INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

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INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

CONTRACTING PARTIES

(as of 31 December 2013)

Albania, Algeria, Angola, Barbados, Belize, Brazil, Canada, Cape Verde, China, Côte d'Ivoire, Egypt, Equatorial Guinea, European Union, France (St. Pierre & Miquelon), Gabon, Ghana, Guatemala, Guinea (Rep.), Honduras, Iceland, Japan, Korea (Rep.), Libya, Mauritania, Mexico, Morocco, Namibia, Nicaragua, Nigeria, Norway, Panama, Philippines, Russia, Sao Tomé & Principe, Senegal, South Africa, Sierra Leone, St. Vincent and the Grenadines, Syria, Trinidad & Tobago, Tunisia, Turkey, United Kingdom (Overseas Territories), United States, Uruguay, Vanuatu, Venezuela

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Panel No.	***PANEL MEMBERSHIP***	***Chair***
-1- Tropical tunas	Angola, Belize, Brazil, Canada, Cape Verde, China, Côte d'Ivoire, Equatorial Guinea, European Union, France (St. Pierre & Miquelon), Gabon, Ghana, Guatemala, Guinea (Rep.), Honduras, Japan, Korea (Rep.), Libya, Mauritania, Mexico, Morocco, Namibia, Nigeria, Panama, Philippines, Russia, Sao Tome & Principe, Senegal, Sierra Leone, South Africa, St. Vincent & the Grenadines, Trinidad & Tobago, Turkey, United States, Uruguay, Venezuela.	Côte d'Ivoire
-2- Temperate tunas, North	Albania, Algeria, Belize, Brazil, Canada, China, Egypt, European Union, France (St. Pierre & Miquelon), Guatemala, Honduras, Iceland, Japan, Korea (Rep.), Libya, Mauritania, Mexico, Morocco, Norway, Panama, St. Vincent and the Grenadines, Syria, Tunisia, Turkey, United States, Venezuela.	Japan
-3- Temperate tunas, South	Belize, Brazil, China, European Union, Japan, Mexico, Namibia, Panama, Philippines, South Africa, Turkey, United States, Uruguay.	South Africa
-4- Other species	Algeria, Angola, Belize, Brazil, Canada, China, Côte d'Ivoire, Egypt, Equatorial Guinea, European Union, France (St. Pierre & Miquelon), Gabon, Guatemala, Guinea (Rep.), Japan, Korea (Rep.), Mauritania, Mexico, Morocco, Namibia, Nigeria, Norway, Panama, Sao Tome & Principe, Senegal, South Africa, St. Vincent & the Grenadines, Trinidad & Tobago, Tunisia, Turkey, United Kingdom (Overseas Territories), United States, Uruguay, Venezuela.	Brazil

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	Chair
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CONSERVATION & MANAGEMENT MEASURES COMPLIANCE COMMITTEE	D. Campbell, United States (since 25 November 2013)
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STANDING WORKING GROUP TO ENHANCE DIALOGUE BETWEEN FISHERIES SCIENTISTS AND MANAGERS (SWGSM)	M. TSAMENYI. GHANA (since 25 November 2013)

ICCAT SECRETARIAT

Executive Secretary: MR. D. MESKI
Assistant Executive Secretary: DR. P. PALLARÉS
Address: C/Corazón de María 8, Madrid 28002 (Spain)
Internet: http://www.iccat.int - *E-mail:* info@iccat.int

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, 2012-2013, Part II (2013)"***, which describes the activities of the Commission during the second half of said biennial period.

This issue of the Biennial Report contains the Report of the 23rd Regular Meeting of the Commission (Cape Town, South Africa, November 18-25, 2013) 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.

The Report is 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. ***Volume 4*** 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.

MASANORI MIYAHARA
Commission Chairman

REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)
(Madrid, Spain - September 30-October 4, 2013)

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

(Madrid, Spain – September 30 to October 4, 2013)

1. Opening of the meeting

The 2013 Meeting of the Standing Committee on Research and Statistics (SCRS) was opened on Monday, September 30, at the Hotel Velázquez in Madrid by Dr. Josu Santiago, Chairman of the Committee. Dr. Santiago 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. The Executive Secretary noted that in recent years, the work of the SCRS has augmented in an unprecedented manner partly due to the increasing requests of the Commission and the perception by the general public that tuna stocks are depleted. This in turn has meant that the Secretariat has had a large workload this year providing support to the SCRS in those tasks traditionally developed by the Secretariat but also incorporating new tasks in the stock assessment process.

Mr. Meski pointed out that according with the ICCAT *Basic Texts*, national scientists should conduct most of the work of the SCRS. However, currently only 50% of CPC sent scientists to the inter-sessional meetings of the SCRS. This has meant that increasingly more work has to be done by the Secretariat and that some of this work is going beyond the role assigned to the Secretariat in the *Basic Texts*. The opening address of the Executive Secretary is attached as **Appendix 11**.

The Chair of the SCRS, Dr. Josu Santiago, thanked the Executive Secretary and appreciated his clear message. The Chair indicated that the SCRS have had around 15 different meetings in 2013 representing more than 85 days, in order to provide the best scientific advice to the Commission. He also noted that the increasing demand of advice requested by the Commission is translated into an enormous workload to both the SCRS and the Secretariat. He agreed that the role of the Secretariat in the SCRS is something to debate and recognized that the current workload (i.e., 85 days of meetings in 2013) for both scientists and the Secretariat would be difficult to maintain with the current human resources. Dr. Santiago pointed out that the SCRS Strategic Plan on Science currently developing, should provide the appropriate framework for this debate.

The Committee agreed on the need of reviewing the roles of CPC scientists and the scientific staff of the Secretariat and clearly defining them to avoid any potential confusion on those roles. The SCRS Chair indicated that when the Commission approved the position of the Population Dynamics Expert it was precisely to respond to the needs of the SCRS in the stock assessment process. He also referred to the reiterated SCRS recommendation that further additions to data management staff at the Secretariat should be made to address current and future demands, which are likely to increase further.

Finally, the Chair of the SCRS thanked Andres Domingo, John Nielson, Jean-Marc Fromentin, Thierry Frédou and Paul De Bruyn who are stepping down from their roles as SCRS rapporteurs, for their hard work. However, he was pleased to be able to say that they would still be valued colleagues within the SCRS. While those who are now stepping down have done a great job he acknowledged those coming in will do an equally good one. He was therefore pleased to welcome the new rapporteurs: Enric Cortes (U.S.A), Miguel Neves dos Santos (EU-Portugal), Sylvain Bonhommeau (EU-France), Mikihiko Kai (Japan) and Michael Schirripa (U.S.A).

The Chair concluded by asking for the collaboration and help of the SCRS for a successful meeting.

2. Adoption of Agenda and arrangements for the meeting

The Tentative Agenda was revised and adopted with some changes (attached as **Appendix 1)**. Stock assessments were carried out this year on North and South Atlantic Albacore (ALB) and Atlantic swordfish (SWO).

The following scientists served as rapporteurs of the various species sections (Agenda Item 8) of the 2013 SCRS Report.

Tropical tunas- General			D. Gaertner
YFT	-	Yellowfin tuna	C. Brown
BET	-	Bigeye tuna	D. Die
SKJ	-	Skipjack tuna	D. Gaertner
ALB	-	Albacore	H. Arrizabalaga, J. Ortiz de Urbina (Med.)
BFT	-	Bluefin tuna	C. Porch (West), J.M. Fromentin (East)
BIL	-	Billfishes	F. Arocha
SWO	-	Swordfish	M. Neves dos Santos (Atl.), G. Tserpes (Med.)
SBF	-	Southern bluefin	
SMT	-	Small tunas	N. Abid
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 25 Contracting Parties present at the 2013 meeting: Algeria, Angola, Brazil, Canada, Cape Verde, China, (P. R.), Côte d'Ivoire, European Union, France-St. Pierre & Miquelon, Ghana, Japan, Korea Rep., Morocco, Mexico, Namibia, Norway, Russian Federation, St. Tomé & Príncipe, Senegal, South Africa, Tunisia, Turkey, United States, Uruguay and Venezuela. The List of Participants at the Species Groups Meetings and the Plenary Sessions is attached as **Appendix 2**.

4. Introduction and admission of observers

Representatives from the following Cooperating non-Contracting Party, Entity, or Fishing Entity (Chinese Taipei), inter-governmental organizations (International Council for the Exploration of the Seas-ICES), and non-governmental organizations (Confédération Internationale de la Pêche Sportive- CIPS, Federcoopesca, Federation of Maltese Aquaculture Producers-FMAP, International Seafood Sustainability Foundation-ISSF, Marine Stewardship Council-MSC, Oceana, Pew Environment Group, The Ocean Foundation, and WWF Mediterranean Programme Office) were admitted as observers and welcomed to the 2013 SCRS (see **Appendix 2**).

5. Admission of scientific documents

The Secretariat informed the Committee that 182 scientific papers had been submitted at the various 2013 inter-sessional meetings.

Besides the scientific documents, there are 10 reports of inter-sessional meetings and Species Groups, 32 Annual Reports from the Contracting Parties, and non-Contracting Cooperating Parties, Entities and Fishing Entities, 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 which includes information on research activities carried out between December 2012 and September 2013. The report and tables summarize the fisheries data submitted in 2013, with general high reporting and on time for most CPCs. However, it was noticed that preliminary data submissions are becoming more prevalent in part due to compliance priority reasons. This implies many revisions, updates and incomplete data submission what augments the work of the Secretariat to have the complete data integrated before the SCRS Species Groups meetings. The Secretariat noted that during the meeting of the Sub-Committee on Statistics a proposal was presented to define guidelines for the Secretariat on the minimum data requirements for acceptance of data submissions. Details of this proposal are included in Addendum 2 to Appendix 8. In short, a two-filter stage will be applied in 2014, but while filter 1 will be used for acceptance of data (Task I, Task II and Tagging), filter 2 will be used in a testing way. For compliance purposes, only data from accepted data submissions will be reported.

The Secretariat also informed on both conventional and electronic tagging activities during last year. It was noted that almost all tagging activities are aimed towards bluefin tuna under the GBYP research program. Tagging of other species has diminished substantially in recent years. The Secretariat also reported on issues with tagging programs, such the low reporting of releases by CPCs that greatly reduce the usefulness of this tagging data for scientific purposes. This and other matters were also discussed by the Ad hoc Tagging Working Group and will be reported in Addendum 6 to Appendix 8. Other activities reported by the Secretariat included ICCAT publications issues, noting in particular: (a) an increase workload at the Secretariat for the publication of SCRS documents (*Collective Volume of Scientific Papers*), mainly due to lack of compliance with formats and to delays in submissions; and (b) a revision of the publication agreement with *Aquatic Living Resources* (ALR), a peer-review journal, as their recent editorial line change towards an ecosystem approach on fisheries management substantially restricts the options for publication of SCRS documents. The SCRS agreed to apply the guidelines for authors of SCRS documents more strictly and to accept only those documents for publication, and proposed seeking contact with other peer-review journals for publication. It was noted, however, that the quality of SCRS documents is not affected by the lack of peer review and authors still have the opportunity to submit their papers to any peer review journal they consider appropriate.

The Secretariat commented on the Secretariat staff's increasing work and participation in the scientific activities of the SCRS working groups. It was noted that the increasing requirements by the Working Groups, including the implementation of complex fisheries models that required considerable detailed data and preparation in advance, as well as the more active participation of the Secretariat staff during the evaluations. Although the Secretariat has hired a Population Dynamics Expert and a Bycatch Coordinator, following the SCRS recommendations, the increases in the number of stocks to assess and in the use of more complex stock assessment methods, has greatly increased the data management and data preparation by the Statistics Department. The SCRS agreed that this reflects the "cross-roads" at which the SCRS is, with an increase demand of activities from Commission requests as well as from the SCRS' need to use more complex and integrated analysis for most species stocks. The SCRS acknowledged that this additional work, plus the diminishing scientific participation of some CPCs in working groups, has transferred more responsibilities to the Secretariat. Different CPCs commented on the need to redefine the roles of the SCRS and the Secretariat in terms of the scientific support requested to the Secretariat and to reallocate the supporting human resources of the Secretariat accordingly. It was further commented that this review should be within the SCRS Strategic Plan schedule for 2014. Finally, the SCRS expressed its support for and congratulations to the work done by the Secretariat in 2013.

The Coordinator of ICCAT/Japan Data Management and Improvement Project (JDMIP) presented a report of the activities carried out in 2013 and supported by this program. This project continues to support observer and port sampling in Tema (Ghana) and the eastern Caribbean (Venezuela, Belize, Trinidad & Tobago), and training workshops in Sao Tome & Principe on data collection and statistics reporting of ICCAT species. This program has also made financial contributions towards the participation of scientists (18) from developing CPCs to SCRS meetings.

The CPCs expressed their gratitude to the assistance of the JDMIP to continue improving its sampling, training and statistics collection programs. It was also acknowledged the importance of the support provided to scientists from the developing CPCs for participating at SCRS meetings, increasing their contribution, experience and knowledge of the ICCAT objectives. SCRS and CPCs expressed the need for the continuity of this effort and support.

7. Review of national fisheries and research programs

In accordance with the format established in 2005 and revised 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).

Algeria

Algerian tuna and tuna-like catches registered for 2012 amount to approximately 387 tons for swordfish, 69 tons for bluefin and 1,667 tons for small tunas. An increase in swordfish productions for 2012 has been noted if we compare it to 2011.

Moreover, it should be noted that in 2012, two national purse seiner type tuna vessels measuring between 25 and 30 m have participated in the bluefin tuna fishing campaign. Catches taken in this fishing campaign amount to 69 t over 138 t authorised to be taken by one vessel only. The second vessel had an unsuccessful fishing trip.

A sample of nineteen (19) dead bluefin tuna fish were measured and their sex was determined on board the fishing vessel.

For swordfish (*Xiphias gladius*), size and weight samples were carried out at the landing ports and 307 fish were sampled.

As regards statistics, a harmonised monitoring and data collection device is operative at national level. Monitoring is carried out using vessel records, logbooks, catch reports which can be completed by on board observer programmes and particularly by the implementation of the VMS system for bluefin tuna fishing. These tools not only aim at identifying the group of vessels carrying out fishing activities, but also to evaluate the quantities landed.

Moreover, within the framework of the work carried out by the *Centre National de la Recherche et du Développement de la pêche et de l'Aquaculture (CNRDPA)*, an area of research on the study and monitoring of highly migratory species was registered, in particular concerning the monitoring of juvenile bluefin tuna growth.

Angola

The scombrid species caught along the Angolan coast are divided into two major groups, of which the big tunas that include albacore (*Thunnus alalunga*), bigeye (*Thunnus obesus*) and yellowfin (*Thunnus albacares*) and small tunas, which include skipjack (*Katsuwonus pelamis*), little tunny (*Euthynnus alletteratus*), Spanish mackerel (*Scomberomorus tritor*), Atlantic bonito (*Sarda sarda*) and frigate tuna (*Auxis thazard*). As target species, they are caught by the industrial vessels, using longline as the gear, and operating in a joint venture regime with Angolan companies. The artisanal fishery also makes an important contribution to the catches, using gill net, hook and line and traps. There are also insignificant catches from the industrial and semi-industrial fishing using bottom trawl and purse seine. From 2009 to 2012, the higher catches of tuna species were registered in 2010 (10,353 tons) and the lowest in 2011 (6,448 tons). Important catches are from the artisanal fishery, but a significant increase was registered in the catches from the industrial fishery in 2012 (4,689 tons), dominated by bigeye tuna (*Thunnus obesus*) (4,069 tons). During this year, the lowest catches of tunas were registered in the time-series from the artisanal fishery (3,656 tons), mainly comprised of little tunny (*Euthynnus alletteratus*) 1,903 tons). The catches of tuna registered as bycatch were insignificant (< 20 tons per year). Two species are mainly caught as bycatch: *Euthynnus alletteratus* and *Katsuwonus palamis*. Biological sampling of small tunas is carried out at the Fisheries Research Centre of Benguela, while the catches are from the National Directorate of Fisheries, the National Institute of Fisheries Research and the Institute of the Artisanal Fisheries.

Brazil

In 2012, the Brazilian fleet fishing for tuna and tuna like fishes consisted of 229 vessels, registered in 10 different ports. The chartered vessels, equal to 5, represented 2.2 % of the fleet. The Brazilian catch of tunas and tuna-like fishes, including billfishes, sharks, and other species of minor importance (e.g. wahoo and dolphin fish), was 45,180 t (live weight), representing a decrease of more than 13 % if compared with the catches of 2011, when more than 52,000 t was produced. The majority of the catch was taken by baitboats (33,111 t; or 73,3 % of total catch), with skipjack tuna being the most abundant species (30,872.23 t), representing 68.3 % of the total Brazilian tuna and tuna like fishes production and 93.2 % of the baitboat catches. Catches coming from longline reached 9,288.08 t, the second largest catch, representing 20.6 % of the total catches, with swordfish, blue shark and yellowfin tuna representing more than 78 % of longline catches, and that for handline reached 1,259.03 t, which represents 2.8 % of the total catches. About 4% of the Brazilian catches, around 1,900 t, resulted from the fishing activities of small scale fishing boats from 10 to 20m (LOA), that had been previously annotated in 2011, as a result of a revision of the Brazilian Registry of fishing vessels, done in conjunction with the extension of vessel monitoring system to all vessels equal or larger than 15m (LOA). The fleet is based mainly in the southeast coast, targeting a variety of species with different fishing gears, including longline, handline, trolling and other surface gears. The main target species of this fleet in 2012 was, as usual, the dolphin fish, which accounted for about a third of the catches. The majority of these small scale tuna vessels is based at Itaipava, Espírito Santo State, Southeastern Brazil, where 423 boats were registered and this figure might appear a huge increase of tuna fleets and fishing vessels in Brazil from the past years, which steep raised the number of boats from around 200 to more than 600, whilst deserves a better characterization and in some extend others methodological data analysis treatment. Data collection aiming at catch-at-size and catch-at-age analysis continues to be done, although the number of fish measured sharply decreased. Research on monitoring of incidental catches of seabirds and sea turtles in the longline fisheries was carried on, as well as research on mitigation measures to avoid catches of these species.

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 2012 was 488.8t which includes an 86.5t transfer from Mexico. A total of 659 licensed fishermen were active (i.e. licenses that had landings) in the directed bluefin fishery using rod and reel, handlines, tended lines, electric harpoon and trap nets to harvest 428.3t. An additional 48.2t was harvested as bycatch the pelagic longline fleet in the swordfish and the other tunas fishery. There was also 7.8t from assumed mortalities in tagging studies and in the charter boat and catch and release fisheries and observed dead discards of 3.1t. Each fish harvested in the directed fishery or as an incidental bycatch 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 2012 was 1,548.1t with landings reaching 1488.5t. The tonnage taken by longline was 1391.1t while 97.3t were taken by harpoon. Of the 77 licensed swordfish longline fishermen, 47 were active in 2012 with a number of these vessels (17) fishing with harpoon or harpoon and trolling gear only. Only 34 of 1,203 harpoon licenses reported swordfish landings in 2012.

The other tunas (albacore, bigeye and yellowfin) are at the northern edge of their range in Canada and are harvested from May through October. Canadian catches of these other large pelagic species are an integral component of the Canadian fishery. In 2012, other tunas accounted for approximately 13% of the commercial large pelagic species landed.

All commercial vessels fishing pelagic species are required to hail out their intention to fish prior to a trip and hail in harvests from sea. 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 to weigh out the landing, and log record data must be submitted by each fisherman whether a fish is harvested on a trip or not. There were no landings of tuna or tuna like species at Canadian ports by foreign vessels in 2012.

Canada continues to support and is active in research that improves the basic inputs and approaches of the Atlantic bluefin and shark stock assessments. Canadian scientists continue studies on the age determination and natal origin of bluefin tuna caught by the rod and reel fisheries conducted in the Gulf of St. Lawrence and off Nova Scotia’s Atlantic coast. Additional studies are comparing trends in primary productivity and ocean climate with the abundance and distribution of bluefin tuna and forage species in the southern Gulf of St. Lawrence. Efforts are also being made to improve the length-weight and dressed to round conversions that allow landed dressed weights to be identified with an age through the use of a length based age slicing routine. For sharks, research has focused on PSAT tagging, with focus in recent years on shortfin mako and porbeagle shark movements and post-release mortality.

Cape Verde

Cape Verde faces natural structural constraints which are linked to its volcanic origin, its insular and archipelago nature and its location in the Sahel region. Given the country's archipelagic nature, with an Exclusive Economic Zone (EEZ) estimated at 734 265 km^2 and, by a small surface area of only 4,033 km^2, the successive governments of Cape Verde have continuously attempted to benefit from the potential of the sea area and the resources for the socio-economic development of the country.

Within this context, fishing has always been considered as one of the most important sectors as regards the socio-economic development of the country providing animal protein for people, contributing to the generation of jobs and the balance of payments through export, and working as a factor of commitment for the population.

The total preliminary catch in 2012 amounted to 13,200 t, taken mainly by purse seine in the industrial or semi-industrial fishery and by hand line in the artisanal fishery. Fishery resources are exploited by the artisanal fleet, including 1,239 vessels (2011 recount), of which 72% have an engine and the rest use oars and measure between 3,5 to 6,5 m with a lack of security measures. The semi-industrial fleet is composed of a heterogeneous group of vessels, the majority measuring 6 to 25 meters, including 5-14 fishermen. In 2011, the number of industrial or semi-industrial vessels registered by the maritime authority, amounted to 91.

In Cape Verde waters, there are a lot of shark species, however shark fishing has not been carried out systematically due to different factors, such as population preference, species biology, lack of fishing equipment, vessel security, as well as a weak catch profitability. Their catch data is the result of research surveys, by-catch taken by the national fleet, attempts of national owners to profit from this type of fishery and reported catches such as by-catch species, by vessels operating in Cape Verde's EEZ, through fishing agreements. In the artisanal fishery, the catch proportion of sharks did not exceed 0.3% of total landings at national level, which indicates that this is the amount of by-catch in the fishery directed at other resources. As concerns the industrial fishery, no licenses were granted and there were no reported landings.

China

The number of vessels from China operated in the Atlantic Ocean decreased from 30 in 2011 to 24 in 2012. The longline was the only fishing gear used to fish tunas, tuna-like species and sharks and the target species were still bigeye tuna and bluefin tuna. The total catch was 4241.71 t (in round weight), 755.39 t lower than that in 2011 (4997.1 t) and 2631.49 t lower in 2010 (6873.2 t). The catch of bigeye tuna and bluefin tuna amounted to 3231.2 t and 36.0 t in 2012, respectively. The catch of bigeye tuna accounted for 76.1% of the total in 2012 which was 74.4% in 2011, however, it was 489.0 t lower than that in 2011 (3720.2 t) and 2257.8 t lower in 2010 (5489.0 t). Yellowfin tuna, swordfish and albacore tuna were taken as bycatch. The catch of yellowfin tuna decreased from 346.4 t in 2011 to 264.1 t in 2012. The catch of swordfish was 374.5 t, with a little increase compared with previous year (322.2 t in 2011). The catch of albacore tuna was 82.1 t, which was down 54.7% and 65.8% respectively in contrast to 2011 and 2010. 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 PRC. PRC has carried out a national scientific observer program for the tuna fishery in ICCAT waters since 2001. Two observers have been dispatched on board two Chinese Atlantic tuna longline fishing vessels covering the area of N5°00'~N16°55', W29°24'~W42°02', N5°22'~N17°26', W26°33'~W35°35'(targeting bigeye tuna), N49°31'~N55°32', W16°12'~W32°26' and N50°02'~N56°01', W17°01' ~W33°18' (targeting bluefin tuna) since September 2012. Data of target species and non-target species (sharks, sea turtles, especially) were collected during the observation.

Côte d'Ivoire

The tuna resources of Côte d'Ivoire are mainly exploited by an international fleet of large French and Spanish tuna vessels within the framework of a fishing agreement between Côte d'Ivoire and the European Union. The landings of these tuna vessels at the fishing port of Abidjan are monitored by the IRD of France and the IEO of Spain, in collaboration with the *Centre de Recherches Océanologiques-CRO* (Center for Oceanographic Research). Besides this international fleet, Côte d'Ivoire has another fleet whose catches are significant. In 2012 tuna catches amounted to 1,325 t. Other species are insignificant compared to the amount of tuna species.

As regards artisanal fisheries, 11,765.963 t of tuna species were caught compared to 222,438 t of associated species caught and 46,619 t for sharks.

In artisanal and industrial fishing, skipjack is the dominant species and it represents more than 2/3 landed catches in Côte d'Ivoire.

Considering the importance of these tuna species for the national economy and concerned with a better management of the existing stock, knowledge on the biology and re-enforcement of the staff carrying out surveys is essential.

Côte d'Ivoire will now be taking part in the statistical monitoring program as it has a tuna purse seiner flying Ivorian flag since the end of 2011.

European Union

Nine countries of the European Union carry out tuna fishing in the Atlantic and Mediterranean, following the accession of Croatia to the European Union in 2013. The EU fleets caught 200,000 t of tuna and billfish in 2012, *i.e*., almost 40% of the total ICCAT catches. Catches taken in the recent years have been stable for 3 years, following the increasing catches of tropical tunas and the return to the Atlantic, since 2008, of several purse seiners which operated in the Indian Ocean. Thus, these catches remain well below 300,000 t that were landed in the early 1990s by the same EU countries and a reduction of catches in 2011: Spain (130,000 t), France (40,000 t) and Portugal (12,500 t).

The major species caught by the EU countries in 2012 were skipjack with a strong increase in catches (83,000 t.) probably due to the current high price of this species, yellowfin (38,000 t), bigeye (21,000 t), albacore (24,500 t), and swordfish (18,500 t). All the classical fishing gear are operative in the European Union: purse seiners, baitboats, longliners, hand lines, troll, driftnets, harpoons, mid-water trawl, traps and sport fishing. Since 2001, the European Union finances, to a large extent (at a 50% rate), the collection of biological data of all its member States and some research on tunas and minor species of various tuna fisheries. Biological sampling of tropical tuna catches by European purse seiners have been carried out in the Abidjan canneries and, since 2008, in the artisanal fisheries of the French Antilles. These statistics also serve to estimate the so-called *faux poisson* catches, all the species that are landed at the port of Abidjan by the international purse seiners destined for the local market.

Task I and II statistical data submitted to ICCAT in 2012 by the EU countries are generally complete and comply with ICCAT regulations. It should be noted that the EU also supports observer programmes on various fleets. Tropical purse seiners with around 10% of the fishing effort is monitored by observers, and estimation of discards observed have been submitted to the SCRS. Besides, 100% of the fishing days were observed on purse seiners fishing bluefin tuna in the Mediterranean. Also noteworthy is the considerable financial support again in 2011 and 2012 from the EU towards the ICCAT GBYP intensive research on bluefin tuna, a programme in which scientists from EU countries continue to play a very active role. Besides, the European Commission has decided to carry out an extensive project on the historical catches of high seas sharks.

The active participation of European scientists at all the ICCAT scientific meetings and the large number of 2013 SCRS documents, co-authored by EU scientists covering all ICCAT research areas and species, was also noted. EU countries also carry out extensive research and thesis's fundamentally on tunas, for example on ecosystems, by-catch reduction, tuna/environment relationships, tuna behaviours, FADs, larvae and juvenile bluefin tuna reproduction and production, protected marine areas used for tuna resources, decrease of unwanted by-catch, offshore pelagic ecosystem modelling, etc. The participation of researchers from EU countries is active for example within the scope of the CLIOTOP/GLOBEC program which has extensive objectives for its research on matters regarding tuna, which is quite multidisciplinary and global, and which is aimed at carrying out improved modelling of the sustainable exploitation of the tuna resources based on the environment and the ecosystems. Some researchers of several countries of the EU have also played a very active role in carrying out research for the GBYP programme, in particular on biology.

France (St. Pierre & Miquelon)

The total amount of catches taken from the ICCAT quotas allocated to France (St. Pierre & Miquelon - SPM) amounts to 0 tons of tuna and tuna-like species for 2012. It should be noted that 2012 was marked by ongoing important technical problems as regards the vessel in 2011, which prevented the development of the tuna fishing campaign; thus, tuna catches in 2012 were null. The quotas allocated to France (on behalf of St. Pierre & Miquelon) only permitting a local boat owner to operate one vessel, the French tuna and tuna-like catches are normally caught by a longline vessel measuring 28 metres. This vessel, purchased by a boat owner from Saint Pierre sails under French flag since March 9, 2011 to exploit the French tuna quotas (North swordfish mainly). Fishing is regulated by issuing licenses. Vessels are required to report catches and can also occasionally embark a controller.

Ghana

The tuna industry in Ghana comprises skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*). Twenty (20) baitboats, and 17 purse seiners that are currently fishing within the EEZ of Ghanaian coastal waters and beyond exploit these tuna species amongst other minor tuna-like species such as the black skipjack (*Euthynnus alletteratus*). During the year under review, skipjack catches were the highest (77%), followed by yellowfin (12%), bigeye (4%) and other tuna-like species including black skipjack (7%), respectively.

Both fleets employ fish aggregating devices (FADs) in fishing and collaborate extensively sharing their catch during fishing operations. Over 80% of catches are conducted off FADs. A total catch of 75329.40 metric tons (t) were landed in 2012, a decrease of approximately 2500 t over the year 2011.

Recent improvements in sampling, coupled with the provision of more logbook information from the fishery, have contributed to a better understanding of the spacio-temporal distribution of the species. It is envisaged that further synthesis of the database on Ghana since 1980-2012 would give a clear sampling strategy to improve the catch and species composition of the entire catch (Task II) in relation to innovations observed in the fishery. Completion of revision in Ghana's Task II in 2013 by experts would enable the assessment of tropical species be carried out with minimal assumptions.

An observer programme was organized in 2012 on board 12 purse seine vessels with the aim of training officers on proper methods of estimating catches and filling out of information in logbooks. The programme was also conducted to estimate the proper species composition of the catch.

Beach sampling of the billfishes continued off the western coast of Ghana from artisanal drift gill operators with virtually low catches of the swordfish and white marlin.

Japan

Longline is the only tuna-fishing gear deployed by Japan at present in the Atlantic Ocean. The final coverage of the logbook from the Japanese longline fleet has been 90-100 % before 2011. The current coverage for 2012 is estimated to be about 84%. In 2012 fishing days were 18,700, which was 72% of average value in recent ten years. The catch of tunas and tuna-like fishes (excluding sharks) is estimated to be about 28,000 t, which are about 98 % of the past ten years average catch. The most important species was bigeye representing 53% of the total tuna and tuna-like fish catch in 2012. The next dominant species was yellowfin occupied 18% in weight and third species was albacore (12%). Observer trips on longline boats in the Atlantic were conducted and total of about 580 fishing days were monitored. In addition to the logbook submission mentioned above, Fisheries Agency of Japan (FAJ) has set catch quotas for western and eastern Atlantic bluefin as well as for northern, 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) by radio or facsimile. All Japanese longline vessels operating in the Convention area has been equipped with satellite tracking devices (VMS) onboard.

Korea (Rep.)

In 2012, 16 Korean longliners were engaged in fishing for tuna and tuna-like species in the Atlantic Ocean. The total catches were 3,294 metric tons (t), which declined by 28.6% from the previous year. Bigeye tuna, yellowfin tuna and albacore dominated in the catches, with 1,908 t, 498 t and 289 t, respectively. There were 65 t of southern swordfish caught, of which 23 t were discarded and all northern swordfish were discarded. The catches of shark species amounted to 447 t. The fishing area was the same as in previous years, which is the tropical area of the Atlantic Ocean (20ºN-20ºS, 10ºE-60ºW) throughout the year, from January to December. Two observers were deployed onboard a longline vessel for the period from January to February and in another period from October to December, 2012. Observer coverage was about 3.3% in terms of effort (number of hooks). In 2012, one Korean purse seiner caught 77 t of Atlantic bluefin tuna. The Fisheries Information and Data Reporting Act was revised and put into effect from 5 December 2012. It includes the data collection and reporting requirements recently adopted by the tuna RFMOs for discards/releases and bycatch mitigation, etc. for target species as well as bycatch species. In line with the Act, the NFRDI developed a program able to monitor data collection, and crosscheck the catches from different sources and manage reporting the data in a timely and accurate way.

Morocco

During 2012, tuna and tuna-like catches amounted to 8,224.4 t, *i.e*. a decrease of around 9.5 % as regards to volume.

Bluefin tuna catches amounted to 1,223 t. Swordfish catches amounted to 1,572 t in 2012, which represents a decrease of around 13% compared to 2011. This reduction was mainly due to the prohibition of FADs. Bigeye catches have remained stable at around 300 t. Yellowfin catches have declined by 77% compared to the preceding year and have not exceeded 55 t. Provisional skipjack landings amounted to 2,267 t, a slight increase of 5% compared to 2011.

Small tuna catches amounted to 1,651 t, of which 85% were frigate tuna and plain bonito. As regards sharks, their catches amounted to 1,011 t of which 40% were shortfin mako. These catches constitute a small decrease of 6% compared to 2011.

As regarding scientific research, 2012 was marked by the active participation of Morocco through the INRH, in the ICCAT Atlantic-wide Bluefin Tuna Research Programme (ICCAT/GBYP), and this through the following actions: 1) Ongoing collection of size data (500 fish sampled in 2012); 2) collection of biological and genetic samples necessary for the study of bluefin tuna growth and structure, including otolithes, spines and muscles; 3) Participation in the electronic bluefin tagging programme, coordinated by ICCAT/GBYP, on board the Moroccan trap « Essahel ».

Mexico

Yellowfin tuna fishing (*Thunnus albacares*) in the Gulf of Mexico is carried out with the use of medium sized longline vessels. Besides catching the target species in this activity, other species are also caught incidentally, such as: skipjack tuna (*Katsuwonus pelamis*), bigeye tuna (*Thunnus obesus*) Atlantic bluefin tuna (*Thunnus thynnus*), sharks and swordfish, among others. The regulatory legal framework which regulates this fishery includes the General Law on Sustainable Fisheries and Aquaculture (*Ley General de Pesca y Acuacultura Sustentables, LGPAS*), as well as the Official Mexican Regulation which regulates the use of the tuna species caught with longline vessels in waters under Federal jurisdiction of the Gulf of Mexico and the Caribbean Sea (NOM-023-PESC-1996). This publication will be updated, incorporating the regulations adopted by the International Commission for the Conservation of Atlantic Tunas (ICCAT) clearly and concisely. The Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food of Mexico (SAGARPA) through the National Fisheries Institute (INAPESCA) is responsible for developing scientific research of these fishery resources, as well as being responsible of research and collection of statistics on longline tuna fishing in the Gulf of Mexico. Moreover, through the National Commission of Aquaculture and Fisheries (CONAPESCA), it is responsible of implementing policies, programmes and regulations which bring about and facilitate sustainable and competitive development of the fishing and aquaculture sector of the country.

Norway

There were no catches of Atlantic bluefin tuna (*Thunnus thynnus*), Atlantic swordfish (*Xiphias gladius*) and Atlantic bonito (*Sarda sarda*) in Norway in 2012. Norway continuously works on historical data on tuna and tuna-like species and aims to put the data on these species into an ecosystem perspective. Norway participated at the SCRS annual science meeting in 2012.

Russian Federation

The fishery. In 2012 and 2013 a specialized (seine net) tuna fishing fleet of the Russian flag did not carry out any operations. In 2012 trawling vessels caught 717 t of tuna of 4 species and 850 t of Atlantic bonito as a by-catch in the central-East Atlantic. In the first half of 2013, the trawling vessels caught 785 t of tuna of 3 species and 28 t of Atlantic bonito.

Scientific research and statistics. In 2012, Federal State unitary enterprise AtlantNIRO observers collected biological and fishery material on tunas onboard trawlers in the central-East Atlantic (area SJ71 according to ICCAT classification). Fish length and weight were measured, fish sex, gonads maturity stages and stomach fullness indices were determined. Species of the group “Small Tunas” occurred in trawls as a by-catch, from a few individual specimens up to a few dozen. Data on frigate tuna, bullet tuna, Atlantic black skipjack and

Atlantic bonito were collected from 3156 specimens for length measurements and 737 specimens for biological analyses.

Senegal

In 2012, the Senegalese industrial fishery was comprised of six baitboat vessels that targeted mainly yellowfin *(Thunnus albacares),* bigeye *(Thunnus obesus)* and skipjack *(Katsuwonus pelamis*) and two longline vessels targeting swordfish (*Xiphias gladius*). Besides, part of the artisanal fishery (hand line, troll and purse seine) and the sport fishery is directed at billfish (marlins, swordfish and sailfish) and small tunas (Atlantic black skipjack, Atlantic bonito, frigate tuna, etc.). In 2012 the total Senegalese baitboat catches were estimated at 6,181 t (1,645 t of yellowfin, 4,276 of skipjack, and 225 t of bigeye). Catches increased slightly compared to 2011 (6,118 t). This increase is related to yellowfin catches. In 2012, longline catches were estimated at 410 t (312 t in 2011). Catches are mainly comprised of swordfish, sharks and blue marlin. As regards artisanal fisheries, catches of small tunas and tuna-like species in 2012 amount to 5,542 t. Catches decreased as compared to 2011 (9,064 t). Regarding sport fishing, catches are estimated at 180 t in 2012 with a fishing effort of 1,428 trips.

Constant monitoring of tuna fishing activities is always guaranteed by the team placed at the port of Dakar by the *Centre de Recherches Océanographiques de Dakar Thiaroye (CRODT).* The work consists in the collection of catch and fishing effort statistics. This work is completed with the information of various sources (factories, boat owners, Fishery Directorates, Customs, etc.). Multi-specific samples are also carried out in the artisanal and industrial fishery. With the funds of the Enhanced Research Programme for Billfish (ERBP) catch, effort and size sampling of billfish has increased in the major landing centres of the artisanal fishery.

South Africa

The South African tuna and billfish resources are exploited by baitboat and longline methods. In 2012 a slightly increased catch of 3,478 t of juvenile and sub-adult albacore (*Thunnus alalunga*) and a reduced catch of 141 t of yellowfin tuna (*Thunnus albacares*) were caught in the ICCAT region by 129 baitboat vessels. The South African flagged longline vessels mainly target swordfish (*Xiphias gladius*) in the ICCAT region, whilst the Japanese foreign flagged vessels target yellowfin and bigeye tuna (*Thunnus obesus*) with effort focused in the Indian Ocean. A total catch of 50 t of swordfish, 31 t of bigeye and 12 t of yellowfin were caught by 12 vessels in the ICCAT region. Southern bluefin tuna (*Thunnus maccoyii*) are not generally targeted because of the minimal quota granted by CCSBT, thus landings totalled 79 t in 2012. Albacore forms the basis of the baitboat fleet and swordfish the basis of the local longline fleet, and reduced catches of these two species over the last 5 years has seen the local vessels begin to struggle to maintain viable operations in their sectors. Six local longline vessels continue to target blue sharks (*Prionace glauca*) and shortfin mako sharks (*Isurus oxyrinchus*), landing 158 t and 92 t, respectively. Strategies to reduce shark targeting will be implemented from 2014. The necessity to conduct research into the stock origin and level of mixing of tunas and swordfish between the Atlantic and Indian Oceans is a high research priority in South Africa.

Tunisia

The management of tuna fishing is regulated by national regulations and ICCAT recommendations.

Within the framework of the implementation of ICCAT Recommendations, and in particular Rec. 12-03, Tunisia has reduced its fishing capacity in 2012 to 21 vessels; tuna vessels have been reduced from 42 vessels in 2010 to 21 vessels in 2012, *i.e.* a 50% reduction rate. Similarly, an individual quota allocation system for catching vessel was applied.

In 2012, the collection of statistics on bluefin tuna is carried out by the documents established pursuant to Rec. 12-03, the observer programme on board tug vessels (size and weight samples at the time of catch) and in the fattening farms (size and weight samples at the time of caging and harvesting).

Likewise and in accordance with Rec. 10-10, the competent authority, supported by the research has covered 5% of swordfish and tuna catch vessels by scientific observers. The information on discards and by-catch did not include seabirds, turtles or marine mammals during fishing operations. However, the amount of dead bluefin tuna during transfer operations and in fattening farms (42 t) has provided biological material for studies related to the reproduction and growth of bluefin tuna and for the development of statistical documents for Task II.

It should be noted that research studies have mainly focused on bluefin tuna. Research and surveys, as well as a management plan on swordfish and small tunas, is ongoing. Tunisia, however, has little information on sharks.

Turkey

During the course of 2012, the total catch of tuna and tuna-like fishes amounted to 38,993 t. In 2012, Turkey's total catch of bluefin tuna, albacore, Atlantic bonito and swordfish were 535.5 t, 61.7 t, 35,764.2 t, and 79.7 t, respectively. The entire bluefin tuna catch was caught by purse seiners, the majority of which have an overall length 35-62 meters. The fishing operation was conducted intensively off Antalya Bay in the south of Turkey and in the Eastern Mediterranean region. The bluefin tuna catch was started in May and finished in early June.

Uruguay

Catches have reduced in 2012, mainly due to the albacore quota limitations that Uruguay had until that year. It is estimated that catches will increase from 2013, returning to historical values. However, research was developed through the observer programme of the tuna fleet, as well as the DINARA research vessel. Conventional and satellite tagging was carried out for various species, as well as studies on genetics and biology among others and there was great participation in the various SCRS groups, in particular, in the albacore swordfish and sea turtle assessments. Uruguayan scientists collaborate with the ICCAT Manual in the chapters on fishing gear and species. In 2012, the Agreement of the Port State Control was ratified, all the recommendations of the Commission were adopted and new conservation measures for sharks and sea turtles were developed.

Venezuela

In 2012, the Venezuelan fleet was comprised of the following: 70 longliners, 7 purse seiners and 6 baitboats. 35 artisanal vessels were also recorded using driftnets in the central coast of Venezuela. Tuna and tuna-like landings from the Atlantic Ocean amounted to 8,128 t this year. 90.6% of these are represented by tunas, the remaining 9.4% by tuna-like species. The majority of the landings (64.6%) come from the purse seine fishery, 11.6% from baitboat, 19% from longline and 4.8% from the artisanal fisheries. These statistics are gathered from the Socialist Institute of Fisheries and Aquaculture (INSOPESCA) by means of a logbook collection programme at the landing and multi-specific landing ports. Moreover, from 2011 the National on board Observers Programme of Venezuela (PNOB) is established and aims at monitoring at least 5% of the total annual campaigns by fishery. National and international institutions, such as INIA, University of Oriente and ICCAT collaborate in the development of research. With the contribution of the Venezuelan Enhanced Research Program for Billfish, the daily monitoring of billfish landings and other large pelagics in the community of Playa Verde, in the Central Coast is ongoing; the collection of biological samples of white marlin and sailfish is maintained, as well as longbill and roundscale spearfishes for the studies of stock differentiation and three sport fishing tournaments were monitored. Under the framework of the ICCAT/Japan Data Management Improvement Programme, Venezuela applies an alternative monitoring method of the offshore artisanal fleet since 2011 which operates with the pelagic longline system in the ports of Juan Griego, Nueva Esparta state and Morro de Puerto Santo, in Sucre state. Recently measures were taken to regulate the maximum allowable catch quota of albacore (*Thunnus alalunga*), starting with discards in the second semester of 2013. Since the Resolution where technical management measures regulating catch, exchange, distribution, trade and transport of sharks in 2012 was published, catches of silky shark (*C.falciformis*), hammerhead shark (*Sphyrna spp*), oceanic shark (*C. longimanus*) and bigeye thresher sharks (*Alopias superciliosus*), were prohibited. Venezuela continues to apply control and surveillance measures of the technical management measure to regulate fishing and trade of the families Istiophoridae and Xiphiidae species throughout the entire national territory.

— ***Cooperating Parties, Entities and Fishing Entities***

Chinese Taipei

In 2012, the number of authorized fishing vessels was 134 with 75 targeting bigeye tuna and 59 targeting albacore, and the total catch of tuna and tuna-like species was about 30,500 t. The most dominant species was albacore accounting for 45% of the total catch in weight, and the following species was bigeye tuna accounting for 35% of the total catch. In 2012, there were 31 observers placed on fishing vessels in the Atlantic Ocean, and the observer coverage was as set by ICCAT. The research programs conducted by scientists in 2012 included the researches on CPUE standardizations and assessments of bigeye tuna, yellowfin tuna, albacore, white marlin and sharks; effects of climate variability on albacore; the estimation of historical catches for dominant sharks; and the mitigation research on seabirds. Besides, we conducted a pilot program on reducing the incidental catch of sea turtles by tuna longline vessels in 2012-2013, which compared the harvest rate of using 18/0 circle hooks with J tuna hooks. The research results were presented at the inter-sessional working group meetings and regular meetings of SCRS. As for the reporting obligation, the related statistical information was submitted to the ICCAT Secretariat within the required timeframe, including data on fleets characteristics, Task I, Task II, size, information on the bycatch of sea turtle collected by our observer programs and the report of Chinese Taipei's scientific observer programs.

8. Executive Summaries on species

The Committee reiterated that in order to achieve a more rigorous understanding of these Executive Summaries from a scientific point of view, the previous Executive Summaries should be consulted, as well as the corresponding Detailed Reports which are published in the *Collective Volume of Scientific Papers.*

The Committee also pointed out that the texts and tables of these Summaries generally reflect the information available in ICCAT immediately prior to the SCRS plenary sessions, since they were prepared during the meetings of the Species Groups. Therefore, the catches reported to ICCAT during or after the SCRS meeting cannot be included in these Summaries.

8.1 YFT – YELLOWFIN TUNA

A stock assessment for yellowfin tuna was conducted in 2011, at which time catch and effort data through 2010 were available. The catch table presented in this Executive Summary **(YFT-Table 1)** has been updated to include reported catches through 2012, including historical revisions to Ghanaian catches recently adopted by the Committee. Readers interested in a more complete summary of the state of knowledge on yellowfin tuna should consult the detailed report of the 2011 ICCAT Yellowfin Tuna Stock Assessment Session (Anon. 2012c).

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

The Tropical Tunas Work Plan **(Appendix 4)** 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. This assumption is based upon information such as observed transatlantic movements (from west to east) indicated by conventional tagging and longline catch data that indicates yellowfin are distributed continuously throughout the entire tropical Atlantic Ocean. However, movement rates and timing, routes, and local residence times remain highly uncertain. In addition, some electronic tagging studies in the Atlantic as well as in other oceans suggest that there may be some degree of extended local residence times and/or site fidelity. 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. Males are predominant in the catches of larger sized fish (over 145 cm), which could be explained if females experience a higher natural mortality rate (perhaps as a consequence of spawning). On the other hand, females are predominant in the catches of intermediate sizes (120 to 135 cm), which could support a hypothesis of distinct growth curves between males and females, with females having a lower asymptotic size (140 cm) than males (150 cm). Recent results from studies in the Indian Ocean tend to support this latter hypothesis. These uncertainties in both natural mortality and growth have important implications for stock assessment.

Growth rates have been described as relatively slow initially, increasing at the time the fish leave the nursery grounds; this characterization is supported by results size frequency distributions as well as from tagging data. Nevertheless, questions remain concerning the most appropriate growth model for Atlantic yellowfin tuna; this discrepancy in growth models could have implications for stock assessments.

The younger age classes of yellowfin tuna (40-80 cm) exhibit a strong association with FADs (natural or artificial fish aggregating devices/floating objects). 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

Overall Atlantic catches declined by nearly half from the peak catches of 1990 (193,539 t) to the lowest level in nearly 40 years (100,000 t) in 2007, although catches have increased by about 10% from that level in recent years. A provisional 108,343 t was estimated for 2010 at the time of the assessment; 109,989 t is currently reported for 2010. The reported catches for 2012, as of the SCRS Plenary session, are 101,866 t.

In the eastern Atlantic, purse seine catches declined by 60% from 128,729 t in 1990 to 51,207 t in 2007, but then increased by about 32% from that level to 67,414 t in 2012 **(YFT-Table 1; YFT-Figure 2)**. Baitboat catches declined by more than half from 1990 to 2007 (from 19,648 t to 8,899 t), and have since fluctuated at about that level. Longline catches, which were 10,253 t in 1990, have fluctuated since between 5,790 t and 14,638 t and were 13,437 t in 2007 (a 30% increase from 1990), but have declined since to a level of 5,565 t in 2012.

In the western Atlantic, purse seine catches (predominantly from Venezuela) declined by more than 90% from a peak in 1994 to 2009 (from 19,612 t to 1,512 t), the lowest level in more than 30 years, before reversing the trend by increasing to 3,302 t in 2011. Baitboat catches also reached a nearly 30 year low (886 t) in 2008, declining nearly 90% from 7,094 t in 1994, before increasing again; baitboats caught 1,108 t in 2012. Longline catches, which were 11,790 t in 1994, have fluctuated since between 10,059 t and 16,019 t, and were 13,108 t in 2012.

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.

Purse seine catch levels had been held in check until 2007 in large part by a continued decline in the number of purse seine vessels in the eastern Atlantic. As a recent 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, with an average age of about 25 years (see **SKJ-Figure 7** for trends in number of vessels and carrying capacity**)**. Since then, however, the number of purse seiners increased by about 40% to 35, 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. Overall carrying capacity of the total purse seine fleet in 2010 had increased to about the same level as in the 1990s and FAD based fishing has accelerated more rapidly than free school fishing (although both have substantially increased), with the number of sets on FADs reaching levels not seen since the mid-1990s.

It has been noted that significant catches of yellowfin tuna (over 1000 tons) were obtained in 2011 by EU purse seiners south of 15°S off the coast of West Africa (in association with skipjack and bigeye on FADs). This area is very special in its environment and low oxygen levels. This was the first time that yellowfin tuna catches have been obtained by purse seiners in this region, although this species was once dominant in the catches on Angolan baitboats until 1965. These unusual yellowfin tuna catches (**YFT-Figure 3**) warrant further analysis and any future catches in the area should be monitored.

Species composition and catch at size of landings from the Ghanaian fleet of baitboats and purse seiners, has been thoroughly reviewed. This review has led to new estimates of Task I and Task II catch and effort and size for these fleets for the period 1973-2005. Similar estimates for the period 2006-2012 are expected to be available soon. This revision has shown that catches of yellowfin tuna by Ghanaian fleets were significantly lower than it was previously estimated by a yearly average of 4,300 t over the period 1996-2005. These recent corrections do not represent a significant change in the Atlantic-wide yellowfin tuna catch, however, they do represent a large reduction in the number of small (~ 3 kg average weight) yellowfin tuna landed.

Available catch rate series from purse seine data, after an initial period of apparent declines, showed high variability without clear trend in recent years **(YFT-Figure 4)**. Baitboat catch rate trends **(YFT-Figure 5)** also exhibit large fluctuations, with a somewhat declining overall trend. Such large fluctuations may reflect changes in local availability and/or fishing power, which do not necessarily reflect stock abundance trends. Standardized catch rates for the longline fisheries **(YFT-Figure 6)** generally show a declining trend until the mid-1990s, and have fluctuated without clear trend since.

The average weight trends by fleet (1970-2010) are shown in **YFT-Figure 7**. The recent average weight in European purse seine catches, which represent the majority of the landings, has declined to about 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 beginning in the 1990s. A declining trend is also reflected in the average weight of eastern tropical baitboat catches. Longline mean weights have been more variable.

Apparent changes in selectivity can also be seen in the overall trends in catch at age shown in **YFT-Figure 8**. The variability in overall catch at age is primarily due to variability in catches of ages 0 and 1. 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 2011, applying both an age-structured model and a non-equilibrium production model to the available catch data through 2010. As has been done in previous stock assessments, stock status was evaluated using both production and age-structured models. Models used were similar in structure to those used in the previous assessment, however, other alternative model structures of the production model and the VPA were explored in sensitivity runs. These runs confirmed that some of the estimated benchmarks obtained from production models are somewhat sensitive to the assumption used that MSY is obtained at half of the virgin biomass. This assumption was used in the production models that contributed to benchmark estimates found in this report.

The estimate of MSY (~144,600 t) may be below what was achieved in past decades because overall selectivity has shifted to smaller fish (**YFT-Figure 8**); the impact of this change in selectivity on estimates of MSY is clearly seen in the results from age structured models (**YFT-Figure 9**). 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**. When the uncertainty around the point estimates from both models is taken into account, there was only an estimated 26% chance that the stock was not overfished and overfishing was not occurring in 2010 (**YFT-Figure 11)**.

In summary, 2010 reported catches were well below MSY levels, stock biomass is estimated to most likely be about 15% below the Convention objective and fishing mortality rates most likely about 13% below F_{MSY}. The recent trends through 2010 are uncertain, with the age-structured models indicating increasing fishing mortality rates and decline in stock levels over the last several years, and the production models indicating the opposite trends.

YFT-4. Outlook

Projections were made considering a number of constant catch scenarios, and the results from all models are summarized to produce estimated probabilities of achieving Convention Objective ($B>B_{MSY}$, $F<F_{MSY}$), for a given level of constant catch, for each year up to 2025 (**YFT-Figure 11** and **YFT-Table 2)**. Maintaining current catch levels (110,000 t) is expected to lead to a biomass somewhat above B_{MSY} by 2016 with a 60% probability. Higher catch levels would have a lower probability of achieving that goal and may require a longer time frame for rebuilding.

Following the recent low in 2007, overall catches of yellowfin tuna increased nearly 20% by 2009, before dropping again to the lower levels by 2012. The relative contribution of purse seine gear to the total catch has increased by about a third since 2007, which is related to the increasing purse seine effort trend. Estimates of fishable biomass trends from production modeling indicate a slow, continued rebuilding tendency, but estimates of spawning stock and total biomass trends from the age-structured assessment indicates recent decline and corresponding increasing F. In either case, continued increasing catches are expected to slow or reverse rebuilding.

YFT-5. Effect of current regulations

Recommendation 04-01 implemented a closure for the surface fishing in the area 0º-5ºN, 10ºW-20ºW during November in the Gulf of Guinea. Analyses of purse seine catches which have been presented to the Committee confirmed that this closure was less effective than previous moratoria in reducing the proportional catch of small fish harvest and avoiding growth overfishing.

In response to Committee advice that larger time/area moratoria are likely to be more precautionary than a smaller moratoria (providing that the moratoria are fully complied with), Recommendation 11-01 replaced the closure implemented by Rec. 04-01 with a new closure of surface fishing on FADs in the area from the African coast to 10ºS, 5ºW-5ºE during January-February in the Gulf of Guinea. This closure came into effect for the first time in 2013. Rec. 11-01 also implemented a TAC of 110,000 t for 2012 and subsequent years. The overall catch in 2012 (101,866 t) was lower than this TAC.

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 the age-structured model, effective effort in 2010 appeared to be near (estimates range from about 5% above to about 10% below) the 1992 levels.

YFT-6. Management recommendations

The Atlantic yellowfin tuna stock was estimated to be overfished in 2010. Continuation of catch levels on the order of 110,000 t is expected to lead to a biomass somewhat above B_{MSY} by 2016 with a 60% probability. Catches approaching 140,000 t or more would reduce the chances of meeting Convention Objectives below 50%, even after 15 years (2025). In addition, the Commission should be aware that increased harvests on FADs could have negative consequences for yellowfin and bigeye tuna, as well as other by-catch species. Should the Commission wish to increase long-term sustainable yield, the Committee continues to recommend that effective measures be found to reduce FAD-related and other fishing mortality of small yellowfin. The Committee notes that the closure implemented in Rec. 11-01 may be more effective than that implemented by Rec. 04-01.

ATLANTIC YELLOWFIN TUNA SUMMARY

Maximum Sustainable Yield (MSY)	144,600[1] (114,200 - 155,100)
2012 Yield	101,866 t
Relative Biomass B_{2010}/B_{MSY}	0.85 (0.61-1.12)[2]
Relative Fishing Mortality: $F_{current(2010)}/F_{MSY}$	0.87 (0.68-1.40)[2]

Management measures in effect:

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

[Rec. 11-01] (in effect beginning in 2013):
- Time-area closure for FAD associated surface fishing; TAC of 110,000 t beginning in 2013
- Specific limits of number of longline and/or purse seine boats for a number of fleets

Other measures also impacting yellowfin tuna

[Rec. 09-01], para. 1 of [Rec. 06-01], [Rec. 04-01]:
- 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 (75), Philippines (10), Korea (16).
- 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 10ºW-20ºW.

NOTE: $F_{current(2010)}$ refers to F_{2010} in the case of ASPIC, and the geometric mean of F across 2007-2010 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. Relative biomass is calculated in terms of spawning stock biomass in the case of VPA and in fishable biomass in the case of ASPIC.

[1] Estimates (with 80% confidence limits) based upon results of both the non-equilibrium production model (ASPIC) and the age-structured model (VPA).
[2] Median (10^{th}-90^{th} percentiles) from joint distribution of age-structured and production model bootstrap outcomes considered.

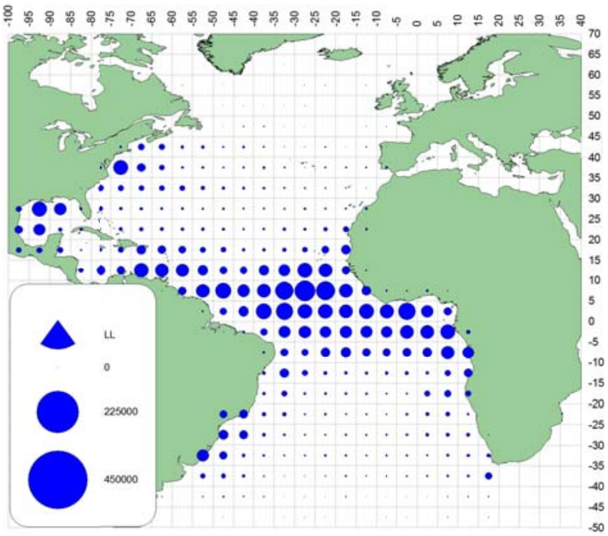
YFT-Table 1. Estimated catches (t) of Yellowfin tuna (*Thunnus albacares*) by area, gear and flag.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			136265	162247	193536	166901	163762	162753	172584	153251	149505	136861	144132	135913	131995	154496	134705	122135	118963	103752	105945	101485	109778	120524	109989	103432	101866
	ATE		101671	125345	160805	130004	126050	124009	124369	117977	116449	104520	113212	105203	96372	114173	105045	97153	87725	77684	77674	77318	91654	101728	89154	85909	81457
	ATW		34594	36902	32731	36897	37712	38745	48215	35274	33056	32341	30919	30710	35623	40323	29660	24982	31238	26068	28272	24167	18123	18796	20835	17523	20409
	MED		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	Bait boat	16020	12168	19648	17772	15095	18471	15652	13496	11365	12683	14265	16729	10022	14034	11145	9967	14639	9725	10434	8899	11723	10949	8132	8260	6529
		Longline	8956	7566	10253	9082	6518	8537	14638	13723	14236	10495	13872	13561	11369	7570	5790	9075	11442	7317	7234	13437	8566	7386	5560	6639	5565
		Other surf.	2646	2586	2175	3748	2450	2122	2030	1989	2065	2136	1674	1580	2424	2074	1826	2540	2928	4047	4833	3774	2379	3866	2582	1253	1949
		Purse seine	74049	103025	128729	99402	101987	94880	92050	88770	88783	79206	83402	73333	72556	90496	86284	75571	58716	56594	55173	51207	68987	79527	72881	69756	67414
	ATW	Bait boat	5822	4834	4718	5359	6276	6383	7094	5297	4560	4275	5511	5349	6753	5315	6009	3764	4868	3867	2695	2304	886	1331	1436	2311	1108
		Longline	19046	17128	18851	13667	16594	12129	11790	11185	11882	11554	11671	13326	15760	14872	11921	10166	16019	14449	14249	13557	13192	12660	13078	10521	13108
		Other surf.	3692	3293	2362	3457	3483	4152	9719	12454	5830	4801	4581	5345	5241	7027	3763	6445	7134	5118	6880	5959	1973	3285	3590	2425	2883
		Purse seine	6034	11647	6800	14414	11359	16081	19612	6338	10784	11710	9157	6523	7870	13108	7966	4607	3217	2634	4442	2341	2067	1512	2722	2256	3302
	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	
		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	
Discards	ATW	Longline	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	5	6	5	9	8	9	7
Landings	ATE	Angola	246	67	292	510	441	211	137	216	78	70	115	170	35	34	34	34	34	111	0	405	98	701	520	485	191
		Belize	0	0	0	0	0	0	0	1	0	3	0	0	5	0	0	0	0	0	0	0	0	402	1794	3172	5861
		Benin	2	7	1	1	1	1	1	1	1	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	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	2468	2870	2136	1932	1426	1536	1727	1781	1448	1721	1418	1663	1851	1684	1802	1868	3236	8146	7493	5923	8601	5493	5856	6002	4603
		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	139	156	200	124	84	71	1535	1652	586	262	1033	1030	1112	1056	1000	365	214	169	220	170
		Chinese Taipei	207	96	2244	2163	1554	1301	3851	2681	3985	2993	3643	3389	4014	2787	3363	4946	4145	2327	860	1707	807	1180	537	1463	811
		Congo	15	21	22	17	18	17	14	13	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	1694	703	798	658	653	541	238	212	257	269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Curaçao	0	0	0	0	0	0	0	0	3183	6082	6110	3962	5441	4793	4035	6185	4161	0	1939	1368	7351	6154	5302	4413	6792
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	2	0	0	673	213	99	302	565	175	482	216	626	90	470	385	1471
		EU.España	50167	61649	68603	53464	49902	40403	40612	38278	34879	24550	31337	19947	24681	31105	31469	24884	21414	11795	11606	13584	24409	32793	25560	21026	18854
		EU.Estonia	0	0	0	234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	21323	30807	45684	34840	33964	36064	35468	29567	33819	29966	30739	31246	29789	32211	32753	32429	23949	22672	18940	11330	16115	18923	20280	22036	18506
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	
		EU.Latvia	0	0	0	255	54	16	0	55	151	223	97	25	36	72	334	334	334	334	334	0	0	0	0	0	
		EU.Lithuania	0	0	0	332	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	188	182	179	328	195	128	126	231	288	176	267	177	194	4	6	4	5	16	274	865	300	990	554	452	355
		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	23	21	22
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
		Gabon	0	0	0	0	0	12	88	218	225	225	295	225	162	270	245	44	44	44	44	0	0	0	0	0	
		Gambia	0	0	2	16	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Georgia	0	0	0	25	22	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	8555	7035	11988	9254	9331	13283	9984	9268	8182	15080	13222	20815	12304	23392	18100	15002	14044	13019	11931	15463	14250	18355	12512	10754	9240
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2906	5265	3461	3736	2603	3124	2803	2949
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	892	892	199	
		Guinée Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	730	0	
		Honduras	0	0	0	0	2	0	0	4	3	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	5808	5882	5887	4467	2961	2627	4194	4770	4246	2733	4092	2101	2286	1550	1534	1999	5066	3088	4206	8496	5266	3563	3041	3348	3700
		Korea Rep.	1248	1480	324	259	174	169	436	453	297	101	23	94	142	3	8	209	984	95	4	303	983	381	324	20	26
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	208	73	73	0	0	0	0	0	0	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	108	95	183	95	102	110	110	44	272	55
		Mixed flags (FR+ES)	932	825	1056	2220	2455	2750	1898	1172	1166	981	1124	1369	1892	1427	599	992	1052	933	1063	655	626	459	533	700	709
		NEI (ETRO)	3140	5436	12601	4856	10921	9875	8544	8970	9567	6706	7225	5418	5448	10169	8209	5396	4294	1781	219	0	0	0	0	0	
		NEI (Flag related)	206	280	1115	2310	1315	1157	2524	2975	3588	3368	5464	5679	3072	2090	133	466	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	35	14	72	69	3	147	59	165	89	139	85	135	59	28	11	1	9	90	0
		Nigeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	3	1
		Norway	493	1787	1790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		Panama	1239	901	1498	7976	8338	10973	12066	13442	7713	4293	2111	1315	1103	574	1022	0	1887	6170	8557	9363	6175	5982	5048	4358	5004
		Philippines	0	0	0	0	0	0	0	0	0	0	126	173	86	0	50	9	68	13	30	88	53	152	89	134	5

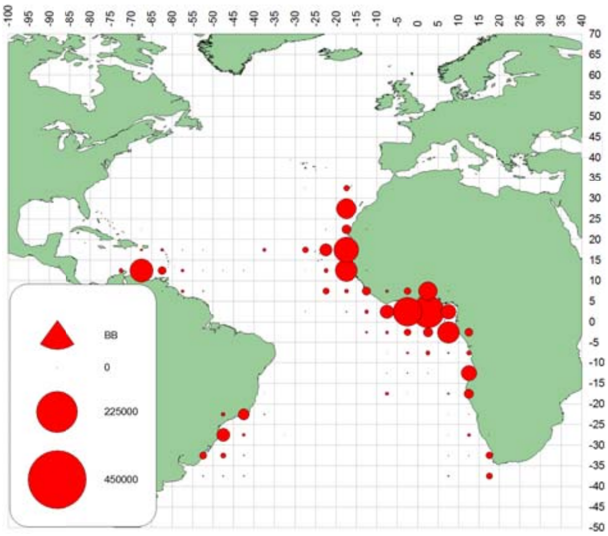
		Russian Federation	0	0	0	3200	1862	2160	1503	2936	2696	4275	4931	4359	737	0	0	0	0	4	42	211	42	33	0	0	
		S. Tomé e Príncipe	298	299	164	187	170	181	125	135	120	109	124	114	122	122	122	122	134	145	137	0	160	165	169	0	
		Senegal	0	2	90	132	40	19	6	20	41	208	251	834	252	295	447	279	681	1301	1262	819	588	1279	1212	1050	1683
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	6	0	11	0	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	0	0	0	0	0	0	0	0	1658	
		South Africa	137	671	624	52	69	266	486	183	157	116	240	320	191	342	152	298	402	1156	1187	1063	351	303	235	673	174
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	14	0	101	209	83	74	28	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.	3207	4246	3615	0	0	0	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	1
		UK.Sta Helena	98	100	92	100	166	171	150	181	151	109	181	116	136	72	9	0	0	0	344	177	97	104	65	163	149
		Ukraine	0	0	0	215	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	24	145	483	450	331	23	10	124
		Venezuela	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	Argentina	66	33	23	34	1	0	0	0	0	0	0	0	0	0	0	0	327	327	0	0	0	5	0	0	
		Barbados	236	62	89	108	179	161	156	255	160	149	150	155	155	142	115	178	211	292	197	154	156	79	129	131	195
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	143	1164	1160	943	264	42	41
		Brasil	2512	2533	1758	1838	4228	5131	4169	4021	2767	2705	2514	4127	6145	6239	6172	3503	6985	7223	3790	5468	2749	3313	3617	3499	2836
		Canada	30	7	7	29	25	71	52	174	155	100	57	22	105	125	70	73	304	240	293	276	168	53	166	50	93
		China P.R.	0	0	0	0	0	0	0	0	0	0	628	655	22	470	435	17	275	74	29	124	284	248	258	126	94
		Chinese Taipei	1641	762	5221	2009	2974	2895	2809	2017	2668	1473	1685	1022	1647	2018	1296	1540	1679	1269	400	240	315	211	287	305	259
		Colombia	206	136	237	92	95	2404	3418	7172	238	46	46	46	46	46	46	46	46	46	46	0	0	0	0	0	
		Cuba	98	91	53	18	11	1	14	54	40	40	15	15	0	0	65	65	65	65	65	0	0	0	0	0	
		Curaçao	170	170	170	150	160	170	155	140	130	130	130	130	130	0	0	0	0	0	0	0	0	139	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	10
		Dominica	0	0	18	12	23	30	31	9	0	0	0	80	78	120	169	119	81	119	65	103	124	102	110	132	119
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	89	220	226	226	226	226	226	226	226	0	0	0	0	0	
		EU.España	1	3	2	1462	1314	989	7	4	36	34	46	30	171	0	0	0	0	0	1	84	81	69	27	33	32
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	513	556	
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	60	88	179	260	99	127	92
		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	**0**
		Grenada	215	235	530	620	595	858	385	410	523	302	484	430	403	759	593	749	460	492	502	633	756	630	673	0	
		Jamaica	0	0	0	0	0	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	2395	3178	1734	1698	1591	469	589	457	1004	806	1081	1304	1775	1141	571	755	1194	1159	437	541	986	1431	1539	1106	1488
		Korea Rep.	120	1055	484	1	45	11	0	0	84	156	0	0	0	0	0	0	0	580	279	270	10	52	56	470	472
		Mexico	283	345	112	433	742	855	1093	1126	771	826	788	1283	1390	1084	1133	1313	1208	1050	938	890	956	1211	916	1174	1414
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	
		NEI (Flag related)	2118	2500	2985	2008	2521	1514	1880	1227	2374	2732	2875	1730	2197	793	42	112	0	0	0	0	0	0	0	0	
		Panama	2192	1595	2651	2249	2297	0	0	0	0	0	0	5	0	0	0	0	0	0	2804	227	153	119	2134	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	36	106	78	12	79	145	299	230	234	151	167	0	0	0	30
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	1	40	48	22	65	16	43	37	35	48	38	1989	1365	1160	568	4251	0	2680	2989	2547	2274	854	963	1031
		Sta. Lucia	97	70	58	49	58	92	130	144	110	110	276	123	134	145	94	139	147	172	103	82	106	97	223	114	98
		Suriname	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1943
		Trinidad and Tobago	1	11	304	543	4	4	120	79	183	223	213	163	112	122	125	186	224	295	459	615	520	629	788	799	930
		U.S.A.	11064	8462	5666	6914	6938	6283	8298	8131	7745	7674	5621	7567	7051	6703	5710	7695	6516	5568	7091	5529	2473	2788	2510	3010	4109
		UK.Bermuda	23	22	15	17	42	58	44	44	67	55	53	59	31	37	48	47	82	61	31	30	15	41	37	100	66
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**0**
		Uruguay	177	64	18	62	74	20	59	53	171	53	88	45	45	90	91	95	204	644	218	35	66	76	122	24	6
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	681	689	661	555	873	816	720	330	207
		Venezuela	10949	15567	10556	16503	13773	16663	24789	9714	13772	14671	13995	11187	11663	18651	11421	7411	5774	5097	6514	3911	3272	3198	4783	4419	4837
	MED	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	
		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	
Discards	ATW	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	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	5	9	8	9	7
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	0	0	0	0	0	0	

YFT-Table 2. Kobe II matrices giving the probability that the biomass will exceed the level that will produce MSY and the fishing mortality will fall below the fishing mortality rate that would maintain MSY, in any given year, for various constant catch levels based on combined model results.

