146	59	20	31	6	3	3	4	8	61	3	2	7
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	1	95	46	75	175
		EU.Malta	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	2	2	2
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	41	14	3	0	56	22	0	0	
		Japan	0	0	0	0	0	0	0	0	0	5	7	1	1	0	0	0	0	0	1	1	2	0	0	0	
Discards	ATN	U.S.A.	0	0	526	421	480	741	772	184	1136	572	618	704	180	192	100	137	106	68	0	65	66	45	54	130	101
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	3	1	0	0	8	0	0	0	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	60	14	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	0	0	

POR-Table 1. Estimated catches (t) of porbeagle *(Lamna nasu* s) by area, gear and flag.

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			687	732	844	1025	1013	1309	1990	2603	1910	2729	2140	1560	1859	1469	1403	1469	999	848	648	745	571	507	515	606	427
	ATN		687	732	844	1024	1013	1309	1990	2603	1909	2726	2136	1556	1833	1451	1393	1457	998	838	604	725	539	470	502	513	398
	ATS		0	0	0	1	0	0	0	0	1	2	3	3	26	17	10	11	1	11	43	17	31	37	13	91	28
	MED		0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2	1
Landings	ATN	All gears	687	732	844	1024	1013	1309	1990	2601	1909	2725	2136	1556	1833	1451	1393	1457	998	838	604	725	539	470	502	513	398
	ATS	All gears	0	0	0	1	0	0	0	0	1	2	3	3	26	16	9	11	1	11	43	17	31	37	13	91	28
	MED	All gears	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2	1
Discards	ATN	All gears	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATS	All gears	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	
Landings	ATN	Canada	26	24	59	83	73	78	329	813	919	1575	1353	1051	1334	1070	965	902	499	237	142	232	202	192	93	124	62
		EU.Denmark	72	114	56	33	33	46	85	80	91	93	86	72	69	85	107	73	76	42	0	0	0	0	0	0	
		EU.España	23	26	30	69	42	26	47	15	21	52	19	41	25	25	18	13	24	54	27	11	14	34	8	41	77
		EU.France	254	260	280	446	341	551	300	496	633	820	565	267	315	219	240	410	361	461	303	413	276	194	354	311	228
		EU.Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	1	3	0	0	0	0	0	0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	6	3	11	18	0	4	8	7	3
		EU.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	
		EU.Portugal	0	0	3	3	2	2	1	0	0	0	0	0	0	0	0	7	4	10	101	50	14	6	0	3	17
		EU.Sweden	10	8	5	3	3	2	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	
		EU.United Kingdom	12	6	3	3	15	9	0	0	0	0	0	0	0	1	6	8	12	10	0	0	24	11	26	15	11
		Faroe Islands	210	270	381	373	477	550	1189	1149	165	48	44	8	9	7	10	0	0	0	0	0	0	0	0	0	
		Iceland	0	0	0	0	0	0	0	1	3	4	6	5	3	4	2	2	3	2	1	1	0	1	0	1	0
		Japan	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	12	11	
		Norway	80	24	25	11	25	43	32	41	24	24	26	28	17	27	32	22	11	14	19	0	8	27	0	0	
		U.S.A.	0	0	1	0	2	2	5	1	50	106	35	78	56	13	3	1	1	1	0	1	0	0	0	1	1
	ATS	Benin	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	
		Chile	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	7	1	2	9	4	0	3	5	4	13
		EU.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	
		EU.Poland	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	
		Falklands	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Japan	0	0	0	1	0	0	0	0	1	0	0	3	14	0	1	0	0	0	0	0	0	0	5	47	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Uruguay	0	0	0	0	0	0	0	0	0	0	3	0	5	13	2	4	0	8	34	8	28	34	3	40	14
	MED	EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	2	0
		EU.Malta	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0	0	1
Discards	ATN	U.S.A.	0	0	0	0	0	0	0	2	0	1	0	0	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	1	1	0	0	0	0	0	0	0	0	0	

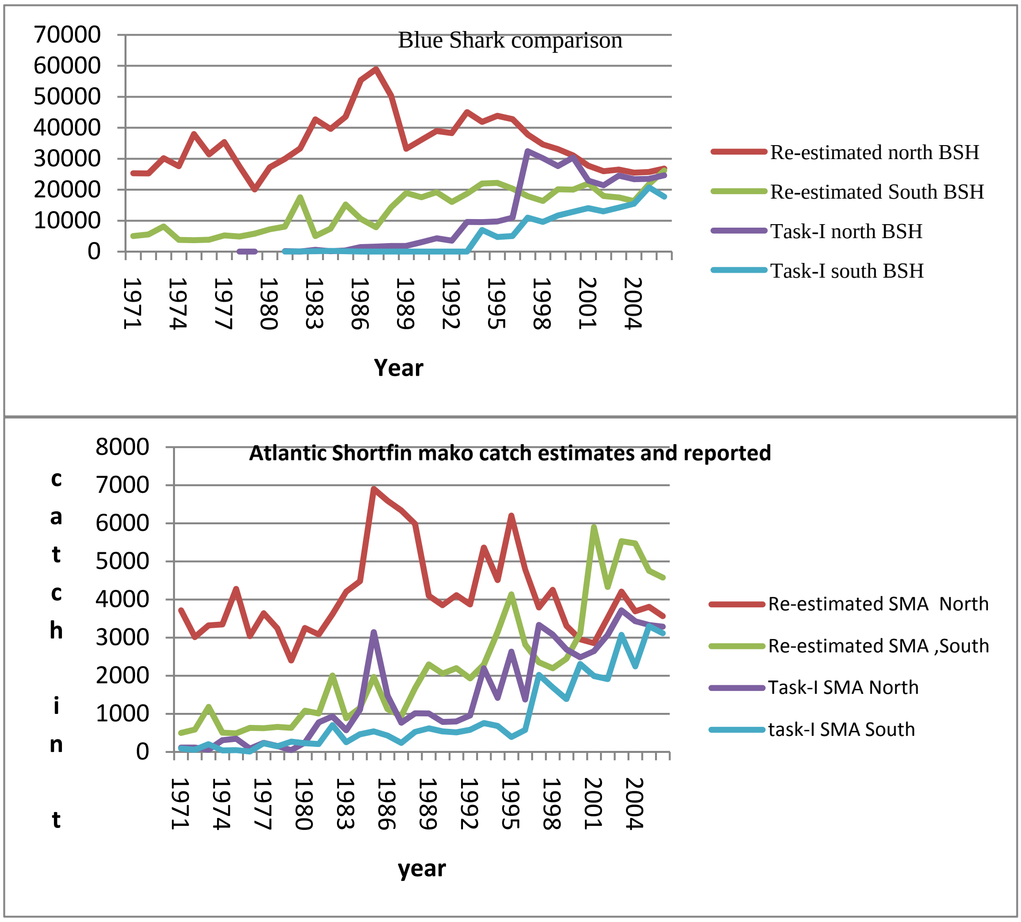
SMA-Table 1. Estimated catches (t) of Shortfin mako *(Isurus oxyrinchus)* by area, gear and flag.

			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL			3803	1951	1028	1562	1648	1349	1326	1446	2966	2972	4870	2778	5570	5477	4097	4994	4654	5361	7324	7487	6336	6073	6753	5307	5781
	ATN		3143	1481	766	1014	1011	785	797	953	2193	1526	3109	2019	3545	3816	2738	2568	2651	3395	3895	5063	3190	3113	3917	3412	3844
	ATS		661	471	262	548	637	564	529	493	773	1446	1761	759	2019	1652	1355	2422	1996	1964	3426	2423	3130	2951	2834	1894	1937
	MED		0	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1	1
Landings	ATN	Longline	194	184	295	214	321	497	573	660	1499	1173	1633	1770	3369	3648	2645	2254	2424	3129	3792	4755	3172	3105	3901	3376	3449
		Other surf.	2949	1297	462	795	681	278	213	254	670	331	1447	248	177	168	91	313	227	266	104	308	18	8	10	27	375
	ATS	Longline	661	471	262	548	637	564	519	480	763	1426	1748	744	1997	1642	1345	2413	1979	1949	3395	2347	3116	2907	2792	1811	1930
		Other surf.	0	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	18	15	31	76	14	43	30	82	7
	MED	Longline	0	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1	1
		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
Discards	ATN	Longline	0	0	9	5	9	10	11	38	24	21	29	1	0	0	0	0	0	0	0	0	0	0	7	9	19
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	
Landings	ATN	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	23
		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	
		Canada	0	0	0	0	0	0	0	0	0	0	111	67	110	69	70	78	69	78	73	80	91	71	72	43	53
		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	81	16	19
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	57	19	30	25	24	14
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	2416	2199	2051	1566	1684	2047	2068	3404	1751	1918	1816	1895	2216
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
		EU.Portugal	0	0	0	0	0	193	314	220	796	649	657	691	354	307	327	318	378	415	1249	473	1109	951	1540	1033	1169
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	1	1	0	0	0	1	15
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	
		Japan	142	120	218	113	207	221	157	318	425	214	592	790	258	892	120	138	105	438	267	572	0	0	82	140	
		Mexico	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	16	0	10	6	9	5	8	6	7
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	49	33	39
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	17	21
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	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	0	0	0	0	0	0	0	
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3	1	2	1	1	1	1
		U.S.A.	3001	1361	540	896	795	360	315	376	948	642	1710	469	407	347	159	454	395	415	142	411	187	130	216	188	196
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	20	6	11	2	35
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	17	2	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	83	190	0	27	219	409	226	283	238	426	210	145	203	99
		China P.R.	0	0	0	0	0	0	0	0	34	45	23	27	19	74	126	305	22	208	260	0	0	0	77	6	24
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	121	128	138	211	125	129
		Côte D'Ivoire	0	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	15	15	30	15	14	16	25	0	5
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	1356	1141	861	1200	1235	811	1158	703	584	664	654	628	939
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	92	94	165	116	119	388	140	56	625	13	242	493	375	321	502
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	11
		Japan	540	428	234	525	618	538	506	460	701	1369	1617	514	244	267	151	264	56	133	118	398	0	0	72	127	
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	459	0	509	1415	1243	1002	295	23
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	1	0	0	0	0	0	0	0	10	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	19	13	0	79	19	138	126	125	99	208	136	100
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	0	
		Uruguay	121	43	28	23	19	26	13	20	28	12	17	26	20	23	21	35	40	38	188	249	146	68	36	41	106
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	12	13	1	0	
	MED	EU.Cyprus	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

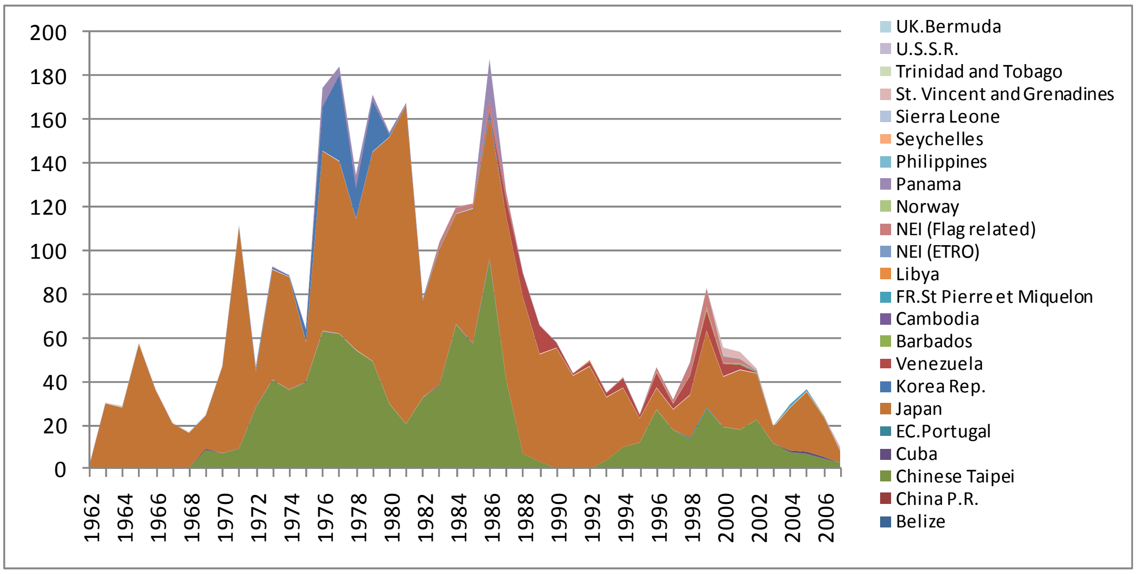
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	6	7	5	3	2	2	2	2	2	4	1	0	0
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0	0	15	5	0	0	
Discards	ATN	Mexico	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	9	5	9	10	11	38	24	21	28	1	0	0	0	0	0	0	0	0	0	0	7	10	20
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	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	12	0	

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

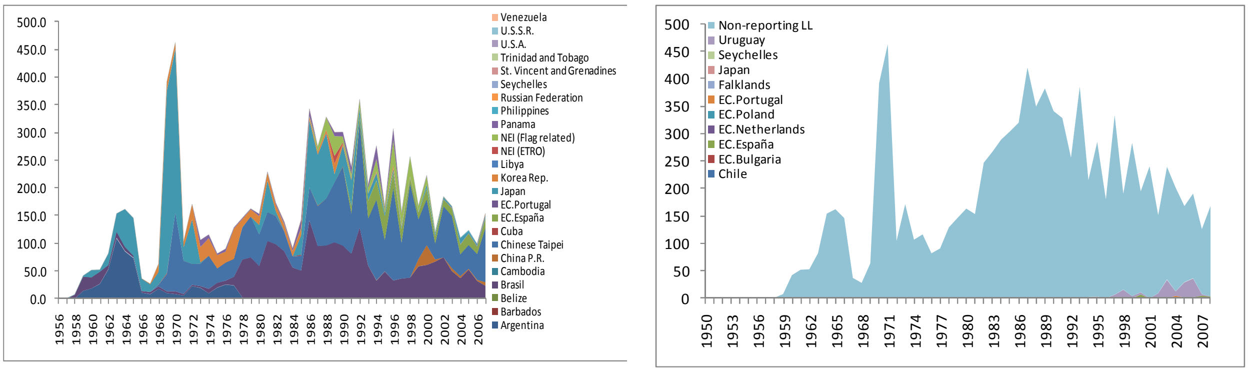
Species	*Productivity (r)*	*Productivity rank*
BTH (*Alopias superciliosus*)	0.010	1
SMA (*Isurus oxyrinchus*)	0.014	2
LMA (*Isurus paucus*)	0.014	3
POR (*Lamna nasus*)	0.053	4
FAL (*Carcharhinus falciformis*)	0.076	6
OCS (*Carcharhinus longimanus*)	0.087	7
SPL (*Sphyrna lewini*)	0.090	8
SPZ (*Sphyrna 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*)	-	-



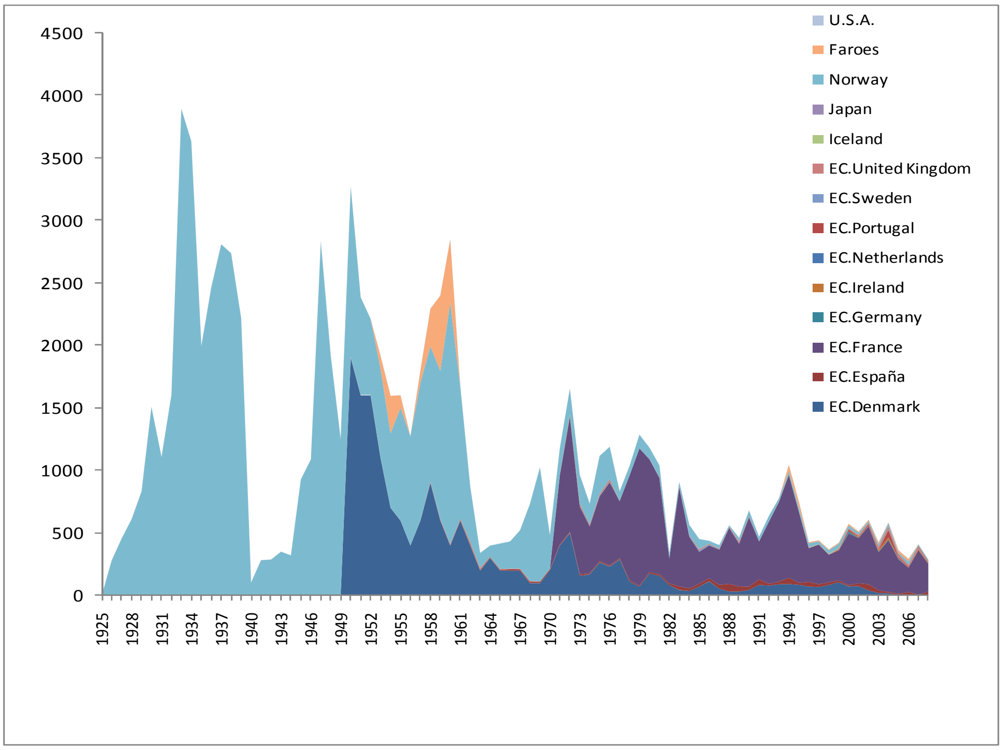
SHK-Figure 1. Blue shark and shortfin mako catches reported to ICCAT and estimated by the Committee.



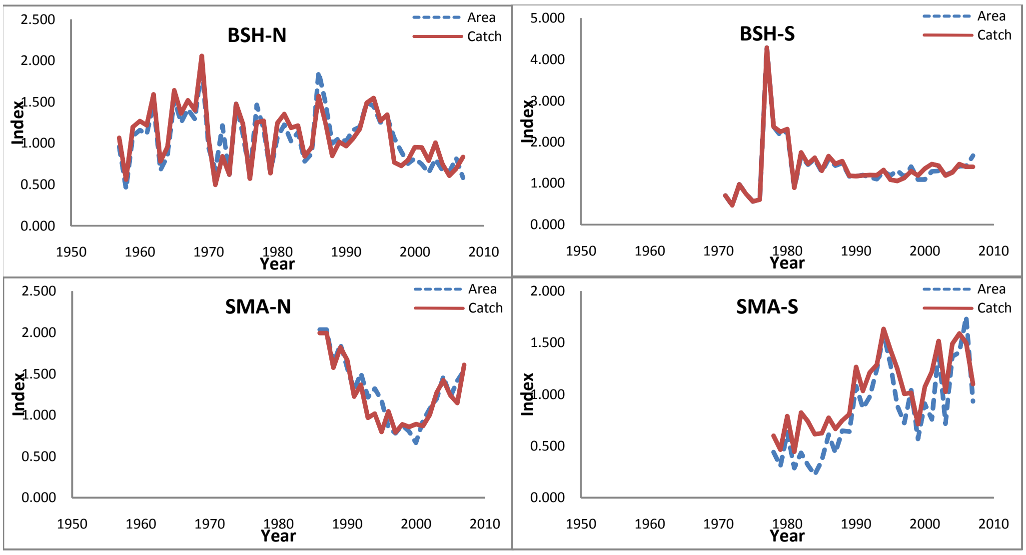
SHK-Figure 2. Potential catch of porbeagle by non-reporting longline fleets using catch ratios for the NW stock. Limited observations across the time-series result in an unquantified uncertainty in the estimates.



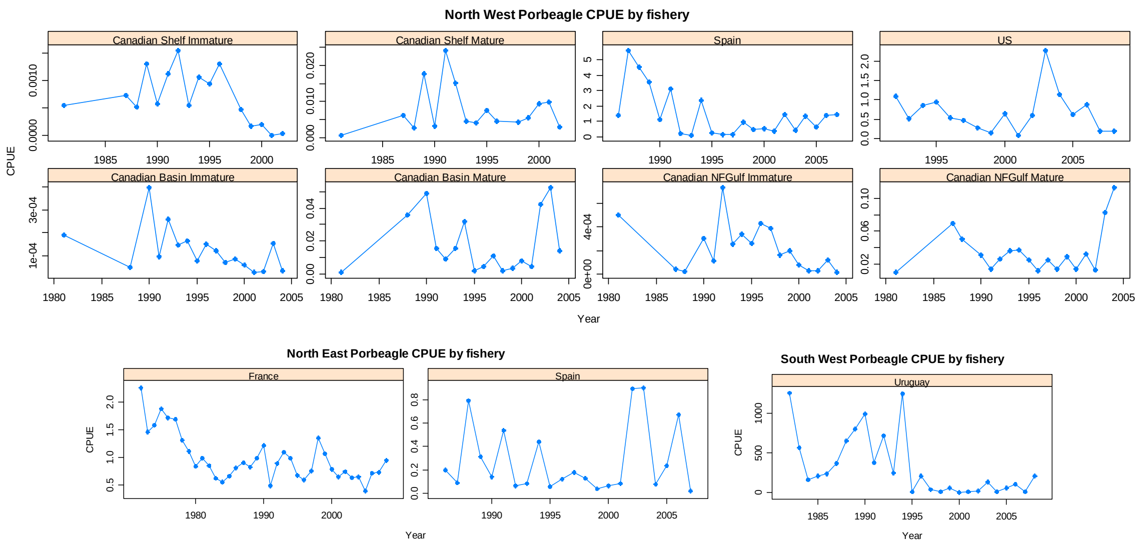
SHK Figure 3. Left plate: Estimated catch of porbeagle by non-reporting longline fleets using catch ratios for the SW stock. Very limited observations across the time-series result in a high but unquantified uncertainty in the estimates. Right plate: Comparison of estimates for non-reporting longline fleets with reported catch levels held in the Task I data set for the SW stock area.



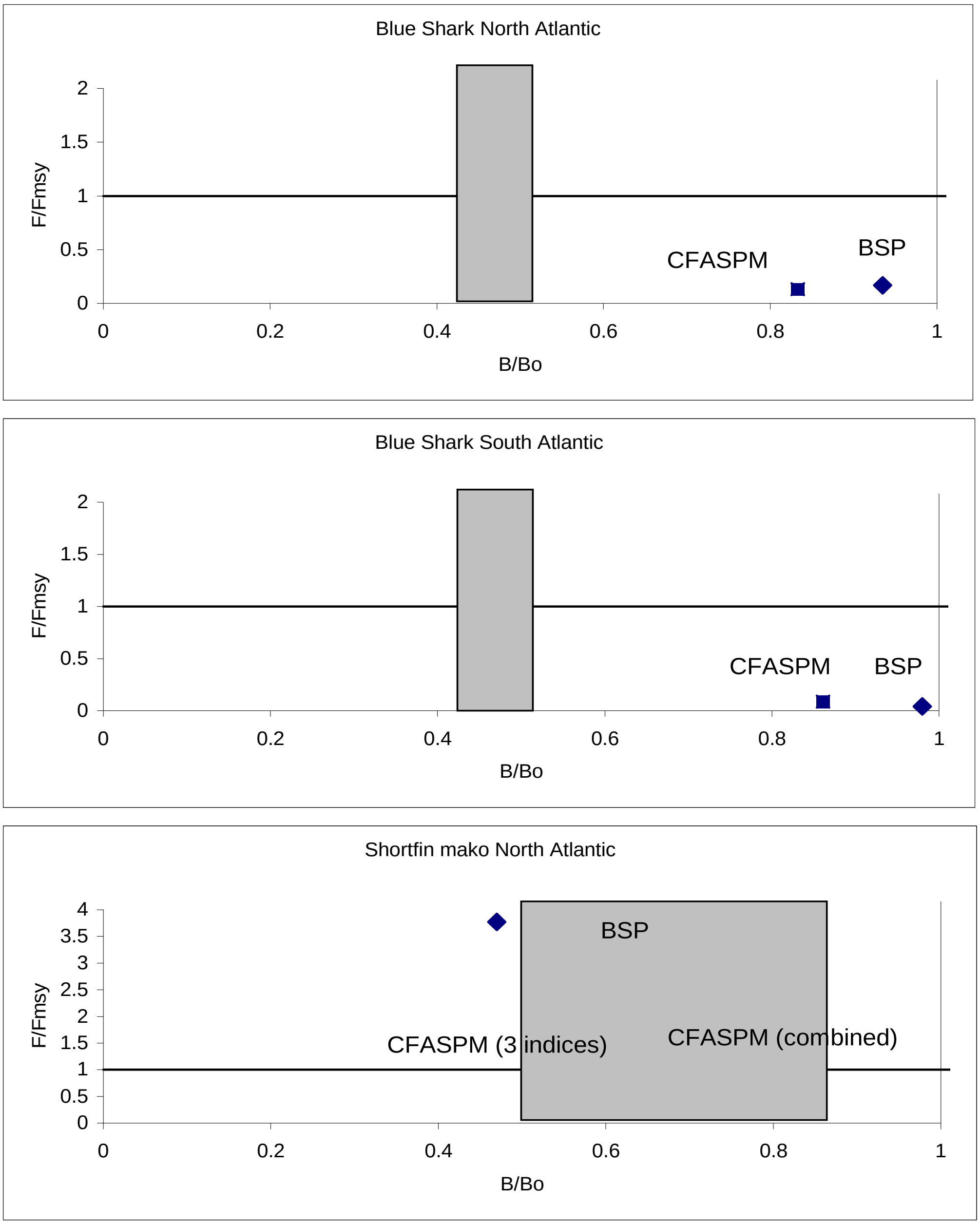
SHK Figure 4. Catch by flag of porbeagle sharks from the northeastern Atlantic used in the assessment. While these catches are considered the best available,, they are believed to underestimate the pelagic longline catches for this species.



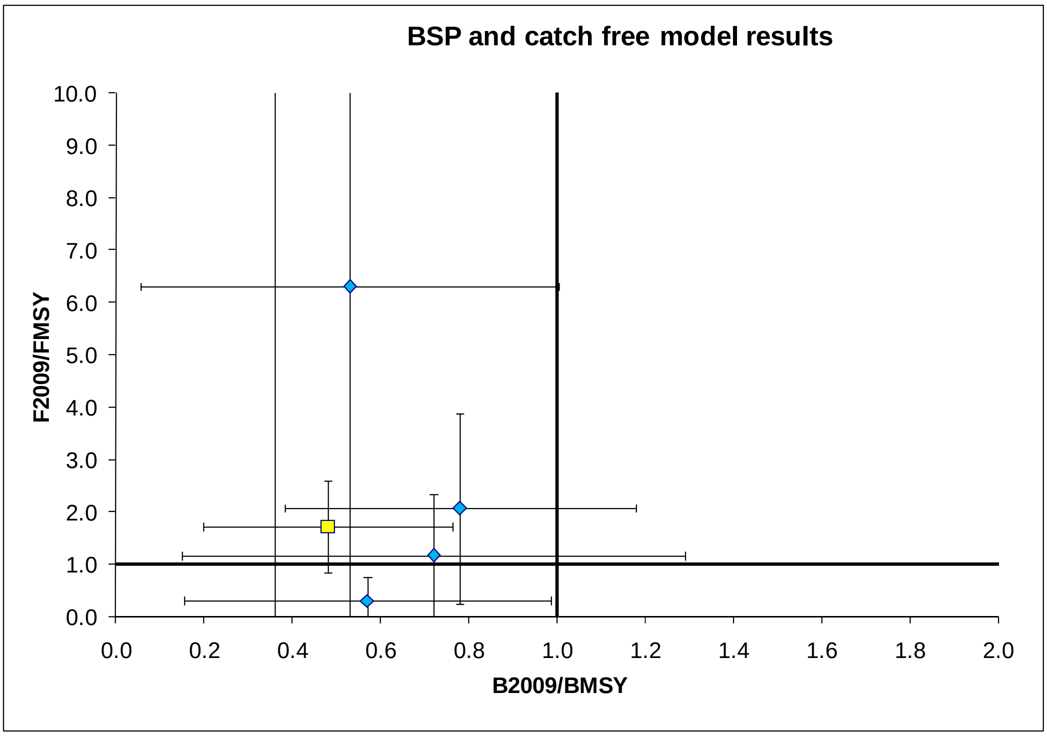
SHK-Figure 5. Average trends in the CPUE series used in the assessments of blue shark (BSH) and shortfin mako (SMA). The averages were calculated by weighting the available series either by their relative catch or by the relative spatial coverage of the respective fisheries.



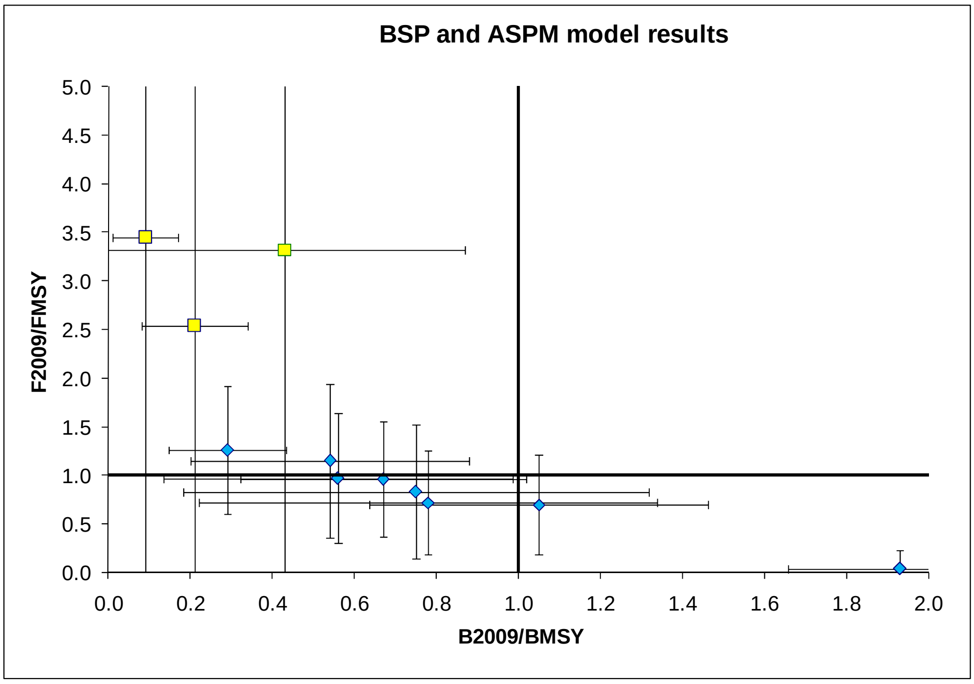
SHK-Figure 6. CPUE series for the porbeagle NW stock (upper figures), NE stock (lower left figures) and SW stock (lower right figure).



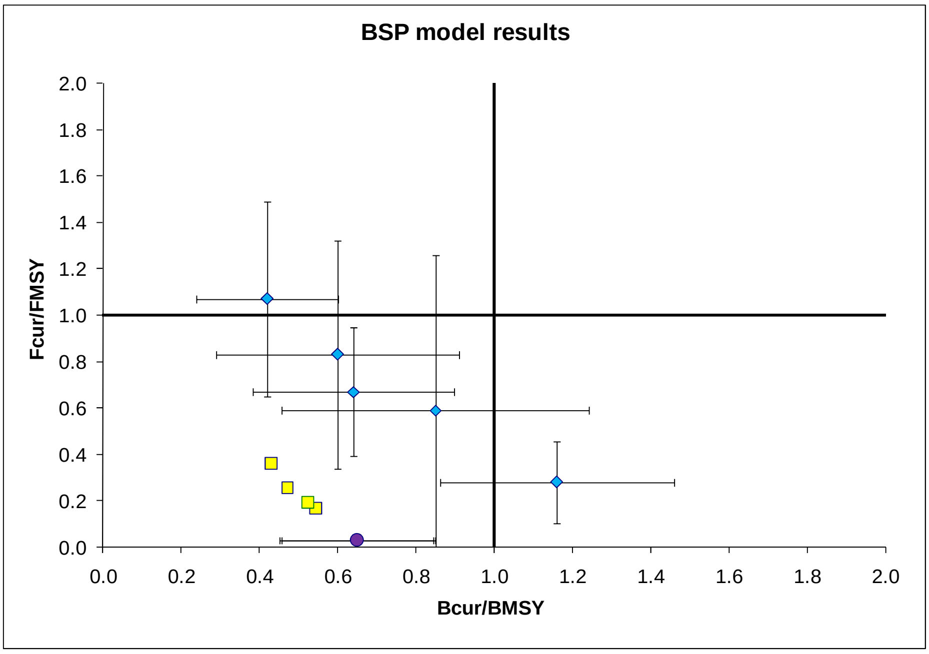
SHK-Figure 7. Phase plots summarizing base scenario outputs for the current stock status of blue shark (BSH) and shortfin mako (SMA). BSP=Bayesian surplus production model; CFASPM=catch-free, age-structured production model. The shaded box represents the area at which the biomass at MSY is estimated 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 8. Phase plot for the southwest Atlantic porbeagle, showing status in 2009 from both the BSP model runs (diamonds) and the catch free age structured production model (square) results. Error bars are plus and minus one standard deviation.



SHK-Figure 9. Phase plot showing current status of northeast Atlantic porbeagle for the BSP model (diamonds) and the ASPM model (squares). Error bars are plus and minus one standard deviation.



SHK-Figure 10. Phase plot showing the northwest Atlantic porbeagle expected value of B/B_{MSY} and F/F_{MSY} in the current year, which is either 2005 (diamonds) or 2009 (circles), as well as approximate values from Campana *et al.* (2010) (squares). B/B_{MSY} was approximated from Campana *et al.* (2010) as N2009/N1961 times 2. Error bars are plus and minus one standard deviation.

9. Report of inter-sessional meetings

The reports of the inter-sessional meetings held in 2010 were presented, with special emphasis not directly related to the stock assessments because their results are not included and presented in the Executive Summaries. The following meetings were presented.

9.1 Working Group on Stock Assessment Methods

The main term of reference of the Working Group was to advise the Commission how the precautionary approach could be best expressed in the ICCAT Convention. As well as suggesting changes to the Convention text in order to incorporate the precautionary approach the Group recommended harmonisation of estimation procedures and produced guidelines for the application of the Kobe II strategy matrix. It was recommended that all Species Groups construct a Kobe II Strategy Matrix (K2SM) and should clearly document how the matrix was constructed.

Discussion

The subsequent discussion recognised the importance of socio-economics although it was also noted that the capacity within the SCRS for this type of work still lagged behind that for stock assessment. In response to a Recommendation related to simulation testing of methods used for standardisation of CPUE the importance of understanding the operational changes in fisheries over time was emphasised.

Document SCRS/2010/010 contains the detailed report of the meeting.

9.2 Bigeye Data Preparatory Meeting

The Tropical Tuna Working group met two months before the assessment to prepare the data necessary for the population analyses. The meeting had the dual purpose of preparing the general basic fishery data, such as estimates of total harvest and relative abundance estimates, and the highly specific data required to support the use of statistically-based age-structured population models (Multifan-CL and SS3). The later require far more time for preparation of inputs than the VPA and production models, time that would not have been available during the assessment meeting.

The data preparatory meeting achieved its main goals: in addition to obtaining estimates of harvest the majority of the data required for inputs for statistically-based age-structured population models was developed during the data preparatory meeting.

The detailed report of the meeting is presented as document SCRS/2010/011.

Discussion

The SCRS acknowledges the comprehensive analyses and presentation regarding the bigeye evaluation during 2010. It was noted, that the use of multiple models for evaluation provides a better view of the levels of uncertainty of the overall assessment. The Chair of the Working Group reflected on the advantages and limitations of having a data preparatory meeting and an assessment meeting. It was noted that the implementation of complex models such Catch Statistical Models require a large effort in data preparation and integration between scientist and the Secretariat, as well sufficient time to run alternative models which are not possible in a single meeting.

9.3 Blue Marlin Data Preparatory Meeting

A Blue marlin Data Preparatory Meeting was held in Madrid, May 17 to 21, 2010 to review and update basic information, review and compile new biological and habitat information, review catch reports, and update relative abundance indices for Atlantic blue marlin. Analysis of basic information (Task I catch and fleet, Task II catch/effort and size) was carried out by the Working Group, revisions and new data reported during the meeting were incorporated into the ICCAT database. Size information was analyzed in detail for its potential use in integrated assessment models and its potential for a future creation of a catch-at-size/age estimation to be used in structured type models. New information on the estimation of age structure and growth of blue marlin was presented. In addition, a new research on the impact of the oxygen minimum zone (OMZ) in the eastern tropical Atlantic on the vertical habitat use of blue marlin provided new insights on its vulnerability to surface gears and the potential variation in catchability inside and outside the OMZ. Analysis of reported catches generated new estimates of total catch for the stock. These analyses included disaggregation of catches reported such as unclassified billfish and filling the gaps of the time series for fleets that had incomplete historical reports. Several relative abundance indices were presented at the meeting including updates of the Brazilian longline, United States recreational and longline, and Venezuelan small scale, longline, and recreational fisheries; three additional indices were generated for Japan, Chinese Taipei and Korea during the meeting in which the standardization included a binomial factor based on the OMZ in the Atlantic (i.e., inside versus outside the OMZ).

This review provided enough information to support the goal of assessing blue marlin during a meeting in 2011.

Document SCRS/2010/012 contains the detailed report of the meeting. No discussion points were raised during the plenary.

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

The report of the inter-sessional meeting held in Madrid between May 31 and June 4 was revised by the Group (Anon. 2010d). Main Agenda items (items 2 to 6) included the revision of the new information available on ecosystems, the optimum observer coverage for reliable estimates of by-catch, ecosystem indicators useful for the SCRS, review of the work conducted under the short term by-catch contract and additional information on seabird data collection, assessment and management.

New information was presented about ecosystem models (including SEAPODYM and spatial multispecies production models), and the Ecosystem Considerations section of the IATTC Fisheries Status Report was reviewed, together with new information about by-catch characterization and by-catch mitigation measures. Regarding the optimum observer coverage, the discussion following the documents and analyses conducted during the meeting concluded that optimum coverage depends on both the frequency at which each species is caught and the variability in the amount (i.e. CPUE) of the by-catch, and thus it is difficult to provide a unique observer coverage level for all taxa and all fleets. However, the Group agreed that at minimum observer coverage should be 5-10%. Different ecosystem indicators covering some of the major types of indicators identified in the literature were presented and discussed by the group in terms of data needs, meaning and usefulness. The data available in the ICCAT database was reviewed. The Sub-Committee indicated that these data should be used with caution since reporting of by-catch had been variable in the past. The Sub-Committee also revised the work conducted under the by-catch contract and made several suggestions for improvement. The final report is available as SCRS/2010/047rev. Finally, new information about seabird data collection, assessment and management was presented, including latest advice on mitigation measures that was consistent with the advice provided in 2009.

The Sub-Committee also made a series of Recommendations about by-catch data collection through observer programs, development of reporting mechanisms, and research on by-catch characterization, mitigation measures, ecosystem models and indicators. The Sub-Committee also reaffirmed the recommendations made in 2009 regarding the seabird by-catch mitigation.

Document SCRS/2010/013 contains the detailed report of the meeting.

9.5 Mediterranean Swordfish Stock Assessment

The meeting was held in Madrid, Spain, June 28 to July 2, 2010. The Mediterranean Swordfish Executive Summary reflects the major results of this assessment. The detailed report of the meeting can be found in document SCRS/2010/015.

9.6 Mediterranean Albacore Data Preparatory Meeting

The meeting (Madrid, June 28-July 2, 2010) was held at the request of the albacore Species Group during the SCRS to review and prepare in advance of the future reassessment of the stock.

Albacore fisheries are characterised by high spatio-temporal variability in landings and fishing patterns. The gears used are surface longline, troll and gillnet, mainly in the western Mediterranean. Likewise, baitboats and rod and reel are also used. In the last decade, 69% of the total Mediterranean catch was reported by Italy, while Greece reported about 20%, followed by Spain (5%), Cyprus (4%) and Turkey (2%).

Several sport associations in the Mediterranean conducted a survey of its membership regarding the change in availability of albacore in the sport fishery. They indicated that albacore has largely disappeared from these grounds.

Task I nominal catch, Task II catch and effort and size frequencies, as well conventional tagging information, was examined. Of note is the weight of unclassified gear in the overall catches (nearly 100% in the 1980s, about 40% in the 1990s and 30% in 2000). The discrimination of gears (longline, gillnet) is crucial for fisheries-based characterization and subsequent modelling approaches (catchability of the various fleet components, biomass abundance indices estimations, exploitation rates and selectivity patterns).

The catch and effort data available (SCRS/2010/016, **Table 2**) evidences the poor coverage of the available statistics when considering the two. At the same time, there is large heterogeneity in the level of stratification (in particular time strata, geographical strata, various efforts units for the same gear) even within the same CPC. This revision should facilitate the CPUE standardization in the future. It was difficult to match the reported data in Task I and Task II, catch and effort data at the fishery level fleet/gear combinations.

The size composition information presents poor coverage (Task II). There are no catch rates estimations from the diverse fleets targeting albacore.

Biological information such as length-weight relationship and growth parameters are partially available from some regions within the Mediterranean. The stock can be classified as data poor. A variety of indicators have been proposed. Evaluation of the robustness of any indicators used for management is essential. Credibility with stakeholders is important, especially where results are based on incomplete data.

The detailed report of the meeting is presented as document SCRS/2010/016.

9.7 Bigeye Tuna Stock Assessment Session

Please see item 9.2 that describes the report from the data preparatory meeting (Madrid, Spain, July 5 to 9, 2010) and the assessment meeting and corresponding discussions. Document SCRS/2010/017 contains the detailed report of the meeting.

9.8 Bluefin Tuna Data Preparatory Meeting

The SCRS conducted a data preparatory meeting for Atlantic and Mediterranean bluefin tuna during June 14 to 19, 2010 in Madrid, Spain. The detailed report of the meeting is presented as document SCRS/2010/014.

9.9 Bluefin Tuna Stock Assessment Session

The SCRS conducted a comprehensive assessment of Atlantic and Mediterranean bluefin tuna during September 6 to 14, using the available data (catch, effort and size statistics).

The detailed report of the bluefin tuna assessment meeting was adopted by correspondence during the SCRS plenary (SCRS/2010/018).

10. Report of Special Research Programs

10.1 Atlantic-wide Bluefin Tuna Research Programme (GBYP)

Mr. Antonio Di Natale, General Coordinator, presented the report on the Atlantic-wide Bluefin Tuna Research Programme (GBYP) activities carried out in 2010.

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 2011, was presented by the Program Coordinator, Mr. David Die.

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

11. Report of the Sub-Committee on Statistics

Mr. Mauricio Ortiz presented the report (**Appendix 8**) of the Sub-Committee of Statistics which held its session in Madrid, September 27 and 28, 2010. In reviewing the 2009 recommendations from this Sub-Committee, the following were noted: (i) The 2009 Data Confidentiality proposal for ICCAT was still pending approval by the Commission. The Sub-Committee reiterated the importance of this proposal and suggested re-submitting it as the main recommendation from the SCRS this year. (ii) The Secretariat upgraded the internet WiFi hardware for meeting which greatly facilitated network accessibility during 2009/2010 inter-sessional and SCRS meetings.

The main topics of discussion during 2010 Sub-Committee of Statistics meeting were: (i) confusion in the datelines of data submission for the inter-sessional meetings, particularly between data preparatory and assessment meetings; (ii) undefined geographic areas reported for Task I information, and (iii) the report of by-catch information by CPCs.

Finally, the Committee approved the recommendations adopted by the Sub-Committee on Statistics which will be attached to the general recommendations of the SCRS.

12. Report of the Sub-Committee on Ecosystems

Mr. Hariz Arrizabalaga, the Convener of the Sub-Committee on Ecosystems chaired the meeting Sub-Committee on Ecosystems presented the report of the meeting held in Madrid, May 17 to 21, 2010 (**Appendix 9**).

The Committee agreed on the need of completing the databases created by the short-term contracted By-catch Coordinator and keep them operational to be useful and to help achieve the objectives and mandate of the SCRS. In addition, it was recognized the need to work on the by-catch issues agreed by the Joint tuna RFMO Working Group on by-catch in Brisbane. Taking into account the enhanced magnitude of by-catch related work that is anticipated, the Committee supported the request that the Commission funds a full-time By-catch Coordinator position at the Secretariat.

The Committee approved the recommendations adopted by the Sub-Committee on Ecosystems which will be attached to the general recommendations of the SCRS.

13. Consideration of implications of the Tuna RFMOs Workshops held in 2010 in Barcelona and Brisbane

13.1 Joint Tuna RFMOs Meeting of Experts to Share Best Practices on the Provision of Scientific Advice

Mr. Laurie Kell presented the report of the Joint Tuna RFMOs Meeting of Experts to Share Best Practices on the Provision of Scientific Advice held in Barcelona, Spain, May 31 to June 2, 2010.

Similar problems are faced by all the tuna RFMOs, in that same tuna species are fished worldwide within similar offshore pelagic ecosystems, whilst most tuna fleets and gears are highly mobile using the same technology and selling within similar markets. Therefore, the scientific problems faced in stock assessment by all tuna RFOs are very similar. The workshop reviewed and made recommendations with regard to future priorities in data collection and tuna research in order to allow the RFMOs to provide more efficient and fully transparent scientific advice on their tuna stocks and their pelagic ecosystems.

The Agenda covered (i) routine annual data collection, (ii) biological data, (iii) stock assessment, (iv) communication between RFMOs and the world, and (v) enhanced co-operation between tuna RFMOs. In addition, a variety of presentations were made on FAO tuna related activities, the CLIOTOP integrated and coordinated ecosystem-based research for improved scientific advice on tuna fisheries at a global scale, the development of a management procedure by CCSBT, and capacity building by the RFMOs. The report of the meeting and all the presentations are available at http://www.iccat.int/Documents/Meetings/Announce/2010-RFMO/2010-RFMO-1.htm

The main recommendations that came out of the meeting were:

Routine data collected by year: Catch, effort and size data

1. All members of t-RFMOs are called upon to give a top priority to the provision of data of good quality in a timely manner, according to the existing mandatory data requirements of tuna RFMOs, in order to facilitate the work of tuna RFMOs scientific bodies in the provision of scientific advice based on the most recent information.
2. Lags in the submission of fishery data should be reduced making a full use of communication technologies (e.g. web based) and efforts should be undertaken that basic data formats are harmonized.
3. Efforts should be undertaken so that basic data used in stock assessment (catch, effort and sizes by flag and time/area strata) provided by members should be made available via the websites of tuna RFMOs or by other means.
4. Fine scale operational data should be made available in a timely manner to support stock assessment work, and confidentiality concerns should be addressed through RFMOs rules and procedures for access protection and security of data.
5. Tuna RFMOs should ensure adequate sampling for catch, effort and size composition across all fleets and especially distant water longliners for which this information is becoming limited.
6. Tuna RFMOs should cooperate to improve the quality of data, in particular for methods to estimate: (1) species and size composition of tunas caught by purse seiners and by artisanal fisheries and (2) catch and size of farmed tunas.
7. Tuna RFMOs should use alternative sources of data, notably observer and cannery data, to both validate the information routinely reported by Parties and estimate catches from non-reporting fleets.

Biological data

8. Regular large scale tagging programs should be developed, along with appropriate reporting systems, to estimate natural mortality growth and movement patterns by sex, and other fundamental parameters for stock assessments.
9. Archival tagging should be an ongoing activity of tagging programs as it provides additional insights into tuna behavior and vulnerability.
10. Spatial aspects of assessment should be encouraged within all tuna RFMOs in order to substantiate spatial management measures.
11. The use of high-resolution spatial ecosystem modeling frameworks should be encouraged in all tuna RFMOs since they offer the opportunity to better integrate biological features of tuna stocks and their environment.

Stock assessment

12. Tuna RFMOs should promote peer reviews of their stock assessment works.
13. Tuna RFMOs should use more than one stock assessment model and avoid the use of assumption-rich models in data-poor situations.
14. Chairs of Scientific Committees should jointly develop checklists and minimum standards for stock assessments.

Communication by tuna RFMOs

15. Standardized executive summaries should be developed for consideration by all tuna RFMOs to summarize stock status and management recommendations. These summaries should be discussed and proposed by the chairs of the Scientific Committees at Kobe 3.
16. The application of the Kobe 2 strategy matrix should be expanded and applied primarily to stocks for which sufficient information is available.
17. Tuna RFMOs should develop mechanisms to deliver timely and adequate information on their scientific outcomes to the public.
18. All documents, data and assumptions related to past assessments undertaken by tuna RFMOs should be made available in order to allow evaluation by any interested stakeholder.

Enhanced cooperation between tuna RFMOs

19. Chairs of Scientific Committees should establish an annotated list of common issues that could be addressed jointly by tuna RFMOs and prioritize them for discussion at the Kobe 3 meeting.
20. Tuna RFMOs should actively cooperate with programs integrating ecosystem and socio-economic approaches such as CLIOTOP to support the conservation of multi-species resources.

Capacity-building

21. Where determined by a Tuna RFMO, a review of the effectiveness of capacity-building assistance already provided should be undertaken. Reviews of tuna scientific management capacity in developing countries, within the framework of the respective RFMO may also be conducted at their request.
22. Developed countries should strengthen in a sustained manner their financial and technical support for capacity-building in developing countries, notably small island developing States, on the basis of adequate institutional arrangements in those countries and making full use of local, sub-regional and regional synergies.
23. Tuna RFMOs should have assistance funds that cover various forms of capacity-building (e.g. training of technicians and scientists, scholarships and fellowships, attendance to meetings, institutional building, development of fisheries).
24. Tuna RFMOs, if necessary, should ensure regular training of technicians for collecting and processing of data for developing states, notably those where tuna is landed.
25. The structural weaknesses in the receiving mechanism for capacity building within a country should be improved by working closely with Tuna RFMOs

13.2 Joint Tuna RFMOs Meeting of Experts on Tuna RFMO Management Issues Relating to by-catch

Mr. Haritz Arrizabalaga presented the report of the International Workshop on tuna RFMO management issues relating to by-catch that took place in Brisbane, Australia, June 23-25 2010, with special emphasis on items related with the SCRS, which was reviewed by the SCRS.

The objectives of the meeting were to review the available information on by-catch, to provide advice to tuna RFMOs on best practices, methods and techniques to assess and reduce the incidental mortality, to develop and coordinate relevant research and observer programs, and to recommend mechanisms to streamline the work of t-RFMOs in this field and avoid duplication.

Five background documents were prepared and distributed to the participants summarizing the relevant information available for each of the taxa (turtles, seabirds, mammals, sharks and finfish).

The discussion highlighted the difficulties faced by t-RFMOs to characterize the impact of their fisheries e.g. because impacts from other fisheries not under the mandate of the RFMO need to be considered, as well as some other sources of mortality such as land threats, lack of expertise/knowledge about the by-caught species, lack of data, etc. The group also highlighted the importance of implementing observer programs (with a minimum of 5%), and to conduct Ecological Risk Assessments as a way to identify those species which require immediate attention.

The main recommendations with implications for the SCRS are summarized below:

- Adopt standards for by-catch data collection that allow assessing the impact of fisheries on the populations as well as the effectiveness of by-catch measures.
- Evaluate the effectiveness of mitigation measures, as well as the impact on target species. Identify research priorities and facilitate a full compendium of information regarding mitigation techniques.
- As a matter of priority, establish a joint T-RFMO technical working group to promote cooperation and coordination on by-catch issues. The Working Group would include 2-3 representatives from each tuna RFMO, with the following ToRs:
    - harmonize data collection protocols
    - identify species of concern that require immediate action
    - review methods to determine population status
    - review analyses to identify factors contributing to by-catch

- review existing mitigation measures and consider the utility of new ones, based on research findings.
- review and compile information on by-catch research and delineate future research priorities.

− Collaborate with the fishing industry, IGOs, NGOs, Universities and other parties as necessary.

− Promote capacity building programs for developing countries

14. Consideration of plans for future activities

14.1 Annual Work Plans

The rapporteurs presented the 2011 Work Plans for the various Species Groups. These Plans were adopted and are attached as **Appendix 5.**

Depending on the decision of the Commission, the inter-sessional meetings next year will be: Workshop on the use of R, Working Group on the analysis of the bluefin tuna aerial surveys, conventional tagging and biological sampling, Working Group on issues related with the SCRS organization, Methods Working Group, blue marlin assessment and white marlin data preparatory meeting, Sub-Committee on Ecosystems, tropical Working Group on the revision of Ghanaian statistics (Phase I), bluefin Working Group on methodological issues and electronic tagging, sharks data preparatory meeting to conduct ecological risk analyses, South Atlantic and Mediterranean albacore assessments meeting; The meeting timetable is attached as **Table 14.1**.

14.2 Inter-sessional meetings proposed for 2011

Taking into account the assessments mandated by the Commission and the Committee's recommendations for research coordination, the proposed inter-sessional meetings for 2011 are shown as in **Table 14.1**. The Committee noted 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 2010 and meetings scheduled by other RFMOs.

14.3 Date and place of the next meeting of the SCRS

The next meeting of the SCRS will be held in Madrid from the October 3 to 7, 2011; the Species Groups will meet from the September 26 to 30, 2011.

Table 14.1. Proposed calendar of ICCAT scientific meetings in 2011.

	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					
											R tools Workshop							GBYP A.S./Tag.conv./Bio. Samp.																			
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		
						WG Org.																			Methods WG												
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							
																									BUM assess./WHM data												
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				
						cir. hooks Miami					SC-ECO Miami														Trap S. Moroc.												
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		
						Trop. WG ph. I																										BFT WG/Elect. Tag					
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						
											TRFMOs 3 meeting														SHK data prep												
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	
											ALB SA/MED Assess																					Species Groups					
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					
				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 Holidays | Scientific meeting

15. General recommendations to the Commission

15.1 General recommendations to the Commission that have financial implications

Albacore

The Committee has recommended initiating and focusing on an albacore research program for North Atlantic albacore. Research on North Atlantic albacore depends on available funds supported annually by Contracting Parties individually involved in the albacore fisheries. The research plan will be focussed on three main research areas: biology and ecology, fisheries data, and management advice during a four-year period. Detailed research aims are presented in document SCRS/2010/155. The requested funds to develop this research plan have been estimated at a cost of 4.3 million Euros. Details of the economic plan are provided in the Albacore 2011 Work Plan **(Appendix 5).**

Bluefin tuna

The SCRS recommends that a defined methodology should be adopted by the Commission, in order to ensure the regular funding of the Atlantic-wide Research Programme for Bluefin Tuna (GBYP) to support the regular follow-up of the programme and provide all CPCs concerned a method to calculate their voluntary contribution.

The SCRS recommends that all CPCs concerned shall provide the necessary support to the Atlantic-wide Research Programme for Bluefin Tuna (ICCAT-GBYP) in order to:

- help the ICCAT Secretariat initiatives in the framework of the GBYP, particularly for contacts with the national Authorities concerned;
- ensure assistance for the necessary permits concerning the GBYP activities in their territorial waters or airspace;
- provide the necessary contacts at the national level for ensuring the regular development of the GBYP.

The Commission should consider the merits of a research TAC set aside to help fund the GBYP. A research allocation of up to 50 t could be quite beneficial in supporting the GBYP research enterprise while reducing the necessity for voluntary contributions for the program.

Fishery-independent information is crucial to reduce uncertainty in assessment models that would otherwise be based only on catch and fishing effort data, particularly when those data become biased owing to management regulations. The Committee strongly recommends the development of a large-scale tagging program and fishery-independent surveys of abundance to better track trends in biomass and better estimate fishing mortality rates.

Given the above two concerns, it is essential that the Commission seek the means to fully fund the GBYP.

Billfish

The Commission should increase the contribution to the Enhanced Billfish Research Plan by 10,000 Euros in 2011 to allow the plan to be fully accomplished.

Tropical tunas

The Committee recommends the implementation of a broad-scale “Atlantic Ocean Tropical Tuna Tagging Program (AOTTP)”, starting in 2011, for a duration of five years and a total cost close to 11,400,000 Euros (see **Appendix 5**).

Sub-Committee on Ecosystems

The SCRS recommends implementing observer and logbook programs, as soon as possible, to permit quantifying the total catch (including by-catch), its composition and disposition. The initial minimum observer coverage recommended is 5-10%, although the precision of by-catch estimates might remain low for certain species and higher coverage may be warranted depending upon the Commission’s objectives.

Moreover, the magnitude of by-catch related work is continuously increasing and it is essential that the Commission fund a full-time By-catch Coordinator position at the Secretariat to make all the information operational and useful for the mandate of the SCRS.

Work on harmonization of by-catch related activities with other Tuna RFMOs.

Sub-Committee on Statistics

Due to the overall and increasing workload, the Committee is concerned that the structural support available to the Secretariat may not be sufficient enough to respond to these tasks and responsibilities regarding scientific and compliance related tasks, particularly the use of more complex models which are going to require much more support as concerns the preparation of data. Consequently, the Committee recommends that an evaluation be carried out on the structural work and human needs aimed at considering foreseeable difficulties.

15.2 Other recommendations

*Albacor*e

In order to carry out the assessment of the South Atlantic stock [Rec. 07-03] in 2011, it is recommended that scientists involved with surface (Namibia and South Africa) and longline (Chinese Taipei and Japan) fleets participate in the assessment session. Otherwise the results from the analyses might suffer from the lack of expertise on the nature of the data and the information available.

In the case of the first attempt to assess the Mediterranean albacore stock it is emphasized to follow the Work Plan and recommendations from the Data Preparatory meeting (SCRS/2010/015), as well participation from scientists with expertise on the main fisheries exploiting the stock.

Bluefin tuna

The Committee reiterated that it is essential to obtain representative samples of otoliths and other tissues from all major fisheries in all areas. Such collections will provide direct estimates of the age composition of the catch (avoiding the biases associated with determining age from size), direct estimates of the stock of origin (a key factor to improve our ability to conduct mixing analyses) and will help in verifying current assumptions concerning age-at-maturity and fecundity-at-age. This activity should be coordinated with the GBYP.

Tropical tunas

The Committee is supportive of research programs to mitigate by-catch in purse seine fisheries (especially on FADs), such as the program that ISSF has initiated. The Committee notes that some issues and potential solutions are region-specific, and therefore recommends that part of the research be conducted in the Atlantic Ocean.

The Committee noted that some national scientists would like to access the cannery data that ISSF-participating companies are submitting to the Secretariat. This would be extremely useful in several ways. For example, in cases where those national scientists have vessel logbooks which could be matched with the cannery information on a trip-by-trip basis, thus allowing for improved estimates of catches by species. For this reason, the Committee encourages the development of MOUs that will allow these national scientists to access the data while protecting the confidential components of the ISSF data submissions.

Small tunas

Include blackfin tuna (*Thunnus atlanticus*) in the small tunas chapter of the *ICCAT Manual* and include dolphinfish (*Coriphaena* spp.) among the species considered by the ICCAT Small Tunas Species Group.

Sharks

Due to the vulnerability and deficient statistical information on these species, it is essential to advance in research and the collection of data in order to assess the stocks.

The Committee recommends that the countries generate research programs to minimize by-catch and the discard mortality of sharks.

The Committee recommends continuing activities with the ICES Working Group on Sharks, participating in the porbeagle data preparatory meeting that ICES will hold in 2011, and in the future assessment to be carried out in 2012.

Considering that *Carcharhinus longimanus* is found among the five species with the highest risk in a Ecological Risk Assessment carried 2008, that it makes up a small part of the catches, has high rates of survival and is easily identifiable, that a significant proportion of its catches is comprised of juveniles, the Committee recommends that research be conducted to better determine which life stages are important for the productivity of the stock.

Swordfish

Working Group participation. The SCRS noted that attendance at inter-sessional meetings is becoming an increasing concern. For example, during the recent Atlantic swordfish assessment, one of the longest CPUE time series was submitted by correspondence, without the author or another scientist familiar with the analyses being present at the meeting. This made it difficult to evaluate the suitability of the time series. The Committee recommends that CPCs that can make valuable contributions to the assessments make the necessary arrangements to ensure the presence of their national scientists at those meetings.

Sub-Committee on Ecosystems

The SCRS recommends that research be conducted on measures to mitigate by-catch in ICCAT fisheries. The research should include the effect of mitigation measures on both by-catch and target species. The SCRS further recommends that CPCs periodically submit summary reports to the SCRS on subjects like by-catch characterization, trends in by-catch rates, effect of mitigation measures, etc.

Assessments and methods

Regarding standardizing practices among tuna RFMOs, the Committee concluded that harmonization should be encouraged between RFMOs for data inputs, data structure and data formats, but not necessarily for assessment methods. The Committee encourages making data available on the web, that can be used in meta-analysis type research for highly migratory species. To facilitate this harmonization process, the Committee recommends holding joint meetings with scientists from other tuna RFMOs.

Sub-Committee on Statistics

The Committee reiterates the importance of adopting the Data Confidentiality Policy for the ICCAT Secretariat, and reminds the Commission that a proposal was approved and presented by the SCRS in 2009. The Committee also resolved that the Data Confidentiality Policy will be resubmitted to the Commission at the 2010 ICCAT Commission Meeting.

The Committee approved the protocol prepared by the Secretariat regarding travel funding for scientific meeting participation and recommended that at a minimum, two-week lead times be obligatory for requesting travel funds.

16. Responses to Commission's requests

16.1 Defining a standardized methodology for the collection of sport and recreational fisheries data for all species under the ICCAT mandate, including estimates of post-release mortality and data from sampling, tagging and counting programs

In 2006, the Commission resolved that the SCRS should establish a Working Group to evaluate sport and recreational fishing activities. The Working Group would:

a) Examine the biological and economic impact of recreational and sport fishing activities on ICCAT managed stocks and assess the level of harvest.

b) Based on available information, identify approaches for managing the recreational and sport fishing activities in ICCAT fisheries.
c) Report the results of deliberations to the Commission and, as appropriate, propose recommendations for next steps to manage the recreational and sport fishing activities in the Convention area. CPCs shall report prior to the Working Group meeting the techniques used to manage their sport and recreational fisheries and methods used to collect such data.