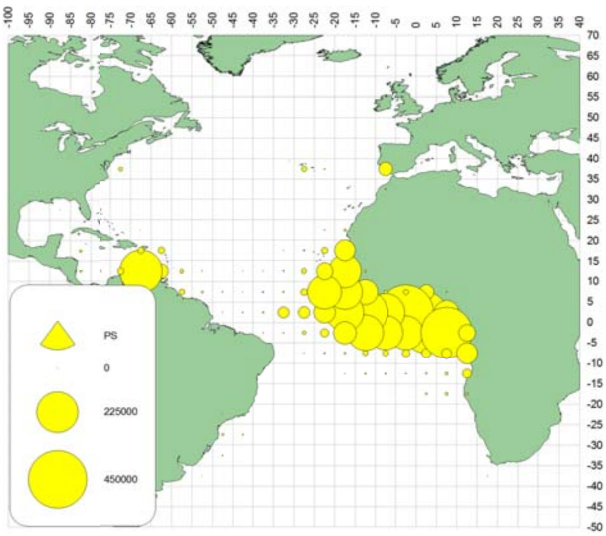
Constant Catch (t, in 1000s)	*Probability (%) that $B>B_{MSY}$ and $F<F_{MSY}$ in each year*													
	2012	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*	*2025*
50	25	51	70	78	84	87	89	**91**	**92**	**93**	**94**	**95**	**95**	**96**
60	24	48	66	76	81	85	87	89	**90**	**92**	**93**	**93**	**94**	**94**
70	24	45	63	73	78	82	85	87	89	**90**	**90**	**92**	**92**	**93**
80	24	43	59	69	75	79	82	84	86	87	88	89	**90**	**90**
90	24	40	54	65	71	75	78	81	82	84	85	86	87	88
100	24	37	49	59	66	70	73	76	78	80	81	82	83	84
110	23	35	45	53	59	64	67	70	72	74	75	76	77	78
120	23	32	40	46	51	55	58	61	64	65	66	68	69	70
130	23	29	35	39	43	45	47	49	51	53	54	55	56	58
140	22	26	29	31	33	34	36	36	37	38	39	39	40	40
150	20	21	22	22	22	21	21	21	21	21	21	21	20	20



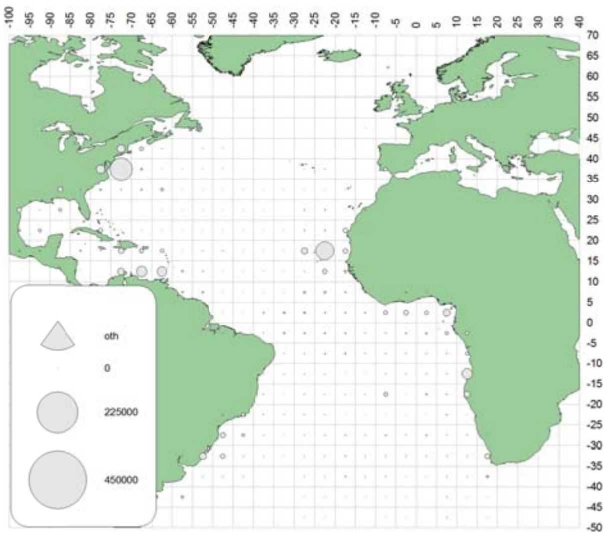
a. YFT (LL)



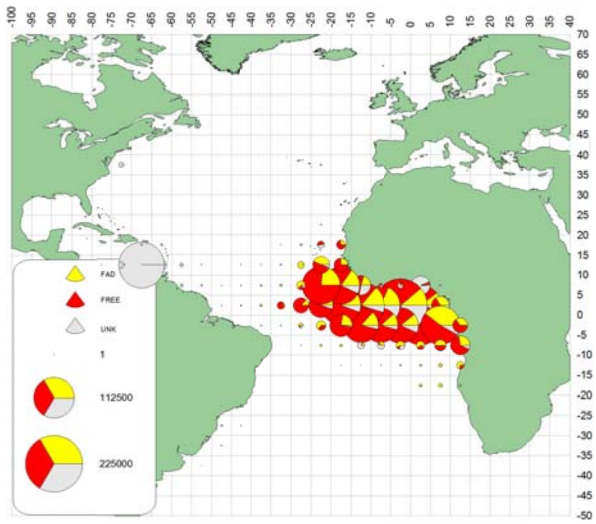
b. YFT (BB)



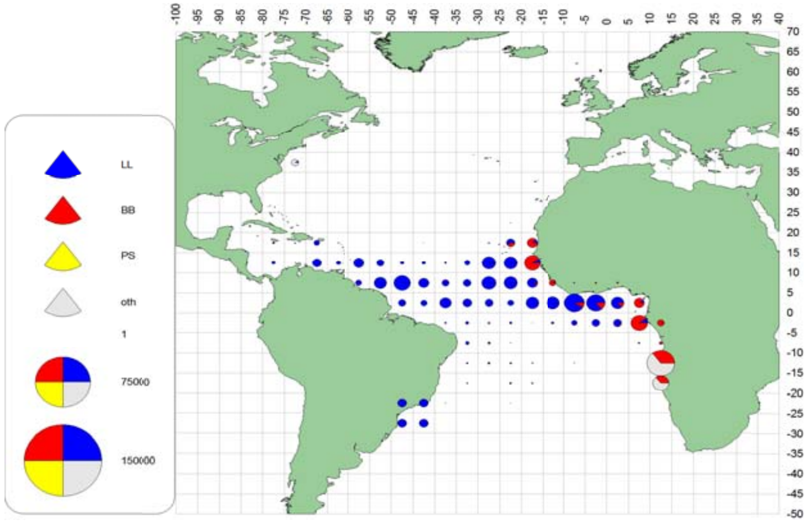
c. YFT (PS)



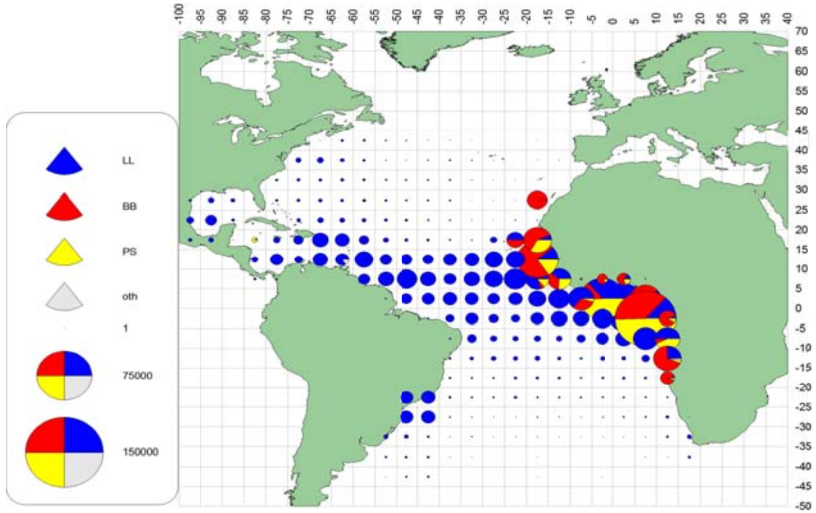
d. YFT (oth)



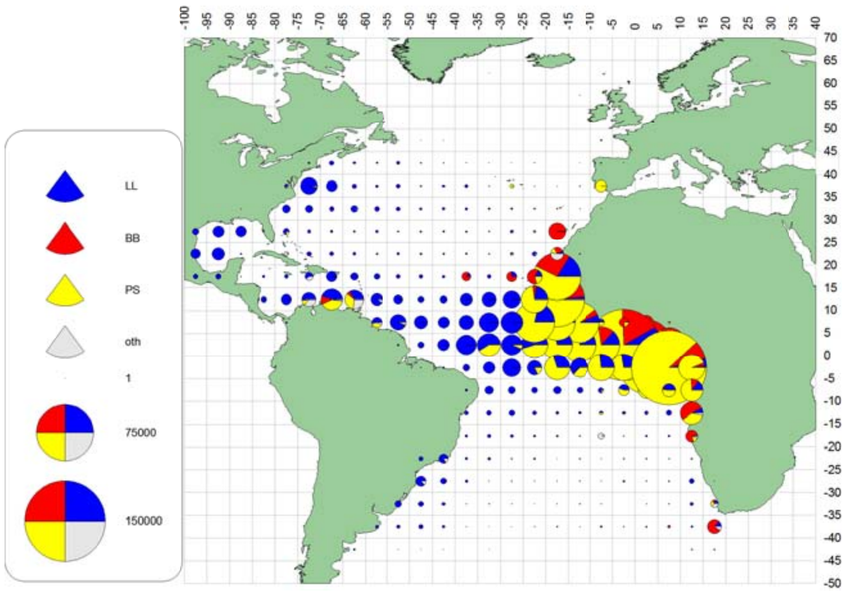
e. YFT PS (FAD/FREE 1991-11)



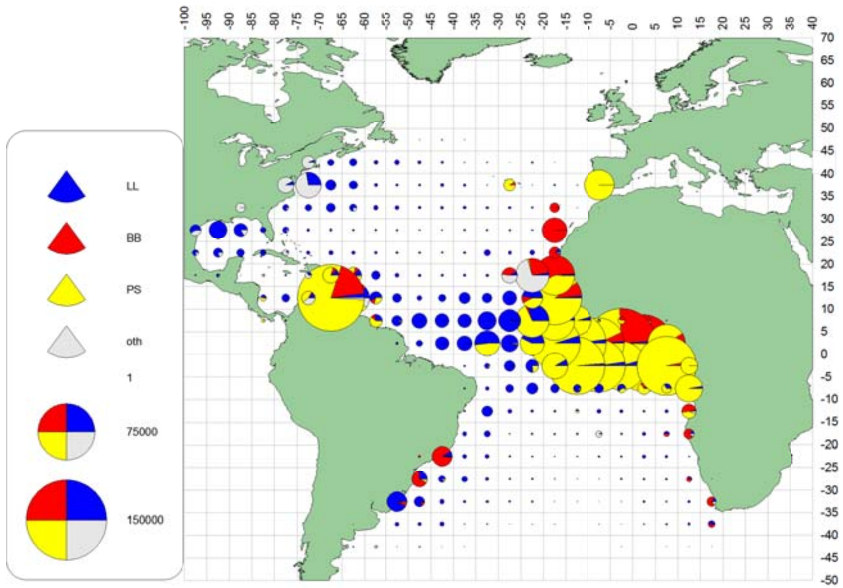
f. YFT (1950-59)



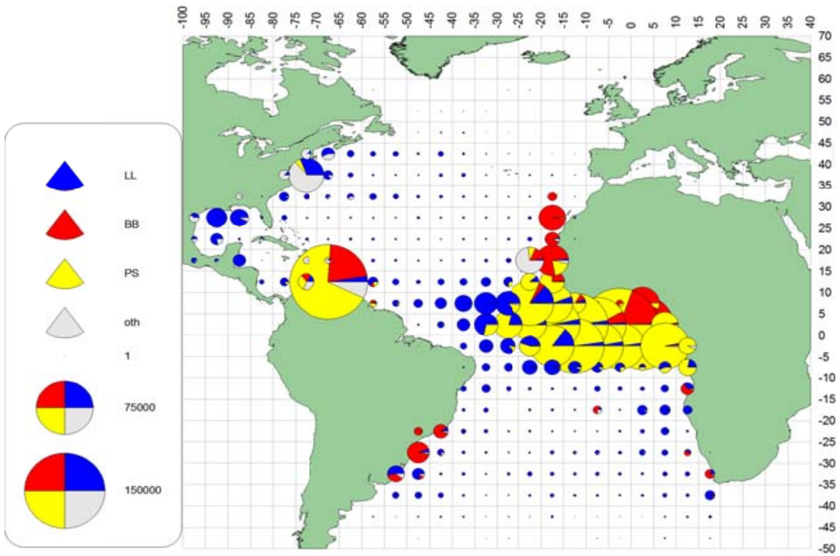
g. YFT (1960-69)



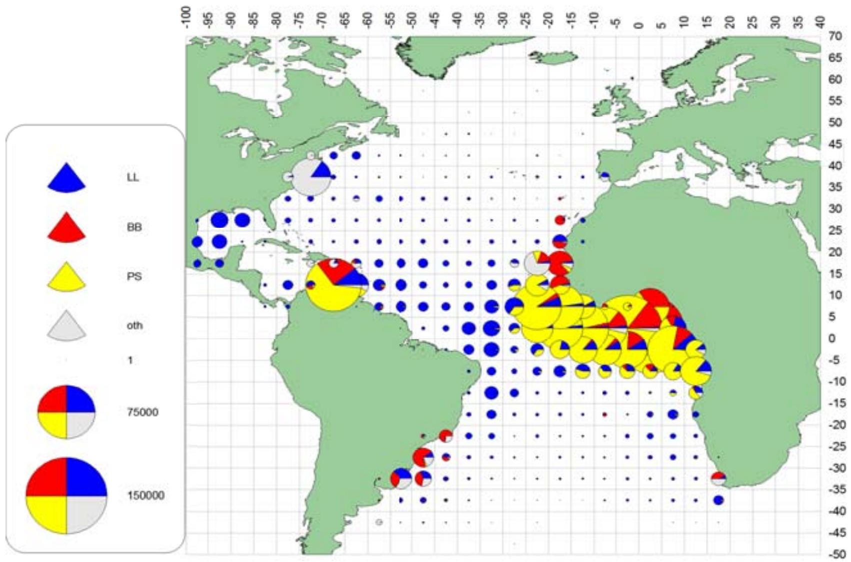
h. YFT (1970-79)



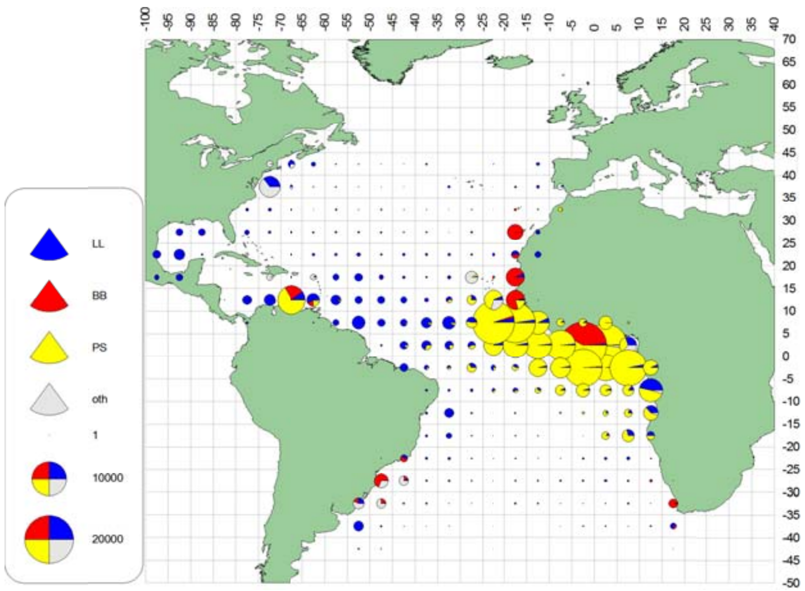
i. YFT (1980-89)



j. YFT (1990-99)

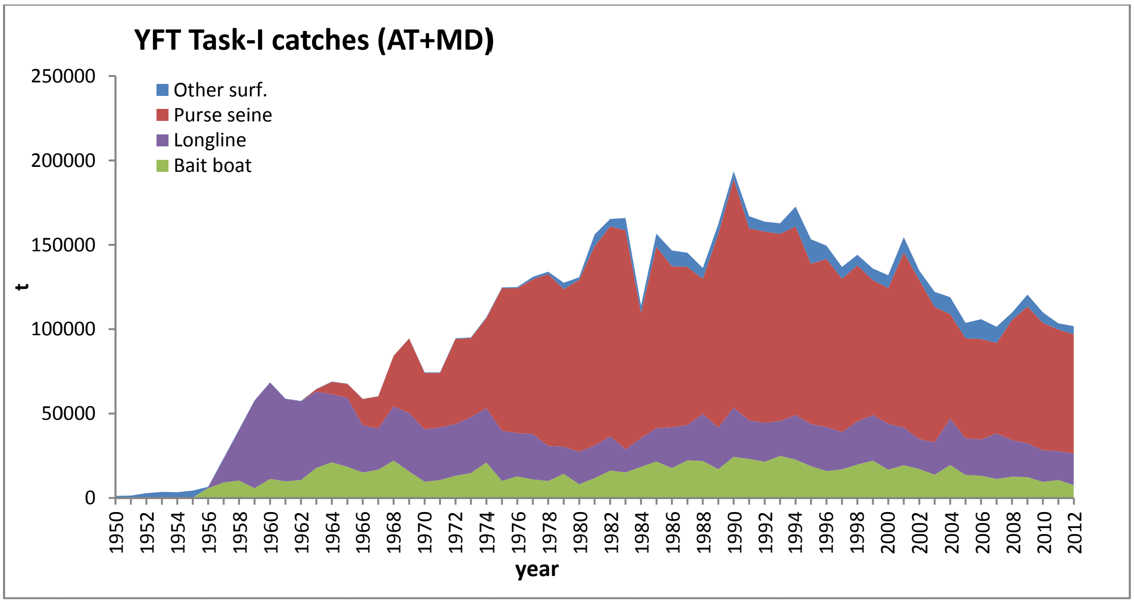


k. YFT (2000-09)

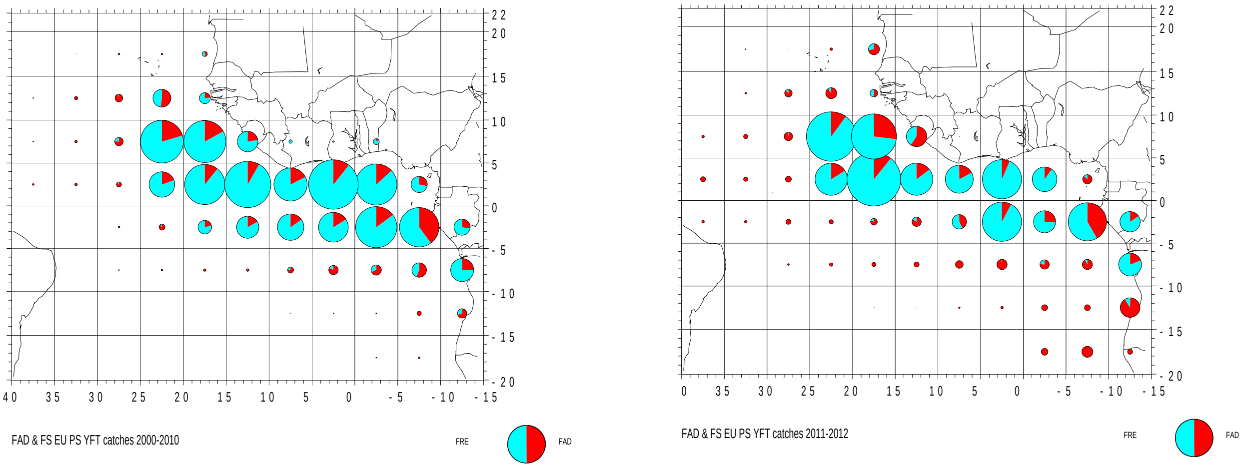


l. YFT (2010-11)

YFT-Figure 1. Geographical distribution of yellowfin tuna catches by major gears [a-e] and decade [f-l]. The maps (f-k) are scaled to the maximum catch observed during 1950-2009. Map l is scaled to the maximum catch observed from 2010-2011.



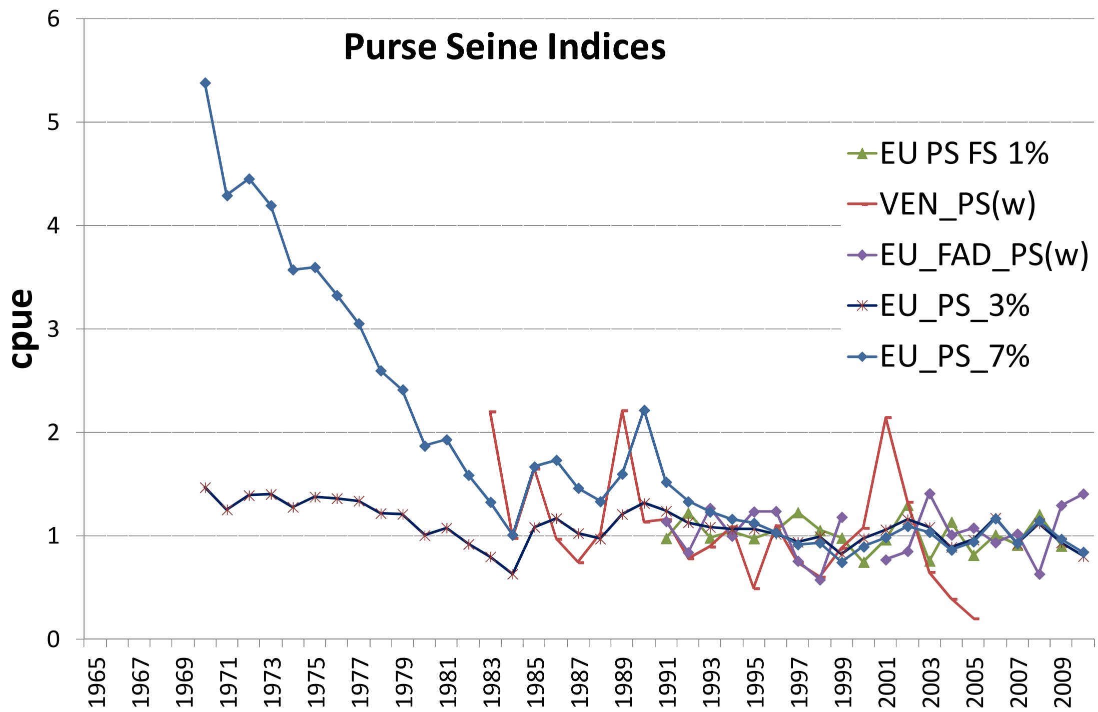
YFT-Figure 2. Estimated annual catch (t) of Atlantic yellowfin tuna by fishing gear, 1950-2012.



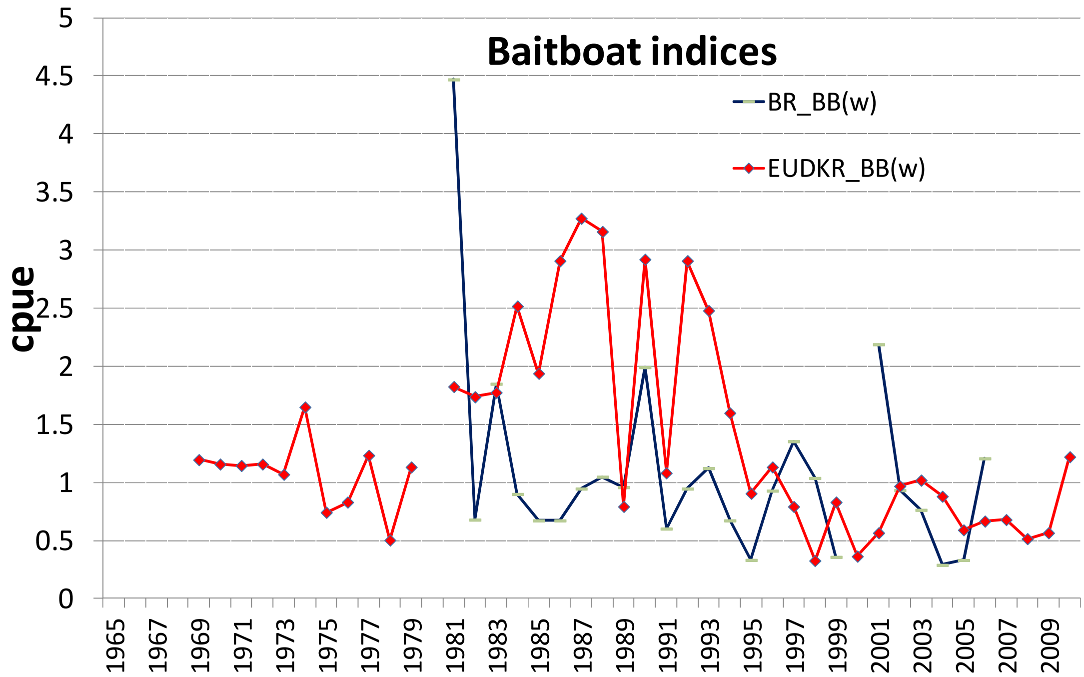
2000-2010
YFT free schools & FAD catches

2011-2012

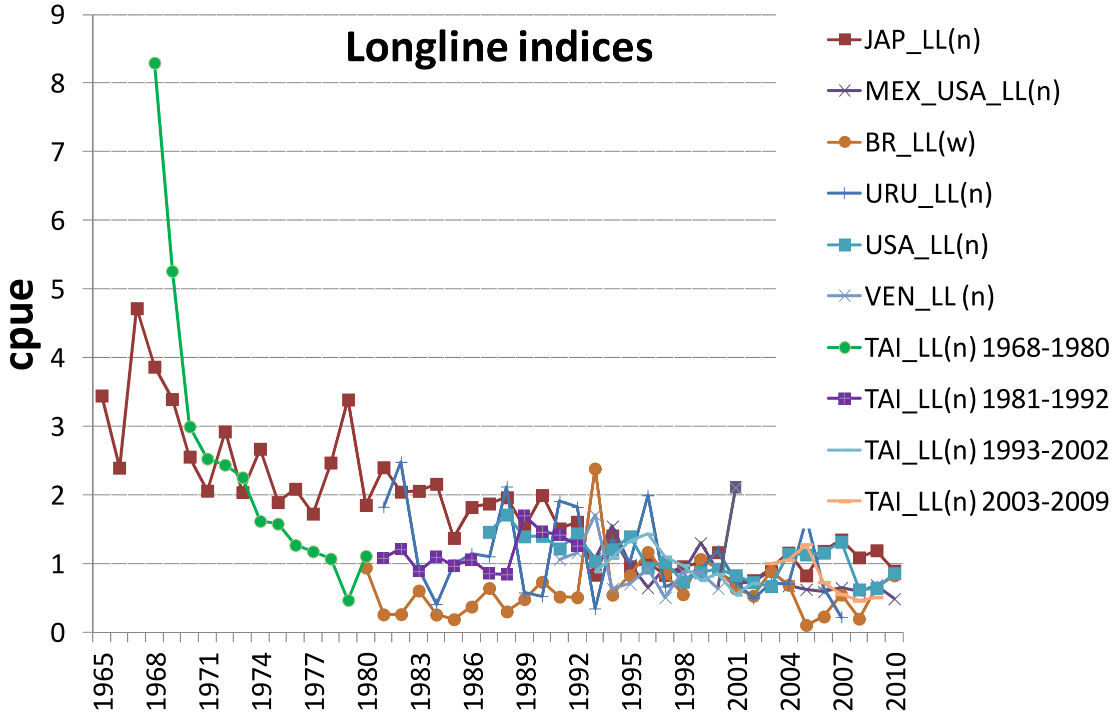
YFT-Figure 3. Comparison of the geographic distribution of EU purse seine catches of yellowfin tuna for the period 2000-2010 (left), and 2011-2012 (right).



YFT-Figure 4. Yellowfin relative catch rate trends (both nominal and applying various annual increases in effectiveness) from purse seine fleets, in weight.

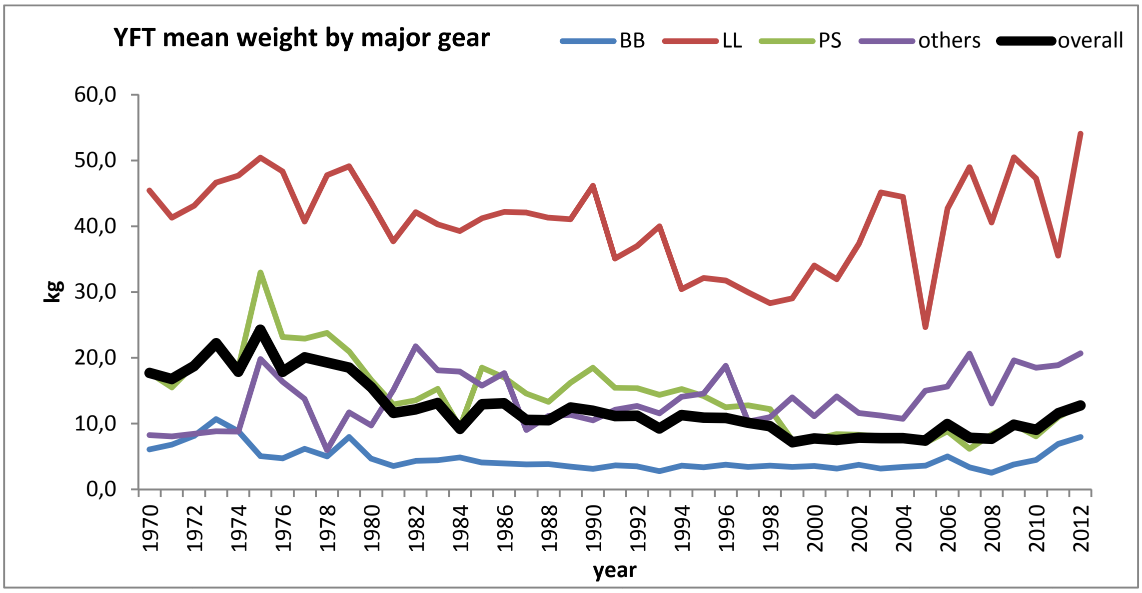


YFT-Figure 5. Yellowfin standardized catch rate trends from baitboat fleets, in weight.

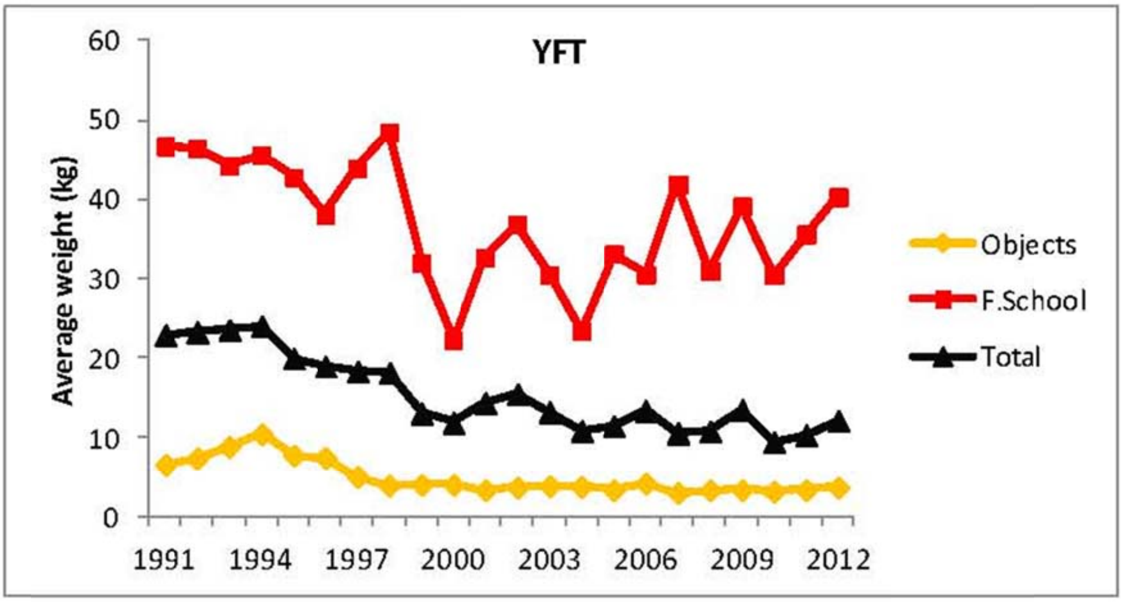


YFT-Figure 6. Yellowfin standardized catch rate trends from longline fleets, in weight (w) and numbers (n).

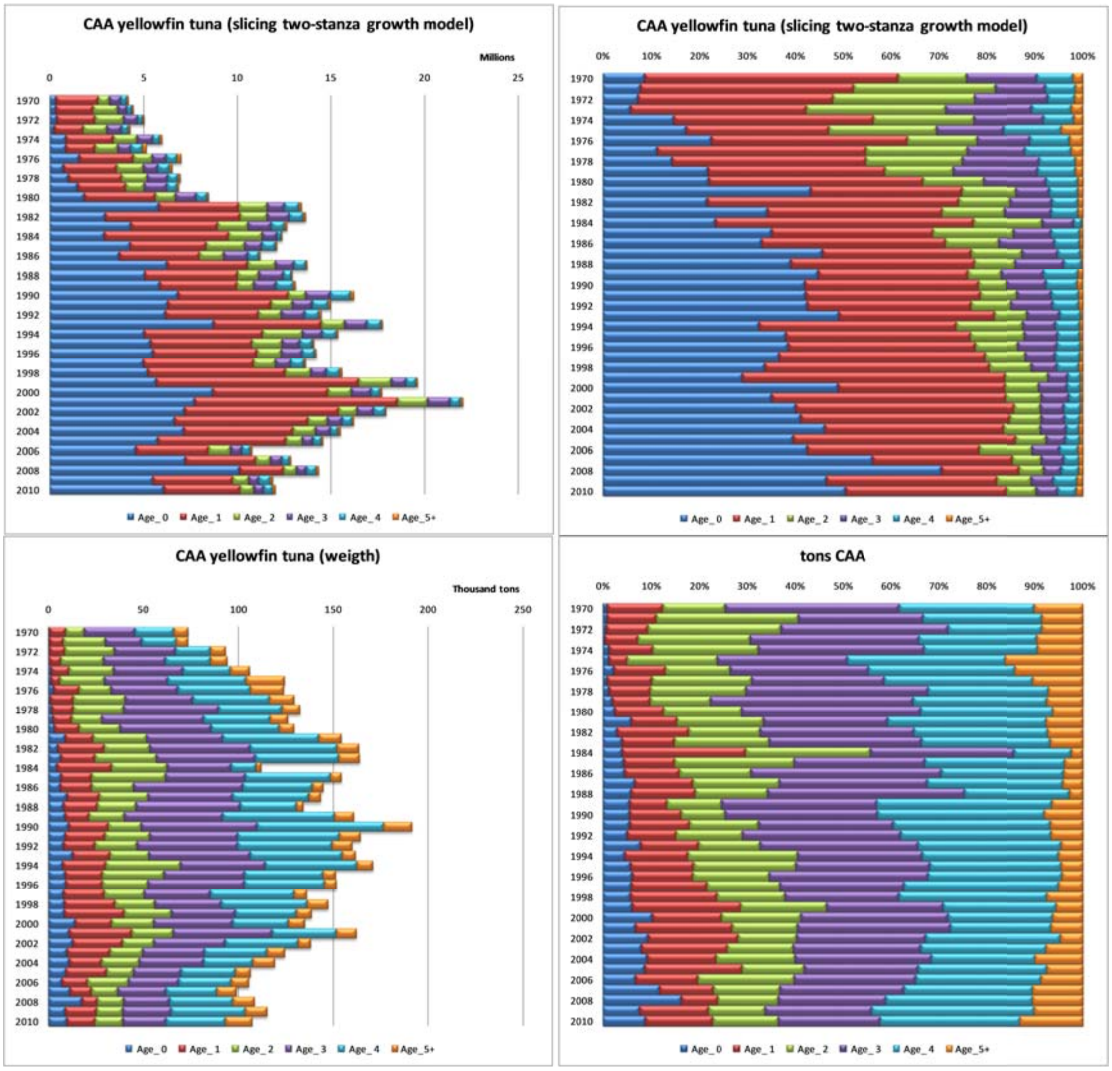
a)



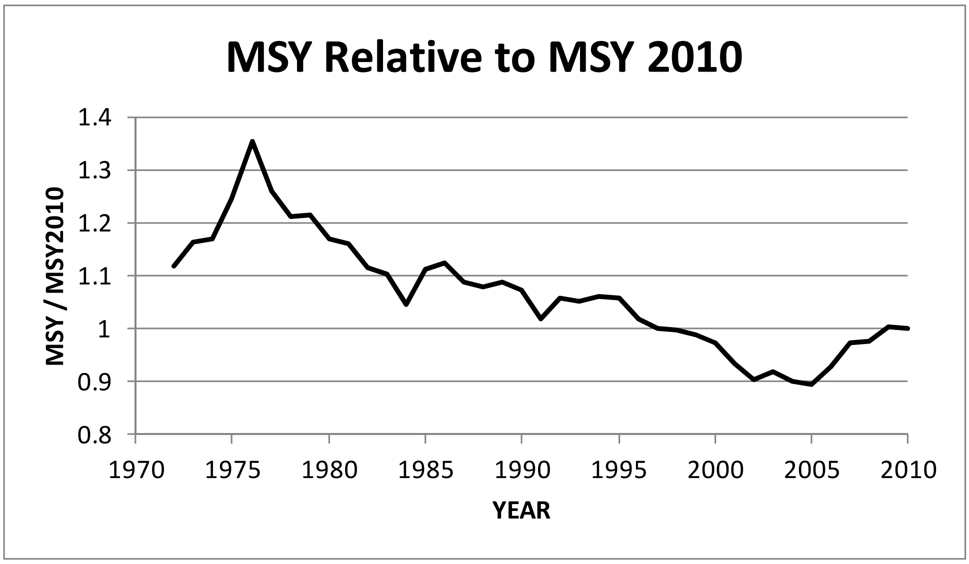
b)



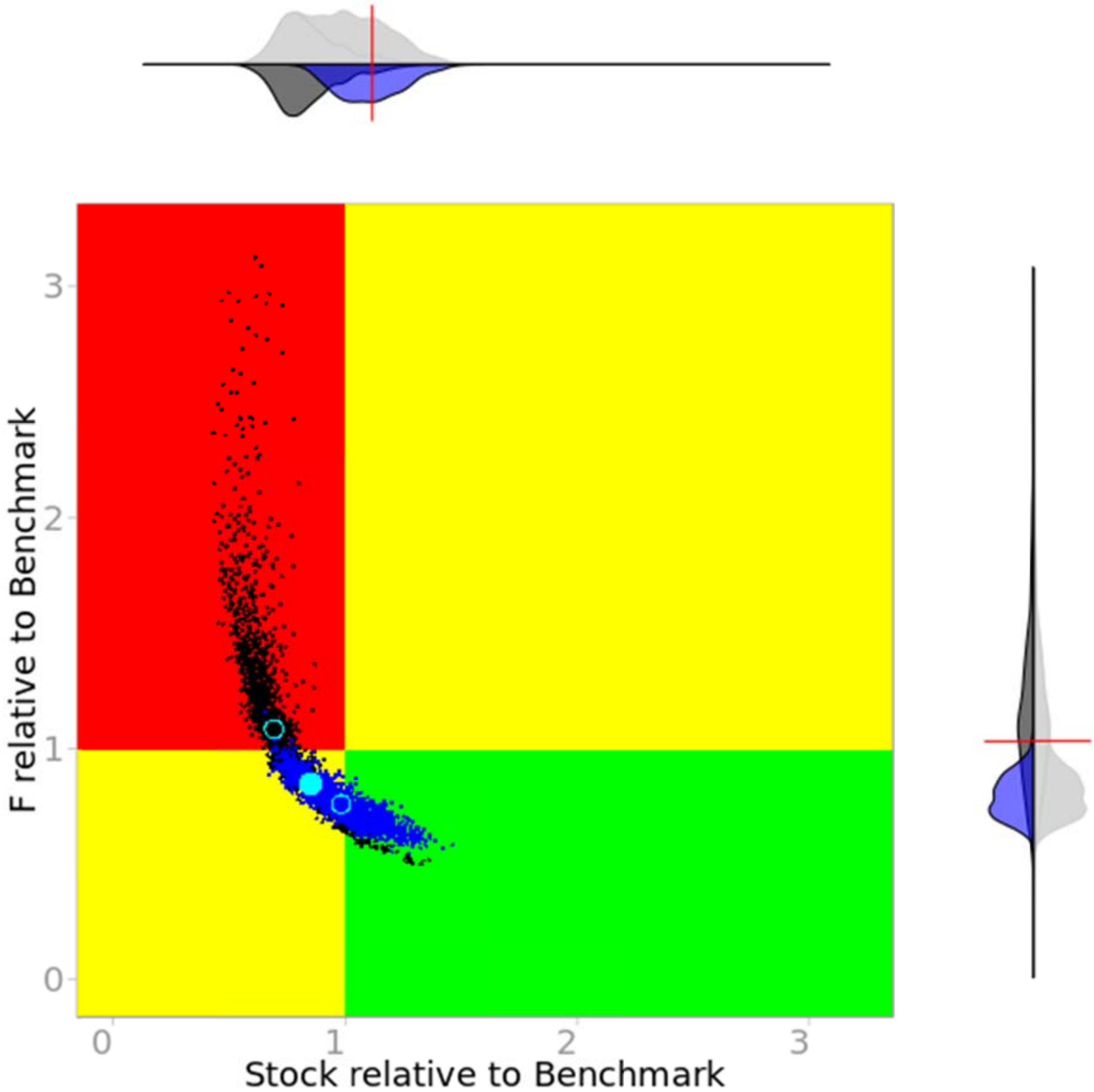
YFT-Figure 7. Trend of mean weight for yellowfin tuna based on the catch-at-size data a) by major fisheries (1970-2012) (NOTE: 2011 and 2012 are preliminary values based on some reported CAS series) and b) for European purse seiners (total) and separated between free schools and FAD associated schools (1991-2012).



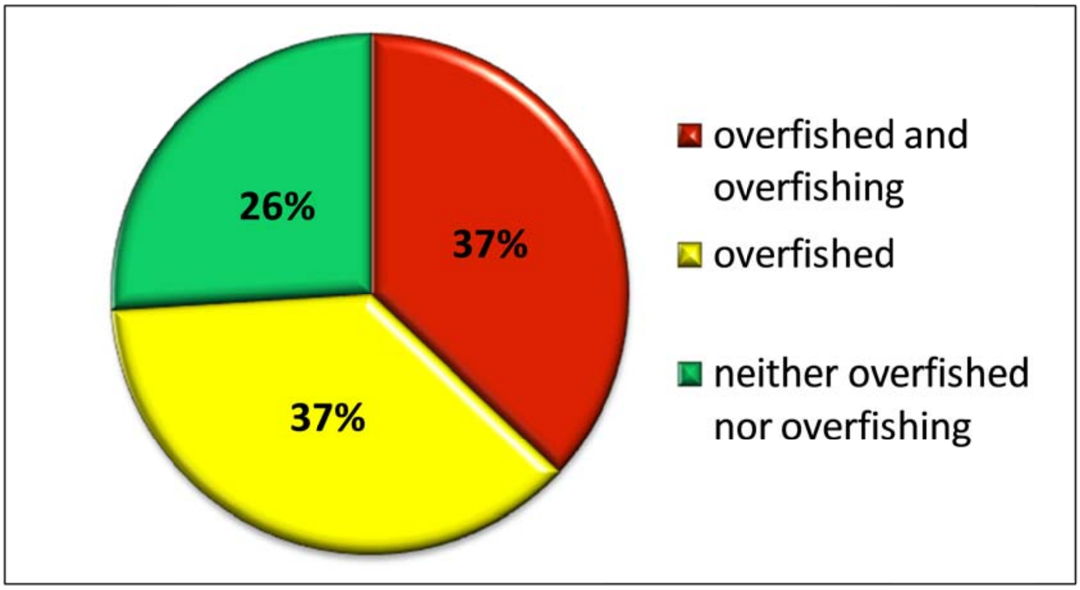
YFT-Figure 8. Distribution of Atlantic yellowfin catches by age (0-5+) in numbers of fish (top row) and in weight (bottom row) for 1970-2010.



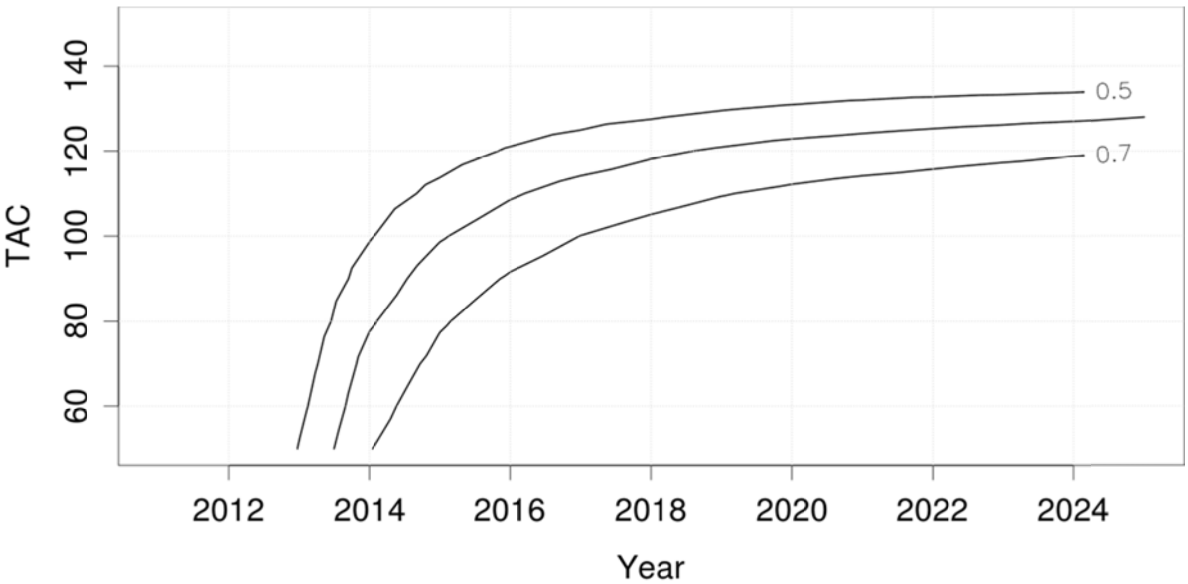
YFT-Figure 9. Estimates of historical MSY values, relative to the MSY estimated for 2010, for Atlantic yellowfin obtained through the age-structured model analysis, which considers the changes in selectivity that have occurred.



YFT-Figure 10. Current status (2010) of yellowfin tuna based on age structured and production models. The results are shown combined in a joint distribution. The clouds of points depict the bootstrap estimates of uncertainty for the most recent year (black=production model, blue=age structured). The median point estimate for each models results are shown in open (cyan) circles, and the median point estimate for the combined model results is shown as a solid (cyan) circle. The marginal density plots shown above and to the right of the main graph reflect the frequency distribution of the bootstrap estimates of each model with respect to relative biomass (top) and relative fishing mortality (right). The frequency distributions of the combined model bootstraps are shown in light blue. The red lines represent the benchmark levels (ratios equal to 1.0)



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 2010.



YFT-Figure 12. Probability plot based on Kobe II matrices giving the probability that the biomass will exceed the level that will produce MSY and the fishing mortality will fall below the fishing mortality rate that would maintain MSY, in any given year, for various constant catch levels based on combined model results.

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 (Anon. 2011a) and an assessment meeting in July (Anon. 2011e). 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. In the eastern tropical Pacific, this diurnal pattern is exhibited equally by juveniles and adults. 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. Recently, however, reports from other oceans suggest that growth rates of juvenile bigeye are lower than those estimated in the Atlantic. Bigeye tuna over 200 cm are relatively rare. Bigeye tuna become mature after they reach 100 cm at between 3 and 4 years old. Young fish form schools 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 weakens as bigeye tuna grow larger. Natural mortality rates for juvenile fish, estimated from tagging data, are similar to those applied for 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 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 EU 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 2010-2012, landings in weight of bigeye tuna caught by the longline fleets represent 53%, purse seine fleets represent 32% and baitboat fleets represent 14% of the total bigeye tuna catch (**BET-Table 1**).

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. The preliminary estimate for 2012 is 70,536 t.

After the historic high catch in 1994, all major fisheries exhibited a decline of catch while the relative share by each fishery in total catch remained relatively constant. These reductions in catch are related to declines in fishing fleet size (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 European and associated purse seiners operating in 2009-2012 was similar to the number operating in 2003-04 **(SKJ-Figure 7)**.

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.

Species composition and catch at size from the Ghanaian fleet of baitboats and purse seiners, has been thoroughly reviewed. This review has led to new estimates of Task I and Task II catch and effort and size for these fleets for the period 1973-2005. Similar estimates for the period 2006-2012 are expected to be available soon. This revision has shown that catches of bigeye tuna by Ghanaian fleets were significantly lower than it was previously estimated by an average of 2,500 tons over the period 1996-2005. These recent corrections do not represent a significant change in the Atlantic-wide bigeye tuna catch, however, they do represent a large reduction in the number of small (~ 3 kg average weight) bigeye tuna landed.

Significant catches of small bigeye tuna continue to be channeled to local West African markets, predominantly in Abidjan, and sold as "*faux poissons*" in ways that make their monitoring and official reporting challenging. Monitoring of such catches has recently progressed through a coordinated approach that allows ICCAT to properly account for these catches and thus increase the quality of the basic catch and size data available for assessments.

Mean average weight of bigeye tuna decreased prior to 1998 but has been relatively 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 baitboats, and 4 kg 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 2010. During the same period purse seine-caught bigeye tuna had weights between 3 kg and 4 kg. Bigeye tuna caught in free schools are more than two times heavier than those caught around FADs. This difference in weight between these two fishing modes is even more pronounced since 2006. 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 inter-annual 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. 2008b) 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. ICCAT established a TAC of 85,000 t for 2010 onwards through Rec. 09-01], and [Rec. 11-01]. Note, that because this TAC does not affect all countries that can land bigeye tuna, in theory the total catch removed from the stock could exceed 85,000 t. 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. Effect 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 [Rec. 09-01 and later modified by Rec. 11-01] to 85,000 t. Estimates of reported catch for 2005-2012 **(BET-Table 1)** have been always lower than 85,000 t. Note however, that since 2006, some significant portion of the purse seine catch have not been reported to ICCAT, however, given recent estimates of unreported catch for the period prior to 2006, it is unlikely that catches have exceeded 85,000 t since 2006.

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 [Recs. 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 increase the future chances that the stock will 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, 09-01 and 11-01 and other countries were to maintain recent catch levels, then the total catch could well exceed

100,000 t. The Committee recommends that the 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 and/or misidentified 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 (2012) Yield	70,536 t [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], [Rec. 04-01], [Rec. 10-01], and [Rec. 11-01]. − Total allowable catch for 2012-2015 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 (75), Philippines (11), Korea (14), EU (269) and Japan (245). − Specific limits of number of purse seine boats; Panama (3), EU (34) and Ghana (13). − No fishing with natural or artificial floating objects during January or February in the area encompassed by the African coast, 10º S, 5ºE and 5ºW.

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 2012 reflect most recent data but should be considered provisional.

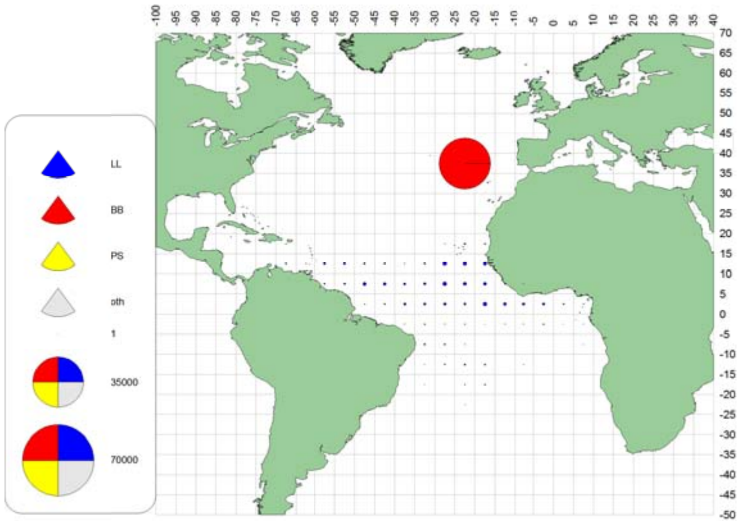
BET-Table 1. Estimated catches (t) of bigeye tuna (*Thunnus obesus*) by area, gear and flag.

		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL		66148	78376	84901	96074	99374	112572	133630	126778	120635	109625	107224	120957	103005	91463	75730	87195	89897	67293	65858	79766	68719	82122	75513	77542	70536
Landings A+M	Bait boat	9710	12672	18280	17750	16248	16467	20361	25576	18300	21276	18999	22301	12365	14540	8523	11450	20812	13058	14671	15432	12359	14940	8968	12124	10017
	Longline	47766	58389	56537	61556	62403	62871	78934	74852	74930	68310	71856	76527	71193	55265	46438	54466	48396	38035	34182	46232	41063	43985	42925	38211	38373
	Other surf.	474	644	293	437	607	652	980	567	357	536	434	1377	1226	1628	1138	1340	1301	717	553	448	225	274	461	977	678
	Purse seine	8198	6671	9791	16331	20116	32582	33355	25782	27048	19503	15934	20752	18221	20030	19631	19939	19388	15483	16452	17654	15072	22923	23159	26230	21469
Landings A+M	Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	476	75	0	0	0	452	410	320	4069
	Argentina	50	17	78	22	0	0	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	24	17	18	18	6	11	16	19	27	18	14	14	7	12	7	15
	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	60	70	234	249	1218	1242
	Benin	7	8	10	10	7	8	9	9	9	30	13	11	0	0	0	0	0	0	0	0	0	0	0	0	
	Brasil	946	512	591	350	790	1256	601	1935	1707	1237	644	2024	2768	2659	2582	2455	1496	1081	1479	1593	958	1189	1151	1799	1400
	Cambodia	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	
	Canada	95	31	10	26	67	124	111	148	144	166	120	263	327	241	279	182	143	187	196	144	130	111	103	137	166
	Cape Verde	117	100	52	151	105	85	209	66	116	10	1	1	2	0	1	1	1	1093	1407	1248	446	553	554	1037	713
	China P.R.	0	0	0	0	0	70	428	476	520	427	1503	7347	6564	7210	5840	7890	6555	6200	7200	7399	5686	4973	5489	3720	3231
	Chinese Taipei	1469	940	5755	13850	11546	13426	19680	18023	21850	19242	16314	16837	16795	16429	18483	21563	17717	11984	2965	12116	10418	13252	13189	13732	10805
	Congo	10	14	15	12	12	14	9	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Cuba	151	87	62	34	56	36	7	7	5	0	0	0	0	0	16	16	0	0	0	0	0	0	0	0	
	Curaçao	0	0	0	0	0	0	0	0	1893	2890	2919	3428	2359	2803	1879	2758	3343	0	416	252	1721	2348	2688	3441	2890
	Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	790	576	47	507
	Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	
	EU.España	8475	8263	10355	14705	14656	16782	22096	17849	15393	12513	7110	13739	11250	10133	10572	11120	8365	7618	7454	6675	7494	11966	11272	13100	10914
	EU.France	4161	3261	5023	5581	6888	12719	12263	8363	9171	5980	5624	5529	5949	4948	4293	3940	2926	2816	2984	1629	1130	2313	3329	3507	3756
	EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	33	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	2818	5295	6233	5718	5796	5616	3099	9662	5810	5437	6334	3314	1498	1605	2590	1655	3204	4146	5071	5505	3422	5605	3682	6920	6128
	EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	32	0	0	
	FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	28	6	0	2	3	0	2	0	**0**
	Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	11	8	0	0	0	0	0	0	0	0	0	0	0	
	Gabon	0	0	0	0	0	1	87	10	0	0	0	184	150	121	0	0	0	0	0	0	0	0	0	0	
	Ghana	1214	2158	5031	4090	2866	3577	4738	5517	4751	10165	10155	10416	5269	9214	5611	8646	17744	8860	9141	13267	9269	10554	6769	4440	2914
	Grenada	0	0	0	65	25	20	10	10	0	1	0	0	0	0	0	0	0	0	0	10	31	0	0	0	
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	998	949	836	998	913	1011	282	262
	Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	50	0	58	
	Honduras	0	0	0	0	44	0	0	61	28	59	20	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	1	0	0	0	0	0	0	0	0	0	0	0	0	
	Japan	32064	39540	35231	30356	34722	35053	38503	35477	33171	26490	24330	21833	24605	18087	15306	19572	18509	14026	15735	17993	16684	16395	15205	12306	15062
	Korea Rep.	4919	7896	2690	802	866	377	386	423	1250	796	163	124	43	1	87	143	629	770	2067	2136	2599	2134	2646	2762	1908
	Liberia	0	206	16	13	42	65	53	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	
	Libya	0	0	0	0	508	1085	500	400	400	400	400	400	400	31	593	593	0	0	4	0	0	0	0	0	
	Maroc	0	0	0	0	0	0	0	0	0	0	0	700	770	857	913	889	929	519	887	700	802	795	276	300	300
	Mexico	0	0	0	0	0	1	4	0	2	6	8	6	2	2	7	4	5	4	3	3	1	1	3	1	1
	Mixed flags (FR+ES)	339	300	384	807	893	1000	690	426	424	357	409	498	688	519	218	361	383	339	386	238	228	381	0	609	435
	NEI (ETRO)	20	93	959	1221	2138	4594	5034	5137	5839	2746	1685	4011	2285	3027	2248	2504	1387	294	81	0	0	0	0	0	
	NEI (Flag related)	2155	4650	5856	8982	6151	4378	8964	10697	11862	16569	24896	24060	15092	8470	531	0	0	0	0	0	0	0	0	0	
	NEI (UK.OT)	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Namibia	0	0	0	0	0	0	715	29	7	46	16	423	589	640	274	215	177	307	283	41	146	108	181	289	196
	Nigeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0
	Norway	60	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	3847	3157	5258	7446	9991	10138	13234	9927	4777	2098	1252	580	952	89	63	0	1521	2310	2415	2922	2263	2405	3047	3462	1694
	Philippines	0	0	0	0	0	0	0	0	0	0	1154	2113	975	377	837	855	1854	1743	1816	2368	1874	1880	1399	1267	532
	Russian Federation	0	0	0	0	0	0	0	0	13	38	4	8	91	0	0	0	0	1	1	26	73	43	0	0	

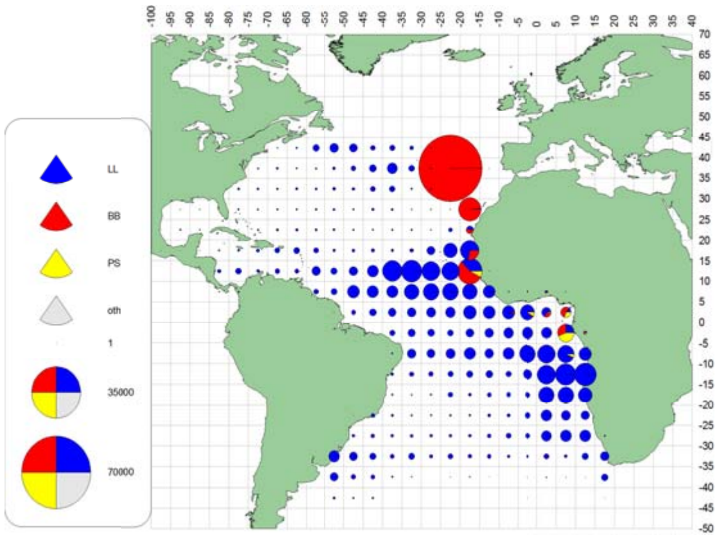
S. Tomé e Príncipe	5	8	6	3	4	4	3	6	4	5	6	5	4	4	4	4	11	6	4	0	92	94	97	0	
Senegal	0	0	0	15	5	9	126	237	138	258	730	1473	1131	1308	565	474	561	721	1267	805	926	1042	858	239	230
Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	58	0	162	0	0	0	0	0	0	0	0	0	
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	0	0	0	0	1088	
South Africa	561	367	296	72	43	88	79	27	7	10	53	55	249	239	341	113	270	221	84	171	226	159	145	153	47
St. Vincent and Grenadines	0	0	0	0	1	3	0	0	4	2	2	1	1216	506	15	103	18	0	114	567	171	292	396	38	45
Sta. Lucia	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	2	0	2	0	0	0	0	0	0	0
Togo	7	12	12	6	2	86	23	6	33	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0	
Trinidad and Tobago	1	19	57	263	0	3	29	27	37	36	24	19	5	11	30	6	5	9	12	27	69	56	40	33	33
U.S.A.	1127	847	623	975	813	1090	1402	1209	882	1138	929	1263	574	1085	601	482	416	484	991	527	508	515	571	722	869
U.S.S.R.	1077	424	95	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	0	0	0	0	1	1	0	0	0	0	0	0	0
UK.Sta Helena	1	1	3	3	10	6	6	10	10	12	17	6	8	5	5	0	0	0	25	18	28	17	11	190	51
Uruguay	120	55	38	20	56	48	37	80	124	69	59	28	25	51	67	59	40	62	83	22	27	201	23	15	2
Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	109	52	132	91	34	42	39	23
Venezuela	332	115	161	476	270	809	457	457	189	274	222	140	221	708	629	516	1060	243	261	318	122	229	85	264	98

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.

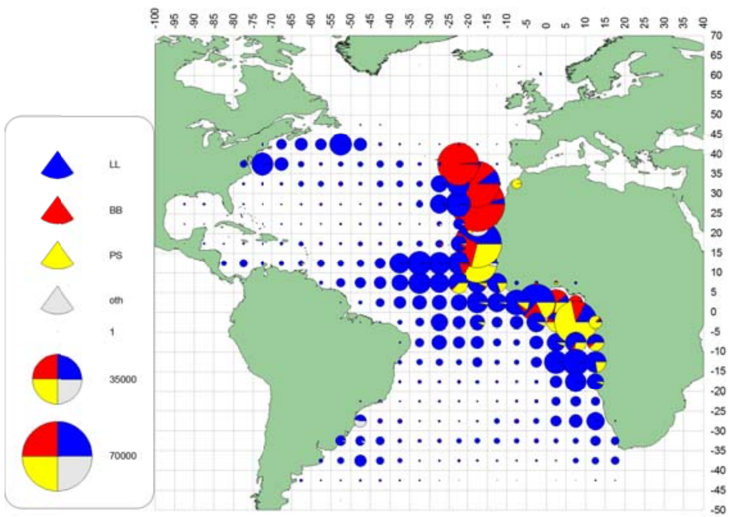
	Year									
TAC	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
60	54%	63%	71%	75%	79%	82%	84%	85%	86%	87%
70	54%	61%	67%	71%	74%	76%	77%	79%	80%	81%
80	54%	58%	62%	66%	68%	70%	71%	72%	73%	74%
90	54%	57%	58%	60%	61%	62%	62%	63%	63%	64%
100	53%	54%	54%	54%	54%	54%	54%	54%	55%	55%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



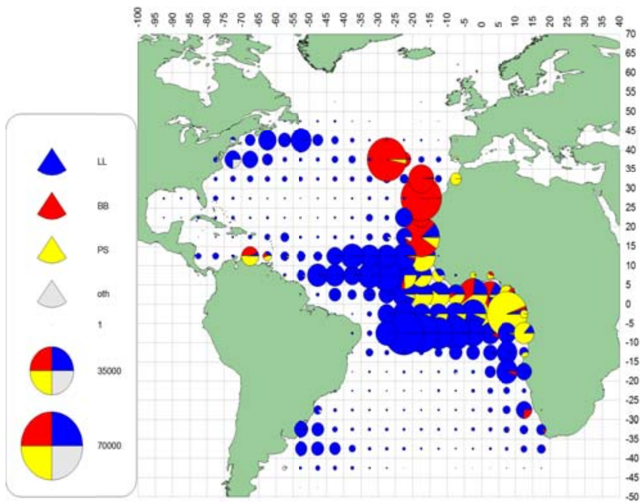
a. **BET (1950-59)**



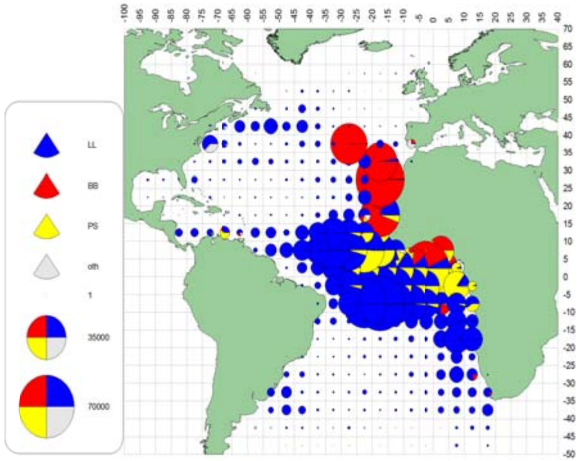
b. **BET (1960-69)**



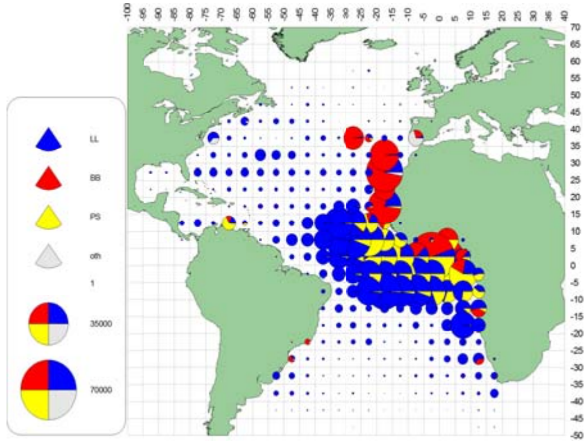
c. **BET (1970-79)**



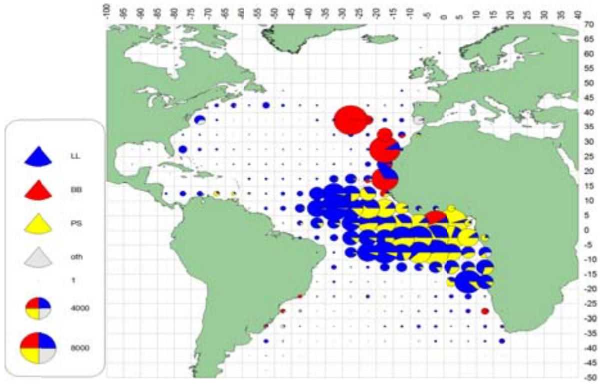
d. **BET (1980-89)**



a. **BET (1990-99)**

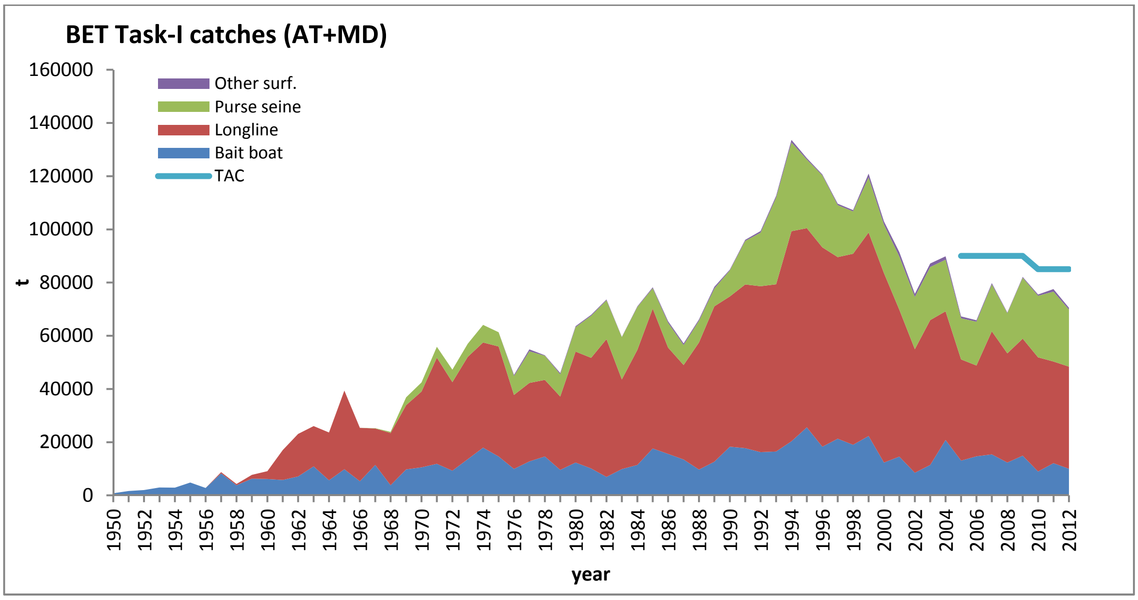


b. **BET (2000-09)**



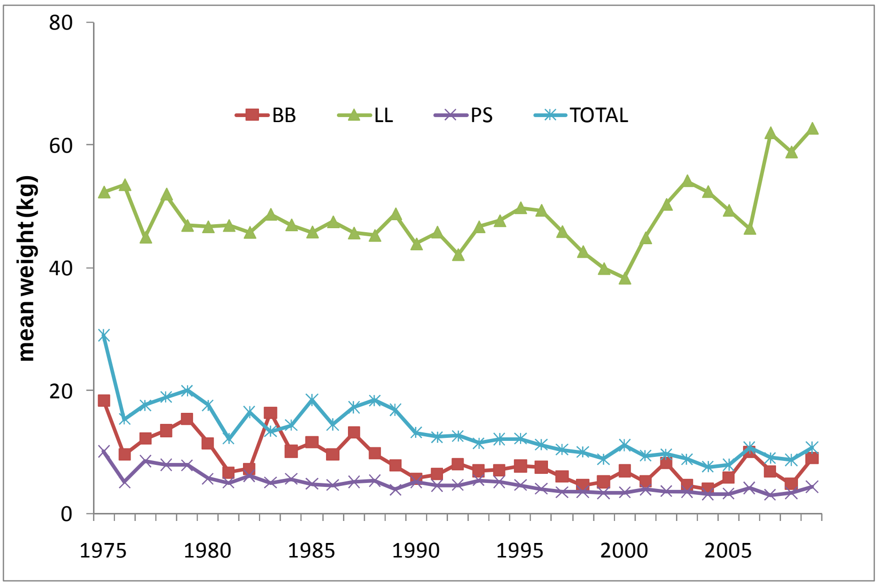
c. **BET (2010-11)**

BET-Figure 1 [a-g]. Geographical distribution of the bigeye tuna catch by major gears and decade. The maps (a-f) are scaled to the maximum catch observed during 1950-2009. Map (g) is scaled to the maximum catch observed from 2010-2011.

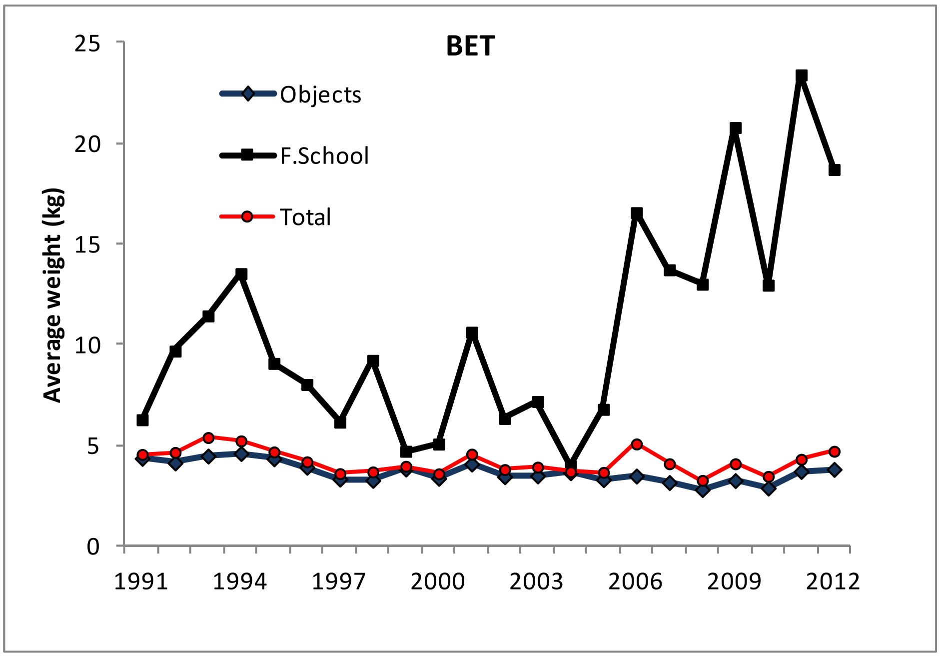


BET-Figure 2. Bigeye Task I catches for all the Atlantic stock, in tonnes. The value for 2012 represents preliminary estimates because some countries have yet to provide data for this year.

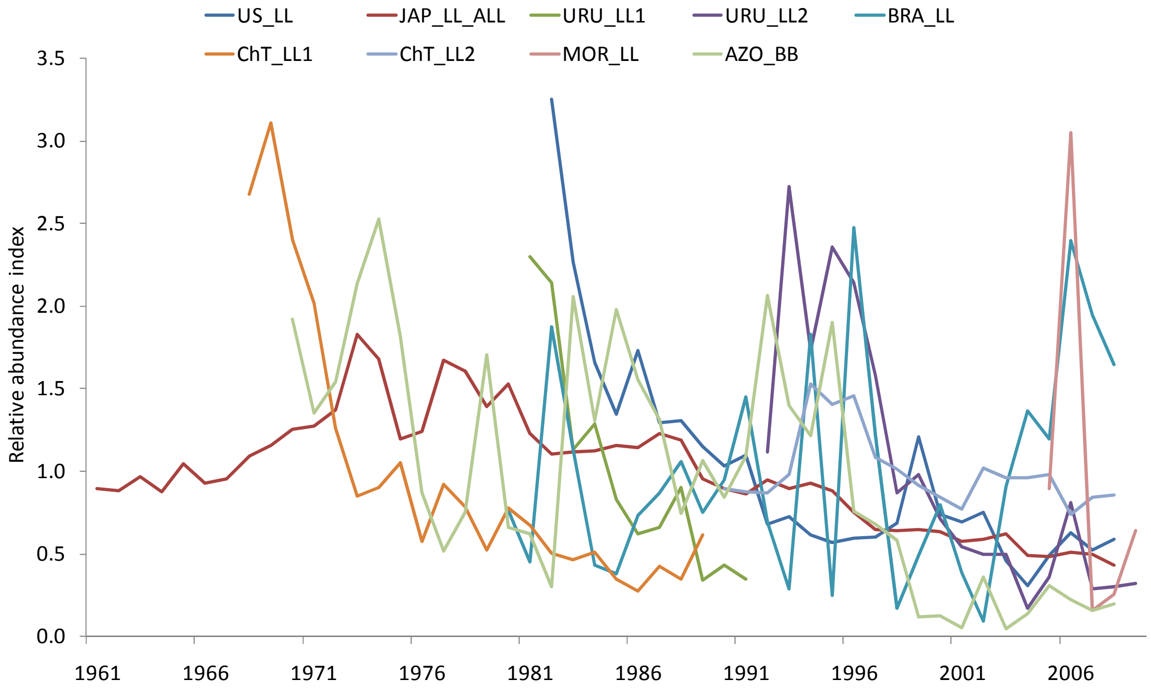
a)



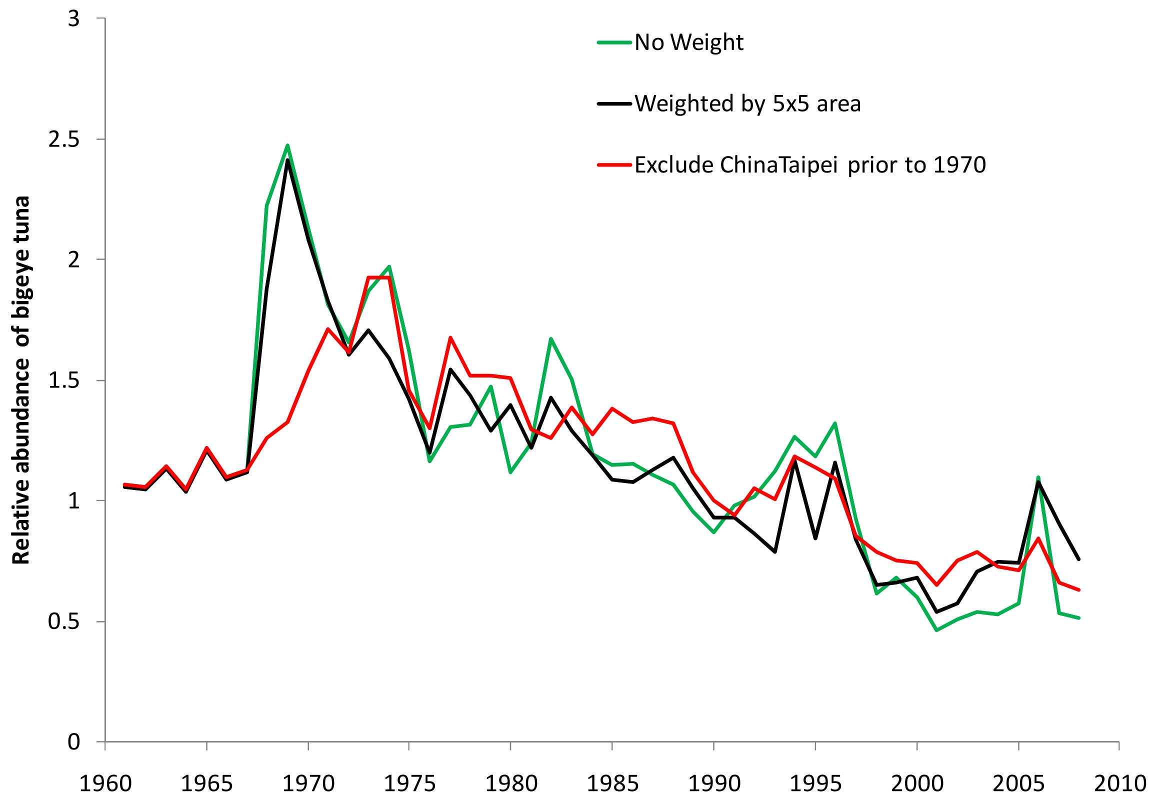
b)



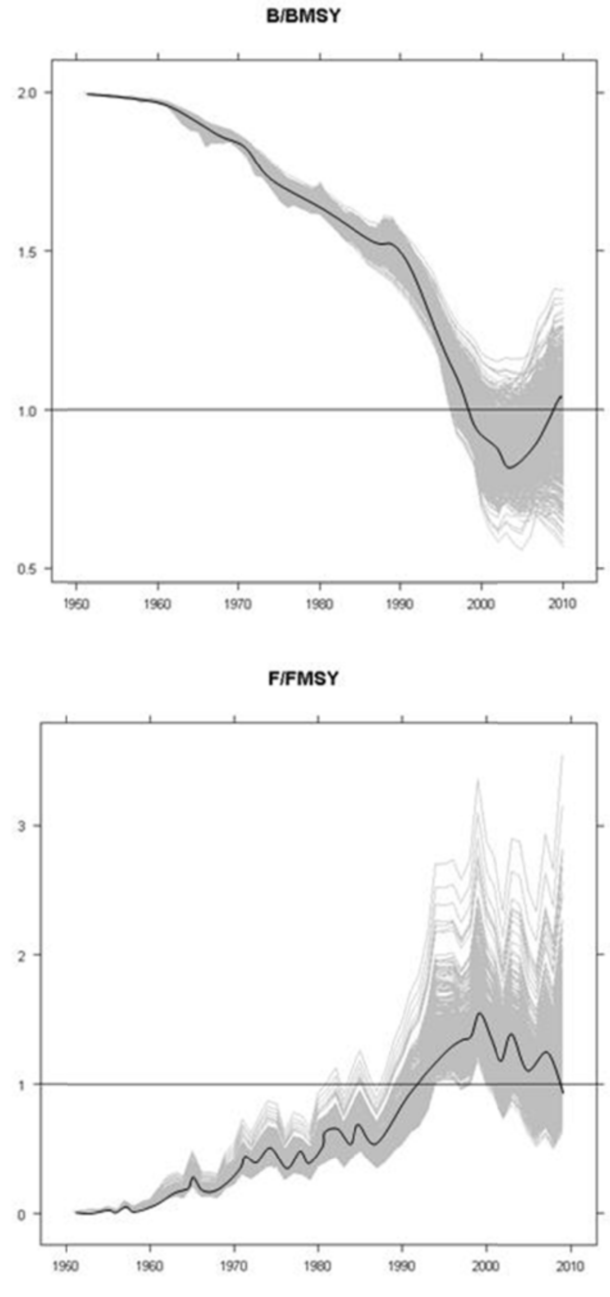
BET-Figure 3. Trend of mean weight for bigeye based on the catch-at-size data a) by major fisheries and total (1975-2009), b) for European purse seiners (total) and separated between free schools and FAD associated schools (1991-2012).



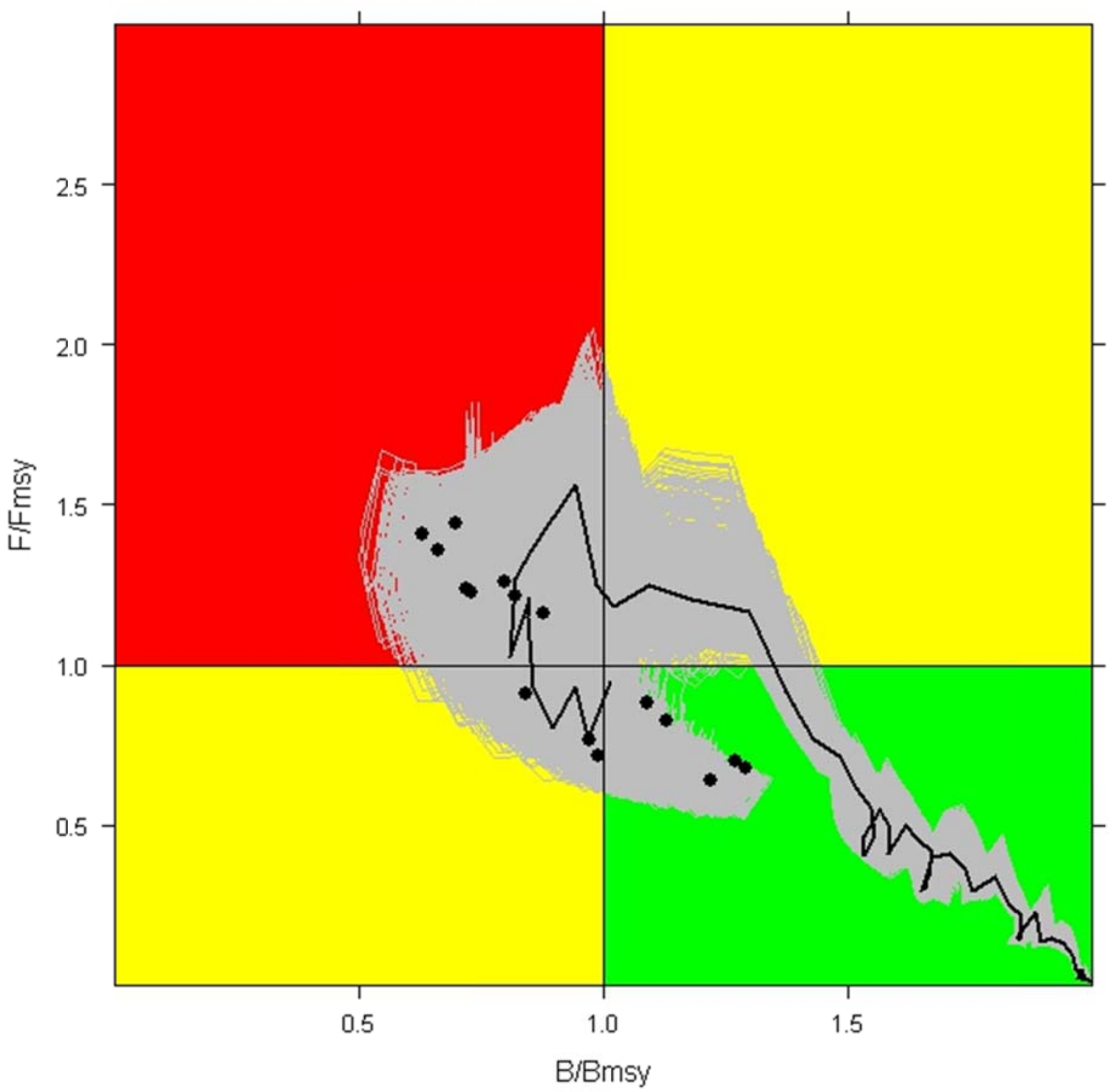
BET-Figure 4. Relative abundance indices for bigeye tuna. AZO_BB Azores Baitboat, BRA_LL, Brazil longline, ChT_LL1, Chinese Taipei longline 1968-1989, ChT_LL2 Chinese Taipei longline 1990-2008, JAP_LL Japanese longline, MOR_LL Morocco longline, URU_LL1 Uruguay longline 1981-1991, URU_LL2 Uruguay longline 1992-2008, US_LL USA longline.



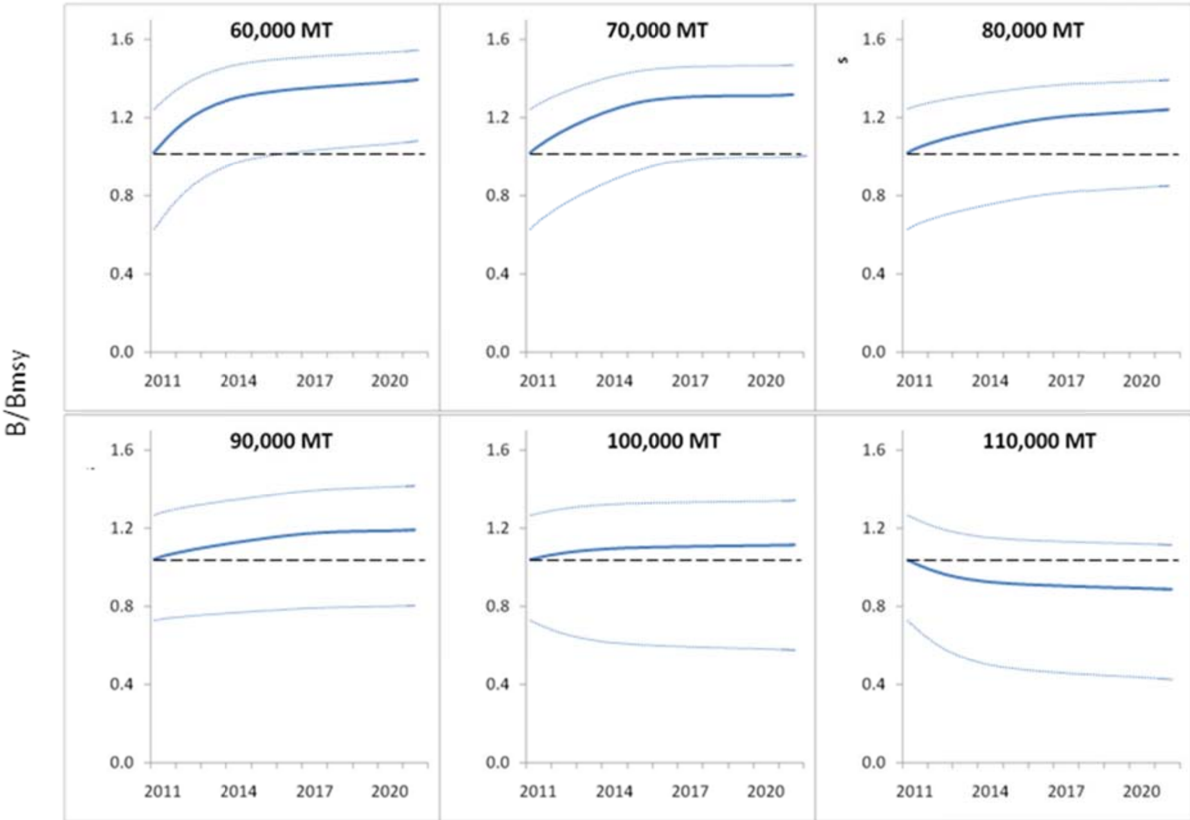
BET-Figure 5. Three alternative combined indices selected for the bigeye tuna assessment with logistic non-equilibrium production models.



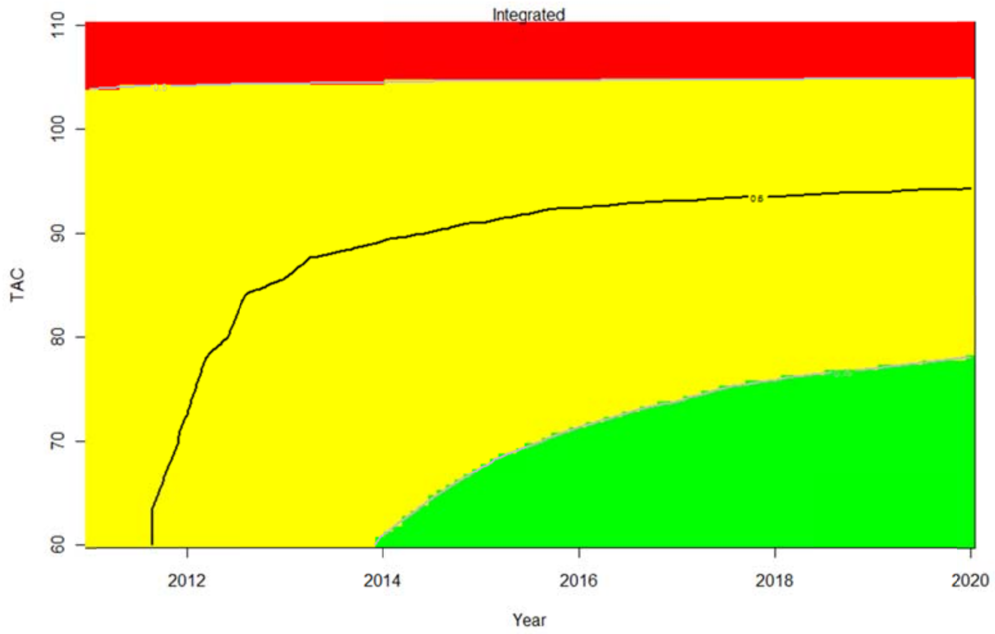
BET-Figure 6. Trajectories of B/B_{MSY} and F/F_{MSY} estimated from the logistic production model. Lines represent the 80% percentile of bootstrap results and thicker line the median.



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. 2009b) using available catches to 2006. Skipjack had only been assessed previously in 1998 (Anon. 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. The 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. Fishery indicators

The total catches obtained in 2012 in the entire Atlantic Ocean (including estimates of skipjack in the *faux-poisson* landed in Côte d'Ivoire by the EU-purse seiners) reached a historic record of 241,000 t **(SKJ-Table 1**, **SKJ-Figure 2)**. This represents a considerable increase compared to the average catches of the previous five years (168,000 t). It is possible however, that the catches of a segment of the Ghanaian purse seine fleet, transshipped at sea on carriers before 2011, had escaped the collection process of fishery statistics. On the other hand, the results of the recent missions of experts carried out in Ghana under ICCAT have shown the existence of bias, which have already been corrected, in the sampling protocol aimed at correcting the multi-species composition of catches reported in the logbooks.

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, Belize, Panama, EU-France and Curaçao, followed by the baitboat fisheries of Ghana, EU-Spain, EU-Portugal and EU-France. The preliminary estimates of catches made in 2012 in the East Atlantic amounted to 207,500 t, that is, a sharp increase of about 46% as compared to the average of 2007-2011 **(SKJ-Figure 3)**. A strong increase in the skipjack catches by European purse seiners is noted, probably due to the high selling price of this species. In recent years, the seasonal fishing by European purse seiners on free schools, off Senegal, has decreased sharply and consequently, the proportion of the catches on floating objects continued to increase up to 2007, reaching slightly more than 90% of the catches **(SKJ-Figure 4)**. The high catches, unusual for this type of fishing off Mauritania beyond 15^{o}N latitude in 2012 between August and November, reinforces this trend. It should be noted that the catches are made on practically single species schools (**SKJ-Figure 1**).

The unreported catches of some purse seine catches were estimated by comparing monitored landings in West African ports and cannery data to catches reported to ICCAT. The Committee has had cooperation from many CPCs of this region and from the professional sector in estimating these catches and significant revisions have been made in recent years for the purse seiners as well as for the other fleets since 2005. On the other hand, species composition and catch at size of the Ghanaian baitboat and purse seine fleet, has been thoroughly reviewed. This review has resulted in new estimates of Task I and Task II catch and effort and size for these fleets for the 1973-2005 period. Similar estimates for the 2006-2012 period, are expected to be available soon. This revision has shown that skipjack tuna catches by Ghanaian fleets were significantly higher, on average around 9,000 t/year for the 1996-2005 period, compared to what was previously estimated.

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 studies conducted on board French purse seiners (estimated at 42 kg per ton of skipjack landed). Furthermore, the amount of small skipjack (average size 37 cm FL) landed in the local market of Abidjan in Côte d'Ivoire as *faux-poisson* has been estimated at 235 kg per ton of skipjack landed. However, new estimates, on the specific composition in particular, of *faux-poisson*, carried out during the recent Tropical Tuna Species Group Inter-sessional Meeting on the Ghanaian Statistics Analysis, indicate amounts of around 11,000 t/year between 2005 and 2010 for the overall purse seiners operating in the East Atlantic (4,092 t/year between 2003 and 2012 for the European and associated purse seiners, **SKJ-Figure 5**). The Committee regularly integrates these estimates in the reported historical catches for the EU-purse seiners since 1981, as well as in the catch-at-size matrix and this procedure should be extended to all the fleets landing *faux-poisson*.

In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. Catches in 2012 in the West Atlantic have been estimated at 33,200 t, which is close to the historic record of 40,000 t obtained in 1985. This very strong increase (29% compared to the average catches observed in the last 5 years) is largely due to the good catches reported by Brazilian baitboats **(SKJ-Figure 6)**. As the fishing effort of this fleet has not increased, this increase could be due to an increase either due to the productivity or catchability. This corresponds to the increase in catches also observed in the East Atlantic by European purse seiners.

It is difficult to estimate effective fishing effort for skipjack tuna in the East Atlantic because this species is not always targeted and besides it is difficult to estimate fishing effort related to fishing under FADs and to quantify the assistance provided by the supply vessels. The Committee recognizes that the use of data series on the annual development of sale prices of tropical species by commercial category would allow identification of the years where skipjack was targeted by fishing fleets and recommends the ICCAT Secretariat to identify conditions for accessing the databases on this subject. 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 one new purse seine fleet operating from Tema (Ghana), and whereby catches are probably highly underestimated (2006-2012 period undergoing revision), 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 has stabilized since 2010. 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 hypothesis of a 3% average annual increase in skipjack catchability to account for technological changes, an analysis has been conducted by fixing MSY and K at levels that agree with estimates made during previous stock assessments. This method considers an increase in catchability within a range of values 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 reached its maximum historical level in 2011 and 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, various 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 to carry out a follow up of the development 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 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**) and/or to seasonal changes of fishing zones as suggested by a recent study on this fishery. 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 spatial 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 was unlikely that until recent years skipjack were overexploited in the eastern Atlantic **(SKJ-Figure 15)**. The high catches and the extension of the fishing zone reported recently suggest an increase in the available biomass or an increase in fishing mortality, and the development of the fishery towards a new exploitation regime which should be evaluated very soon.

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 absence of a larval index trend, limited to the Gulf of Mexico, seems to reinforce this hypothesis. However, 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 Committee 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. Effect of current regulations

There is currently no specific regulation in effect for skipjack tuna. Although the average of catches in recent years are below the estimates of MSY, the Committee is concerned about the high catches of skipjack reported in 2011 from the two coasts of the Atlantic and the potential under-reporting in recent years for the East stock.

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] and the establishment of a time/area closure of the surface fishery [Rec. 04-01], which aims at decreasing mortality due to juvenile bigeye tuna fishing, are regulatory measures whose effects were analyzed by the Species Group meeting.

Although aimed at a total closure, this measure which is much smaller in time (November) and area (0º-5ºN, 10ºW-20ºW) than the previous moratorium on FADs, has been considered less effective in reducing the catches of small bigeye taken by the surface fishery. For purposes of comparison, when the fishing effort of the EU purse seine fleet was at its maximum value (period 1994-1996, i.e., before the implementation of the first moratorium on FADs), 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).

The new Recommendation [Rec. 11-01] which replaces that relative to the complete closure of the surface fishery and establishes a new moratorium on FAD fishing in the area that extends from the coast to 10ºS and 5ºW latitude to 5ºE longitude during the months of January and February, will enter into force in 2013 and will most likely have an impact on the skipjack catches.

SKJ-5. Management recommendations

The Committee reiterated its advice that catches should not be allowed to exceed MSY. As recent catches have clearly exceeded the estimate of MSY, made in 2008, and taking into account: 1) the uncertainties related to the status of these stocks, relative to this reference point, in the new exploitation scheme, and 2) uncertainties identified in the 2008 assessment, it is difficult to know if the current catches can produce overexploitation. Therefore, the Committee recommends an assessment of the skipjack stocks in 2014.

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

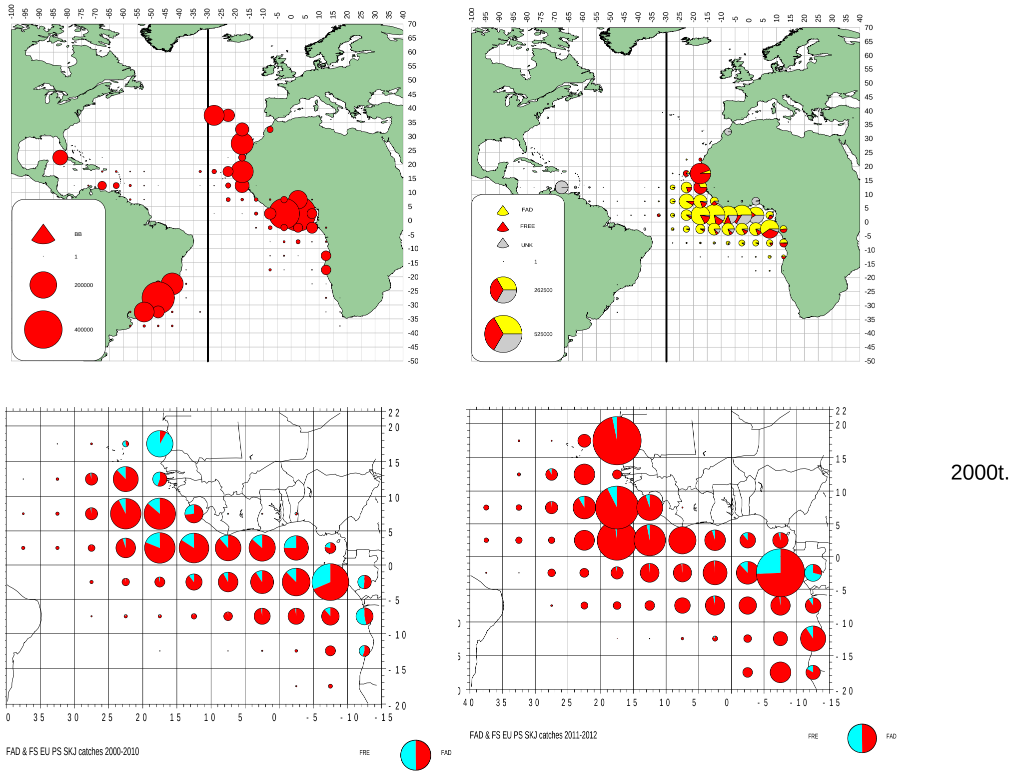
	East Atlantic	***West Atlantic***
Maximum Sustainable Yield (MSY)	Around 143,000-170,000 t	Around 30,000-36,000 t
Current (2012) Yield [1]	207,500 t	33,200 t
Current Replacement Yield	Somewhat below 207,500 t	Somewhat above 33,200 t
Relative Biomass (B_{2008}/B_{MSY})	Most likely>1	Most likely>1
Relative Fishing Mortality: (F_{2008}/F_{MSY})	Most likely<1	Most likely<1
Management measures in effect	Rec. 04-01 (effective 2005) [2] Rec. 11-01[3]	None

[1] Reports of catches for 2012 should be considered provisional, particularly for the West Atlantic.
[2] Although this time-area measure was implemented to reduce mortality on juvenile bigeye tuna, a total area closure has the expected effects on all the tropical tuna species.
[3] This new moratorium on FADs entered into force in January 2013 and replaces Rec. 04-01.

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

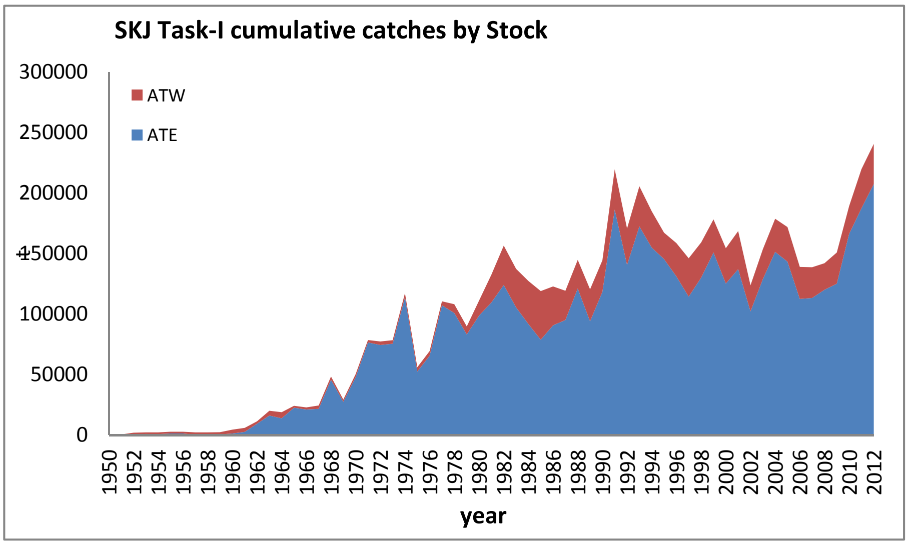
			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			144796	120419	144471	219733	170708	205685	185014	167381	158730	146110	159356	178295	154498	168753	123852	153673	179010	172011	139042	138879	142142	150872	189301	219846	240821
	ATE		121060	94037	118361	186330	140554	172462	155065	145479	131160	114395	130093	150887	125215	137190	102216	128792	151388	143367	112569	113332	120053	125093	166261	187450	207545
	ATW		23736	26382	26110	33404	30155	33221	29949	21860	27562	31712	29087	27356	29193	31486	21600	24749	27461	28517	26453	25443	22022	25774	23000	32383	33219
	MED		0	0	0	0	0	2	0	43	9	4	176	53	90	77	37	132	161	127	20	104	67	5	40	13	58
Landings	ATE	Bait boat	48015	41000	36922	41611	35660	31656	37817	33691	35872	37314	46784	44762	33909	56689	31076	34445	54602	48185	41118	29888	44173	33623	37114	31256	45086
		Longline	4	9	0	5	3	2	10	3	7	47	85	42	48	53	56	66	47	71	201	405	172	58	42	30	319
		Other surf.	1506	1643	1357	2067	1602	1062	501	445	501	304	923	417	2423	764	681	551	1085	2305	5182	3379	3764	6500	6250	1714	6057
		Purse seine	71535	51385	80082	142646	103288	139742	116737	111340	94780	76729	82301	105667	88834	79684	70403	93730	95654	92806	66069	79659	71944	84912	122855	154449	156083
	ATW	Bait boat	21057	23292	22246	23972	20852	19697	22645	17744	23741	26797	24724	23881	25641	25142	18737	21990	24082	26028	23749	22865	20617	22770	19923	29468	30693
		Longline	9	25	23	33	29	20	16	34	19	12	21	58	22	60	349	95	206	207	286	52	49	20	30	41	470
		Other surf.	355	600	600	872	764	710	1577	2023	452	556	516	481	467	951	398	367	404	316	372	1317	455	950	1104	1014	474
		Purse seine	2315	2466	3241	8527	8509	12794	5712	2059	3349	4347	3826	2936	3063	5332	2116	2296	2769	1967	2045	1209	901	2035	1943	1859	1582
	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	3	17	21	12	3	23	27	0	4	5	28
		Other surf.	0	0	0	0	0	2	0	43	9	4	176	53	90	77	32	12	40	17	17	44	24	4	27	7	29
		Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	103	101	99	0	38	16	1	8	1	1
Discards	ATE	Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	ATW	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	0
Landings	ATE	Angola	30	85	69	66	41	13	7	3	15	52	2	32	14	14	14	14	10	0	0	0	0	50	636	44	91
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1373	2714	7429	12816
		Benin	3	7	2	2	2	2	2	2	2	7	3	2	2	0	0	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	1456	971	806	1333	864	860	1007	1314	470	591	684	962	789	794	398	343	1097	7737	4999	5778	5038	5560	5155	7883	5535
		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	4	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	1	3	0	5	3	2	10	3	5	47	73	39	41	24	23	26	16	10	9	14	19	6	11	15	13
		Congo	8	11	12	9	9	10	7	7	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	206	331	86	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Curaçao	0	0	0	0	0	0	0	0	7096	8444	8553	9932	10008	13370	5427	10092	8708	0	3042	1587	6436	9143	9179	11939	12779
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	1173	259	292	143	559	1259	1565	1817	2328	2840	2840	2107	10923
		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	47643	35300	47834	79908	53319	63660	50538	51594	38538	38513	36008	44520	37226	30954	25456	44837	38725	28139	22206	23670	35105	36694	41186	56661	66648
		EU.Estonia	0	0	0	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	16504	15211	17099	33271	21890	33735	32779	25188	23107	17023	18382	20344	18183	16593	16615	19899	21879	14850	7034	4168	4439	7789	14741	13065	13139
		EU.Germany	0	0	0	0	0	0	0	0	3	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	14	14	14	0	0	8	6	0	
		EU.Latvia	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Lithuania	0	0	0	221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	14257	7725	3987	8059	7477	5651	7528	4996	8297	4399	4544	1810	1302	2167	2958	4315	8504	4735	11158	8995	6057	1084	12974	4143	2794
		Gabon	0	0	0	0	0	1	11	51	26	0	59	76	21	101	0	0	0	0	0	0	0	0	0	0	
		Ghana	26597	22751	24251	25052	18967	20225	21258	18607	24205	26364	41840	52024	34980	55475	37570	32977	46030	54209	30236	34572	37387	36064	53813	50363	57699
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6389	4959	5546	6319	4036	2951	2829	3631
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1224	1224	1010	
		Japan	3200	2243	2566	4792	2378	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	5
		Korea Rep.	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		Maroc	428	295	1197	254	559	310	248	4981	675	4509	2481	848	1198	268	280	523	807	1893	3779	1570	1291	2575	2317	2147	2265
		Mixed flags (FR+ES)	4660	4125	5280	11101	12273	13750	9492	5862	5831	4905	5621	6845	9461	7137	2995	4959	5262	4666	5313	3275	3128	2969	4163	3300	3884
		NEI (ETRO)	2994	2263	10869	11335	12409	20291	17418	16235	16211	6161	6748	8893	7127	8087	8550	9688	11137	2873	629	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	2	15	0	1	0	0	0	8	0	0	0	0	0	0	0	71	2	2	15
		Nigeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	12	4
		Norway	738	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	8312	8719	13027	12978	14853	5855	1300	572	1308	1559	281	342	0	7126	11490	13468	18821	8253	8518	9590	12509	10927
		Rumania	0	59	142	349	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	1175	1110	540	1471	1450	381	1146	2086	1426	374	0	0	0	0	0	392	1130	313	260	0	20	
		S. Tomé e Príncipe	195	196	204	201	178	212	190	180	187	178	169	181	179	179	179	179	117	166	143	0	229	235	241	0	
		Senegal	0	47	134	652	260	95	59	18	163	455	1963	1631	1506	1271	1053	733	1333	4874	3534	2278	3661	4573	2447	4823	4340

		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6770	
		South Africa	157	96	17	15	7	6	4	4	1	6	2	1	7	1	1	2	2	1	0	0	4	4	2	6	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	8
		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.	1822	1915	3635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	158	397	171	24	16	65	55	115	86	294	298	13	64	205	63	63	63	63	88	110	45	15	25	371	
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
	ATW	Argentina	7	111	106	272	123	50	1	0	1	0	2	0	1	0	0	0	30	0	0	0	0	3	12	0	
		Barbados	3	9	11	14	5	6	6	6	5	5	10	3	3	0	0	0	0	0	0	0	0	0	0	1	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
		Brasil	17316	20750	20130	20548	18535	17771	20588	16560	22528	26564	23789	23188	25164	24146	18338	20416	23037	26388	23270	24191	20846	23307	20590	30563	30872
		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	7	19	0	32	26	9	7	2	10	1	2	1	0	1	16	14	27	28	29	2	8	0	2	1	0
		Colombia	0	0	0	0	0	2074	789	1583	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	1631	1449	1443	1596	1638	1017	1268	886	1000	1000	651	651	651	0	0	624	545	514	536	0	0	0	0	0	
		Curaçao	40	40	40	40	40	45	40	35	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	
		Dominica	0	0	60	38	41	24	43	33	33	33	33	85	86	45	55	51	30	20	28	32	45	25	0	13	
		Dominican Republic	63	117	110	156	135	143	257	146	146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	0	0	0	1592	1120	397	0	0	0	0	0	1	1	0	0	0	0	0	0	5	11	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	17	10	
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	9	0	0	23	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	3	3	5	21	11	0	6	0	8	
		Grenada	22	11	23	25	30	25	11	12	11	15	23	23	23	15	14	16	21	22	15	26	20	0	0	0	
		Jamaica	0	0	0	0	0	0	0	0	62	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	1	0	0	0	0	0	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	
		Mexico	10	14	4	9	8	1	1	0	2	3	6	51	13	54	71	75	9	7	10	7	8	9	7	9	8
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	0	0	0	35	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	
		St. Vincent and Grenadines	17	28	29	27	20	66	56	53	37	42	57	37	68	97	357	92	251	251	355	90	83	54	46	50	0
		Sta. Lucia	53	38	37	51	39	53	86	72	38	100	263	153	216	151	106	132	137	159	120	89	168	0	153	143	109
		Suriname	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	373
		Trinidad and Tobago	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	57	73	304	858	560	367	99	82	85	84	106	152	44	70	88	79	103	30	61	66	67	119	54	87	112
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0
		Venezuela	4509	3723	3813	8146	7834	11172	6697	2387	3574	3834	4114	2981	2890	6870	2554	3247	3270	1093	2008	921	757	2250	2119	1473	1742
	MED	Algerie	0	0	0	0	0	0	0	0	0	0	171	43	89	77	0	0	0	0	0	0	0	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	26	10	15	44	12	0	5	7	56
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	8	2	0
		EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102	99	99	0	0	0	0	0	0	
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	29	34	17	0	0	0	0	0	0	
		Maroc	0	0	0	0	0	2	0	43	9	4	5	10	1	0	1	1	2	1	5	22	18	5	26	4	2
		Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	36	0	0	0	
Discards	ATE	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	1	
	ATW	Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

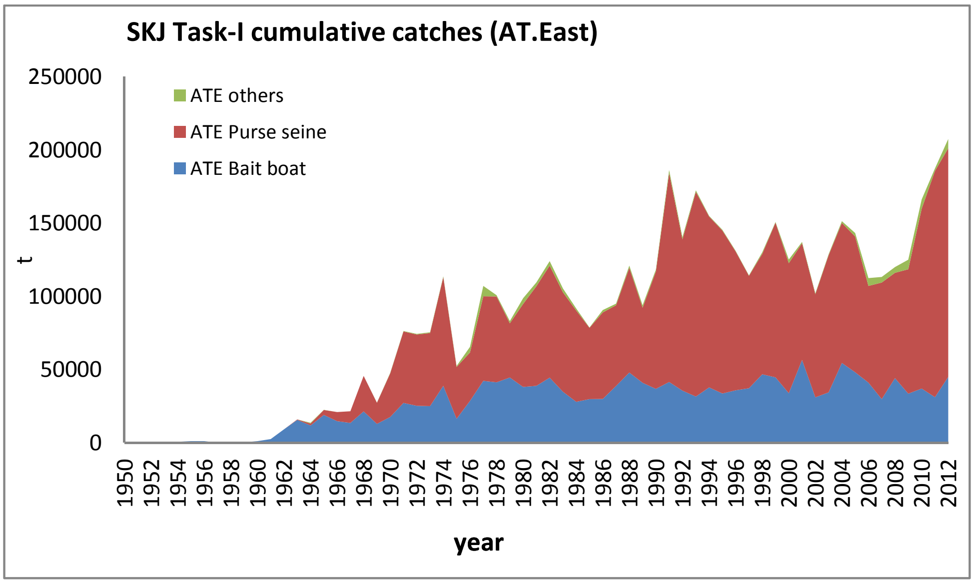


2000-2010 **2011-2012**
SKJ free schools & FAD catches

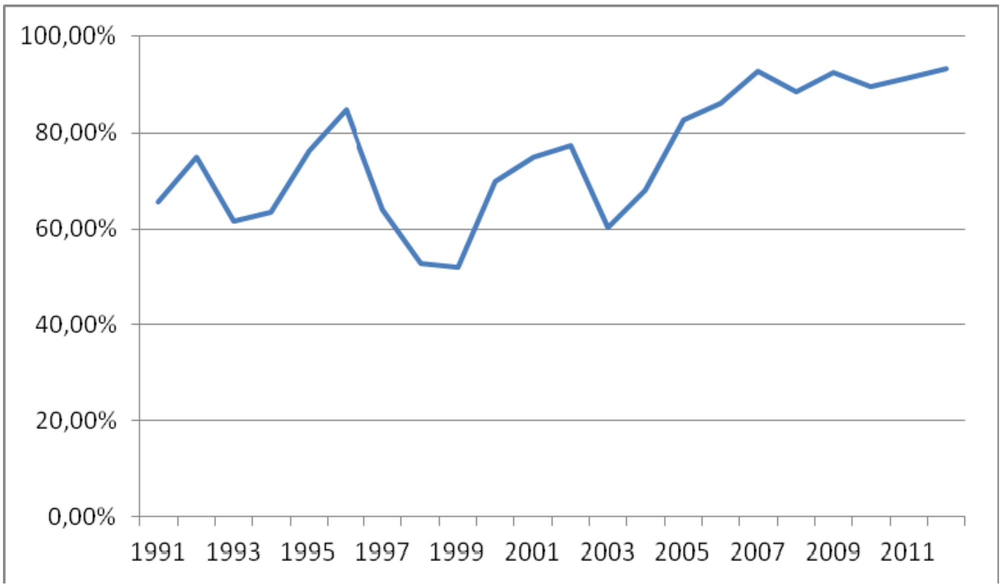
SKJ-Figure 1. (A) Distribution of skipjack catches in the Atlantic for baitboat (upper left panel) between 1950 and 2011 and for purse seiners (upper right panel) by fishing mode (free schools vs. FADs) between 1991 and 2011. (B) Skipjack catches made by. European and associated purse seiners (about 75% of the total catches), by fishing mode, between 2000 and 2010 (lower left panel) and between 2011 and 2012 (lower right panel) showing the withdrawal from the Senegal fishing zone on free schools, due to non-renewal of the fishing agreements in 2006, and the appearance of a fishing area under FADs in 2012 North of 15°N latitude.



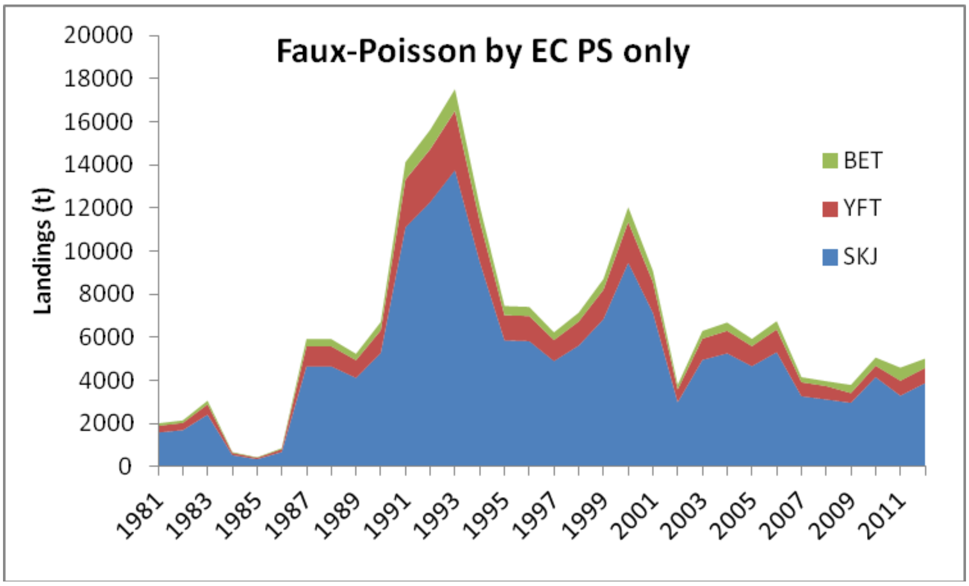
SKJ-Figure 2. Total catch (t) for skipjack tuna in the Atlantic Ocean and by stocks (East and West) between 1950 and 2012. Estimates of skipjack in the "*faux poissons*" landed in Côte d'Ivoire were included in the skipjack trade catches in the eastern Atlantic (only catches to 2006 were considered for the stock assessment). It is possible that skipjack catches taken in the eastern Atlantic in recent years were not reported or were under-estimated in the logbook correction of species composition based on multi-species sampling carried out at the ports.



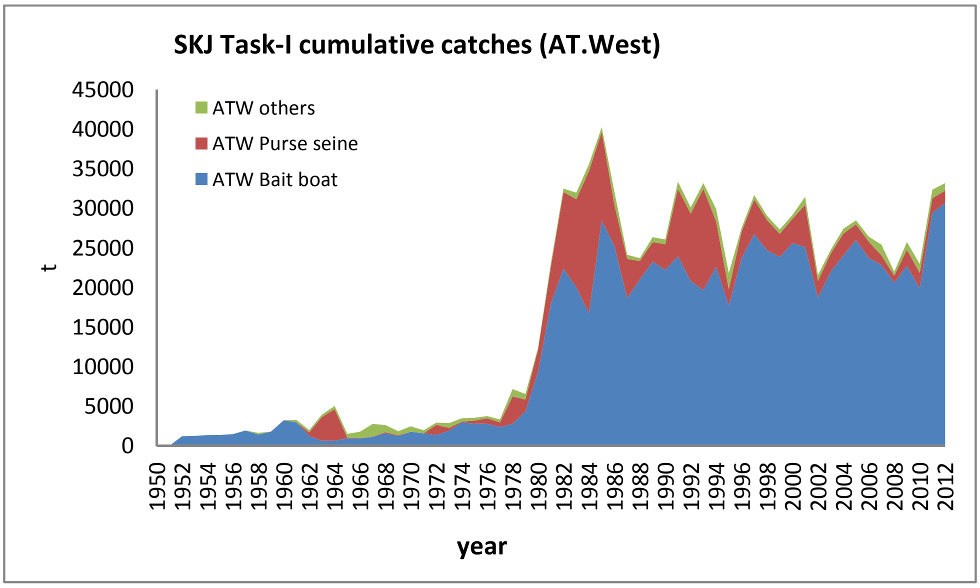
SKJ-Figure 3. Skipjack catches in the eastern Atlantic, by gear (1950-2012), after correction of Ghana's data by species (1996-2005). It is possible that skipjack catches taken by purse seiners during recent years were not reported or under-estimated (in the case of Ghana, undergoing revision: 2006-2012).



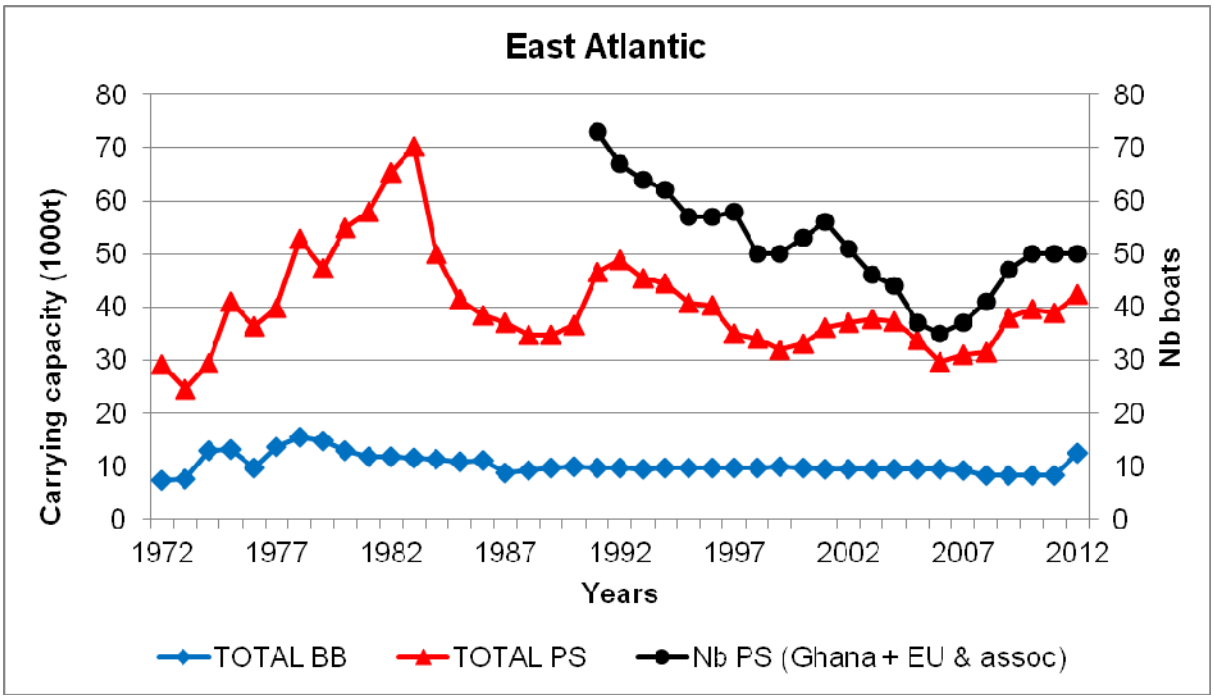
SKJ-Figure 4. Changes in the proportion of skipjack catches made by European purse seiners under FADs (1991-2012). The increase in the percentage of catches under FADs coincides with the shift from the Senegal area (due to not renewing the fishing agreements); area known for its seasonal fishing on free schools (see **Figure 1**).



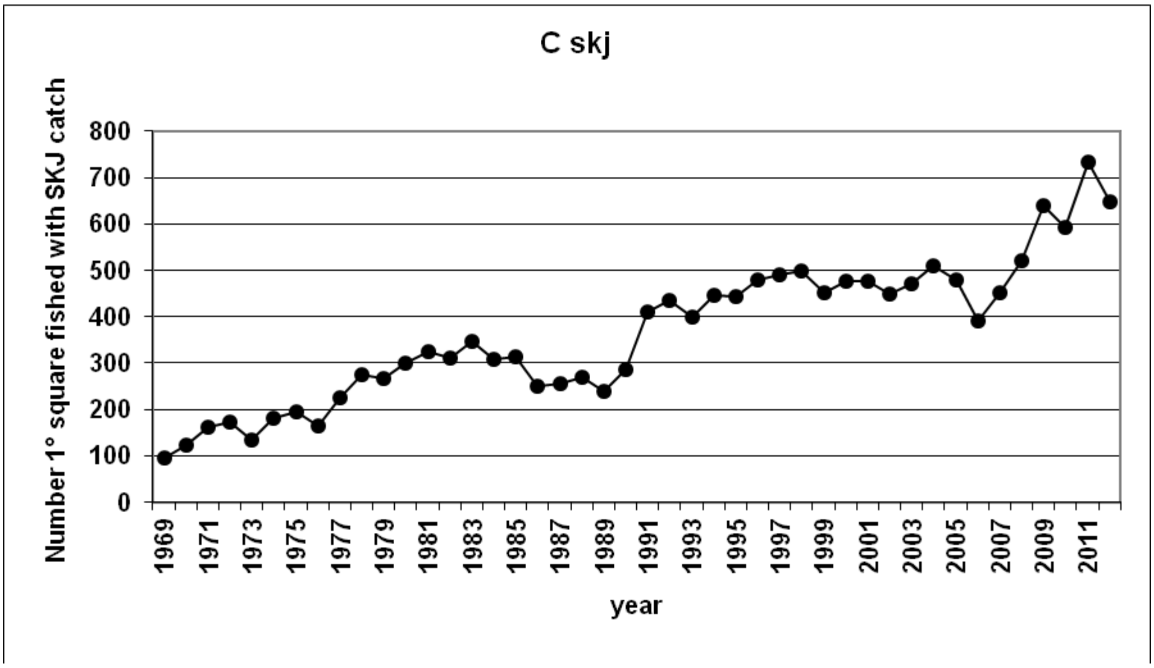
SKJ-Figure 5. Cumulative estimated landings of "*faux poissons*" (1981-2012) for the European or associated purse seiners for the three main species of tropical tunas in the local market of Abidjan (Côte d'Ivoire).



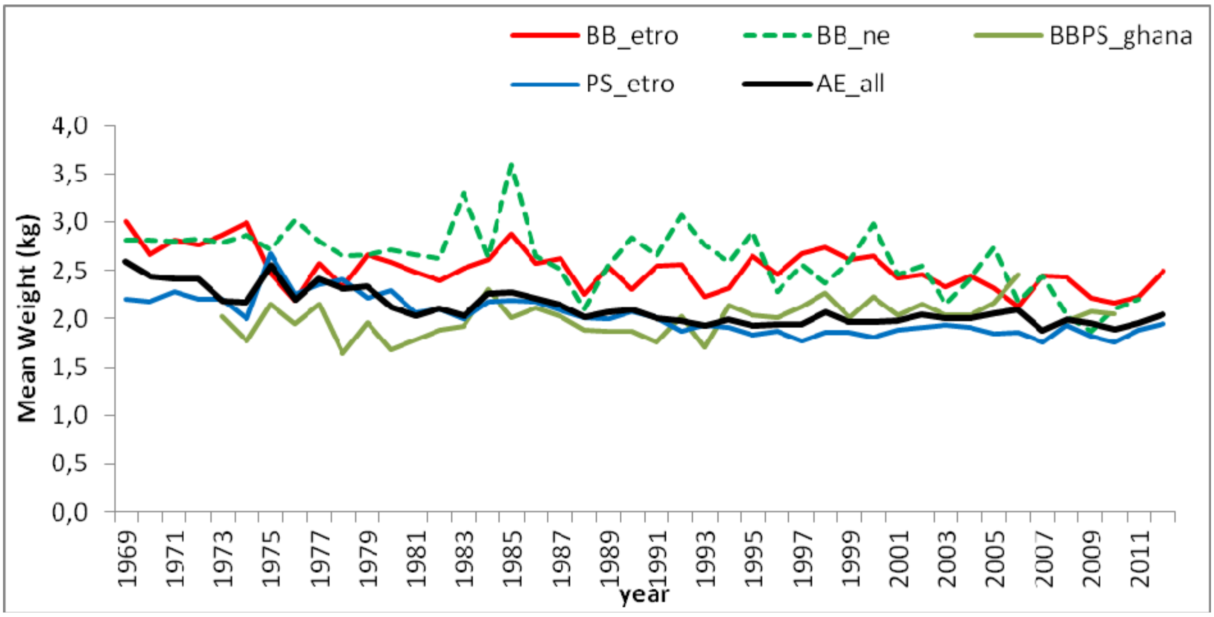
SKJ-Figure 6. Skipjack catches in the western Atlantic, by gear (1950-2012).



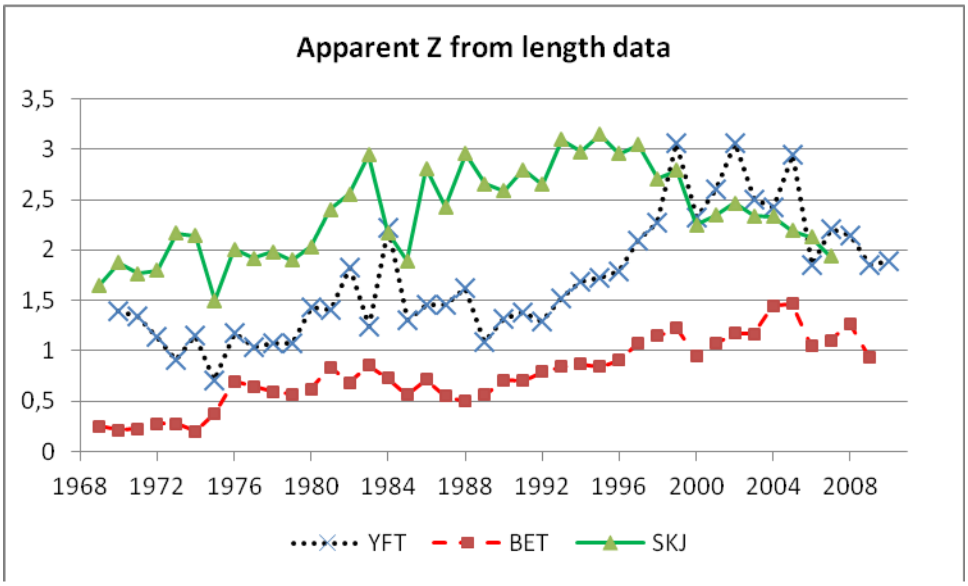
SKJ-Figure 7. Changes over time in the carrying capacity, corrected by the annual percentage of time at sea, (left axis) for the overall purse seiners and baitboats operating in the eastern Atlantic (1971-2012) and in number of boats for the European purse seiners, associated and Ghanaian fleets (right axis). It is possible that the carrying capacity for some segments of the purse seine fleet was underestimated during recent years.



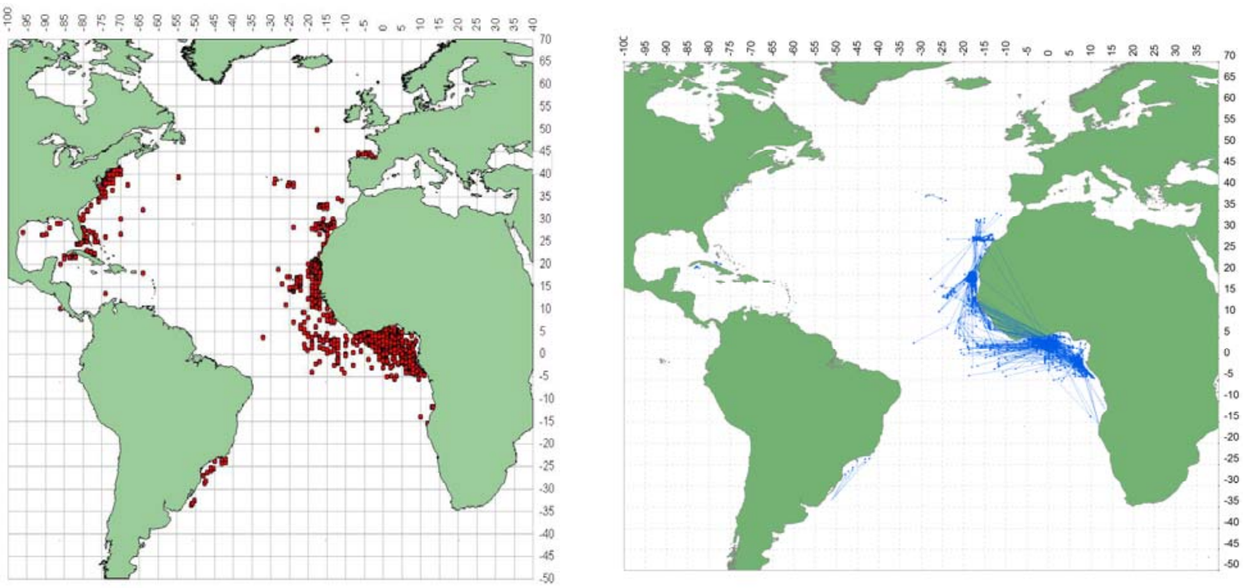
SKJ-Figure 8. Number of 1°x1° squares with catch of skipjack for the purse seiners operating in the eastern Atlantic (1969-2012). The increase observed in 1991 could be due to a modification of the species composition correction procedure of the catches implemented at this date (skipjack catches could 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.



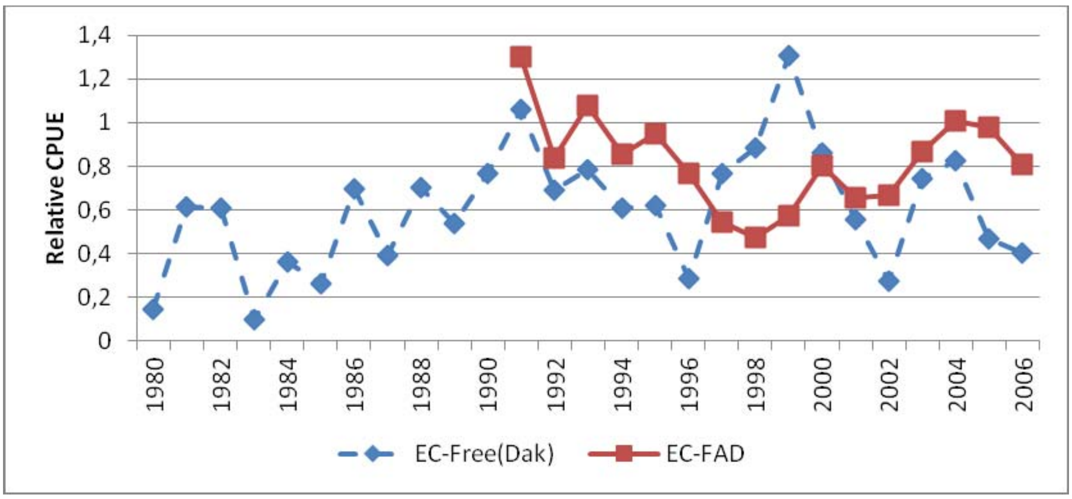
SKJ-Figure 9. Changes in non-standardized mean weight (kg) of skipjack by several gears operating in the eastern Atlantic (1969-2012). Because of their type of cooperation, Ghanaian purse seiners and baitboats are considered a combined gear. The estimates of average weight for the entire East Atlantic between 2007 and 2012, calculated from catches by size available only for some fleets are preliminary.



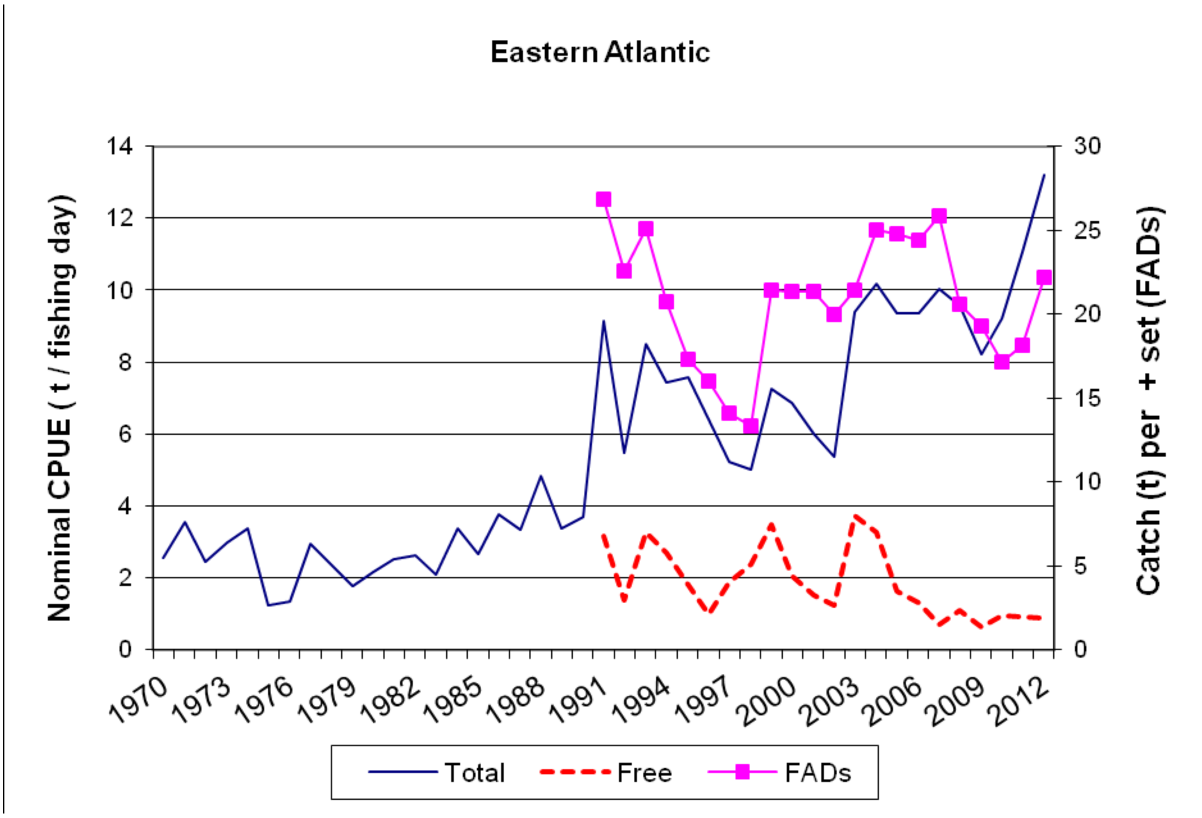
SKJ-Figure 10. Changes over time in the apparent total mortality *Z*, calculated based on Beverton and Holt's equation, for the three main tropical tuna species in the Atlantic Ocean. YFT = yellowfin, BET = bigeye, SKJ = eastern skipjack. The size at which the fish are fully recruited was fixed at 50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



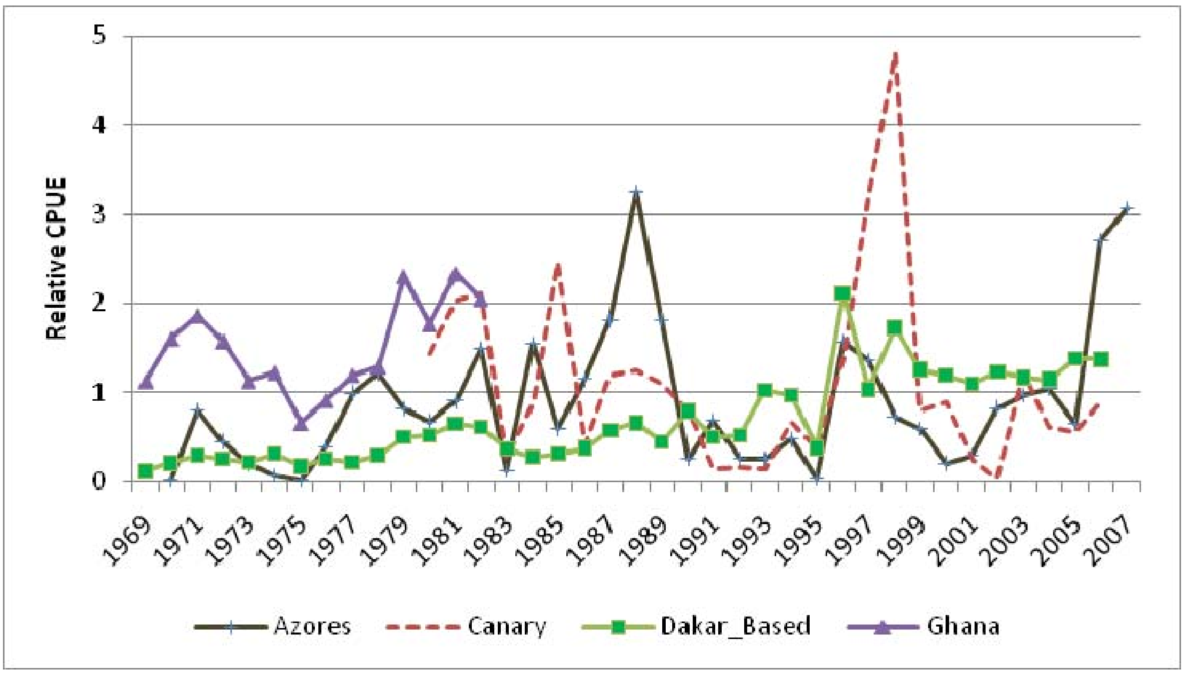
SKJ-Figure 11. Distribution of tagged and released SKJ (left panel) and apparent movements from geographic positions of recaptured fish (right panel).