With regard to item (a), the group recognized that recreational and sport fishing activities can have considerable biological and economic impact on ICCAT managed stocks. Furthermore, these impacts are not currently estimable due to a general lack of data.

With regard to item (b), the group recognized that the evaluation of suitable management measures requires reliable statistics be reported by all CPCs with non-trivial recreational and sport fisheries, and would be further improved by concomitant socio-economic data. The group recommended enhanced efforts by CPCs to collect and report such information.

With regard to item (c), the CPCs that attended the group made reports on their sport and recreational fishing activities, and the techniques used to collect data and manage these activities. These reports have been compiled, and will be reported to the SCRS during the 2011 Meeting of the Working Group on Stock Assessment Methods.

Taking into account the need to improve stock assessments by obtaining reliable estimates of total removals (harvest + dead discards) of ICCAT managed stocks; the Committee recommended the following:

1) In order to develop appropriate estimates of harvest and dead discards by recreational and sport fishing activities, the SCRS recommended that each CPC:

   a) Identify the “universe” of recreational fishing participants.
   b) Sample that universe with appropriate coverage to allow estimation of total removals with sufficient accuracy and precision.
   c) Produce or obtain estimates of release mortality to facilitate the quantification of fish released alive that subsequently die due to interaction with fishery.

2) The Committee concluded that sufficiently accurate and precise estimates of total recreational removals require CPCs to collect the following information through national and/or regional sampling programs. This data would be retained by CPCs, but used to develop the estimates of total recreational removals that are reported to ICCAT. The following should be considered minimum standard practices. These are the essential components for estimation of Task I and Task II data to meet reporting obligations.

   a) Catch by species
   b) Length/Weight of landed fish
   c) Discards by species
   d) Length/Weight of discarded fish
   e) Disposition of discards (e.g. released alive and likely to survive, released alive but unlikely to survive, discarded dead, used for bait).
   f) Location and time of fishing trip
   g) Estimates of release mortality by species

3) The Committee acknowledged that some CPCs have already developed successful sampling programs, and currently use data collected by these programs to report recreational Task I and Task II statistics to ICCAT. Several of these programs were identified by the group, and the methodologies were discussed. This information will be re-compiled, and will be further evaluated by the SCRS in 2011.

16.2 Continuation of the evaluation of data elements pursuant to Rec. 05-09

In response to the Commission Res. [05-09], the SCRS through the Sub-Committee on Statistics and the Secretariat prepare each year a summary of the impact on stock assessment and evaluations from the lack of, deficiencies and limitations of data available for the Working Groups. Since 2007, a questionnaire has been distributed to the rapporteurs of each working group that had an assessment or data preparatory meeting during the year. The questionnaire attempts to collect the working group data availability and impact on their analysis, as well specific recommendations to improve their assessment work. During 2010, three ICCAT species were assessed: bluefin tuna east and west stock units, the bigeye tuna stock and the Mediterranean swordfish stock. Besides, two data preparatory meetings were held, for the Mediterranean albacore stock and for the blue marlin stock. Document SCRS/2010/165 includes the response to the questionnaires by the Chairs of the respective Working Group in 2010.

16.3 Identify as precisely as possible bluefin tuna spawning grounds in the Mediterranean in view of the creation of sanctuaries [Rec. 08-05]

The 2008 *Recommendation Amending the Recommendation by ICCAT to Establish a Multi-annual Recovery Plan for Bluefin Tuna in the Eastern Atlantic and Mediterranean* [Rec. 08-05], paragraph 25, requests that for the annual meeting of the Commission in 2010 the SCRS identify as precisely as possible spawning grounds in the Mediterranean in view of the creation of sanctuaries.

Information has been gathered over a number of years about the location and timing of bluefin spawning in the Mediterranean. While considerable literature is known to exist with which to characterize spawning areas and oceanographic covariates in the region, a complete synthesis of this information will require considerable time and further investigation in order to compare historical knowledge with more contemporary observations. A complete characterization of bluefin spawning in the Mediterranean will also require a better understanding of the biology of bluefin and its importance in achieving management objectives; an objective of the GBYP.

The most contemporary, although provisional and likely incomplete without fishery independent information view of spawning locations in the Mediterranean, considering overlap with the fishery, comes from the VMS data now required for purse seine (and other) vessels fishing for bluefin in the Mediterranean during the spawning period (mid-May through mid-July). To this end, concentrations of purse seine vessel locations on fishing grounds can give a generalized view of the regions where schooling bluefin are susceptible to capture during spawning and pre-spawning aggregations. The 2008-2009 purse seine VMS data were used to identify spawning locations for which the GBYP aerial surveys of the bluefin spawning stock were conducted in 2010 **(Figure 16.3)**. It is noteworthy that these areas are consistent with scientific knowledge available to SCRS. While spawning is known to have occurred outside of these general areas on the basis of location of larvae and other information, these 6 primary areas are believed to represent the dominant spawning areas in the recent past and also represent areas with heavy concentrations of fishing effort during the past few years. With additional data collected through the GBYP, a more refined and comprehensive evaluation of spawning areas and behaviors of bluefin in the Mediterranean will be possible.

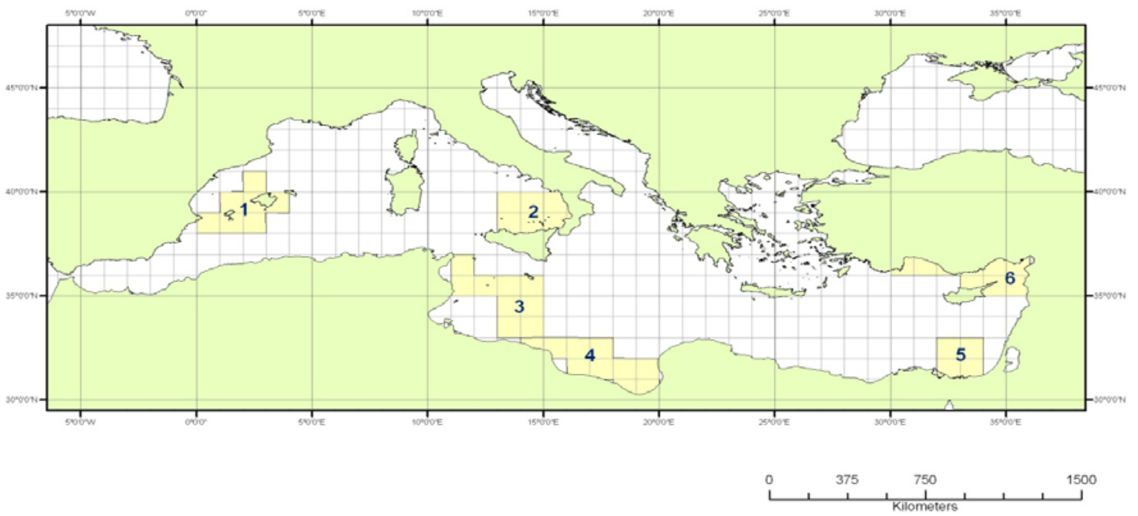


Figure 16.3. Spawning areas identified through analysis of VMS data used in the 2010 GBYP aerial survey program for surveying spawning biomass in the Mediterranean.

16.4 Review of information on farmed bluefin tuna growth rates [Rec. 06-07; 08-05]

The 2008 *Recommendation by ICCAT Amending the Recommendation by ICCAT to Establish a Multi-Annual Recovery Plan for Bluefin Tuna in the Eastern Atlantic and Mediterranean* [Rec. 08-05] states:

> 96. "Each CPC shall define growth factors to be applied to bluefin tuna farmed in its cages. It shall notify to ICCAT Secretariat and to the SCRS the factors and methodology used. The SCRS shall review this information at its annual meetings in 2009 and 2010 and shall report to the Commission. The SCRS shall further study the estimated growth factors and provide advice to the Commission for its annual meeting in 2010."

At the 2009 SCRS meeting, the Committee reviewed several industry-sponsored studies and concluded that the gain in weight of bluefin tuna in farms can be significantly higher than the value which has been used to-date (see Anon. 2010i). The Committee recommended that Contracting Parties tentatively adopt growth factors that are consistent with those in Table 16.6 of the 2009 SCRS Report, although the Committee advised it is important to note that these growth factors do not take into account any of the losses that are known to occur (e.g., due to mortality, escapees and other sources of loss). The Committee advised that applying these factors to an amount of harvested bluefin in order to estimate the initial caged amount will likely result of an underestimate of the input to the cages.

In 2010, the Committee examined the implications of these growth factors by their application to observations from the Japanese fresh auction market weight distributions and found application of the weight gain rates from Table 16.6 (2009 SCRS Report), resulted in back-calculate fish weights at initial capture which seemed to show unrealistic size distributions, in that more fish below the 30 kg minimum are calculated as having been caught than would be expected given existing controls. The Committee reemphasized concern about using the available farmed bluefin tuna growth rates (Anon. 2010i; 2009 SCRS Annual Report) to back-calculate individual fish weight, since those rates seem to represent a maximum weight gain that might be obtained only under the best of conditions; the consequence of the overestimation of growth rates would be an underestimate of sizes at original capture, such as appears to be occurring in application of these rates to recent observations.

The Committee also recommends that Contracting Parties continue to conduct studies that can lead to a better quantification of the inputs into cages. This includes average growth factors that take losses into account. However, more importantly, it is necessary to develop methods to measure the size of the fish entering the cages.

As real size samples at time of the catch are needed to significantly decrease uncertainties in future stock assessment, it is necessary to routinely use a system (dual camera system or any other operational technology) that will provide sizes of fish entering into cages. Therefore, the SCRS strongly encourages the farms to test these systems that have been recently developed as soon as possible.

16.5 Review of data availability on the interaction of tuna fisheries on seabirds and sea turtles

ICCAT [Res. 03-11] encouraged CPCs to report data of interaction of their fleet with sea turtles in the Convention area. Similarly, [Rec. 07-07] required the submission of similar data for seabirds. Reporting of by-catch information is essential to characterize the degree of interaction of by-catch species with ICCAT fisheries and to assess the overall impact of these fisheries on these species.

In 2009, the SCRS completed a seabird assessment. During the assessment, only a limited number of CPCs provided detailed information about interactions with seabirds, which greatly limited the assessment results (see Response to Rec. 07-07 in 2009). Information on by-catch has typically been made available in the form of SCRS documents. But, formal statistical submissions of information related with seabird and sea turtle interactions have not been possible due to the lack of established formal submission mechanisms for by-catch data (e.g. electronic forms, etc.)

During 2010, the By-catch Coordinator compiled into a database the by-catch information available in different working documents, peer reviewed publication and reports. The By-catch Coordinator and the SCRS identified the minimum data requirements to characterize the quantity, species composition, and disposition of the by-catch. These requirements included species identification, quantities (in number or weight), an indication of sizes, fate (kept, released alive or discarded dead), and proportion of fishing effort observed or sampled.

Although some of this information can be submitted using the existing reporting electronic forms, the SCRS requested the Secretariat to develop as soon as possible electronic forms specific for by-catch to facilitate the reporting of this type of information. It is recommended that CPCs submit their by-catch information using these new forms as soon as they become available.

16.6 Review of Ghana's action plan to strengthen the collection of statistical data

In 2009, the Commission requested Ghana to submit to ICCAT an action plan in order to strengthen the collection of statistical data (Task I and II, including size composition) and to develop control measures so as to ensure the full implementation of conservation and management measures (paragraph 5, Rec. 09-01). Thus, Ghana presented the document "Ghana's action plan to strengthen the collection of statistical data (Task I and Task II) and control measures to ensure the full implementation of conservation and management measures" (ICCAT Circular #908/10).

In summary, this plan intends to assure the collection of Task I and Task II fishery statistics by means of (i) obtaining data from the tuna canneries which will allow to breakdown the total catch of Ghanaian vessels by species (Task I); (ii) completing and submitting to Ghanaian authorities the ICCAT logbooks after every fishing trip which will be required by law (for Task II); (iii) increasing the number of sampled fish, following SCRS recommendation, to 500 individuals per vessel and trip (Task II size); and (iv) including observers onboard in every purse seiner. In order to assure that all Ghanaian flag vessels are covered under this action plan, Ghana has signed an MoU with Côte d'Ivoire to sample vessels that unload tuna at the port of Abidjan. Finally, as a control measure, the fishery licenses will be renewed quarterly provided that catch data and logbook data are correctly submitted.

The Committee acknowledges the commitment made by Ghana to strengthen the collection of statistical data and hopes that Ghana will make available the human and financial resources necessary to achieve this plan. The Committee encourages Ghanaian scientists and any other interested parties to continue the analysis and revision of Ghanaian statistics. The Secretariat informed that some data from the Ghanaian fleet unloading tuna in Abidjan were already received, although improvement in the format is required before they can be analysed.

The Committee notes that there may be subtle differences in the sampling programs to collect fishery statistics for purse seiners in Abidjan and it would be convenient that both sampling programs follow the same standard and criteria in order to facilitate joint analysis of standardized data. In that sense, as different teams are responsible for the Ghanaian and European purse seine sampling in Côte d'Ivoire, it would be convenient to enhance collaboration and coordination between both groups. The Committee recommends, as a first step, that a SCRS document explaining in detail how the Ghanaian sampling program is carried out be prepared by Ghanaian scientists.

The Committee also discussed specific issues related to the Ghanaian sampling program as well as to the plan of work in order to review and analyse actual and past Ghana fishery statistics. For example, the issue of whether the "*faux-poisson*" is computed in the logbooks or not was discussed; which can be cross-checked based on logbook data and observer onboard data. Similarly, it was commented that various projects with the aim to improve Ghanaian fishery statistics have been carried out in ICCAT; which will need to be reviewed to get a general overview of the current situation of Ghanaian Statistics.

In light of those issues, the Committee recommends the establishment of a Working Group with the participation of scientists who are familiar with the fishery in the region in order to analyse and study different approaches to improve the collection of Ghanaian fishery statistics as well as revise past data.

The Terms of Reference of this Working Group are described in the Tropical Tunas Work Plan for 2011.

16.7 Evaluation of the effect of the closure contained in [Rec. 08-01] and alternative closures

In 2008, the Commission requested the SCRS to evaluate the closure contained in the proposal from Ghana and Côte d'Ivoire (Annex 1 of Rec. 08-01), and any alternative closure, taking into account the need to reduce the catch of juvenile fish, and make appropriate recommendations to improve the closure.

The Committee considered in its 2009 meeting the past FADs moratoria [Rec. 99-01], the current FADs moratoria, [Rec. 04-01] and the proposed FADs moratoria Annex 1 of [Rec. 08-01]. However, it should be noted that the data available to the Committee are not of sufficient detail and quality required to allow carrying out this sort of evaluation in a fully satisfactory manner. For example, there was a lack of catch statistics of a major country in this fishery. Moreover, the lack of compliance of past/present moratoria in addition to the changes in the population/fishery, which have occurred in the period studied due to an important effort reduction, make it difficult to separate moratorium and effort reduction effects in the reduction of juvenile catch. Therefore, in general the results presented below should be considered inconclusive in evaluating the effect of the FADs moratoria contained in Annex 1 of Rec. 08-01. Nevertheless, and based on the analysis carried out by the Tropical Tunas Species Group meeting, the Committee provides the advice below.

The Committee had to make a number of assumptions in order to develop a spatially-structured time series of catch and effort data for the major fleets (EU and Ghana). These data show clearly that the major catches on FADs that were observed in the moratorium area before its 1997-2000 implementations have not been observed during recent years.

Moreover, the first [Rec. 99-01] moratorium on FADs substantially reduced the catches of small bigeye for some fleets in the closed area, although this benefit was partially offset by increase catches of small fish, both bigeye and yellowfin, outside the closed area and inside by non-compliant vessels, which makes it difficult to appraise the effectiveness of the past moratorium. The Committee's analyses indicate that, compared to the current closure, the past moratorium reduced the catches made by European and associated fleets on FADs. This conclusion was also supported by a preliminary analysis presented to the Committee examining direct indices of abundance within the moratorium areas.

The Committee also conducted per-recruit analyses to address the potential effects of changes in relative effort among gears including changes in FAD effort. The Committee notes that the results of these analyses rely heavily upon the assumed value of natural mortality for small fish, which is highly uncertain. The results of these analyses confirm previous conclusion that modest gains in YPR for yellowfin and bigeye can be obtained by simultaneously considerably decreasing the FAD fishing mortality and increasing the fishing mortality exerted by the other fleets. The results also show that increases in effective effort levels, particularly that of the FAD 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 did not conduct similar analyses for skipjack. However, taking into account the biological characteristics of this species, it was considered that the application of measures such as time-area closure should not produce gains in YPR but should result in foregone skipjack catches that would be proportional to the size of the area closed and the period of closure.

Additional analysis of the European surface fleet performance before and after the various moratoria that have been agreed was undertaken as a way to evaluate the potential effects of the alternative time-area closure defined in [08-01]. Regarding the voluntary moratoria on FADs and the ICCAT recommendations [98-01, 99-01] they appeared to fulfill the objective of reducing sets on FADs and therefore a decrease on their catches, especially the juveniles (**Figure 16.7-1**). Regarding ICCAT Recommendation 04-01, inside this moratorium the EU purse seine fleet did not make fishing activities inside the closure area once the closure entered into force, fulfilling this objective. However, the moratorium was not large enough, both the length of time and the surface area to noticeably reduce fishing activities.

There was high presence of the fleet during the proposed months to the left side outside the proposed area in [08-01]. This could result in an increase of fishing effort with the use of FADs around the area. Extending the proposed area westward might improve the efficacy of this proposed time-area closure (**Figure 16.7-2**).

An evaluation of the available tagging data from the periods before and during the moratoria was also conducted. The amount of tag and recapture information from these periods was not sufficient to draw any firm conclusions regarding the efficacy of the different moratoria. Additional large-scale tagging experiments would be required to address this question.

As previously noted, the Committee is unable to provide a comprehensive and quantitative evaluation of the proposed moratoria described in Annex 1 of Rec. 08-01 due to the limitations described previously. Work planned for 2011 to reexamine in detail the Ghanaian data may provide an improved basis for this evaluation. However, there is a general agreement that larger time/area FAD moratoria are likely to be more precautionary than a smaller FAD moratoria, providing that reductions in juvenile mortality are necessary to achieve management objectives and observers are present to verify the compliance with any FAD moratorium.

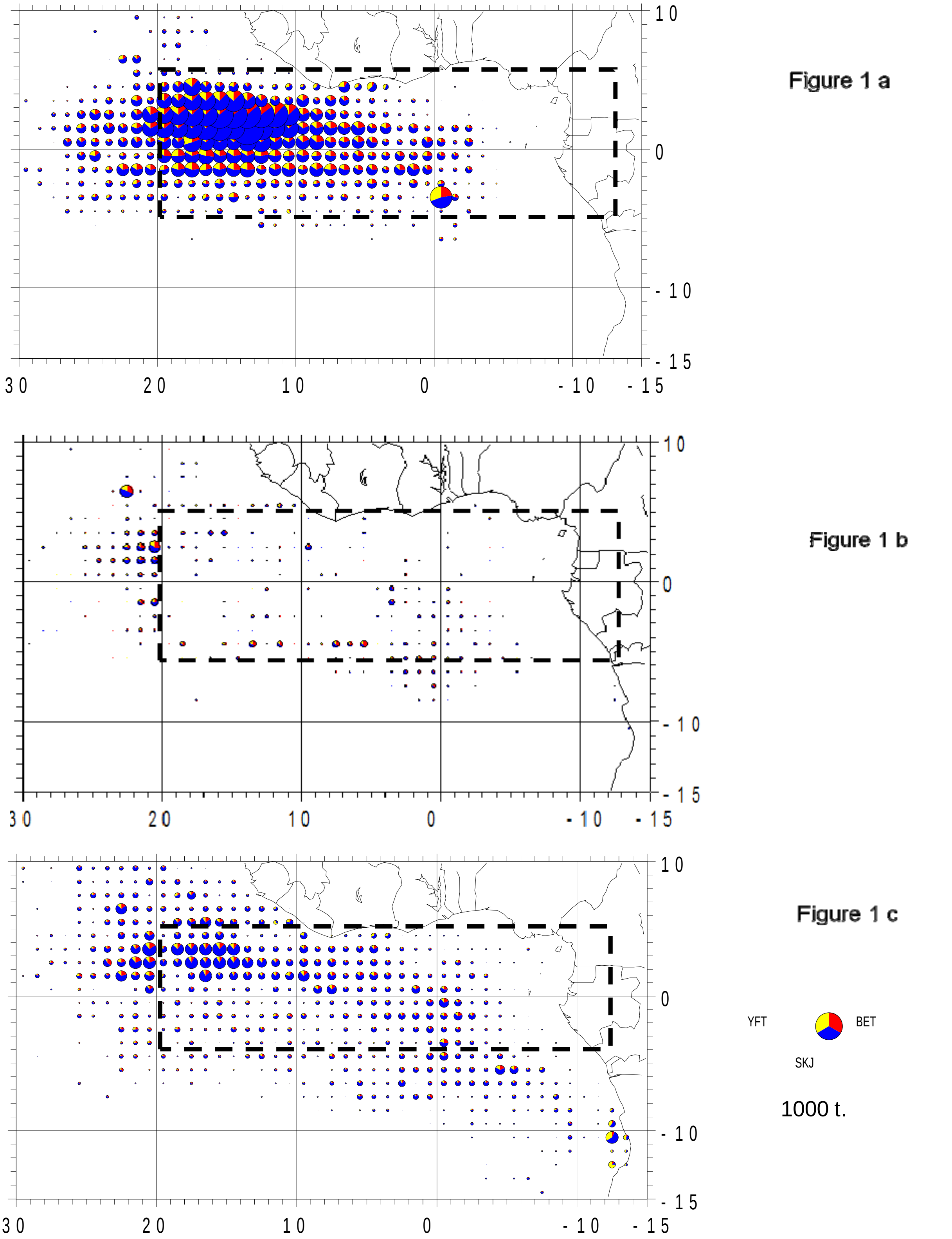


Figure 16.7-1. Distribution of European purse seine catches under FADs during November, December and January: *Figure 1a*, before the moratorium on FADs (1991-1996); *Figure 1b*, during the voluntary moratorium on FADS (1997-2000), and *Figure 1c*: after the moratorium, between 2001 and 2008.

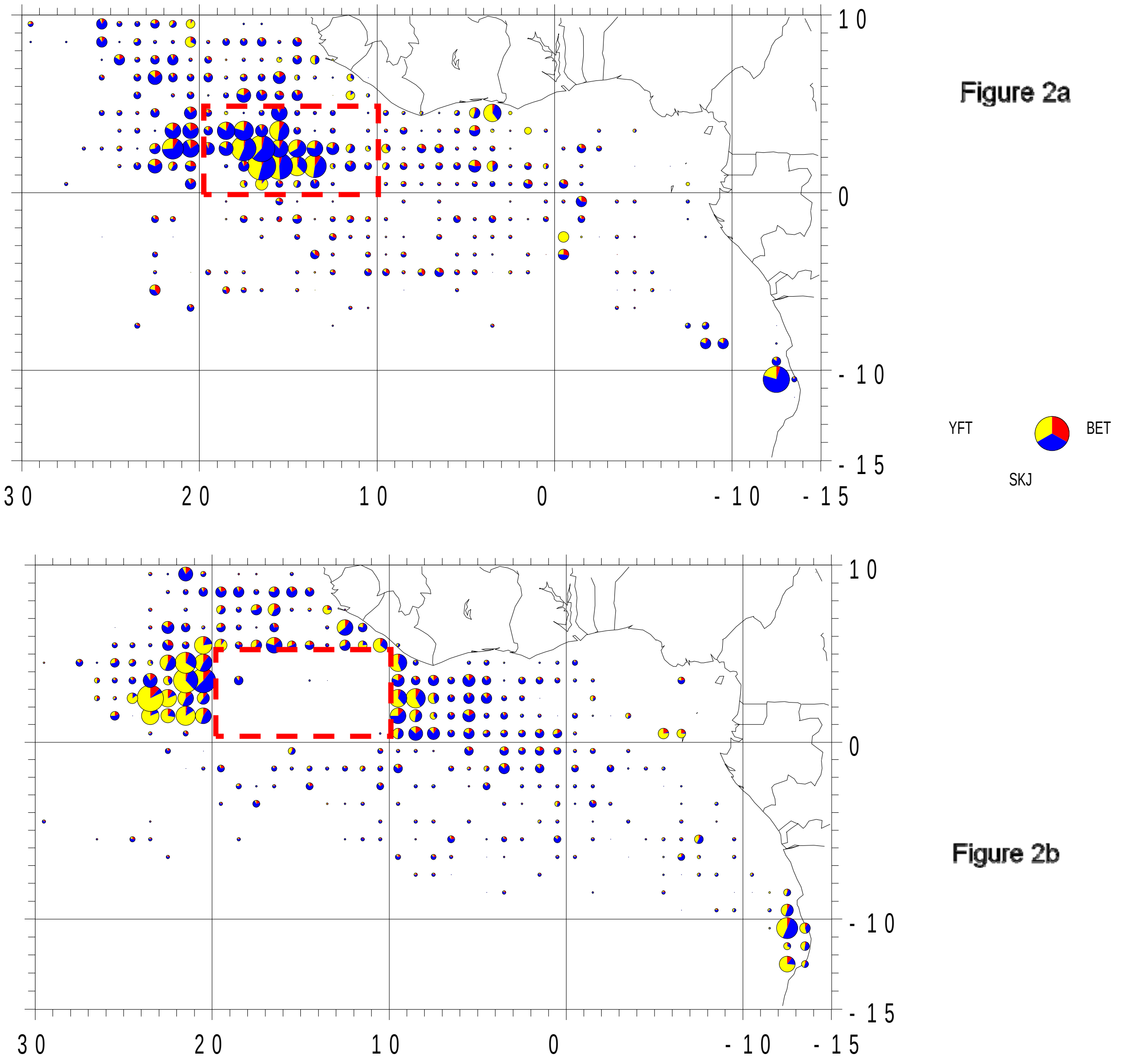


Figure 16.7-2. Area distribution of the total catches made by European purse seiners; *Figure 2a*: before (2000-2004) and *Figure 2b*: during (2005-2009) the implementation of the complete closure for the surface fishery in the so-called Piccolo area in the month of November.

16.8 Reporting on the bluefin scientific data coverage level achieved by each Contracting Party observer program [Rec. 08-05]

The 2008 *Recommendation Amending the Recommendation by ICCAT to Establish a Multi-annual Recovery Plan for Bluefin Tuna in the Eastern Atlantic and Mediterranean* [Rec. 08-05], established two observer programs, one for Contracting Parties to implement, and a Regional one for the Secretariat to manage.

The Recommendation states that the Commission will develop a set of requirements and procedures that, taking into account Contracting Party confidentiality requirements, will allow the data collected under these programs to be provided to the SCRS. Furthermore, for the scientific aspects of the program, the Recommendation asks the SCRS to report on the coverage level achieved by each Contracting Party, to summarize the data collected, and to make recommendations for improvement.

16.8.1 Regional Observer Program (ROP-BFT)

– Vessels

Target observer coverage is 100% on purse seine vessels over 24 m during the entire annual fishing season and on all purse seiners involved in joint fishing operations. In addition, observers shall be present during all transfer of bluefin tuna to and harvest from the cages. The Recommendation entered into force after the 2009 purse seine fishing season, and therefore Contracting Parties were asked to use their own Contracting Party observer programs if they wished to fully implement the provisions of this Recommendation even before it was officially in force.

A call for tenders was issued in September 2009 with a view to awarding the contract before the 2010 fishing season. A consortium was selected and contracted for the implementation of the programme on both vessels and farms.

Observers were recruited and trained for deployment on 94 vessels as follows:

Flag vessel	*Observers*
Croatia	12
EU	24
Korea	1
Libya	17
Morocco	1
Tunisia	21
Turkey	18

Two of these vessels (one Libyan and one Turkish) did not fish due to technical problems. At the time of writing, most observers had disembarked from their vessels and are currently undergoing debriefing.

The data obtained from the vessel observer program has, thus far, little, if any, scientific value, since observers are principally concerned with monitoring compliance with the requirements of [08-05]. Recommendations below, if they are implemented in 2011 and beyond could result in significant information in support of stock assessments (see Recommendations).

– Farms

Rec. [08-05] also calls for the ROP to have observers in farms during all caging and harvests. In 2009, the Secretariat implemented the programme for harvests for two Contracting Parties. In 2009, some CPCs participated in the ROP for farms and scientific data were collected and provided to ICCAT. These data, from Croatian and Turkish farms, have not yet been fully incorporated into the assessment databases, since they were delivered to the Secretariat in late September, 2010. In the future, the scientific data collected through these programs should be reported in a more timely manner and adhere to the established reporting deadlines for Task I and Task II reports. In 2010, four Contracting Parties have indicated their intention to participate (Croatia, EU, Tunisia and Turkey). Some harvests have been covered and deployments for caging are currently ongoing. Some raw data are available but to date is incomplete. Size samples have been collected during the harvests. The data are sent to the Contracting Parties concerned and can be included in the Task II submissions as required by Rec. 08-05.

16.8.2 Contracting Party Observer Program

The national Observer Program requires the following coverage levels:

20% of active PS between 15-24 m
20% active trawlers
20% active LL
20% active BB
100% harvesting traps

By the 2010 SCRS meeting (Bluefin Tuna Data Preparatory Meeting) only Japan and Morocco had provided the coverage levels (20.1% for Japan and 100% for Moroccan traps) of its national Observer Programs (SCRS/2010/066, Annual Report of Morocco). For the rest of CPCs some information is available on their target coverage levels, but not about the actual coverage achieved or the data collected

− Recommendations

In order to facilitate the reporting of observer coverage achieved by Contracting Parties, the Committee continues to recommend that the Secretariat develop appropriate reporting forms taking into account the Sub-Committee on Ecosystems and the Kobe II By-catch reports for 2010, and that it request CPCs to provide the information. At a minimum, the information that should be recorded by observers includes species identification, quantity, size, and fate, as well as the ratio of observed to exerted fishing effort. It is also recommended to record catch of all species so as to have a complete characterization of total removals.

The SCRS also believes that it may be useful for the Commission to consider the *"Suggested Rules and Procedures for the Protection, Access to, and Dissemination of Data Compiled by ICCAT"* (Appendix 10 of the 2009 SCRS Report), as these may assist the Commission in its development of requirements and procedures for the submission of observer data.