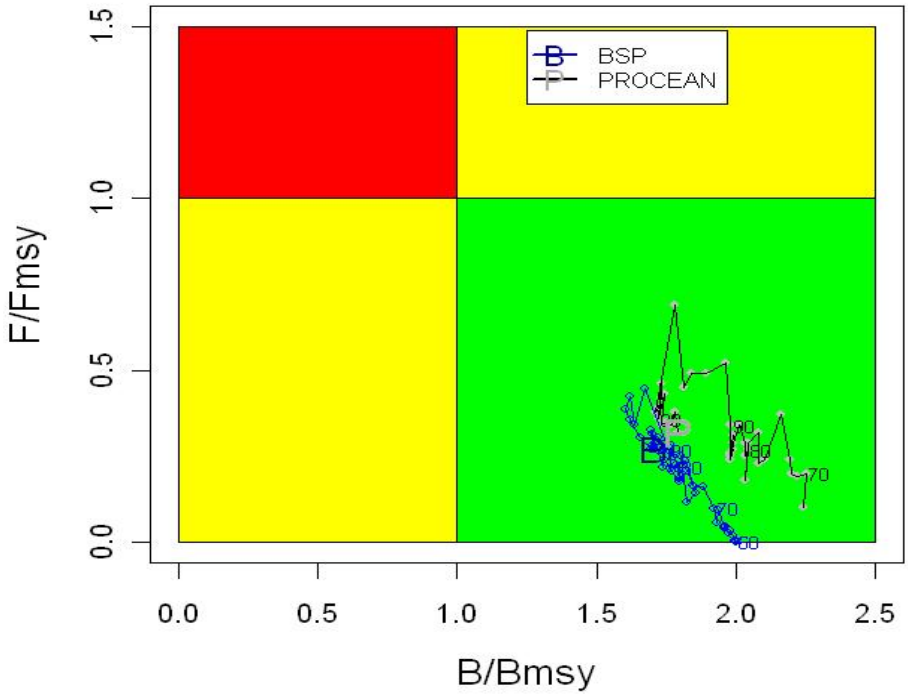
SKJ-Figure 12. Standardized skipjack CPUE for EU purse seiners in the eastern Atlantic Ocean. Free = free school off Senegal; FAD = schools associated with fish aggregating devices in the equatorial areas.



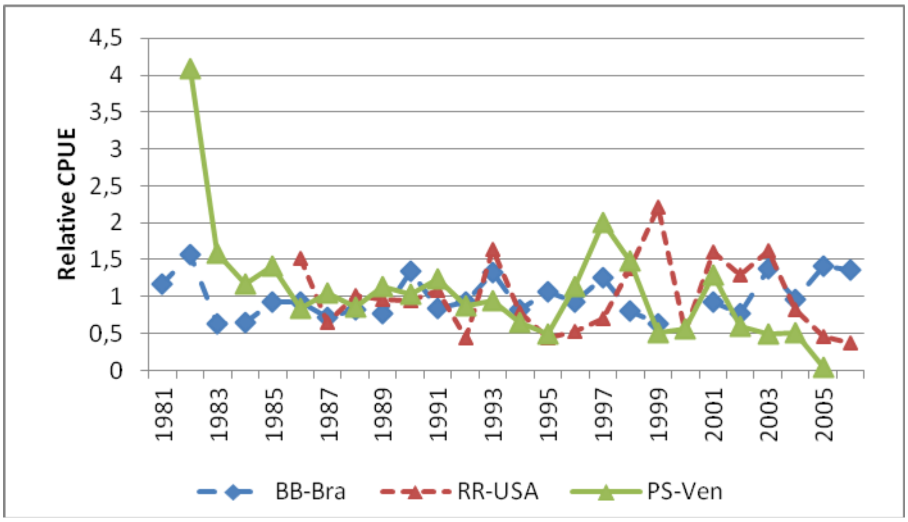
SKJ-Figure 13. Changes in nominal CPUE for the European purse seiners in the eastern Atlantic (1970-2012). Free = free schools (t/f. day) off Senegal; FADs = schools associated with fish aggregating devices (t /successful set) in the equatorial area.



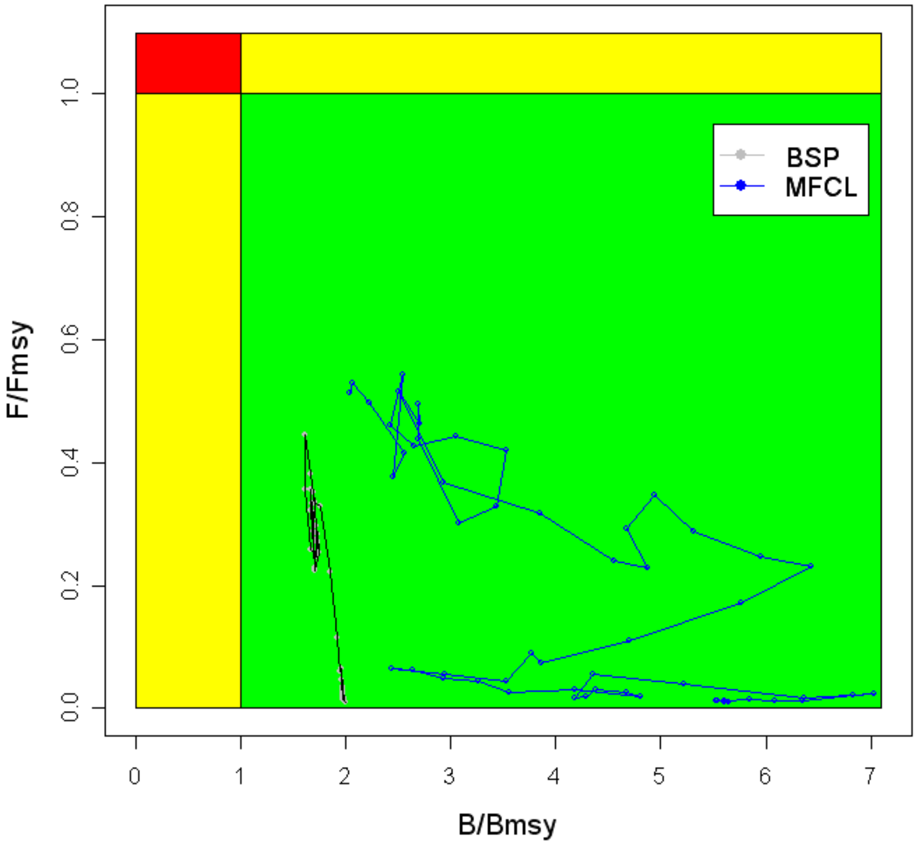
SKJ-Figure 14. Standardized CPUE for the main baitboat fleets operating in the eastern Atlantic Ocean: Azores, Canary islands (non standardized), Dakar and Ghana-based baitboats.



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 and South Atlantic albacore stocks is based on the most recent analyses conducted in June 2013 by means of applying statistical modelling to the available data up to 2011. Complete information on the assessment can be found in the Report of the 2013 ICCAT Albacore Stock Assessment Session (SCRS/2013/016).

The status of the Mediterranean albacore stock is based on the 2011 assessment using available data up to 2010. Complete information is found in the Report of the 2011 ICCAT South Atlantic and Mediterranean Albacore Stock Assessment Session (Anon. 2012b).

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 a Mediterranean stock (**ALB-Figure 1)**. However, some studies support the hypothesis that various sub populations of albacore exist in the North Atlantic and Mediterranean. 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, North Pacific and the Mediterranean, suggest that environmental variability may have a serious potential impact on albacore stocks, affecting fisheries by changing the fishing grounds, as well as productivity levels and potential MSY of the stocks. Those yet sufficiently unexplored aspects might explain recently observed changes in fisheries, such as the lack of availability of the resource in the Bay of Biscay in some years, or 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 in the Atlantic occurs in tropical waters. Present available knowledge on habitat, distribution, spawning areas and maturity of Atlantic albacore is based on limited studies, mostly from past decades. In the Mediterranean, there is a need to integrate different available studies so as to better characterize growth of Mediterranean albacore. Besides some additional recent studies on maturity, in general, there is poor knowledge about Mediterranean albacore biology and ecology.

More information on albacore biology and ecology is published in the *ICCAT Manual*.

ALB-2. Description of fisheries or fishery 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, and 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. Since the 1980s, a significant reduction of the effective albacore area fished was observed for both longline and surface fisheries.

Total reported landings, steadily increased since 1930 to peak above 60,000t in the early 1960s, declining afterwards, 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 2012 was 26,237 t, and the average catch in the last five years has remained about 20,000 t, the lowest recorded in the time series since 1950. During these years, the surface fisheries contributed to approximately 85% of the total catch **(ALB-Table 1)**. The reported catch in 2012 for EU-France, EU-Ireland and EU-Spain was above the average of the last five years.

Longline catch contributed to approximately 15% of the total catch during the last five years. During the last decades, both Chinese Taipei and Japan have reduced their fishing effort directed to albacore. In the case of Japan, albacore is taken mainly as by-catch. Still, the catch reported in 2012 for Japan was above the last 5 year average, and for Chinese Taipei it was similar to the average for the last five years.

The trend in mean weight for northern albacore remained stable between 1975 and 2011, ranging between 7 and 11 kg. The mean weight for surface fleets (baitboat and troll) showed a stable trend with an average of 7 kg (range: 4-10), and for longline fleets it showed no clear trend with an average of 19 kg, but some important fluctuations between 15 and 26 kg since the 1990 (**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 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.

Albacore landings increased sharply since the mid-1950s to reach values oscillating around 25,000 t between mid-1960s and the 1980, 35,000 t until the last decade were they oscillated around 20,000 t. Total reported albacore landings for 2012 were 24,726 t, higher than the last five year average. The Chinese Taipei catch in 2012 was slightly above the last five year average. However, the Chinese Taipei catch in the last years has decreased compared to historical catches, mainly due to a decrease in fishing effort targeting albacore. Chinese Taipei longliners (including boats flagged in 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. The 2012 catch for Brazil is higher than catches in the recent past. However, albacore is only caught as by-catch in Brazilian tropical tuna-directed longline and baitboat fisheries. The significantly higher average catch of about 4,287 t during the period 2000-2003 was obtained by the Brazilian longline fleet when albacore was a target species.

In 2012, the estimated South African and Namibian catch (mainly baitboat), was below the average of the last five years. Japan takes albacore as by-catch using longline gear. However, catches during the last five years double those in the last few decades. This increase was due to an increase in fishing effort in the waters off southern Africa (20-40˚S).

The trend in mean weight from 1975 to 2011 is shown in **ALB-Figure 3b.** Surface fleets showed a stable trend from 1981 onwards with an average of 13 kg and a maximum and minimum average weight of 17 kg and 10 kg, respectively. Longline fleets showed a relatively stable trend for the mean weight around 17 kg until 1996 where the average weight increased to about 20 kg, oscillating between 16 and 26 kg.

Mediterranean

The catch series was revisited and compared to additional sources of information. This allowed identifying some catches that were not included in the ICCAT database, which requires further revisions. In 2012, the reported landings were 2,085 t, substantially below those in the last decade (**ALB-Table 1** and **ALB-Figure 2c**). The majority of the catch came from longline fisheries. EU-Italy is the main producer of Mediterranean albacore, with around 70% of the catch during the last 10 years. In 2012 the Italian catch was substantially lower than the last five year average.

ALB-3. State of stocks

North Atlantic

A thorough revision of North Atlantic Task I and Task II data was conducted and catch rate analyses were improved and updated with new information for the northern albacore fisheries. The base case assessment during the 2013 assessment session was based on similar methods and assumptions as in the previous assessment conducted in 2009 (Anon. 2010c). However, this time, a wider range of assessment methods were considered in sensitivity runs, including some that do not assume that catch-at-age is perfectly known. The approach provided the opportunity to evaluate a range of biological assumptions and 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 2011.

The CPUE trends for the various surface fleets, based upon the most recent available data showed somewhat different patterns from each other. This was also the case for the different longline fleets (**ALB-Figure 4**). The Spanish troll CPUE series showed a rather flat trend compared to the Spanish baitboat CPUE series that showed a more upward trend in the last three decades. For the longline fleets, the general trend in CPUE indices is a decline over time up until the mid 80ies, with varying rates, with some stability afterwards and a slight increase in the last few years. Comparatively, the Japanese CPUE showed steeper declines at the beginning of the series and the Chinese Taipei CPUE showed steeper increasing trends during the last years. 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.

The data sets used for the analyses from 1930 to 2011 were compiled and screened during the April 2013 data preparatory meeting. The basic input data, catch, effort and catch-at-size were revised due to updates in the ICCAT Task I (**ALB-Table 1**) and Task II database, and the indices to be used in assessments were specified. The definition of the fisheries was also revised and 12 fishery units were agreed for the base case Multifan-CL assessment (compared to 10 fishery units used in the last assessment). In general, the base case included similar but not exactly the same model specifications and datasets used in 2009. Decisions on the final specifications of the base case model were guided by first principles (e.g. knowledge of the fisheries) and diagnostics (e.g. goodness of fit of the model to the data).

There is substantial uncertainty on current stock status, since different models and assumptions provide a wide range of B/B_{MSY} and F/F_{MSY} estimates (**ALB-Figure 5**). However, most of them agreed on the view that spawning stock biomass decreased since the 1930s and started to recover since the mid-1990s (**ALB-Figure 6**). Most of the model formulations, as well as the base case, concluded that currently the stock is not undergoing overfishing but the spawning stock biomass is overfished. According to the base case assessment which considers catch and effort since the 1930s and size frequency since 1959, the spawning stock size has declined and in 2011 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 (**ALB-Figure 7**).

The assessment indicated that the stock has remained overfished with SSB below SSB_{MSY} since the mid-1980s but has improved since the lowest levels around 30% in the late 1990s, and current SSB_{2011} is approximately 94% of SSB at MSY (**ALB-Figure 8**). Corresponding fishing mortality rates have been above F_{MSY} between the mid-1960s and the mid 2000's. Peak relative fishing mortality levels in the order of 2.5 were observed in the mid 90ies and remained below 1 afterwards, current F_{2011}/F_{MSY} ratio being 0.72 (**ALB-Figure 8**). According to the base case assessment, the probability of the stock being overfished and overfishing (red) is 0,2%, of being neither overfished nor overfishing (green) is 27.4%, and of being overfished or overfishing but not both (yellow) is 72.4% (**ALB-Figure 9**).

South Atlantic

In 2013, a stock assessment of South Atlantic albacore was conducted including catch, effort and size data up until 2011, and considering similar methods as in the previous assessment.

The southern standardized CPUE trends are mainly for longline fisheries, which harvest mostly adult albacore. The longest time series (those of Japan and Chinese Taipei), showed a strong declining trend in the early part of the time series, and less steep decline over the past decade. However, the Uruguayan longline CPUE series showed significant decreases since the 1980s (**ALB-Figure 10**).

In the 2013 assessment, the same eight scenarios as in 2011 were considered, but after screening during the data preparatory meeting, less CPUE series were input in the models. Stock status results varied significantly among scenarios (**ALB-Figure 11a,b**). Two different production model forms were considered, each with four scenarios. One showed more optimistic results than the other. However, the Committee lacked enough objective information to identify the most plausible scenarios. Considering the whole range of scenarios, the median MSY value was 25,228 t (ranging between 19,109 t and 28,360 t), the median estimate of current B/B_{MSY} was 0.92 (ranging between 0.71 and 1.26) and the median estimate of current F/F_{MSY} was 1.04 (ranging between 0.38 and 1.32). The wide confidence intervals reflect the large uncertainty around the estimates of stock status. Considering all scenarios, there is 57% probability for the stock to be both overfished and experiencing overfishing, 13% probability for the stock to be either overfished or experiencing overfishing but not both, and 30% probability that biomass is above and fishing mortality is below the Convention objectives (**ALB-Figure 11c**).

Mediterranean

In 2011, the first stock assessment for Mediterranean albacore was conducted, using data up until 2010. The methods used were adapted to the "data poor" category of this stock. The more data-demanding methods applied, such as a production model, gave unrealistic results.

Some CPUE series for Mediterranean fisheries became available (**ALB-Figure 12**). However, these series were discontinuous and highly variable, with no clear trend over the last couple of decades. Since they are mostly very short, and there is little overlap between time series, they may or may not accurately characterize biomass dynamics in Mediterranean albacore.

The results of the 2011 assessment, based on the limited information available and in simple analyses, point to a relatively stable pattern for albacore biomass in the recent past. Recent fishing mortality levels appear to have been reduced from those of the early 2000s, which were likely in excess of F_{MSY}, and might now be at about or lower that level (**ALB-Figure 13**).

ALB-4. Outlook

North Atlantic

The stock projected under different scenarios indicates that if catch in the future were on average similar to those observed over the recent five years (about 20,000 t) or around the current TAC (28,000 t), the biomass would continue to increase from its level of 2012 (**ALB-Table 2**). Considering the Commission's decision framework in Rec. [11-13] (**ALB-Figure 14**), and noting that the Commission requested SCRS to identify a limit reference point for northern Albacore (Rec [11-04]), the outlook for stock status under the Commission's decision guidelines was projected making use of Harvest Control Rule (HCR, **ALB-Figure 15**) options (**ALB-Table 3**) consistent with the policies identified in Rec [11-13], using an interim biomass limit of $0.4B_{MSY}$ that should be further tested, together with other candidate reference points, using the MSE framework. Projections were constructed in this way to inform the Commission's choice of 'high probability' and 'short period' (**ALB-Figure 14**), considering the uncertainty in stock status evaluations that could be quantified and assuming that the indicated strategy could be perfectly implemented.

ALB-Table 4 provides the results of the HCR evaluations and indicate the projected probability of being 'Green' within the time-frame indicated. Expected catch along different timeframes are also shown, allowing the Commission to choose appropriate probability and time frames and weigh tradeoffs with expected catch.

South Atlantic

The projection results differ between the base case scenarios. Since there is not objective information with which to select which scenario is most plausible, the group considered the entire range of scenarios, thus characterizing the range of possible responses to the distinct catch levels projected, as done in 2011. Projections at a level consistent with the 2013 TAC (24,000 t) showed that probabilities of being in the green area of the Kobe plot would be higher than 50% only after 2020. Similar probabilities could be achieved earlier with lower TAC values. Likewise, lower TAC values would provide higher probabilities of being in the green area by 2020 (**ALB-Table 5**). However, larger TACs would not provide larger than 50% probability in the timeframe analyzed.

Projections at $F_{MSY,}$ without considering implementation errors, suggested that the stock biomass would not rebuild with a probability higher than 50% before 2026. Similar probabilities (higher than 50%) of rebuilding could be obtained from 2017 when projected at $0.95*F_{RMS}$.

Mediterranean

Due to the fact that the management advice for the Mediterranean stock was based on catch curve analysis and due to the limited quantitative information available to the SCRS, projections for this stock were not conducted. As a result, future stock status in response to management actions could not be simulated. The outlook for this stock is thus unknown.

ALB-5. Effect of current regulations

North Atlantic

In 2011, the Commission established a TAC for 2012 and 2013 of 28,000 t [Rec. 11-04], 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, since the establishment of the TAC in the year 2001, catch remained substantially below the TAC in all but two years **(ALB-Figure 2)**. This might have accelerated rebuilding over the last decade.

South Atlantic

In 2011 the Commission established a new TAC of 24,000 t for 2012 and 2013 [Rec. 11-05]. The Committee noted that, since 2004, reported catches remained below 24,000 t, except in 2006, 2011 and 2012, where reported catches were slightly above this value **(ALB-Table 1)**.

Mediterranean

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

ALB-6. Management recommendations

North Atlantic

Projections at the current TAC level (28,000 t) indicate that the stock would rebuild by 2019 with 53% probability, which would meet the objective of the albacore recovery plan (11-04). The recovery of the stock with similar probabilities would be faster (by 2016) if the catches remain at the level of recent catches (around 20,000 t). Higher probabilities of rebuilding would require longer timeframes. For instance, 75% probability of rebuilding would be achieved by 2019 with a constant catch of 20,000 t, and by 2027 with a constant catch of 28,000t. Catches above 34,000 t would not rebuild the stock with at least 50% probability in the projected timeframes (**ALB-Table 2**).

These projections were complemented by a set of projections under alternative provisional HCRs that could serve the Commission to decide on desired timeframes and probabilities for recovering the north Atlantic stock and which are consistent with the decision framework of Rec [11-13] in that there is a high probability of $F<F_{MSY}$ in as short a time as possible. A range of time-frames and probability levels for achieving the Commission's goals established in Rec [11-13] are provided in **ALB-Table 4**. Longer time frames provide more options for HCR parameters that project higher probabilities of being 'Green'. The HCR projections indicate, for example, should the Commission wish to have a 'high probability' of 75% within a 10 year time-frame, then the HCR with a Biomass Threshold at B_{MSY} paired with a Target F of $.9F_{MSY}$ would provide the highest expected 10 year cumulative catch amongst options and the average catch expected from 2014-2016 would be approximately 26,260 t. Should the Commission consider a 'high probability' of 60% sufficient within a five year time-frame, then the HCR with a Biomass Threshold at B_{MSY} paired with a Target F of $.9F_{MSY}$ would also meet that objective and provide the highest expected cumulative catch amongst options that would provide at least 60% probability within five years and the average catch from 2014-2016 would remain approximately 26,260 t. Unlike the constant catch projections, the HCR projections imply increasing catch as the population biomass increases

resulting in higher cumulative catch over time to achieve equivalent conservation objectives of a constant catch policy. This can be evaluated by comparing **ALB-Tables 2** and **4**. Consideration of implementation and other uncertainties in these projections would likely change the probability level estimates.

South Atlantic

Results indicate that, most probably, the South Atlantic albacore stock is around the spawning biomass and the fishing mortality that can sustain the maximum sustainable levels. However, there is considerable uncertainty about the current stock status, as well as on the effect of alternative catch limits on the rebuilding probabilities of the southern stock.

Projections at a level consistent with the 2013 TAC (24,000 t) showed that probabilities of being in the green area would exceed 50% only after 2020. Similar probabilities could be achieved earlier with lower TAC values.

With catches around 20,000 t, probabilities of 50% would be exceeded by 2015, and probabilities of 60% would be exceeded by 2018. Further reductions in catches would increase the probability of recovery in those timeframes. And likewise, increases would reduce rebuilding probabilities and extend the timeframes. Catches over the current TAC (24,000 t) will not permit the rebuilding of the stock with at least 50% probability over the projection timeframe (**ALB-Table 5**).

Mediterranean

The available information on Mediterranean albacore stock status indicates a relatively stable pattern for albacore biomass over the recent past. Unfortunately, very little quantitative information is available to SCRS for use in conducting a robust quantitative characterization on biomass status relative to Convention objectives. While additional data to address this issue might exist at CPC levels, our ability to provide quantitative management advice will be seriously impeded until such data become available either through recovery of historical data or institution of adequate fishery monitoring data collection programs. Recent fishing mortality levels appear to have been reduced from those of the early 2000s, which were likely in excess of F_{MSY}, and might now be at about or lower than that level. However, there is considerable uncertainty about this and for this reason, the Commission should institute management measures designed to limit increases in catch and effort directed at Mediterranean albacore.

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY

	North Atlantic	**South Atlantic**	**Mediterranean**
Maximum Sustainable Yield	31,680 t	25,228 t (19,109-28,360)[1]	Unknown
Current (2013) TAC	28,000 t	24,000 t	None
Current (2012) Yield	26,237 t	24,726 t	2,085 t
Yield in last year of assessment (2011)	20,044 t	24,117 t	
Yield in last year of assessment (2010)			2,124 t
SSB_{MSY}	81,110 t		
B_{MSY}		216,807 t (88,380-595,953) [1]	
F_{MSY}	0.1486	0.176 (0.063-0,481) [1]	
SSB_{cur}/SSB_{MSY} [2]	0.94 (0.74-1.14) [2]		Not estimated
SSB_{cur}/Blim	2.4[3]		
B_{2012}/B_{MSY} [1]		0.92 (0.71-1.26)[1]	
F_{cur}/F_{MSY} [2]	0.72 (0.55-0.89) [2]		<=1 [4]
F_{2011}/F_{MSY} [1]		1.04 (0.38-1.32)[1]	
Stock Status	Overfished: YES	Overfished: YES	?
	Overfishing: NO	Overfishing: YES	NO
Management measures in effect:	[Rec. 98-08]: Limit number of vessels to 1993-1995 average. [Rec. 11-04] TAC of 28,000 t for 2012 and 2013.	[Rec. 11-05]: TAC of 24,000 t for 2012 and 2013	None

[1] Median range and 80% CI calculated for the whole range of the 8 base cases.
[2] Average for the last three years, with base case 95% confidence interval.
[3] The proposed interim Blim is 0.4.
[4] Estimated with length converted catch curve analysis, taking M as a proxy for F_{MSY}.

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

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			67295	63342	67491	56326	69615	73086	71812	67517	60379	59585	59039	67058	70088	69915	60094	61462	53378	57728	67389	48836	42310	41647	40825	48821	53048
	ATN		33059	32071	36881	27931	30851	38135	35163	38377	28803	29023	25746	34551	33124	26253	22741	25567	25960	35318	36989	21991	20483	15380	19509	20044	26237
	ATS		30173	27212	28714	26016	36562	32813	35300	27552	28426	28022	30595	27656	31387	38796	31746	28002	22543	18882	24453	20278	18857	22246	19192	24117	24726
	MED		4063	4060	1896	2379	2202	2138	1349	1587	3150	2541	2698	4851	5577	4866	5608	7893	4874	3529	5947	6566	2970	4021	2124	4660	2085
Landings	ATN	Bait boat	15933	15374	18624	8968	12436	15646	11967	16411	11338	9821	7562	8780	11072	6103	6638	7840	8128	10458	14273	8496	7931	4994	6026	5530	8816
		Longline	3013	2239	2683	5315	3152	7093	7309	4859	4641	4051	4035	6710	7321	7372	6180	7699	6917	6911	5223	3237	2647	2619	3913	3666	4309
		Other surf.	994	1652	3865	3999	5173	7279	7506	3555	3337	4378	6846	6817	5971	2828	422	551	697	624	625	525	274	427	324	412	359
		Purse seine	97	12	1	222	139	229	292	278	263	26	91	56	191	264	118	211	348	99	188	198	70	89	74	5	167
		Trawl	1693	2240	1033	469	2603	1779	2131	3049	2571	2877	1318	5343	3547	5374	5376	3846	2369	7001	6385	3429	4321	2811	2026	6852	6678
		Troll	11329	10554	10675	8959	7348	6109	5959	10226	6652	7870	5894	6845	5023	4312	4007	5419	7501	10224	10296	6105	5239	4440	7146	3578	5909
	ATS	Bait boat	7696	7393	5981	3454	6490	7379	8947	7091	6960	8110	10353	6709	6873	10355	9712	6973	7475	5084	5876	3374	4346	7922	3743	5938	6710
		Longline	21894	19407	21590	22008	27162	23947	24806	20040	21000	19547	19799	20640	24398	28039	21671	20626	14735	12977	17740	15087	13218	12113	13471	16445	17599
		Other surf.	398	411	1139	137	393	39	483	10	209	127	0	73	58	377	323	82	299	288	395	1762	1219	2066	1651	1538	66
		Purse seine	185	0	4	416	2517	1448	1064	412	257	117	434	183	58	25	39	309	16	534	442	54	75	145	328	196	351
		Trawl	0	0	0	0	0	0	0	0	0	120	9	52	0	0	0	12	18	0	0	0	0	0	0	0	
	MED	Bait boat	0	0	83	499	171	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0	0	0	0	0	
		Longline	168	165	624	524	442	410	350	87	391	348	194	417	2800	2597	3706	4248	2345	2012	3010	4119	2695	1580	1719	2356	1997
		Other surf.	3879	3879	1098	1198	1533	879	766	1031	2435	1991	2426	4265	2689	2193	1755	3166	2176	1200	134	1401	250	2414	404	2245	8
		Purse seine	16	16	91	110	6	559	23	0	0	0	0	0	0	0	1	478	353	317	2803	1046	24	25	0	34	68
		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	
		Troll	0	0	0	48	50	59	129	306	119	202	45	73	0	0	117	0	0	0	0	0	0	1	1	0	6
Discards	ATS	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	
	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	25	6
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	0	1	1	1	0	2	5	8	10	13	9	7	7	4	6	4	20
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	26	39	416	351	155
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	
		Canada	47	22	6	5	1	9	32	12	24	31	23	38	122	51	113	56	27	52	27	25	33	11	14	28	34
		Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	
		China P.R.	0	0	0	0	0	0	14	8	20	0	0	21	16	57	196	155	32	112	202	59	24	27	142	101	21
		Chinese Taipei	2117	1294	3005	4318	2209	6300	6409	3977	3905	3330	3098	5785	5299	4399	4330	4557	4278	2540	2357	1297	1107	863	1587	1367	1180
		Cuba	4	1	2	0	0	0	0	0	0	0	0	0	0	0	1	322	435	424	527	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	25	53	39	146
		Dominican Republic	0	0	0	0	0	0	0	0	0	323	121	73	95	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	26738	25424	25792	17233	18175	18380	16998	20197	16324	17295	13285	15363	16000	9177	8952	12530	15379	20447	24538	14582	12725	9617	12961	8357	13719
		EU.France	2805	4050	3625	4123	6924	6293	5934	5304	4694	4618	3711	6888	5718	6006	4345	3456	2448	7266	6585	3179	3009	1122	1298	3348	3361
		EU.Ireland	0	0	40	60	451	1946	2534	918	874	1913	3750	4858	3464	2093	1100	755	175	306	521	596	1517	1997	788	3597	3575
		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	6	**0**
		EU.Portugal	184	169	3185	709	1638	3385	974	6470	1634	395	91	324	278	1175	1953	553	513	556	119	184	614	108	202	1046	1231
		EU.United Kingdom	0	0	0	0	59	499	613	196	49	33	117	343	15	0	0	0	0	6	19	30	50	67	118	57	50
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	7	2	0	3	0	0	0	0	**0**
		Grenada	0	0	0	0	0	0	0	2	1	6	7	6	12	21	23	46	25	29	19	20	15	18	18	18	
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	
		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	723	764	737	691	466	485	505	386	466	414	446	425	688	1126	711	680	893	1336	781	288	402	288	525	336	658
		Korea Rep.	16	53	34	1	0	8	0	2	2	1	0	0	0	0	0	0	0	59	45	12	59	82	110	60	200
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	81	120	178	98	96	99	130	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**
		NEI (Flag related)	0	0	0	11	19	13	10	8	11	3	8	12	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	29	60	117	73	11	5	0	0	0	0	0	0	0	0	96	298	113	45	154	103	

	Philippines	0	0	0	0	0	0	0	0	0	0	151	4	0	0	0	0	0	9	0	8	19	54	0	0	83
	Sierra Leone	0	10	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	0	0	0	0	0	0	
	St. Vincent and Grenadines	0	0	0	0	0	2	0	0	0	0	0	1	704	1370	300	1555	89	802	76	263	130	135	177	329	597
	Sta. Lucia	0	0	0	0	1	1	0	1	1	0	0	0	1	3	2	10	0	2	2	2	2	0	130	2	3
	Suriname	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	249
	Trinidad and Tobago	0	0	4	0	247	0	0	0	0	2	1	1	2	11	9	12	12	9	12	18	32	17	17	23	47
	U.S.A.	288	243	357	479	438	509	741	545	472	577	829	315	406	322	480	444	646	488	400	532	257	189	315	422	425
	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	1	0	2	2	2	0	0	1	1	0	0	0	0	0	1	0
	Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	414	507	235	95	20	140	187	196	172
	Venezuela	137	41	94	302	193	246	282	279	315	75	107	91	299	348	162	346	457	175	321	375	222	398	288	247	312
ATS	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	168
	Argentina	344	354	151	60	306	0	2	0	0	120	9	52	0	0	0	12	18	0	0	0	0	0	130	43	
	Belize	0	0	0	0	0	0	0	2	0	0	0	8	2	0	0	0	0	0	54	32	31	213	303	365	171
	Brasil	421	435	514	1113	2710	3613	1227	923	819	652	3418	1872	4411	6862	3228	2647	522	556	361	535	487	202	271	1269	1857
	Cambodia	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	
	Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	46	24	0	0	0	0	
	China P.R.	0	0	0	0	0	0	0	0	0	0	0	39	89	26	30	26	112	95	100	35	25	89	97	80	61
	Chinese Taipei	20746	18386	21369	19883	23063	19400	22573	18351	18956	18165	16106	17377	17221	15833	17321	17351	13288	10730	12293	13146	9966	8678	10975	13032	12644
	Cuba	2	1	2	17	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Curaçao	0	0	0	0	0	0	0	0	0	9	192	0	2	0	0	0	0	0	0	0	0	21	4	4	24
	Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	43	45	50
	EU.España	185	0	0	280	1943	783	831	457	184	256	193	1027	288	573	836	376	81	285	367	758	933	1061	294	314	351
	EU.France	0	0	0	50	449	564	129	82	190	38	40	13	23	11	18	63	16	478	347	12	50	60	109	53	161
	EU.Portugal	1153	557	732	81	184	483	1185	655	494	256	124	232	486	41	433	415	9	43	8	13	49	254	84	44	11
	EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	56	0	
	Honduras	0	0	0	0	29	0	0	2	0	7	1	6	0	0	0	0	0	0	0	0	0	0	0	0	
	Japan	405	450	587	654	583	467	651	389	435	424	418	601	554	341	231	322	509	312	316	238	1370	921	973	1194	2863
	Korea Rep.	180	54	19	31	5	20	3	3	18	4	7	14	18	1	0	5	37	42	66	56	88	374	130	70	89
	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	
	NEI (ETRO)	0	0	4	8	122	68	55	63	41	5	27	0	0	10	14	53	0	7	0	0	0	0	0	0	
	NEI (Flag related)	0	0	0	149	262	146	123	102	169	47	42	38	0	0	0	0	0	0	0	0	0	0	0	0	
	Namibia	0	0	0	0	0	0	1111	950	982	1199	1429	1162	2418	3419	2962	3152	3328	2344	5100	1196	1958	4936	1320	3791	2420
	Panama	0	0	0	240	482	318	458	228	380	53	60	14	0	0	0	0	0	17	0	87	5	6	1	0	
	Philippines	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	52	0	13	79	45	95	96	60
	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	6636	6890	5280	3410	6360	6881	6931	5214	5634	6708	8412	5101	3610	7236	6507	3469	4502	3198	3735	3797	3468	5043	4147	3380	3553
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	2116	4292	44	0	0	0	65	160	71	51	31	94	196
	U.S.A.	0	0	0	0	0	0	0	0	1	5	1	1	1	2	8	2	1	0	0	0	0	0	0	0	
	U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UK.Sta Helena	1	1	1	5	28	38	5	82	47	18	1	1	58	12	2	0	0	0	62	46	94	81	3	120	2
	Uruguay	100	83	55	34	31	28	16	49	75	56	110	90	90	135	111	108	120	32	93	34	53	97	24	37	12
	Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	1400	96	131	64	104	85	35
MED	EU.Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	12
	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	6	0	12	30	255	425	507	712	209	223	206	222	315
	EU.España	3	0	84	548	227	298	218	475	429	380	126	284	152	200	209	1	138	189	382	516	238	204	277	343	389
	EU.France	31	31	121	140	11	64	23	3	0	5	5	0	0	0	1	0	0	0	0	2	1	0	1	2	0
	EU.Greece	500	500	500	500	500	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448	191	116	125	165	165
	EU.Italy	3529	3529	1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6912	3671	2248	4584	4017	2104	2724	1109	2494	1117
	EU.Malta	0	0	0	0	0	0	0	0	0	1	1	1	4	0	2	0	10	15	0	1	5	1	2	5	19
	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	2	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0	**0**
		NEI (MED)	0	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	14	0	0	0	
		Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	30	73	852	208	631	402	1396	62
		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	
Discards	ATS	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	
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	6

ALB-Table 2. North Atlantic albacore estimated probabilities (in %) that the fishing mortality is below F_{MSY} (a), spawning stock biomass is above SSB_{MSY} (b) and both (c). Projections for constant catch levels are shown.

(a) Probability F<Fmsy

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
20000	96	97	98	98	98	98	98	98	98	98	99	99	99	99	99	99	99	99
22000	93	94	95	96	96	97	97	97	97	97	97	98	98	98	98	98	98	98
24000	87	89	91	92	93	94	94	95	95	95	96	96	96	96	96	96	96	97
26000	79	82	84	86	87	89	90	90	91	91	92	92	93	93	93	93	94	94
28000	68	72	74	77	78	80	81	83	84	85	85	86	87	87	88	88	89	89
30000	57	61	63	66	68	70	72	73	75	76	77	78	78	79	80	81	81	82
32000	48	49	52	54	56	58	60	61	63	65	66	67	68	69	70	71	71	72
34000	39	40	42	44	45	47	49	51	52	53	54	55	56	57	57	58	59	59
36000	32	33	34	35	36	37	38	40	41	42	43	44	45	46	47	47	48	48
38000	24	25	26	27	28	29	30	31	32	33	33	34	35	35	36	36	37	38
40000	17	17	18	18	19	20	20	21	22	22	23	23	23	24	24	25	26	27

(b) Probability SSB>SSBmsy

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
0	38	56	74	86	91	94	96	97	98	98	99	99	99	99	100	100	100	100
20000	29	38	45	54	63	69	75	79	83	85	87	89	90	92	93	93	94	95
22000	28	36	43	50	58	64	70	75	78	81	84	85	87	89	89	91	92	92
24000	27	35	40	46	53	59	64	69	73	76	79	81	83	84	86	87	88	89
26000	26	33	38	43	49	54	59	63	67	70	73	76	78	79	81	83	84	84
28000	25	31	36	39	44	49	53	57	61	63	66	69	71	73	75	76	77	79
30000	24	29	34	37	39	43	47	50	54	56	59	61	63	65	66	68	69	71
32000	23	27	31	34	36	39	41	43	47	49	51	53	55	57	58	59	61	62
34000	22	25	27	30	33	35	36	38	40	42	43	45	47	48	50	51	52	53
36000	22	23	24	26	28	30	32	33	34	35	36	37	38	39	40	41	41	42
38000	21	21	22	22	23	24	25	26	27	28	29	29	30	31	31	32	32	32
40000	21	20	19	19	19	19	19	19	19	20	20	20	20	20	21	21	21	21

(c) Probability of green status (SSB>SSBmsy and F<Fmsy)

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Average catch over: 3 years	Cumulative Catch over: 5 years	10 years	15 years	20 years
0	38	56	74	86	91	94	96	97	98	98	99	99	99	99	100	100	100	100	0	0	0	0	0
20000	29	38	45	54	63	69	75	79	83	85	87	89	90	92	93	93	94	95	20,000	100,000	200,000	300,000	400,000
22000	28	36	43	50	58	64	70	75	78	81	84	85	87	89	89	91	92	92	22,000	110,000	220,000	330,000	440,000
24000	27	35	40	46	53	59	64	69	73	76	79	81	83	84	86	87	88	89	24,000	120,000	240,000	360,000	480,000
26000	26	33	38	43	49	54	59	63	67	70	73	76	78	79	81	83	84	84	26,000	130,000	260,000	390,000	520,000
28000	25	31	36	39	44	49	53	57	61	63	66	69	71	73	75	76	77	79	28,000	140,000	280,000	420,000	560,000
30000	24	29	34	37	39	43	47	50	54	57	59	61	63	65	66	68	69	71	30,000	150,000	300,000	450,000	600,000
32000	23	27	31	34	36	39	41	44	47	49	51	53	55	57	58	59	61	62	32,000	160,000	320,000	480,000	640,000
34000	22	24	27	30	32	34	36	38	40	41	43	45	47	48	49	50	52	52	34,000	170,000	340,000	510,000	680,000
36000	21	22	23	25	27	29	31	32	33	34	35	36	38	39	40	40	41	42	36,000	180,000	360,000	540,000	720,000
38000	18	19	19	20	21	22	23	24	25	26	27	28	29	30	30	31	31	32	38,000	190,000	380,000	570,000	760,000
40000	16	16	16	16	16	16	17	17	17	18	18	18	18	19	19	19	19	20	40,000	200,000	400,000	600,000	800,000

ALB-Table 3. Levels of Target F, and Biomass threshold levels in combination with an interim Biomass limit of $0.4B_{MSY}$ in HCR parameterization consistent with Rec [11-13] to inform the Commission in support of identifying 'high probability' and 'short period'.

FTarget: $.75F_{MSY}$, $.8F_{MSY}$, $.85F_{MSY}$, $.9F_{MSY}$, $.95F_{MSY}$, F_{MSY}

BThreshold: $.6B_{MSY}$, $.8B_{MSY}$, B_{MSY}

ALB-Table 4. North Atlantic albacore estimated probabilities (in %) that the fishing mortality is below F_{MSY} and spawning stock biomass is above SSB_{MSY} (green status). Projections conducted with different Harvent Control Rules (as combinations of Bthresh and Ftarget values, all assuming Blim=0.4SSB_{MSY}) are shown (see also **ALB-Figure 14 and ALB-Figure 15**).

	Kobe II Strategy matrix. Future probability of SSB>SSBMSY and F<FMSY for different combinations of Bthreshold and Ftarget values																		Average catch over		Cumulative catch over:		
Bthreshold	Ftarget	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	3 years	5 years	10 years	15 years	20 years
.6Bmsy	0.75Fmsy	29	32	36	49	54	57	61	65	68	70	73	75	77	78	80	81	82	84	26.969	139.100	293.575	454.716	620.434
.6Bmsy	0.8Fmsy	29	31	35	45	52	55	58	61	64	67	69	71	74	75	77	78	79	80	28.458	146.274	306.335	472.388	642.668
.6Bmsy	0.85Fmsy	29	31	33	42	47	52	55	57	59	62	64	67	69	71	72	74	76	77	29.911	153.211	318.349	488.666	662.774
.6Bmsy	0.9Fmsy	29	30	30	39	42	46	50	52	54	56	58	60	62	64	66	68	70	71	31.330	159.918	329.637	503.591	680.809
.6Bmsy	0.95Fmsy	29	29	20	36	37	39	42	44	48	50	51	52	54	55	56	58	60	61	32.715	166.398	340.221	517.205	696.835
.8Bmsy	0.75Fmsy	29	32	42	51	55	59	63	67	70	72	75	76	78	80	81	83	86	88	25.260	133.581	289.167	451.760	618.642
.8Bmsy	0.8Fmsy	29	32	41	50	53	56	59	62	66	69	71	73	75	77	78	80	81	83	26.655	140.496	301.820	469.532	641.152
.8Bmsy	0.85Fmsy	29	31	39	48	50	53	56	58	61	63	67	69	71	73	75	76	77	79	28.016	147.185	313.734	485.931	661.571
.8Bmsy	0.9Fmsy	29	30	35	46	48	50	51	54	56	58	60	62	64	67	69	70	72	73	29.346	153.654	324.930	500.996	679.954
.8Bmsy	0.95Fmsy	29	29	23	45	45	46	47	48	49	51	52	54	55	56	58	59	61	63	30.643	159.905	335.420	514.759	696.359
Bmsy	0.75Fmsy	29	35	47	58	62	68	72	75	78	80	82	84	87	90	92	94	95	96	22.639	123.151	277.783	441.651	610.569
Bmsy	0.8Fmsy	29	34	46	56	61	66	71	73	76	78	80	82	85	87	90	92	94	95	23.877	129.456	289.836	458.946	632.882
Bmsy	0.85Fmsy	29	33	45	55	59	63	69	71	74	77	78	80	82	84	87	89	91	93	25.083	135.543	301.142	474.839	653.068
Bmsy	0.9Fmsy	29	33	42	54	56	60	66	68	71	74	76	77	79	81	83	85	87	89	26.260	141.416	311.703	489.342	671.130
Bmsy	0.95Fmsy	29	32	32	52	54	57	62	64	67	70	72	73	76	77	78	80	81	83	27.407	147.079	321.520	502.449	687.030

ALB-Table 5. South Atlantic albacore estimated probabilities (in %) that the South Atlantic albacore stock fishing mortality is below F_{MSY} (a), biomass is above B_{MSY} (b) and both (c). Projections for constant F and constant catch levels are shown.

(a) Probability F<Frms

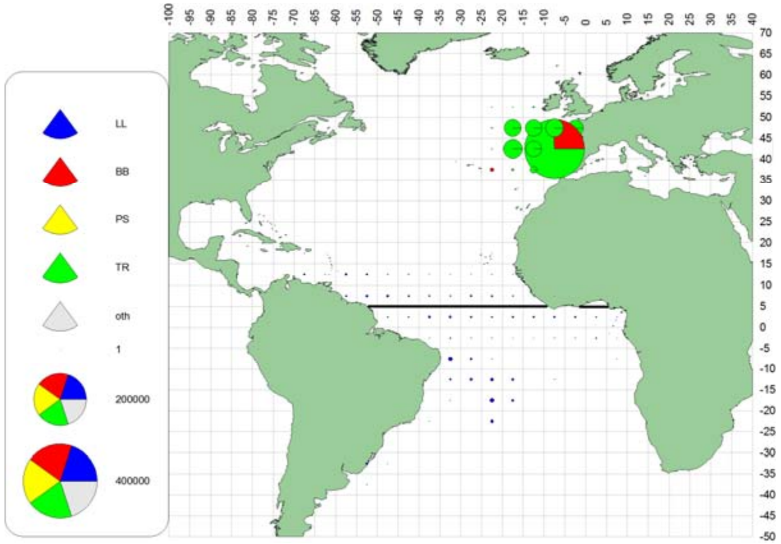
Harvest	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
14000	0.909	0.914	0.919	0.922	0.923	0.924	0.926	0.928	0.929	0.929	0.930	0.932	0.931
16000	0.857	0.863	0.871	0.874	0.878	0.882	0.887	0.892	0.895	0.897	0.899	0.901	0.902
18000	0.799	0.808	0.819	0.825	0.830	0.834	0.838	0.841	0.843	0.846	0.848	0.851	0.852
20000	0.680	0.698	0.708	0.719	0.728	0.740	0.746	0.753	0.759	0.765	0.772	0.776	0.781
22000	0.590	0.603	0.610	0.618	0.626	0.634	0.637	0.644	0.648	0.654	0.656	0.659	0.662
24000	0.506	0.511	0.519	0.526	0.530	0.534	0.537	0.540	0.541	0.542	0.545	0.547	0.550
26000	0.414	0.413	0.414	0.414	0.415	0.415	0.417	0.418	0.419	0.419	0.420	0.419	0.418
28000	0.339	0.332	0.325	0.322	0.316	0.311	0.306	0.304	0.301	0.299	0.292	0.287	0.284
30000	0.286	0.272	0.261	0.247	0.236	0.227	0.221	0.213	0.207	0.200	0.193	0.188	0.185
32000	0.240	0.220	0.206	0.192	0.182	0.175	0.170	0.166	0.161	0.157	0.154	0.149	0.148
34000	0.201	0.182	0.171	0.165	0.157	0.151	0.144	0.140	0.133	0.129	0.126	0.124	0.123

(b) Probability B>Brms

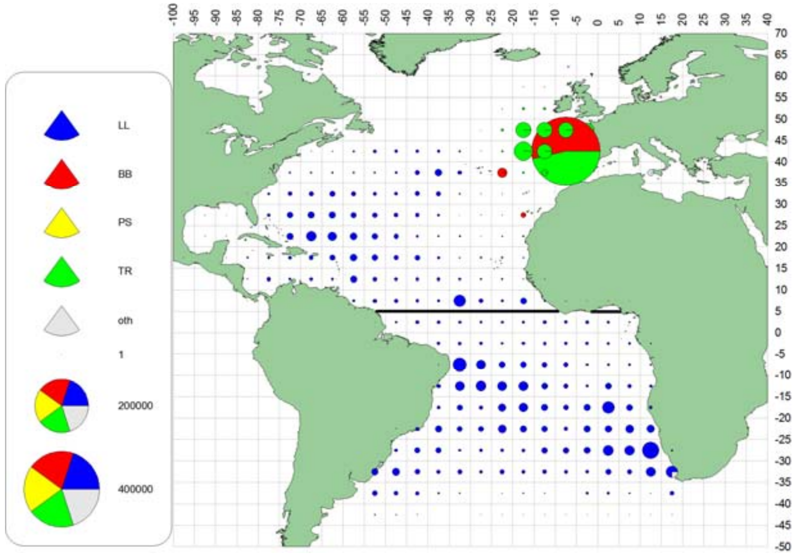
Harvest	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
0.75 Fmsy	0.470	0.539	0.598	0.637	0.678	0.700	0.728	0.753	0.778	0.809	0.824	0.841	0.851
0.8 Fmsy	0.465	0.526	0.576	0.610	0.641	0.675	0.693	0.717	0.735	0.755	0.782	0.796	0.810
0.85 Fmsy	0.464	0.510	0.547	0.584	0.609	0.634	0.658	0.676	0.696	0.712	0.723	0.738	0.757
0.9 Fmsy	0.459	0.490	0.522	0.548	0.570	0.592	0.610	0.625	0.642	0.658	0.671	0.681	0.694
0.95 Fmsy	0.457	0.475	0.493	0.513	0.526	0.542	0.557	0.568	0.581	0.591	0.600	0.609	0.618
1.0 Fmsy	0.451	0.459	0.464	0.471	0.475	0.480	0.482	0.487	0.490	0.493	0.496	0.499	0.500
14000	0.477	0.581	0.643	0.696	0.734	0.762	0.790	0.815	0.836	0.848	0.855	0.864	0.872
16000	0.472	0.562	0.615	0.660	0.700	0.724	0.750	0.767	0.788	0.802	0.822	0.833	0.840
18000	0.471	0.541	0.590	0.623	0.650	0.678	0.703	0.719	0.737	0.750	0.763	0.775	0.787
20000	0.465	0.519	0.564	0.592	0.610	0.627	0.644	0.658	0.671	0.680	0.688	0.696	0.709
22000	0.463	0.495	0.529	0.549	0.570	0.583	0.591	0.599	0.606	0.615	0.623	0.628	0.635
24000	0.460	0.475	0.488	0.501	0.511	0.522	0.524	0.534	0.538	0.542	0.544	0.548	0.551
26000	0.455	0.453	0.451	0.449	0.449	0.444	0.443	0.443	0.439	0.436	0.437	0.437	0.438
28000	0.454	0.432	0.412	0.398	0.384	0.372	0.361	0.352	0.347	0.337	0.327	0.321	0.316
30000	0.447	0.409	0.373	0.350	0.326	0.308	0.285	0.269	0.253	0.242	0.231	0.226	0.218
32000	0.445	0.386	0.342	0.307	0.265	0.239	0.221	0.209	0.201	0.193	0.187	0.182	0.176
34000	0.442	0.368	0.308	0.257	0.224	0.205	0.191	0.182	0.175	0.169	0.160	0.155	0.151

(c) Probability of green status (B>Brms y F<Frms).

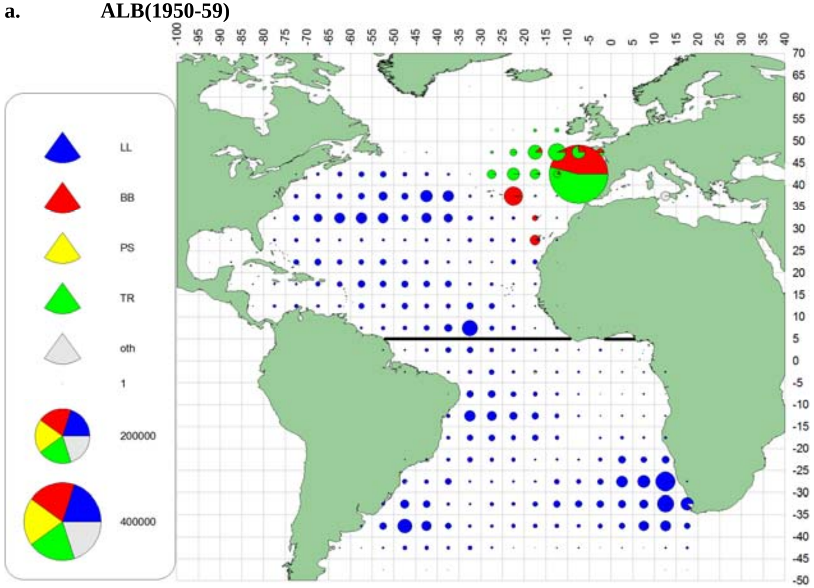
Harvest	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
0.75 Fmsy	0.469	0.538	0.597	0.637	0.677	0.699	0.728	0.753	0.778	0.809	0.824	0.841	0.851
0.8 Fmsy	0.465	0.525	0.575	0.610	0.641	0.675	0.693	0.717	0.735	0.755	0.782	0.796	0.810
0.85 Fmsy	0.464	0.509	0.547	0.583	0.609	0.634	0.658	0.676	0.696	0.712	0.723	0.738	0.757
0.9 Fmsy	0.458	0.489	0.522	0.547	0.570	0.592	0.610	0.625	0.642	0.658	0.671	0.681	0.694
0.95 Fmsy	0.456	0.474	0.492	0.513	0.526	0.541	0.557	0.568	0.581	0.591	0.600	0.609	0.618
1.0 Fmsy	0.160	0.169	0.174	0.181	0.186	0.190	0.193	0.197	0.201	0.203	0.207	0.209	0.211
14000	0.474	0.578	0.641	0.693	0.731	0.760	0.788	0.812	0.833	0.846	0.853	0.861	0.868
16000	0.468	0.557	0.610	0.656	0.695	0.720	0.746	0.763	0.785	0.798	0.819	0.829	0.837
18000	0.463	0.533	0.583	0.615	0.642	0.672	0.697	0.713	0.730	0.744	0.757	0.770	0.783
20000	0.454	0.508	0.553	0.581	0.601	0.618	0.635	0.650	0.663	0.673	0.682	0.692	0.704
22000	0.446	0.480	0.514	0.536	0.558	0.572	0.580	0.590	0.598	0.608	0.615	0.620	0.627
24000	0.428	0.445	0.459	0.475	0.484	0.496	0.503	0.513	0.517	0.521	0.526	0.529	0.532
26000	0.394	0.395	0.399	0.400	0.402	0.403	0.405	0.406	0.407	0.409	0.411	0.412	0.413
28000	0.336	0.329	0.324	0.321	0.315	0.309	0.305	0.302	0.300	0.298	0.291	0.285	0.283
30000	0.286	0.272	0.261	0.247	0.236	0.227	0.221	0.213	0.207	0.200	0.193	0.188	0.185
32000	0.240	0.220	0.206	0.192	0.182	0.175	0.170	0.166	0.161	0.157	0.154	0.149	0.148
34000	0.201	0.182	0.171	0.165	0.157	0.151	0.144	0.140	0.133	0.129	0.126	0.124	0.123



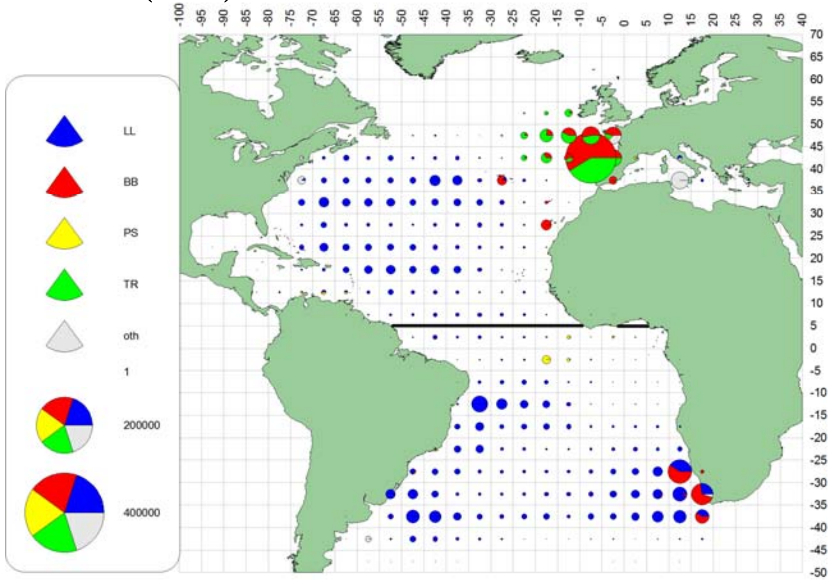
a. **ALB(1950-59)**



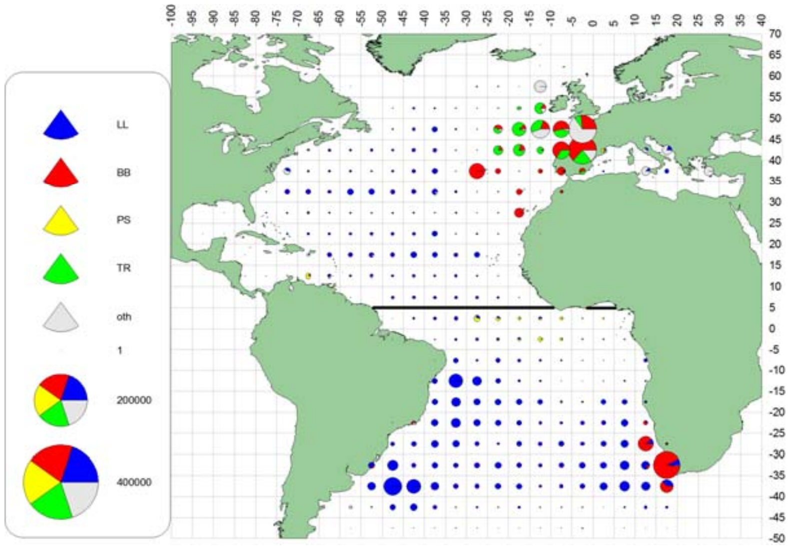
c. **ALB(1960-69)**



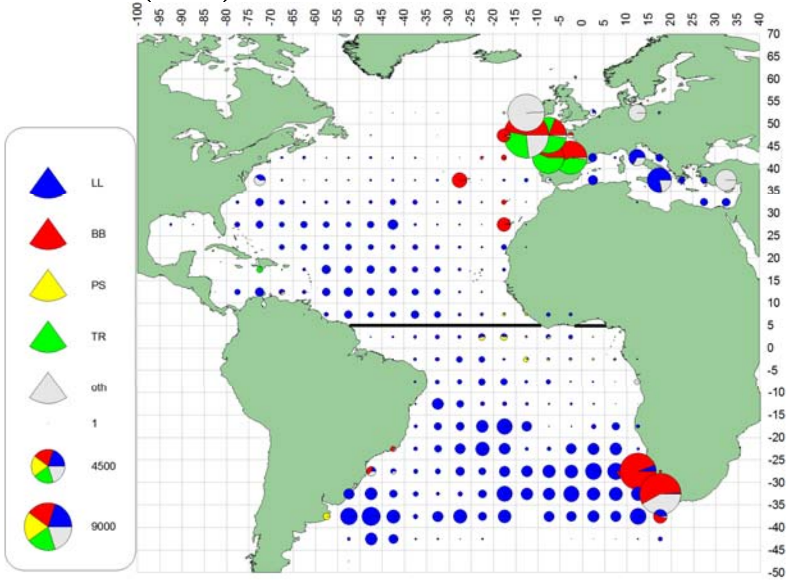
b. **ALB(1970-79)**



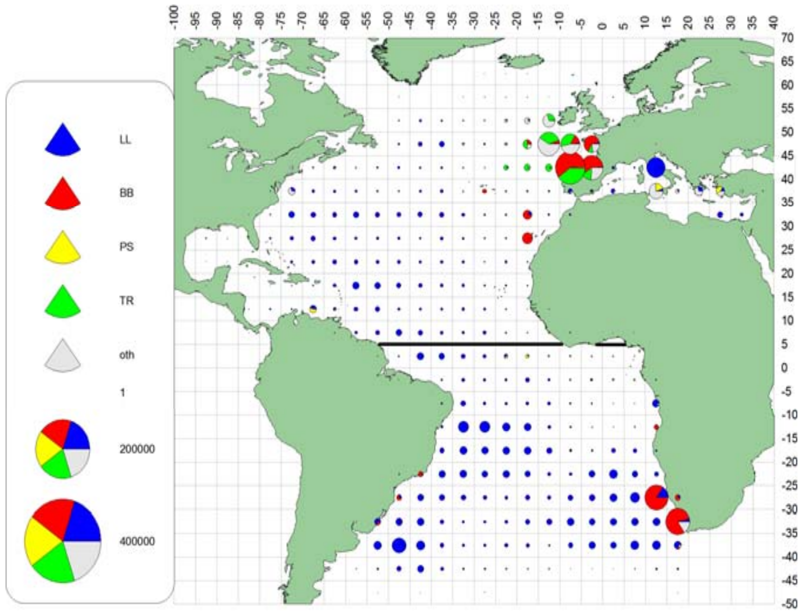
d. **ALB(1980-89)**



e. **ALB(1990-99)**

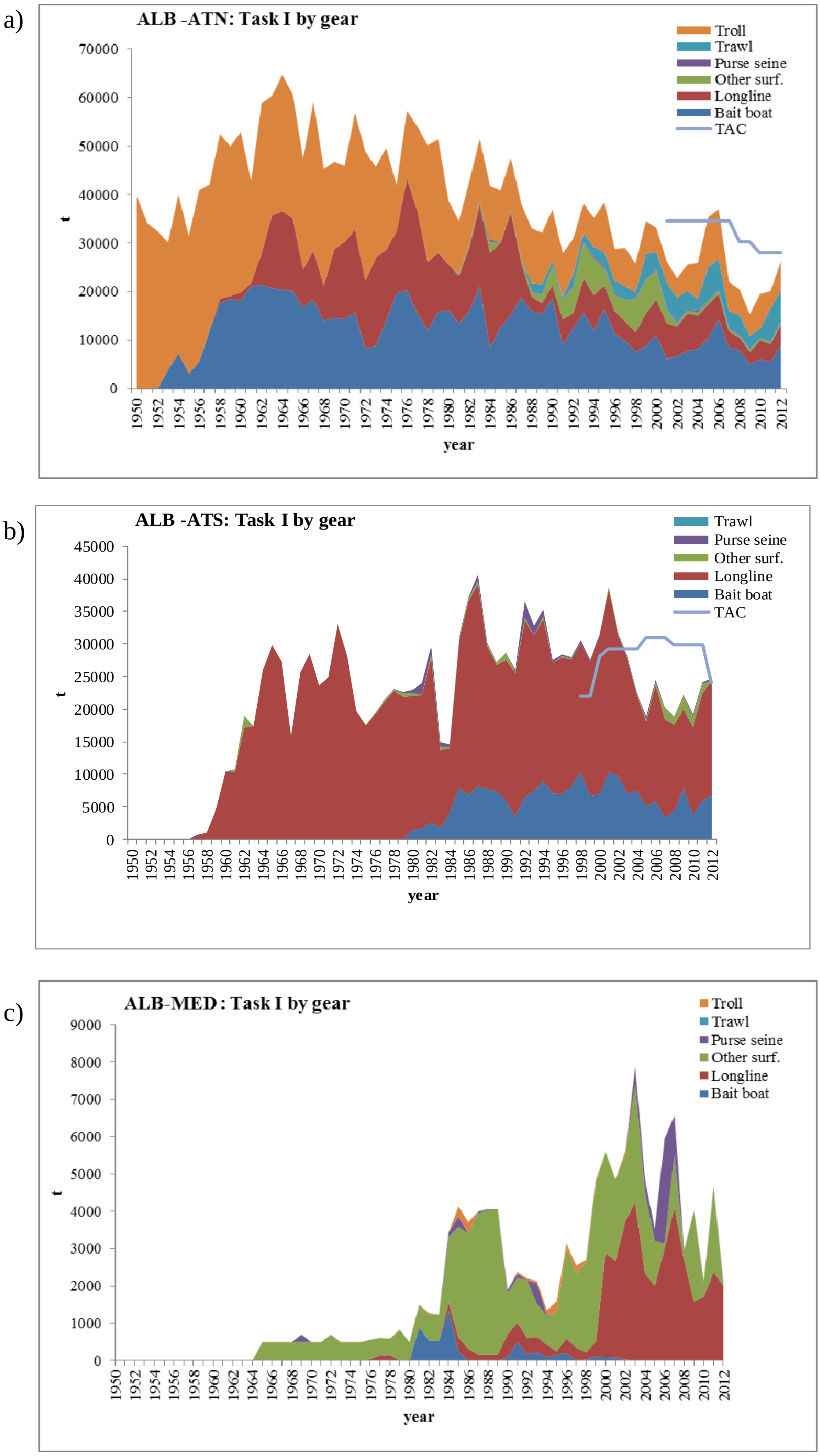


g. **ALB(2010-11)**



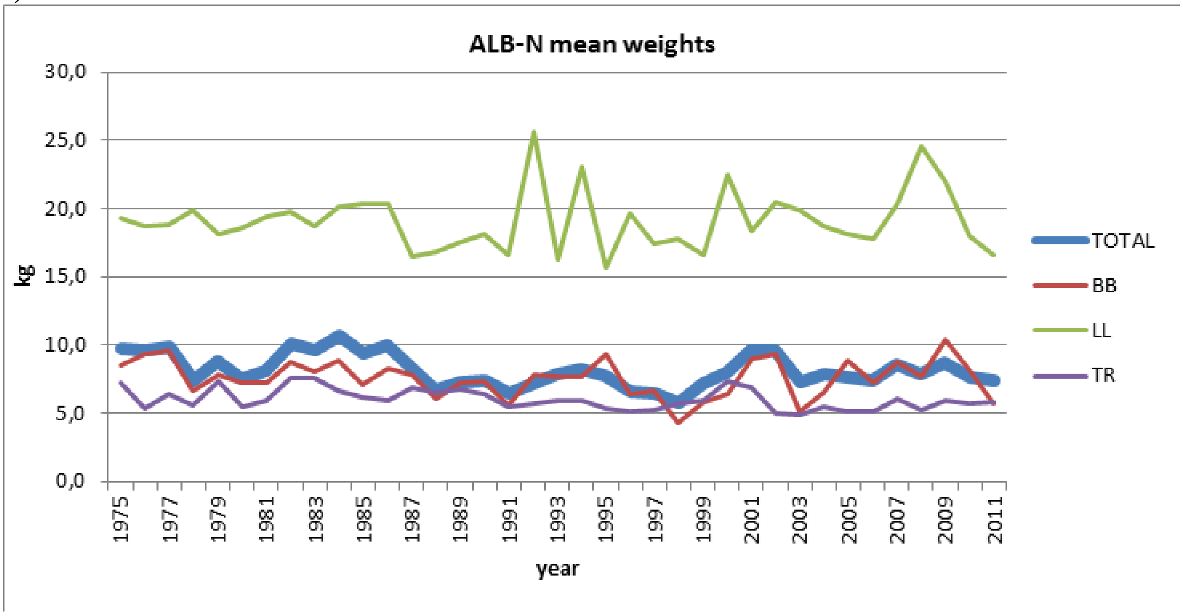
f. **ALB(2000-09)**

ALB-Figure 1. Geographic distribution of albacore accumulated catch by major gears and decade (1950-2011). Baitboat and troll catches prior to the 1990s, these catches were assigned to only one 5ºx5º stratum in the Bay of Biscay. The symbols for the 2010-2011 information (g) are scaled to the maximum catch observed during 2010-2011, whereas the remaining plots (a-f) are scaled to the maximum catch observed from 1950 to 2009.

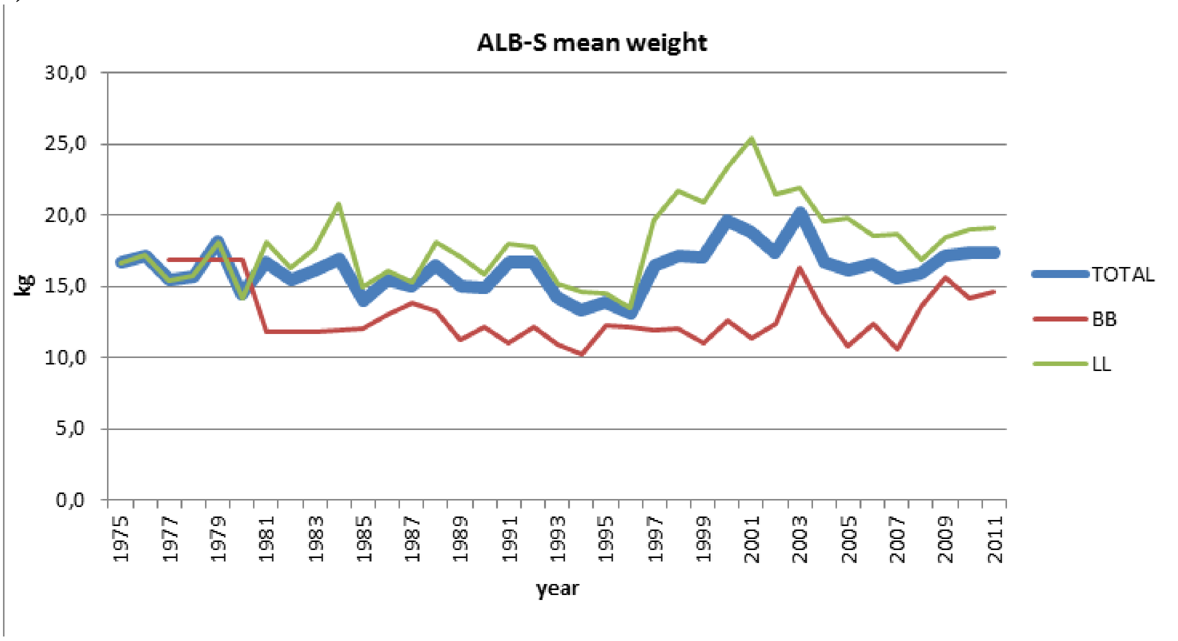


ALB-Figure 2a, b, c. Total albacore catches reported to ICCAT (Task I) by gear for the northern, southern Atlantic stocks including TAC, and the Mediterranean stock.

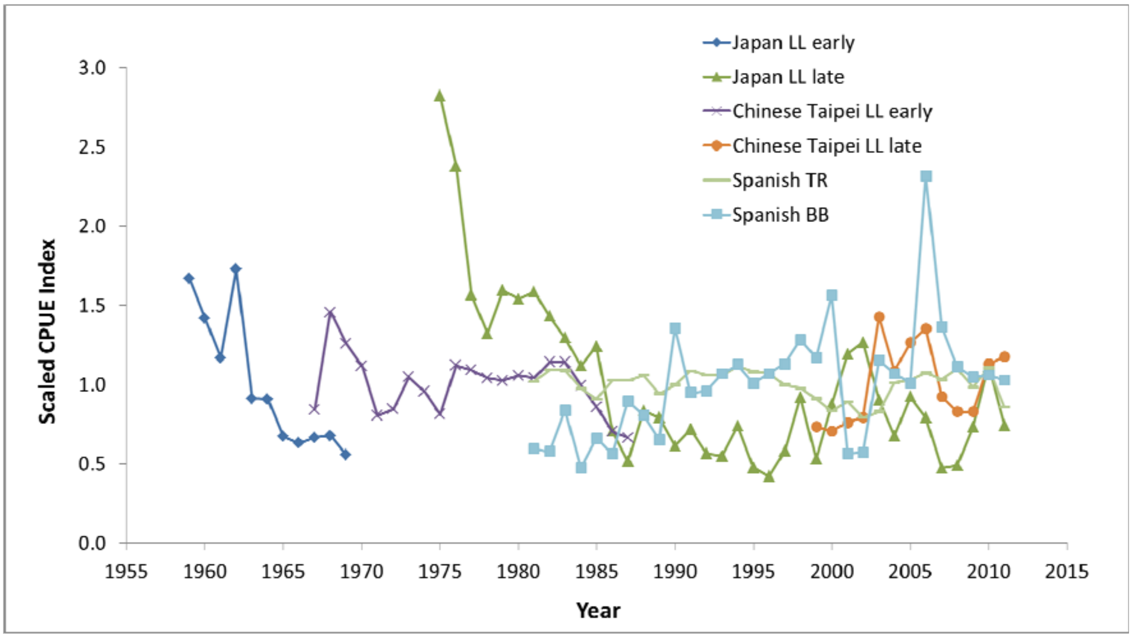
a)



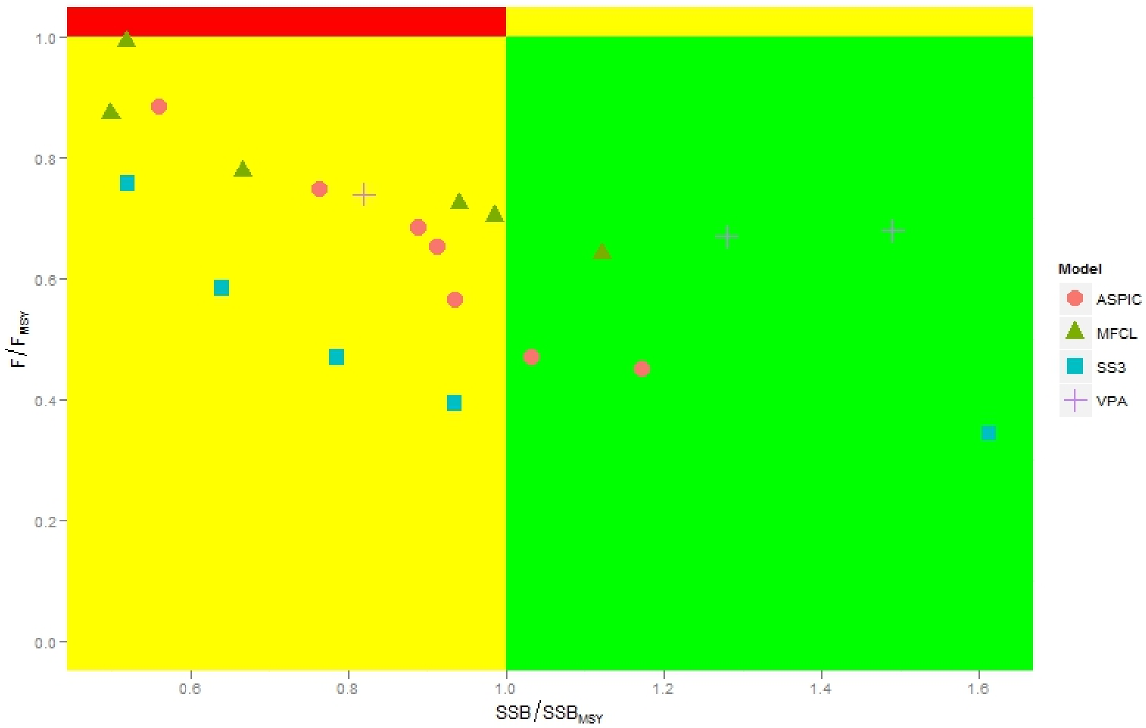
b)



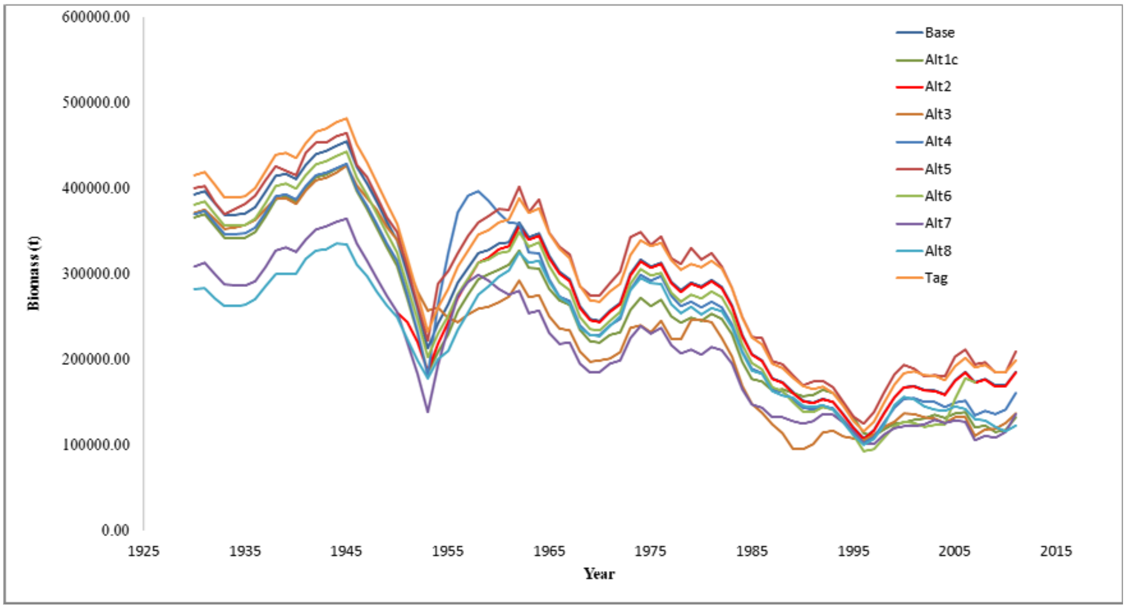
ALB-Figure 3a, b. North Atlantic and South Atlantic albacore. Mean weight trend by surface and longline fisheries in North Atlantic (a) and South Atlantic (b) stocks.



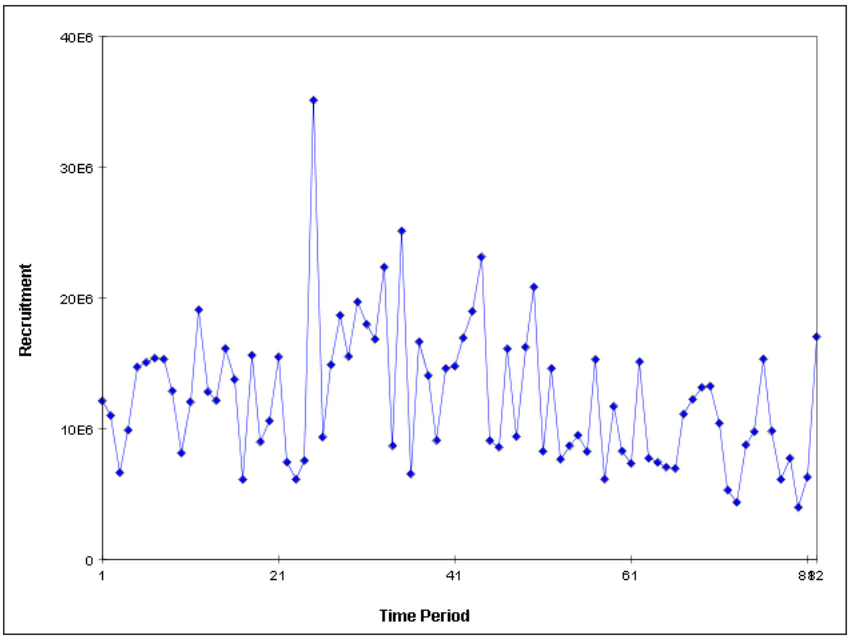
ALB-Figure 4. Standardized catch rate indices used in the 2013 northern albacore stock assessment from the surface fisheries, which take mostly juvenile fish, and from the longline fisheries, which take mostly adult fish.



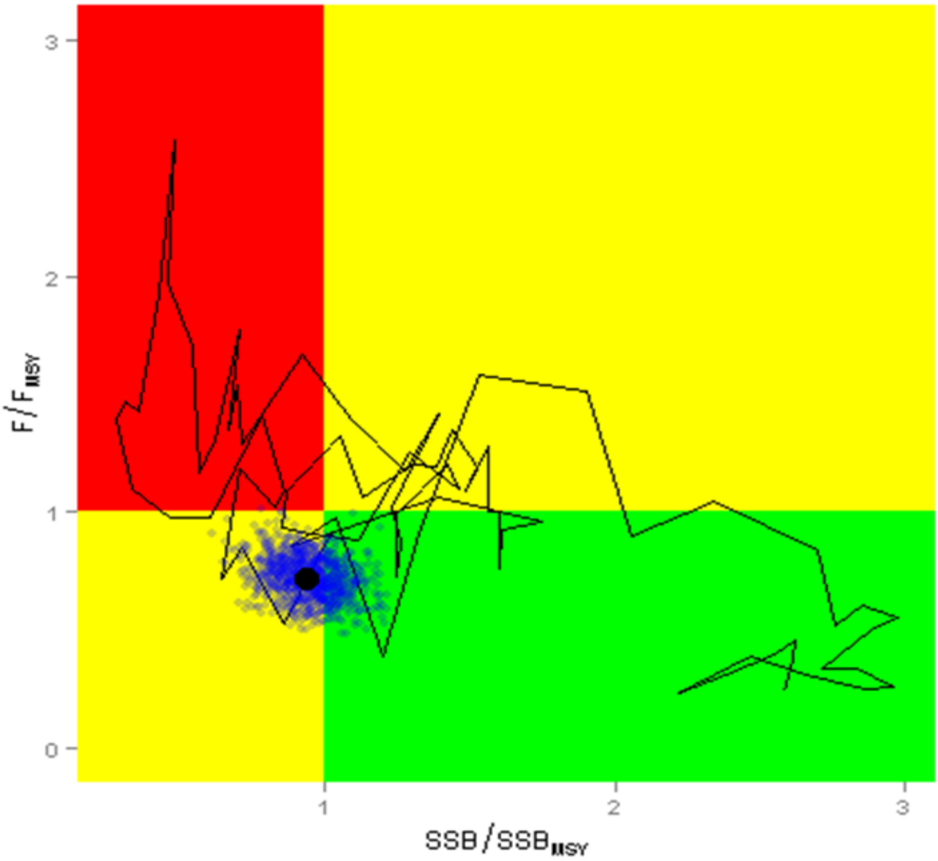
ALB-Figure 5. Stock status of Northern albacore tuna according to base case as well as different models and runs considered during the assessment.



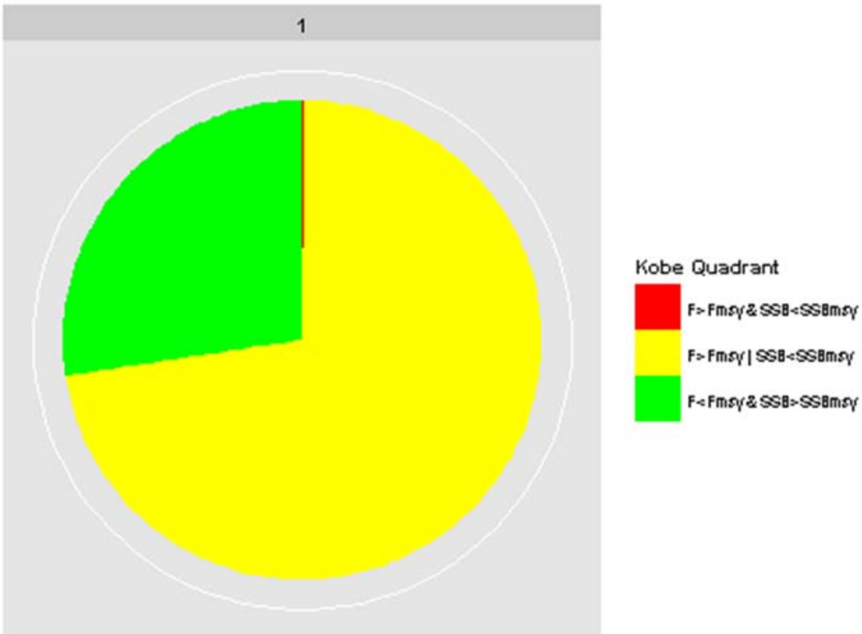
ALB-Figure 6. Estimates of northern Atlantic albacore spawning stock size between 1930-2011 according to the Multifan-CL Base Case and the different sensitivity runs considered in the assessment.



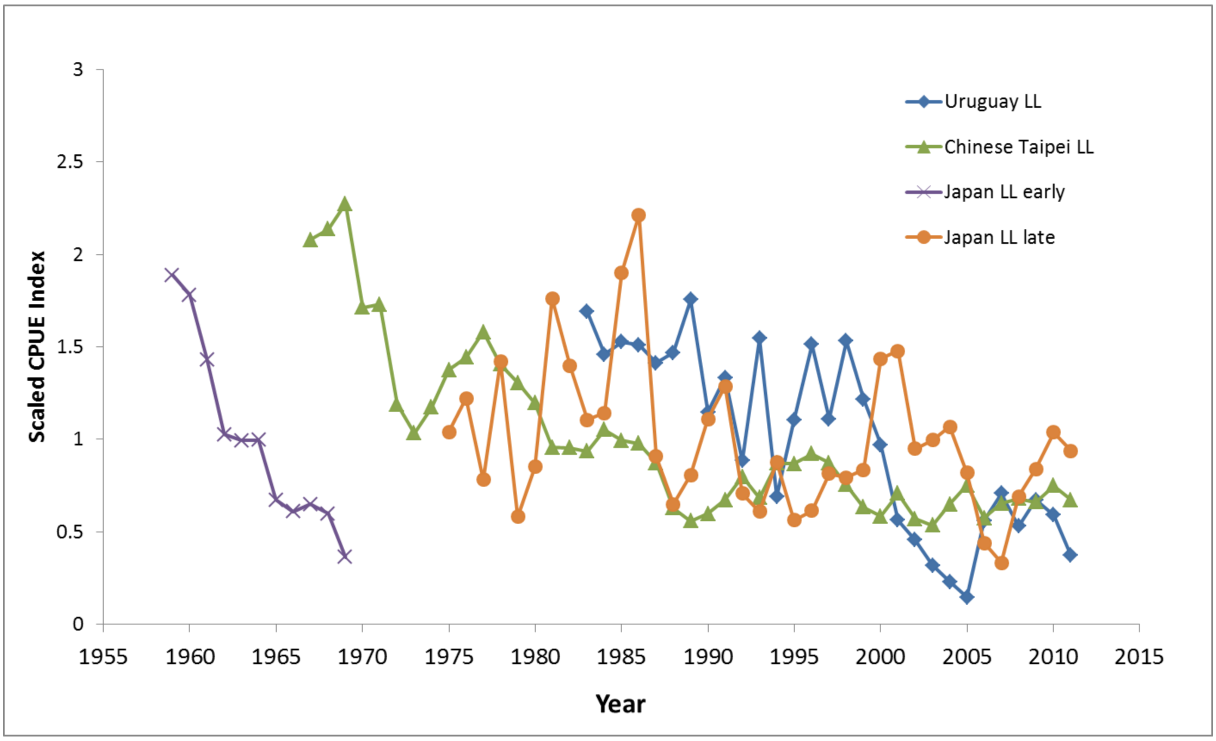
ALB-Figure 7. Estimates of northern Atlantic albacore recruitment (age 1) between 1930-2011 from Multifan-CL base case. Uncertainty in the estimates has not been characterized, but the uncertainty in recent recruitment levels is considered to be higher than in the past.



ALB-Figure 8. Joint trajectories of SSB/SSB_{MSY} and F/F_{MSY} over time and current stock status of northern albacore according to the estimated Multifan-CL Base Case. The black point represents the stock status in 2011, and the blue points represent the uncertainty on the current stock status.

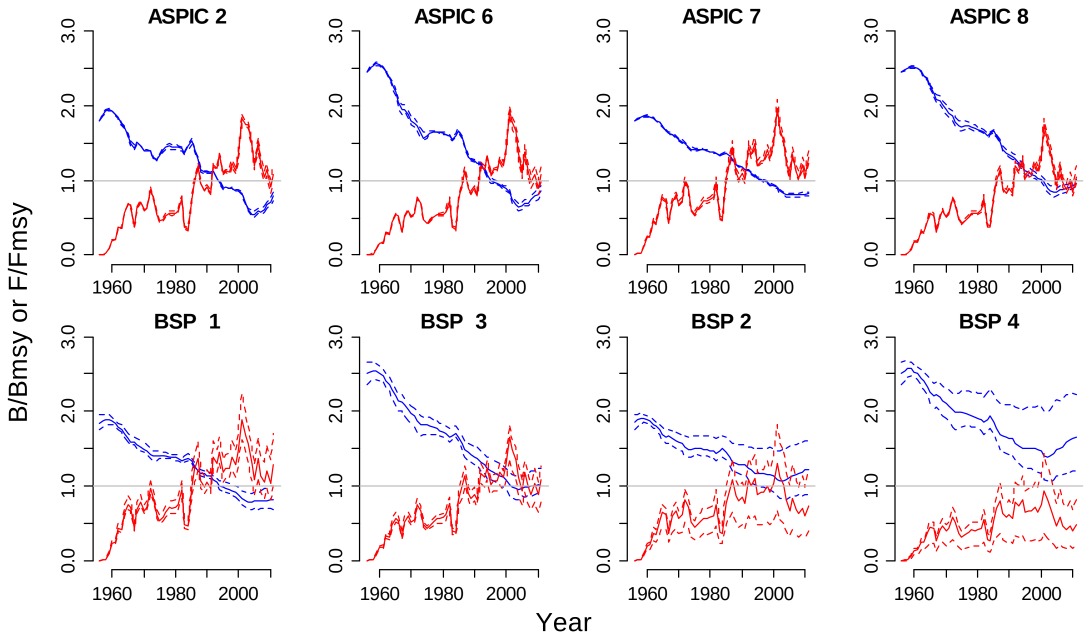


ALB-Figure 9. North Atlantic albacore probability of being overfished and overfishing (red, 0,2 %), of being neither overfished nor overfishing (green, 27.4%), and of being overfished or overfishing, but not both (yellow, 72.4%), according to the Multifan-CL Base Case.

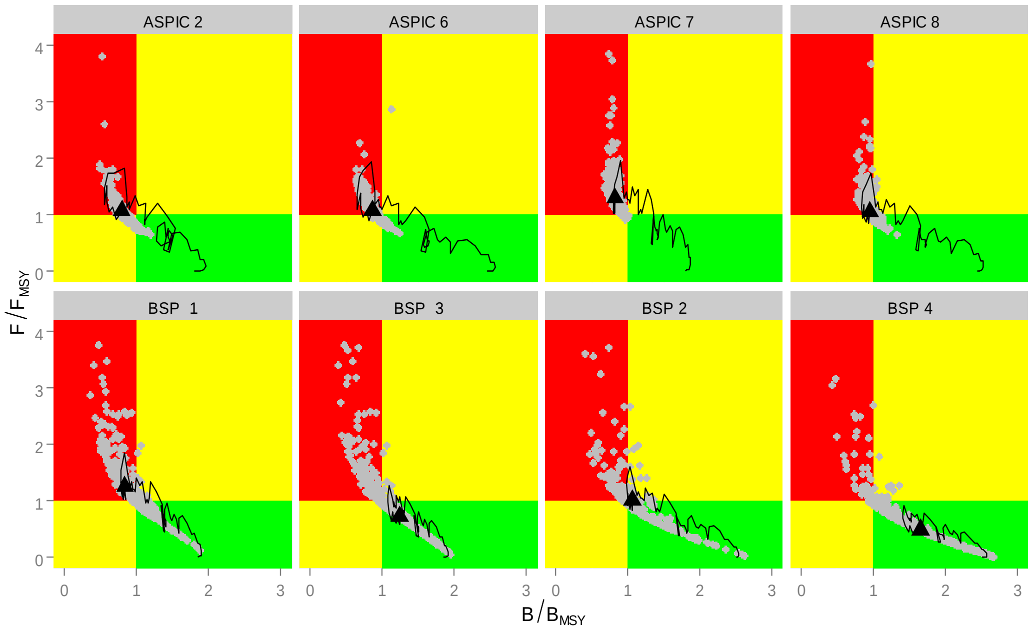


ALB-Figure 10. Standardized catch rates used in the 2013 southern albacore stock assessment.

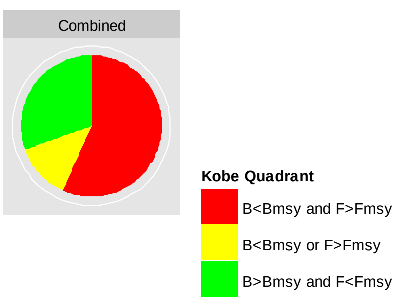
a)



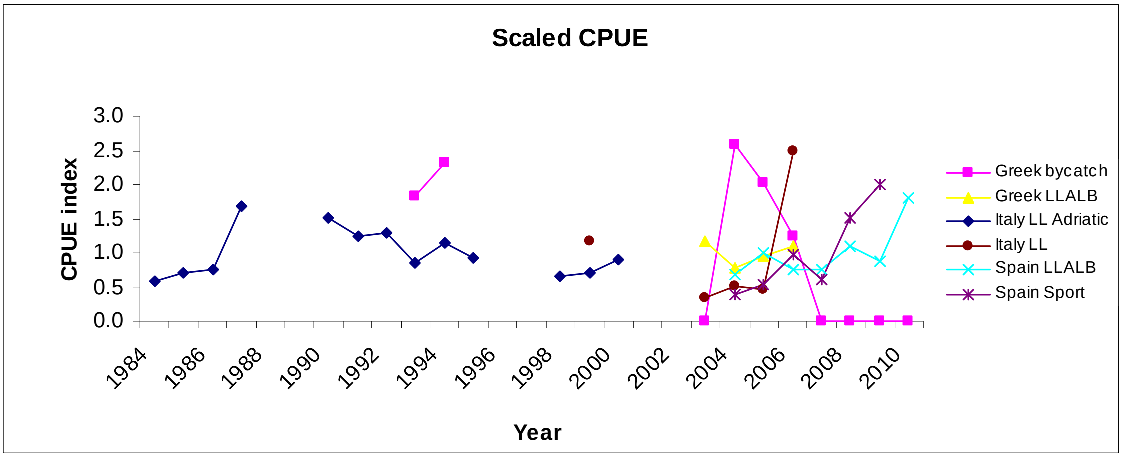
b)



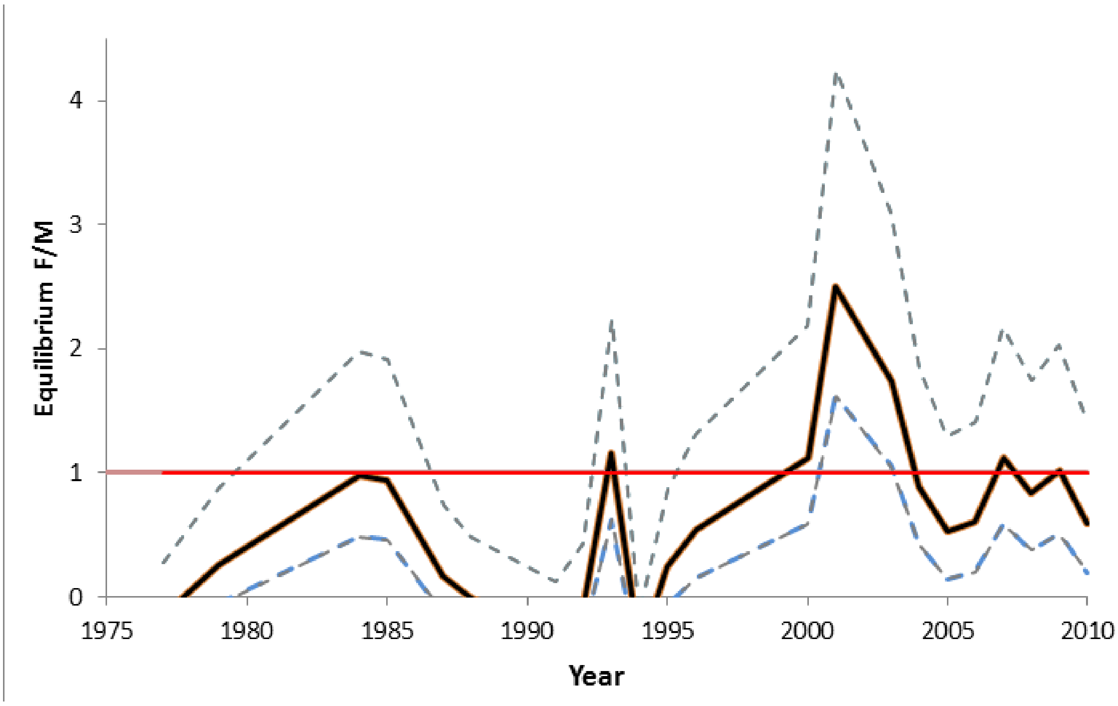
c)



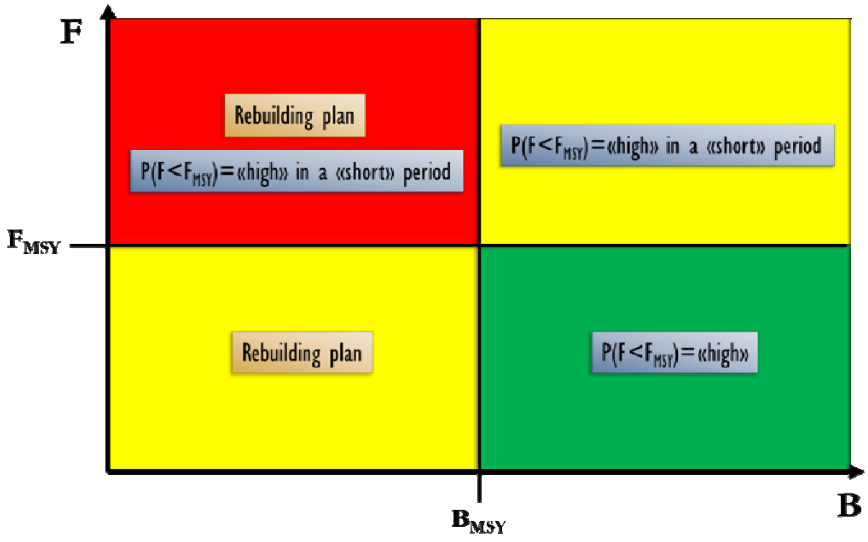
ALB-Figure 11. South Atlantic albacore. a) Median biomass (in blue) and fishing mortality rates (in red) relative to MSY levels, with 50% credibility intervals, for the 4 base case Bayesian Surplus Production (BSP) models and the point estimate biomass and 50% credibility intervals for the 4 base case ASPIC Production models. (b) Stock status trajectories of B/B_{MSY} and F/F_{MSY}, as well as uncertainty around the current estimate (Kobe plots) for the base case ASPIC models (Runs 2, 6, 7 and 8) alongside those from the base case BSP runs (1, 2, 3 and 4). (c) Combined probability of being overfished and overfishing (red, 57%), of being neither overfished nor overfishing (green (30%), and of being overfished or overfishing, but not both (yellow, 13%).



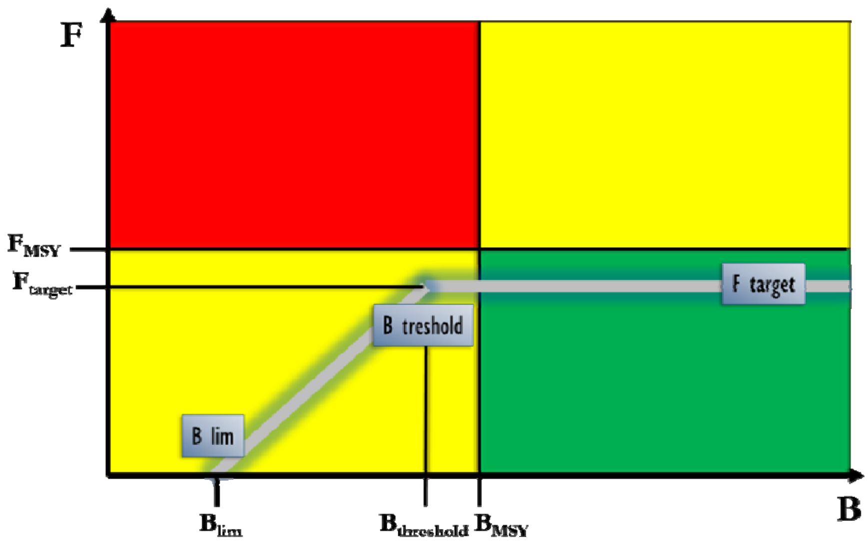
ALB-Figure 12. Set of standardized and nominal CPUEs used in the assessment of the Mediterranean albacore stock. The "Greek by-catch" indicates the probability of albacore by-catch in the swordfish fishery, practically null in some years. This series is the only one that is not included in the base case Bayesian production model.



ALB-Figure 13. Mediterranean albacore. Estimates of equilibrium fishing mortality rate relative to M (as a proxy for $F_{MSY)}$ based on length-converted catch curve analysis. The central solid line represents an M assumption of 0.3 with patterns resulting from an assumed M of 0.4 (lower dashed) and 0.2 (upper dashed) also depicted.



ALB-Figure 14. Schematic representation of the key elements of the *Recommendation by ICCAT on the principles of decision making for ICCAT conservation and management measures* [Rec. 11-13].



ALB-Figure 15. Generic form of the HCR recommended by SCRS (SCRS, 2011). Blim is the limit biomass reference point, BThreshold is the biomass point at which increasingly strict management actions should be taken as biomass decreases and Ftarget, the target fishing mortality rate to be applied such that it is lower than FMSY with 'high probability' [Rec. 11-13].

8.5 BFT – ATLANTIC BLUEFIN TUNA

In 2012, the SCRS conducted an update of the 2010 assessment of Atlantic bluefin tuna (Anon. 2011f). In this update, the available data included catch, effort and size statistics through 2011. As previously discussed, there are considerable data limitations for the eastern stock up to 2007. While catch data reporting for the eastern and Mediterranean fisheries has substantially improved since 2008 and some historical statistical data have been recovered, none-the-less, most of the data limitations that have plagued previous assessments remain and will require new approaches in order to improve the scientific advice the Committee can offer. The SCRS strongly recommends the continuation of enhanced data collection program and the replacement of current assessment methods with appropriate approaches that take unquantified uncertainties into account.

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 however been made over the last years and therefore the Committee investigated in 2013 the size data retrieved from the observer on board of cages programmes (see SCRS/2013/014). There was considerable quantity of information that were analyzed and compared to current catch at size. These data appeared to be of good quality and the Committee recommended the integration of this new valuable source of information in the Task II database prior to the next stock assessment (work to be completed during the 2014 bluefin tuna data Working Group). Pilot studies using dual camera system or acoustic coupled with video system have been presented at the SCRS since 2010. The results are encouraging and last studies showed that this technique can provide precise catch composition when it is used with a proper and well defined protocol (see SCRS/2013/182).

The Atlantic-wide Research Program for Bluefin Tuna (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, particularly with respect to obtain fisheries-independent indices of stock size, 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.

In 2012 and 2013, the SCRS also reviewed new information on the biology, spatial dynamics, catch statistics and fisheries catch rates. The SCRS also discussed progress made by the GBYP and other research program about the aerial survey, tagging, data mining, biological sampling, stock mixing and new modeling approaches (see SCRS/2012/139 and SCRS/2013/014).

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 have a wide geographical distribution living mostly in temperate Atlantic waters and adjacent seas (**BFT-Figure 1**). The absence of catch allowance for incidental catches in the South Atlantic could prevent a proper knowledge about the spatial distribution of Atlantic bluefin tuna in this Ocean. Archival tagging and tracking information confirmed that bluefin tuna can sustain cold as well as warm temperatures while maintaining stable internal body temperature. 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, the SCRS assumes that eastern Atlantic and Mediterranean bluefin tuna mature at approximately 25 kg (age 4) and western Atlantic bluefin tuna at approximately 145 kg (age 9). Recent information received by the SCRS indicated that some individuals caught in the West Atlantic as small as 47 kg (age 5) were mature. 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, but slower than other tuna and billfish species. Fish born in June attain a length of about 30-40 cm long and a weight of about 1 kg by October. After one year, fish reach about 4 kg and 60 cm long. Growth in length tends to be lower for adults than juveniles, but growth in weight increases with age. 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.

During an intersessional meeting in May 2013 the Committee evaluated new information from GBYP and national research projects on reproduction direct age estimations and population structure (SCRS/2013/014). Natal origin has been mapped from otolith stable isotopes and with the expanded biological sample collections now being undertaken by CPCs and through the GBYP, more information on stock structure will be forthcoming through other molecular approaches (genetic and contaminant tag analyses). Recent analyses and catch information (e.g. SCRS/2013/014, SCRS/2011/075) support the presence of the strong 2003 year class in both the eastern and western fisheries.

An important electronic and conventional tagging activity on both juveniles and adults fish has been performed in the East Atlantic and Mediterranean by GBYP, national programmes and NGOs. These ongoing efforts have started to provide significant insight into bluefin tuna stock structure, mixing and migrations and would possibly help in estimating fishing mortality rates.

The Committee recognized that there have been important recent contributions to the understanding of bluefin tuna biology and ecology that should have significant impacts on the assessment of the resource.

BLUEFIN TUNA – EAST

BFTE-2. Fishery Trends and Indicators – East Atlantic and Mediterranean

It is very well known that introduction of fattening and farming activities into the Mediterranean in 1997 and good market conditions resulted in rapid changes in the Mediterranean fisheries for bluefin tuna mainly due to increasing purse seine catches. In the last few years, nearly all of the declared Mediterranean bluefin fishery production 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 **(BFTE-Figure 1)**. Both the increase and the subsequent decrease in declared production occurred mainly for the Mediterranean **(BFTE-Figure 1)**. Since 2008, there was a significant decrease in the reported catch following more restrictive TACs. Declared catch was, at the time of the meeting, 23,849 t, 19,751 t, 11,328 t, 9,774 t and 10,852 t for the East Atlantic and Mediterranean, of which 16,205 t, 13,066 t, 6,949 t, 5,790 t and 7,019 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 a major cause of stock decline over that period. 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 the 2010 ICCAT Data Preparatory Meeting on Bluefin Tuna) (Anon. 2011c). 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. The Committee discussed extensively catch estimates based on trade statistics and concluded that these studies could substantially improve size data and could be used to corroborate reported total catch. However, the methodology developed for the back-calculation needs to be improved and should further integrate information from the BCDs (Bluefin Catch Document) before to be used by the SCRS (see Bluefin Tuna 2012 Detailed Report) (Anon. 2013d).

Available indicators from the Bay of Biscay baitboat fisheries (small and medium fish) shows a general increasing trend over the whole time period, with more variable values after the mid 80's, with two peaks in the 90s and one in the mid-2000s (**BFTE-Figure 2**). This CPUE index covers the longest period (1952-2011), during which changes in selectivity took place, especially during the most recent periods because of changes in management regulations. This index could not be updated because this fishery sold most of its quota to other Spanish fisheries in 2012 and 2013.

Indicators from Moroccan and Spanish traps targeting large fish (spawners) are standardized catch per unit of effort (CPUE) up to 2012 and include released individuals, which represent more than 10,000 individuals in 2012. The Moroccan trap index was further updated up to 2013 including 32,000 released individuals during that year. CPUE of Moroccan and Spanish traps showed a slight increasing trend over the last years and large fluctuations, with period of high catch rates, as in the early 1980s, late 1990s and late 2000s and periods of lower catch rates, as in the mid-1990s and mid-2000s (**BFTE-Figure 2**).

Indicators from Japanese longliners targeting large fish (spawners) in the East Atlantic (South of 40ºN) and the Mediterranean Sea displayed a recent increase after a general decline since the mid-1970s (**BFTE-Figure 2**). However, this index has not been updated since 2009 because this fleet did not operate in the Mediterranean and rarely in the East Atlantic (South of 40ºN) in recent years. Indicators from Japanese longliners targeting medium to large fish in the northeast Atlantic were available since 1990 and has been updated to 2012. This index showed a strong increasing trend in the last 3 years (**BFTE Figure 2**). This index becomes more valuable since the major part of Japanese catch come from this fishing ground in recent years. The size of bluefin caught in this area showed a large contribution of the 2003 year class. This high proportion of the 2003 year class and the contraction of the spatial coverage of the Japanese longliners in recent years in response to a lower number of boats and management regulations may affect the ability of this index to track changes in bluefin tuna abundance.

Catch rates of Spanish purse seiners operating in the Balearic area showed a large increase over the last three years. Changes in the size composition of the catch have been observed and could be due to changes in the fishing season. Another new index from the Sardinian traps has also been provided and led to similar increase in catch rates in the recent years.

CPUE indices updated in 2013 are thus consistent with stock rebuilding estimated in the 2012 stock assessment (Anon. 2013d).

Fisheries-independent information from the aerial surveys performed on the juveniles fish in the northwestern Mediterranean Sea provide similar indications, showing a three to four-fold increase in juveniles abundance in 2009-2012 compared to 2000-2003. Note, however, that the relative abundance was lower in 2012 than in 2011, which may be partially due to bad weather conditions in 2012 that delay most of the surveys at the end of the season. Note also that this index has a restricted spatial coverage (i.e., the northwestern Mediterranean Sea).

The SCRS recognized that the recent regulatory measures affect significantly the CPUE values (e.g., Spanish baitboat, Moroccan and Spanish traps and Japanese longline indices) through the change of operational pattern, length of the fishing season and target sizes. Recent tendency in the indicators are likely a reflection of positive outcomes from recent management measures. However, in 2012, the Committee had too little information about the catch composition, effort and spatial distribution of the main Mediterranean fisheries to derive any conclusive statement; a situation that should improve in the coming years due to increasing available information in that key area. Fisheries-independent indicators (e.g., aerial and larval surveys) and a large-scale tagging program are nonetheless needed to provide more reliable stock status indicators.

BFTE-3. State of the stock

The quality and the representativeness of catch statistics is the most crucial element of the bluefin tuna stock assessment. In spite of recent improvements in the data quantity and quality for the past few years, there remain important data limitations for the 2012 updated assessment of the stock (Anon. 2013d). These included poor temporal and spatial coverage for detailed size and catch-effort statistics for several fisheries, especially in the Mediterranean. Substantial under-reporting of total catches was also evident between 1998 and 2007. Nevertheless, the Committee updated the 2010 stock assessment (Anon. 2011f) as requested by the Commission, applying the same methodologies and hypotheses adopted by the Committee in 2010. The Committee believes that while substantial improvements in catch and effort statistics are necessary in the future for more robust stock assessment, it appears unlikely that such substantial improvements can be made regarding historical fishery performance. Because of this, the Committee believes that assessment methodologies applied so far 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 tuna. This process will require at least three years (from 2012) to complete in terms of robustness testing of the methodologies envisioned and the Committee has therefore planned a series of working groups by 2015 (see the 2012 and 2013 work plans).

The updated assessment results indicated that the spawning stock biomass (SSB) peaked over 300,000 tonnes in the late 1950s and early 1970s and then declined to about 150,000 tonnes until the mid-2000s. In the most recent period, the SSB showed clear signs of increase in all the runs that have been investigated by the Committee (see Bluefin Tuna Detailed Report, **BFTE-Figure 3)**. However, the magnitude and the speed of the SSB increase vary considerably among the runs and remain, therefore, highly uncertain. Trends in fishing mortality (F) for the younger ages (ages 2-5) displayed a continuous increase until recent years. Since 2008, F at ages 2-5 decreased sharply to reach the lowest historical values. For oldest fish (ages 10+), F had been decreasing during the first 2 decades and then rapidly increased since the 1980s and finally declined since the late 2000s (**BFTE-Figure 3**). These recent trends in F are consistent with those obtained during the 2010 stock assessment. For the 1995-2007 years, Fs for older fish are also consistent with a shift in targeting towards larger individuals destined for fattening and/or farming. Recent recruitment levels remain uncertain due to limited information about incoming year class strength and uncertainties in the indicators used to track recruitment. The low recent catches of fish less than the minimum size also while improving the yield per recruit may cause problem to evaluate recruitment levels.

Estimates of current stock status relative to MSY benchmarks are highly sensitive to the selectivity pattern (and thus to some technical assumptions in the VPA) and, for the biomass reference point, to the hypotheses about the recruitment levels. In addition to those uncertainties, the current perception of the stock status is also closely related to the assumptions made about stock structure and migratory behavior, which remain poorly known. Nonetheless, the perception of the stock status derived from the 2012 updated assessment has improved in comparison to previous assessments, as F for both younger and older fish have declined during the recent years. All the runs investigated by the Committee also showed a clear increase of the SSB, but both the speed and magnitude of this upward trend remain highly uncertain, as these strongly depend on model specifications (see detailed report, section 6). F_{2011} appears to clearly be below the reference target $F_{0.1}$ (a reference point used as a proxy for F_{MSY} that is more robust to uncertainties than F_{MAX}) in both catch scenarios: $F_{2011}/F_{0.1}$= 0.7 and 0.36 for the reported and inflated catch scenarios, respectively. If F_{2011} would be consistent with the Convention Objectives, current SSB remained most likely to be under the level expected at $F_{0.1}$: $SSB_{2011}/SSB_{0.1}$= 0.63 and 0.76 for reported and inflated catch scenario when considering medium recruitment. In the reported catch scenario, the median of the SSB is about 37% (high recruitment scenario) to 89% (low recruitment scenario) of the biomass that is expected under a $F_{0.1}$ strategy. In the inflated catch scenario, the median SSB ranges from 37% (high recruitment) to 116% (low recruitment, the only scenario for which current biomass would be above target reference biomass level, **BFTE-Figure 4 and 5)**.

BFTE- 4. Outlook

In 2012, the Committee performed a set of projections using similar technical specifications as in 2010, *i.e.* using three mean recruitment levels and two catch scenarios (reported and inflated) and the current selectivity patterns (computed as the geometric means over the 2009-2011 partial Fs, see (Kell *et al*., 2013 for more details). According to the 2012 VPA results and above specifications, F would remain below $F_{0.1}$ in the 10 coming years with at least 60% of probabilities for all catch levels investigated, 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, with at least 60% of probabilities, is slightly more restrictive (**BFTE-Tables 1 and 2**).

Projections are known to be impaired by various sources of uncertainties that have not yet been fully quantified. Although the situation has improved regarding recent catch, there are still uncertainties about the speed and magnitude of the SSB increase (see the slope of **BFTE-Figure 3**), key modeling parameters for bluefin tuna productivity, the current and future recruitment levels, the stock structure and the level of IUU catch (although the Committee believed that the level of IUU has strongly decreased since 2008). These uncertainties, as those reflected above, cannot be taken into account in the Kobe matrices. Acknowledging these limitations, the 2012 stock assessment indicates that the rebuilding of eastern bluefin tuna at $SSB_{F0.1}$ level with a probability of at least 60% could be achieved before 2022 with catch at around recent TACs. Current estimates also indicate that the rebuilding could be achieved by 2022 with higher TAC (up to 28,000 t, **BFTE-Table 3**). While the updated fisheries indicators are consistent with the estimation of stock rebuilding, there still remain key uncertainties regarding current and future recruitment levels and the speed and magnitude of the rebuilding of the SSB.The results from the projections thus need to be further confirmed by future data and analyses.

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 2011 and 2012 TAC were set at 12,900 t by [Rec. 10-04], while that of 2013 was at 13,400 t [Rec. 12-03].

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 fishing capacity, 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 (23,849 t), 2009 (19,751 t), 2010 (11,328 t), 2011 (9,779 t) and 2012 (11,474 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 (**BFT-Table 1, BFTE-Figure 1**). Although care is needed when considering estimates of catch using capacity measures, the Group’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, the Committee remains concerned about current capacity which could easily harvest catch volumes well in excess of the rebuilding strategy adopted by the Commission.

Recent analyses from the reported catch-at-size and catch-at-age displayed important changes in selectivity patterns over the last 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 younger fish and subsequently a significant increase in the annual mean-weight in the catch-at-size since 2007 (**BFTE-Figure 6**). Additionally, higher abundance or higher concentration of small bluefin tuna in the north-western Mediterranean detected from aerial surveys could also reflect positive outcomes from increase minimum size regulation. Rec. [06-05] also resulted in improved yield-per-recruit levels in comparison to the early 2000s as well as to a greater recruitment to the spawning stock biomass due to higher survival of juvenile fish.

As noted above, the recent regulatory measures significantly affect most of the fisheries in the East Atlantic and Mediterranean and consequently some key fisheries indicators. The difficulties to update the Spanish baitboat and the Japanese indices, as well as the difficulties to access to Spanish trap catch information in 2013, could be highly problematic for the coming years, as those indices are crucial for stock assessment. It also worth noting that the transfer of quotas from one fisheries to another may also affect stock assessment outcomes, as such transfer have implications on the repartition of the fishing effort and thus on selectivity patterns, which are known to impact the references points. Therefore, the Committee reiterates the importance to continue effort, through national programs and GBYP, to obtain robust fisheries-independent indicators.

BFTE-6. Management Recommendations

In [Res. 09-06, 10-04, 12-03] the Commission established a total allowable catch for eastern Atlantic and Mediterranean bluefin tuna between 12,900 t and 13,500 t since 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.

The Kobe matrices are presented in **Tables BFTE 1** to **3** indicating the probabilities of $F<F_{MSY}$, $SSB>SSB_{MSY}$ and $F<F_{MSY}$ and $SSB>SSB_{MSY}$ for quotas from 0 to 30,000 t for 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59%, 60- 69%, 70-79%, 80-89% and greater or equal to 90%. It should be kept in mind, however, that the Kobe matrices cannot integrate some important sources of uncertainties that currently remain unquantified. The quantification of those uncertainties will take time and will imply intensive research effort, as carried out under GBYP.

The implementation of recent regulations through [Recs. 12-03, 10-04, 09-06, and previous recommendations] has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years. However, given the above unquantified uncertainties, the Committee cannot give robust advice that would support a substantial change in the TAC. Nonetheless, the Committee notes that maintaining catches at around recent TACs under the current management scheme 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. A period of stabilization in the main management regulations of the rebuilding plan would allow the SCRS to better estimate the magnitude and speed of recent trends in F and SSB in the coming years.

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY

Current reported yield (2012)	10,852 t	
	Reported catch	Inflated catch
Maximum Sustainable Yield[1]		
Low recruitment scenario (1970s)	21,500 t	23,370 t
Medium recruitment scenario (1950-2006)	30,700 t	35,900 t
High recruitment scenario (1990s)	52,900 t	74,900 t
$F_{0.1}$ [2,3]	0.10 yr^{-1}	0.083 yr^{-1}
$F_{2011}/F_{0.1}$	0.70	0.36
$SSB_{F0.1}$		
Low recruitment scenario (1970s)	318,500 t	342,500 t
Medium recruitment scenario (1950-2006)	452,500 t	524,100 t
High recruitment scenario (1990s)	774,700 t	1,087,000 t
$SSB_{2011}/SSB_{F0.1}$		
Low recruitment scenario (1970s)	0.89	1.16
Medium recruitment scenario (1950-2006)	0.63	0.76
High recruitment scenario (1990s)	0.37	0.37
TAC (2010 - 2013)	13,500 t - 12,900 t - 12, 900 t - 13,400 t	

[1] Approximated as the average of the potential long-term yield that is expected at a $F_{0.1}$ strategy. The levels of these yields have been computed using the 2012 selectivity pattern and can substantially change according to different selectivity patterns.

[2] The Committee decided, on the basis of current published literature, to adopt $F_{0.1}$ as the proxy for F_{MSY}. $F_{0.1}$ has been indeed shown to be more robust to uncertainty about the true dynamics of the stock and observation errors than F_{MAX}. Values are given for both reported and inflated catch scenarios, respectively. $F_{0.1}$ have been also computed using the 2012 selectivity pattern and can thus substantially change according to different selectivity patterns

[3] The recruitment levels do not impact $F_{0.1}$.

BFT-Table 1. Estimated catches (t) of North bluefin tuna (*Thunnus thynnus*) by area, gear and flag.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			27014	23819	26027	29349	34131	36635	48853	49712	53320	49489	42375	35228	36541	37390	37089	33469	33505	37602	32501	36154	25849	21730	13205	11781	12602
BFT-E			24118	21061	23247	26429	31849	34268	46740	47286	50807	47155	39718	32456	33766	34605	33770	31163	31381	35845	30689	34516	23849	19751	11328	9774	10852
	ATE		6951	5433	6040	6556	7619	9367	6930	9646	12663	13539	11376	9628	10528	10086	10347	7362	7410	9036	7535	8037	7645	6684	4379	3984	3834
	MED		17167	15628	17207	19872	24230	24901	39810	37640	38144	33616	28342	22828	23238	24519	23424	23801	23971	26810	23154	26479	16205	13066	6949	5790	7019
BFT-W			2896	2759	2780	2920	2282	2367	2113	2425	2514	2334	2657	2772	2775	2784	3319	2305	2125	1756	1811	1638	2000	1980	1876	2007	1750
Landings	ATE	Bait boat	1936	1971	1693	1445	1141	3447	1980	2601	4985	3521	2550	1492	1822	2275	2567	1371	1790	2018	1116	2032	1794	1260	725	636	282
		Longline	1169	962	1496	3197	3817	2717	2176	4388	4788	4534	4300	4020	3736	3303	2896	2750	2074	2713	2448	1706	2491	1960	1194	1157	1166
		Other surf.	1221	1020	562	347	834	1548	932	1047	646	511	621	498	703	712	701	560	402	1014	1047	502	187	298	143	36	48
		Purse seine	0	0	54	46	462	24	213	458	323	828	692	726	1147	150	884	490	1078	871	332	0	0	0	1	0	0
		Sport (HL+RR)	1	2	1	0	0	0	0	0	0	162	28	33	126	61	63	109	87	11	4	10	6	2	25	19	25
		Traps	2624	1478	2234	1522	1365	1631	1630	1152	1921	3982	3185	2859	2996	3585	3235	2082	1978	2408	2588	3788	3166	3164	2292	2137	2311
	MED	Bait boat	0	0	25	148	158	48	0	206	5	4	11	4	0	0	1	9	17	5	0	0	0	38	0	0	
		Longline	1227	1121	1026	2869	2599	2342	7048	8475	8171	5672	2749	2463	3317	3750	2614	2476	2564	3101	2202	2656	2254	1344	1058	869	585
		Other surf.	2870	3289	1212	1401	1894	1607	3218	1043	1197	1037	1880	2976	1067	1096	990	2536	1106	480	301	699	1022	0	275	223	26
		Purse seine	11198	9450	11250	13245	17807	19297	26083	23588	26021	24178	21291	14910	16195	17174	17656	17167	18785	22475	20020	22952	12641	11395	4984	4293	6094
		Sport (HL+RR)	838	457	1552	738	951	1237	2257	3556	2149	2340	1336	1622	1921	1321	1647	1392	1340	634	503	78	137	146	351	226	177
		Traps	1034	1311	2142	1471	821	370	1204	772	601	385	1074	852	739	1177	515	221	159	115	129	95	152	144	281	165	125
Discards	MED	Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	12
Landings	ATW	Longline	1371	698	739	894	674	695	539	468	547	382	764	914	858	610	729	186	644	425	565	420	606	366	529	743	478
		Other surf.	425	755	536	578	509	406	307	384	432	293	342	281	284	202	108	140	97	89	85	63	82	121	126	148	117
		Purse seine	383	385	384	237	300	295	301	249	245	250	249	248	275	196	208	265	32	178	4	28	0	11	0	0	2
		Sport (HL+RR)	601	786	1004	1083	586	854	804	1114	1029	1181	1108	1124	1120	1649	2035	1398	1139	924	1005	1023	1130	1251	1009	887	917
		Traps	14	1	2	0	1	29	79	72	90	59	68	44	16	16	28	84	32	8	3	4	23	23	39	26	17
Discards	ATW	Longline	102	119	115	128	211	88	83	138	167	155	123	160	222	105	211	232	181	131	149	100	159	207	174	202	220
		Other surf.	0	14	0	0	0	0	0	0	4	0	0	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	14	3	0	0	6	0	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	
		China P.R.	0	0	0	0	0	0	0	0	0	0	85	103	80	68	39	19	41	24	42	72	119	42	38	36	36
		Chinese Taipei	0	109	0	0	0	6	20	4	61	226	350	222	144	304	158	0	0	10	4	0	0	0	0	0	
		EU.Denmark	1	0	0	0	0	37	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	4567	3565	3557	2272	2319	5078	3137	3819	6174	6201	3800	3360	3474	3633	4089	2138	2801	3102	2033	3276	2938	2409	1550	1483	1329
		EU.France	724	460	510	565	894	1099	336	725	563	269	613	588	542	629	755	648	561	818	1218	629	253	366	228	135	148
		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	
		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	14	21	52	22	8	15	3	1	1	2	1	1	1	2	4	10
		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	48	3	27	117	38	25	240	35	199	712	323	411	441	404	186	61	27	79	97	29	36	53	58	180	223
		EU.Sweden	0	0	0	1	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	1	0	1	1	12	0	0	0	0	0	0	0	0	0	1	0	0	
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	67	104	118	0	0	0	0	0	0	0	0	0	0	0	
		Guinée Rep.	0	0	0	0	0	0	330	0	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	2	27	0	0	1	0	0	0	0	0	0	0	0	2	5
		Japan	1169	838	1464	2981	3350	2484	2075	3971	3341	2905	3195	2690	2895	2425	2536	2695	2015	2598	1896	1612	2351	1904	1155	1089	1093
		Korea Rep.	0	0	0	0	0	0	4	205	92	203	0	0	6	1	0	0	3	0	1	0	0	0	0	0	
		Libya	0	0	0	0	312	0	0	0	576	477	511	450	487	0	0	0	0	0	47	0	0	0	0	0	

		Maroc	437	451	408	531	562	415	720	678	1035	2068	2341	1591	2228	2497	2565	1797	1961	2405	2196	2418	1947	1909	1348	1055	990
		NEI (ETRO)	5	6	74	4	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	85	144	223	68	189	71	208	66	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	5	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	1	19	550	255	0	13	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	2	0	0	0	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	93	118	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	MED	Albania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	
		Algerie	677	820	782	800	1104	1097	1560	156	156	157	1947	2142	2330	2012	1710	1586	1208	1530	1038	1511	1311	0	0	0	69
		China P.R.	0	0	0	0	0	0	97	137	93	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	0	0	0	0	0	328	709	494	411	278	106	27	169	329	508	445	51	267	5	0	0	0	0	0	
		EU.Croatia	0	0	0	1418	1076	1058	1410	1220	1360	1105	906	970	930	903	977	1139	828	1017	1022	825	834	619	389	371	369
		EU.Cyprus	10	10	10	10	10	14	10	10	10	10	21	31	61	85	91	79	105	149	110	1	132	2	3	10	18
		EU.España	1428	1645	1822	1392	2165	2018	2741	4607	2588	2209	2000	2003	2772	2234	2215	2512	2353	2758	2689	2414	2465	1769	1056	942	1064
		EU.France	5780	4434	4713	4620	7376	6995	11843	9604	9171	8235	7122	6156	6794	6167	5832	5859	6471	8638	7663	10157	2670	3087	1754	805	791
		EU.Greece	159	182	201	175	447	439	886	1004	874	1217	286	248	622	361	438	422	389	318	255	285	350	373	224	172	176
		EU.Italy	4201	4317	4110	3783	5005	5328	6882	7062	10006	9548	4059	3279	3845	4377	4628	4973	4686	4841	4695	4621	2234	2735	1053	1783	1788
		EU.Malta	24	29	81	105	80	251	572	587	399	393	407	447	376	219	240	255	264	346	263	334	296	263	136	142	137
		EU.Portugal	0	0	0	278	320	183	428	446	274	37	54	76	61	64	0	2	0	0	11	0	0	0	0	0	
		Egypt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	
		Israel	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	258	127	172	85	123	793	536	813	765	185	361	381	136	152	390	316	638	378	556	466	80	18	0	0	
		Korea Rep.	0	0	0	0	0	0	684	458	591	410	66	0	0	0	0	0	700	1145	26	276	335	102	0	0	
		Libya	300	84	328	370	425	635	1422	1540	812	552	820	745	1063	1941	638	752	1300	1091	1280	1358	1318	1082	645	0	756
		Maroc	140	295	1149	925	205	79	1092	1035	586	535	687	636	695	511	421	760	819	92	190	641	531	369	205	182	223
		NEI (Flag related)	0	0	0	0	0	0	427	639	171	1066	825	140	17	0	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	633	757	360	1799	1398	0	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	773	211	0	101	1030	1995	109	571	508	610	709	0	0	0	0	0	0	0	
		Panama	67	0	74	287	484	467	1499	1498	2850	236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	0	0	2	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	
		Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	41	0	34	0	
		Tunisie	624	661	406	1366	1195	2132	2773	1897	2393	2200	1745	2352	2184	2493	2528	791	2376	3249	2545	2622	2679	1932	1042	852	1017
		Turkey	1343	1707	2059	2459	2817	3084	3466	4220	4616	5093	5899	1200	1070	2100	2300	3300	1075	990	806	918	879	665	409	519	536
		Yugoslavia Fed.	1523	560	940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	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	
		EU.Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5
		Libya	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
		Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
Landings	ATW	Argentina	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	
		Brasil	0	2	1	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	1
		Canada	393	619	438	485	443	459	392	576	597	503	595	576	549	524	604	557	537	600	733	491	575	530	505	474	477
		Chinese Taipei	0	20	0	0	0	0	0	4	0	2	0	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	74	11	19	27	19	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	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	

		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	10	5	0	4	3	2	8	0	
		Japan	1109	468	550	688	512	581	427	387	436	322	691	365	492	506	575	57	470	265	376	277	492	162	353	578	289
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	52	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	4	0	19	2	8	14	29	10	12	22	9	10	14	7	7	10	14	14	51
		NEI (ETRO)	0	30	24	23	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (Flag related)	0	0	0	0	0	0	0	0	2	0	0	429	270	49	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	0	0	0	0	0	0	0	0	0	0	
		Sta. Lucia	3	2	14	14	14	2	43	9	3	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	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	1289	1483	1636	1582	1085	1237	1163	1311	1285	1334	1235	1213	1212	1583	1840	1426	899	717	468	758	764	1068	803	738	713
		UK.Bermuda	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Discards	ATW	Canada	0	14	0	0	0	0	0	0	0	6	16	11	46	13	37	14	15	0	2	0	1	3	25	36	17
		Japan	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
		U.S.A.	102	119	115	128	211	88	83	138	171	155	110	149	176	98	174	218	167	131	147	100	158	204	150	166	202

BFTE-Table 1. The probabilities of $F<F_{MSY}$ for quotas from 0 to 30,000t for 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59 %, 60- 69 %, 70-79 %, 80-89 % and greater or equal to 90 %.

Table 1: Kobe II Strategy Matrix, $P(F \leq F_{MSY})$.

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	100	100	100	100	100	100	100	100	100	100
2000	100	100	100	100	100	100	100	100	100	100
4000	100	100	100	100	100	100	100	100	100	100
6000	100	100	100	100	100	100	100	100	100	100
8000	100	100	100	100	100	100	100	100	100	100
10000	100	100	100	100	100	100	100	100	100	100
12000	100	100	100	100	100	100	100	100	100	100
12900	100	100	100	100	100	100	100	100	100	100
13500	100	100	100	100	100	100	100	100	100	100
14000	100	100	100	100	100	100	100	100	100	100
16000	99	100	100	100	100	100	100	100	100	100
18000	97	98	99	99	100	100	100	100	100	100
20000	93	95	97	97	98	98	98	99	99	99
22000	86	89	92	93	94	94	94	95	95	95
24000	77	81	85	86	88	89	89	90	90	90
26000	68	73	78	80	81	82	83	83	84	84
28000	59	65	70	73	74	76	76	77	77	78
30000	51	57	62	66	68	70	70	71	71	71

BFTE-Table 2. The probabilities of SSB >SSB_{MSY} for quotas from 0 to 30000 t for 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59 %, 60- 69 %, 70-79 %, 80-89 % and greater or equal to 90 %.

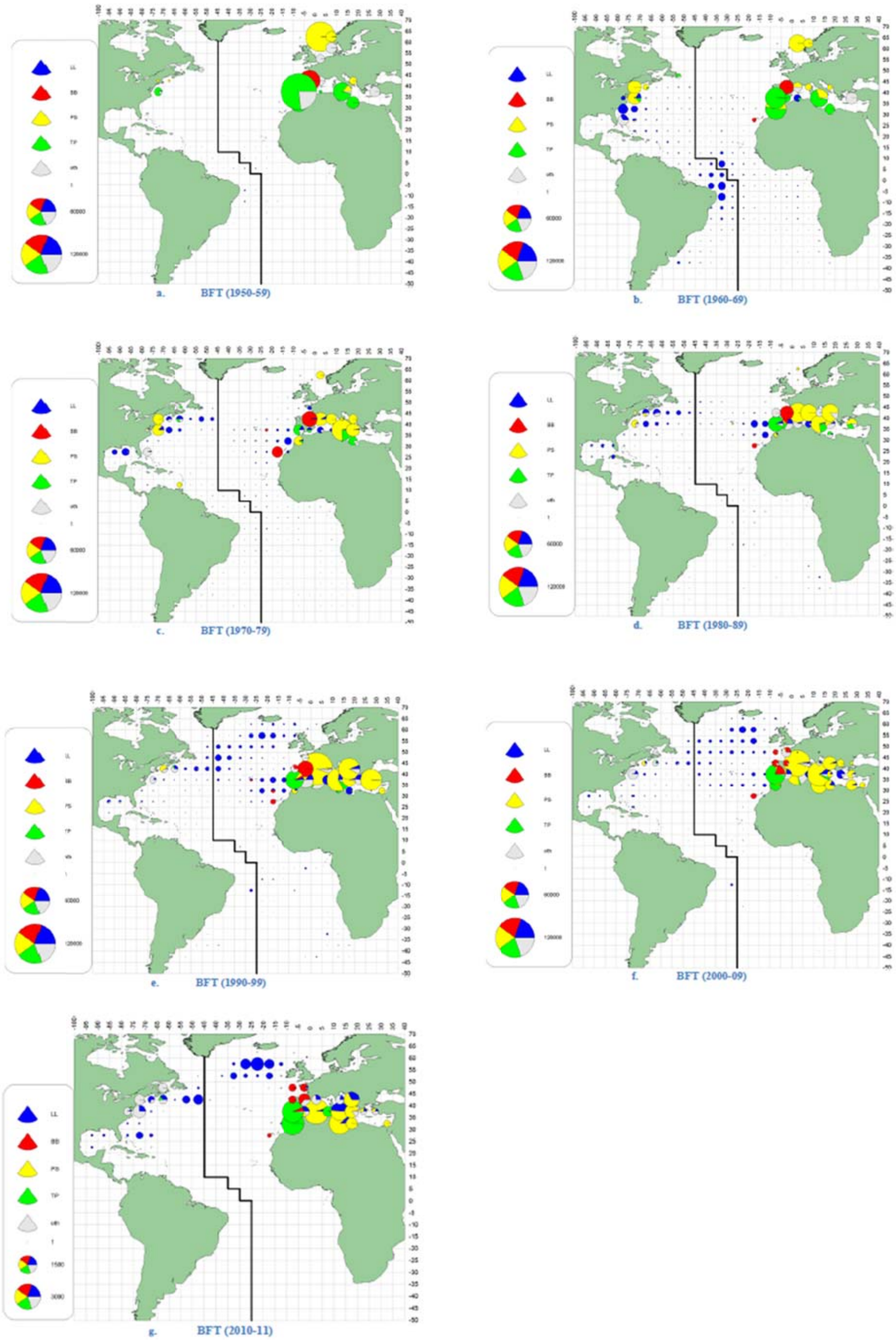
Table 2: Kobe II Strategy Matrix, $P(SSB \geq B_{MSY})$).