Furthermore, the Committee continues to recommend that the Commission require scientific work from observers in both the Contracting Party Observer Program and in the ROP (paragraph 88 and Annex 7 of Rec. [08-05] state that "*...the observer shall carry out scientific work, such as collecting Task II data, when required by the Commission, based on the instructions from the SCRS*"). Such scientific work should cover the following:

- Representative size samples
- Catch and fishing effort information
- Access to biological samples when feasible
- In general, activities in support of the Bluefin Research Program (GBYP)

17. Other matters

17.1 Continued Involvement with ISSF

The International Seafood Sustainability Foundation (ISSF) is an NGO formed by some of the major tuna canning interests and WWF, which aims to undertake science-based initiatives for the long-term conservation and sustainable use of tuna stocks. ISSF invited Mr. Gerald Scott to become a member of their Scientific Advisory Committee. The role of the Advisory Committee, conformed by scientists who are familiar with the various tuna RFMOs, is to review a scientific report that is written by ISSF ensuring that it is consistent with the scientific assessments produced by the RFMOs. Mr. Scott participated in a meeting of the Scientific Advisory Committee on April 13-16 in La Jolla, USA. In addition, ISSF participating companies have been providing data on catches directly to ICCAT (and other FMOs) and, as indicated in a letter received on October 1, 2010 **(Appendix 10)**, it is the intention of ISSF in providing these data sets for them to be used in a meaningful way by the RFMO scientific bodies. In order for national scientists to conduct the analysis needed to improve the working of the Scientific Committee as part of the ICCAT process, ISSF suggested that a mechanism that allows to access the data in a manner that maintains confidentiality, and within the frameworks that have already been established (i.e., ICCAT working group for tropical tunas, *etc.*) should be developed to support these research initiatives.

The Committee noted that some national scientists would like to access the cannery data that ISSF-participating companies are submitting to the Secretariat. This would be extremely useful in several ways. For example, in cases where those national scientists have vessel logbooks which could be matched with the cannery information on a trip-by-trip basis, thus allowing for improved estimates of catches by species. Such work will be necessary to complete the 2011 work plan for tropical tunas and for this reason, the Committee encourages development of mechanisms that will allow these national scientists to access the data while protecting the confidential components of the ISSF data submissions. A framework for such a mechanism was discussed and adopted by the 2009 SCRS (see Attachment 2 to Addendum 3 in the 2009 SCRS Report).

18. Election of the Chairman

Brazil nominated Mr. Josu Santiago (EU) for Chair of the SCRS; the nomination was seconded by Ghana. Mr. Santiago was elected unanimously. The new SCRS Chair thanked everyone and stated that he had been rapporteur for albacore in the past but had to leave the SCRS when he became involved in management. However, he has been attending the Commission meetings and noted the increase in the work load of the SCRS, although he had not expected to take on the challenge and responsibility of the SCRS chairmanship. He thanked all the Chairs who had preceded him and stated that being Chair of the SCRS will be a challenge and that he would appreciate the support and help of the SCRS and the Secretariat.

The outgoing Chair, Mr. Jerry Scott, thanked everyone for their support during his chairmanship and offered his help to the incoming Chair, if needed. The Executive Secretary noted that it was difficult to say goodbye and expressed his appreciation for the great contribution that Mr. Scott had made during his chairmanship. Mr. Scott had chaired the SCRS well and, in particular, had been very successful in conveying results to others. He was key in the development of the Kobe matrix, which should really be called the "Scott matrix". The Executive Secretary wished Mr. Scott good luck and hoped to still see him at meetings of the SCRS. Finally the Executive Secretary welcomed Mr. Santiago and stated that he will have the support of the Secretariat. He then presented Mr. Scott with an engraving of a bluefin tuna trap.

Finally, Mr. Alain Fonteneau (EU) praised the quality of the work done by the ICCAT Secretariat, particularly the website and the *Statistical Bulletin*. He remarked on the incredible efficiency of the Secretariat compared with elsewhere. Mr. Gerry Scott also praised the work of the Secretariat, not just those who work first hand with the SCRS, but also those who actively work behind the scenes, including the interpreters.

19. Adoption of Report and closure

The SCRS Chairman expressed his gratitude to the participants for their collaboration and congratulated the Secretariat for the excellent work carried out.

After congratulating the Committee for its work, the Executive Secretary acknowledged the professionalism and efficiency of the Secretariat staff and the interpreters who work for ICCAT.

The Report of the 2010 SCRS meeting was adopted.

The 2010 Meeting of the SCRS was adjourned.

Appendix 1

AGENDA

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of Contracting Party delegations
4. Introduction and admission of observers
5. Admission of scientific documents
6. Report of Secretariat activities in research and statistics
7. Review of national fisheries and research programs
8. Executive Summaries on species including the Kobe matrix with the corresponding levels of catch for bluefin and bigeye tunas [Res. 09-12]:

   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 Bigeye Data Preparatory Meeting

   9.3 Blue Marlin Data Preparatory Meeting

   9.4 Inter-Sessional Meeting of the Sub-Committee on Ecosystems

   9.5 Mediterranean Swordfish Stock Assessment

   9.6 Mediterranean Albacore Data Preparatory Meeting

   9.7 Bigeye Stock Assessment Session

   9.8 Bluefin Data Preparatory Meeting

   9.9 Bluefin Stock Assessment Session
10. Report of Special Research Programs

    10.1 Atlantic Wide Research Programme for Bluefin Tuna (GBYP)

    10.2 Enhanced Research Program for Billfish
11. Report of the Sub-Committee on Statistics
12. Report of the Sub-Committee on Ecosystems

13 A Consideration of Implications of the Tuna RFMOs workshops held in 2010 in Barcelona and Brisbane.

14. Consideration of plans for future activities

    14.1 Annual Work Plans

    14.2 Inter-sessional meetings proposed for 2011

    14.3 Date and place of the next meeting of the SCRS
15. General recommendations to the Commission

    15.1 General recommendations to the Commission that have financial implications

    15.2 Other recommendations

16. Responses to Commission's requests

    16.1 Defining a standardized methodology for the collection of sport and recreational fisheries data for all species under the ICCAT mandate, including estimates of post-release mortality and data from sampling, tagging and counting programs.

    16.2 Continuation of the evaluation of data elements pursuant to Rec. 05-09.

    16.3 Identify as precisely as possible bluefin tuna spawning grounds in the Mediterranean in view of the creation of sanctuaries Rec. 08-05.

    16.4 Review of information on farmed bluefin tuna growth rates Rec. 06-07 and 08-05.

    16.5 Review of data availability on the interaction of tuna fisheries on seabirds and sea turtles.

    16.6 Review of Ghana’s action plan to strengthen the collection of statistical data.

    16.7 Evaluation of the effect of the closure contained in [Rec. 08-01] and alternative closures.

    16.8 Reporting on the bluefin scientific data coverage level achieved by each Contracting Party observer program [Rec. 08-05].

17. Other matters

18. Election of the Chairman

19. Adoption of report and closure

Appendix 2

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Appendix 3

LIST OF 2010 SCRS DOCUMENTS

Number	*Title*	*Author(s)*
SCRS/2010/010	Report of the 2010 ICCAT Working Group on Stock Assessment Methods *(Madrid, Spain, April 21-23, 2010).*	Anon.
SCRS/2010/011	Report of the 2010 ICCAT Bigeye Tuna Data Preparatory Meeting *(Madrid, Spain - April 26 to 30, 2010).*	Anon.
SCRS/2010/012	Report of the 2010 ICCAT Blue Marlin Data Preparatory Meeting *(Madrid, Spain - May 17 to 21, 2010).*	Anon.
SCRS/2010/013	Report of the 2010 Inter-sessional Meeting of the Sub-Committee on Ecosystems *(Madrid, May 31-June 4, 2010).*	Anon.
SCRS/2010/014	Report of the 2010 ICCAT Bluefin Tuna Data Preparatory Meeting *(Madrid, Spain - June 14-19, 2010).*	Anon.
SCRS/2010/015	Report of the 2010 ICCAT Mediterranean Swordfish Stock Assessment Meeting *(Madrid, Spain -June 28-July 3, 2010).*	Anon.
SCRS/2010/016	Report of the 2010 ICCAT Mediterranean Albacore Data Preparatory Meeting *(Madrid, Spain -June 28-July 2, 2010.)*	Anon.
SCRS/2010/017	Report of the 2010 ICCAT Bigeye Tuna Stock Assessment Session *(Madrid, Spain - July 5 to 9, 2010).*	Anon.
SCRS/2010/018	Report of the 2010 ICCAT Bluefin Tuna Stock Assessment Session *(Madrid, Spain -September 6 to 12, 2010).*	Anon.
SCRS/2010/019	An evaluation of changes in stock productivity and consequences for management. An example based on North Atlantic albacore (*Thunnus alalunga*).	Kell, L.T and Fromentin, J.M.
SCRS/2010/020	Standardized catch rates for blue marlin (*Makaira nigricans*) from the Venezuelan pelagic longline fishery off the Caribbean Sea and the western central Atlantic: Period 1991-2009.	Arocha, F. and Ortiz, M.
SCRS/2010/021	Catch rates for blue marlin (*Makaira nigricans*) from the small scale fishery off la Guaira, Venezuela: Period 1991-2009.	Arocha, F., Medina, M., Bárrios, A., Ortiz, M. and Marcano, L.A.
SCRS/2010/022	Bigeye (*Thunnus obesus*) by-catch estimates from the albacore Spanish surface fishery in the North East Atlantic: 2007-2009 years.	Ortiz de Zárate, V., Perez, B. and Ruiz, M.
SCRS/2010/023	The Precautionary Approach to fisheries management: How this is taken into account by Tuna regional fisheries management organisations (RFMOs).	de Bruyn, P., Murua, H and Aranda, M.
SCRS/2010/024	Preliminary evaluation of alternative stock-recruitment models for estimating benchmarks of tuna-like species. Application to the eastern bluefin tuna (*Thunnus thynnus*) stock and recruitment data.	Ortiz, M.
SCRS/2010/025	Incorporation of scientific uncertainty to define precautionary management targets: a case study of Atlantic bigeye tuna.	Cass-Caley, S.
SCRS/2010/026	Construction and examination of Stock Synthesis Assessment Model for bigeye tuna.	Schirripa, M.

SCRS/2010/027	Proportion of *Tetrapturus georgii* (SPG) with respect to *T. albidus* (WHM) in the Venezuelan pelagic longline catch in the western Caribbean Sea and adjacent Atlantic waters during 2002-2007.	Arocha, F. and Silva, J.
SCRS/2010/028	Standardized catch rates for bigeye tuna (*Thunnus obesus*) from the pelagic longline fishery in the northwest Atlantic and the Gulf of Mexico.	Ortiz, M.
SCRS/2010/029	Estandarización de la CPUE del atún ojo grande, *Thunnus obesus*, capturado por la flota de palangre pelágico de Uruguay entre 1981 y 2009.	Pons, M. and Domingo, A.
SCRS/2010/030	Estandarización de la CPUE del atún ojo grande, *Thunnus obesus*, con datos obtenidos por observadores a bordo en la flota de palangre pelágico de Uruguay (1998-2009).	Pons, M. and Domingo, A.
SCRS/2010/031	Distribucion y composicion de tallas de *Thunnus obesus*, obtenida del programa nacional de observadores de la flota palangrera uruguaya (1998-2009).	Domingo, A., Forselledo, R. and Pons, M.
SCRS/2010/032	Final report of the ICCAT/Japan Data Improvement Project.	Wazawa, M. and Suzuki, T.
SCRS/2010/033	Updated standardized CPUE for bigeye tuna (*Thunnus obesus)* caught incidentally by the Moroccan longline fleet targeting swordfish in the North Atlantic. Period 2005-2009.	N. Abid, M. Idrissi, B. Jilali and F. El Omrani
SCRS/2010/034	Recent Taiwanese bigeye tuna fisheries in the Atlantic Ocean.	Liu, H.
SCRS/2010/035	Verification of catch-effort data and standardization of abundance index of bigeye tuna by the Taiwanese longline fishery in the Atlantic Ocean.	Hsu, C.
SCRS/2010/036	Standardized CPUE series of bigeye tuna, *Thunnus obesus*, caught by Brazilian tuna longline fisheries in the southwestern Atlantic ocean (1980-2008).	Hazin, H.G., Fredou, T., Hazin, F. and Travassos, P.
SCRS/2010/037	Standardized CPUE of bigeye tuna of the Japanese tuna longline fisheries that operated in the Atlantic Ocean (1961-2008).	Satoh, K. and Okamoto, H.
SCRS/2010/038	Standardized bigeye tuna, *Thunnus obesus*, CPUE for Multifan-CL fisheries.	Kell, L and Palma, C.
SCRS/2010/039	Standardized CPUE index of bigeye tuna, *Thunnus obesus*, from the Azores baitboat fishery.	Ortiz, M., Cass-Calay, S. and Pereira, J.
SCRS/2010/040	Updated US conventional tagging data base for Atlantic blue marlin (1955-2008), with comments on potential stock structure	Orbesen, E.S., Snodgrass, D., Hoolihan, J.P. and Prince, E.D.
SCRS/2010/041	The U.S. conventional tagging data base updates for Atlantic white marlin (1954-2008).	Snodgrass, D., Orbesen, E.S., Hoolihan, J.P. and Prince, E.D.
SCRS/2010/042	Modeling growth in white marlin.	Drew K. and Die, D.J.
SCRS/2010/043	Updated blue marlin (*Makaira nigricans*) catch rates from the U.S. pelagic longline in the northwest Atlantic and Gulf of Mexico 1986-2009.	Ortiz, M. and Hoolihan, J.P.
SCRS/2010/044	Updated blue marlin (*Makaira nigricans*) catch rates from the U.S. recreational tournament fishery in the northwest Atlantic, U.S. Gulf of Mexico, Bahamas and U.S. Caribbean 1973-2009.	Hoolihan, J.P., Ortiz, M. and Prince, E.D.

SCRS/2010/045	Análisis de la captura, distribución y composición de tallas de la aguja azul, *Makaira nigricans*, observada en la flota de palangre uruguaya (1998-2009).	Domingo, A. and Pons, M.
SCRS/2010/046	Distribution of ecological related species in the Atlantic Ocean: Sighting by Taiwanese tuna longline fishing vessels from 2004 to 2008.	Hsiang-Wen Huang and Yu-Wen Huang
SCRS/2010/047	Report of the By-catch Coordinator.	Cotter, J.
SCRS/2010/048	Age and growth of blue marlin (*Makaira nigricans*).	Pinheiro, P.
SCRS/2010/049	Standardized CPUE series of blue marlin caught by Brazilian tuna longline fisheries in the southwestern Atlantic Ocean (1980-2008).	Hazin, H.G., Hazin, F., Travassos, P. and Frédou, T.
SCRS/2010/050	Albatross and petrel distribution in the Atlantic Ocean and overlap with ICCAT longline fishing effort.	ACAP
SCRS/2010/051	Review of seabird by-catch mitigation measures for pelagic longline fisheries	ACAP
SCRS/2010/052	Summary advice for reducing the impact of pelagic longline gear on seabirds.	ACAP
SCRS/2010/053	Albatross Task Force. Developments in experimental mitigation research. ATF Progress Report Extracts January 2010.	Birdlife Int.
SCRS/2010/054	Establishing an ICCAT Regional Observer Programme: Minimum data standards for reporting seabird by-catch.	Birdlife Int.
SCRS/2010/055	Spatial surplus production modelling of Atlantic tunas and billfish.	Carruthers, T. and McAllister, M.
SCRS/2010/056	Computing prior probability distributions for the intrinsic rate of increase for Atlantic tuna and billfish using demographic methods.	Carruthers, T. and McAllister, M.
SCRS/2010/057	A comparison of the effectiveness of light tori lines and an emerging pelagic tori line design in reducing seabird by-catch in the Brazilian pelagic longline fleet.	Marques, C., Peppes, F., Sales, L. and Neves, T.
SCRS/2010/058	A simulation study of different observer coverage of the U.S. pelagic longline fleet in the Gulf of Mexico.	Diaz, G.
SCRS/2010/059	Habitat modeling of Atlantic blue marlin with seapodym and satellite tags.	Schirripa, M.J., Lehodey, P., Prince, E. and Luo, J.
SCRS/2010/061	Four ecological indicators for evaluating the status of scombrid stocks on a global scale.	Juan-Jorda, M.J., Mosqueira, I., Freire, J., Dulvy, N.K. and Cooper, A.B.
SCRS/2010/062	A simulation framework to assess on optimum observer coverage for by-catch rates	Kell, L., Arrizabalaga,H. And Ortiz de Urbina, J.M.
SCRS/2010/063	La captura objetivo e incidental en la pesquería de palangre: bases para una interpretación integral.	Domingo, A., Abreu, M., Forselledo, R., Jiménez, S., Miller, P. and Pons, M.
SCRS/2010/064	Programa de observadores en el palangre pelágico: cuándo, dónde y qué.	Domingo, A., Abreu, M., Forselledo, R., Jiménez, S., Miller, P. and Pons, M.

SCRS/2010/080	Some biometric relationships of East Atlantic bluefin tuna (*Thunnus thynnus*).	A lot, E., Ortiz de Urbina, J.M., Rodríguez-Marín, E., de la Serna, J.M. and Macias, D.
SCRS/2010/081	Albacore (*Thunnus alalunga*) stock structure in the Mediterranean Sea.	Ortiz de Zárate, V., Quelle, P., Lastra, P.
SCRS/2010/082	A review of Mediterranean albacore (*Thunnus alalunga*) biology and growth studies.	Quelle, P., Ortiz de Zárate, V., Lastra, P. and Ruiz, M.
SCRS/2010/083	Standardized catch rates of swordfish (*Xiphias gladius*) caught by the Moroccan driftnet fleet in the Mediterranean Sea. Period 1999-2009.	Abid, N. and Idrissi, M.
SCRS/2010/084	Inclusion of stock reproductive potential in the evaluation of management scenarios for the Mediterranean swordfish stock.	Tzanatos, E. and Tserpes, G.
SCRS/2010/085	Analysis of swordfish (*Xiphias gladius*) catch rates in the central-eastern Mediterranean.	Tserpes, G., Peristeraki, P., Di Natale, A. Mangano,A.
SCRS/2010/086	Use of risk analysis for the evaluation of different management strategies for the Mediterranean swordfish stock.	Tserpes, G., Tzanatos, E. and Peristeraki, P.
SCRS/2010/087	Updated standardized catch rates in number and weight for swordfish (*Xiphias gladius* L.) caught by the Spanish longline fleet in the Mediterranean sea, 1988-2009.	Ortiz de Urbina, J.M., de la Serna, J. M., Mejuto, J. and Macías, D.
SCRS/2010/088	A comparison of age slicing with statistical age estimation for Mediterranean swordfish (*Xiphias gladius*).	Kell, L. and Kell, A.
SCRS/2010/089	Albacore (*Thunnus alalunga*) fisheries in the Tyrrhenian Sea and in the South-central Mediterranean: Fishery pattern, size frequencies, length-at-age, CPUEs.	Di Natale, A., Mangano, A., Potoschi, A. and Valastro, M.
SCRS/2010/090	Analysis of the catch rate of juvenile bigeye depending on the depth of the purse seine net used by the tropical fleet.	Delgado de Molina, A., Ariz, J., Santana, J.C. and Sotillo, B.
SCRS/2010/091	A preliminary assessment of the bigeye tuna (*Thunnus obesus*) population in the Atlantic Ocean using the integrated stock assessment model, Multifan-CL.	de Bruyn, P., Kell, L. and Palma, C.
SCRS/2010/092	Possible stock assessment models for bigeye tuna in the Atlantic Ocean up to 2008 using Stock Synthesis III (SS3).	Schirripa, M.
SCRS/2010/093	Données des faux poissons de Dakar.	Ngom, F.
SCRS/2010/095	Consideration on biological reference points for Atlantic bluefin tuna.	Suzuki, Z.
SCRS/2010/096	Note on potential indicators of the Japanese longline fishery targeting bluefin tuna in the Atlantic.	Fonteneau, A.
SCRS/2010/097	Estudio del patrón anual de la CPUE del atún rojo (*Thunnus thynnus*) en la región Balear y factores de distorsión: Flota Balfegó 2000-2010.	Gordoa, A.
SCRS/2010/098	Estudio de distribución de pesos de atún rojo (*Thunnus thynnus*) reproductor en el caladero Mediterráneo occidental.	Mèlich, B., Navarro, J.J., Cort, J.L. y de la Serna, J.M.

SCRS/2010/099	Análisis de la ratio de sexos por clases de talla del atún rojo (*Thunnus thynnus*) en el caladero Mediterráneo occidental.	Mèlich, B., Lara, M. y Porras, Y.
SCRS/2010/100	Actividades desarrolladas en el Programa de Investigación Intensiva sobre Marlines en Venezuela. Período 2009-2010.	Marcano, L.A., Arocha, F., Alío, J., Vizcaino, G. y Gutiérrez, X.
SCRS/2010/101	Catch rate standardization for the Canadian southern Gulf of St. Lawrence bluefin tuna fishery, 1981 to 2009.	Hanke, A.R. and Neilson, J.D.
SCRS/2010/102	Bluefin tuna catches in the Algarve tuna trap (southern Portugal, NE Atlantic): Comments on the recent management regulations in the Mediterranean Sea.	Neves dos Santos, N.
SCRS/2010/103	Estimates of selectivity for the East Atlantic and Mediterranean bluefin tuna from 1970 to 2009.	Fromentin, J-M. and Bonhommeau, S.
SCRS/2010/104	Potential impacts of TAC implementation on the perception of the East Atlantic and Mediterranean bluefin tuna stock.	Bonhommeau, S. and Fromentin, J-M.
SCRS/2010/105	Investigating the performances of a Bayesian biomass dynamics model with informative priors on the East Atlantic and Mediterranean bluefin tuna.	Simon, M., Fromentin, J-M., Gaertner, D. Bonhommeau, S. and Etienne, M.P.
SCRS/2010/106	Standardized CPUE of bluefin tuna (*Thunnus thynnus*) caught by Spanish traps for the period 1981-2009.	de la Serna, J.M., Rodríguez-Marín, E. and Macías, D.
SCRS/2010/107	Aproximación al impacto sobre el reclutamiento del atún rojo (*Thunnus thynnus*) de las capturas de cerco en Baleares con el actual periodo de veda.	Gordoa, A.
SCRS/2010/108	Results of a growth trial carried out in Malta with 190kg fattened Atlantic bluefin tuna (*Thunnus thynnus* L.).	Deguara, S., Caruana, S. and Agius, C.
SCRS/2010/109	Potential growth rates in fattened/farmed Pacific bluefin tuna (*Thunnus orientalis* Temminck and Schlegel) and southern bluefin tuna (*Thunnus maccoyii* Castelnau).	Deguara, S., Caruana, S. and Agius, C.
SCRS/2010/110	Updated nominal catch rates of Atlantic bluefin tuna caught by the Spanish baitboat fishery in the Bay of Biscay (eastern Atlantic). Effect of current regulations.	Rodriguez-Marin, E., Ortiz, M., Ortiz de Urbina, J.M., Ruiz, M. and Perez, B.
SCRS/2010/111	Standardized CPUE by age of Atlantic bluefin tuna (*Thunnus thynnus*) caught by Spanish traps for the period 1984-2009.	Ortiz de Urbina, J.M., de la Serna, J.M., Macías, D. and Rodriguez-Marin, E.
SCRS/2010/112	Summary of bluefin tuna tagging activities carried out between 2009 and 2010 in the East Atlantic and Mediterranean.	Medina, A., Cort, J.L., Aranda, G., Varela, J.L., Aragón, L. and Abascal, F.J.
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SCRS/2010/115	A literature review of Atlantic bluefin tuna age at maturity.	Schirripa, M.J.

SCRS/2010/116	Distribution of Atlantic bluefin tuna (*Thunnus thynnus*) in the Gulf of Maine.	Golet, W.J., Galuardi, B. and Lutcavage, M.
SCRS/2010/117	Biological sampling of Atlantic bluefin tuna in the NW Atlantic to determine reproductive and maturity status, 2004-2009.	Knapp, J.M., Heinisch, G. and Lutcavage, M.
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SCRS/2010/119	Estimating the Atlantic bluefin (*Thunnus thynnus*) catch-at-size by quarter and 5 by 5 degree squares.	Palma, C. and Ortiz, M.
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SCRS/2010/122	Virtual Population Analysis based projections with a dynamic plus group.	Kell, L. and Ortiz, M.
SCRS/2010/123	A comparison of statistical age estimation and age slicing for Atlantic bluefin tuna **(***Thunnus thynnus***).**	Kell, L. and Ortiz, M.
SCRS/2010/124	Updated standardized bluefin CPUE from the Japanese longline fishery in the Atlantic up to 2009.	Kimoto, A., Itoh, T. and Miyake, M.
SCRS/2010/125	Resultados preliminares de las actividades de marcado de atún rojo (*Thunnus thynnus*) realizadas por la Confederación Española de Pesca Marítima Recreativa Responsable (CEPRR) con la coordinación científica del Instituto Español de Oceanografía.	de la Serna, J.M., Abascal, F and Godoy, M.D.
SCRS/2010/126	Simulation of biomass trends of eastern bluefin tuna (*Thunnus thynnus*) stock under current management regulations.	Belda, E. and Cort, J.L.
SCRS/2010/127	Differences on size of Loggerhead sea turtle by-catch in function of longline strata.	Báez J.C., Camiñas, J.A., Ortíz de Urbina, J.M., García, S.and Macías, D.
SCRS/2010/128	Marine mammals by-catch in Spanish Mediterranean large pelagic longline fisheries, with special attention to Risso´s dolphin (*Grampus griseus*).	Macías, D., García, S., Baez, J.C., de la Serna J.M. and Ortiz de Urbina, J.M.
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SCRS/2010/130	Weight-size relationships and condition factors of Mediterranean population of albacore (*Thunnus alalunga*).	Macías, D., Gómez-Vives, M.J., Rioja, P., García, S., A lot, E. and Ortiz de Urbina, J.M.
SCRS/2010/131	Estimating batch fecundity of the Mediterranean albacore. A comparison between quantification of post-vitellogenic follicles and post-ovulatory follicles.	Saber, S., Gómez-Vives, M.J., Báez, J.C., Godoy, D., Macías, D.

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SCRS/2010/133	Biomass of Atlantic bigeye tuna (*Thunnus obesus*) as calculated using conflicting databases.	Andrade, H.A.
SCRS/2010/134	Effects of seasonal area closure on tropical tuna purse seine fleet dynamics through some indicators.	Torres-Irineo, E., Gaertner, D., Delgado, A. and Ariz, J.
SCRS/2010/135	ICCAT GBYP. Atlantic-wide Bluefin Tuna Research Programme. 2010 GBYP Coordinator Detailed Activity Report for 2009-2010.	Di Natale, A.
SCRS/2010/136	Preliminary age and growth of the bigeye thresher shark, *Alopias superciliosus*, in the eastern Atlantic Ocean.	Carvalho, J., Coelho, R. and Santos, M.N.
SCRS/2010/137	Preliminary age and growth of the smooth hammerhead shark, *Sphyrna zygaena*, in the eastern Atlantic Ocean.	Coelho, R., Carvalho, J. and Santos, M.N.
SCRS/2010/138	An automatic executive summary using R.	Kell, L.
SCRS/2010/139	An update on Canada's swordfish fisheries in 2009.	Paul, S.D. and Busawon, D.
SCRS/2010/140	Statistics on tuna surface fishery’s by-catch landed in Abidjan, Côte d’Ivoire, for the 1982-2009 period.	Chavance, P., Amon Kothias, J.B., Amandè, J.M., Djoh A., Dewals, P., Damiano, A., Dewals, P., Delgado de Molina, A. and Pianet, R.
SCRS/2010/141	By-catch and discards of the European purse seine tuna fishery in the Atlantic Ocean: Estimation and characteristics for 2008 and 2009.	Amandè, J.M., Ariz, J., Chassot, E., Chavance, P., Delgado de Molina, A., Gaertner, D., Murua, H., Pianet, R. and Ruiz, J.
SCRS/2010/142	How sampling coverage affects by-catch estimates in the purse seine fishery.	Amandè, J.M., Lennert-Cody, C.E., Hall, M.A. and Bez, N.
SCRS/2010/143	Estadísticas españolas de la pesquería atunera tropical, en el Océano Atlántico, hasta 2009.	Delgado de Molina A., Santana J.C., Ariz J. y Sabaté I.
SCRS/2010/144	Datos estadísticos de la pesquería de túnidos de las Islas Canarias durante el periodo 1975 a 2009.	Delgado de Molina, A., Delgado de Molina, R., Santana, J.C. y Ariz, J.
SCRS/2010/145	Statistics from the Spanish albacore (*Thunnus alalunga*) surface fishery in the north eastern Atlantic in 2009.	Ortiz de Zárate, V., Perez, B. and Ruiz, M.
SCRS/2010/146	Updated standardized age specific catch rates for albacore, *Thunnus alalunga*, from the Spanish troll fishery in the northeast Atlantic: 1981 to 2009.	Ortiz de Zárate, V. and Ortiz de Urbina, J.M.
SCRS/2010/147	Updated white marlin (*Tetrapturus albidus*) standardized catch rates from the U.S. pelagic longline fishery in the northwest Atlantic and Gulf of Mexico 1986-2009.	Ortiz, M. and Hoolihan, J.P.
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SCRS/2010/149	A preliminary analysis of Ghanaian landings and logbook data from the tropical tuna fishery in the Gulf of Guinea.	Kell, L.T., Palma, C., Palares, P., Bannerman, P. and Ayivi, S.
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SCRS/2010/151	Effect of hook type and bait on the catches of marine turtles by the pelagic long-line fishery in the Equatorial area: preliminary results of the SELECT-PAL project.	Santos, M.N. and Coelho, R.
SCRS/2010/152	International Seafood Sustainability Foundation initiatives to develop and test by-catch mitigation options for tropical purse seine fisheries.	Restrepo, V. and Dagorn, L.
SCRS/2010/153	Statistiques de la pêcherie thonière europeenne et assimilée dans l'océan Atlantique durant la période 1991-2009.	Pianet, R., Delgado, A., Floch, L., Ariz, J., Damiano, A., Sabate, I., Kouassi, Y. et N'Gom Sow, F.
SCRS/2010/154	Statistiques de la pêcherie thonière française dans l'océan Atlantique durant la période 1991-2008.	Pianet, R., Floch, L., Damiano, A., Kouassi, Y. et N'Gom Sow, F.
SCRS/2010/155	North Atlantic Albacore ICCAT Research Program.	Ortiz de Zárate, V.
SCRS/2010/156	On-going albacore research in the Bay of Biscay (northeast Atlantic): the "HEGALUZE 2010" project.	Goñi, N., Fraile, I., Arregui, I., Santiago, J., Laconcha, U., Arrizabalaga, H. and Estonba, A.
SCRS/2010/157	Catch rates and size composition of blue sharks caught by the Brazilian pelagic longline fleet in the southwestern Atlantic Ocean.	Carvalho, F.C., Murie, D.J., Hazin, F.H.V., Hazin, H.G., Leite-Mourato, B., Travassos, P. and Burgess, G.H.
SCRS/2010/158	Size, distribution and relative abundance of the oceanic whitetip shark caught by the Brazilian tuna longline fleet.	Tolotti, M., Travassos, P., Frédou, F.L., Andrade, H., Carvalho, F. and Hazin, F.
SCRS/2010/159	Hammerheads sharks, *Sphyrna lewini* and *S. zygaena* caught by longliners off southern Brazil (2007-2008).	Amorim, A.F., Della-Fina, N. and Piva-Silvan, N.
SCRS/2010/160	Occurrence of slender tuna, *Allothunnus fallai* off Sao Paulo State, Brazil.	Largacha, A.A., Gonzalez, M.M.B. and Amorim, A.F.
SCRS/2010/161	*Coryphaena hippurus* and *Acanthocybium solandri* incidental catch off south and southeast Brazil (1971-2009) by Sao Paulo tuna longliners.	Amorim, A.F. Arfelli, C.A., Domingues, R.R., Piva-Silva, N., Minte-Vera, C.V.
SCRS/2010/162	Stomach contents analysis of white marlin (*Tetrapturus albidus*) caught in southern off Brazil: a Bayesian analysis.	Gorni, G.R., Loibel, S., Goitein, R. and Amorim, A.F.

SCRS/2010/163	Reproductive boilogy of oceanic whitetip shark, *Carcharhinus longimanus* (Elasmobranchii: Carcharhinidae), in the equatorial and southwestern Atlantic Ocean.	Tambourgi, M.R.S., Hazin, F.V.H., Oliveira, P.G.V., Coelho, R., Burgess, G. and Roque, P.C.G.
SCRS/2010/164	Reproductive biology of the wahoo, *Acanthocybium solandri* (Teleostei: Scombridae), in the Saint Peter and Saint Paul archipelago, Brazil.	Viana, D., Hazin, F., Branco, I., Carvalho, F., Araújo, R., Fischer, A. and Travassos, P.
SCRS/2010/165	Responses to the data deficiencies and its impact in assessments.	Ortiz, M.

Appendix 4

OPENING ADDRESS BY DRISS MESKI, ICCAT EXECUTIVE SECRETARY

You scientists are here once again to continue the long discussions initiated many months ago. I would like to take this opportunity to express to you, on behalf of the Commission, my wholehearted appreciation for your sacrifices and the courage which you exemplify each time you are requested. I cannot avail myself of this occasion without congratulating you for your efforts and your devotion to the cause of ICCAT and your Chairman, Gerry Scott, who has made the work of our Commission a model to follow at the international level.

As usual, the city of Madrid, which the majority of you know better than I, welcomes you. I would like to thank the Spanish authorities at all levels for their constant support of our Commission.

Mr. Chairman, Ladies and Gentlemen, I too would like to share with you the feeling of frustration and even dismay about some things that I hear and read about the regional and international authorities in charge of fishing.

Reference is always made to ICCAT describing it as a regional organization that is not modern and whose work is not being done in terms of adequate management of the tuna resources. This surprises me when I see the intensity of the work of your Committee and the deep respect the Commission has for your work. It is true that in the past and for some species there has been a discrepancy between the recommendations from the SCRS and those from the Commission, but I believe that this discordance is past. I hope that the deliberations of your Committee provide all the information needed to respond to the concerns expressed by international public opinion and that our Commission takes these into consideration, and refutes any prejudgment on the effectiveness of our organization.

My best wishes to you and may you enjoy a pleasant stay in Madrid.

Appendix 5

WORK PLANS OF THE SPECIES GROUPS FOR 2011

Tropical Tunas Work Plan

No stock assessment(s) are planned for yellowfin tuna, bigeye tuna or skipjack tuna in 2011. Nonetheless, it is necessary to update the fishery indicators for all three stocks in 2011. Noting the on-going difficulties posed by inadequacies in the data for the eastern tropical purse seine fisheries, in particular the Ghanaian statistics as well as the accounting of "*faux poisson*", the Group decided to set a priority on improving these data prior to revisiting analyses of management measures (such as closed areas and gear restrictions) or conducting stock assessments.

The Group plans to address this problem in two phases. First, a working group will be formed to examine the available Ghanaian data, sampling and reporting programs in detail, as well as the relevant programs in Côte d'Ivoire for estimating "*faux poisson*". This group, which should be kept relatively small to enable efficient collaboration of these evaluations, should consist of experts in the eastern tropical purse seine fisheries, including operations, data collection and processing. Scientists from Ghana and the EU must be involved, as should scientist(s) from the Côte d'Ivoire (to advise on "*faux poisson*" estimation), and other scientists with relevant expertise (including those from countries without eastern tropical purse seine fisheries, to provide a broad perspective). This small working group will be tasked with gaining a thorough understanding of the data, data collection, processing and reporting systems, in order to provide guidance and initial recommendations to the Group.

The Group decided that in order to conduct a thorough review of the findings of the small group and develop a clear plan for future data collection, processing and reporting as well as potential historical revisions that could be adopted by the Committee, the second phase of this process should be a meeting of the Tropical Tunas Working Group held after the first phase is complete. The tentative agenda for this meeting is shown in **Addendum 1 to Appendix 5**.

It is expected that although initial work for phase 1 may be conducted by correspondence, it will necessitate a meeting to review the data and procedures and to formulate findings. This meeting should be conducted early enough in the year to allow time for the phase 2 meeting of the Work Group (to finalize analyses and advice) to take place.

In addition, the Tropical Tunas work plan envisions proceeding with a large-scale tagging program **(Addendum 2 to Appendix 5)** in 2011 and beyond.

Albacore North and South Atlantic and Mediterranean Stocks Work Plan

Overview

The results from the assessment of North Atlantic albacore carried out in 2009 (Anon. 2010f), modelling data up to 2007 could indicate that the stock is being overfished since the mid-1980s. Sources of uncertainties identified in the data when analyzing the status of the stock and used to draw conclusions on the status of the stock are a continuous concern in the Group.

The results from the July 2007 assessment of the South Atlantic albacore stock and modelling data up to 2005 are still considered to adequately characterize the status of this stock (Anon. 2008). Nevertheless, there is a recommendation from the Commission to assess the southern stock in 2011 [Rec. 07-03].

This year, in July, following the recommendations of the Commission in 2009, a Mediterranean Albacore Data Preparatory Meeting was held, although no assessment was done. Complete information is given in SCI-032 report.

North Atlantic Stock Proposed Work Plan

Given the uncertainty on the results obtain in the last assessment done which analyzed data to 2007, the Group reiterates the need to carry out a comprehensive research program (SCRS/2010/155 and Annex SCRS/2010/155) that had been presented for support by the Contracting Parties and allocate funds to this purpose. Some partial research is being carried out through national funding. The main research objectives identified by the Albacore Species Group are:

1) Improved knowledge of the population dynamics of albacore in the North Atlantic.

2) Improved understanding of the interactions between the biological and ecological processes of the albacore stock and the fisheries.

3) Reduced uncertainty in stock assessment, e.g. growth modelling and modelling of indices of abundance that take into account migrations based on variable environmental conditions and targeting.

4) The provision of robust management strategies for the sustainable exploitation of the stock at MSY that take into account social and economic objectives.

Meanwhile for 2011, it is recommended that basic indicators be developed for the northern stock to improve the reporting rate of Task II data (catch, effort and size) according to the required standards of ICCAT for the surface and longline fisheries and to produce standardized catch rates from all gears fishing northern albacore.

The Committee endorses the proposed research plan in SCRS/2010/155 and **Addendum 3 to Appendix 5** and recommends funding be initiated in 2011 or as soon as possible.

South Atlantic Stock Proposed Work Plan

Assuming the recommendation to have an assessment of the southern stock in 2011, the following tasks shall be accomplished and be available to ICCAT at least of two weeks before the assessment session:

- Complete and revised Task I data for the surface (mainly baitboats) and longline fleets.
- Complete and revised Task II data (catch, effort and size) for the major surface and longline fleets.
- Time series of standardized CPUE for the main surface and longline fleets exploiting the southern stock.
- Produce the catch-at-age (CAA) for the southern stock.
- Any new information concerning biological parameters to be used in the modelling of the stock should be provided to Group.
- Revision of the model to be applied in the assessment and well documented code is required in advance of the assessment.
- Coordination between national scientists and the ICCAT Secretariat is planned before the assessment and a website will be set up to facilitate data provision and communication among participants.

Mediterranean Albacore Stock Proposed Work Plan for 2011

There are a number of statistics and research recommendations listed by the Albacore Working Group in the Report of the 2010 ICCAT Mediterranean Data Preparatory Meeting (SCRS/2010/016) in order to carry out the assessment of this stock in 2011:

- CPCs are urged make an effort to provide all Task I and Task II data for all fleets according to ICCAT's required statistical format at least one month before the assessment meeting. Also, efforts should be addressed to provide the revision of both Task I and Task II data available in ICCAT database according to the problems identified.
- Standardized catch rates for the major longline fleets and surface fisheries and also for the sport catches should be developed. The data should be available at least two weeks before the assessment meeting.

- Considering that biological data have likely been collected in different data collection programs (e.g. EU/DCR), it is recommended that a concerted effort be made to consolidate these data in an appropriate form for analyses.

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. Furthermore, the eastern fisheries are currently adapting to new management measures (*i.e.* [Rec. 08-05], [Rec. 09-06]), so that again it will take a few years to fully evaluate the implications of these measures on the stock. Therefore, the bluefin tuna Species Group does not plan to conduct any new comprehensive assessment before 2013.

In the interim, the Bluefin Tuna Species Group plans to focus efforts on the research activities outlined within the Bluefin Research Plan, such as large-scale tagging, aerial surveys, otolith micro-constituent analyses, genetics and reproductive biology. 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 forecasting and operating models that incorporate spatial variability and mixing as an example. 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.

Therefore, a first Working Group is planned in 2011 (April or May) to review potential alternative approaches (statistical models, MSE, etc.) that could better take into account uncertainties in the data. During 2011 and 2012, the candidate models would be simulation tested. Then, a data preparatory meeting would be held in 2012 to prepare for the stock assessment session. If the Commission requires an assessment before 2013, the Committee would be unable to develop new quantitative approaches or to fully use novel information from the GBYP and could only update past assessments with standard tools (*i.e.* VPA).

Billfish Work Plan

Summary

The Working Group initially proposed to conduct a data preparatory meeting in 2009 and the next assessment of blue marlin and white marlin in 2010. These meetings were later postponed to 2010 and 2011 to better accommodate the 2009 Atlantic sailfish stock assessment. Due to genetic analyses and model projections results reported by Beerkircher *et al. (*2009), historical catches of white marlin may also inadvertently reflect significant numbers of roundscale spearfish and even longbill spearfish. For this reason, the working group felt that a white marlin assessment would not be possible in 2011, until this problem is resolved.

In 2009 the Working Group proposed to conduct the assessment through a three stage process:

1) Hold a data preparatory meeting for blue marlin in the first half of 2010 to produce catch estimates, update biological parameters, and estimate relative abundance indices for blue marlin which was successfully completed.
2) Conduct an assessment of blue marlin in 2011 and develop white marlin catch estimates, including a major effort to separate catches of roundscale spearfish (and other spearfish) from white marlin catches to the extent possible. We anticipate this effort will require an investment of funds by ICCAT through the ERPBF to accelerate the genetic analyses currently being conducted on this topic. Update biological parameters and estimate relative indices of abundance for white marlin if possible. Data in support of the blue marlin assessment and white marlin data preparatory meeting evaluation must be available at least two weeks in advance (Task I and Task II, including any revisions to historical time series, through 2009, submission of more recent data is also encouraged, but not required) of the assessment meeting.
3) Conduct an assessment of white marlin stocks in 2012.

Background

The last stock assessments for blue marlin and white marlin were conducted in 2006. No assessments have ever been conducted on spearfishes (*Tetrapturus spp.*). During 2009, the Working Group conducted the first successful assessments for western and eastern Atlantic sailfish stocks.

Work completed in 2010

The data preparatory meeting for blue marlin was conducted in 2010. In it the group analyzed basic information (Task I catch and fleet, Task II catch/effort and size), revisions and new data reported during the meeting were incorporated into the ICCAT database. Size information was analyzed in detail for its potential use in integrated assessment models. Disaggregation of reported catches such as unclassified billfish and filling the gaps of the time series for fleets that had incomplete historical reports were conducted. Several relative abundance indices were presented at the meeting, and three additional indices were generated during the meeting. Importantly, the Working Group initiated procedures for the first time to incorporate habitat compression phenonema (Prince *et al.* 2010) into the assessment process by standardizing CPUEs for blue marlin caught inside and outside the Atlantic compression area from three offshore LL fleets separately.

Historical catch estimates of blue marlin from artisanal fleets with FADs from the Caribbean Sea were calculated. The estimates obtained by the Working Group during the meeting substituted the current blue marlin catch data in Task I for this fishery.

Progress was made in estimating spatial and temporal proportions of roundscale spearfish in relation to white marlin from observer program sets of fishing data in the Caribbean Sea and adjacent waters of the Atlantic.

Progress continues to be made on the age and growth of blue marlin, sailfish and longbill spearfish.

Progress continues to be made on sailfish reproduction off the West Africa and Atlantic coast of South America.

Proposed work for 2011

- Conduct a blue marlin stock assessment including the estimation of reference points (see recommendations No. 3, 4, and 5 below);
- Provide updates of age and growth of blue marlin (see Recommendation No. 2); and
- Update management recommendations.

To prepare for a white marlin assessment in 2012; the following tasks are scheduled or recommended:

1) Accelerate the retrospective genetic analyses to separate landings of white marlins from spearfishes *Tetrapturus spp.* in historical data.
2) Expand sampling program for the collection of tissues of spearfish and white marlin in:
   2.1 West Africa (Senegal, Ghana, Côte d'Ivoire, Sao Tomé and possibly Gabon.
   2.2 Chinese Taipei vessels landing in Trinidad and Tobago (Port of Spain), Uruguay (Montevideo) and possibly South Africa (Cape Town).
   2.3 Continue sampling in longline vessels from United States, Venezuela, Brazil, Uruguay and Spain.
3) Provide spatial and temporal proportion of roundscale spearfish in relation to white marlin.
4) Update biological parameters (including age and growth) and estimate relative abundance indices for white marlin including those from small scale fisheries that target billfish species.
5) Continue to support the improvement of biological sampling of all billfish species.

Recommendations

1) The Working Group recommended the need to stress that CPC's should report Task I and Task II for inter-sessional meetings by the deadlines provided by the Secretariat (two weeks in advance of the inter-sessional or 31 July, whichever is earlier).

2) The Working Group recommended that anal spine sections and ring measurements be examined to identify and exclude "*faux anneau*" (false annual rings), and that authors of this work make use of the work by Prince *et al.* (1991) to “anchor” the early growth estimates obtained from spine sections.

3) The Working Group recommended that the trend analysis conducted in the 2006 blue marlin stock assessment be updated in the 2011 stock assessment meeting.

4) The Working Group recommended that surplus production models conducted in the 2000 blue marlin stock assessment be updated in the 2011 stock assessment meeting.

5) The Working Group recommended to establish a protocol (web based) to continue progressing with the application of a statistically integrated assessment model that would take into consideration, seasonal catch, effort, size information for all gears, and the new geographical stratification proposed during the blue marlin data preparatory meeting.

6) The Working Group recommends that the genetic analysis proposal (**Appendix 6**) be considered at the next SCRS species group meeting.

7) The Working Group recommends that the ICCAT Manual be updated to consider the misidentification problems between roundscale spearfish, longbill spearfish and white marlin.

8) The Working Group recommends the preparation of identification sheets for all species of billfish, similar to those being prepared for sharks and small tunas.

9) In noting that estimation of relative abundance indices is always best done at the highest spatio-temporal resolution warranted by the available data, the Working Group recommends that all CPCs, and especially those that have important catches of blue marlin, provide updated relative abundance indices obtained from such high resolution CPUE data.

10) The Working Group should conduct an analysis on gaps of reported catches from various CPC’s by considering Task I and Task II data and the methods used during the sailfish data preparatory meeting in 2008 (Anon. 2009).

11) The Working Group recommends that the quality of conventional tags being distributed by ICCAT be improved, as there is significant evidence of tag shedding.

12) In order to improve the information on all billfish, continue the efforts of reviewing catch estimates, especially for those countries that are known to land billfish but do not report it to ICCAT.

Swordfish Work Plan

Background

The last assessments for North and South Atlantic swordfish were conducted in 2009. The next assessment should take place no sooner than 2012.

For the Mediterranean stock, the last assessment was conducted in 2010. The next assessment should take place not before 2013 except if negative indicators arise from the fisheries.

Proposed work

North and South Atlantic

A list of recommended work has been provided in the Report of the 2009 ICCAT Atlantic Swordfish Stock Assessment Session. Among those recommendations, the following were identified as high priority areas where continued efforts are required:

− Data Preparatory and Methods Meetings. Due to time constraints, recent sessions of the Swordfish Working Group have provided assessments that have updated past results using methods and approaches available at the time. The Group recognizes that newer stock assessment approaches are now available which more fully incorporate biological data and provide more complete representations of uncertainties in stock status. To allow the Group time to explore the new approaches and to assemble the data in advance of the stock assessment session, it is recommended that a working session of five days duration be convened prior to the next assessment. The meeting could be convened in the year before the next assessment (next assessment proposed for 2013).

- Catch. All countries catching swordfish (directed or by-catch) should report catch, catch-at-size (by sex) and effort statistics by a small an area as possible, and by month. These data must be reported by the ICCAT deadlines, even when no analytical stock assessment is scheduled. Historical data should also be provided.

- CPUE series. It is recommended that given the similarity between part of the Brazilian and Uruguayan swordfish fishing fleets and taking into account that the CPUE standardization studies of both fleets submitted at the meeting differ in their methods and results it would be desirable that scientists from Brazil and Uruguay hold inter-sessional meetings to deal with the standardization of CPUE series and processing of data from their respective fleets.

- Assignment of ages. The computer codes used for ageing swordfish in the Atlantic should be updated. The new sex-specific growth curves (Arocha *et al.* 2003) should be incorporated, and its impact in terms of the catch-at-age estimation, as well as its consistency with the tagging data should be evaluated before a new set of growth curves is formally adopted by the Group.

- Discards. Information on the number of undersized fish caught, and the numbers discarded dead and released alive should be reported so that the effect of discarding and releasing can be fully included in the stock assessment. Observer sampling should be sufficient to quantify discarding in all months and areas in both the swordfish directed fisheries and the tuna fisheries that take swordfish as by-catch. Studies should be conducted to improve estimation of discards and to identify methods that would reduce discard mortality of swordfish. Studies should also be conducted to estimate the subsequent mortality of swordfish discarded alive; these are particularly important given the level of discarding due to the minimum size regulatory recommendation.

- Target species. All fleets should record detailed information on log records to quantify which species or species group is being targeted. Compilation of detailed gear characteristics and fishing strategy information (including time of set) are very strongly recommended in order to improve CPUE standardization. The recommendations made by the 2002 meeting of the Working Group on Methods for looking at diagnostics in this context should be followed. The Group recommended the investigation of alternative forms of analyses in the south that deal with both the by-catch and target patterns, such as age- and spatially-structured models.

- Recruitment indices. The Group's ability to forecast stock status within the VPA is contingent on the availability of reliable indices of abundance at the youngest ages. For example, age-1 indices of abundance are only available up to 2001. Countries that have traditionally provided such indices should update their time series, as a matter of high priority. This research should be supported at the Contracting Party level.

- Assessment methods. The Swordfish Species Groups (Atlantic North and South and Mediterranean) shall develop a research plan to address key data deficiencies associated with the stock assessments, and to investigate new stock assessment methodologies. The Plan should be tabled for discussion during the 2011 SCRS Plenary and include cost estimates.

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 and discards be estimated. The Group noted that it is important to collect size data together with the catch and effort data to provide meaningful CPUEs by age.

- Gear selectivity studies. Although some work has been already done, 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.

- Stock mixing and management boundaries. Considering differences in the catch and CPUE patterns between different Mediterranean fisheries, further research, including tagging investigations, in defining temporal variations in the spatial distribution pattern of the stock will help to improve stock assessment and management.

Small Tunas Work Plan

Continue improving catch statistics through the distribution of the small tunas species identification sheets and with the support of ICCAT data improvement projects.

Continue studies on stock structure and species distribution.

Review of the small tuna species for their inclusion in the consolidated ICCAT official list of species.

Develop simple indicators of stock sustainability such as proportion of juveniles within the catch and statistical trends in catch histories.

Collaborate, as much as possible, with CRFM on blackfin tuna assessment that will be held in 2011.

Follow progress of blackfin tuna aquaculture experiments being performed the University of Miami (United States).

Sharks Work Plan

General comments

In the porbeagle assessment carried out in June 2009, some of the problems already identified in past assessment meetings still persisted. Of concern are the lack of total or partial Task I and Task II data, standardized CPUE series for some fleets, and the lack of biological information, which results in uncertainties in the assessment. Further, as occurred on other occasions, the absence of scientists from the Parties that catch this species, limits the possibilities of the assessment. As was expressed last year, this situation is not exclusive to this Group and raises a problem that should be resolved through the firm commitment of the Parties.

Work Plan

Develop standardized CPUE series for future assessments, for as many species as possible, for all the major fleets that exploit shark species as target or by-catch in the North and South Atlantic. To do this, collaboration among the Parties that leads to an exchange of information should be generated, and conventions or specific projects that could be financed by ICCAT funds for capacity building should be encouraged.

A more extensive and improved database should be developed to update the Ecological Risk Assessment (ERA) carried out in 2008. In this sense, the scientists are urged to carry out work on the life history of the shark species and to provide the Sharks Species Group with all the available information for their respective countries to be incorporated in future assessments. The information on fishing operations and on the status, availability and size of the individuals caught (collected from the observer programs) is essential to estimate vulnerability and to thus generate a specific ERA for each fleet.

Carry out a data preparatory meeting in 2011 to generate the information needed to conduct an Ecological Risk Assessment (ERA) for as many species as possible in 2012.

In this respect, the possibility of developing a program for sharks such as those for other species, would allow using funds that facilitate research on such a diverse group of species.

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

Support ICES in the data preparatory meeting for the porbeagle assessment in 2011.

Working Group on Methods Work Plan

The plans for 2011 include:

Primary topics for 2011:

- Conducting Meta-analysis for investigation of key parameters (e.g. steepness, r, K, *etc*) in order to reduce uncertainty, assess parameter influence on assessment outputs and improve estimates.
- The Group plans to conduct investigation into thresholds, reference points, and the use of HCRs to manage risk of exceeding key reference points.

Secondary topics - long term:

- Important issues raised during the 2010 meeting have resulted in the need to investigate plus-group dynamics and the implications of different calculations and assumption.
- To investigate techniques to weight assessment models for those cases where the outputs of more than one model are combined to provide advice.
- Lastly the Group would like to conduct some preliminary investigations into Ecosystem models in terms of data requirements as well as suitable models for use by the Commission Working Groups.

Sub-Committee on Ecosystems Work Plan

An inter-sessional meeting is envisaged for 2011 (not before May so as to allow enough time to complete the analyses).

The Sub-Committee on Ecosystems encourages scientists to continue providing available detailed information about interactions with by-catch species that may allow quantification of total removals. Moreover, it considers essential to gain information on basic knowledge about the ecosystem (e.g. relationship between tunas, their prey, their competitors, the environment, etc.) in order to facilitate the development of ecosystem models in the Atlantic. The Sub-Committee also suggests continuing discussions on ecosystem indicators (e.g. biodiversity indicators, size based indicators, trophodynamic indicators, etc.) that would be useful to monitor in the SCRS context. Finally, the Subcommittee encourages scientists to continue providing results on research about the impacts of mitigation measures on catch rates of by-catch and target species.

A tentative agenda for the 2011 inter-sessional meeting would be:

- Review of new information regarding ecosystems
- Ecosystem modeling approaches
- Ecosystem indicators useful for the SCRS
- Research on by-catch mitigation measures
- Other matters
- Recommendations

Addendum 1 to Appendix 5

Revision of Ghanaian Statistics

The Working Group on the Revision of Ghanaian Statistics focuses on two objectives:

- Analyze Ghanaian Task I and Task II (including size data), specifically in a comparative approach with the EU purse seine fishery operating in the same fishing grounds.

- Propose a sampling scheme as close as possible as the protocol used in the EU fishery and rebuilding past Ghanaian statistics, if necessary, based on the comparative analysis.

Tentative Agenda

1. Opening
2. Historical overview
   2.1 Summarized background information on the different data collection and processing systems used before the JDIP started its contribution to the improvement of statistics (Ghanaian scientist)
   2.2 Information on the Ghanaian data (Task I and Task II data) existing in the ICCAT database (Secretariat)
3. Yearly Task I data
   3.1 Total catch by species and by gear
      3.1.1 Source of data: Skipper's declaration, canneries data, logbooks (including description of information provided and coverage) (Ghanaian scientist)
      3.1.2 Cross-checking and other validation process (Ghanaian scientist)
      3.1.3 Potential problems: Landings in Abidjan, transshipments (at sea and in foreign ports), BB-PS collaboration, "*faux poissons*", potential under reporting of total catches
      3.1.4 Species composition (in connection with 4 and 5)
   3.2 Fleet (Ghanaian scientist)
      3.2.1 Source of data
      3.2.2 Updating process
4. Yearly Task II: Catch and effort data
   4.1 Logbooks system: coverage, validation process, processing system (Ghanaian scientist)
      4.1.1 Data available in the ICCAT data base: summary of information received including description, format in which the information was received and analyses conducted by the Secretariat (Secretariat)
      4.1.2 Problems related with the logbooks system and possible improvements
      4.1.3 Species composition sampling and comparison between EU and Ghana yearly species composition
   4.2 Observers program: coverage, data processing (Ghanaian scientist)
      4.2.1 Data available in the ICCAT data base: summary of information received including description, the format in which the information was received and the analyses conducted by the Secretariat (Secretariat)
      4.2.2 Problems related with the observer's program system and possible improvements
5. Yearly Task II: Sampling system and estimated catch at size
   5.1 Species and size sampling in Tema:
      5.1.1 Description of sampling scheme, coverage (Ghanaian scientist)
      5.1.2 Data processing: from size samples to catch at size. Data reported to ICCAT. (Ghanaian scientist-Secretariat)
      5.1.3 Comparison between estimated PS CAS and cannery data
      5.1.4 Comparison between EU and Ghana yearly catch at size by species
   5.2 Sampling in Abidjan:
      5.2.1 Description of sampling scheme, coverage (Ghanaian scientist)
      5.2.2 Data processing. Data reported to ICCAT. (Ghanaian scientist-Secretariat)
   5.3 Problems related with sampling and possible improvements
      5.3.1 Potential bias: apparent lack of large fish in the samples. Comparative analyses with EU samples, canneries information and other possible sources should be done in advance to the meeting (EU scientists-Ghanaian scientists)
      5.3.2 Suggested improvements in historical data and recommendations for future sampling scheme
6. Recommendations
7. Other matters

Addendum 2 to Appendix 5

A Proposal for an Atlantic Ocean Tropical Tuna Tagging Program (AOTTP)
(Developed by the SCRS Tropical Tuna Species Group)

Abstract

Since there is no independent fishery information for tuna stock assessments, the objective of this document is to present a proposal for a large scale tropical tuna tagging program in the Atlantic. Such program is fundamental to improve the estimates of key-parameters of population dynamic, to reduce stock assessment uncertainties and to gauge the effectiveness of different fisheries management options. For all of these reasons, we propose an Atlantic Ocean Tropical Tuna Tagging Program (AOTTP) for a duration of five years and a total cost close to

11,400,000 Euros; including three baitboats chartering, the recruitment of a specific tagging team, and the associated costs related to tagging operations (tags, rewards, publicity, etc.). The technical objective of this program is the tagging of 150,000 fish of the three main tropical tuna species at different sizes with conventional tags and 300 fishes with archival tags.

Introduction

Stock assessments of Atlantic tropical tunas are hampered due to uncertainties in several population, life history and biological parameters. These include such important considerations as stock structure, natural mortality at age, sex-specific growth and sex-specific natural mortality (which may be particularly important for yellowfin tuna), survival rates after release, migratory patterns and residence times, the influence of FADs and oceanographic features on behavior and productivity, the exploitation rates suffered by the stocks and the extend of fishery interactions between fleets. In contrast to many other fisheries where direct estimates from fishery-independent sources, such as surveys, can be combined with fishery data, tropical tuna assessments are based only on fishery-dependent data. As a consequence, tagging information (from both conventional and electronic tags) is very relevant (1) in stock status diagnosis and (2) in evaluating fisheries management options, such as time-closure areas, minimum sizes and catch quotas as they provide additional information partly independent of fishery.

It must be stressed than different tagging programs have been conducted in the past in the Atlantic tropical Ocean. However, these programs were implemented during discontinuous periods of time, in specific areas (i.e., mainly in the eastern Atlantic), in general within a mono-specific assessment framework (the different ICCAT "Year Programs") and, even under the ICCAT coordination, by different national tagging teams. In most cases, the heterogeneous and limited results have had very little impact on stock assessments done by ICCAT scientists on Atlantic tropical tunas.

The Committee recommends that a large scale comprehensive tagging program, covering the entire distribution of the three species of tropical tunas (yellowfin, skipjack and bigeye), be initiated as soon as possible (see **Figure 1** for the spatial distribution of catches).

The objectives of this document are to:

1) highlight the links between stock status diagnosis, fisheries management options, and the expected outputs from a large-scale tagging program throughout both sides of Atlantic Ocean;
2) provide an overview of the organizational and logistical requirements for such a large scale successful program and,
3) provide an indicative budget.

Expected outputs of a large tagging program

The program is expected to have a time-duration of five years, including initial phases and a period allowing for tag recovery.

The broad geographical coverage and a three-year tagging period are required to determine:

- the extent of movements of the three main tropical tunas species (yellowfin, skipjack and bigeye) throughout the entire Atlantic Ocean and its potential effect on the revision of the present stock structure hypothesis;
- the recent levels of exploitation across the entire range of the stocks and to reduce uncertainties in parameter estimates (with special attention to integrated stock assessment models that can potentially incorporate capture-recaptures data);
- the improvement of age- and area-specific population parameters (e.g., natural mortality by age/size, movement rates, sex- and area- specific growth etc) as well as their geographical and inter-annual variability (for instance by comparison with results obtained during historical tagging programs.)
- the level of interaction between surface and longline fisheries throughout the Atlantic Ocean; specifically for bigeye and yellowfin tuna (assuming an improvement of the recovery rate of tags on longliners);
- the interactions between the 3 major tuna species in terms of a multispecies approach of stock assessment, their habitat uses and their respective integration in habitat based model;

- the effect of the use of FADs by purse seiner in the Gulf of Guinea on the movement patterns and biology of skipjack (at all ages) and of juveniles bigeye and yellowfin, as in the associated school fishing technique in some bait boat fisheries (the "ecological trap" hypothesis), as well as the residence time of tunas around seamounts and other features;
- characterizing and quantifying the effects of environmental factors on the movements and behaviors of each species, which may be size-dependent;
- the analysis of survival rates for released fish in case of size-catch regulation.