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	36	46	54	63	72	82	92	97	100	100
2000	36	45	54	62	70	81	90	97	99	100
4000	36	45	53	61	69	79	89	96	99	100
6000	36	44	52	59	67	77	87	94	98	100
8000	36	43	51	58	66	75	85	92	97	99
10000	35	43	50	56	64	73	83	91	96	99
12000	35	42	48	55	63	70	80	88	95	98
12900	35	42	48	55	62	69	79	87	93	98
13500	35	42	48	54	61	69	78	87	93	97
14000	35	42	47	54	60	68	77	86	92	97
16000	35	41	46	52	58	66	74	83	90	94
18000	34	40	45	51	56	63	71	79	86	92
20000	34	39	44	49	54	60	68	75	83	88
22000	34	39	43	47	52	57	63	71	77	83
24000	34	38	42	46	50	55	60	67	73	78
26000	34	37	41	44	48	52	57	62	67	73
28000	33	36	40	43	45	49	53	58	63	66
30000	33	36	38	41	43	46	50	54	58	62

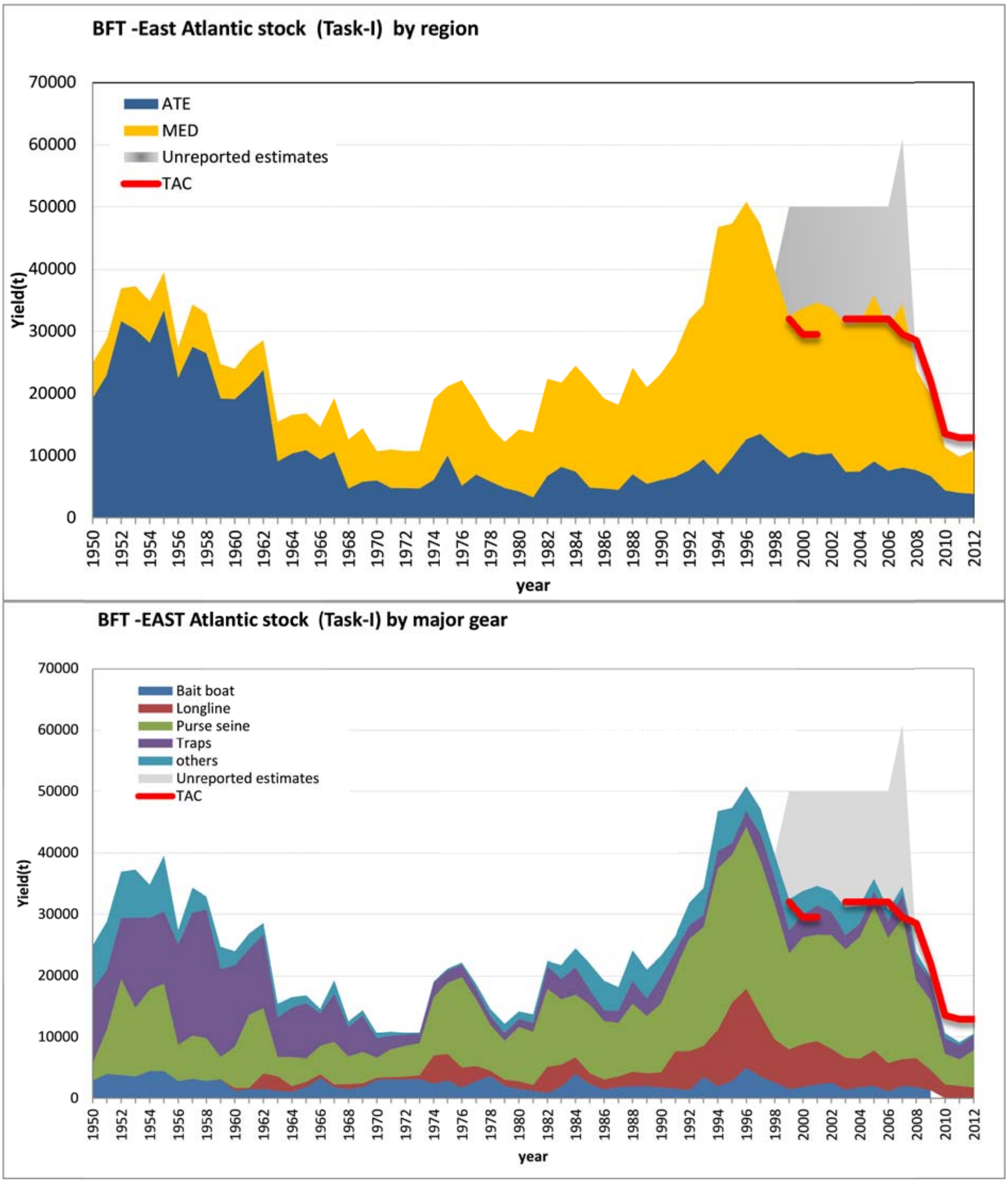
BFTE-Table 3. The probabilities of F<F_{MSY} and SSB >SSB_{MSY} for quotas from 0 to 30000 t for 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59 %, 60- 69 %, 70-79 %, 80-89 % and greater or equal to 90 %.

Table 3: Kobe II Strategy Matrix, $P(F \leq F_{MSY})$ and $P(SSB \geq B_{MSY})$.

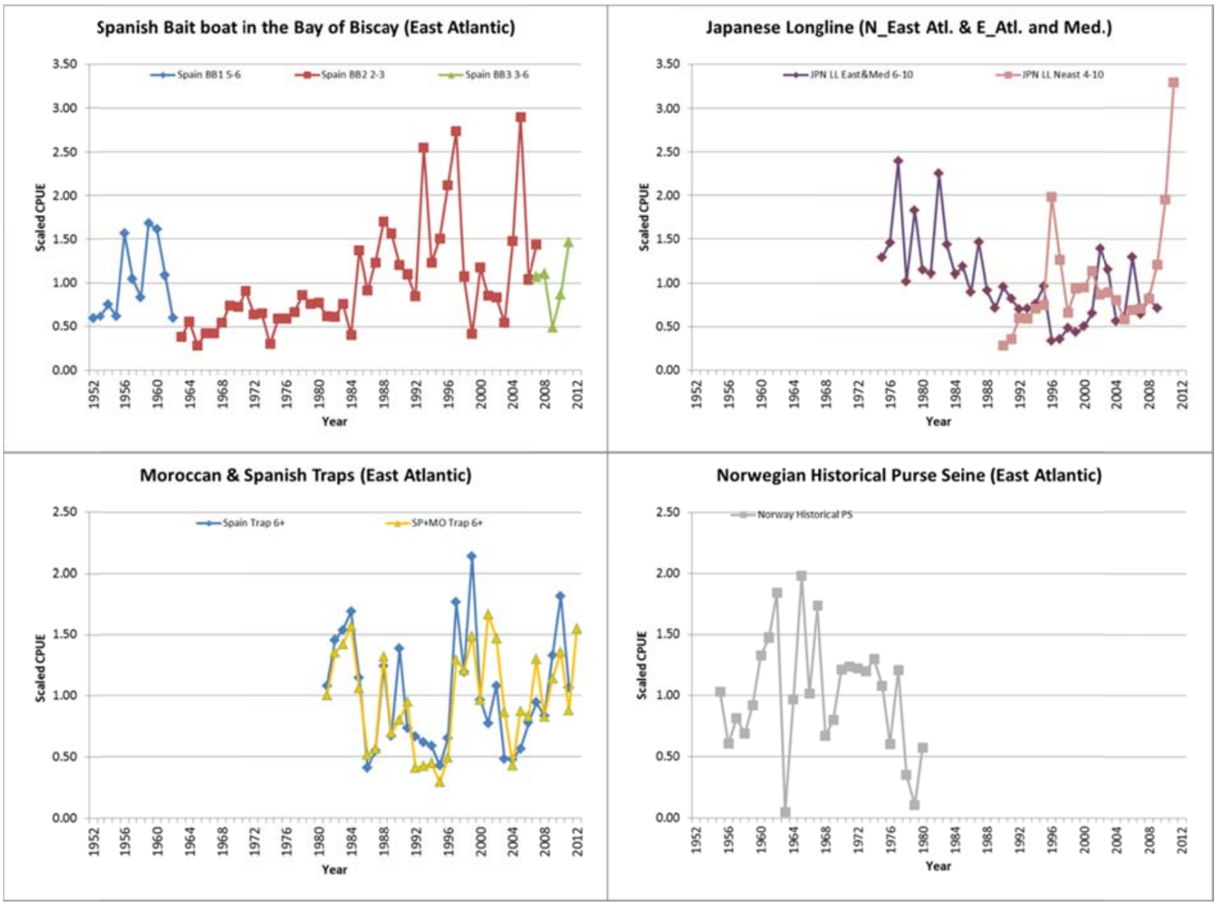
TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	36	46	54	63	72	82	92	97	100	100
2000	36	45	54	62	70	81	90	97	99	100
4000	36	45	53	61	69	79	89	96	99	100
6000	36	44	52	59	67	77	87	94	98	100
8000	36	43	51	58	66	75	85	92	97	99
10000	35	43	50	56	64	73	83	91	96	99
12000	35	42	48	55	63	70	80	88	95	98
12900	35	42	48	55	62	69	79	87	93	98
13500	35	42	48	54	61	69	78	87	93	97
14000	35	42	47	54	60	68	77	86	92	97
16000	35	41	46	52	58	66	74	83	90	94
18000	34	40	45	51	56	63	71	79	86	92
20000	34	39	44	49	54	60	68	75	83	88
22000	33	37	42	46	51	56	63	70	76	83
24000	30	34	38	41	46	51	56	63	69	74
26000	28	31	34	37	41	45	50	57	62	67
28000	25	27	31	34	38	41	46	51	56	60
30000	23	25	28	31	34	38	41	46	50	54



BFT-Figure 1. Geographic distribution of bluefin tuna catches per 5x5 degrees and per main gears from 1950 to 2011.

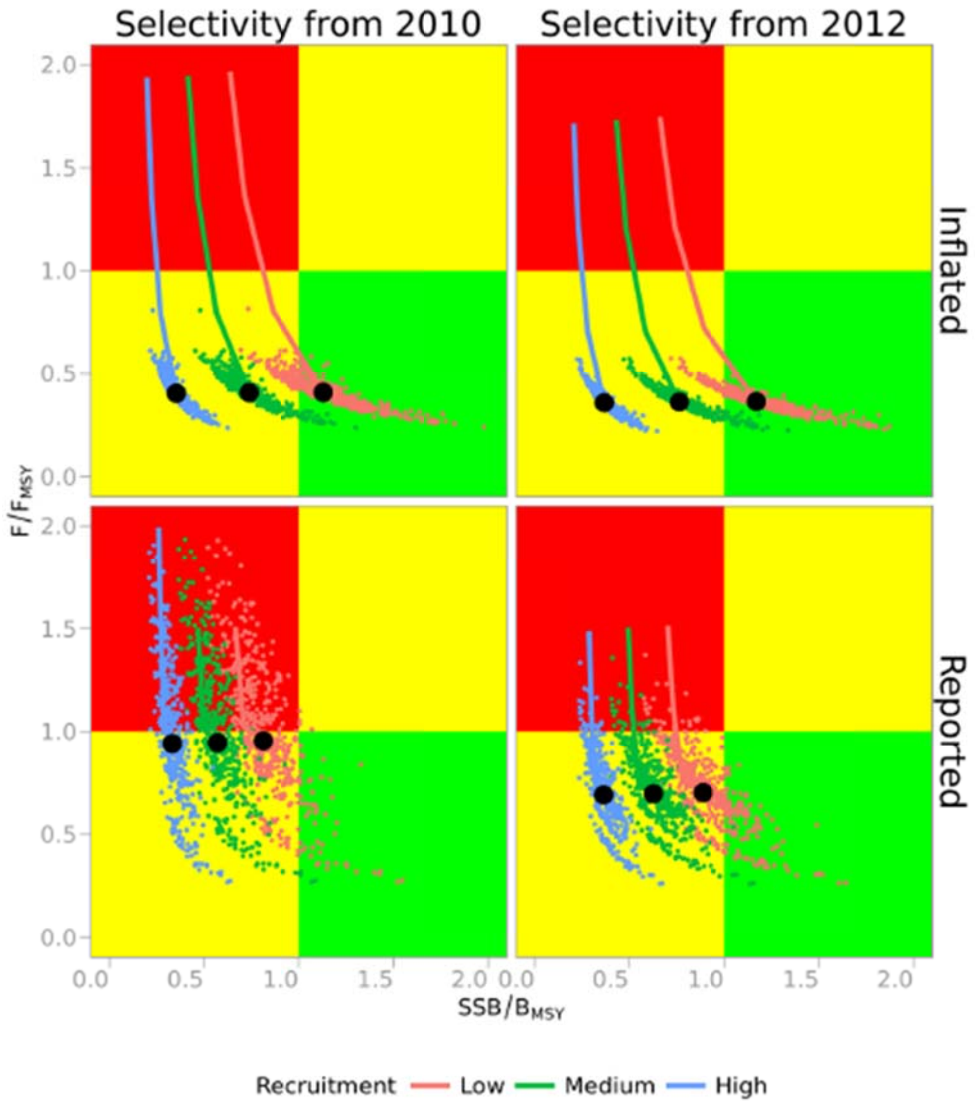


BFTE-Figure 1. Reported catch for the East Atlantic and Mediterranean from Task I data from 1950 to 2012 split by main geographic areas (top panel) and by gears (bottom panel) together with unreported catch estimated by the SCRS (using fishing capacity information and mean catch rates over the last decade) from 1998 to 2007 (the SCRS did not detect unreported catch using fishing capacity information since 2008) and TAC levels since 1998.

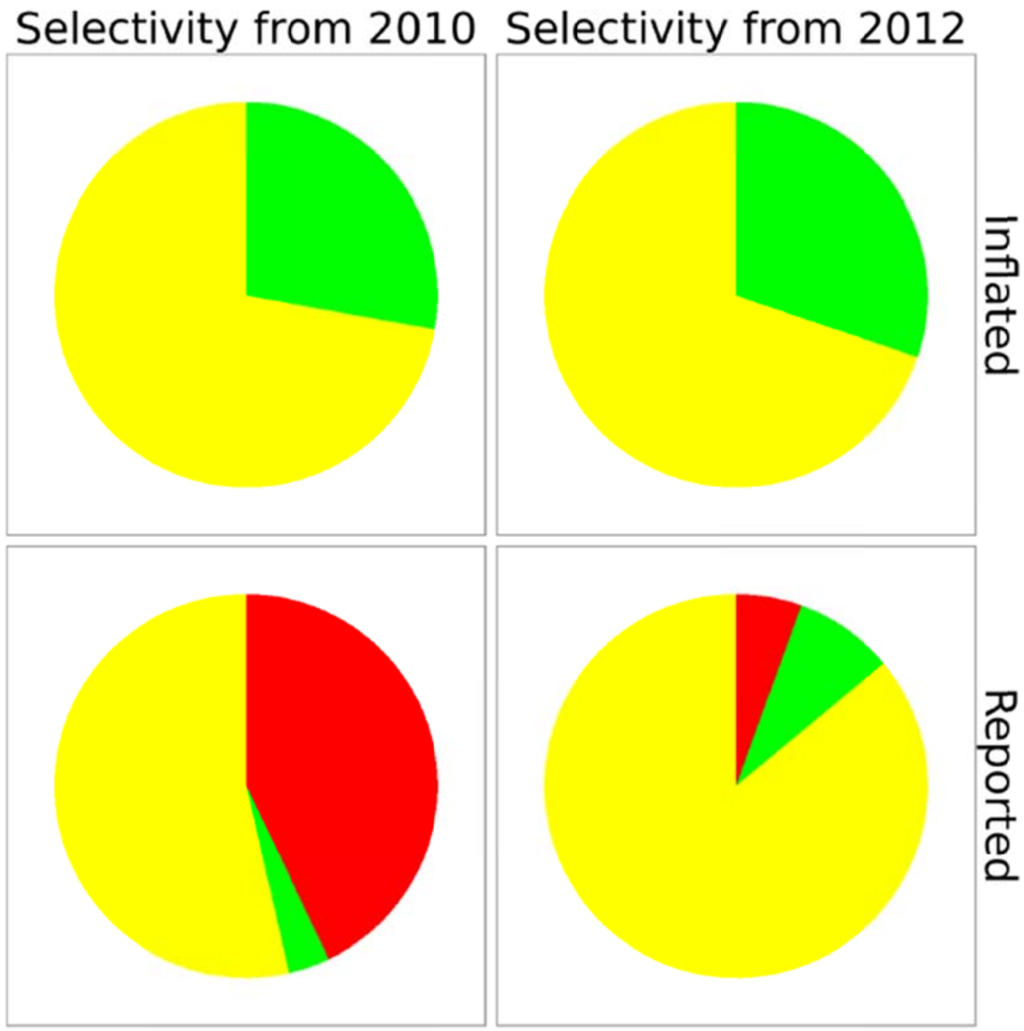


BFTE-Figure 2. Plots of the CPUE time series fishery indicators for the East Atlantic and Mediterranean bluefin tuna stock used in the 2012 stock assessment. All CPUE series are standardized series except the nominal Norway PS index. The Spanish BB series (top left panel) was split in three series to account for changes in selectivity patterns. The Moroccan-Spanish traps CPUE and the Japanese Longlines CPUE for the Northeast Atlantic have been updated until 2012.

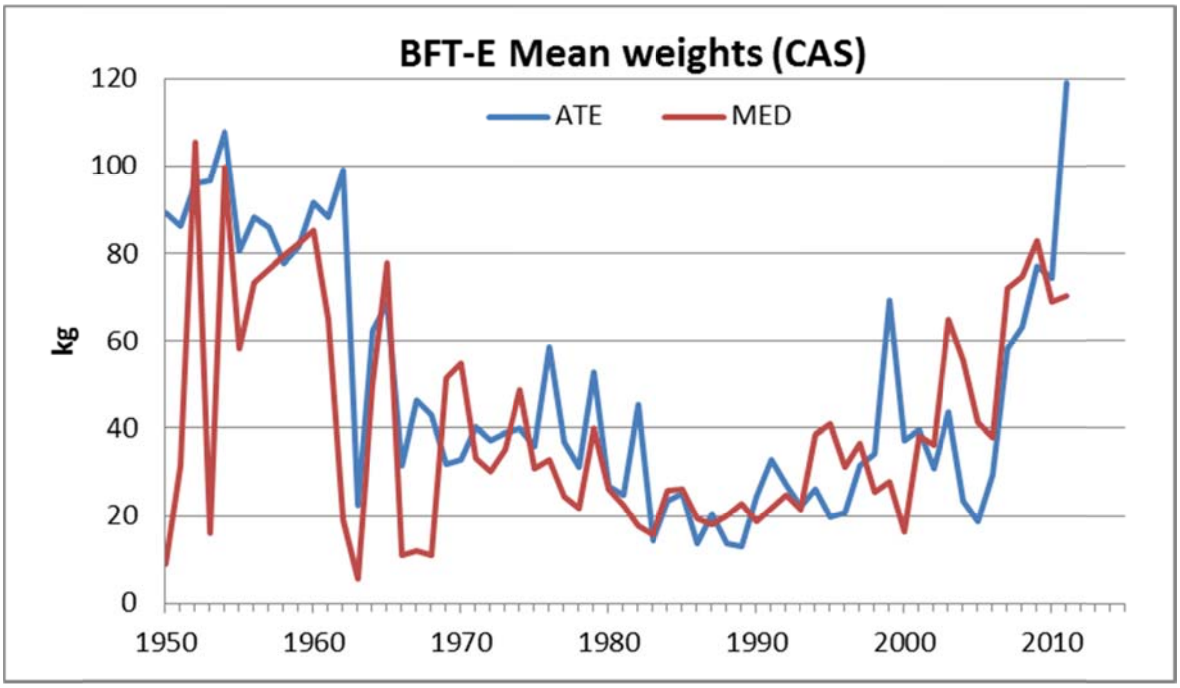
BFTE-Figure 3. Fishing mortality (for ages 2 to 5 and 10+), spawning stock biomass (in kg) and recruitment (in number of fish) estimates from VPA continuity run (considered as the base case in the 2012 stock assessment). Blue line: reported catch; red line: inflated (from 1998 to 2007) catch.



BFTE-Figure 4. Stock status from 2008 to the terminal year (2011) estimated from VPA continuity run with reported and inflated catch (upper and lower panels) and considering low, medium and high recruitment levels (blue, green and red lines). Blue, green and red dots represent the distribution of the terminal year obtained through bootstrapping for the corresponding three recruitment levels. Left Panel (2012): 2011 SSB and F relative to reference points calculated during the 2012 stock assessment. Right Panel (2010): 2011 SSB and F relative to the reference points that have calculated during the 2010 stock assessment.



BFTE-Figure 5. Pie chart showing the proportion of the VPA continuity run results for the terminal year (2011) that are within the green quadrant of the Kobe plot chart (not overfished, no overfishing), the yellow quadrant (overfished or overfishing), and the red quadrant (overfished and overfishing). Split by catch scenario (reported and inflated) and benchmark (estimated in 2010 and estimated in 2012).



BFTE-Figure 6. Plots of the annual mean weight from the catch-at-size data per main area (ATE: East Atlantic and MED: Mediterranean) from 1950 to 2011 used in the 2012 stock assessment.

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 (that started in 1962) and the U.S. purse seine fishery for juvenile fish **(BFT-Table 1, BFTW-Figure 1)**. 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 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 and 2009 to 2,000 t and 1,980 t, respectively. The catch in 2012 was 1,750 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 (735 t in 2006); the 2006 catch was the highest recorded since 1977 (972 t). The 2012 Canadian catch (including dead discards) was 493 t. Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons, and 2009 (162 t). Japanese landings for 2011 were considerably higher than previous at 578 t, while catch in 2012 was 289 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 a catch level of 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 1,272 t and since that time catches have remained around 900 t with a catch in 2012 of 915 t.

The indices of abundance used in the 2012 assessment were updated through 2012 **(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 and showed small increases in 2010 and 2011, but declined in 2012. The catch rates of adults in the U.S. rod and reel fishery remain low, but increased in 2010 to the highest level since 2002, showed a small decrease in 2011 and 2012. The catch rates of the Japanese longline fishery north of 30°N fluctuated significantly since 2007, showing considerably high values for 2007, 2009, 2011, and 2012 fishing years. These high indices might be related to an increase in abundance of relatively small (135-150cm, 50-60 kg) and medium (180-200 cm, 115-165 kg) sized bluefin. The catch rates from the U.S. Gulf of Mexico longline fishery showed a gradual increasing trend from 1996 to 2008, a slight decrease afterwards, and a sharp increase in 2012. The nominal catch rates in the Gulf of St. Lawrence have increased steadily since 2004 and the catch rates in 2011 were the highest in the time series considered in the 2012 assessment, and further increased in 2012. The nominal catch rates in southwest Nova Scotia have continued to follow a general increasing trend since 2000. The Gulf of Mexico larval survey (the only fishery independent indicator) continues to fluctuate around the low levels observed since the 1980s. In view of these trends, there is no indication of a change in stock status sufficient to warrant advancing the scheduling of the next stock assessment.

BFTW-3. State of the stock

The most recent assessment was conducted in 2012 and included information through 2011 (Anon. 2013d). The SCRS cautions that the conclusions of that 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. 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. Mixing models will be further investigated prior to the next assessment. 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. Many of these deficiencies are being addressed by current research programs.

The 2012 assessment estimated trends that are consistent with previous analyses in that spawning stock biomass (SSB) declined steadily from 1970 to 1992 and has since fluctuated between 25% and 36% of the 1970 level (**BFTW-Figure 4**). In recent years, however, there appears to have been a gradual increase in SSB from 27% in 2003 to an estimated 36% in 2011. Since 1998, when the rebuilding plan was adopted, the SSB has increased by 19%. 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 previous 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 previous assessment estimated that the 2003 year-class was the largest since 1974, but the current assessment estimates two somewhat smaller year classes (2002 and 2003) instead. The Committee continues to believe the 2003 year class was large based on the progression of size classes through various fisheries; and the estimate of two adjacent but smaller year classes is likely an artifact of the lack of direct observations of the age of fish in the catch and recent regulations in the United States that limited the take of fish in that size range. In 2012, the 2003 year class has started to contribute to the spawning biomass.

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 (2008-2010) is 61% of F_{MSY} and SSB_{2011} is about 140% of SSB_{MSY} (**BFTW-Figure 5, BFTW-Figure 6**). Estimates of stock status are more pessimistic if a high recruitment scenario is considered (F =160% of F_{MSY}, SSB =19% of SSB_{MSY}).

The Committee recognizes that the large uncertainty in stock status is exacerbated by the lack of appropriate information/data and scientific surveys, and suggests using a scientific research quota (as recommended previously by the SCRS) to help support the improvement of stock abundance indices for western Atlantic bluefin tuna and overcome this standstill situation. However, the Committee also points out that the collection of the information mentioned above is a long-term endeavor.

BFTW-4. Outlook

A medium-term outlook evaluation of changes in spawning stock size and yield over the remaining rebuilding period under various management options was conducted in 2012. Future recruitment was assumed to fluctuate under two scenarios: (i) average levels observed for 1976-2008 (87,000 fish, the low recruitment potential scenario) and (ii) levels that increase as the stock rebuilds (MSY level of 280,000 fish, the high recruitment potential scenario). The Committee has no strong evidence to favor either scenario over the other and notes that both are plausible (but not extreme) lower and upper bounds on rebuilding potential.

The outlook for bluefin tuna in the West Atlantic is summarized in **BFTW-Figure 7 and BFTW-Tables 1-3**. 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. Constant catches of 2,000 t would result in 2019 SSB nearly equal to that in 2012. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,200 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. Effect of current regulations

The Committee previously noted that Recommendation 08-04, which was implemented in 2009, 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 10-03, which was implemented in 2011, and Recommendation 12-02, which was implemented in 2013. Nevertheless, the available fishery indicators **(BFTW-Figure 3)** as well as the 2012 assessment suggest the spawning biomass of western bluefin tuna continues to increase.

BFTW-6. Management recommendations

In 1998, the Commission initiated a 20-year rebuilding plan designed to achieve SSB_{MSY} with at least 50% probability. In response to recent assessments, the Commission recommended a total allowable catch (TAC) of 1,900 t in 2009, 1,800 t in 2010 [Rec. 08-04] and 1,750 t in 2011, 2012 and 2013 [Rec. 10-03, Rec. 12-02].

The most recent (2012) assessment indicates similar historical trends in abundance as in previous assessments. The strong 2003 year class has contributed to stock productivity such that total 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 1970s and a “low recruitment scenario” in which future recruitment is expected to remain near present levels (even if stock size increases). The results of this assessment have shown that long term implications of future biomass are different between the two hypotheses and the issue of identifying the correct one remains unresolved.

Probabilities of achieving SSB_{MSY} within the Commission rebuilding period were projected for alternative catch levels **(BFTW-Table 1)**. The "low recruitment scenario" suggests that biomass is currently sufficient to produce MSY, whereas the "high recruitment scenario" suggests that SSB_{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 (1,750 t) should allow the biomass to continue to increase. Larger catches in excess of 2,000 t will prevent the possibility of the 2003 year class elevating the productivity potential of the stock in the future. Maintaining catch at current levels (1,750 t) is expected to allow the spawning biomass to increase, which may help resolve the issue of low and high recruitment potential. Analyses conducted in SCRS/2013/191 predict that maintaining catches of 1,750 t could allow the more correct recruitment scenario to be identified with reasonable confidence (statistical power of 70-80%) by the year 2024 and maintaining a catch of 1,000 t or less could allow the spawning biomass to rebuild enough to do so by the end of the rebuilding period (2018).

The Commission should decide the TAC, which should include the scientific research quota (such as proposed by Japan, see SCRS/2013/200, SCRS/2013/203) if it is implemented. The Committee notes that TAC should be decided considering the alternative catch levels shown above and the priority placed on protecting 2003 year class, continued stock growth, and the future ability to discriminate the recruitment hypothesis.

As noted previously by the Committee, both the productivity of western Atlantic bluefin tuna and western Atlantic bluefin tuna 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 considerable 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 (2012) Catch (including discards)	1,750 t	
Assumed recruitment	Low potential	High potential
Maximum Sustainable Yield (MSY)	2,634 (2,452-2,834)[1]	6,472 (5,736-7,500)[1]
SSB_{MSY}	12,943 (12,717-13,268)[1]	93,621 (77,288-116,679)
SSB_{2011}/SSB_{MSY}	1.4 (1.14-1.72)[1]	0.19 (0.13-0.29)[1]
F_{MSY}	0.17 (0.14-0.19)[1]	0.064 (0.056-0.074)[1]
$F_{0.1}$	0.11 (0.10-0.12)[1]	0.11 (0.10-0.12)[1]
$F_{2008\text{-}2010}/F_{MSY}$[2]	0.61 (0.49-0.74)[1]	1.57(1.24-1.95)[1]
$F_{2008\text{-}2010}/F_{0.1}$	0.92 (0.77-1.12)[1]	0.92 (0.77-1.12)[1]
Stock status	Overfished: NO	Overfished: YES
	Overfishing: NO	Overfishing: YES
Management Measures:	[Rec. 08-04] TAC of 1,900 t in 2009 and 1,800 t in 2010, including dead discards.	
	[Rec. 10-03, Rec. 12-02] TAC of 1,750 t in 2011-2013, including dead discards.	

[1] Median and approximate 80% confidence interval from bootstrapping from the assessment.
[2] $F_{2008\text{-}2010}$ refers to the geometric mean of the estimates for 2008-2010 (a proxy for recent F levels).

BFTW-Table 1. Kobe II matrices (updated during the 2012 stock assessment) giving the probability that the spawning stock biomass will exceed the level that will produce MSY ($B>B_{MSY}$, not overfished) in any given year for various constant catch levels under the low recruitment, high recruitment, and combined scenarios. The current TAC of 1,750 t [Rec. 10-03] is indicated in bold.

Low Recruitment

TAC	2012	2013	2014	2015	2016	2017	2018	2019
0	98%	98%	99%	100%	100%	100%	100%	100%
1600	98%	97%	96%	96%	96%	97%	99%	99%
1750	98%	97%	94%	96%	94%	97%	97%	98%
1900	98%	97%	94%	95%	93%	95%	96%	97%
2100	98%	97%	94%	94%	91%	92%	93%	94%
2300	98%	96%	93%	93%	87%	87%	90%	89%
2500	98%	96%	92%	92%	84%	84%	84%	84%
2600	98%	96%	91%	90%	82%	82%	80%	80%
2700	98%	96%	91%	89%	80%	78%	77%	76%
2800	98%	96%	90%	88%	78%	76%	75%	72%
2900	98%	96%	90%	87%	77%	73%	70%	67%
3000	98%	96%	89%	85%	74%	70%	67%	62%
3100	98%	96%	87%	83%	70%	68%	61%	56%
3200	98%	95%	87%	82%	67%	63%	57%	52%
3300	98%	95%	86%	81%	66%	58%	53%	47%

High Recruitment

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	0%	0%	0%	0%	0%	0%	0%	0%
500	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%
1500	0%	0%	0%	0%	0%	0%	0%	0%
1750	0%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	0%	0%	0%	0%	0%	0%

Combined

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	49%	49%	49%	50%	50%	50%	50%	50%
100	49%	49%	49%	50%	50%	50%	50%	50%
200	49%	49%	49%	50%	50%	50%	50%	50%
300	49%	49%	49%	50%	50%	50%	50%	50%
400	49%	49%	49%	50%	50%	50%	50%	50%
500	49%	49%	49%	50%	50%	50%	50%	50%
600	49%	49%	49%	50%	50%	50%	50%	50%
700	49%	49%	49%	50%	50%	50%	50%	50%
800	49%	49%	49%	50%	50%	50%	50%	50%
900	49%	49%	48%	50%	50%	50%	50%	50%
1000	49%	49%	48%	49%	50%	50%	50%	50%
1100	49%	48%	48%	49%	49%	50%	50%	50%
1200	49%	48%	48%	49%	49%	50%	50%	50%
1300	49%	48%	48%	49%	49%	50%	50%	50%
1750	49%	48%	47%	48%	47%	48%	49%	49%
1800	49%	48%	47%	48%	47%	48%	48%	49%
1900	49%	48%	47%	48%	47%	48%	48%	49%
2000	49%	48%	47%	47%	46%	47%	47%	48%
2500	49%	48%	46%	46%	42%	42%	42%	42%

BFTW-Table 2. Kobe II matrices (updated during the 2012 stock assessment) giving the probability that the fishing mortality rate (F) will be less than the level that will produce MSY ($F<F_{MSY}$, no overfishing) in any given year for various constant catch levels under the low recruitment, high recruitment, and combined scenarios. The current TAC of 1,750 t [Rec. 10-03] is indicated in bold.

Low Recruitment

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	100%	100%	100%	100%	100%	100%	100%	100%
1600	100%	100%	100%	100%	100%	100%	100%	100%
1750	100%	100%	100%	100%	100%	100%	100%	100%
1900	100%	99%	100%	100%	100%	100%	100%	100%
2100	100%	99%	99%	98%	98%	99%	99%	99%
2300	100%	96%	96%	95%	94%	96%	95%	95%
2500	100%	91%	90%	86%	85%	87%	86%	84%
2600	100%	87%	85%	82%	81%	81%	81%	79%
2700	100%	83%	81%	76%	74%	75%	72%	70%
2800	100%	79%	76%	69%	67%	68%	65%	61%
2900	100%	74%	70%	62%	58%	59%	56%	53%
3000	100%	67%	63%	53%	51%	51%	48%	45%
3100	100%	60%	55%	46%	43%	44%	40%	35%
3200	100%	52%	48%	39%	36%	36%	31%	28%
3300	100%	45%	42%	33%	29%	29%	26%	23%

High Recruitment

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	8%	100%	100%	100%	100%	100%	100%	100%
700	8%	100%	100%	100%	100%	100%	100%	100%
800	8%	99%	99%	100%	100%	100%	100%	100%
900	8%	95%	97%	98%	99%	100%	100%	100%
1000	8%	89%	92%	94%	97%	98%	99%	100%
1100	8%	80%	85%	87%	90%	95%	97%	98%
1200	8%	67%	75%	78%	83%	88%	91%	93%
1300	8%	52%	62%	66%	72%	81%	83%	86%
1400	8%	39%	48%	52%	60%	70%	74%	79%
1500	8%	30%	38%	41%	47%	57%	64%	68%
1600	8%	19%	28%	30%	38%	46%	53%	57%
1700	8%	13%	18%	21%	28%	37%	42%	46%
1750	8%	12%	15%	17%	23%	32%	38%	42%
1900	8%	6%	9%	10%	12%	20%	24%	28%
2100	8%	2%	3%	4%	5%	9%	11%	13%
2300	8%	1%	2%	2%	3%	3%	5%	6%

Combined

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	54%	100%	100%	100%	100%	100%	100%	100%
900	54%	98%	99%	99%	100%	100%	100%	100%
1000	54%	95%	96%	97%	98%	99%	100%	100%
1100	54%	90%	93%	93%	95%	98%	98%	99%
1200	54%	83%	88%	89%	91%	94%	96%	97%
1300	54%	76%	81%	83%	86%	90%	92%	93%
1400	54%	70%	74%	76%	80%	85%	87%	90%
1500	54%	65%	69%	71%	73%	79%	82%	84%
1600	54%	59%	64%	65%	69%	73%	77%	78%
1700	54%	57%	59%	60%	64%	69%	71%	73%
1750	54%	56%	57%	59%	61%	66%	69%	71%
1800	54%	54%	56%	57%	60%	64%	66%	68%
1900	54%	53%	54%	55%	56%	60%	62%	64%
2000	54%	51%	52%	53%	54%	56%	59%	60%
2100	54%	50%	51%	51%	52%	54%	55%	56%
2200	54%	50%	50%	50%	50%	52%	53%	53%
2300	54%	49%	49%	48%	49%	50%	50%	51%
2400	54%	47%	47%	46%	46%	48%	47%	47%
2500	54%	46%	45%	44%	43%	45%	44%	43%

BFTW-Table 3. Kobe II matrices (updated during the 2012 stock assessment) giving the joint probability that the fishing mortality rate will be less than the level that will produce MSY ($F<F_{MSY}$) and the spawning stock biomass (SSB) will exceed the level that will produce MSY ($B>B_{MSY}$) in any given year for various constant catch levels under the low recruitment, high recruitment, and combined scenarios. The current TAC of 1,750 t [Rec. 10-03] is indicated in bold.

Low Recruitment

TAC	2012	2013	2014	2015	2016	2017	2018	2019
0	98%	99%	100%	100%	100%	100%	100%	100%
1600	98%	97%	96%	96%	96%	97%	99%	99%
1750	98%	97%	94%	96%	94%	97%	97%	98%
1900	98%	97%	94%	95%	93%	95%	96%	97%
2100	98%	97%	94%	94%	91%	92%	93%	94%
2300	98%	95%	93%	92%	87%	87%	90%	89%
2500	98%	91%	89%	85%	83%	83%	84%	83%
2600	98%	87%	85%	82%	79%	80%	79%	77%
2700	98%	83%	81%	76%	74%	74%	72%	70%
2800	98%	79%	76%	69%	67%	68%	65%	61%
2900	98%	74%	70%	62%	58%	59%	56%	53%
3000	98%	67%	63%	53%	51%	51%	48%	45%
3100	98%	60%	55%	46%	43%	44%	40%	35%
3200	98%	52%	48%	39%	36%	36%	31%	28%
3300	98%	45%	42%	33%	29%	29%	26%	23%

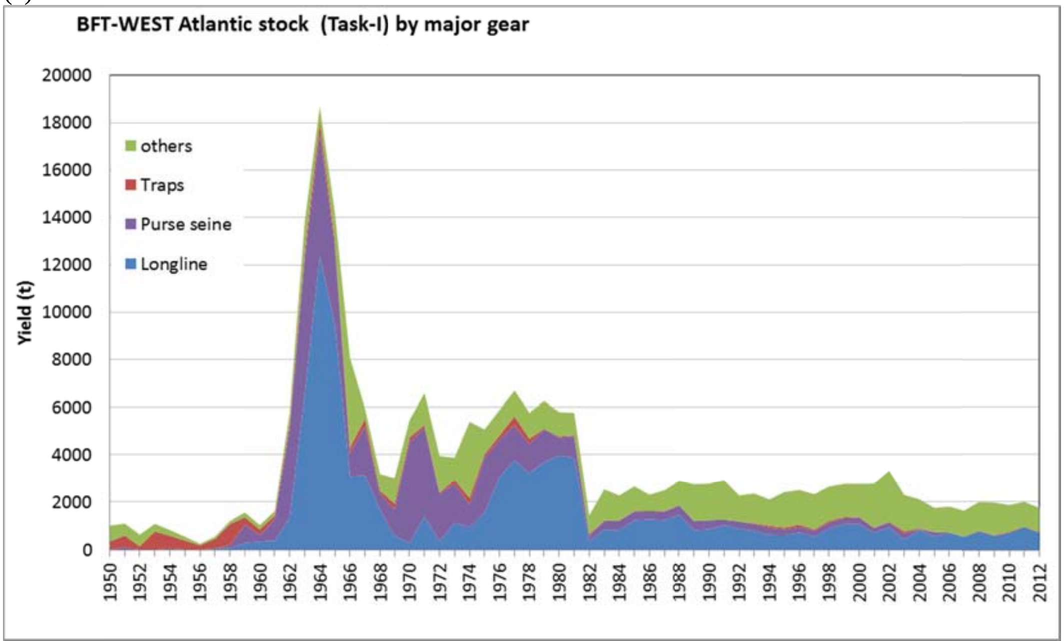
High Recruitment

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	0%	0%	0%	0%	0%	0%	0%	0%
500	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%
1500	0%	0%	0%	0%	0%	0%	0%	0%
1750	0%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	0%	0%	0%	0%	0%	0%

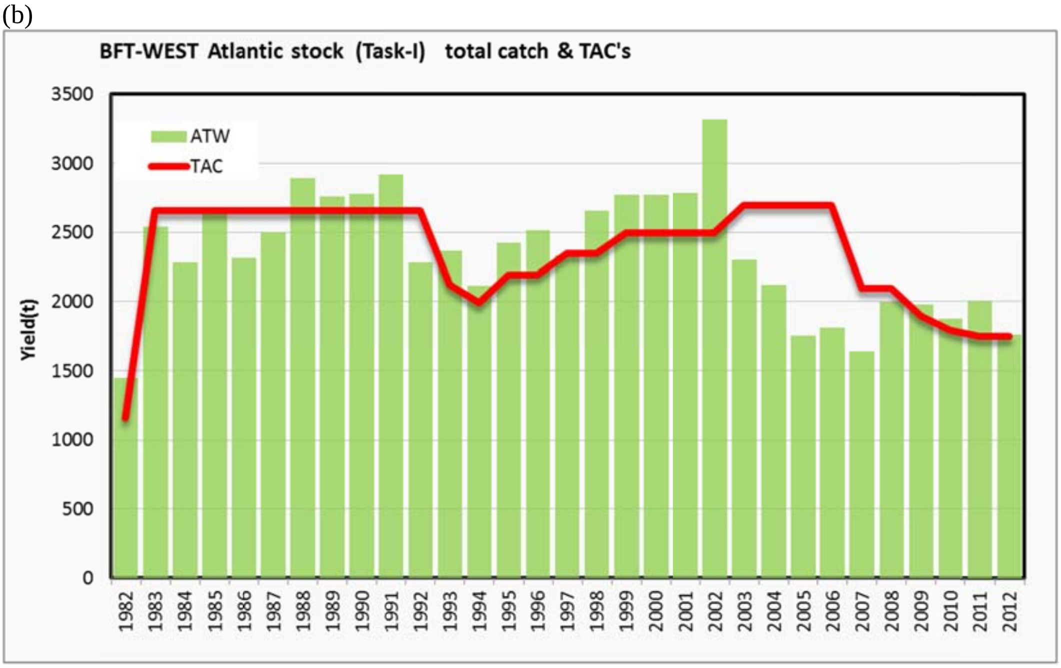
Combined

TAC (t)	2012	2013	2014	2015	2016	2017	2018	2019
0	49%	49%	49%	50%	50%	50%	50%	50%
100	49%	49%	49%	50%	50%	50%	50%	50%
200	49%	49%	49%	50%	50%	50%	50%	50%
300	49%	49%	49%	50%	50%	50%	50%	50%
400	49%	49%	49%	50%	50%	50%	50%	50%
500	49%	49%	49%	50%	50%	50%	50%	50%
600	49%	49%	49%	50%	50%	50%	50%	50%
700	49%	49%	49%	50%	50%	50%	50%	50%
800	49%	49%	49%	50%	50%	50%	50%	50%
900	49%	49%	48%	50%	50%	50%	50%	50%
1000	49%	49%	48%	49%	50%	50%	50%	50%
1100	49%	48%	48%	49%	49%	50%	50%	50%
1200	49%	48%	48%	49%	49%	50%	50%	50%
1300	49%	48%	48%	49%	49%	50%	50%	50%
1750	49%	48%	47%	48%	47%	48%	49%	49%
1800	49%	48%	47%	48%	47%	48%	48%	49%
1900	49%	48%	47%	48%	47%	48%	48%	49%
2000	49%	48%	47%	47%	46%	47%	47%	48%
2500	49%	46%	44%	43%	41%	42%	42%	41%

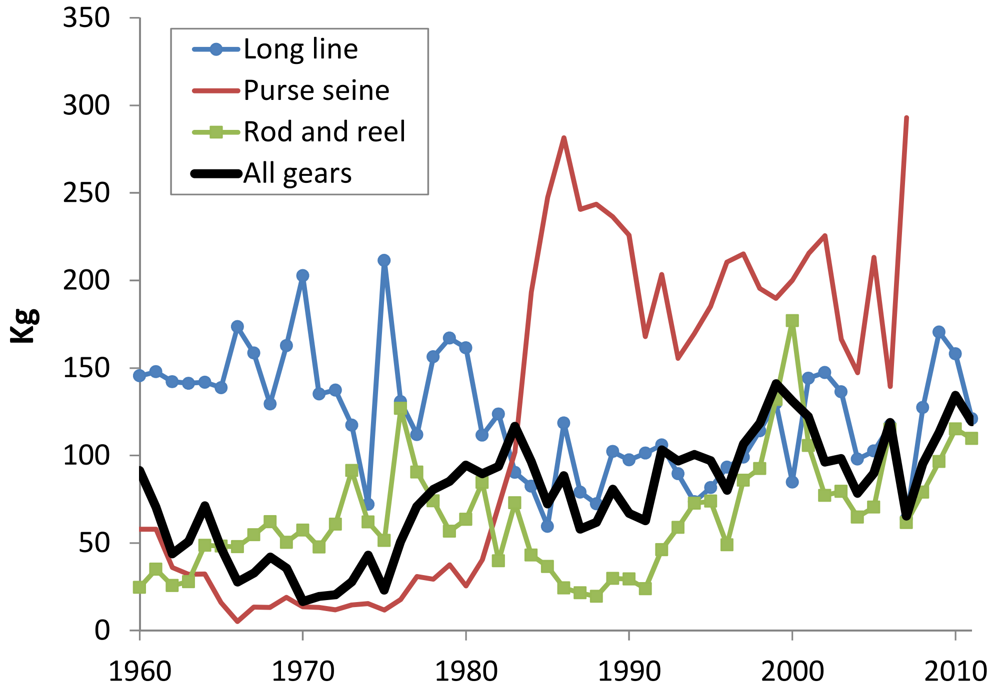
(a)



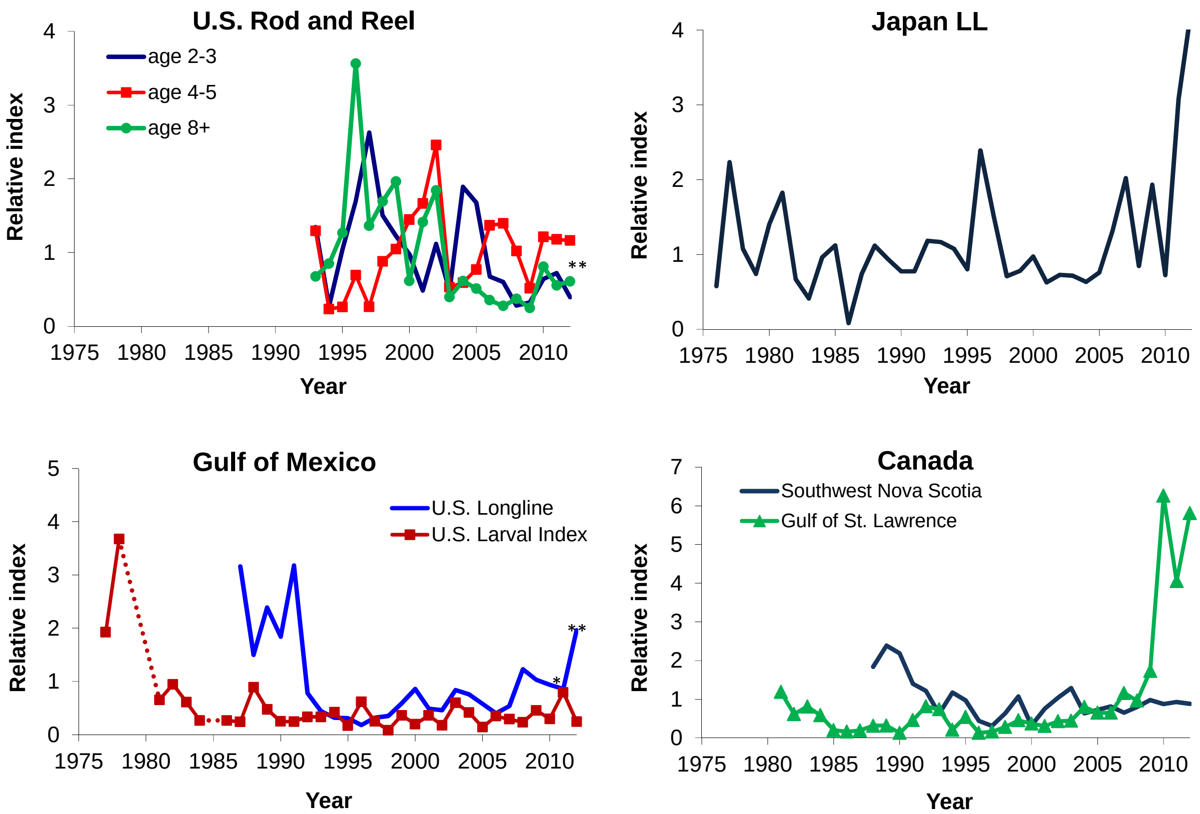
(b)



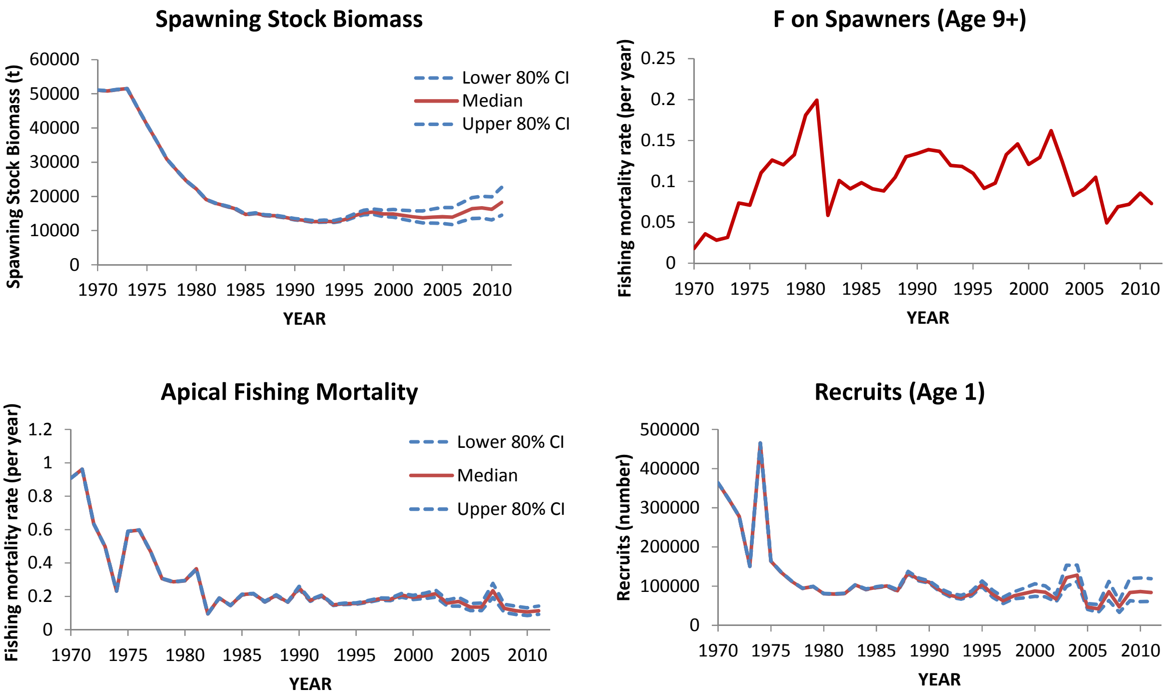
BFTW-Figure 1. Historical catches of western bluefin tuna: (a) by gear type and (b) in comparison to TAC levels agreed by the Commission.



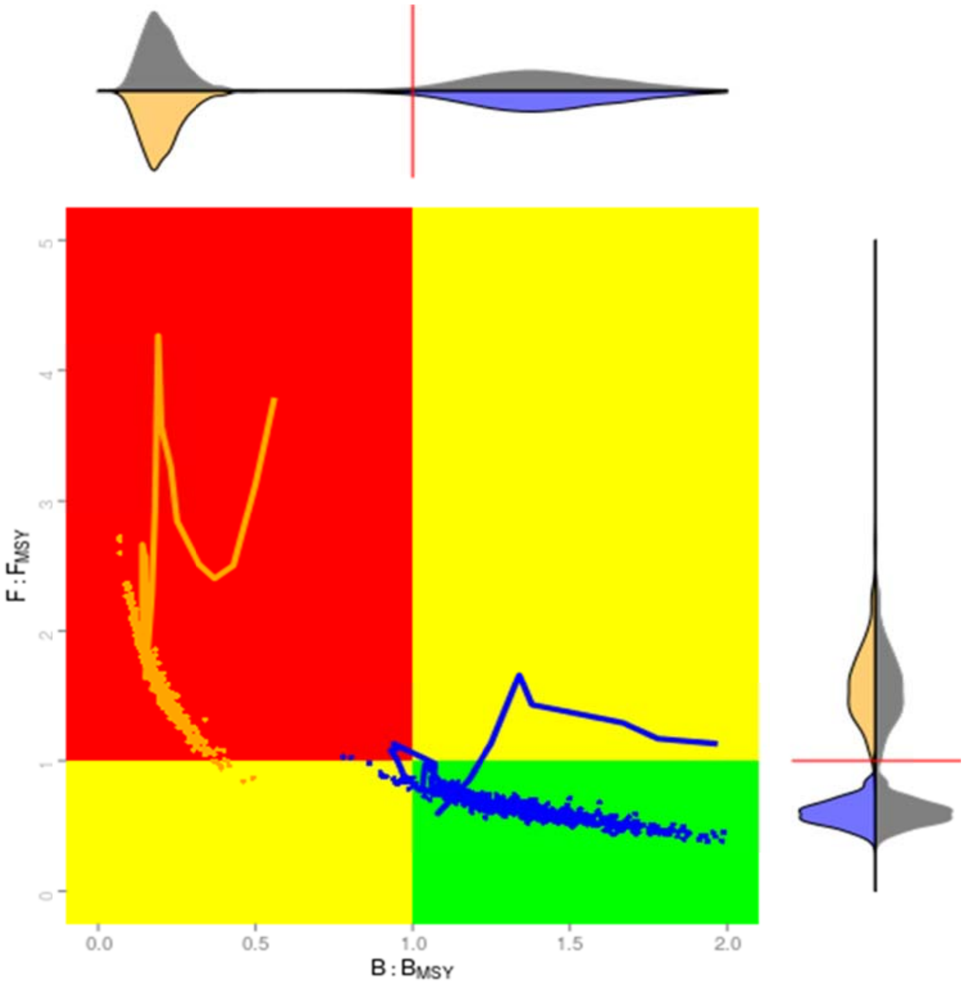
BFTW-Figure 2. Mean weight of western bluefin tuna catches by purse seine, longline, rod and reel, and all gears combined (estimated from the catch-at-size compiled information).



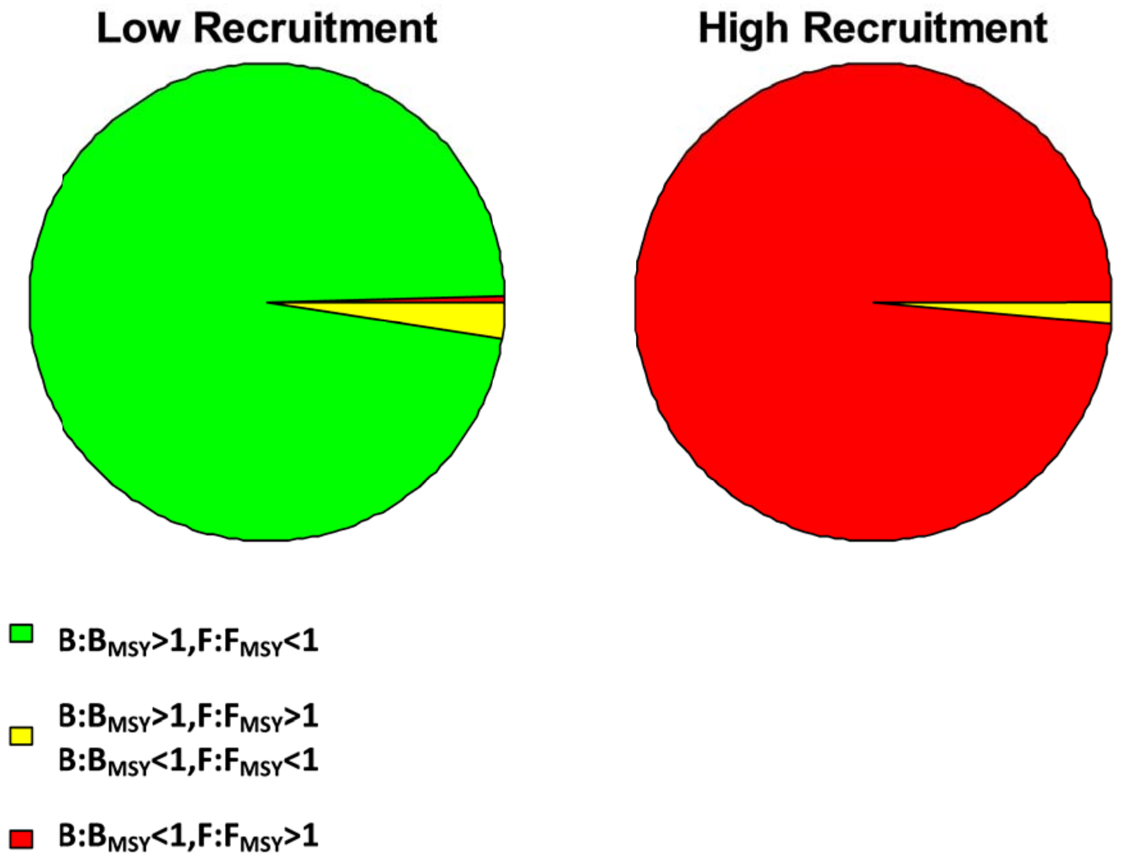
BFTW-Figure 3. Updated indices of abundance for western bluefin tuna. The dashed portions of the larval survey bridge the gaps between years where data were missing or otherwise considered unreliable by the 2012 SCRS (and not used in the base assessment). The Canadian indices represent nominal catch rates, all others are standardized indices. *The value for 2011 in the U.S. Gulf of Mexico longline index was not used in the 2012 assessment. **2012 U.S. rod and reel and Gulf of Mexico longline data are preliminary and subject to revision.



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.

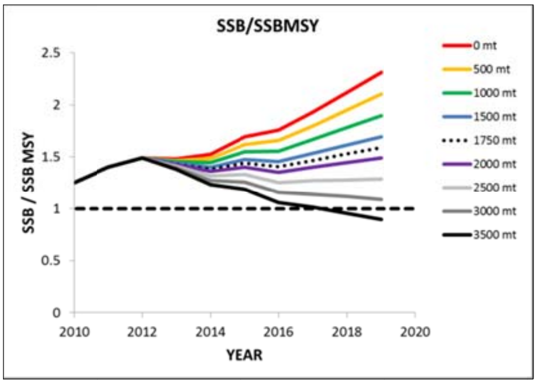


BFTW-Figure 5. Estimated status of stock relative to the Convention objectives (MSY) by year (1973 to 2011) and recruitment scenario (black=high recruitment potential, blue=low recruitment potential). The light blue dots represent the status estimated for 2011 and the clouds of symbols depict the corresponding bootstrap estimates of uncertainty.The lines give the historical point estimates. The marginal density plots shown above and to the right of the main graph reflect the frequency distribution of the bootstrap estimates of each model with respect to relative biomass (top) and relative fishing mortality (right). The frequency distributions of the combined model bootstraps are shown in light blue. The red lines represent the benchmark levels (ratios equal to 1.0)

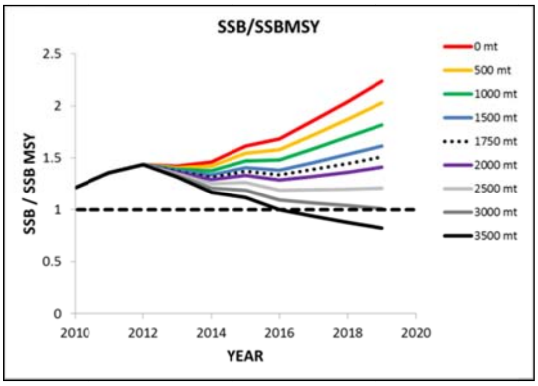


BFTW-Figure 6. Pie chart summarizing stock status, showing the proportion of model outputs that are not overfished and not undergoing overfishing (green), either overfished or undergoing overfishing (yellow) and both overfished and undergoing overfishing (red).

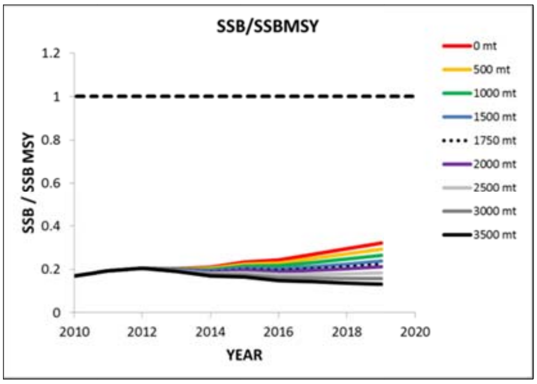
A) 50% probability
Low recruitment potential



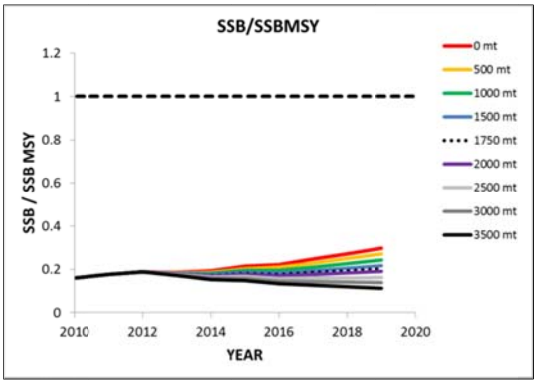
B) 60% probability
Low recruitment potential



C) 50% probability
High Recruitment potential



D) 60% probability
High recruitment potential



BFTW-Figure 7. 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.

8.6 BUM-BLUE MARLIN

The most recent assessment for blue marlin was conducted in 2011 through a process that included a data preparatory meeting in May 2010 (Anon. 2011c) and an assessment meeting in April 2011 (Anon. 2012a). The last year of fishery data used in the assessment was 2009.

BUM-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.

Atlantic blue marlin inhabits 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 800 m. They do not confine themselves to a narrow range of temperatures but most tend to be found in waters warmer than 17°C. The distribution of time at depth is 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 blue marlin indicates that simplistic assumptions about habitat usage made during the standardization of CPUE data may be inappropriate.

*BUM-***2.** *Fishery indicators*

The decadal geographic distribution of the catches is given in **BUM-Figure 1**. The Committee used Task I catches as the basis for the estimation of total removals **(BUM-Figure 2)**. Total removals for the period 1990-2009 were obtained during the 2011 Blue Marlin Stock Assessment Session and the White Marlin Data Preparatory Meeting (Anon. 2012a) by modifying Task I values with the addition of blue marlin that the Committee estimated from catches reported as billfish unclassified. Additionally the reporting gaps were filled with estimated values for some fleets.

During the 2011 blue marlin assessment (Anon. 2012a) it was noted that catches continued to decline through 2009. Over the last 20 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 and increasing in some areas, however reports to ICCAT on these catches are incomplete. Even though catches from the Antillean artisanal fleets were included in the stock assessment, additional documentation of past and present Task I catches from these fisheries is required. 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-Table 1)** in 2012 were 1,834 t, compared to 2,252 t reported for 2011. Task I catches of blue marlin for 2012 are preliminary. Due to the work conducted by the Committee and improved reporting by CPCs the amount of unclassified billfish in the Task I table has been reduced.

A number of relative abundance indices were estimated during the blue marlin 2011 assessment. However, given the apparent shift in landings from industrial to non-industrial fleets in recent times, it is imperative that CPUE indices are developed for all fleets that have substantial landings.

During the 2011 assessment, an estimated standardized combined CPUE index for blue marlin showed a sharp decline during the period 1960-1975, followed by a period of stabilization from about 1976 to 1995, and further decline thereafter to the lowest value in the series (**BUM-Figure 3**).

BUM-3. State of the stocks

Unlike the partial assessment of 2006 assessment, the Committee conducted a full assessment in 2011, which included estimations of management benchmarks. The results of the 2011 assessment indicated that the stock remains overfished and undergoing overfishing (**BUM-Figure 4**). In contrast to the results of the 2006 assessment, which indicate that, the declining trend in biomass had partially stabilized, current results indicated a continued decline trend. Current status of the blue marlin stock is presented in **BUM Figure 5.** However, the Committee recognizes the high uncertainty with regard to data and the productivity of the stock.

BUM-4. Outlook

Although uncertain, the results of the 2011 stock assessment indicated that if the recent catch levels of blue marlin (3,358 t in 2010) are not substantially reduced, the stock will continue to decline further (**BUM-Figure 6; BUM-Table 2**). The current management plan has the potential of recovering the blue marlin stock to the BMSY level if properly conducted.

BUM-5. Effect of current regulations

A 2006 recommendation [Rec. 06-09] established that the annual amount 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. Furthermore, in 2012, The Commission established a TAC for 2013, 2014, and 2015 of 2,000 t [Rec. 12-04], placed additional catch and commerce restrictions in recreational fisheries for blue marlin and white marlin, and requested methods for estimating live and dead discards of blue marlin and white marlin/spearfish.

The Committee is concerned with the significant increase in the contribution from non-industrial fisheries to the total blue marlin harvest and that these fisheries are not fully accounted for in the current ICCAT data-base. The Committee expressed its serious concern over this limitation on data for future assessments. Such data limitation precludes any analysis of the current regulations.

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 since 2006. Additional information has come about, for some fleets, regarding the potential for modifying gears 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-6. Management recommendations

In 2012, the Commission implemented [Rec. 12-04], intended to reduce the total harvest to 2,000 t in 2013, 2014, and 2015 to allow the rebuilding of the blue marlin stock from the overfished condition. The Committee expressed its concern on the effectiveness of such measure in light of severe under reporting currently occurring in some fisheries. Therefore, the Committee alerts the Commission that unless such non-compliance issues are properly addressed the adoption of additional measures might be rendered ineffective.

The Commission may consider the adoption of measures such as, but not limited to the mandated use of non-offset circle hooks as terminal gear. Recent research has demonstrated that in some longline fisheries the use of non-offset circle hooks resulted in a reduction of marlin mortality, while the catch rates of several of the target species remained the same or were greater than the catch rates observed with the use of conventional J hooks or offset circle hooks. The Committee considers that this approach may be more efficient and enforceable than time-area closures and, thus, it recommends that the Commission considers this alternative approach. Currently, three ICCAT Contracting Parties (Brazil, Canada, and the U.S.) already mandate or encourage the use of circle hooks on their pelagic longline fleets. In addition, reducing fishing mortality of blue marlin from non-industrial fisheries should be considered.

ATLANTIC BLUE MARLIN SUMMARY

BUM	
Maximum Sustainable Yield	2,837 t (2,343 – 3,331 t)[1]
Current (2012) Yield	1,834 t[2]
Relative Biomass (SSB_{2009}/SSB_{MSY})	0.67 (0.53 – 0.81)[1]
Relative Fishing Mortality (F_{2009}/F_{MSY})	1.63 (1.11 – 2.16)[1]
Overfished	Yes
Overfishing	Yes
Conservation and Management Measures in Effect:	Recommendation [Rec. 12-04]. 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.

1. Stock Synthesis version 3.2.0.b model results. Values correspond to median estimates, 95% confidence interval values are provided in parenthesis.

2 2012 yield should be considered provisional. The 2009 yield used in the 2011 assessment was 3,341 t.