Electronic (including archival) tags can be combined with conventional tags to provide valuable information in addressing all of these points. They will be particularly useful in evaluating the influences of environmental factors, as well as in providing critical data for developing management measures for multispecies fisheries (species-protected time areas, size-quota by time-area strata, etc).

Based on previous tagging programs in the Atlantic, it must be stressed that the majority of released fish were individuals less than three years old, principally because these age classes are easily caught and tagged in surface schools by bait boats. All sizes and ages of skipjack can easily be tagged by such method, but as one of the core objectives of the proposed program is to provide estimates of the main biological parameters over the entire life cycle of yellowfin and bigeye, the program will tag a wide a range of sizes/ages of these two species, using a variety of tagging platforms across the Atlantic Ocean. Another goal of this tagging program would be to tag similar numbers of the three species, keeping in mind that bigeye and yellowfin are more difficult to tag in large numbers: in order to reach this target, the tagging program will include the use of the "associated school" fishing technique developed by the Dakar baitboat fishery that permits tagging a high percentage of bigeye and yellowfin. This tagging mode will require conducting some of the tagging cruises with two tagging vessels working in full cooperation (following the technique employed during commercial operations, wherein the associated school is "handed off" to the next vessel).

Organization and logistics

In light of the success showed by the massive tagging program recently conducted by the IOTC in the Indian Ocean, similar structure in terms of coordination all the stages of this tagging program, constitution of a specific tagging team in charge of the logistics, tagging operations, publicity, recovery of tags in landing ports, data entry and data validation, etc., is highly recommended. There is no doubt that such an approach would provide a wide range of high quality results that cannot be obtained by the traditional ICCAT tagging programs left to heterogeneous tagging teams with an insufficient ICCAT role.

In contrast to historic ICCAT tagging programs devoted mainly to one species, and in general implemented in the Eastern Atlantic, for the reasons mentioned previously, tagging experiments must be developed in the entire Atlantic and under a multispecies framework. The number of releases by spatial-temporal strata should be determined through preliminary analyses or simulation studies (see below) as part of a comprehensive tagging study design phase. Candidate tagging sites for tagging surveys can be easily identified in the Atlantic, where bait boat fisheries or bait boats like vessels have been operating, such as: Azores, Madeira, Morocco, Canary Islands, Mauritania, Senegal, Cape Verde Islands, Ghana, Sao Tome, Gabon, Angola, Cuba, Venezuela, Brazil. Furthermore, the various PIRATA buoys anchored in various place of the Eastern and Western equatorial Atlantic may also offer an interesting potential to tag bigeye tunas as well as other tuna species. With the aim of targeting other age/size classes, additional tagging operations should be conducted from other fisheries, such as recreational fisheries (United States, Venezuela, Mexico, Antillean islands, Brazil), small-scale fisheries (French Antilles), small longliners or from scientific vessels (Uruguay and United States). In the case of candidates tagging sites where tagging has never been conducted yet, the feasibility of the tagging experiments should be explored. It must be stressed that the availability of live bait is always a severe limiting factor when planning such tagging programs. Nevertheless, in the Atlantic there is good knowledge of many potential strata where good live bait can be caught by the tagging vessel (if necessary, in cooperation with artisanal fisheries that are frequently targeting these coastal resources).

As part of this process, simulation modeling of tagging operations should be conducted as soon as possible in order to improve the designs in operational tagging surveys, and in order to reduce uncertainties in parameter estimates (with special focus on integrated stock assessment models). Based on other type of information (e.g., assumed trajectory of FADs) potential time-closure areas should be accounted for in order to design future tagging experiments useful to evaluate the effectiveness of protected area to reduce the fishing mortality exerted on juveniles (i.e., to evaluate the residence time within protected areas and movement rates between the free-access areas and the protected area).

Given the urgent requirement for stock assessments and potential regulatory measures, we propose to begin in 2011 a number of small scale exploratory tagging and promotional pilot projects, as precursors to the main program, as well as a meeting devoted to the design the plan and budget of the full scale tagging experiments.

Given the ocean-basin scale of the field work, the tagging program will need to be a multi-national effort. All ICCAT members and Cooperating non-Contracting Parties would be approached to assist with the program, including with respect to the granting of access to the tagging cruises in the various EEZs, with the publicity campaign concerning tag recoveries and reporting, the recovery of tags and the and the initial validation of the reported tags. However, the ICCAT should take the lead role of program coordination through the formation of a special tagging program staff unit that would be fully responsible of most steps in the tagging program (a framework similar to the recent IOTTP ran by the IOTC).

The unit would comprise the following staff:

1) Chief Scientist: Coordinate the program, senior staff supervision, data analyses, reporting
2) Field Coordinator: Responsible for field logistics, tagging protocols, supervision of tagging staff
3) 4 Senior Tagging technicians.
4) Promotions/Liaison/support officer
5) 1 administrator and 1 secretary
6) 3 field technicians at the main landing ports in charge of tag recoveries

Ad hoc support by in-country scientists who are experts in tagging would also be very useful and could be used instead of the tagging staff in some components of the tagging program. The program should ensure that all taggers have a full tagging efficiency, reducing as much as possible the immediate tagging mortality or loss of tags. The use of the same baitboat and of the same tagging staff during most tagging operations, a method used by the IOTC, might be considered.

From past experience in historic tagging programs coordinated by ICCAT, it was evidenced that many recaptured tags for which data are not validated and corrected at the time of the report are then not usable for the majority of scientific studies. Keeping in mind the costs of a tagging program, the validation and the potential correction of recoveries in a short time as well as a detailed report of the released fishes are an important issue in all large tagging programs. These activities, and the continuous update of a specific friendly user tagging data base, are important tasks which justify the recruitment of a tagging staff, even if the contributions of national scientists and ICCAT Secretariat are essential.

Estimation of tag reporting rates should also be an important target in the tagging program. For estimates of fishing mortality and, to a lesser extent, natural mortality, estimates of tagged fish tagging results need to be representative of mortality rates of the population in general, and estimates of tag-reporting rates for all significant fisheries must be obtained. For purse seine fisheries, this estimate of reporting rates can easily be accomplished by means of a tag-seeding experiment, and a lot of emphasis should be given on doing such a tag-seeding experiment before and during the entire tagging program.

The tagging program should also include a wide range of publicity and rewards that are essential in the success of such a large scale program in order to maximize the report of tagged fishes. These publicity actions should, for instance, cover (1) appropriate incentives for the return of tags, i.e., attractive cash rewards, caps, t-shirts, etc.; (2) prompt payment of rewards, along with a letter to the tag finder advising full details of the tagged fish; (3) widespread multilingual publicity regarding the program via tagging posters; (4) ads in local newspapers, radio, TV to advertise special events such as tag lotteries; and (5) regular visits of fisheries officers to unloading ports to personally ensure that the tag return process is functioning smoothly.

Timetable-cost and financing plan

The main AOTTP tagging operations would be conducted for a period of two years by three pole and line vessels, but a number of small scale and exploratory tagging, promotional pilot projects, should be conducted before and during the AOTTP.

Based on a recovery rate assumed close to 20%, it is expected that at least 150,000 tagged fishes with conventional tags would need to be released in order to yield fully significant data, preferably tagging similar percentages of the three species. Such a target should easily be reached in the Atlantic Ocean, an area where pole and line vessels p-up satellite archival tags (PSATs) to obtain information about habitat used by the different species at different size.

The appended provisional budget is proposed to cover the main framework of the tagging program presently recommended by SCRS.

Scenario: 3 baitboats / 2 years		**YEARS**					**%**
		1	**2**	**3**	**4**	**5**	
Vessel costs							
No. of vessels	3						
Annual charter cost (€ / vessel, year)	1 000 000	3 000 000	3 000 000				**52.9**
Vessel storage facility		25 000	25 000				**0.4**
Cost PSAT archival tags							
No. of archival tags	300						
Unit price of archival tag	2 500						
Cost		750 000					**6.6**
Cost conventional tags							
No. of conventional tags	150 000						
Unit price of conventional tag	1						
Cost		150 000					**1.3**
Fishing equipment		170 000	170 000				**3.0**
Reward archival tag recovery							
Recovery rate archival tag (%)	90						
Reward archival tag	100						
Cost		13 500	13 500				**0.2**
Reward conventional tag recovery							
Recovery rate conventional tag (%)	20						
Reward conventional tag	20						
Cost		120 000	120 000	120 000	60 000	20 000	**3.9**
Publicity materials		250 000	100 000	20 000	10 000	10 000	**3.4**
Project Management Unit							
Personnel							
Chief Co-ordinator		150 000	150 000	150 000	150 000	150 000	**6.6**
Publicity Officer		100 000	100 000	50 000			**2.2**
Financial Administrator		30 000	30 000	30 000	30 000	30 000	**1.3**
		YEARS					**%**
		1	**2**	**3**	**4**	**5**	
Project Management Unit, *ctd.*							
Secretary		15 000	15 000	15 000	15 000	15 000	**0.7**
Technicians for operation (2)		120 000	120 000				
Others							
Operational costs		50 000	30 000	20 000	20 000	20 000	**1.2**
IT and data processing		30 000					**0.3**
Office equipment		40 000	30 000	5 000	5 000	5 000	**0.7**
Vehicle		40 000					**0.4**
Consultants		30 000	30 000	30 000			**0.8**
Capacity building and training		20 000	20 000	5 000	5 000		**0.4**
Regional liaison		20 000	20 000	5 000	5 000		**0.4**
Evaluations							
Mid-term evaluation				60 000			**0.5**
Final evaluation						60 000	**0.5**
Financial audit		20 000	20 000	20 000	20 000	20 000	**0.9**
Sub-total		5 143 500	3 993 500	530 000	320 000	330 000	**90.9**
Contingencies (%)	**10.0**	514 350	399 350	53 000	32 000	33 000	**9.1**
Total		5 657 850	4 392 850	583 000	352 000	363 000	**100.0**
Total project cost over 5 years:		**11 348 700**					

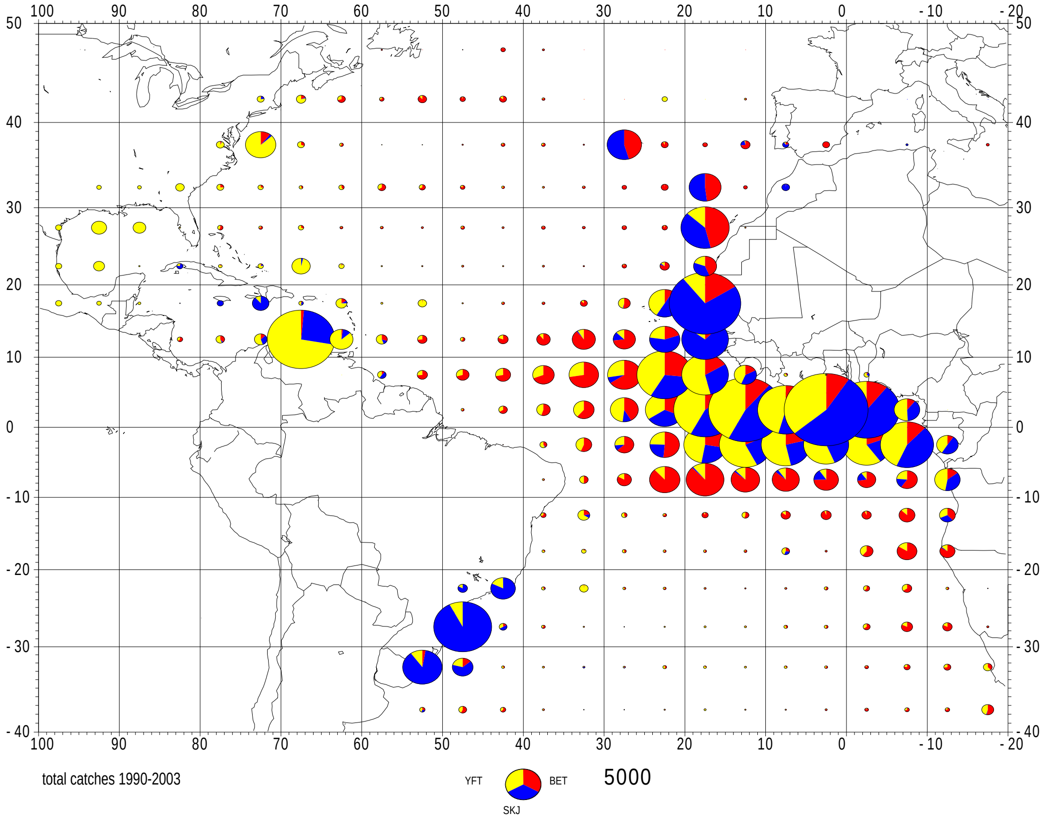

Figure 1. Average catch by species for the 1990-2003 period.

Addendum 3 to Appendix 5

North Atlantic Albacore ICCAT Research Program

The Albacore species Group reiterates the last year proposal of initiate a coordinated, comprehensive research program on North Atlantic albacore to advance knowledge of this stock and provide more accurate scientific advice to the Commission.

The research plan will be focussed on three main research areas: biology and ecology, fisheries data and management advice during four-year period. Each of these main topics includes more detailed research aims as is presented in document SCRS/2010/155. The requested funds to develop this research plan have been estimated in a cost of 4.3 million Euros. The research program will be an opportunity to joint efforts from European scientist from research institutes involved in the albacore fisheries as well as CPC's scientists involved in the research of longline fisheries of North Atlantic albacore.

Research aim	***Feasibility***	***Priority***
1. Biology and Ecology	1 to 4	1 to 3
- Reproductive biology (maturity, spawning area and season, and sex-ratio)	2	1
- Growth (validation, growth modelling by sex)	1	1
- Stock structure, genetics	1	1
- Natural mortality, conventional tagging (*)	4	3
- Habitat and migration (wintering and feeding areas; horizontal and vertical distribution),electronic tags (*)	2	1
- Feeding ecology (isotopes)	1	3
2. Fishery data		
- Recovery of catch, effort and size from logbooks and increase the number of size samples for longline and surface fleets	1	1
- Efficiency of fleets	1	1
3. Modelling		
- Environmental influence on the population dynamics	2	1
- Improve relative abundance indices by means of CPUE's analyses	2	1
- Improve conversion of catch-at-size into catch-at-age	2	1
- evaluate uncertainties under alternative hypothesis and models used	1	1
- Evaluate robustness of alternative management strategies, uncertainties	1	1

Cost estimates in Euros (*) all tagging activities: conventional and electronic

Biology and ecology: estimated budget	€3,790.000
Fishery data: estimated budget	€250.000
Modelling: estimated budget	€300.000
Total estimated cost for a four-year program	€4,340.000

Appendix 6

ICCAT GBYP ATLANTIC-WIDE BLUEFIN TUNA RESEARCH PROGRAMME 2010 ACTIVITY REPORT FOR 2009-2010

1. Introduction

The Atlantic-wide Bluefin Tuna Research was officially adopted by the SCRS and the Commission in 2008, after a long process. In 2003, as an input of the Working Group established by Rec. 02-11, the SCRS presented the Commission with a research plan to improve knowledge on bluefin tuna, with a special focus on mixing between the two stocks (Anon. 2004). The various research elements included in this first proposal are still pertinent today, even if some other activities have been included in the following years. During the Marrakech Commission meeting (2008), the SCRS chair met with all the scientists present at the meeting and a detailed proposal was forwarded to the Commission. The proposal was adopted by the Commission in plenary (ICCAT, 2009) and resulted in a first official document, Res.08-06, which covered only the 2004 SCRS proposal but under a broader title. At the same time, the Commission approved the STACFAD Report, which included the agreement to endorse the Atlantic-wide research Programme, establishing three priorities in 2009 (Coordinator, data mining and aerial surveys), other action to be further discussed by SCRS in 2009 and the provision for the programme to be adjusted in the following years taking into account the evolution of its implementation and research needs. The total budget of the programme was estimated at about 19 million Euros in six years, with the engagement of the European Union and some other Contracting Parties to contribute to this programme in 2009 and in the following years.

The SCRS, in 2009, reviewed the updated research proposal submitted by the SCRS Chair, as it was discussed and presented to the Commission at its meeting in 2008 (ICCAT, 2010a). The SCRS indicated the priorities identified in the 2008 document, as follows:

a) Improve basic data collection;
b) Improve understanding of key biological and ecological processes;
c) Improve assessment models and provision of scientific advice on stock status.

A number of Contracting Parties expressed a willingness to make extra-budgetary contributions to such a programme with a view towards initiation of activities in 2009 related to programme coordination, data mining, aerial surveys, and tagging design studies, with additional research activities to be undertaken in the following years. The first phase costs were set at 750,000 Euros and voluntary contributions sufficient to initiate the year 1 activities were jointly committed by the European Union (80%), United States, Japan, Canada, Norway, Croatia, Turkey and Chinese Taipei, while Morocco indicated its interest in future contributions. The provision to accept additional contributions from various entities and private institutions or companies was also agreed.

2. Coordination activities

The GBYP officially started on 12 October 2009, with the signature of the agreement between the European Community and the ICCAT Secretariat. The GBYP co-ordination full-time activity officially started on 3 March 2010, after hiring the Coordinator (Dr. Antonio Di Natale).

The very first period was devoted to set-up a detailed weekly workplan for 2010 and to organise the coordination structure at the Secretariat, The ICCAT Secretariat set up the administrative structure and the administrative rules were agreed and established, accordingly with the ICCAT system and taking into account the GBYP administrative needs.

During the 1st Phase of the GBYP, the Coordinator participated officially in 15 meetings in various countries. Furthermore, the GBYP Coordinator is providing scientific support to all the national initiatives which are potentially able to increase the effectiveness of the GBYP and its objectives. For this reason, the Steering Committee recommended cooperating with the program on bluefin tuna developed by the NOAA.

The detailed report is available on SCRS/2010/135.

3. Steering Committee

The GBYP Steering Committee was nominated on March 13, 2010, whose the members are the SCRS Chair (Mr. Gerald Scott), the BFT-W Rapporteur (Mr. Clay Porch), the BFT-E Rapporteur (Mr. Jean-Marc Fromentin), the ICCAT Executive Secretary (Mr. Driss Meski), and an external expert (Mr. Tom Polacheck), who kindly accepted this duty.

The Steering Committee´s activities included continuous and constant e-mail contacts with the GBYP Coordinator, who provided all the necessary information. The Steering Committee held various meetings (23-24 April 2010; 19 June 2010; 4-5 September 2010; 10-11-12 September 2010; and 30 September 2010) to discuss various aspects of the programme, providing guidance and opinions. During the first two meetings in September, the Steering Committee also provided the detailed plans for Phase 2 and Phase 3 of the GBYP under two different scenarios and a budget according to the original figure and a reduced minimum budget.

4. Aerial surveys

The aerial surveys have the scope to provide fishery independent indices, concerning various components of the stock. The aerial surveys targeting spawning aggregations can potentially provide trends and indices for the spawning stock biomass, while aerial surveys targeting aggregations of juveniles can potentially provide indices for recruitment. Surveys will be conducted with a statistically sound design and for several years in order to get reliable indices.

The budget available (300,000 Euros) for the first phase was not enough to cover all areas and all needs (spawning aggregations and juvenile aggregations) and then it was decided to concentrate all efforts and resources only on bluefin tuna spawning aggregations.

4.1 Aerial survey design

The preliminary work was devoted to identifying the most relevant areas and this was carried out at the ICCAT Secretariat using the 2008 and 2009 VMS data from purse seine vessels. It was agreed to concentrate efforts only on areas where the purse seine fishing activity was more intense in these last two years and 6 sub-areas were identified.

The study for the aerial survey was awarded to a well-known specialist, who provided a detailed design, which is statistically sound and able to balance the available funds with the flight hours required. After two revisions, the design was provided on 1 May 2010 and the ICCAT Secretariat provided the file to submit the survey data.

4.2 Aerial survey on spawning aggregations

The aerial survey on spawning aggregations was carried out by three companies, selected from among seven tenders and the contracts were discussed and agreed from 11 to 13 May 2010. All tenders were able to obtain flight permits from Spain, Italy, Malta, Cyprus and Turkey in due time, but it was not possible to obtain flight permits from Libya and Tunisia, while the permit from Egypt was changed and withdrawn when the aircraft entered Egyptian airspace. All these problems imposed a revision of the contracts and, at the same time, a revision of the aerial sampling design. The aerial survey started on 24 May and ended on 3 August.

Two sub-areas were cancelled and another was reduced, creating a serious problem for the survey in general, because the biological information on bluefin tuna spawning and behaviour in these areas was almost non-existent. In agreement with the Steering Committee, it was decided to define two additional sub-areas, where fishing activity on spawners was present in 2008 and 2009, providing in the emergency a new aerial survey design for those new sub-areas and amending one contract accordingly.

The monitoring of the sea surface temperatures and sea state and winds was carried out by the Coordinator and data were provided to the various teams in real time. The unfavourable weather conditions and the cold water temperatures in spring 2010 created additional operational problems for the aerial survey, prolonging the time required to fulfil the necessary flight time. A delay in bluefin tuna spawning activities was noticed in several sub-areas. Five aircraft and teams conducted the surveys in the various sub-areas. The aerial survey data have been provided on schedule by all teams and the individual reports are already available.

A contract was granted to a company on 6 August 2010 to analyse the aerial survey data. The report was provided in due time (27 September 2010) and the results are considered very useful for improving the aerial survey activities in the following years. This first year´s aerial survey activity is considered essential and extremely useful to better plan and refine the next aerial surveys, including the necessary preliminary official contacts with all CPCs interested in the aerial survey activities, in order to inform the local authorities and to obtain the flight permits on time.

5. Data mining and data recovery

The first preliminary activity was conducted at the ICCAT Secretariat. An analysis of the ICCAT database on bluefin tuna was carried out for the purpose of identifying the most relevant gaps in the data series which are potentially useful for the stock assessment. This gap analysis was provided by the GBYP to the SCRS scientists and national statistical correspondents to help them in detecting the missing data.

Three Calls for Tenders were issued on this item and five contracts were awarded on 30 July 2010 to various entities, public and private. The various proposed data sets, actually missing from the bluefin tuna database, concern about 180,000 specimens and a wide range of years and gears, and should improve knowledge on several fisheries in various areas. A common format for transmitting the data to the ICCAT Secretariat was provided to all the contractors, with the purpose to obtaining the data “ready to use” and in a format allowing their immediate incorporation in the bluefin tuna database. Many data sets have been already provided to the GBYP on due time. The final report must be submitted by 4 October 2010.

Sea surface temperature data sets will be acquired, to allow various type of analysis, either for VMS or aerial survey data.

6. Tagging design

This item is considered extremely relevant because it should provide a better estimate of natural mortality rates (M) by age or age-groups and/or total mortality (Z). It should provide also updated tagging reporting rates by major fisheries and areas, and it should improve the knowledge on habitat utilisation and movement patters of bluefin tuna in the various areas. It will provide the base to carry out the tagging activities in the following years, with important implications on the GBYP budget. This item was largely discussed, at first at the Secretariat level, and then with the Steering Committee, because of the various possible options of tagging techniques and their different possible uses for the assessment. At the end of the discussion, a Call for Tender was issued on 26 July 2010 and a single bid was received. The Steering Committee (4-5 September 2010, in agreement with the ICCAT Secretariat and the GBYP Coordinator) asked the tender to modify the proposal, in order to obtain a tagging design limited to the eastern Atlantic and Mediterranean, for conventional tags and PITs (and electronic tagging in Phase 3), and to verify the practical tagging possibilities with tuna trap owners and purse seine fishermen, and including a manual for tagging. The official request to modify the offer, also taking into account the revised and reduced budget adopted by the Steering Committee, was delivered on 14 September 2010 and the revised offer arrived on 24 September 2010 and is now under examination.

7. Definition of GBYP publication policy, editorial and data rules

The need to have a clear and defined publication policy, along with editorial and data use rules, was one the first issues undertaken within the GBYP coordination. Discussion was carried out at the Secretariat level, taking into account the ICCAT rules in this sector and the SCRS statements, and the final document was officially adopted on 15 March 2010.

8. GBYP web page

It was agreed that the ICCAT Secretariat would add a GBYP page to the official ICCAT web page, for the purpose of providing full and transparent information about all the activities carried out by the GBYP. This page will be updated regularly.

9. Future activities

The next phases of the Atlantic-Wide Research Programme for Bluefin Tuna will only include activities able to provide fishery-independent data and indices within the time-frame of the overall programme and in agreement with the GBYP general plan adopted by the SCRS and the Commission. Due to the limited budget available for Phase 2 (2010-2011) some activities already included in the original general planning have been temporarily excluded (i.e., egg and larval survey, intercalibration of aerial surveys), others have been delayed (i.e., electronic tagging), while others (i.e., conventional and PITs tagging) have been considerably reduced. The Steering Committee agreed to keep only the activities already initiated or absolutely essential for the programme, but confirmed the need to follow the original list and volume of activities whenever appropriate funds are available. For this reason, GBYP Phase 2 is considered a contingency minimal programme, while a similar strategy is temporarely planned for Phase 3.

GBYP Phase 2 (under the reduced minimum budget perspective) will include the following activities:

1) **Coordination**, reinforcing the coordination team with two additional staff (1 G2.1 and 1 P2), due to the workload and with contracts for the external members of the Steering Committee.
2) **Data mining, data retrieval and data elaboration**, including data collection on juveniles from small-scale and recreational fisheries, elaboration of VMS, environmental and aerial survey data, and a symposium on tuna trap data issues.
3) **Aerial surveys,** including a workshop to refine the activity, the revision of the aerial survey design, a training course for pilots, spotters and observers, and the 2^{nd} year survey on spawning aggregations.
4) **Tagging**, including conventional and PITs tagging and activities to improve tag reporting and tag recovery, with related rewards.
5) **Biological sampling**, including hard parts sampling for ageing and micro-constituent analysis, genetic sampling and related analysis.
6) **Modelling**, only including a workshop on modelling approaches.

GBYP Phase 3 (still temporarily under the reduced minimum budget perspective) will include the following activities:

1) **Coordination**.
2) **Data mining, data retrieval and data elaboration**, including data collection on juveniles from small scale and recreational fisheries, elaboration of VMS, environmental and aerial survey data.
3) **Aerial surveys,** including the up-dating of the aerial survey design and the 3^{nd} year survey on spawning aggregations.
4) **Tagging**, including conventional and PITs tagging, a limited electronic tagging and activities to improve tag reporting and tag recovery, with related rewards.
5) **Biological sampling**, including hard parts sampling for ageing and micro-constituent analysis, genetic sampling and related analysis.
6) **Modelling,** including modelling trials.

The GBYP Phase 3 budget and activities will be revised by the Steering Committee and SCRS in the last part of Phase 2, according to the updated budget perspectives and the research needs.

The provisional calendar for the meetings is as follows:

- Symposium on Tuna Trap Fishery and Data Standardisation: May 2011 (in Italy, Morocco or Spain, 3 days);
- Training course for aerial survey staff: May 2011 (ICCAT Secretariat, 2 days)
- Modelling Workshop: July 2011 (ICCAT Secretariat, 5 days).

Table 1. GBYP budget in Phase 1 (2009-2010).

Contributors	*Amount (€)*	*Allocation*	*Amount (€)*
European Union	600,000.00	Coordination	210,000.00
United States	71,200.00	Data mining and data recovery	200,000.00
Turkey	22,500.00	Aerial survey	300,000.00
Norway	20,000.00	Conventional tagging design	40,000.00
Canada	15,000.00	Total	**750,000.00**
Japan	10,000.00		
Croatia	7,000.00		
Chinese Taipei	3,000.00		
ICCAT Secretariat	1,300.00		
Total	**750,000.00**		

Table 2. GBYP reduced minimum budget for Phase 2 (2010-2011) and Phase 3 (2011-2012).

GBYP Phase 2 (2010-2011)		***GBYP Phase 3 (2011-2012)***	
Allocation	*Amount (€)*	*Allocation*	*Amount (€)*
Coordination	443,000.00	Coordination	448,980.00
Data mining, data recovery, data elaboration, trap symposium	149,000.00	Data mining, data recovery, data elaboration	123,000.00
Aerial survey (including updating design, workshop and training course)	465,000.00	Aerial survey (including updating design)	404,080.00
Tagging (conventional, PITs, tag recovery and reporting, rewards)	890,000.00	Tagging (conventional, PITs, PATs, tag recovery and reporting, rewards)	965,000.00
Biological sampling (including hard parts, genetic sampling and analysis)	505,000.00	Biological sampling (including hard parts, genetic sampling and analysis)	490,000.00
Modelling (workshop)	40,000.00	Modelling trials	90,000.00
Contingencies	10,000.00	Contingencies	13,000.00
Total	**2,502,000.00**	Total	**2,534,060.00**

Appendix 7

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH

(Expenditures/Contributions 2010 & Program Plan for 2011)

Summary and Program objectives

The ICCAT Enhanced Research Program for Billfish (IERPB), which began in 1987, continued in 2010. The Secretariat coordinates the transfer of funds and the distribution of tags, information, and data. The General Coordinator of the Program is Mr. David Die (USA); the East Atlantic Coordinator was Mr. Paul Bannerman (Ghana), while the West Atlantic Coordinator is Mr. Eric Prince (USA).

The original plan for the ICCAT Enhanced Research Program for Billfish (ICCAT, 1987) 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 past Billfish Species Group meetings, the Billfish Species Group requested that the IERPB expands its objectives to evaluate habitat use of adult billfish, study billfish spawning patterns and billfish population genetics. The Billfish Species Group believes that these studies are essential to improve billfish assessments. Efforts to meet these goals continued during 2010 and are highlighted below.

The Program depends on financial contributions, including in-kind support, to reach its objectives. This support is especially critical because the largest portion of billfish catches is, in recent years, coming from countries that depend on the support of the program to collect fishery data and biological samples. In recent years most of the financial support came from ICCAT funds but in 2009 there was also a contribution from Chinese Taipei.

2010 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/2010/150 and in SCRS/2010/100. Five observer trips onboard Venezuelan longline vessels were completed by July 2010 and some more may be completed before the end of the year. Sampling of Venezuelan artisanal catches also continued in the central coast of Venezuela and more than 1,700 trips were monitored. Biological sampling from both the pelagic longline and artisanal Venezuelan fisheries has provided more than 11,000 samples. These included more than 6,000 sailfish, more than 1,700 blue marlin and almost 1000 white marlin spines and gonads for age, growth and reproductive studies. This year this program recovered 45 tagged billfish before August 2010.

The IERPB continued to support Brazil in its collaboration with U.S. institutions for 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. With IERPB support, Uruguay continued to collect samples this year for age, growth and genetic analysis of billfish on-board longline vessels. Barbados provided the IERPB with catch and effort data on billfish recreational tournaments and has also reinitiated its billfish tagging program.