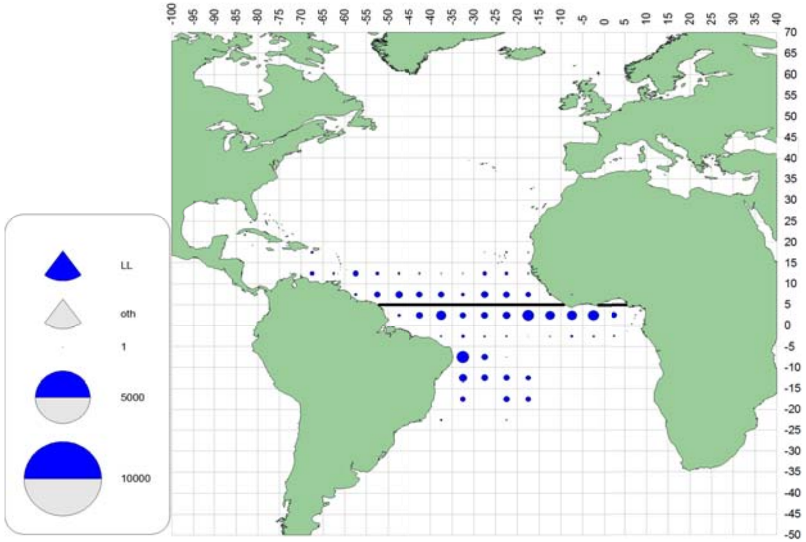
BUM-Table 1. Estimated catches (t) of Atlantic blue marlin (*Makaira nigricans*) by area, gear and flag.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			2882	4325	4565	4171	3027	3044	4127	4063	5199	5488	5458	5086	4980	4018	3290	3877	2404	3603	2478	3517	4665	3433	3137	2252	1834
	ATN		1027	1632	1970	1430	1122	1071	1537	1560	1961	2011	2494	2017	2156	1307	1082	1199	795	1592	832	1078	2126	1636	1471	1214	1086
	ATS		1855	2693	2595	2741	1905	1974	2590	2503	3238	3478	2963	3069	2824	2711	2208	2678	1609	2011	1646	2439	2539	1797	1667	1038	748
Landings	ATN	Longline	459	995	1607	982	625	613	1088	991	1339	1413	1300	1078	971	492	477	533	518	561	512	600	912	854	1142	849	667
		Other surf.	258	300	155	245	261	217	220	343	363	440	1088	820	1089	694	466	625	212	988	221	316	980	651	199	179	207
		Sport (HL+RR)	186	147	49	62	90	113	118	73	64	60	56	38	36	97	90	22	31	18	62	120	197	90	110	132	174
	ATS	Longline	1530	2017	1958	2286	1490	1419	1767	1679	2194	2545	2068	1977	1776	1465	901	1234	909	1010	807	1400	1051	945	822	586	477
		Other surf.	324	675	634	453	414	553	821	822	1041	863	893	1090	1049	1245	1308	1444	701	1000	836	1030	1484	847	839	443	258
		Sport (HL+RR)	1	1	2	1	0	1	2	2	2	28	0	0	0	0	0	0	0	2	1	9	3	5	6	7	13
Discards	ATN	Longline	124	191	159	142	146	127	111	153	196	97	49	81	60	22	37	19	34	24	36	42	37	40	19	53	38
		Other surf.	0	0	0	0	0	0	0	0	0	0	1	0	0	2	11	0	1	1	0	0	1	2	0	0	1
		Longline	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	2	0	0	0	0	2	
Landings	ATN	Barbados	46	3	18	12	18	21	19	31	25	30	25	19	19	18	11	11	0	0	25	0	0	0	9	13	14
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	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	
		China P.R.	0	0	0	0	0	0	41	48	41	51	79	133	9	31	15	17	10	49	0	4	2	26	47	35	38
		Chinese Taipei	26	11	937	716	336	281	272	187	170	355	80	44	64	65	48	66	104	38	35	30	16	25	13	25	16
		Cuba	94	74	112	127	135	69	39	85	43	53	12	38	55	56	34	3	4	7	7	0	0	0	0	0	
		Curaçao	50	50	50	40	40	40	40	40	40	40	40	40	40	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	64	69	75	36	44	55	58	106	76	76	60	
		Dominican Republic	0	0	0	0	0	0	0	0	0	41	71	29	19	23	0	207	0	0	0	0	0	0	0	0	
		EU.España	8	7	5	1	6	7	6	2	25	5	36	15	25	8	1	6	27	12	23	14	23	6	14	2	4
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	776	0	0	753	434	274	338	0
		EU.Portugal	2	5	1	4	2	15	11	10	7	3	47	8	20	17	2	31	27	24	36	56	56	25	56	16	23
		Grenada	34	40	52	64	52	58	52	50	26	47	60	100	87	104	69	72	45	42	33	49	54	45	45	45	
		Jamaica	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	206	593	250	145	193	207	532	496	798	625	656	427	442	155	125	148	174	251	199	221	489	477	460	197	341
		Korea Rep.	14	252	240	34	11	2	16	16	41	16	0	0	0	0	0	0	0	3	14	30	43	28	53	44	26
		Liberia	0	0	0	0	0	0	0	87	148	148	701	420	712	235	158	115	0	0	0	0	0	0	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	**0**
		Mexico	0	0	0	0	0	3	13	13	13	13	27	35	68	37	50	70	90	86	64	91	81	93	89	68	106
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	34	71	35	38	65	37	29	43	26	39	45	49	
		NEI (BIL)	74	103	18	20	38	0	0	0	0	0	0	0	52	164	254	151	28	0	49	68	82	45	0	0	
		NEI (ETRO)	0	0	0	0	0	71	134	149	178	225	330	312	202	112	7	6	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	5	38	38	0	0	0	0	0	0	0	1	0	0	1	
		Senegal	0	1	1	4	8	0	9	0	2	5	0	0	0	11	24	32	11	1	5	91	114	61	41	64	155
		St. Vincent and Grenadines	0	1	0	0	1	2	2	2	0	1	0	0	0	0	19	0	0	0	0	1	3	2	1	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	4	1	0	10	5	0	18	17	21	53	46	70	72	58	64	119
		Trinidad and Tobago	45	13	11	6	1	2	16	28	14	49	15	20	51	17	16	9	11	7	14	16	34	26	22	25	45
		U.S.A.	221	124	29	33	51	80	88	43	43	46	50	37	24	16	17	19	26	16	17	9	13	6	4	6	14
		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	8	15	17	18	19	11	15	15	15	3	5	1	2	2	2	2	2	2	2	2	2	0	1	2	2
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	2	0	0	0	0	0	**0**
		Ukraine	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

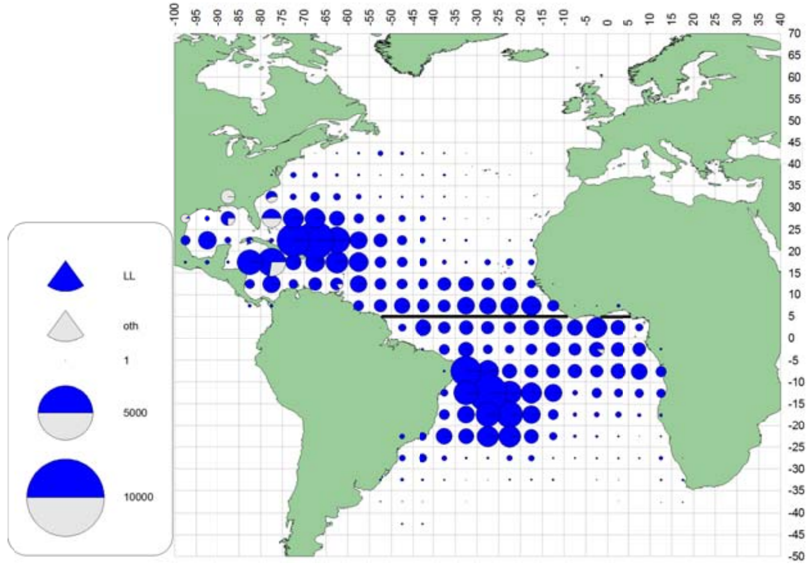
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	6	8	5
		Venezuela	76	149	70	49	66	74	122	106	137	130	205	220	108	72	76	84	83	138	131	206	120	107	136	96	138
Landings	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	3	43
		Benin	12	0	6	6	6	6	5	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	74	60	52	61	125	147	81	180	331	193	486	509	452	780	387	577	195	612	298	262	182	150	133	63	48
		China P.R.	0	0	0	0	0	0	21	25	21	27	41	68	15	61	73	72	49	47	0	61	11	51	54	64	24
		Chinese Taipei	266	462	767	956	488	404	391	280	490	1123	498	442	421	175	246	253	211	113	64	203	132	170	140	174	117
		Cuba	191	77	90	62	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	130	82	88	105	79	139	212	177	157	222	182	275	206	196	78	109	115	107	178	150	991	463	450	42	23
		EU.España	0	15	0	12	40	37	49	38	133	117	159	110	115	86	27	6	24	12	68	25	32	54	151	14	30
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	1	0	24	69	79	102	81	84	38	30
		Gabon	0	0	0	0	0	1	2	0	304	5	0	0	0	1	0	3	0	0	0	0	0	0	0	0	
		Ghana	7	430	324	126	123	236	441	471	422	491	447	624	639	795	999	415	470	759	405	683	191	140	116	332	234
		Japan	617	962	967	755	824	719	991	913	881	724	529	363	441	180	142	294	366	191	290	699	539	345	272	205	167
		Korea Rep.	361	437	84	503	13	11	40	40	103	40	2	3	1	1	0	0	1	4	19	33	47	8	32	13	8
		Mixed flags (FR+ES)	137	144	199	137	116	146	133	126	96	82	80	83	113	80	96	110	106	112	108	92	113	125	133	0	
		NEI (BIL)	0	0	0	0	0	0	0	0	0	0	0	0	1	20	4	16	61	7	110	141	123	133	0	0	
		NEI (ETRO)	0	0	0	0	0	103	192	214	256	323	474	449	290	162	10	8	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	10	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	2	33	0	0	0	0	0	0	0	0	7	0	3	3	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
		S. Tomé e Príncipe	28	19	17	18	21	25	28	33	36	35	33	30	32	32	32	32	9	21	26	0	68	70	72	72	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	2	0	0	1	0	0
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	23	0	73	53	141	103	775	0	0	0	0	0	0	0	0	
		U.S.S.R.	32	5	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	0	0	0	0	0	2	2	2	12
		Uruguay	0	0	0	0	0	0	3	1	1	26	23	0	0	0	1	5	3	2	8	5	0	6	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	1	1	1
Discards	ATN	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	3	
		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.	124	191	159	142	146	127	111	153	196	97	50	81	60	25	49	19	35	25	36	42	38	42	19	50	39
Discards	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	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	2	
		U.S.A.	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	0	0	0	0	0	0	

BUM Table 2. Kobe II Strategy Matrix (K2SM). Percent values indicate the probability of achieving the goal of SSB_{yr} >= SSB_{MSY} and $F_{yr} < F_{MSY}$ for each year (yr) under different constant catch scenarios (TAC tons).

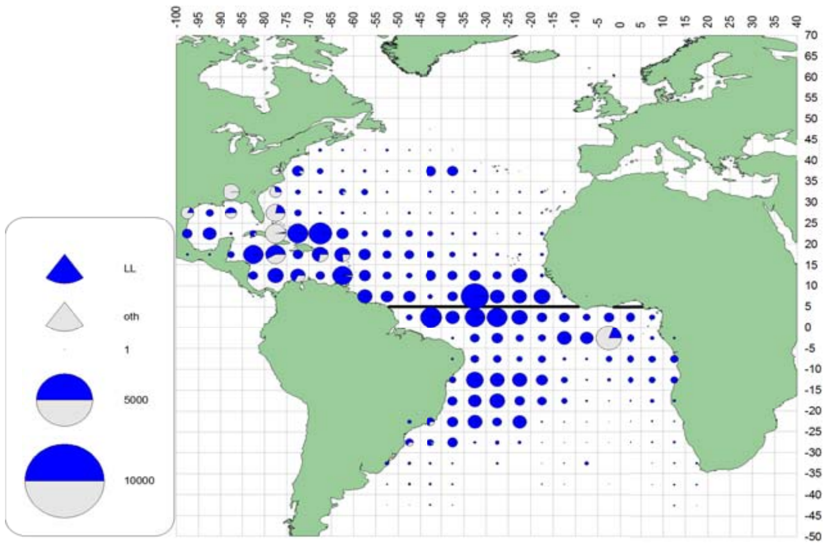
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
0	0%	2%	9%	19%	33%	49%	63%	74%	81%	87%	92%	94%	96%	97%	98%
500	0%	2%	6%	13%	23%	35%	47%	58%	67%	74%	80%	84%	88%	91%	93%
1000	0%	1%	4%	9%	15%	22%	31%	40%	49%	56%	63%	68%	73%	77%	81%
1500	0%	1%	3%	6%	9%	13%	18%	24%	30%	36%	41%	46%	50%	55%	59%
2000	0%	1%	2%	3%	5%	7%	10%	12%	16%	18%	21%	24%	27%	29%	32%
2500	0%	1%	1%	2%	3%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
3000	0%	0%	1%	1%	1%	2%	2%	2%	2%	2%	3%	3%	3%	3%	3%
3500	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%
4000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%



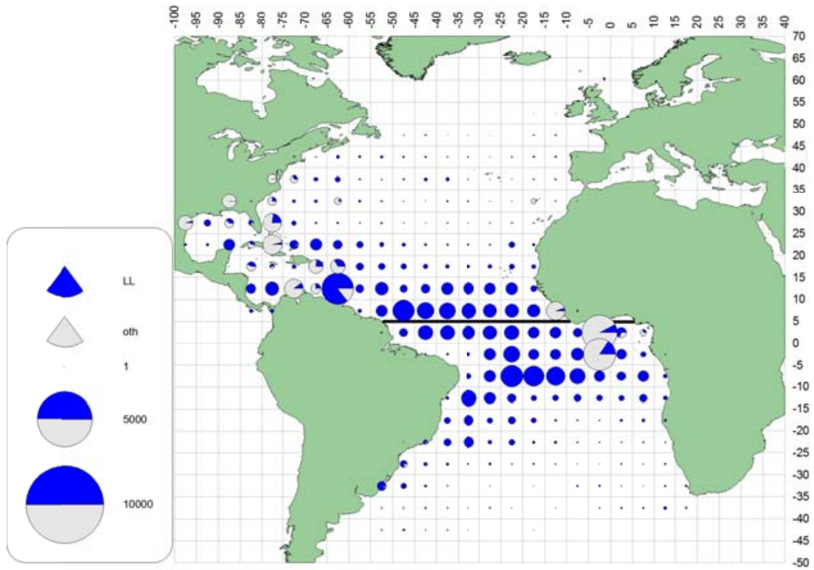
a. **BUM (1950-59)**



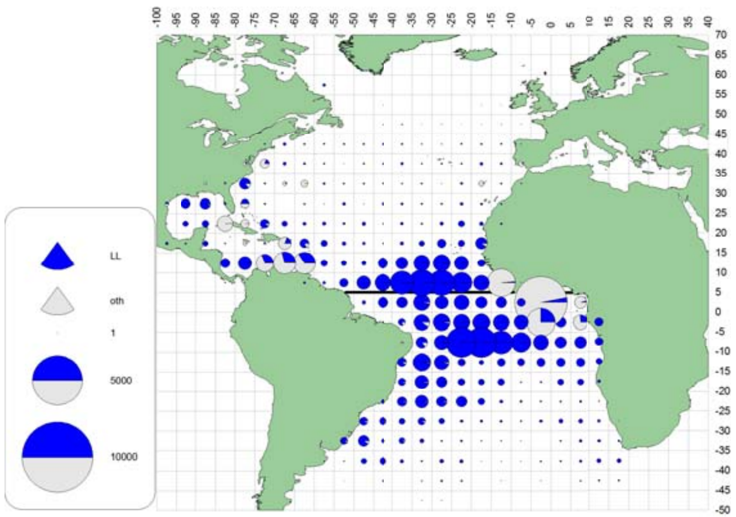
b. **BUM (1960-69)**



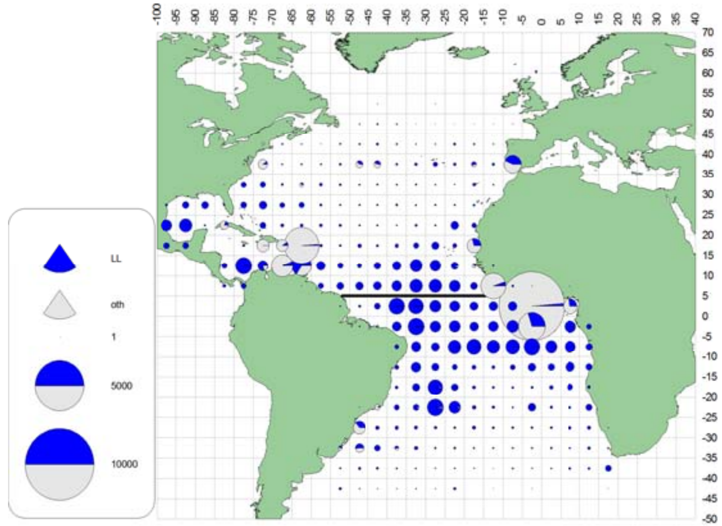
c. **BUM (1970-79)**



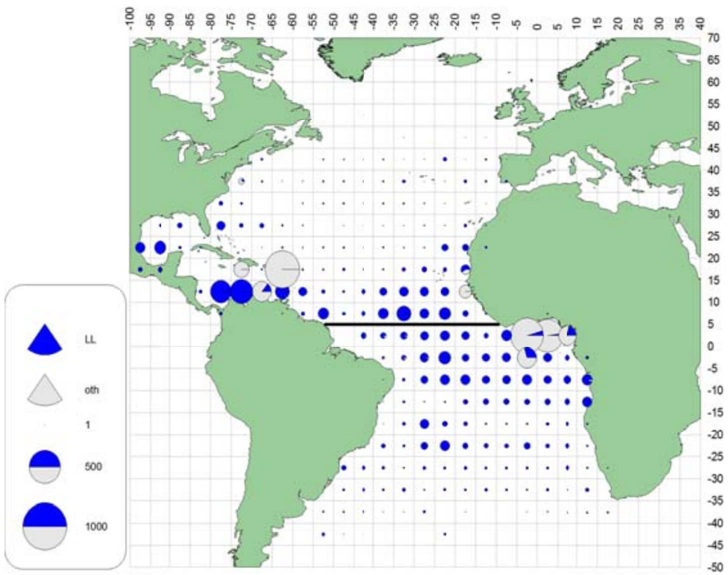
d. **BUM (1980-89)**



e. BUM (1990-99)

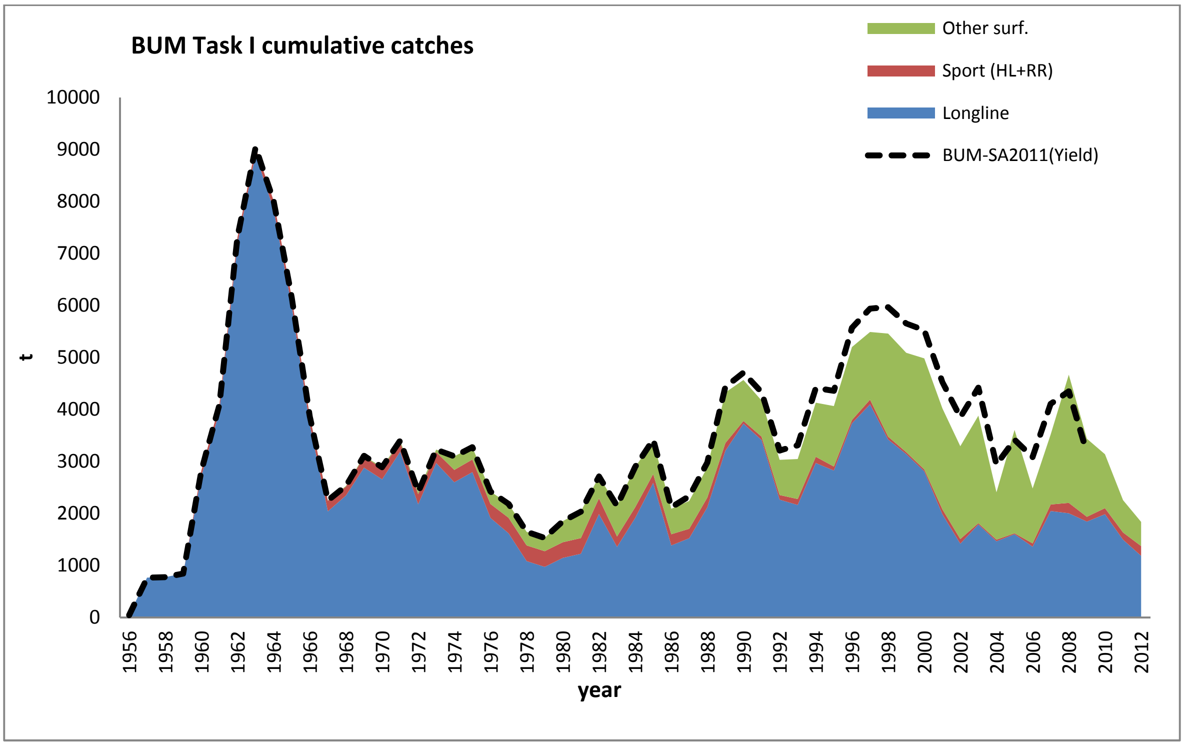


f. BUM (2000-09)

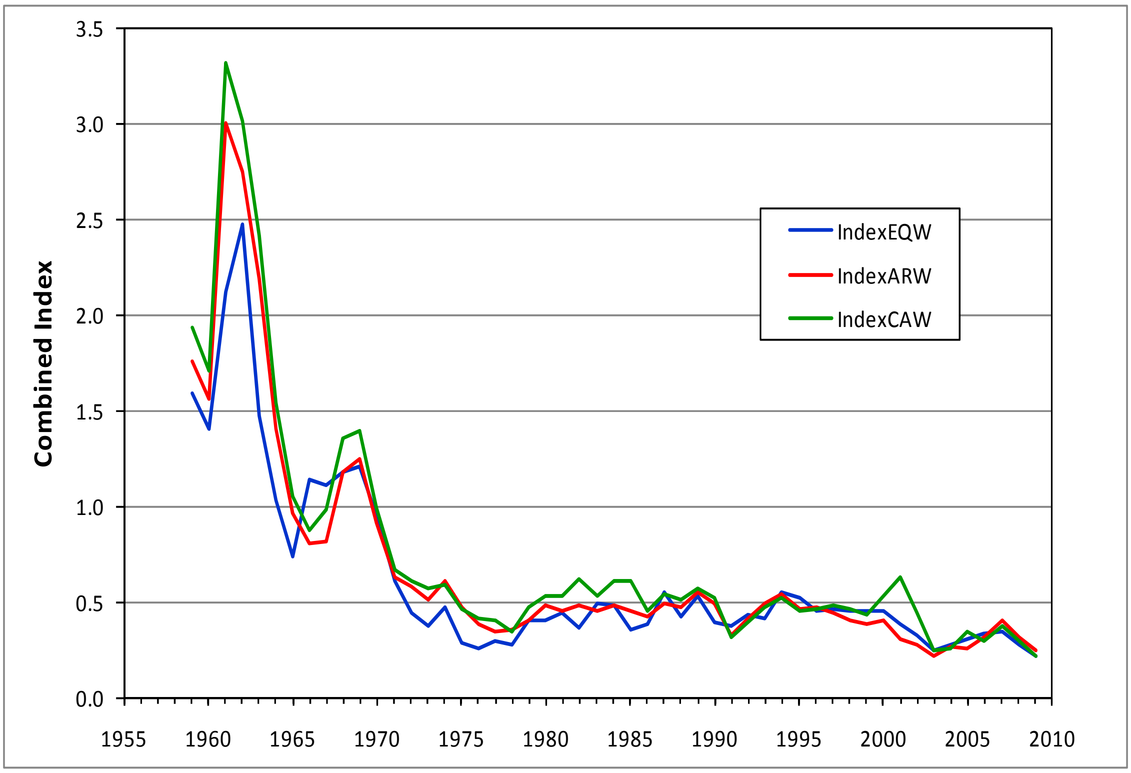


g. BUM (2010-11)

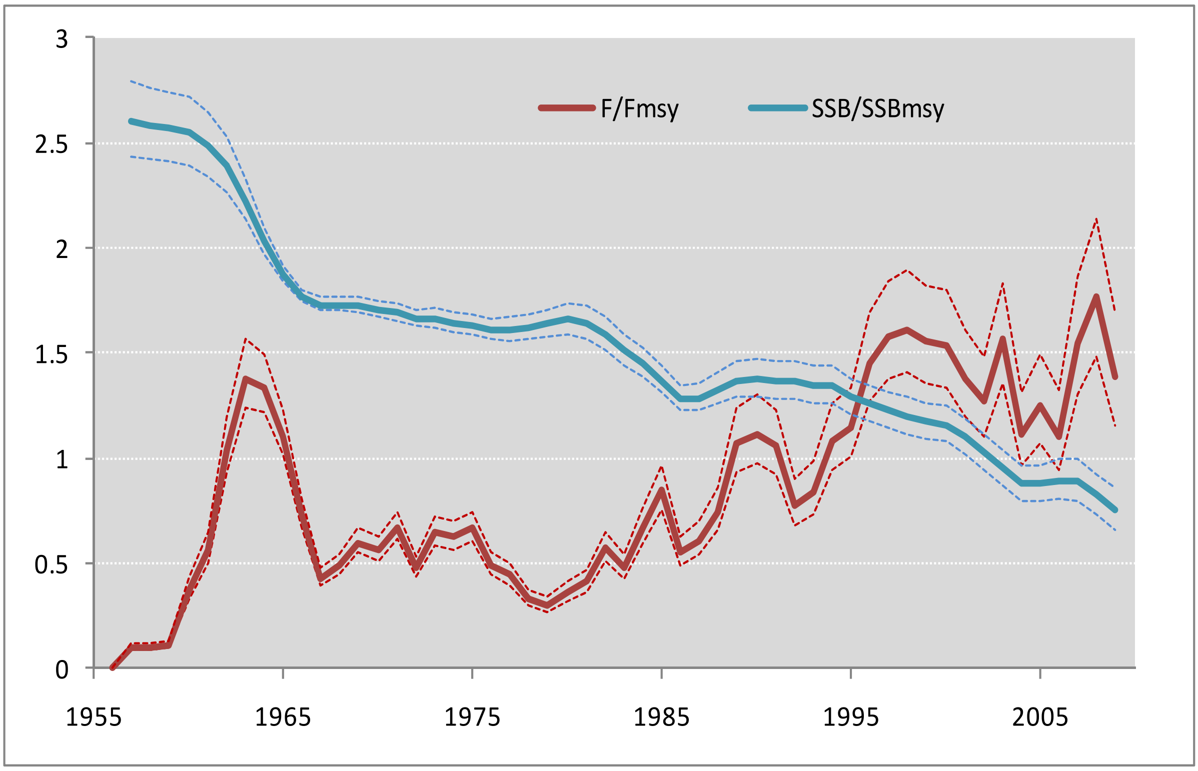
BUM-Figure 1. Geographic distribution of mean blue marlin catch by major gears and decade.



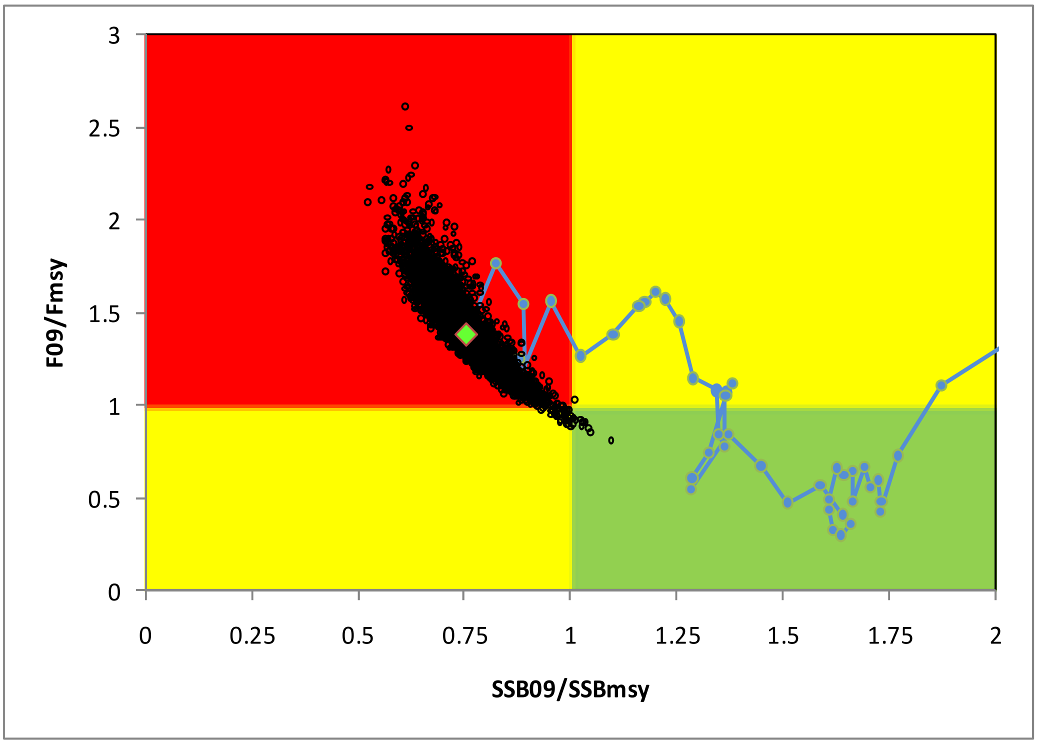
BUM-Figure 2. Total catch of blue marlin reported in Task I.



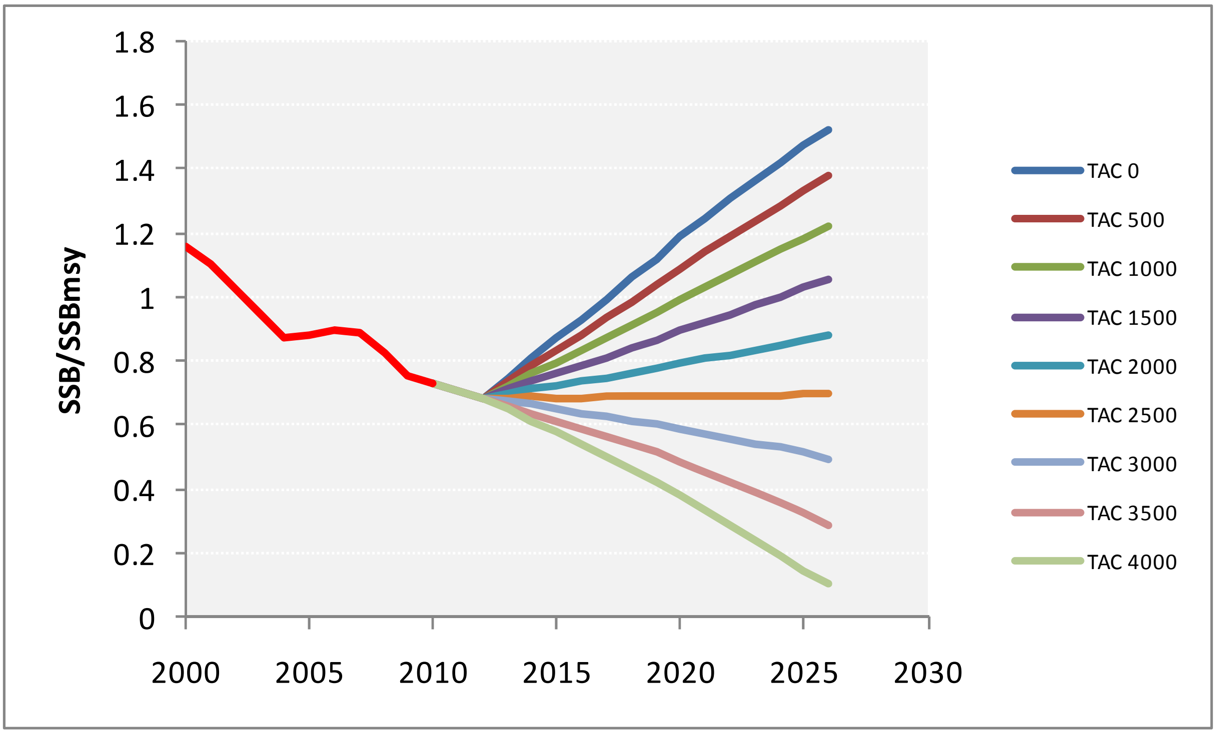
BUM-Figure 3. Blue marlin standardized combined CPUE indices estimated using equal weighting for all CPUE series (EQW), weighting the CPUE series by area (ARW) and by catch (CAW).



BUM-Figure 4. Trends of F/F_{MSY} and SSB/SSB_{MSY} ratios for blue marlin from the base model (SS3). Solid lines represent median from MCMC runs, and broken lines the 10% and 90% percentiles, respectively.



BUM-Figure 5. Phase plot for blue marlin from the base model in final year model assessment (2009). Individual points represent MCMC iterations, large diamond the median of the series. Blue circles with line represent the historic trend of the median F/F_{MSY} vs. SSB/SSB_{MSY} 1965-2008.



BUM-Figure 6. Trends of SSB/SSB_{MSY} ratios under different scenarios of constant catch projections (TAC tons) for blue marlin from the base model. Projections start in 2010; for 2010/11 a catch of 3,341 t was assumed.

8.7 WHM-WHITE MARLIN

The most recent assessment for white marlin was conducted in 2012 through a process that included a data preparatory meeting in April 2011 (Anon. 2012a) and an assessment meeting held in May 2012 (Anon. 2013b). The last year of fishery data used in the assessment was 2010.

WHM-1. Biology

White marlin spawning areas occur mainly in the tropical western North and South Atlantic, predominantly in the same offshore locations in their normal range. In the North Atlantic, spawning activity has been reported off eastern Florida (USA), the Windward Passage (between La Hispaniola and Cuba), and north of Puerto Rico. Seasonal spawning concentrations have been noted northeast of Hispaniola and Puerto Rico, and off the east coast of Hispaniola. Spawning activity has also been reported for the equatorial Atlantic (5°N-5°S) off northeastern Brazil, and in the South Atlantic off southern Brazil.

Previous reports have mentioned that spawning takes place during austral and boreal spring-summer. In the North Atlantic, reproduction events occur from April to July, with spawning activity peaking around April-May. In the equatorial Atlantic (5°N-5°S), spawning occurs during May-June, and in the South Atlantic, reproduction events take place from December to March.

White marlin inhabits the surface mixed layer of the open ocean. Although they spend most of their time in the warm waters of the epipelagic zone, they do not confine themselves to a narrow range of temperatures but are known to explore temperatures ranging 7.8-29.6 °C. Information from pop-up satellite archival tag (PSAT) data indicated frequent short-duration dives extending to >300 m depths, although most dives ranged from 100 to 200 m. Two types of diving behavior have been identified for white marlin, (1) a shorter duration V-shaped dive, and (2) a U-shaped dive characterized as those confined to a specific depth range for a prolonged period. These patterns, however, can be highly variable between individuals and also vary depending on the temperature and dissolved oxygen of the surface mixed layer. Therefore, it is important to consider vertical habitat use and the environmental factors that influence it during the standardization of CPUE data.

All white marlin biological material sampled prior to the confirmation of the presence of roundscale spearfish (*T. georgii*) in 2006, are now presumed to contain an unknown proportion of roundscale spearfish. Therefore reproductive parameters, growth curves and other biological studies previously thought to describe white marlin may not accurately represent this species.

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 most likely comprise a mixture of the two species. Studies of white marlin/roundscale spearfish ratios in the western Atlantic have been conducted, with overall estimated ratios between 23-27%, although they varied in time and space. Previously, these were thought to represent only white marlin. However, there is little information on these species ratios in the eastern Atlantic.

The decadal geographic distribution of the catches is given in **WHM-Figure 1**. The Committee used Task I catches as the basis for the estimation of total removals **(WHM-Figure 2)**. Total removals for the period 1990-2010 were obtained during the 2012 White Marlin Stock Assessment Session by modifying Task I values with the addition of white marlin that the Committee estimated from catches reported as billfish unclassified.

Additionally the reporting gaps for some fleets were completed using estimates based on catch values reported for years before and/or after the gap(s) years.

Task I catches of white marlin in 2011 and 2012 were 384 t and 403 t, respectively (**WHM-Table 2)**. Task I catches of white marlin for 2012 are to be considered preliminary. Due to the work conducted by the Committee and improved reporting by CPCs the amount of unclassified billfish in the Task I table has been minimized.

A series of indices of abundance for white marlin were presented and discussed during the 2011 and 2012 meetings. Following the guidelines developed by the SCRS Working Group on Stock Assessment Methods (WGSAM), seven CPUE series were selected for their inclusion in the assessment models. In general, the indices showed no discerning trend during the latter part of the time series examined (**WHM-Figure 3**). During the 2012 assessment, an estimated standardized combined CPUE index for white marlin showed a sharp decline during the period 1960-1991, and a relatively stable trend thereafter (**WHM-Figure 3**).

WHM-3. State of the stock

Unlike the partial assessment conducted in 2006, the Committee conducted a full assessment in 2012, which included estimations of management benchmarks. Two models were used to estimate the status of the stock, a surplus production model (ASPIC), and a fully integrated model (SS3). The methods used for the fully integrated model followed very closely to those used in the 2011 blue marlin assessment. As recommended by the Working Group in 2010, the model configuration was an effort to use all available data on white marlin, including lengths, dimorphic growth patterns and other biological data. Although it is believed that the modeling methods employed were relatively robust, the input data for the models were very likely less so. Perhaps the most important uncertainty was that associated with the landings data. There remains uncertainty not only in the species composition but also the magnitude of the catch. This is especially a problem with the landings data starting in 2002 when CPCs were mandated to release billfish that were alive at haulback. This lead to a decrease in reported landings but not necessarily a decrease in fishing and/or release mortality. This apparent drop in landings lead to a marked decrease in the estimates of F/F_{MSY} from 2002-present, however the Committee considers that this trend is likely overly optimistic due to unreported catch and unaccounted release mortality.

The results of the 2012 assessment indicated that the stock remains overfished but most likely not undergoing overfishing (**WHM-Figure 4, Figure 5**). Relative fishing mortality has been declining over the last ten years and is now most likely to be below F_{MSY} (**WHM-Figure 6**). Relative biomass has probably stopped declining over the last ten years, but still remains well below B_{MSY} (**WHM-Figure 6**). There is considerable uncertainty in these results. The two assessment models provide different estimates about the productivity of the stock, with the integrated model suggesting that white marlin is a stock that can rebuild relatively fast whereas the surplus production model suggests the stock will rebuild very slowly. The results from both approaches are considered to be equally plausible. These results are conditional on the reported catch being a true reflection of the fishing mortality experienced by white marlin. Sensitivity analyses suggest that if recent fishing mortality has been greater than reported, because discards are not reported by many fleets, estimates of stock status would be more pessimistic and current relative biomass would be lower and overfishing would continue. The presence of unknown quantities of roundscale spearfish in the reported catches and data used to estimate relative abundance of white marlin increases the uncertainty for the stock status and outlook for this species.

WHM-4. Outlook

The outlook for this stock remains uncertain because of the possibility that reported catches underestimate fishing mortality and the lack of certainty in the productivity of the stock. As a result forecasts of how the stock will respond to different levels of catch are uncertain (**WHM-Table 2**). At current catch levels of about 400 t the stock will likely increase in size, but is very unlikely to rebuild to B_{MSY} in the next ten year period (**WHM-Table 2**). Fishing mortality is highly likely to remain below F_{MSY}. The speed at which the stock biomass may increase and the time necessary to rebuild the stock to B_{MSY} remains highly uncertain. This will depend on whether current reported catches are true estimates of fishing mortality, and on the true productivity of the white marlin stock.

WHM-5. Effect of current regulations

A 2006 recommendation [Rec. 06-09] established that the annual amount 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. Furthermore, in 2012, The Commission established a TAC for 2013, 2014, and 2015 of 400 t [Rec. 12-04], placed additional catch and commerce restrictions in recreational fisheries for blue marlin and white marlin, and requested methods for estimating live and dead discards of blue marlin and white marlin/spearfish.

The Committee is concerned with the significant increase in the contribution from non-industrial fisheries to the total white marlin harvest and that these fisheries are not fully accounted for in the current ICCAT database. The Committee expressed its serious concern over this limitation on data for future assessments. Such data limitation precludes any analysis of the current regulations. In addition the Committee expressed concern of the status of white marlin due to the misidentification of spearfishes in the white marlin catches. This situation adds uncertainty to the stock assessment results.

The Committee noted that more countries have started reporting data on live releases in 2006. However there is not enough information on the proportion of fish being released alive to evaluate the effectiveness of the ICCAT recommendation, relating to the live release of white marlin.

WHM-6. Management recommendations

In 2012, the Commission implemented [Rec. 12-04], intended to reduce the total harvest to 400 t in 2013, 2014, and 2015 to allow the rebuilding of the white marlin stock from the overfished condition. The Committee expressed its concern on the effectiveness of such measure in light of the misidentification of spearfishes in the white marlin catches, which causes uncertainty in stock assessment results and enforcement related problems.

One approach to reduce fishing mortality could be the use of non-offset circle hooks as terminal gear. Recent research has demonstrated that in some longline fisheries the use of non-offset circle hooks resulted in a reduction of marlin mortality, while the catch rates of several of the target species remained the same or were greater than the catch rates observed with the use of conventional J hooks or offset circle hooks. The Committee considers that this approach may be more efficient and enforceable than time-area closures and, thus, it recommends that the Commission considers this alternative approach. Currently, three ICCAT Contracting Parties (Brazil, Canada, and the United States) already mandate or encourage the use of circle hooks on their pelagic longline fleets. In addition, reducing fishing mortality of white marlin from non-industrial fisheries should be considered.

ATLANTIC WHITE MARLIN SUMMARY	
MSY	874 t [1] - 1604 t [2]
Current (2012) Yield	403 t [3]
Relative Biomass:	
B_{2010}/B_{MSY}	0.50 (0.42-0.60)[4]
SSB_{2010}/SSB_{MSY}	0.322 (0.23-0.41)[5]
Relative Fishing Mortality:	
F_{2010}/F_{MSY}	0.99 (0.75-1.27)[4] 0.72 (0.51-0.93)[5]
$Catch_{recent}$[6]/$Catch_{1996}$ Longline and Purse seine	0.30
Overfished	Yes
Overfishing	Not likely[7]
Conservation and Management Measure in Effect:	Recommendation [Rec. 12-04]. The annual amount of white 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 of the 1996 or 1999 landing levels, whichever is greater.

[1] ASPIC estimates.
[2] SS3 estimates.
[3] 2012 yield should be considered provisional, 2011 yield was 384 t.
[4] ASPIC estimates with 10 and 90 percentiles.
[5] SS3 estimates with approximate 95% confidence intervals.
[6] $Catch_{recent}$ is the average annual longline and purse seine catch for 2009-2011.
[7] Overfishing could be occurring if catches are under reported.

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

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			1396	1829	1659	1627	1462	1544	2114	1761	1573	1430	1682	1569	1368	978	905	732	742	655	447	601	634	656	433	384	403
	ATN		436	376	407	239	610	543	660	639	669	483	529	492	484	431	293	253	257	287	196	162	136	203	217	198	285
	ATS		960	1453	1252	1388	853	1002	1454	1122	905	947	1152	1077	883	547	612	478	485	368	251	438	498	453	215	187	118
Landings	ATN	Longline	196	241	266	108	466	413	531	473	554	431	475	399	408	381	230	204	204	252	161	123	105	164	192	152	240
		Other surf.	150	11	40	21	35	34	57	48	31	10	17	29	34	30	24	32	24	17	23	30	19	23	12	7	20
		Sport (HL+RR)	29	16	21	19	21	30	30	18	20	9	6	6	2	4	6	1	1	1	2	1	2	2	6	3	3
	ATS	Longline	832	1333	1152	1328	805	950	1420	1086	860	853	979	1021	827	475	497	425	454	325	202	404	417	381	161	146	113
		Other surf.	128	119	96	60	48	52	33	31	40	57	173	55	56	71	116	53	31	43	48	15	80	72	53	39	2
		Sport (HL+RR)	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Discards	ATN	Longline	60	107	81	90	88	66	42	100	64	33	31	57	41	16	29	17	27	17	9	8	9	13	8	36	20
		Other surf.	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	0	2	0	0	1
	ATS	Longline	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	2	19	1	0	2	2	
Landings	ATN	Barbados	117	11	39	17	24	29	26	43	15	41	33	25	25	24	15	15	0	0	33	0	0	0	6	3	5
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
		Canada	0	0	0	0	0	0	4	4	8	8	8	5	5	3	2	1	2	5	3	2	2	1	2	1	2
		China P.R.	0	0	0	0	0	0	6	7	6	7	10	20	1	7	4	2	1	4	1	0	1	3	4	1	2
		Chinese Taipei	0	4	85	13	92	123	270	181	146	62	105	80	59	68	61	15	45	19	16	1	0	1	1	0	2
		Costa Rica	0	0	0	0	0	0	0	0	0	0	0	3	14	0	0	1	0	0	0	0	0	0	0	0	
		Cuba	13	21	14	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	
		EU.España	61	12	12	9	18	15	25	17	97	89	91	74	118	43	4	19	19	48	28	32	10	8	50	3	21
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	11	30	3	2	0	1	2	1	18
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	1	15	8	14	33	10	12	11	17	14	0	0	
		Japan	68	73	34	45	180	33	41	31	80	29	39	25	66	15	10	21	23	28	27	10	22	27	31	18	56
		Korea Rep.	2	82	39	1	9	4	23	3	7	5	0	0	0	0	0	0	0	4	0	0	0	8	19	19	
		Liberia	0	0	0	0	0	0	0	0	1	1	3	8	4	3	4	3	0	0	0	0	0	0	0	0	
		Mexico	0	0	0	0	0	2	8	8	3	5	6	11	18	44	15	15	28	25	16	13	14	19	20	28	36
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	3	5	3	3	5	3	2	2	2	3	3	0	
		NEI (BIL)	0	0	0	0	0	0	0	0	0	0	0	0	34	72	4	8	0	26	9	14	18	20	0	0	
		NEI (ETRO)	0	0	0	0	0	23	43	47	57	72	105	100	64	36	2	2	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	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	44	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	2
		Trinidad and Tobago	29	7	6	3	0	1	11	18	8	32	10	13	4	2	5	12	6	6	5	12	10	11	15	14	39
		U.S.A.	42	10	17	13	11	19	13	7	12	8	5	5	1	3	6	1	1	1	1	0	2	2	2	26	1
		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	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	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	1	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	
		Venezuela	42	47	79	47	187	226	148	171	164	90	80	61	25	72	110	55	55	60	26	52	26	70	54	47	79
	ATS	Argentina	0	8	9	6	0	0	0	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	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	149	204	205	377	211	301	91	105	75	105	217	158	105	172	407	266	80	244	90	52	55	53	36	60	71
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	3	4	3	4	5	10	1	13	19	6	6	4	5	10	3	5	4	2	2
		Chinese Taipei	565	979	810	790	506	493	1080	726	420	379	401	385	378	84	117	89	127	37	28	53	38	27	19	28	13
		Cuba	24	22	6	10	10	0	0	0	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	1	2	1	5	1	2	2	3	1	1	1	1	3	2	0	1	
		EU.España	1	1	0	17	6	12	2	19	54	4	10	45	68	18	2	3	45	10	23	14	21	8	62	2	13

		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	19	0	35	39	9	16	7
		Gabon	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	88	68	31	17	14	22	1	2	1	3	7	6	8	21	2	1	1	1	0	0	4	4	0	1	1
		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	76	73	92	77	68	49	51	26	32	29	17	15	17	41	5	12	13	6	11	11	12	16	10	13	12
		Korea Rep.	17	53	42	56	1	4	20	20	52	18	0	0	0	0	0	11	40	3	0	113	96	70	24	24	
		Mixed flags (FR+ES)	25	27	37	11	10	12	11	9	7	7	9	8	9	8	9	10	8	8	8	7	8	9	9	37	
		NEI (BIL)	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	21	134	16	27	156	186	179	0	0	
		NEI (ETRO)	0	0	0	0	0	91	171	190	228	288	421	399	258	144	9	7	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	
		Philippines	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	1	0	2	2	
		S. Tomé e Príncipe	14	16	19	26	24	17	21	21	30	45	40	36	37	37	37	37	21	33	29	0	36	37	38	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	2	0	0	0	0	0	0	0	0	
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Uruguay	1	1	1	1	3	0	3	0	1	24	22	0	0	0	1	9	2	5	9	3	0	5	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.	60	107	81	90	88	66	42	100	64	33	32	57	41	17	33	17	27	17	10	8	10	14	8	36	21
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	19	1	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	2	2	
		U.S.A.	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	0	0	0	0	0	0	

WHM-Table 2. Kobe II Strategy Matrix (K2SM) of the combined models (ASPIC and SS3). Percent values indicate the probability of achieving the goal of $F<F_{MSY}$, $B>B_{MSY}$, and $SSByr >= SSB_{MSY}$ and $Fyr < F_{MSY}$ for each year (yr) under different constant catch scenarios (TAC tons).

F<Fmsy

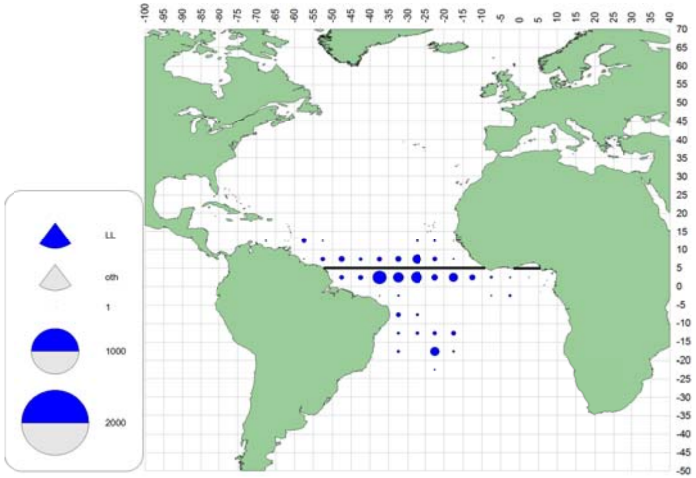
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
200	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
400	73%	74%	75%	77%	79%	79%	81%	82%	84%	85%
600	9%	11%	12%	12%	13%	14%	16%	16%	17%	19%
800	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
1000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1200	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

B>Bmsy

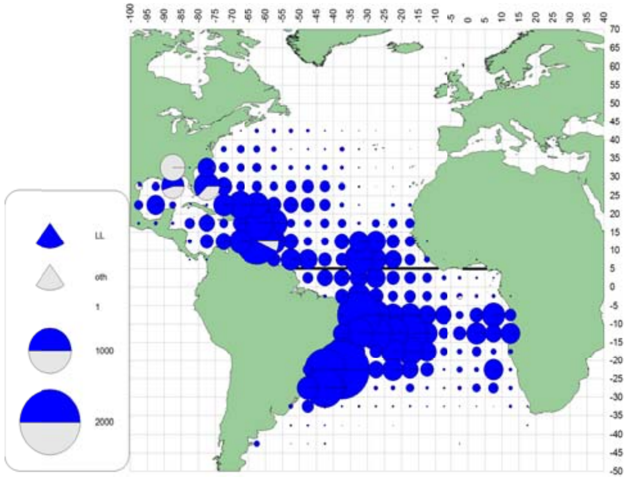
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	0%	0%	0%	0%	0%	0%	0%	1%	1%	2%
200	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
800	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1200	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

F<Fmsy and B>Bmsy

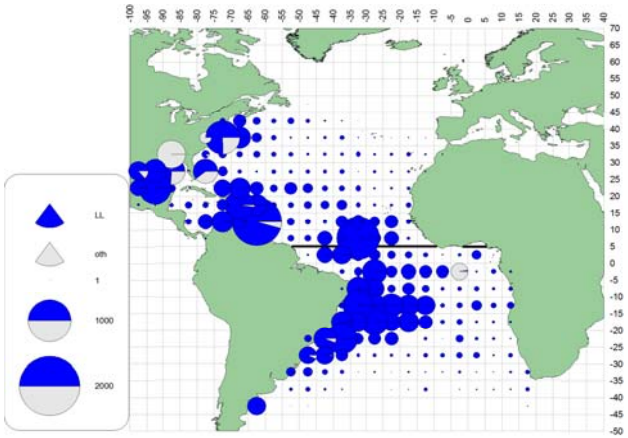
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	0%	0%	0%	0%	0%	0%	0%	1%	1%	2%
200	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
800	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1200	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%



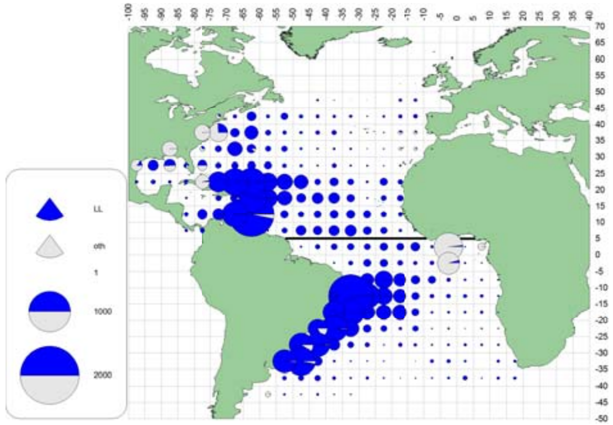
a. **WHM (1950-59)**



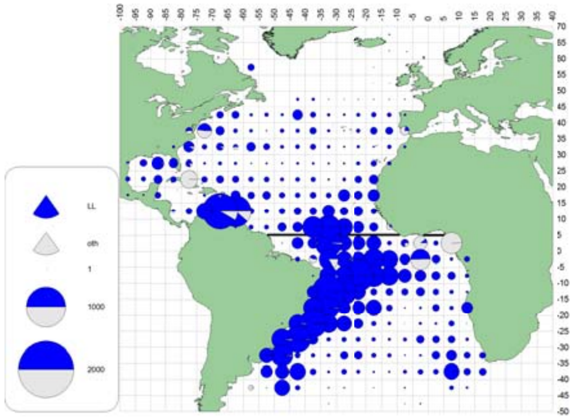
b. **WHM (1960-69)**



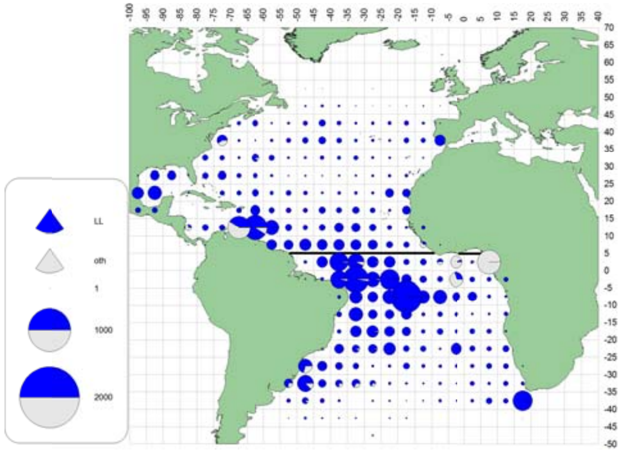
c. **WHM (1970-79)**



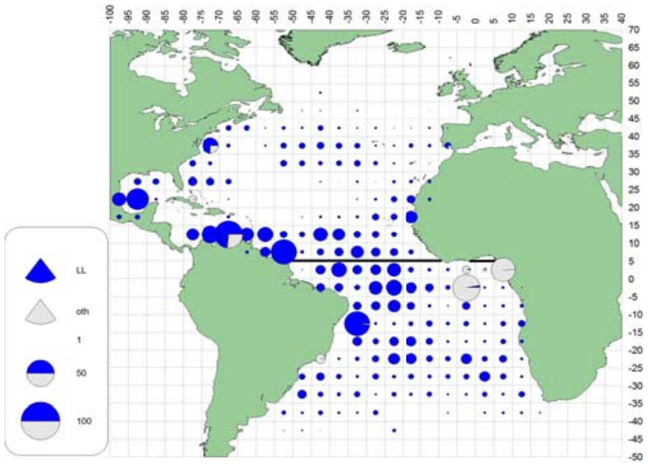
d. **WHM (1980-89)**



e. WHM (1990-99)

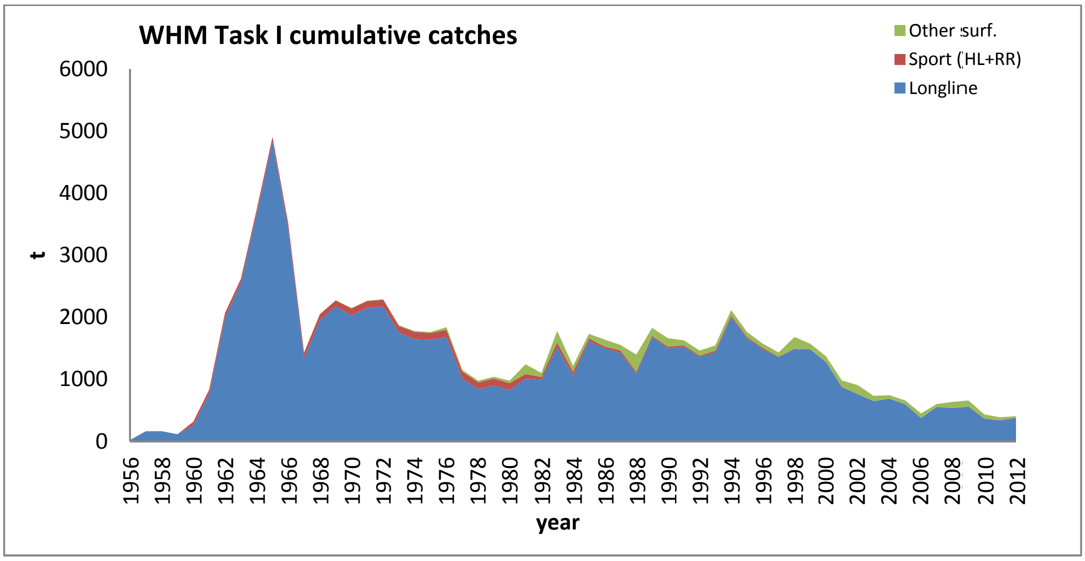


f. WHM (2000-09)

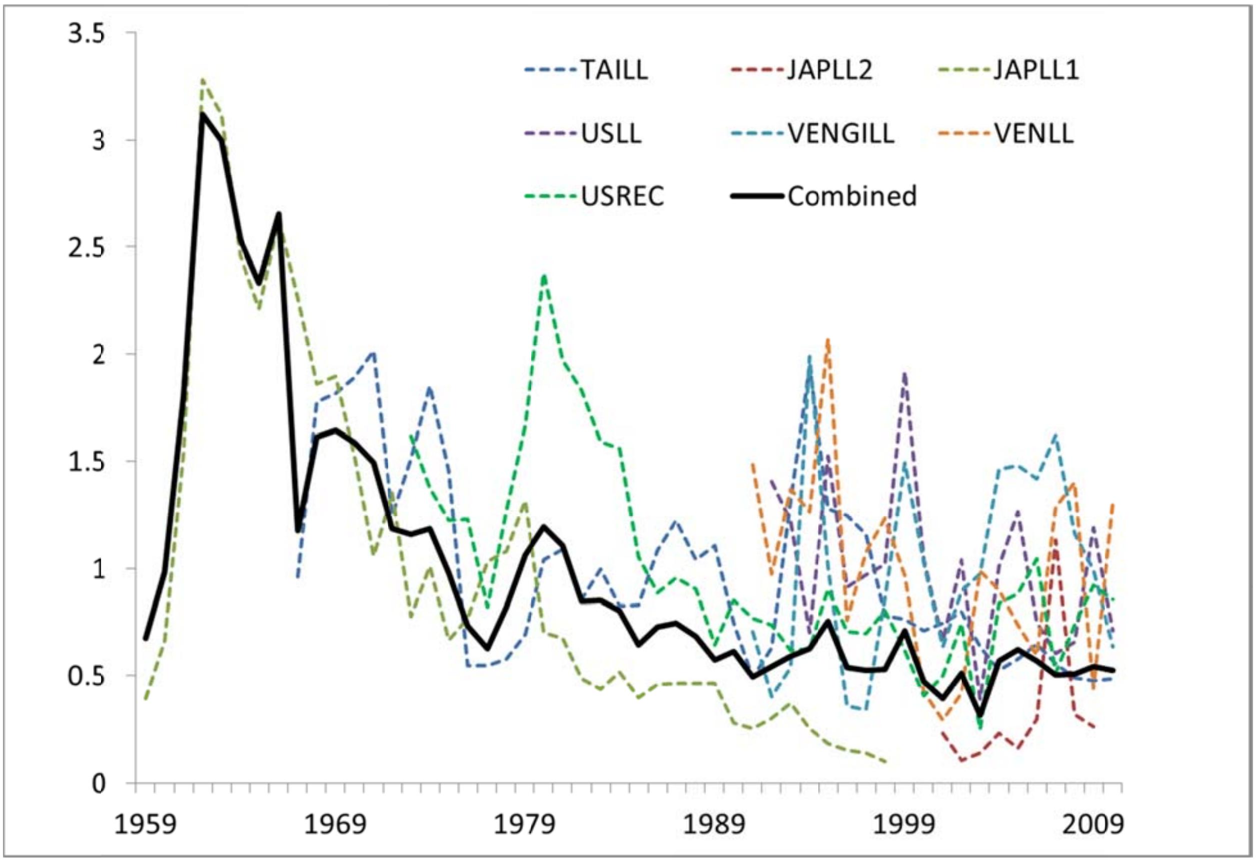


g. WHM (2010-11)

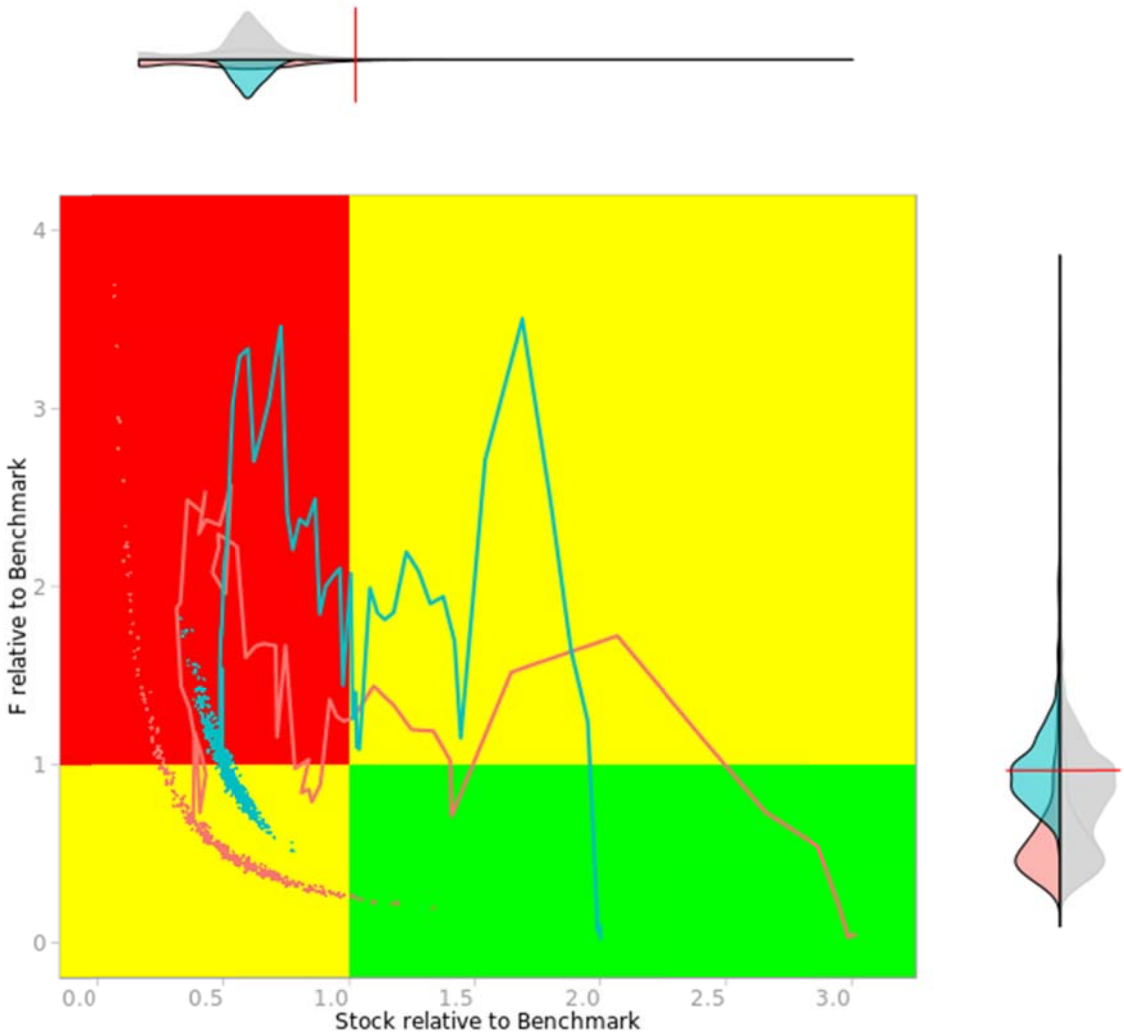
WHM-Figure 1. Geographic distribution of mean white marlin catch by major gears and decade.



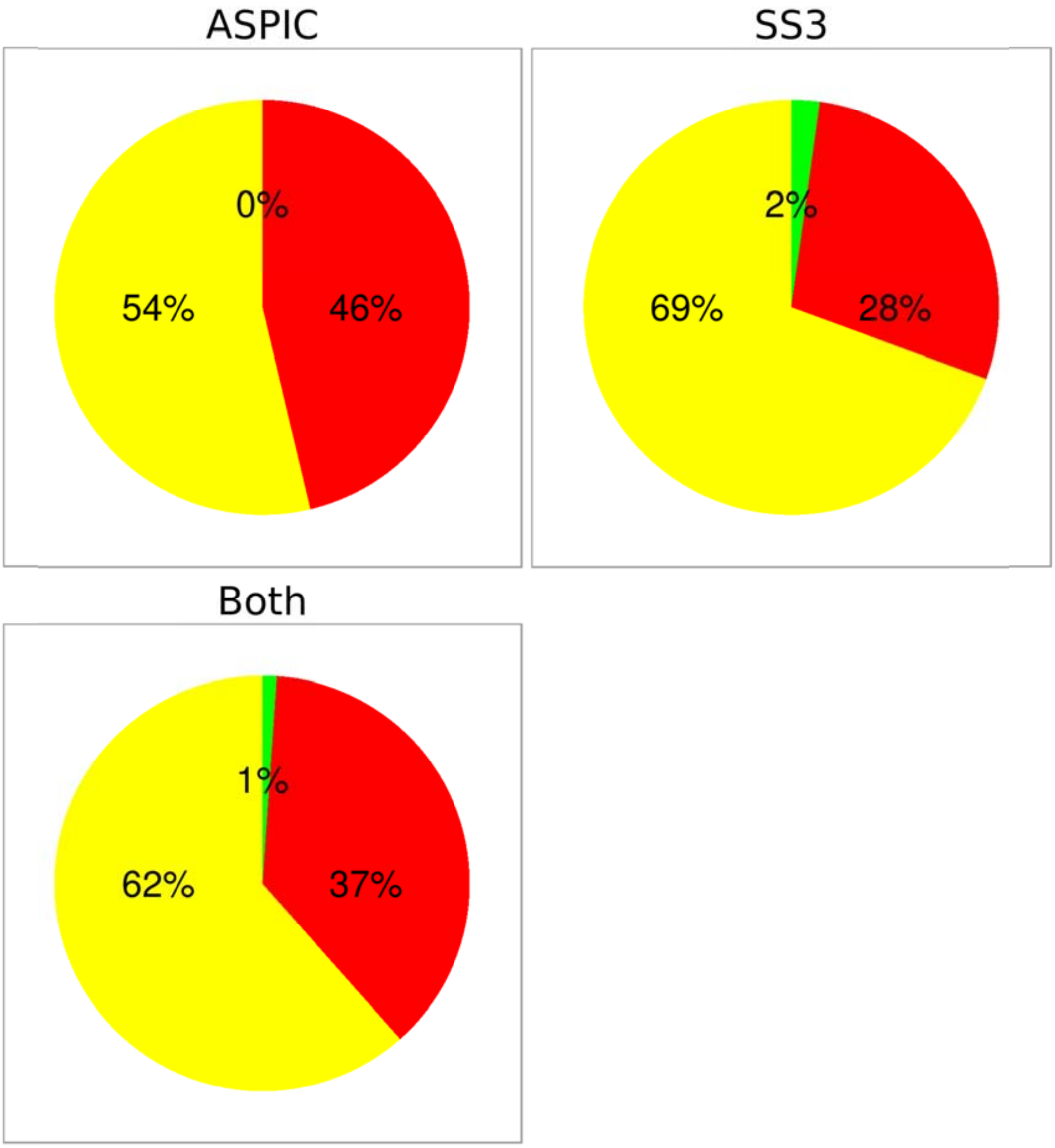
WHM-Figure 2. Total catch of white marlin reported in Task I for the period 1956-2012.



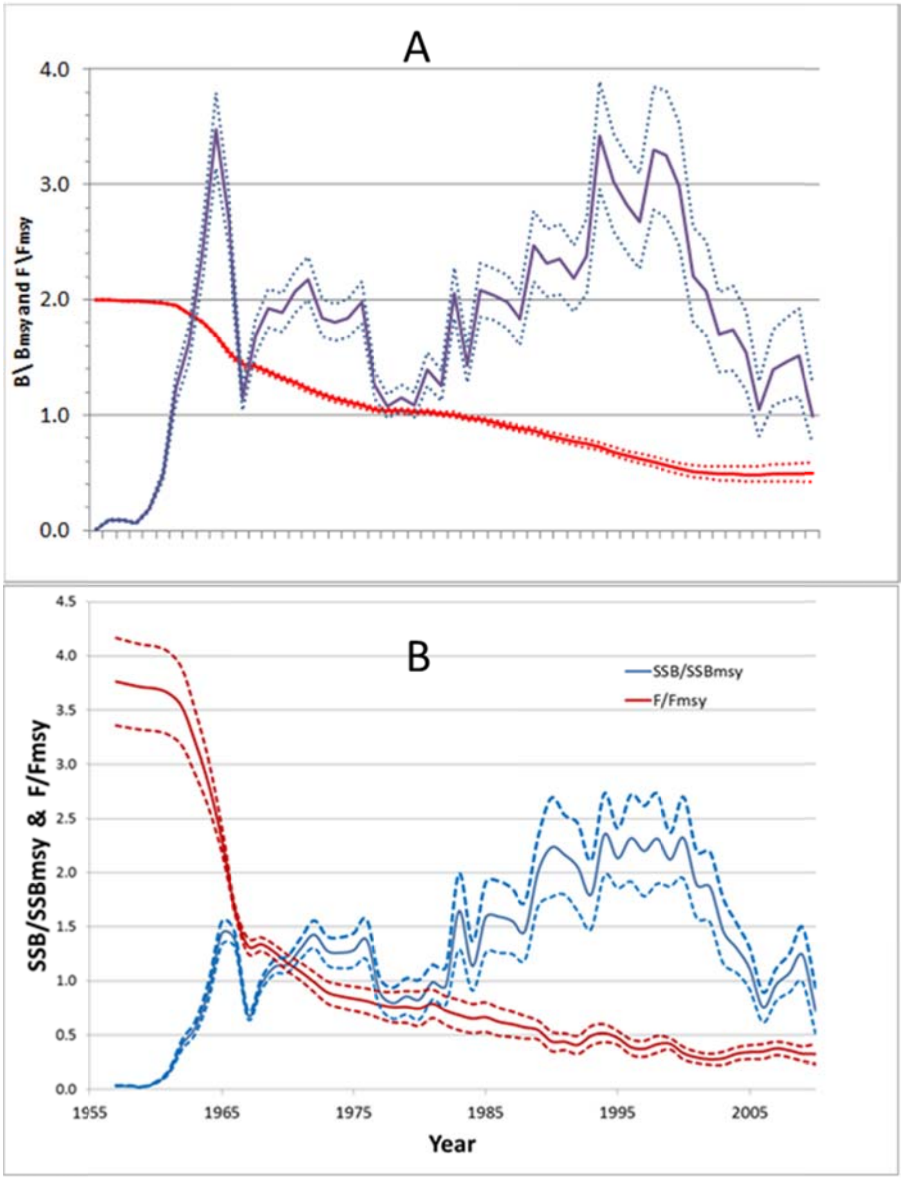
WHM-Figure 3. White marlin indices of abundance presented and selected during the meeting. For graphing purposes the indices were scaled to their respective mean value for the period 1990-2010.



WHM-Figure 4. Kobe phase plot panel showing the estimated trajectories for stock (B) relative to B_{MSY} and harvest rate (F) relative to F_{MSY} (line) along with the bootstrap estimates for 2012. The green quadrant corresponds to the stock not being overfished and no overfishing occurring and the red quadrant to the stock being overfished and overfishing occurring. The red line represents the SS3 model, and the blue line represents the ASPIC model (large panel). The marginal densities plots for stock relative to B_{MSY} and harvest rate relative to F_{MSY} are also shown (top and right of large panel); the upper part (grey) are combined probabilities for both ASPIC and SS3, and the lower part (blue and pink) are individual probabilities of ASPIC and SS3 overlaid. The red lines represent the benchmark levels (ratios equal to 1.0).



WHM-Figure 5. Pie chart showing the proportion of assessment results for 2012 that are within the green quadrant of the Kobe plot chart (not overfished, no overfishing), the yellow quadrant (overfished or overfishing), and the red quadrant (overfished and overfishing).



WHM-Figure 6. Historical ASPIC (A) and SS3 (B) estimates of biomass over biomass at MSY ratio (red) and fishing mortality over fishing mortality at MSY ratios (blue) for white marlin.

8.8 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. 2010a).