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 blue marlin data preparatory meeting of 2010. Support of this Program facilitated the estimation of relative abundance indices for Côte d'Ivoire, Ghana and Senegal during 2010, and studies of spawning of billfish in Côte d'Ivoire. The Program also profited from the cooperation with Spanish scientists that collected biological samples of billfish on-board purse seiners.

Documents that were produced in 2010 with the benefit of direct support of the IERPB were: SCRS/2010/020, SCRS/2010/021, SCRS/2010/027, SCRS/2010/049, SCRS/2010/093 and SCRS/2010/100.

2011 Plan and activities

The highest priorities for 2011 are to support the improvement of data on the genetic identification of white marlin in the historical catches of white marlin and to continue improving the statistics of artisanal fisheries Atlantic-wide. Such priorities will need to continue:

- the support of the monitoring of the Uruguayan, Venezuelan and Brazilian longline fleet through onboard observers, reporting of conventional tags, and biological sampling.
- the support of biological sampling in western Africa.
- to support the processing of historical samples of white marlin spines for genetic studies.

All these activities depend on successful coordination sufficient financial resources and adequate in-kind support. Details of IERPB-funded activities for 2011 are provided below. Some of these will complement general improvements in data collection made with the support of the ICCAT data improvement program.

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 gillnet landings in central Venezuela.

East Atlantic

Monitoring and sample collection will be supported for the artisanal fisheries of Ghana, Côte d'Ivoire, and Senegal.

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.

Tagging

The Program will need to continue supporting conventional tagging and recapture reporting conducted by Program partners.

Biological studies

The biological sampling program for collecting and processing genetic samples from billfish, particularly white marlin and spearfish, will continue in 2011. This program will aim to determine the ocean-wide ratio of white marlin to roundscale spearfish, including how this ratio has changed through time. The later will be done by taking advantage of the spine collections (from Venezuela, Uruguay, Brazil, Spain, and the United States) collected in the past with the support of the IERPB.

Efforts to collect biological samples for 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 be directed at sailfish and longbill spearfish.

Coordination

Training and sample collection

Program Coordinators need to travel to locations not directly accessible to promote the IERPB and its data requirements. This includes travel to West African countries, as well as the Caribbean and South America by the General Coordinator and the West Atlantic Coordinator. 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 to the SCRS is responsibility of the Coordinators. Countries that are allocated budget lines for program activities need to contact the respective Program Coordinators for approval of expenditures before the work is carried out. Invoices and brief reports on activities conducted must be sent to ICCAT to obtain reimbursement of funds.

2010 Budget and expenditures

This section presents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 2010. The 2010 budget recommended by the Billfish Working Group for the IERPB was €39,850. The only contribution made to the IERPB during 2010 was an allocation of €30,000 from the regular ICCAT budget. Carryover funds remaining from previous years were €4,978.80. Thus, the total funds available for 2010 were €34,978.80 **(Table 1)**. As a consequence, some planned activities of the Program were not carried out. Expenditures to date in 2010 were €16,281, but an additional €16,700 are already committed to other activities that have either taken place in 2010 or will take place between October and December. The estimated balance of the Program at the end of 2010 will be €1,997.80 € **(Table 2)**. These unspent funds correspond to savings in the travel by the Coordinator for the East Atlantic who used support from the ICCAT fund to fulfill his coordination travel duties.

In-kind contributions to the program continued to be made during 2010. INIA and the University of Oriente (Venezuela) have 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 western, eastern and overall Program Coordinators traveled to each region of responsibility to oversee IERPB work. Travel expenditures for these trips were absorbed by the U.S. National Marine Fisheries Service, the University of Miami and, by the ICCAT Data Fund that supported and as such, represented in-kind contributions to the IERPB for 2010. Ghana and Senegal provided in-kind contributions by supporting the time spent in the program by Mr. P. Bannerman and Mr. T. Diouf (Senegal) Co-coordinators for the East Atlantic.

2011 Budget and requested contributions

The summary of the 2011 proposed budget, totaling €46,850 is attached as **Table 3**. The Working Group requests that the Commission increases its contribution from €30,600 to €45,600 for 2011 to cover urgent needs of the IERPB (see **Table 4**). The requested contribution from ICCAT is necessary to fully implement the IERPB 2011 Program Plan.

The consequence of the Program failing to obtain the requested budget will be to stop or reduce Program activities for 2011 including: (1) important at-sea observer trips in Venezuela, Uruguay and Brazil; (2) coordination travel for eastern Coordinators; (3) sampling of artisanal fleets in the western and eastern Atlantic (4) sampling and processing of genetic, age and growth samples; (6) promotion of conventional tagging activities, including distribution of tag recovery incentives.

Conclusion

The IERPB has been credited for major improvements in the data supporting the last ICCAT billfish assessments. In preparation for the assessments of marlins the Program needs to continue to facilitate the collection of biological and fishery information. If the IERPB 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 Working Group will be in a difficult position to address the needs of the Commission, especially the upcoming assessment meetings for blue marlin and white marlin. 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 2010 for the Billfish Program.

Source	*Euros (€)*
Balance at start of Fiscal Year 2010	4,978.80
Budget recommended by the Working Group	39,850.00
Income (allocation from ICCAT Regular Budget)	30,000.00
Expenditures and obligations (for details see **Table 2)**	-32,981.00
Estimated balance	**1,997.80**

Table 2. Detailed 2010 Budget & Expenditures (as of October 1, 2010).

		Euros (€)
Balance transferred from 2009		**4,978.80**
Income	**Total**	**30,000.00**
	ICCAT Commission	30,000.00
Expenditures	**Total**	**-16,281.00**
	Venezuela	-16,270.00
	Bank charges	-11.00
Balance (as of October 1, 2010)		**18,697.80**
Funds obligated until end of 2010		**-19,600.00**
	Uruguay	-2,000.00
	Brazil	-5,000.00
	Ghana	-3,000.00
	Senegal	-3,000.00
	Côte d'Ivoire	-3,000.00
	Tag reward	-500.00
	Bank charges	-100.00
Total estimated expenditures		**-32,981.00**
Estimated balance December 31, 2010		**1,997.80**

Table 3. Summary budget of the ICCAT Enhanced Research Program for Billfish for 2011.

Source	*Euros (€)*
Balance at start of Fiscal Year 2011 (estimated)	1997.80
Income (requested from ICCAT Regular Budget)	30,600.00
Other contributions	15,000.00
Expenditures (see **Table 4)**	46,850.00
Balance	**747.80**

Table 4. Detail of expenditures planned for 2011.

Source	*Amount (€)*
STATISTICS & SAMPLING	
West Atlantic shore-based sampling:	
Venezuela	5,000.00
West Atlantic at-sea sampling:	
Venezuela	6,000.00
Uruguay	2,000.00
Brazil	5,000.00
East Atlantic shore-based sampling:	
Senegal	3,000.00
Ghana	3,000.00
Côte d'Ivoire	3,000.00
Processing of genetic samples	17,000.00 *
Lottery rewards – billfish tagging	500.00
COORDINATION	
Coordination travel East Atlantic	2,000.00
Mailing & miscellaneous	100.00
Bank charges	250.00
GRAND TOTAL	**46,850.00**

Authorization of all these expenditures depends on sufficient funds being available by ICCAT and from other contributions.
* The number of samples processed will depend on the final budget of the Program.

Appendix 8

REPORT OF THE SUB-COMMITTEE ON STATISTICS

(Madrid, Spain – September 27-28, 2010)

1. Opening, adoption of Agenda and meeting arrangements

The Sub-Committee on Statistics met at the ICCAT Secretariat (Madrid, Spain) on September 27-28, 2010. The meeting was chaired by Mauricio Ortiz, and Shannon Cass-Calay served as Rapporteur. The revised Agenda proposed by the Chair was accepted and adopted by the Sub-Committee **(Addendum 1 to Appendix 8)**.

2. Review of fisheries and biological data submitted during 2010

The Secretariat presented the "Secretariat Report on Statistics and Coordination of Research in 2010" (ICCAT, 2011, *in* press) which includes a detailed description of the electronic data received by the Secretariat between December 1, 2009 and September 17, 2010 (hereafter referred to as the "Reporting Period"). During the reporting period, the official statistics received and processed by the Secretariat included about 647,000 records, the majority (about 80% of the total) reported using the standard ICCAT electronic forms. This percentage is similar to that in 2009 (after improvements from 60% in 2007 and 70% in 2008), indicating progress toward the goal of 100% electronic reporting. However, the Secretariat noted that submission of incomplete electronic forms continues, which complicates efforts to validate the data.

The Secretariat reiterated to the CPCs the Commission's requirement to use the standard electronic forms, which greatly decreases the Secretariat's workload, substantially reduces data manipulation errors and improves the ability to provide data in a timely fashion. The Sub-Committee reviewed document SCI-008 and made several recommendations which are described below.

2.1 Task I

The Secretariat noted that historical data regarding fleet characteristics are incomplete for some important fleets. In 2010, 28 CPCs reported complete data regarding fleet characteristics while 24 CPCs have not yet submitted complete data. The Secretariat also noted an improvement in the timely submission of Task I nominal catch data by the CPCs during the reporting period. A summary of compliance with Task I submission deadlines by CPCs was discussed. As of September 17, 2010, 15 CPCs had not yet reported Task I data. Additional CPCs failed to meet reporting deadlines, but did report Task I data following the deadline. The Sub-Committee noted that multiple data submission deadlines were announced for certain species in 2010 due to the newly scheduled "Data Preparatory" and "Assessment" workshops. This resulted in confusion regarding the interpretation of submission deadlines. To this end, the Sub-Committee recommended that Species Group Rapporteurs clearly communicate (in the annual working plans) data submission objectives, responsibilities and deadlines to the working group and to ICCAT. Lacking clearly defined deadlines, the Secretariat must use default deadlines that may deviate from the plan of the working group. The Sub-Committee also resolved that the 2010 Task I submission deadlines for bigeye tuna, blue marlin, and white marlin be set to the default submission deadline (July 31, 2010) and that CPCs that reported data by that date be considered in compliance with the submission deadlines.

The Sub-Committee also noted that the interpretation of the tables in the Secretariat´s Report regarding Task I data submission is hampered by the inability to discriminate CPCs that do not report because they do not land a given species, and CPCs that fail to report non-zero landings. To that end, the Sub-Committee recommended that CPCs report cero catch for those ICCAT species not caught in the Task I forms.

The Secretariat also reported that some Task I data cannot be directly allocated to a given species stock unit because a concise geographic delimitation of Task I area is lacking. The Secretariat proposed, and the Sub-Committee approved that the following change be made to the Task I submission form: (1) Beginning in 2011, the species "sampling area" variable, available in form ST02-T1NC, will be the mandatory aggregated geographical level in Task I submission form. (2) However, for the next two years, this variable and the existing variable (Task I Area) will be retained. (3) After that time the existing variable (Task I Area) will be deleted from the Task I data submission form since it is not sufficient (or is not always used appropriately) to consistently discriminate species stock units and may cause confusion. The two year overlap of variables will allow CPCs and statistical correspondents to make their modifications in the estimations of total Task I annual reports.

2.2 Task II

The Secretariat reported that during the reporting period, Task II catch and effort data was received from 29 CPCs while 21 CPCs did not report Task II data. In general, data quality (temporal and spatial resolution) has improved recently. However, the Secretariat emphasized that some deficiencies and problems persist, including: missing or incomplete information, non-standard effort units, and double counting of fishing effort, particularly in mixed-species fisheries. The Secretariat recommended that SCRS scientists collaborate with their statistical correspondents to address these problems. The Secretariat reiterated that all CPCs must submit Task II catch-effort statistics for all species caught (targeted as well as non targeted fish species), and that data should be reported by month and by 5x5 square degree (for LL) or 1x1 square (all other gears). The Sub-Committee discussed complications in reporting by-catch species, and concluded that both estimation and identification of by-catch species need to be validated. The Sub-Committee recommends that the Working Group on Ecosystems and the Secretariat work together to develop a by-catch reporting form to be added to the ICCAT reporting e-forms.

The Secretariat also reported that Task II size frequency data was received from 23 CPCs during the reporting period, while 27 CPCs did not report. Compared to previous years, some improvement was noted in on-time data reporting and in the amount, and spatial/temporal resolution of size-frequency information provided. The Secretariat noted that some CPCs have informed ICCAT that they do not collect and/or possess size frequency information. The Sub-Committee noted that as in Task I, Task II data submission deadlines were not always clearly defined in 2010 due to multiple workshops for assessed species. The recommendations pertaining to Task I submission deadlines also apply to Task II.

2.3 Tagging

The Secretariat informed the Sub-Committee regarding data submissions from electronic and conventional tagging programs in 2009 and 2010. In 2009, information from 37 electronic tags was added to the database (EU-Spain: 5 pop-up tags, Japan: 1 pop-up tag, United States: 31 pop-up and archival tags). During 2010, the Secretariat received information from 225 additional electronic tags (Canada: 95, EU-Spain: 11, EU-France: 26 and USA: 93). This information included internal archival tags as well external archival pop-up tags released on bluefin and swordfish.

The Secretariat also reported that an updated electronic tag form is now available, which addresses the recommendations made by the bluefin tuna Working Group during the 2010 data preparatory meeting. The Secretariat reported that in 2010 the United States USA submitted a tagging database for all years and species. It was noted, however that in 2009 the Secretariat and U.S. scientist had collaborated to standardize the formats and protocols for tagging data submission. Therefore, the Sub-Committee recommended that scientist from US submit only updates and new tagging information to the Secretariat.

3. Updated report on the ICCAT relational database system

The Secretariat provided the Sub-Committee with a detailed description of the ICCAT database information system. The Secretariat emphasized that since 2009, the amount of compliance related data input and database management tasks have significantly increased, mainly in response to Commission Resolutions and Recommendations regarding bluefin tuna. To maintain real-time updates of compliance related information the Secretariat strongly recommends that the data transmission process, electronic data requirements and human resources at the Secretariat be reevaluated as soon as feasible. The Sub-Committee recommended that an external panel review in particular the Secretariat's task and responsibilities for both statistical and compliance related duties and evaluate the available human resources requirements. The Sub-Committee also endorses the Secretariat’s proposal for making compliance related data submissions in electronic forms, rather than typing hard copies or paper images.

The Secretariat also reported that in 2010, the migration to the MS-SQL 2008 server was initiated. The Secretariat has made progress in drafting documentation for the relational database. Also, during 2009 and 2010 the Secretariat produced a series of R-scripts to produce preliminary data analyses and diagnostics for various models and input control files.

4. National and international statistical activities

In 2010, the CWP held its 23rd session. Unfortunately, the ICCAT Secretariat was not able to attend this meeting. Regarding the ad hoc working group on aquaculture, ICCAT responded to the request made to the RFMOs by the Secretariat of the CWP to provide information on activities related to aquaculture. Also, in collaboration with the FIRMS Secretariat, the ICCAT Secretariat also developed fact sheets for several shark stocks assessed by the SCRS. The Sub-Committee requested that the Secretariat provides the CWP with the name of a contact person at the Secretariat who replaces the role carried out by Papa Kebe until last year.

4.1 National data collection systems and improvements

No major improvements were been made to the Task I and Task II databases. The Secretariat has continued to improve the detail level in CATDIS. For some species, additional gears were reclassified and removed from the aggregated gear type “others”. A full revision of CATDIS was made available in May 2010 for the nine major ICCAT species with the objective to include 2008 statistics as well as specific revisions that were made to Task I since the prior version. The Secretariat also discussed plans to make important improvements to the CATDIS in 2011 including: (1) adopting a month as the base time strata instead of trimester when possible; and (2) ongoing reclassification and removal of unique gear codes from the aggregated gear type “other”. The Secretariat described some improvements to the EFFDIS database in 2009, but noted that that database was not updated during 2010. The conventional tagging database was revised and updated in 2009. During 2010 cross-validation and quality control was carried out with the collaboration from scientists from EU-Spain, EU-France, Canada and United States. The Secretariat requested, and the Sub-Committee affirmed, that national scientists should submit only modifications and updates to conventional tagging data provided to ICCAT in previous years.

In collaboration with United States national scientists, the Secretariat updated and simplified (while maintaining the functionality) programs and algorithms for the age slicing of the Catch-at-Size data (AgeIT Program). The updated software, coded in R, provides more detailed information in relation to partial catch at age by fleets or gears to the working groups and is significantly easier to implement and revise as necessary. It was validated and applied during the 2010 bluefin tuna assessment meeting, and was commended by the Working Group as a very substantial improvement.

5. Report on data improvement activities

5.1 ICCAT-Japan Data and Management Improvement Project (JDMIP)

In order to improve the collection of data and strengthen the scientific capacity of some developing CPCs, the Japanese Government created the Japan Data and Management Improvement Project (JDMIP). This project is described in detail in the JDMIP Report (Appendix 2 to the Secretariat Report on Statistics and Coordination of Research in 2010) which will be presented to the SCRS during the plenary session.

5.2 Data Funds from [Res. 03-21]

One objective of the ICCAT Commission, Resolution 03-21, was that CPCs with sufficient resources should create special funds to provide training in data collection and to support scientific participation by scientists from CPCs with fewer resources. In addition to the JDIP (discussed above), the United States, European Union and the Commission Chairman made funds available for that same objective. During 2010, various funds were used to finance the participation of 26 scientists at meetings of the SCRS. In addition, two scientists were funded to participate at the joint ICES-ICCAT training course on Management Strategy Evaluation. The Secretariat noted that the application documentation for this program, including deadlines for transmittal of requests is available on the ICCAT web site. Nevertheless, the Secretariat receives the majority of requests after the deadline which greatly complicates the work of the Secretariat and unnecessarily increases travel expenses. Thus, the Secretariat has developed, and recommended to the Sub-Committee a protocol to request these funds (Appendix 1 to the Secretariat Report on Statistics and Coordination of Research in 2010).

The Sub-Committee agreed that these funds are particularly useful to provide training opportunities, and have resulted in a notable increase in the number and quality of scientific publications from participating CPCs. The Sub-Committee approved the protocol prepared by the Secretariat and recommended that at a minimum, two-week lead times be obligatory.

5.3 Data improvement and recovery activities

The Secretariat described improvements made to ICCAT statistical databases, including incorporation of the Task I disaggregation of sailfish into sailfish and spearfish for relevant fleets as estimated during the 2009 sailfish stock assessment session, re-estimation of Ghanaian fisheries statistics, revisions to historical Task I (Table 6 of the Secretariat´s Report) and Task II (Tables 7-8 of the Secretariat´s Report) data series, and the recovery of historic bluefin data under the GBYP Research Program. A detailed description of these activities can be found in Section 2 of the Secretariat´s Report. The Secretariat noted that many revisions have not been incorporated into the final statistics because they are pending approval. In general this occurs when revisions are submitted without an accompanying justification. The Sub-Committee reiterated its previous recommendation that revisions not be incorporated without the approval of the appropriate species Working Group.

The Sub-Committee requested clarification of the status of the re-estimation of Ghanaian statistics, and the response of Ghana to ICCAT Recommendation [09-01], "Ghana's Action Plan to Strengthen the Collection of Statistical Data and Control Measures to Ensure Full Implementation of Conservation and Management Measures". The Secretariat and the Ghanaian National scientist explained that the re-estimation has been submitted and incorporated. Also, the Secretariat brought to the attention of the Sub-Committee the ICCAT circular #908/10, Ghana's response to Rec. 09-01. The Sub-Committee acknowledged the prompt and capable assistance provided by the national scientists and the Commissioner of Ghana with regard to these matters. The Sub-Committee recommends that the tropical tunas Working Group continue their work on the review and improvement for catch and effort statistics from the Gulf of Guinea in particular in coordination with scientist and research programs involved in this mixed fisheries.

5.4 BFT-E VMS data

Recommendation [08-05] states that VMS information submitted to the Secretariat can be made available to the SCRS upon request. However, at present, ICCAT has not yet adopted a policy on the treatment and distribution of data that can be deemed to be confidential. Therefore, the Secretariat is unable to provide a database for scientists, besides overall annual summaries. The Sub-Committee reiterated its desire to use VMS information to inform scientific analyses. To emphasize the importance of the confidentiality agreement, the Sub-Committee agreed that the confidentiality agreement be re-submitted to the Commission in 2010.

5.5 BFT-E observer data

The Sub-Committee reviewed and discussed the document prepared by the Marine Resources Assessment Group (MRAG) regarding the BFT-E regional observer program (ROP). The Sub-Committee disagreed with some language contained in that document, particularly the explanation of the objective of the ROP which primary emphasized compliance monitoring. The Sub-Committee strongly emphasized the "Equal Importance" of collecting scientific information to support SCRS analytical objectives. The Sub-Committee also felt that the primacy of the compliance monitoring activities, as defined by MRAG, was contradicted by SCRS the recommendation presented to and approved by the ICCAT Commission [Rec. 08-05]. Specifically, that the ROP carry out such scientific work as required by the Commission based on the directions from the SCRS, including but not limited to: (1) the collection of data regarding fishing activity (e.g. temporal and spatial distribution effort) for management strategy evaluations, catch-per-unit effort analyses and capacity analyses), and (2) the collection information regarding the disposition of bluefin tuna discarded or released to improve estimates of total removals.

5.6 BFT-E weekly catch reports

Under Recommendation [08-05], weekly catch reports are sent to the Secretariat. The information obtained through September 17, 2010 was presented to the Sub-Committee (Table 10 of the Secretariat´s Report).

5.7 Transshipment observer data

Recommendation [06-11] established a program to monitor at-sea transshipments by large scale longliners. The Secretariat summarized the amounts transshipped in (Table 13a) of the Secretariat´s Report and noted that there are many product types for which the Secretariat has no conversion factors (Table 13b) making impossible the conversion to round-weight. The Secretariat recommended, and the Sub-Committee concurred that the SCRS develop and adopt conversion factors to facilitate use of this data.

6. Review of publications and data dissemination

6.1 Review of the results of the ICCAT-Aquatic Living Resources publication agreement

The Secretariat reported that the second issue of the scientific journal Aquatic Living Resources (ALR) was published in 2010, including a thematic section on tuna and tuna-like species. Six documents presented to the SCRS in 2009, were included in this section. In addition, there are currently eleven documents accepted for publication, or in the process of being reviewed. The documents that are finally accepted will be published in the corresponding thematic section of the journal.

6.2 Development of small tunas and sharks identification species sheets

The Secretariat updated the fact sheets for several species assessed by the SCRS in 2009, including: North Atlantic albacore, Atlantic swordfish (North and South). Also, in collaboration with the FIRMS Secretariat, the ICCAT Secretariat developed fact sheets for several shark stocks assessed by the SCRS.

7. Review of progress made for a revised *ICCAT Manual*

The Secretariat summarized the progress made in 2010 to complete the ICCAT Manual, including the following. Japanese national scientists have submitted a description of the "Japanese" longline gear used to catch has tunas and tuna-like species. The Secretariat has also contacted other experts on surface longline gear, as well as experts on southwest Atlantic fisheries. The Secretariat also noted the value of including a description of the longline gear used by artisanal fisheries if it becomes available. In addition, Chapter 2 of the *ICCAT Manual* was also published in 2010 in the three official ICCAT languages. Scientists from Spain and Canada continue to develop sections describing the harpoon and trolling gears.

8. Consideration of recommendations from 2010 inter-sessional meetings

The Sub-Committee on Statistics reviewed the 2010 Working Group recommendations pertaining to statistics, data collection and reporting. There were many important recommendations, some of which are addressed specifically below. The Sub-Committee recommended that particularly useful and/or complicated recommendations be brought to the attention of the Species Group rapporteurs at the SCRS officers meeting before the 2010 ICCAT Plenary Session. Pending approval of the SCRS officers, the Sub-Committee has also expressed approval for these measures.

8.1 Working Group on Stock Assessment Methods

The Working Group on Stock Assessment Methods made several important recommendations including the following:

8.1.1 Standardized Executive Summary table format

The Methods Working Group developed and proposed a standardized format for the executive summary table (Appendix 1, Report of the Working Group on Assessment Methods) (Anon. 2010a). This table was presented to the Sub-Committee. The Sub-Committee agreed that was of potential value, and recommended that this table be presented to the Species Group rapporteurs for approval at the SCRS officers meeting before the 2010 ICCAT plenary session.

8.1.2 Model analyses, assumptions and duplicability

The Methods Working Group noted the lack of uniformity in reporting model specification, assumptions and data inputs across species and years, and the resulting difficulty in reproducing model results. They urged the development of standardized formats for the detailed report. The Sub-Committee agreed that was of potential value, and recommended that this issue be presented to the Species Group chairs for comment at the SCRS officers meeting before the 2010 ICCAT Plenary Session. Pending approval of the Species Group rapporteurs, the Sub-Committee recommends the development of standardized formats for the "Detailed Reports".

8.1.3 Kobe-II matrix construction

The Secretariat also reminded the Sub-Committee that the Methods Working Group recommended, and the Commission has required the construction of Kobe II strategy matrices (K2SM) for all ICCAT stock assessments. The construction and usage of K2SM is described in the 2010 Report of the Working Group on Stock Assessment and Methods. The Sub-Committee recommended that Species Group rapporteurs be made aware of this requirement at the comment at the SCRS officers meeting before the 2010 ICCAT Plenary Session.

8.2 Sub-Committee on Ecosystems (ECO)

The Sub-Committee on Ecosystems also requested that the Secretariat develop the necessary mechanisms for CPCs to annually report their observer data (e.g., electronic forms, species codes, etc.) To that end, 27 new species codes were proposed (in collaboration with FAO). These were presented to the Sub-Committee on statistics. A subgroup of the Sub-Committee met to discuss the elimination of duplicate scientific names for some species. They retained the most commonly used name and presented a revised table of codes to the Sub-Committee who approved the revised table for use.

The Sub-Committee on Statistics also discussed problems associated with the reporting of by-catch. First, there are no specific forms or submission formats. Second, by-catch is difficult to estimate because it is difficult to identify CPCs that did not observe a by-catch species (e.g. zero catch) from CPCs that do not report. Also, it is difficult to estimate annual by-catch because many species are rarely encountered, and therefore accurate annual estimates cannot be computed using typical estimation techniques. The Secretariat agreed that there is no standardized format, but described the by-catch data recently submitted by a CP (United States). The observed by-catch data of seabirds was submitted in numbers by species, month/quarter, and disposition (e.g. discarded dead or released alive). Some CPCs (Canada, Brazil, Uruguay) agreed that it might be possible to submit data soon in a similar fashion.

8.3 Bluefin Tuna Species Group

The Bluefin Tuna Species Group recommended that the Sub-Committee on Statistics should revise and adopt the new form for electronic tagging data at its meeting in September 2010 (SCRS/2010/012). The Secretariat presented the new form that is available in the ICCAT web page and it was approved.

8.4 Additional recommendations proposed by the Secretariat

8.4.1 R training workshop

The Sub-Committee strongly supported the Secretariat proposal to conduct a series of workshops, beginning in 2011 to introduce, provide training, validate and distribute these R-scripts to SCRS scientists in order to optimize and standardize common pre-analysis data processing tasks within each Species Group. The Sub-Committee approved of this important activity, and recommended that test datasets be developed to allow validation of R-Scripts and other processes which have been developed by National Scientists. A member of the Sub-Committee also reported that similar efforts have taken place another fisheries management group (ICES). This effort, the "COST Project", proposes the use of standardized data set exchange formats and emphasizes the development of R-scripts for common analyses. A report of this project is available (Jansen *et al.,* 2009), and users may obtain R-scripts by contacting the user group.

9. SCRS proposal for collecting Recreational and Sport fisheries data on ICCAT species

A subgroup of the Sub-Committee (EU, Canada, Japan, Brazil, Mexico, United States) met to develop a proposal to facilitate the reporting of sport and recreational fishing statistics. The subgroup presented their conclusions to the Sub-Committee, and recommended the following data be collected by CPCs to facilitate the reporting of recreational and sport fishing data:

- Catch by species
- Length/Weight of catch
- Discards by species
- Length/Weight of discards
- Disposition of discards (e.g. dead, alive, etc.)

- Location and time of fishing trip
- Estimates of release mortality

The subgroup also made the following recommendations regarding data collection programs:

- Each CPC should identify the "universe" of recreational fishing participants.
- Each CPC should sample that universe with appropriate coverage to allow estimation of total removals (e.g. random stratified scientific sampling).
- Each CPC should identify release mortality to allow estimation of total removals (landed + dead discards + release alive then died due to interaction with fishery).

The Sub-Committee generally agreed with the recommendations of the sub-group and concluded that these recommendations should be submitted to the Secretariat as an official response to (SCRS Report Response to Commission reference), and evaluated by the SCRS during the 2010 Plenary Session.

10. Evaluation of data deficiencies pursuant to [Rec. 05-09]

10.1 Proposals for data recovery plans and improvements on data collections systems

The Sub-Committee requested clarification of the status of the re-estimation of Ghanaian statistics, and the response of Ghana to ICCAT Recommendation [09-01], "Ghana's Action Plan to Strengthen the Collection of Statistical Data and Control Measures to Ensure Full Implementation of Conservation and Management Measures". The Secretariat and the Ghanaian national scientist explained that the re-estimation has been submitted and incorporated. Also, the Secretariat brought to the attention of the Sub-Committee the ICCAT Circular #908/10, Ghana's response to Rec. 09-01. The Sub-Committee acknowledged the prompt and capable assistance provided by the national scientists and the Commissioner of Ghana with regard to these matters.

11. Review of existing data submission formats and procedures

11.1 Improvements to the ICCAT coding system

See Section 8.2, paragraph 1.

11.2 Rules applied to historical data revisions

No modifications. The Sub-Committee reiterates that historical revisions must be submitted with supporting documentation explaining the reason for submission. These materials will be forwarded to the Species Groups for approval. No changes will be made to ICCAT statistics until approval by the Species Groups. The Secretariat noted that many revisions have been submitted without the supporting documentation, and therefore cannot be approved by the Species Groups. Thus, many revisions submitted years ago are still pending. The Sub-Committee recommends that CPCs who have submitted revised series promptly provide supporting documentation if it is lacking.

11.3 Rules used to determine deadlines for submitting statistics

The Sub-Committee reiterates that Species Group rapporteurs must declare clear deadlines for data submission, and communicate those deadlines to the Working Group and the ICCAT Secretariat in the annual working plans presented to the SCRS. Rapporteurs should avoid vague terms and multiple poorly-specified reporting deadlines for workshops occurring in the same calendar year (e.g. data prep and assessment). If vague deadline are proposed, the Secretariat must employ default deadlines that may cause unforeseen complications.

11.4 Review of existing rules and procedures on data handling and dissemination

The Sub-Committee reiterates the importance of adopting the Data Confidentially Policy for the ICCAT Secretariat, and reminds the Commission that a proposal was approved and presented by the SCRS in 2009 (ICCAT 2010b). The Sub-Committee also resolved that the Data Confidentially Policy will be resubmitted to the Commission at the 2010 ICCAT Commission Meeting.

12. Future plans and recommendations

The following is a summary of the different recommendations mentioned and adopted by the Sub-Committee during the meeting:

1. The Sub-Committee reiterates the importance of adopting the Data Confidentiality Policy for the ICCAT Secretariat, and reminds the Commission that a proposal was approved and presented by the SCRS in 2009. The Sub-Committee also resolved that the Data Confidentiality Policy will be resubmitted to the Commission at the 2010 ICCAT Commission meeting.

2. The Sub-Committee recommended that an external panel review in particular the Secretariat's tasks and responsibilities for both statistical and compliance related duties and evaluate the available human resources requirements. The Sub-Committee also endorses the Secretariat’s proposal for making compliance related data submissions in electronic forms, rather than typing hard copies or paper images.

3. The Sub-Committee strongly supported the Secretariat’s proposal to conduct a series of workshops, beginning in 2011 to introduce, provide training, validate and distribute these R-scripts to SCRS scientists in order to optimize and standardize common pre-analysis data processing tasks within each species group. The Sub-Committee approved of this important activity, and recommended that test datasets be developed to allow validation of R-Scripts and other processes which have been developed by National scientists and the Secretariat.

4. The Sub-Committee recommended that Species Group rapporteurs clearly indicate in their annual Work Plan the data required to be submitted and the deadline for the submission of such data. For inter-sessional meetings taking place before July 31, the deadline is two weeks prior to the start of the meeting. For inter-sessional meetings taking place after July 31, the data submission deadline is the default deadline of July 31, 2010.

5. The Sub-Committee reviewed the Secretariat's proposal for requesting "sampling area" as mandatory geographical classification for Task I form reports. The Committee recommended that each CPC report Task I by species stock units (or sampling area), rather than by species and Task I area as is currently done. The Secretariat should modify the electronic forms currently used for Task I data to accommodate this Recommendation.

6. The Sub-Committee recommended that CPCs report zero catch for those ICCAT species not caught in the Task I forms.

7. The Sub-Committee approved the protocol prepared by the Secretariat regarding travel funding for scientific meeting participation and recommended that at a minimum, two-week lead times be obligatory.

8. The Sub-Committee recommends that the tropical tunas Working Group continue their work on the review and improvement for catch and effort statistics from the Gulf of Guinea in particular in coordination with scientist and research programs involved in this mixed fisheries.

9. The Sub-Committee reiterated its desire to use VMS information to inform scientific analyses. To emphasize the importance of the confidentiality agreement, the Sub-Committee agreed that the confidentiality agreement be re-submitted to the Commission in 2010.

10. The Secretariat recommended, and the Sub-Committee concurred that the SCRS develop and adopt conversion factors to facilitate use of transshipment and trade data.

11. The Sub-Committee recommends that CPCs that have submitted revised series, historical reviews promptly provide supporting documentation if it is lacking.

12. The Sub-Committee recommended that scientists from United States submit only updates and new tagging information to the Secretariat.

13. Other matters

No other matters were discussed.

14. Adoption of the report and closure

The meeting was adjourned and the report adopted at the SCRS plenary. The Chair thanked the participants and noted that for next year there will be a new Convener of the Sub-Committee of Statistics and scientist interested should submit their nomination to the SCRS Chair.

Addendum 1 to Appendix 8

Agenda of the Sub-Committee on Statistics

1. Opening, adoption of Agenda and meeting arrangements
2. Review of fisheries and biological data (new and historical revisions) submitted during 2010
   - 2.1 Task I (nominal catches and fleet characteristics)
   - 2.2 Task II (catch & effort and size samples)
   - 2.3 Tagging
   - 2.4 Trade information (BFT Catch Documentation scheme; SWO/BET Statistical Documents)
   - 2.5 Other relevant statistics
3. Updated report on the ICCAT relational database system
4. National and international statistical activities
   - 4.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)
   - 4.2 National data collection systems and improvements
5. Report on data improvement activities
   - 5.1 ICCAT-Japan Data and Management Improvement Project
   - 5.2 Data Funds from [Res. 03-21]
   - 5.3 Data recovery activities
   - 5.4 BFT-E VMS data
   - 5.5 BFT-E observer data
   - 5.6 BFT-E weekly catch reports
   - 5.7 Transhipment observer data
6. Review of publications and data dissemination
   - 6.1 Review of the results of the ICCAT-Aquatic Living Resources publication agreement
   - 6.2 Development of small tunas and sharks identification species sheets
7. Review of progress made for a revised ICCAT Manual
8. Consideration of recommendations from 2010 inter-sessional meetings
9. Evaluation of data deficiencies pursuant to [Rec. 05-09]
   - 9.1 SCRS proposal for collecting Recreational and Sport fisheries data on ICCAT species
10. Review of existing data submission formats and procedures
    - 10.1 Formats and e-FORMS improvement (to account for current fishery practices)
    - 10.2 Improvements to the ICCAT coding system
    - 10.3 Defining standardized methodology for collection of recreational and sport fisheries data for ICCAT species
    - 10.4 Other related matters
11. Review of existing rules and procedures on data handling and dissemination
    - 11.1 Public domain information
    - 11.2 Non-public domain information
12. Future plans and recommendations
13. Other matters
14. Adoption of the report and closure

Appendix 9

REPORT OF THE SUB-COMMITTEE ON ECOSYSTEMS
(Madrid, Spain – September 29, 2010)

The Sub-Committee on Ecosystems met at the Secretariat on September 29, 2010. The meeting was chaired by Mr. Haritz Arrizabalaga (EU-Spain). 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

Eight documents were presented under this agenda item. Document SCRS/2010/094 provided new information about the food habits of marlin, in a Bayesian context. The group encouraged this type of work since they provide important information that may allow food web modeling in the future.

SCRS/2010/127 documented differences in the size of loggerhead turtle caught by traditional drifting surface longliners targeting swordfish, and drifting surface longline targeting albacore, with respect to other four types of longlines. The drifting surface longline targeting albacore caught the smallest turtles. The group discussed the fact that the differences in the size of sea turtles caught between gears could be due to factors such as the size of the hooks and type of the bait. Participants added that squid bait usually provokes higher by-catch of turtles because it remains longer in the hook than other types of bait such as fish.

Document SCRS/2010/128 characterized the marine mammal by-catch of the Spanish Mediterranean pelagic longline fishery during the last decade. By-catch of these fisheries included several marine mammal species. Differences in catch per unit effort (CPUE, number of marine mammals per 1000 hooks) for each longline gear type are reported in this study. A total of 5,398.297 hooks were monitored, which yielded 56 marine mammals belonging to 4 different species. The average CPUE for the studied period was 0.011 marine mammals per 1000 hooks. Risso's dolphin (*Grampus griseus*) was the species most commonly caught. The longfinned pilot whale (*Globicephala melas*) was only present in the longline fishery targeting bluefin tuna (CPUE = 0.0038 mammals per 1000 hooks) and traditional longline targeting swordfish (CPUE = 0.0006 marine mammals per 1000 hooks. In general, low by-catch and high survival rates were observed.

Document SCRS/2010/140 presented the statistics of tuna surface fishery's by-catch landed in Abidjan, Côte d'Ivoire, for the period 1982-2009. Besides some tropical tunas, the statistics also included several other finfish species that are of interest to the Sub-Committee, such as wahoo, dorado, barracuda and triggerfish. The best way to incorporate this information into the ICCAT database is being discussed by the Subcommittee on Statistics.

Document SCRS/2010/142 analyzed the effect of different levels of sampling coverage on by-catch estimates in the tropical tuna purse seine fishery. The analysis was based on resampling from a FAD by-catch dataset from the IATTC, with focus on four species. In general, the conclusions were comparable to those obtained during the Sub-Committee's inter-sessional meeting. In general, the largest gains in precision occurred when coverage increased to 5-10% (although estimates might remain highly imprecise for less frequent species). Document SCRS/2010/141 followed with a characterization of by-catch and discards in the Atlantic tropical tuna purse seine fishery for the years 2008 and 2009, which were comparable to those presented in the past.

Document SCRS/2010/151 presented preliminary results of the effect of hook type and bait on the catches of marine turtles by the pelagic long-line fishery in the equatorial area. A total of 164 longline sets were carried out and analyzed. Three different hook types were used in each long-line set: traditional J hook (EC-9/0-R); G a non-offset circle hook (H17/0-M-S) and GT a 10º offset circle hook (H17/0-M-R). The hooks were baited with mackerel (*Scomber spp*) and squid (*Illex spp.*), but only on type of bait was used in each set. Overall, a total of 219,801 hooks (73,275 J type; 73,272 GT type and 73,274 G type) were set. Overall, the use of the circle hooks reduced the mean CPUE by 50% to 70%, with GT off-set style hooks showing the lowest catch of sea turtles. Hooks baited with mackerel showed lower catches than when squid is used as bait. Hooking location was species specific and not depending on the hook style. Leatherback were mostly entangled or hooked in the flippers, while the remaining species generally swallowed the hook. The overall mortality was lowest for the G style hook (12%) and highest for the GT off-set style (33%).

Document SCRS/2010/152 presented the International Seafood Sustainability Foundation initiatives to develop and test by-catch mitigation options for tropical purse seine fisheries. The research program aims to develop and test technical options to reduce by-catch resulting from industrial tuna fisheries. The initial emphasis will address ways to reduce the incidental mortality of bigeye tuna of undesirable size, oceanic sharks and marine turtles in tropical purse seine fisheries. The ISSF will implement field studies through the full charter of a dedicated purse seine vessel or vessels operating in the Pacific, Atlantic and Indian Oceans over a 24-month schedule, spread over three years. Overall project guidance will be provided by the ISSF Scientific Advisory Committee. A Purse Seine Research Vessel Steering Committee is developing the specific projects to be conducted while considering practical input from skippers and industry representatives gained from regional workshops convened by the ISSF. The first research cruise will be in the eastern Pacific Ocean early in 2011.

2. Other matters

The Group revised the inter-sessional meeting report (see Item 9.4) and the report of the joint tuna RFMO meeting on by-catch held in Brisbane, with special emphasis on future work of the subcommittee (see Item 13).

In addition, The United States announced that it is hosting the 1st International Circle Hook Symposium in Research, Management, and Conservation. The symposium will be held in Miami, Florida, United States in May 4-6, 2011. The goal of the symposium is to produce an updated, science-based assessment of the management and conservation utility of circle hooks in commercial and recreational fisheries around the globe. It was indicated that the symposium is not a venue for advocating widespread use of circle hooks. Rather, its objective is to provide a forum for individuals, organizations and agencies to share relevant research results and perspectives and to subject their findings to peer-review through publication in an internationally-recognized scientific journal. Additional information about the symposium such as venue, lodging, deadlines, registration, etc. can be found in the symposium web site www.circlehooksymposium.org

3. Recommendations

The short term by-catch contractor compiled new information and generated new by-catch databases. However, these databases are not complete, and further information from other publications still needs to be compiled into these databases. These databases need to be kept operational to be useful and to help achieve the objectives and mandate of the SCRS. Moreover, it is essential to conduct quality controls on the new by-catch information submitted to the Secretariat and maintain the by-catch database. In addition, there is a need to work on the by-catch issues agreed by the Joint tuna RFMO Working Group on by-catch in Brisbane. Given the enhanced magnitude of by-catch related work that is anticipated, it is essential that the Commission funds a full-time By-catch Coordinator position at the Secretariat.

Addendum 1 to Appendix 9

Agenda of the Sub-Committee on Ecosystems

1. Review of new scientific information
2. Other matters
3. Recommendations

Appendix 10

LETTERS FROM THE INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION (ISSF) REFERRING TO THE USE OF THEIR DATA

October 1, 2010

Mr. Driss Meski
Executive Secretary
International Commission for the Conservation of Atlantic Tunas

Mr. Gerald Scott
Chair, Standing Committee for Research and Statistics
International Commission for the Conservation of Atlantic Tunas

Re: ISSF participating company data

Dear Mr. Meski and Mr. Scott,

As you are aware, ISSF participating companies are providing species / size data to RFMOs for their tuna purchases, as more fully described in the attached letter of October 6, 2009. This effort is designed to improve the species and size composition data used by RFMO scientific bodies, as more fully described in the ISSF Statement Resolution on Data Support that is also attached. Currently, the data from the ISSF Participating Companies is submitted directly to the RFMO contact that each RFMO has provided to us.

We have been contacted by a number of ICCAT SCRS member scientists seeking access to the data submitted by ISSF Participating Companies directly to the ICCAT contact that ICCAT has provided us. We are pleased that there is increasing interest in sharing the commitment of ISSF and its partners to improve the species and size composition data used by RFMO scientific bodies. It is certainly the intention of ISSF in providing these data sets for them to be used in a meaningful way by the RFMO scientific bodies.

In order for national scientists to conduct the analysis needed to improve the working of the scientific committee as part of the ICCAT process, I suggested that a mechanism (e.g., an MOU) that allows to access the data in a manner that maintains confidentiality, and within the frameworks that have already been established (i.e., ICCAT working group for tropical tunas, etc.) should be developed to support these research initiatives.

Yours sincerely,

(signed)
Susan S. Jackson

President

cc: V. Restrepo

October 6, 2009

To: ISSA Member Companies

Re: Submission of information on unloading/landings and transshipments of tunas and tuna-like species from participating companies of the International Seafood Sustainability Foundation (ISSF) to RFMO scientific bodies

As you are all aware, the International Seafood Sustainability Foundation (ISSF) is a global partnership among the tuna industry, science and WWF, the global conservation organization. The ISSF mission is to undertake science-based initiatives with all stakeholders to facilitate the long-term conservation and sustainable use of target fish stocks and to maintain the health of the marine ecosystem.

ISSF's first principle of governance is to cooperate closely with four major regional fishery management organizations (RFMOs) and their scientists. The second principle of governance is to follow and adopt sound scientific recommendations for sustainable management of targeted fish stocks. However, while each tuna RFMO is supported by a scientific committee or staff, comprised of some of the world's finest scientists who study the health of the world's tuna populations, their work is only as good as the completeness and accuracy of the supporting data.

ISSF and its participating companies have resolved to support the tuna RFMO scientists to ensure that their findings and the data underlying them are as accurate and complete as possible. To this end, the companies have committed to provide data that is within their control directly to the RFMO scientific bodies.

As requested by ISSF, the RFMOs have developed a uniform set of minimum standards for information requested from the companies. The standards are provided in the attached table. In addition, the provisions for protection and handling of members' data by the RFMOs are presented. The RFMOs and scientific body of interest herein are the Inter-American Tropical Tuna Commission (IATTC), the International Commission for the Conservation of Atlantic Tuna (ICCAT), the Indian Ocean Tuna Commission (IOTC), and the Secretariat of the Pacific Community (SPC), which provides scientific advice to the Western and Central Pacific Fisheries Commission (WCPFC).

First, the data provided by a company to an RFMO or scientific body continues to be the property of the company, and it is protected from any release or presentation that would reveal the operations of individual companies. This is accomplished in each organization by rules of procedure which indicate that data presented to the public will be an aggregate of data of three or more companies or individuals. Second, the documents, data (in any form including digital) holdings, offices, and property of the RFMOs and their scientific bodies are protected from search and seizure equivalent to that of a foreign government by laws of Spain (ICCAT), France and New Caledonia (SPC), Seychelles (IOTC), and the United States (IATTC). The IATTC and SPC have a MOU in place providing for data sharing to ensure correct compilation and reporting of data for the entire Pacific, and to facilitate analyses of stock status. Access to records of individual companies or operations may not be released to others without the permission of the data provider.

Generally, the data from unloadings/landings are used to determine total catch by species, and in analyses of catches recorded in fishing vessel logbooks and observer records. Statistics on total catch are used in assessments of stock status and are presented in aggregates that include data from all sources. Analyses of catches from fishing vessel records are generally used to estimate catches by area, and to determine if the information in a logbook or observer record should be included in scientific analyses.

Even in cases where RFMO member nations are fully and timely complying with their data provision obligations to the RFMOs, the scientists find that independent provision of data from companies is valuable for their work and for validation of data received from other sources. The IATTC is an excellent case in point. Due to the 100% observer coverage on purse seine fishing vessels, they have the most robust data set of all of the RFMOs, yet they also have an established process for directly collecting processor and landings data.

The specific information listed below should be compiled and submitted to the RFMO representative. There is no need to submit all data to each RFMO. Rather, the RFMO representing the ocean area of capture should receive the specific trip information. (i.e., for trips in the Eastern Pacific, submit to IATTC; Indian Ocean submit to IOTC, etc).

Information should be complied and submitted for, and within a month of the end of, each calendar quarter. For the initial submission, please submit the data for all of 2009 by January 31, 2010.

The contacts for submission are:

IATTC:	Guillermo Compeán (gcompean@iattc.org) with a copy to Michael Hinton (mhinton@iattc.org).
ICCAT:	info@iccat.int with a copy to: Victor Restrepo (victor.restrepo@iccat.int)
IOTC:	Miguel Herrera (Miguel.Herrera@iotc.org) and Lucia Pierre (Data.Assistant@iotc.org)
SPC/WCPFC:	Tim Lawson (TimL@spc.int) and Peter Williams (PeterW@spc.int)

Please contact me if you have any questions.

Thank you in advance for your cooperation and assistance in this very valuable and worthy undertaking.

Yours sincerely,

(signed)
Susan S. Jackson, President

cc: J. Joseph
A. Anganuzzi (IOTC)
J. Hampton (SPC/WCPFC)
M. Hinton (IATTC)
V. Restrepo (ICCAT)

Information for unloading/landings data to be provided RFMOs or scientific program for each unloading/landing

Information Requested
Unloading directly from fishing vessel
Name of fishing vessel
Call sign
Gear type[1] used to capture fish
Flag state
Start date for unloading to processor
End date for unloading to processor
Fishing area[2] from which the unloaded catch was taken
Date range of operations of catcher vessel(s) for transshipped catch
Out turn, or bill of lading, weight of catch by commercial species/size categories[3], by catcher vessel(s)
Unloading from carrier vessel (transshipments)
Name of vessel
Call sign
Flag state
Start date of unloading at processor
End date of unloading at processor
Name of catcher vessel(s) and/or processor originating transshipment(s)
Date(s) of transfer of fish from catcher vessel(s) by vessel, and/or transfer from processor(s), to carrier
Location of transfers(s) (at sea/port name) by transfer
Date range of operations of catcher vessel(s) for transshipped catch
Out turn, or bill of lading, weight of catch by commercial species/size categories[3], by catcher vessel(s), and/or processor(s) or transshipment(s)

1/ For multi-gear vessels, the gear type used to capture the fish.
2/ Area definitions: Atlantic Ocean, Indian Ocean, eastern Pacific Ocean (IATTC, area east of 150°), western Pacific Ocean (west of IATTC area).
3/ The commercially identified species, and size category for size-sorted fish.

Appendix 11

LIST OF ACRONYMS

ALR	*Aquatic Living Resources*
AOTTP	Atlantic Ocean Tropical tuna Tagging Program
AS	Age structured
ASPIC	Fishery surplus production model (Prager, 1994)
ASPM	Age-Structured Production Model
B	Biomass
BOF	Bureau of Fisheries (China)
BSP	Bayesian Surplus Production model
CARICOM	Caribbean Community
CATDIS	Catch 5x5 distribution
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CECAF	Fishery Committee for the Eastern Central Atlantic
CFASPM	Catch-Free Age-Structured Production Model
CI	Confidence Index
CIPs	*Centres de Recherches de Pêches* (Angola)
CITES	Convention on International Trade of Endangered Species
CLIOTOP	Climate Impacts on Oceanic Top Predators
CPCs	Contracting Parties and Cooperating Contracting Parties, Entities or Fishing Entities
CPUE	Catch-per-unit effort
CRO	*Centre de Recherches Océánologiques* (France)
CRODT	*Centre de Recherche Océanographique de Dakar-Thiaroye* (Senegal)
CV	Coefficient of variation
CWP	Coordinating Working Party on Fishery Statistics
DINARA	*Dirección Nacional de Recursos Aquáticos* (Uruguay)
DNPA	*Direction Nationale de la Pêche et de l'Aquaculture* (Angola)
EEZ	Exclusive Economic Zone
EFFDIS	Fishing effort 5x5 distribution
ERAs	Ecological Risk Assessments
EU	European Union
F	Fishing mortality
FADs	Fish Aggregating Devices
FAJ	Fisheries Agency of Japan
FAO	Food & Agriculture Organization of the United Nations
FMAP	Federation of Maltese Aquaculture Producers
FIRMS	Fishery Resources Monitoring System
FL	Fork length
FMOs	Fisheries Management Organizations
GBYP	ICCAT Atlantic-Wide Bluefin Tuna Research Programme
GEPE	*Cabinet d'Études de Plans et Statistiques* (Angola)
GLOBEC	Global Ocean Ecosystem Dynamics
GRT	Gross Registered Tonnage
IATTC	Inter-American Tropical Tuna Commission
ICES	International Council on the Exploration of the Sea
IERPB	ICCAT Enhanced Research Program for Billfish
INIP	Institut National de Recherches de Pêche (Angola)
INRH	*Institut National de Recherche Halieutique* (Morocco)
IOTC	Indian Ocean Tuna Commission
IPA	*Institut de Pêche Artisanale* (Angola)
ISSF	International Seafood Sustainability Foundation
JDIP	Japan Data Improvement Project
JDMIP	ICCAT/Japan Project for the Improvement of Data and Management of Tuna Fisheries
K2SM	Kobe II Strategy Matrix
LJFL	Lower jaw fork length
LSTLVs	Large-scale tuna longline vessels
MFAD	Moored Fish Aggregating Devices
MOU	Memorandum of Understanding

MRAG	Marine Resources and Fisheries Consultants
MSY	Maximum sustainable yield
NEI	Not Elsewhere Included
Multifan-CL	Length-based, age structured assessment model
OMZ	Oxygen minimum zone
PSAT	Pop-up satellite archival tag
ROP	Regional Observers Program
RFMOs	Regional Fisheries Management Organizations
SEAPODYM	Spatial Ecosystem and Populations Dynamics Model
SPC	Secretariat of the Pacific Community
SPR	Spawning potential/spawner recruit ratio
SS3	Stock Synthesis III
SSB	Spawning stock biomass
TAC	Total allowable catch
T-RFMO	Tuna Regional Fisheries Management Organization
VMS	Vessel monitoring system
VPA	Virtual population analysis
WCPFC	Western Central Pacific Fisheries Commission
YPR	Yield per recruit

Appendix 12

REFERENCES

Aloncle, H. and Delaporte, F. 1973, Start of albacore fishing along the European coast, A “Zone Text”, radial Cape St. Vincent/Azores. Collect. Vol. Sci. Pap. 1: 371-377.

Anon. 2001, Report of the Fourth ICCAT Billfish Workshop. *(Miami, Florida, July 18 to 28, 2000)*. Collect. Vol. Sci. Pap. ICCAT, 53: 1-130.

Anon. 2003, Report of the 2002 ICCAT White Marlin Stock Assessment Meeting *(Madrid, Spain, May 14 to 17, 2002)*. Collect. Vol. Sci. Pap. ICAT, 55(2): 350-452.

Anon. 2004, Bluefin Tuna Research Planning Meeting *(ICCAT Secretariat, May 15-16, 2003)*. Collect. Vol. Sci. Pap. ICCAT, 56(3): 987-1003.

Anon. 2005. Report of the 2004 Inter-sessional Meeting of the ICCAT Sub-Committee on By-Catches: Shark Stock Assessment (Tokyo, Japan, June 14 to 18, 2004). Collect. Vol. Sci. Pap. ICCAT, 58(3): 799-890.

Anon. 2007, Report of the 2006 ICCAT Billfish Stock Assessment *(Madrid, Spain, May 15 to 19, 2006)*. Collect. Vol. Sci. Pap. ICCAT, 60(5): 1431-1546.

Anon. 2008a, Report of the 2007 ICCAT Bigeye Tuna Stock Assessment Session *(Madrid, Spain, June 5 to 12, 2007)*. Collect. Vol. Sci. Pap. ICCAT, 62(1): 97-239.

Anon. 2008b, Report of the 2007 ICCAT Albacore Stock Assessment Session *(Madrid, Spain, July 5 to 12, 2007)*. Collect. Vol. Sci. Pap. ICCAT, 62(3): 697-815.

Anon. 2009a, Report of the 2008 Yellowfin and Skipjack Stock Assessments *(Florianópolis, Brazil, July 21 to 29, 2008)*. Collect. Vol. Sci. Pap. ICCAT, 64(3): 669-927.

Anon. 2009b, Report of the 2008 Shark Stock Assessment Meeting *(Madrid, Spain, September 1 to 5, 2008)*. Collect. Vol. Sci. Pap. ICCAT, 64(5): 1343-1491.

Anon. 2009c, Report of the 2008 ICCAT Sailfish Data Preparatory Meeting *(Madrid, Spain, May 19 to 24, 2008)*. Collect Vol. Sci. Pap. ICCAT, 64(6): 1765-1832.

Anon. 2010a, Report of the 2009 ICCAT Working Group on Stock Assessment Methods *(Madrid, Spain, March 11 to 14, 2009)*. Collect. Vol. Sci. Pap. ICCAT, 65(5): 1851-1908.

Anon. 2010b, Report of the 2009 Inter-sessional Meeting of the Tropical Tunas Species Group *(Madrid, Spain, April 20 to 25, 2009)*. Collect. Vol. Sci. Pap. ICCAT, 65(2): 317-416.

Anon. 2010c, Report of the 2009 ICCAT Sailfish Stock Assessment Session *(Recife, Brazil, June 1 to 5, 2009)*. Collect. Vol. Sci. Pap. ICCAT, 65(5): 1507-1632.

Anon. 2010d, Report of the 2009 Inter-sessional Meeting of the Sub-Committee on Ecosystems *(Recife, Brazil, June 8 to 12, 2009)*. Vol. Sci. Pap. ICCAT, 65(6): 2209-2261.

Anon. 2010e, Report of the 2009 ICCAT-ICES Porbeagle Stock Assessments Meeting *(Copenhagen, Denmark, June 22 to 27, 2009)*. Collect. Vol. Sci. Pap. ICCAT, 65(6): 1909-2005.

Anon. 2010f, Report of the 2009 ICCAT Albacore Stock Assessment Session *(Madrid, Spain, July 13 to 18, 2009)*. Collect. Vol. Sci. Pap. ICCAT, 65(4): 1113-1253.

Anon. 2010g, Report of the 2009 ICCAT Atlantic Swordfish Stock Assessment Session *(Madrid, Spain, September 7 to 11, 2009)*. Collect. Vol. Sci. Pap. ICCAT, 65(5): 1-352.

Anon. 2010i, Record of the 2009 Species Group discussions on Atlantic bluefin tuna. Collect. Vol. Sci. Pap. ICCAT, 65(3): 1044-1051.

Arocha, F., Moreno, C., Beerkircher, L. Lee, D.W. and Marcano, L. 2003, Update on growth estimates for swordfish, *Xiphias gladius*, in the northwestern Atlantic. Collect. Vol. Sci. Pap. 55(4): 1416-1429.

Beerkircher, L., Arocha, F., Barse, A., Prince, E., Restrepo, V., Serafy, J., Shivji, M. 2009, Effects of species misidentification on population assessment of overfished white marlin *Tetrapturus albidua* and Roundscale spearafish *T. Georgii*. Endangered Species Research, Vol. 9:81-90, 2009.

Campana, S.E., Gibson, A.J.F., Fowler, M., Dorey, A. and Joyce, W. 2010, Population dynamics of Porbeagle in the northwest Atlantic, with an assessment of status to 2009 and projections for recovery. Collect. Vol. Sci. Pap. ICCAT, 65(6): 2109-2182.

Chang, F.C. and Yeh, S.Y. 2010. Standardized CPUE of South Atlantic albacore *(Thunnus alalunga)* based on Taiwanese longline catch and effort statistics dating from 1967 to 2008. Collect. Vol. Sci. Pap. ICCAT, 65(4): 1408-1420.

De Bruyn, P., Arrizabalaga, H., Ortiz de Zárate, V. and Palma, C. 2010, A preliminary update of the albacore tuna *(Thunnus alalunga)* stock assessment for the northern Atlantic Ocean using the integrated stock assessment model, Multifan-CL. Collect. Vol. Sci. Pap. ICCAT, 65(4): 1421-1436.

Hsieh, C.H., Chang, F.C. and Yeh, S.Y. 2010, Standardized northern Atlantic albacore *(Thunnus alalunga)* CPUE from 1967to 2008, based on Taiwanese longline catch and effort statistics. Collect. Vol. Sci. Pap. ICCAT, 65(4): 1390-1400.

ICCAT, 1987, Program of Enhanced Research for Billfish. *In* Report for Biennial Period, 1986-87, Part I. pp. 233-235.

ICCAT, 2009, Item 8 of the Proceedings of the 16th Special Meeting of ICCAT and *in* Appendix 10 to Annex 9 of the Proceedings. *In* Report for Biennial Period, 2008-09, Part I, Vol. 1: pp. 42 and 284-287.

ICCAT, 2010a, Report of the Meeting of Panel 2. *In* Report for Biennial Period, 2008-2009, Part II, Vol. 1: pp. 222-224.

ICCAT, 2010b, Suggested Rules and Procedures for the Protection, Access to, and Dissemination of Data Compiled by ICCAT. *In* Report for Biennial Period, 2008-09, Part II, Vol. 2: pp. 287-297.

ICCAT, 2010c, ICCAT Manual. Chapter 2, Description of Fisheries, Section 2.2.1 Sharks. pp. 249-281.

ICCAT, 2011, Secretariat Report on Statistics and Coordination of Research 2010, Appendix 1. *In* Report for Biennial Period, 2010-2011, Part I, Vol. 4, Secretariat Reports. *In press.*

Jansen, T., Degel, H., Vigneau, J. 2009, Definition of standard data exchange format for sampling, landings, and effort data from commercial fisheries. ICES Cooperative Research Report 296, 48pp.

Kell, L.T., De Bruyn, P., Soto Ruiz, M. and Arrizabalaga, H. 2010. Evaluation of Management advice for North Atlantic albacore: Linking Multifan-CL and FLR. Collect. Vol. Sci. Pap. ICCAT, 65(4): 1486-1497.

Prince, E.D., Luo, J., Goodyear, P., Hoolihan, J.P., Snodgrass, D., Orbesen, E.S., Serafy, J.E., Ortiz, M., Schirripa, M.J. 2010, Ocean scale hypoxia-based compression of Atlantic istiophorid billfishes. Fish. Oceanogr. Vol. 19, No. 6, pp. 448-462.

Shuford, R.L., Dean, J.M., Stequert, B., Morize, E. 2007, Age and growth of yellowfin tuna in the Atlantic Ocean. Collect. Vol. Sci. Pap. 60(1): 330-341.