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, while 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 Committee **(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 2012 was 1,153 t and 891 t for the east and west stocks, respectively **(SAI-Figure 3)**. Task I catches of sailfish for 2012 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. 2010a) 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.

One approach to reduce fishing mortality could be the use of non-offset circle hooks as terminal gear. Recent research has demonstrated that in some longline fisheries the use of non-offset circle hooks resulted in a reduction of istiophorid mortality, while the catch rates of several of the target species remained the same or were greater than the catch rates observed with the use of conventional J hooks or offset circle hooks. The Committee considers that this approach may be more efficient and enforceable than time-area closures and, thus, it recommends that the Commission considers this alternative approach. Currently, three ICCAT Contracting Parties (Brazil, Canada, and the United States) already mandate or encourage the use of circle hooks on their pelagic longline fleets. In addition, reducing fishing mortality of sailfish from non-industrial fisheries should be considered.

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
2012 Catches (Provisional)	891 t	1,153 t
B_{2007}/B_{MSY}	Possibly < 1.0	Likely < 1.0
F_{2007}/F_{MSY}	Possibly > 1.0	Likely > 1.0
Overfished	Possibly	Likely
Overfishing	Possibly	Likely
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.

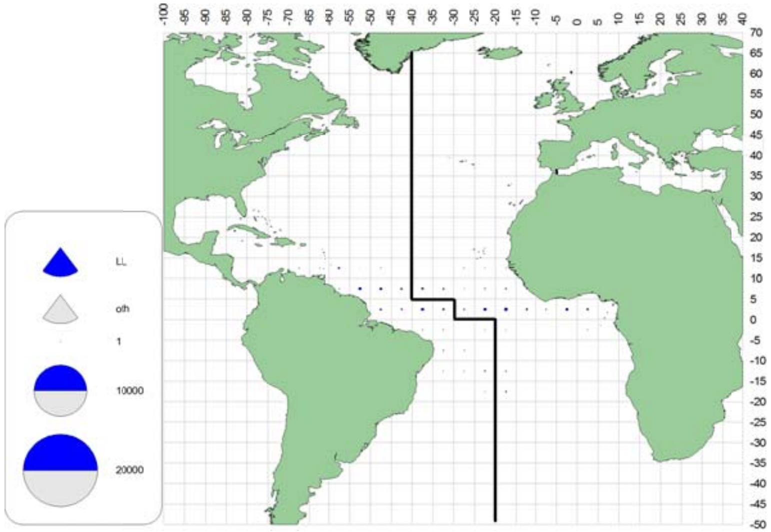
SAI-Table 1. Estimated catches (t) of Atlantic sailfish (*Istiophorus albicans*) by area, gear and flag.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			3180	2673	3475	2591	3105	3093	2231	2358	2923	2500	2709	2724	3798	4480	4294	3943	3984	3629	2997	3837	3734	3498	2553	2053	2044
	ATE		2109	1710	2315	1476	1780	1815	1172	1234	1881	1337	1362	1342	1978	2761	2313	2625	2587	2194	1901	2542	2196	2062	1797	1238	1153
	ATW		1071	963	1160	1115	1325	1278	1059	1124	1041	1163	1346	1382	1820	1719	1981	1318	1397	1435	1096	1295	1537	1437	756	815	891
Landings	ATE	Longline	93	112	109	47	104	256	151	189	196	206	275	273	195	269	354	322	261	294	566	555	596	555	483	454	512
		Other surf.	1479	1153	1249	1000	983	1111	954	910	1504	644	859	883	1231	1725	1862	2022	2106	1756	1289	1798	1488	927	871	643	583
		Sport (HL+RR)	537	445	957	429	692	448	67	135	182	488	228	186	551	767	98	282	219	143	46	189	113	580	443	141	58
	ATW	Longline	334	316	316	159	357	484	346	338	260	323	499	533	1097	1245	1265	873	747	1062	646	830	1018	965	658	694	699
		Other surf.	208	238	514	521	599	498	468	410	482	433	553	615	602	402	603	440	642	368	442	452	502	457	92	101	154
		Sport (HL+RR)	472	352	267	371	333	233	217	348	230	350	267	163	76	60	106	0	0	0	2	6	7	4	2	10	19
Discards	ATE	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	
	ATW	Longline	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	3	5	8	9	10	4	10	18
		Other surf.	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
Landings	ATE	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	
		Benin	40	8	21	20	21	20	20	20	19	6	4	5	5	12	2	2	5	3	3	4	0	0	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	3	3	3	3	5	9	4	5	11	4	4	8	16	8	1	4	5	2	4
		Chinese Taipei	2	3	5	4	80	157	38	58	24	56	44	66	45	50	62	49	15	25	36	109	121	80	21	51	73
		Cuba	22	53	61	184	200	77	83	72	533	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	66	55	58	38	69	40	54	66	91	65	35	80	45	47	65	121	73	93	78	52	448	74	0	108	192
		EU.España	28	14	0	13	3	42	8	13	42	38	15	20	8	150	210	183	148	177	200	192	206	280	174	154	201
		EU.Portugal	0	0	0	0	1	2	1	2	1	2	27	53	11	3	8	13	19	31	136	43	49	103	170	121	70
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		Gabon	0	0	0	0	0	3	3	110	218	2	0	0	0	0	0	4	0	0	0	0	0	0	0	0	
		Ghana	837	465	395	463	297	693	450	353	303	196	351	305	275	568	592	566	521	542	282	420	342	358	417	299	201
		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	26	26	31	6	15	27	45	52	47	19	58	16	26	6	20	22	70	50	62	144	199	94	115	142	165
		Korea Rep.	11	12	12	22	2	2	5	5	11	4	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0
		Liberia	0	0	0	0	0	0	0	33	85	43	136	122	154	56	133	127	106	122	118	115	0	0	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	**0**
		Mixed flags (FR+ES)	408	432	595	174	150	182	160	128	97	110	138	131	353	400	365	413	336	264	274	205	251	308	265	56	
		NEI (BIL)	0	0	0	0	0	0	0	0	0	0	0	0	28	269	408	213	55	1	105	43	20	11	0	0	
		NEI (ETRO)	0	0	0	0	0	27	51	57	69	86	127	120	77	43	3	2	16	7	8	10	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	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
		S. Tomé e Príncipe	78	86	97	84	78	81	88	92	96	139	141	141	136	136	136	136	515	346	292	384	114	119	121	121	
		Senegal	587	552	1040	466	860	462	162	167	240	560	260	238	786	953	240	673	567	463	256	737	446	630	484	174	247
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
		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	4	0	0	0	1	5	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	9	22	36	23	62	55	95	135	47	31	71	0	0	0	0	
		U.S.A.	0	0	0	2	4	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Aruba	20	16	13	9	5	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Barbados	0	69	45	29	42	50	46	74	25	71	58	44	44	42	26	27	26	42	58	42	0	0	18	36	36
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	12	0	0	52	8	
		Brasil	152	147	301	90	351	243	129	245	310	137	184	356	598	412	547	585	534	416	139	123	268	433	78	137	108
		China P.R.	0	0	0	0	0	0	3	3	3	3	3	9	4	3	1	0	1	0	0	0	1	2	1	1	1
		Chinese Taipei	92	86	42	37	17	112	117	19	19	2	65	17	11	33	31	13	8	21	5	14	10	11	6	9	7
		Cuba	78	55	126	83	70	42	46	37	37	40	28	196	208	68	32	18	50	72	47	56	0	0	0	0	
		Curaçao	10	10	10	10	10	15	15	15	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0	0	

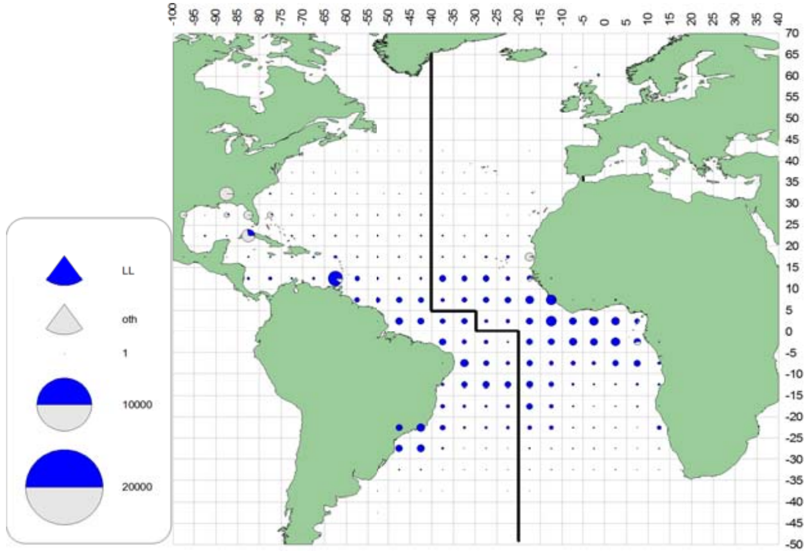
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	1	0	3	3	4	2	0	2	
		Dominican Republic	44	44	40	31	98	50	90	40	40	101	89	27	67	81	260	91	144	165	133	147	0	0	0	0	
		EU.España	0	0	0	8	13	13	19	36	5	30	42	7	14	354	449	196	181	113	148	248	393	451	306	233	239
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	7	0	2	12	12	110	19	53	101	48	19	9	4
		Grenada	114	98	218	316	310	246	151	119	56	83	151	148	164	187	151	171	112	147	159	174	216	183	0	0	
		Japan	5	12	12	27	0	1	8	2	4	17	3	10	12	3	3	10	5	22	4	1	33	43	36	13	18
		Korea Rep.	1	12	16	1	2	3	4	4	12	4	0	0	0	0	0	0	0	0	0	0	0	1	0	45	4
		Mexico	0	0	0	0	0	2	19	19	10	9	65	40	118	36	34	45	51	55	41	46	45	48	34	32	51
		NEI (BIL)	0	0	0	0	0	0	0	0	0	0	0	0	297	268	0	0	0	0	68	81	252	17	0	0	
		NEI (ETRO)	0	0	0	0	0	15	27	30	36	46	67	64	41	23	1	1	9	4	4	6	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	3	0	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	2	1	4	4	4	2	1	3	0	1	0	2	164	3	86	73	59	18	13	8	7	4	9
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	2	3
		Trinidad and Tobago	24	10	7	3	3	1	2	1	4	10	25	37	3	7	6	8	10	9	17	13	32	16	16	38	72
		U.S.A.	451	324	242	343	294	202	179	345	231	349	267	163	76	58	103	0	0	0	0	0	3	3	0	0	7
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Venezuela	22	24	24	65	71	206	162	93	155	175	248	169	83	126	159	133	158	178	184	248	154	162	178	235	314
Discards	ATE	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	
	ATW	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	
		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.	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	4	5	7	10	10	4	10	18

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

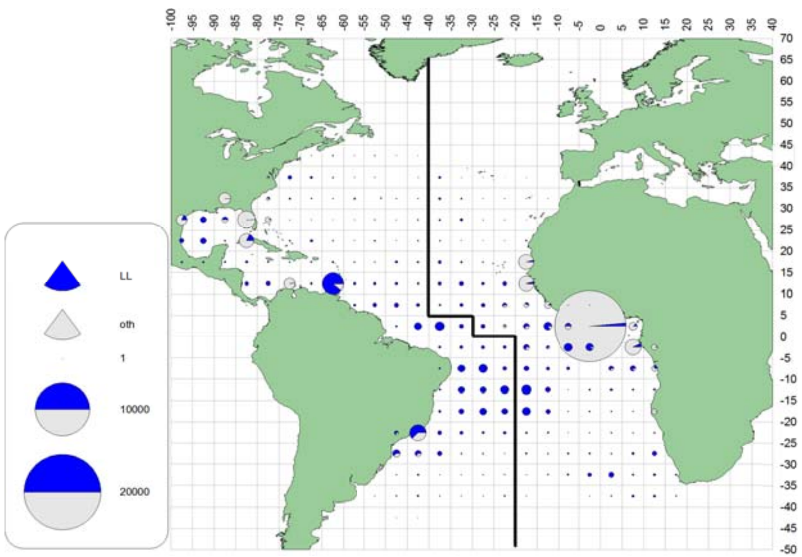
			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			532	418	481	214	273	540	320	240	165	201	266	306	278	188	179	133	188	169	340	167	166	140	245	147	253
	ATE		295	310	417	131	255	419	198	207	128	194	192	255	178	79	84	50	51	68	75	66	60	78	110	66	186
	ATW		236	108	64	83	19	121	122	33	37	7	74	51	100	110	95	84	137	101	265	102	106	62	135	81	67
Landings	ATE	Longline	39	40	44	24	163	307	100	129	69	126	106	174	118	78	84	50	51	68	75	66	60	78	110	66	186
		Other surf.	256	270	373	107	92	112	98	78	59	68	86	81	60	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Longline	236	108	64	83	19	121	122	26	34	7	74	51	100	110	95	84	137	101	265	102	106	62	135	81	67
		Other surf.	0	0	0	0	0	0	0	0	2	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	ATW	Longline	0	0	0	0	0	0	0	6	1	0	0	0	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	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	4	4	8	6	135	263	63	97	41	94	73	112	75	52	62	25	15	25	37	22	2	6	15	7	3
		EU.España	0	0	0	0	0	12	0	5	1	1	9	29	14	7	5	0	0	3	3	0	2	7	29	19	17
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	8	2	6	25	9	18
		Japan	31	31	32	10	27	31	36	26	25	30	22	33	29	20	16	25	36	40	21	36	53	59	35	31	148
		Korea Rep.	4	5	4	8	1	1	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Mixed flags (FR+ES)	256	270	373	107	92	112	98	78	59	68	86	81	60	0	0	0	0	0	0	0	0	0	0	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		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	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	3	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	27	56	39	3	0	0	5	4	0	0	0	24	4
		Chinese Taipei	208	85	41	36	16	111	116	19	18	2	64	16	11	24	39	12	11	20	17	20	0	0	6	14	6
		EU.España	0	0	0	0	0	5	0	1	0	0	0	24	50	22	5	25	0	5	14	0	2	5	3	4	3
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	15	44	10	10	0	3
		Japan	17	10	13	46	1	1	2	3	4	1	8	11	11	3	12	40	41	58	54	25	45	26	71	20	18
		Korea Rep.	2	5	9	0	1	2	4	4	10	4	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	1	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	82	0	135	23	13	7	8	5	9
		Trinidad and Tobago	10	7	1	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	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		Venezuela	0	0	0	0	0	1	0	0	1	0	1	0	0	4	0	3	3	17	5	15	3	14	24	12	24
Discards	ATW	U.S.A.	0	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



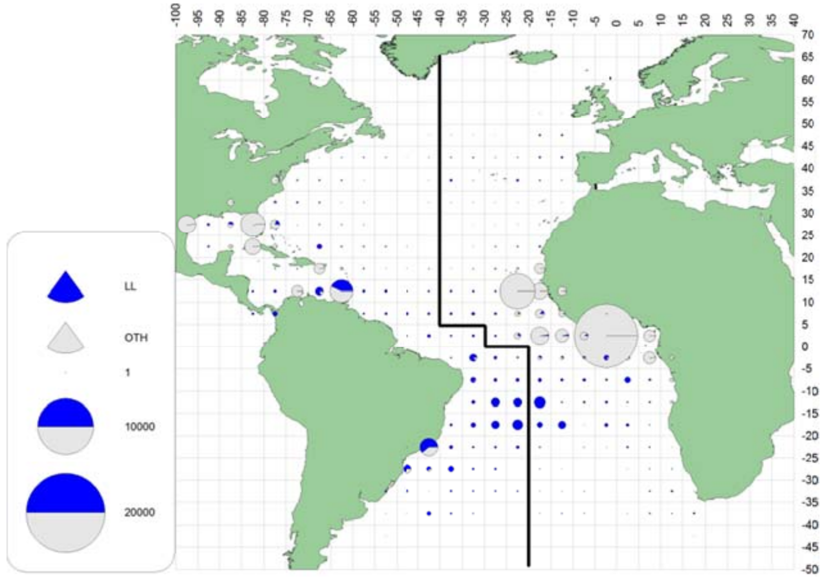
a. SAI (1950-59)



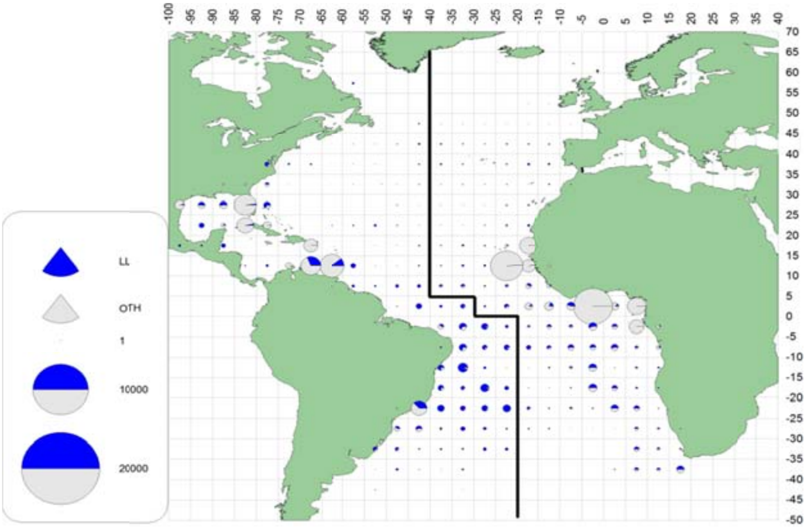
b. SAI (1960-69)



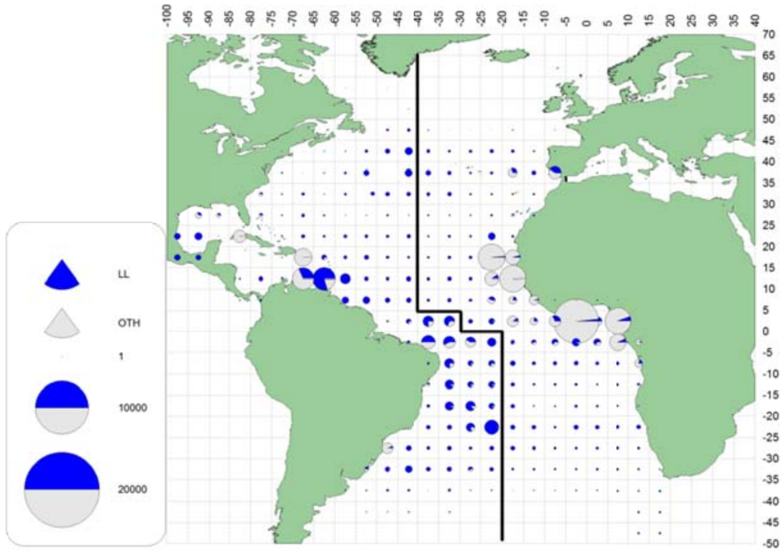
c. SAI (1970-79)



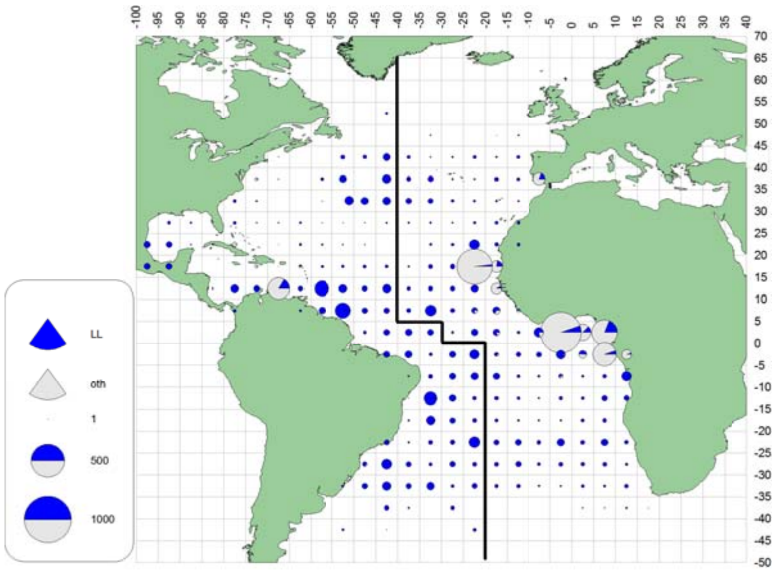
d. SAI (1980-89)



e. SAI (1990-99)

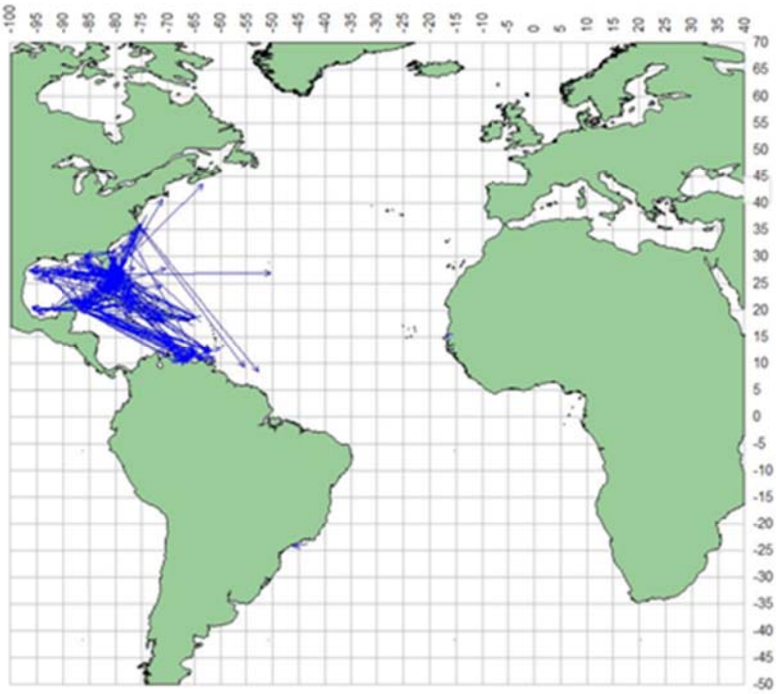


f. SAI (2000-09)

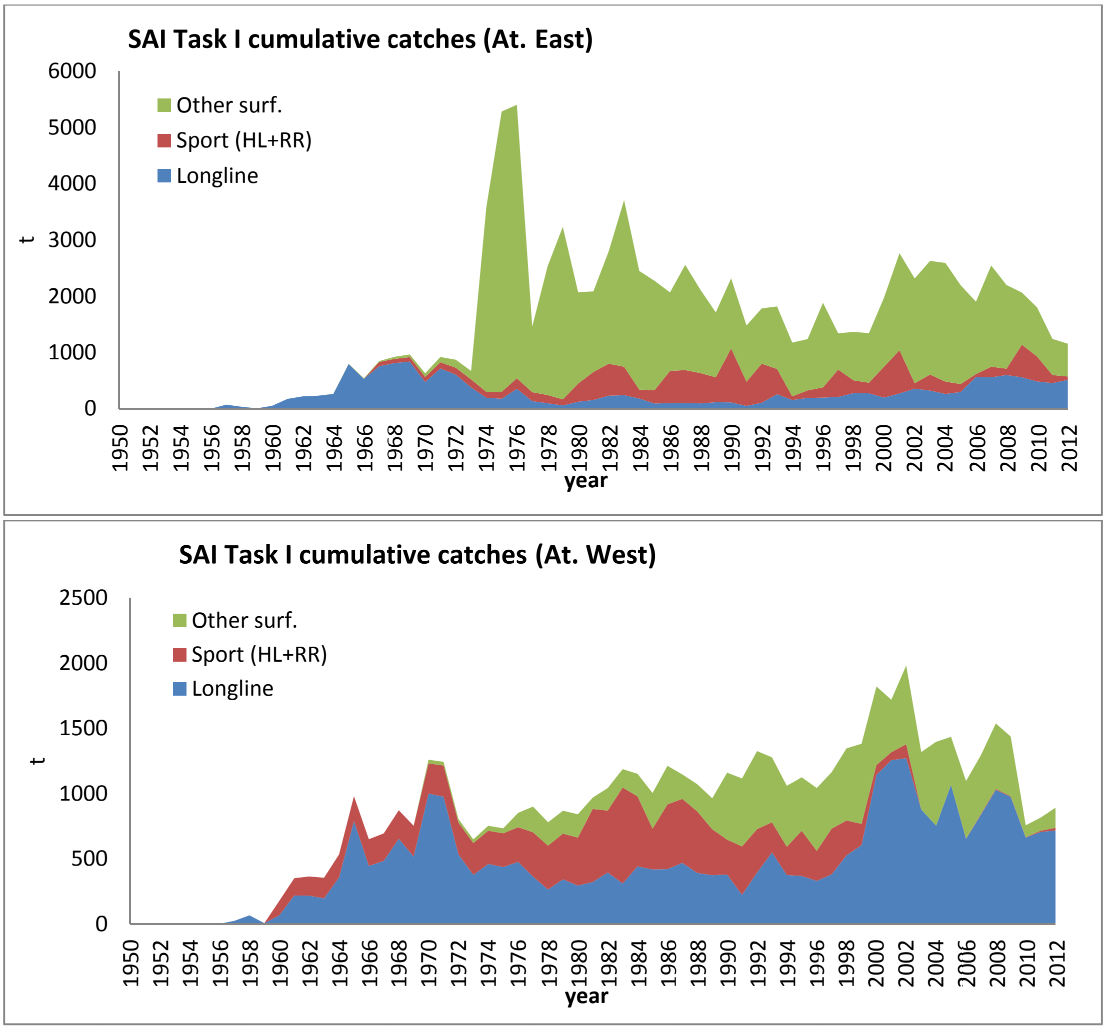


g. SAI (2010-11)

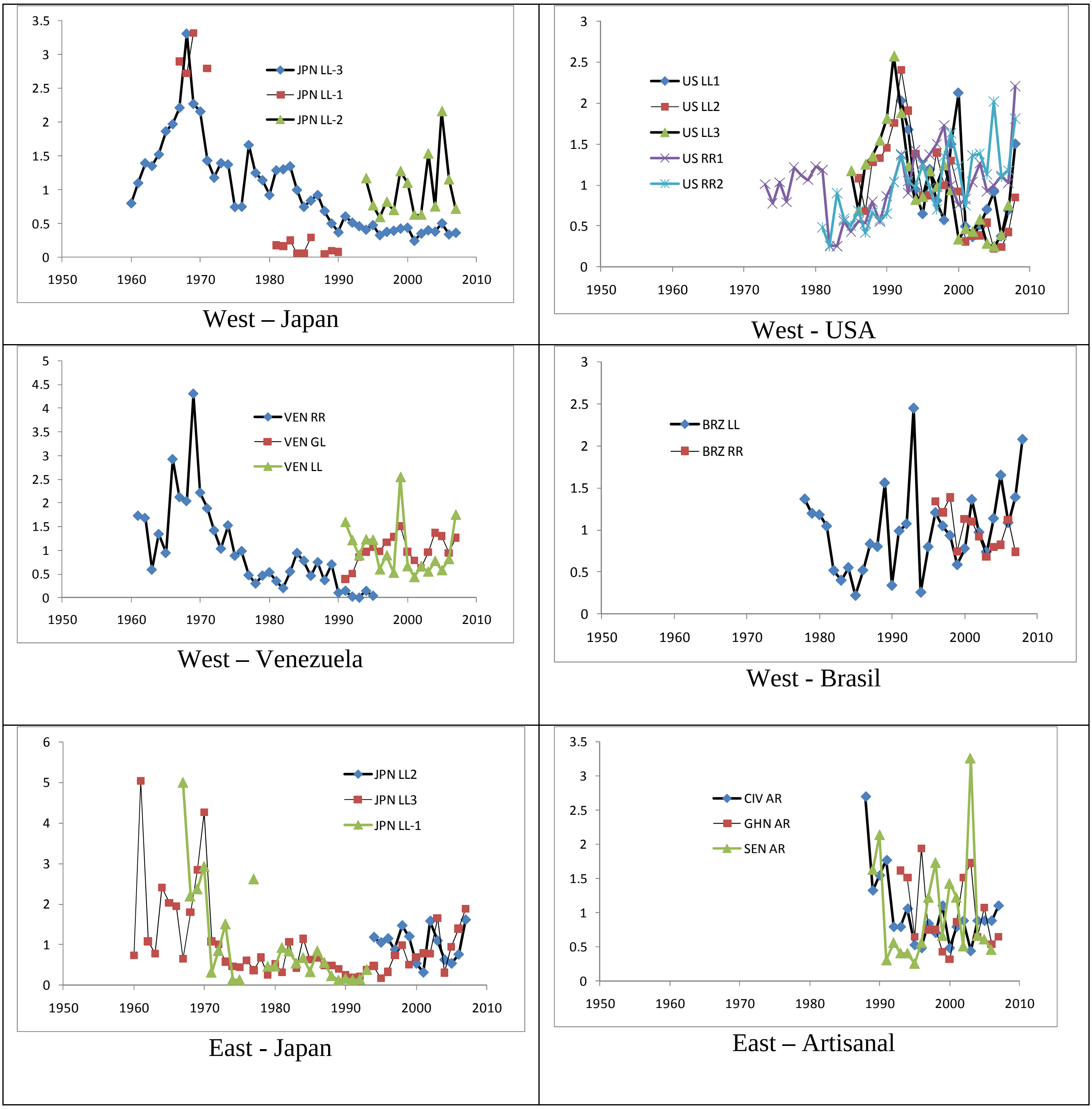
SAI-Figure 1. Geographic distribution of mean catches of sailfish by major gears and by decade. The dark line denotes the separation between stocks.



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.

8.9 SWO-ATL-ATLANTIC SWORDFISH

The status of the North and South Atlantic swordfish stocks was assessed in September 2013, by means of applying statistical modelling to the available data up to 2011. Complete information on the assessment can be found in the Report of the 2013 ICCAT Swordfish Stock Assessment Meeting (SCRS/2013/019). Other information relevant to Atlantic swordfish is presented in the Report of the Sub-Committee on Statistics, included as **Appendix 7** to this SCRS Report, and recommendations pertinent to Atlantic swordfish are presented in Item 17.

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. 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.

New length-weight relationships were proposed for both the North and South Atlantic, but these will be considered interim solutions until further analysis is conducted with new and more recent data.

The Committee reviewed document SCRS/2013/151 which presented the horizontal tracking of 21 swordfish tagged with pop-up satellite tags in the central and eastern North Atlantic. The analysis of the horizontal movements evidenced seasonal patterns with fish generally moving south by winter and returning to the temperate foraging grounds in spring. Broader areas of mixing between some eastern and western areas were also suggested. These new results obtained by pop-up satellite tags fully confirm the previous knowledge that was available from fishery data: deep longline catch swordfish during the day time as a by-catch, while shallow longliners target swordfish at night in very shallow waters.

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** shows total estimated catches for North and South Atlantic swordfish. 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.

The Committee reviewed document SCRS/2013/161 that demonstrated a significant relation between temperate fishery CPUE residuals and the size of the Atlantic Warm Pool (AWP), which was shown to be highly correlated with the Atlantic Multidecadal Oscillation (AMO). This supported the information provided in Sunby *et al.* (2013), that described the occurrence of swordfish (1.5 to 2.65 m) off the Norwegian coast (58 to 70ºN latitude) from 1967 to 2011. The effect of AWP was thought to be responsible for conflicting signals in the CPUEs from the northern temperate and tropical regions. Further analysis and hypothesis testing was recommended to determine if this relationship was due to a swordfish temperature preference, a change in prey distribution, or perhaps both.

For both the North and South Atlantic many of the indices of abundance were affected by changes in gear technology and management that could not be accounted for in the CPUE standardization, and therefore had to be split. Splitting the indices reduces the abundance signal and, to the degree possible continuity of the indices can be maintained, it will increase the reliability of the assessment results.

Total Atlantic

The total Atlantic estimated catch (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2012 (24,152 t) is close to the reported catch in 2011 (23,914 t). As a small number of countries have not yet reported their 2012 catches and because of unknown unreported catches, this value should be considered provisional and subject to further revision.

The trends in mean fish weight taken in the North and South Atlantic fisheries is shown in **SWO-ATL-Figure 3**.

North Atlantic

For the past decade, the North Atlantic estimated catch (landings plus dead discards) has averaged about 11,500 t per year (**SWO-ATL-Table 1** and **SWO-ATL-Figure 4**). The catch in 2012 (13,972 t) represents a 31 % 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.

Available catch per unit effort (CPUE) series were evaluated by the Committee and certain indices were identified as suitable for use in assessment models (Japan, Portugal, Morocco, Canada, Spain and USA). Trends in standardized CPUE series by fleets contributing to the production model are shown in **SWO-ATL-Figure 5**. 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 combined index is shown in **SWO-ATL-Figure 6**, rescaled to the final fishery specific indices.

The most frequently occurring ages in the catch include ages 2 and 3 (**SWO-ATL-Figure 6**).

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 in 1987). 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 2012, the 10,180 t reported catches were about 54 % lower than the 1995 reported level (**SWO-ATL-Figure 4**). The SCRS received reports from Brazil and Uruguay that those CPCs have reduced their fishing effort directed towards swordfish in recent years. Uruguay recently received increased albacore quotas that may allow increased effort for swordfish in the near future.

Six data sets of relative abundance indices (Brazil, Japan, Spain, Uruguay, South Africa and Chinese Taipei) were made available to the Committee. These CPUE indices were standardized using various analytical approaches. The standardized CPUE series presented show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock. The available indices are illustrated in Figure **SWO-ATL-Figure 6**. Two combined indices were produced (**SWO-ATL-Figure 7**), one excluding Brazil and the other excluding both Brazil and Chinese Taipei data series.

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 215 t to 1,139 t per year. Reported annual dead discards (in tonnes) have been declining in recent years.

SWO-ATL-3. State of the stocks

North Atlantic

Two stock assessment platforms were used to provide estimates of stock status for the North Atlantic swordfish stock, non-equilibrium surplus production model (ASPIC) and Bayesian Surplus Production Model (BSP2).

Results from the North Atlantic base case ASPIC model are shown in **SWO-ATL-Figure 8**. The estimated relative biomass trend shows a consistent increase since 1997. The bias corrected deterministic outcome indicates that the stock is at or above B_{MSY} (**SWO-ATL-Figure 9**). The relative trend in fishing mortality shows that the level of fishing peaks in 1995, followed by a decrease until 2001, followed by small increase in the 2002-2005 period and downward trend since then (**SWO-ATL-Figure 8)**. Fishing mortality has been below F_{MSY} since 2000. The estimate of stock status in 2011 is relatively similar to the estimated status in the 2009 assessment, and suggests that there is greater than 90% probability that the stock is at or above B_{MSY}. However, it is important to note that for the first time since 2002 the reported catches in 2012 (13,972 t) exceeded the TAC of 13,700 t. The most recent estimate of stock productivity is very consistent with previous estimates. The absolute biomass trajectory showed a consistent upturn from the estimated 1997 value, and the biomass values for the most recent years are near the level estimated in the mid-1980s (**SWO-ATL-Figure 10**). The high value in 1963 is not well fit as in prior evaluations. Trends in both fishing mortality and biomass are consistent with those produced by the BSP2 model, with the latter model estimating larger stock biomass and lower fishing mortality across the entire time series (**SWO-ATL-Figure 10**). Estimates of stock status from the BSP2 model are consistent with ASPIC results (**SWO-ATL-Figure 11**).

The stock is considered rebuilt, consistent with the 2009 evaluation. Compared with the 2009 ASPIC base case model, the trajectory of biomass and F ratios are similar until the late 1990s, thereafter the current model predicted slightly lower fishing mortality rates and higher relative biomass, but certainly within the estimated 80% confidence bounds (**SWO-ATL-Figure 12**).

South Atlantic

In 2009, evaluation of the status of the South Atlantic swordfish stock was assessed using a ‘Catch only’ model. During the 2013 stock assessment two platforms were used to provide stock status advice for the South Atlantic swordfish stock (i.e. ASPIC and BSP2).

The results of both models indicated that there was a conflicting signal for several of the indices used and substantial conflict between the landings history and the indices. Consequently the Committee had low confidence in the estimation of the absolute productivity level of the stock or on MSY-related benchmarks. Both models had similar difficulties estimating these quantities but both offered useful status advice. Consequently each platform provided a reference model on which the stock status was based.

Both models had similar trajectories of fishing mortality and biomass (**SWO-ATL-Figure 13 and 14**) but differed in their absolute levels and their status relative to benchmarks (**SWO-ATL-Figure 15**). Hence the two models differ in their view of current stock status, with ASPIC estimating the stock to be overfished (B_{2011}/B_{MSY} =0.98) but not undergoing overfishing (F_{2011}/F_{MSY} =0.84), and BSP, neither overfished (B_{2011}/B_{MSY} =1.38), nor overfishing (F_{2011}/F_{MSY} =0.47). Though, it should be noted that there is considerable uncertainty around any of these point estimates.

The groups choose to base stock status determination on a combination of model output and ancillary information, of which two pieces of information are informative. First, total removals (1950-2011) for the South Atlantic stock have been only 73% of the total removals for the North Atlantic stock for the same time period. Second the mean weight for the South (**SWO-ATL-Figure 16**) is larger than for the North. Assuming similar production dynamics, both indicators would suggest a lower exploitation rate for the South stock than for the North. Hence, while the Committee does not believe it can estimate the absolute productivity of the stock without improved scientific information, the Committee believes that the stock is not overfished.

SWO-ATL-4. Outlook

North Atlantic

Based on the currently available information to the Committee, the ASPIC base model was projected to the year 2021 under constant TAC scenarios of 8 to 20 thousand tones. Projections used reported catch as of September 5, 2013 for 2012. For those CPCs whose reported catch was not yet available, their catch was assumed to be the average of the last three years (2009-2011), giving a total catch of 14,038 t. Median trajectories for biomass and fishing mortality rate for all of the future TAC scenarios are plotted in **SWO-ATL-Figure 17**. Results from the 2013 assessment indicated that there is greater than 90% probability that the northern swordfish stock has rebuilt to or above B_{MSY} (**SWO-ATL-Figure 9**), therefore the Commission's rebuilding plan goal has been achieved.

Future TACs above 15,000 t are projected to result in 50% or lower probabilities of the stock biomass remaining above B_{MSY} over the next decade (**SWO-ATL-Table 2**) as the resulting probability of F exceeding F_{MSY} for these scenarios would trend above 50% within four years. A TAC of 13,700 t would have an 83% probability of maintaining the stock and fishing mortality at a level consistent with the Convention objective over the next decade. Projections with BSP also used similar specifications for 2012 and 2013 yields and projected over the same time frame. Both models provide very consistent advice that TAC levels of 13,700 t would maintain the stock at a level consistent with the Convention Objectives over the next decade.

South Atlantic

The Committee considered that the ASPIC and BSP estimated benchmarks were unreliable due to the conflicting signal between the catch data and the CPUE time series available to the Committee. Hence, it is unknown whether it is possible to obtain substantially higher yields from the stock as BSP suggests or whether the stock is fully exploited as suggested by ASPIC. Until improved scientific information is available in the form of more consistent indices, tagging studies to estimate fishing mortality or abundance or other improved information, this uncertainty may remain.

SWO-ATL-5. Effect 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). Rec. 09-02 came into effect in 2010 and extended most of the provisions of Rec. 06-02 for one year only. Rec. 10-02 came into effect in 2011, and again extended those provisions for one year only, but with a slight reduction in total allowable catch (TAC).

For the South Atlantic, the most recent recommendation can be found in Rec. 09-03, which establishes a three year management plan for that stock.

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 11,969 t and did not exceed the TAC in any year. In 2010, the TAC was reduced to 13,700 t, compared with 2012 catches of 13,972 t. Reports for 2012 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 13,482 t, and did not exceed the TAC in any year. In 2010, the TAC was reduced to 15,000 t, compared with 2012 catch of 10,180 t. Reports for 2012 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 some of the Atlantic fleets. The Committee expressed its serious concern over this limitation on data for future assessments.

SWO-ATL-6. Management recommendations

North Atlantic

For continuity of advice relative to previous assessments, ASPIC results are provided in **SWO-ATL-Table 2**, which shows the ranges of total catch limits and associated probabilities associated with stock status by year. The current TAC of 13,700 t has an 83% probability of maintaining the North Atlantic swordfish stock in a rebuilt condition by 2021 almost maintaining the level of biomass. This TAC would be in accordance with [Rec. 11-13], adopted by the Commission that indicates that 'For stocks that are not overfished and not subject to overfishing (i.e., stocks in the green quadrant of the Kobe plot), management measures shall be designed to result in a high probability of maintaining the stock within this quadrant'. However, the Committee acknowledges that without better direction from the Commission with regard to what constitutes a 'high probability', it cannot provide more specific advice. TACs up to 14,300 t would still have a higher than 50% probability of maintaining the stock in a rebuilt condition by 2021 but would be expected to lead to greater biomass declines.

South Atlantic

Considering the unquantified uncertainties and the lack of signal in the data for the southern Atlantic swordfish stock, and until sufficiently more research has been conducted to reduce the high uncertainty in stock status, the Committee did not have sufficient confidence in the assessment results to change the previous recommendation to limit catches to no more than 15,000 t.

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	***South Atlantic***
Maximum Sustainable Yield[1]	13,660 t (13,250-14,080)[3]	Unknown
Current (2012) TAC	13,700 t	15,000 t
Current (2012) Yield[2]	13,972 t	10,180 t
Yield in last year used in assessment (2011)	12,834 t[4]	11,055 t[4]
B_{MSY}	65,060 (54,450-76,700)	Unknown
F_{MSY}	0.21 (0.17-0.26)	Unknown
Relative Biomass (B_{2011}/B_{MSY})	1.14 (1.05-1.24)	Unknown, but likely above 1[5]
Relative Fishing Mortality (F_{2011}/F_{MSY}[1])	0.82 (0.73-0.91)	Unknown, but likely below 1[5]
Stock Status	Overfished: NO Overfishing: NO	Overfished: NO[5] Overfishing: NO
Management Measures in Effect:	Country-specific TACs [Rec. 11-02]; 125/119cm LJFL minimum size	Country-specific TACs [Rec. 12-01]; 125/119cm LJFL minimum size

[1] Base Case production model (Logistic) results based on catch data 1950-2011.
[2] Provisional and subject to revision.
[3] Point estimate, 80% bias corrected confidence intervals are shown.
[4] As of 5 September 2013.
[5] This determination is based on the models and the ancillary information (e.g. catch trends, mean weight trends).

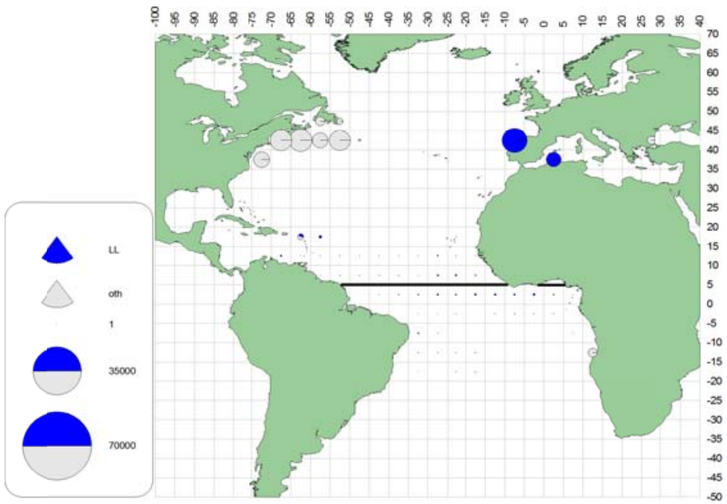
SWO-ATL-Table 1. Estimated catches (t) of Atlantic swordfish (*Xiphias gladius*) by gear and flag.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			32685	34305	32976	28826	29207	32868	34459	38803	33511	31567	26251	27123	27180	25139	23758	24075	25252	25643	25718	27932	23596	24761	24209	23914	24152
	ATN		19513	17250	15672	14934	15394	16738	15501	16872	15222	13025	12223	11622	11453	10011	9654	11442	12175	12480	11473	12302	11050	12081	11553	12523	13972
	ATS		13172	17055	17304	13893	13813	16130	18958	21930	18289	18542	14027	15502	15728	15128	14104	12633	13077	13162	14245	15630	12546	12679	12655	11391	10180
Landings	ATN	Longline	18927	15348	14026	14208	14288	15641	14315	15764	13808	12181	10939	10666	9837	8676	8799	10333	11406	11527	10840	11475	10341	11439	10964	11610	13037
		Other surf.	586	1902	1646	511	723	689	478	582	826	393	800	426	478	433	240	487	449	620	409	546	465	485	437	511	562
	ATS	Longline	12404	16398	16705	13287	13176	15547	17387	20806	17799	18239	13748	14823	15448	14302	13576	11712	12485	12915	13723	14967	11761	12106	11920	10833	9943
		Other surf.	768	657	599	606	637	583	1571	1124	489	282	269	672	278	825	527	920	591	248	522	572	779	574	587	488	214
Discards	ATN	Longline	0	0	0	215	383	408	708	526	562	439	476	525	1137	896	607	618	313	323	215	273	235	151	148	392	362
		Other surf.	0	0	0	0	0	0	0	0	26	12	9	4	1	6	8	5	7	10	8	8	9	7	5	9	10
	ATS	Longline	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	91	6	0	147	70	23
		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	33	16	16	12	13	19	10	21	25	44	39	27	39	20	13	23	21
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	112	106	184	141
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0	0	0	
		Canada	898	1247	911	1026	1547	2234	1676	1610	739	1089	1115	1119	968	1079	959	1285	1203	1558	1404	1348	1334	1300	1346	1551	1489
		China P.R.	0	0	0	0	0	73	86	104	132	40	337	304	22	102	90	316	56	108	72	85	92	92	73	75	59
		Chinese Taipei	23	17	270	577	441	127	507	489	521	509	286	285	347	299	310	257	30	140	172	103	82	89	88	192	166
		Cuba	832	87	47	23	27	16	50	86	7	7	7	7	0	0	10	3	3	2	2	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	25	30	0	7
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	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	**0**
		EU.España	9799	6648	6386	6633	6672	6598	6185	6953	5547	5140	4079	3996	4595	3968	3957	4586	5376	5521	5448	5564	4366	4949	4147	4889	5622
		EU.France	0	0	75	75	75	95	46	84	97	164	110	104	122	0	74	169	102	178	92	46	14	15	35	16	94
		EU.Ireland	0	0	0	0	0	7	0	0	15	15	132	81	35	17	5	12	1	1	3	2	2	1	1	2	5
		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	
		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	617	300	475	773	542	1961	1599	1617	1703	903	773	777	732	735	766	1032	1320	900	949	778	747	898	1054	1203	882
		EU.United Kingdom	0	0	0	0	0	2	3	1	5	11	0	2	1	0	0	0	0	0	0	0	0	2	0	0	0
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	36	48	0	82	48	17	90	1	**0**
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	0	
		Grenada	56	5	1	2	3	13	0	1	4	15	15	42	84	0	54	88	73	56	30	26	43	0	0	0	
		Iceland	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	621	1572	1051	992	1064	1126	933	1043	1494	1218	1391	1089	161	0	0	0	575	705	656	889	935	778	1062	523	715
		Korea Rep.	30	320	51	3	3	19	16	16	19	15	0	0	0	0	0	0	0	51	65	175	157	3	0	0	0
		Liberia	19	35	3	0	7	14	26	28	28	28	28	28	0	0	0	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	2	0	0	0	0	0	
		Maroc	196	222	91	110	69	39	36	79	462	267	191	119	114	523	223	329	335	334	341	237	430	724	963	782	770
		Mexico	0	0	0	0	0	6	14	0	22	14	28	24	37	27	34	32	44	41	31	35	34	32	35	38	40
		NEI (ETRO)	76	112	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	131	190	185	43	35	111	0	0	0	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	**0**
		Panama	0	0	0	0	0	0	0	0	0	0	0	17	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	4	44	5	0	8	0	22	28	0	17	36
		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	1	0	0	0	0	0	0	
		Senegal	0	1	0	6	6	0	0	0	0	0	0	0	0	0	0	0	108	108	0	38	0	28	11	1	44
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	3	0	3	23	0	4	3	1	0	1	0	22	22	7	7	7	0	51	7	34	13	11	16
		Sta. Lucia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0	2	0	0	0	
		Trinidad and Tobago	42	79	66	71	562	11	180	150	158	110	130	138	41	75	92	78	83	91	19	29	48	30	21	16	14
		U.S.A.	6171	6411	5519	4310	3852	3783	3366	4026	3559	2987	3058	2908	2863	2217	2384	2513	2380	2160	1873	2463	2387	2730	2274	2551	3435

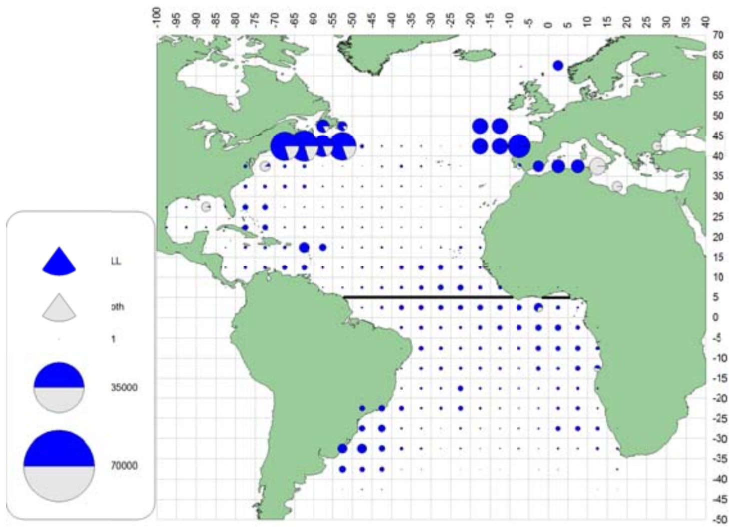
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	0	0	0	0	0	0	0	1	1	5	5	3	3	2	0	0	1	1	0	3	4	3	3	3	1
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	7	0	3	0	0	4	**0**
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	29	14	0	0	0	10	23	15
		Venezuela	2	4	9	75	103	73	69	54	85	20	37	30	44	21	34	45	53	55	22	30	11	13	24	18	25
	ATS	Angola	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	
		Argentina	198	175	230	88	88	14	24	0	0	0	0	38	0	5	10	8	0	0	0	0	0	0	1	0	
		Belize	0	0	0	0	0	0	0	1	0	0	0	17	8	0	0	0	0	0	0	120	32	111	121	207	197
		Benin	19	26	28	28	26	28	25	24	24	10	0	3	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	1162	1168	1696	1312	2609	2013	1571	1975	1892	4100	3847	4721	4579	4082	2910	2920	2998	3785	4430	4153	3407	3386	2926	3033	2833
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	6	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	29	534	344	200	423	353	278	91	300	473	470	291	296	248	316
		Chinese Taipei	798	610	900	1453	1686	846	2829	2876	2873	2562	1147	1168	1303	1149	1164	1254	745	744	377	671	727	612	410	424	379
		Cuba	159	830	448	209	246	192	452	778	60	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	12	7	8	18	13	14	20	19	26	18	25	26	20	19	19	43	29	31	39	17	159	100	114	145	82
		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	4393	7725	6166	5760	5651	6974	7937	11290	9622	8461	5832	5758	6388	5789	5741	4527	5483	5402	5300	5283	4073	5183	5801	4700	4852
		EU.Lithuania	0	0	0	0	0	0	794	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	1	0	0	380	389	441	384	381	392	393	380	354	345	493	440	428	271	367	232	263	184
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	0	0	3	0	0	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	
		Ghana	235	156	146	73	69	121	51	103	140	44	106	121	117	531	372	734	343	55	32	65	177	132	116	60	54
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Honduras	0	0	0	0	3	0	0	6	4	5	2	8	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	4453	4019	6708	4459	2870	5256	4699	3619	2197	1494	1186	775	790	685	833	924	686	480	1090	2155	1600	1340	1314	1233	862
		Korea Rep.	1012	776	50	147	147	198	164	164	7	18	7	5	10	0	2	24	70	36	94	176	223	10	0	0	42
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	
		NEI (ETRO)	0	856	439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	22	0	0	0	0	730	469	751	504	191	549	832	1118	1038	518	25	417	414	85
		Nigeria	0	0	0	0	3	0	0	0	9	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	29	105	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	6	1	8	1	1	4	58	41	49	14	35	15
		S. Tomé e Príncipe	216	207	181	179	177	202	190	178	166	148	135	129	120	120	120	120	126	147	138	138	183	188	193	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	138	195	180	264	162
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	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	0	0	0	0	0	0	0	0	16	
		South Africa	4	0	0	5	9	4	1	4	1	1	240	143	328	547	649	293	295	199	186	207	142	170	145	97	50
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	7	16	4	3	3
		Togo	0	2	3	5	5	8	14	14	64	0	0	0	0	0	0	0	9	10	2	0	0	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	171	396	160	179	142	43	200	21	15	0	0	0	0	0	0	0	**0**
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	20	4	0	0	0	0	0	0	0	0	0	
		Uruguay	427	414	302	156	210	260	165	499	644	760	889	650	713	789	768	850	1105	843	620	464	370	501	222	179	40
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	26	6	3	0	3	1	3
Discards	ATN	Canada	0	0	0	0	0	0	0	0	0	5	52	35	50	26	33	79	45	106	38	61	39	9	15	8	111
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	598	567	319	263	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	170	46
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
		U.S.A.	0	0	0	215	383	408	708	526	588	446	433	494	490	308	263	282	275	227	185	220	205	148	138	223	216
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	6	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	147	70	23
		U.S.A.	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	0	0	0	0	0	**0**

SWO-ATL-Table 2. Estimated probabilities (%) that both the fishing mortality is below F_{MSY} and spawning stock biomass is above SSB_{MSY} for North Atlantic Swordfish from ASPIC base model.

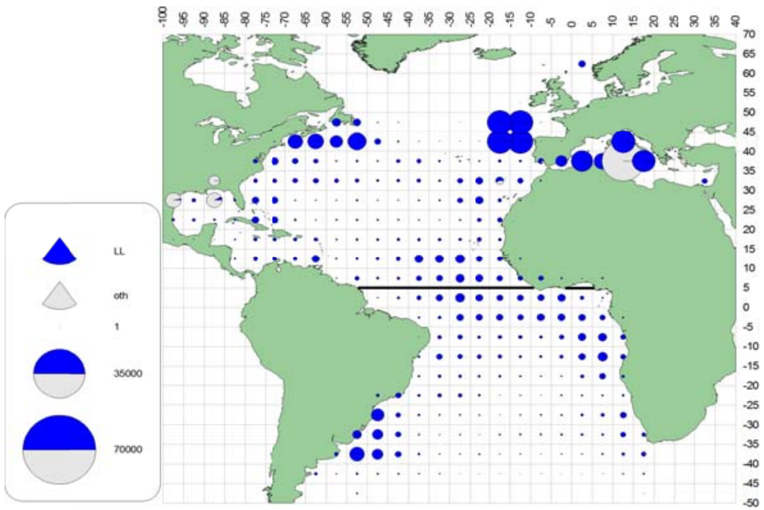
TAC	2014	2015	2016	2017	2018	2019	2020	2021
13000	88	91	92	92	92	92	93	93
13200	88	91	91	92	92	91	91	91
13400	88	90	90	89	89	89	89	89
13600	88	88	88	88	87	87	86	85
13700	88	88	88	87	85	84	84	83
13800	88	87	86	85	83	82	82	81
13900	88	86	84	83	82	80	79	77
14000	88	84	82	80	79	77	75	74
14100	88	82	80	78	76	74	72	69
14200	88	81	79	76	73	71	67	63
14300	88	80	76	73	70	65	61	56
14400	88	78	74	71	65	60	54	47
14600	88	74	69	63	56	47	40	33
14800	88	70	62	51	43	34	29	22
15000	88	64	55	42	32	25	17	13



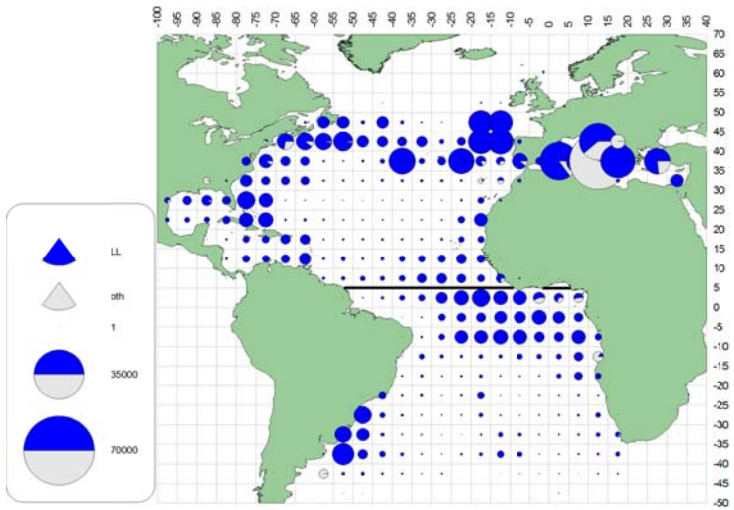
a. SWO (1950-59)



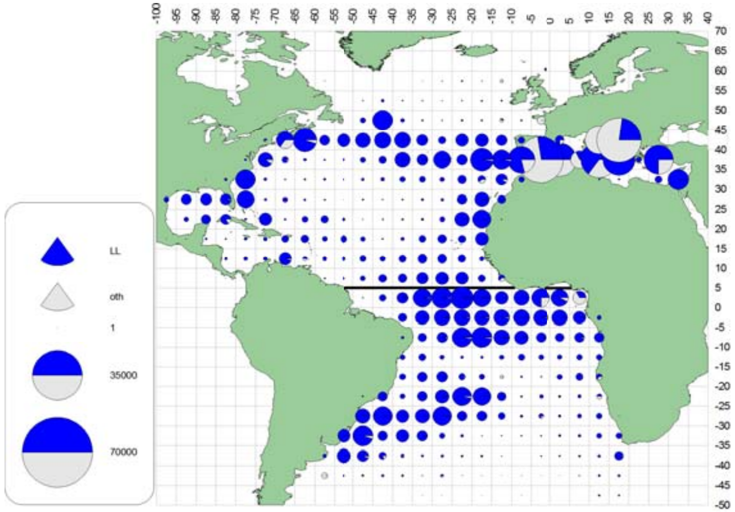
b. SWO (1960-69)



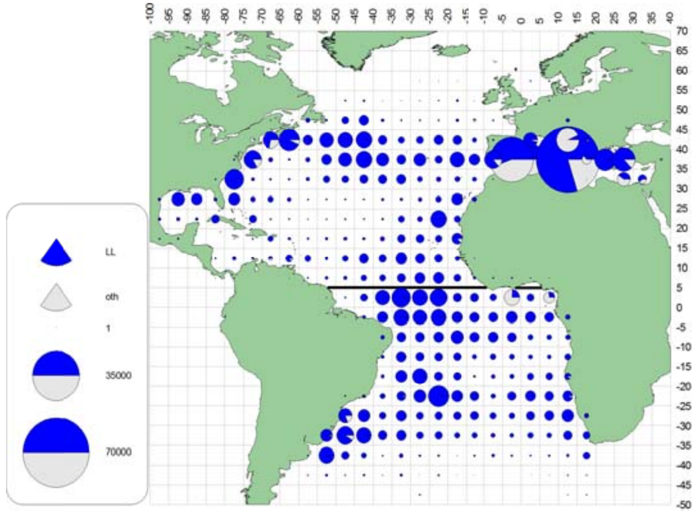
c. SWO (1970-79)



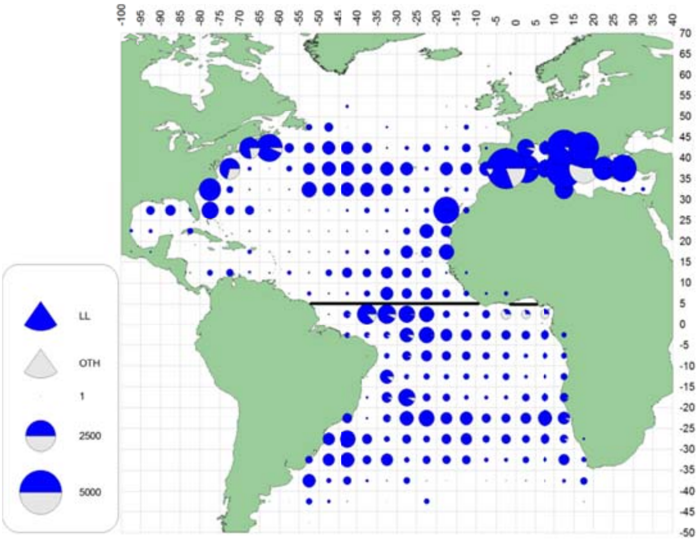
d. SWO (1980-89)



e. SWO (1990-99)

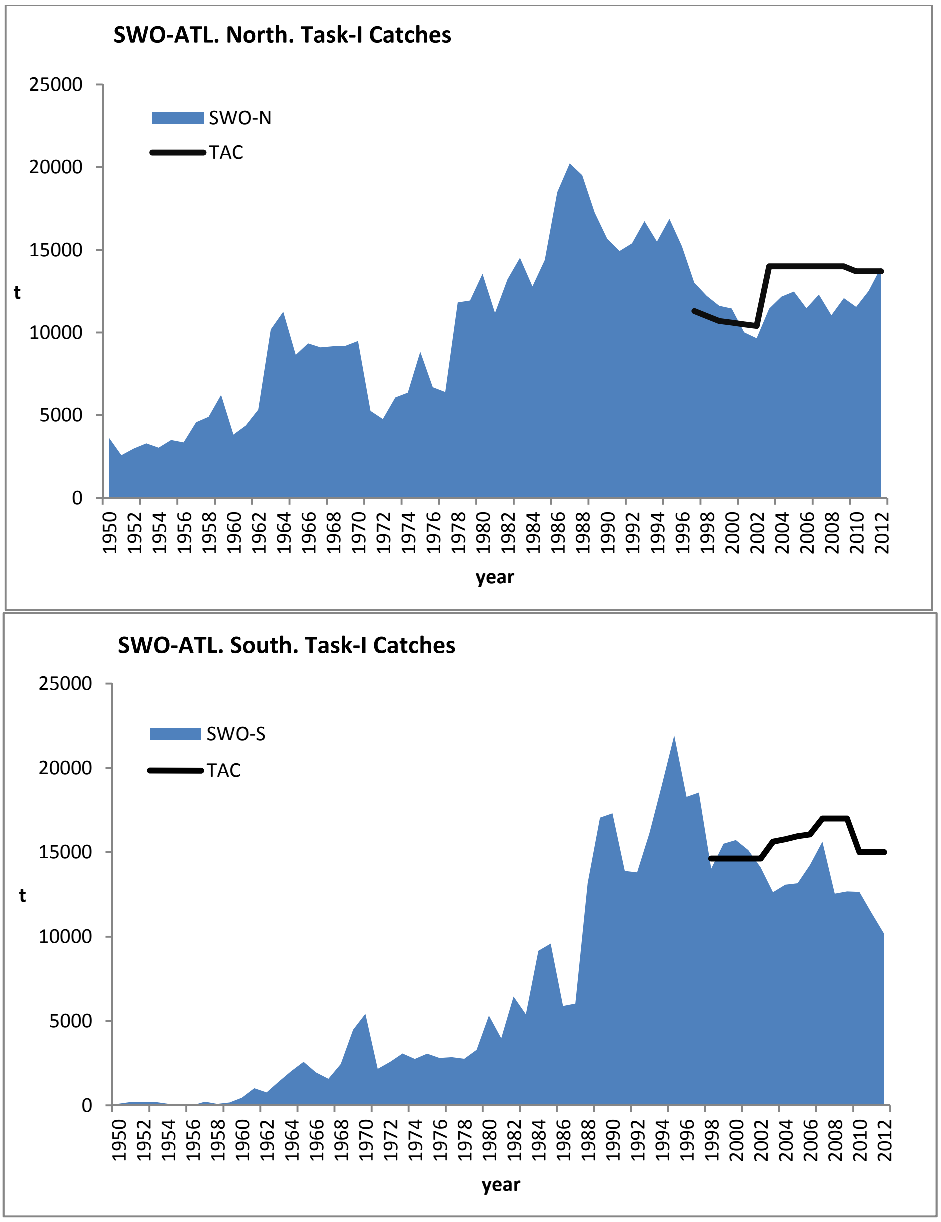


f. SWO (2000-09)

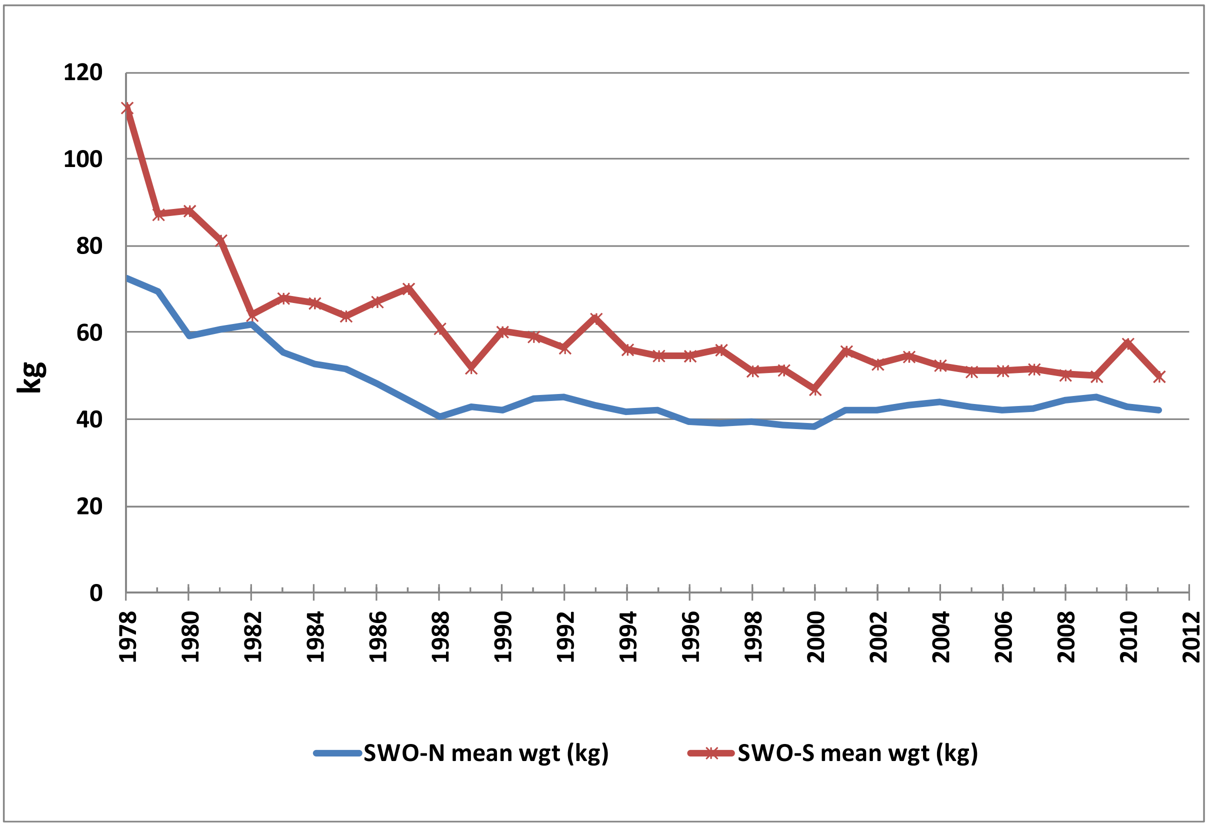


g. SWO (2010-11)

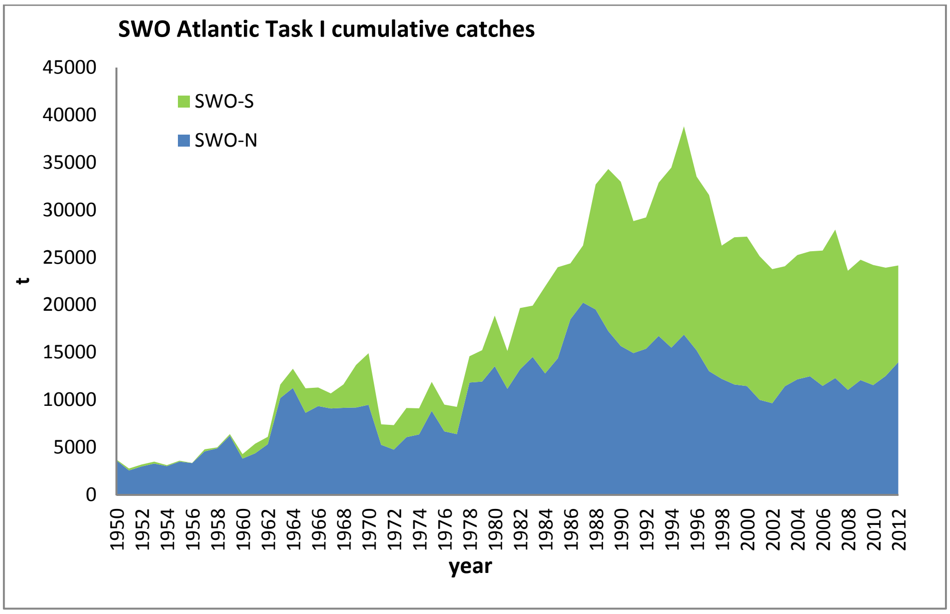
SWO-ATL-Figure 1. Geographic distribution of swordfish cumulative catch (t) by gear, in the Convention area, shown on a decadal scale. The maps (a-f) are scaled to the maximum catch observed during 1950-2009. Map g is scaled to the maximum catch observed from 2010-2011.



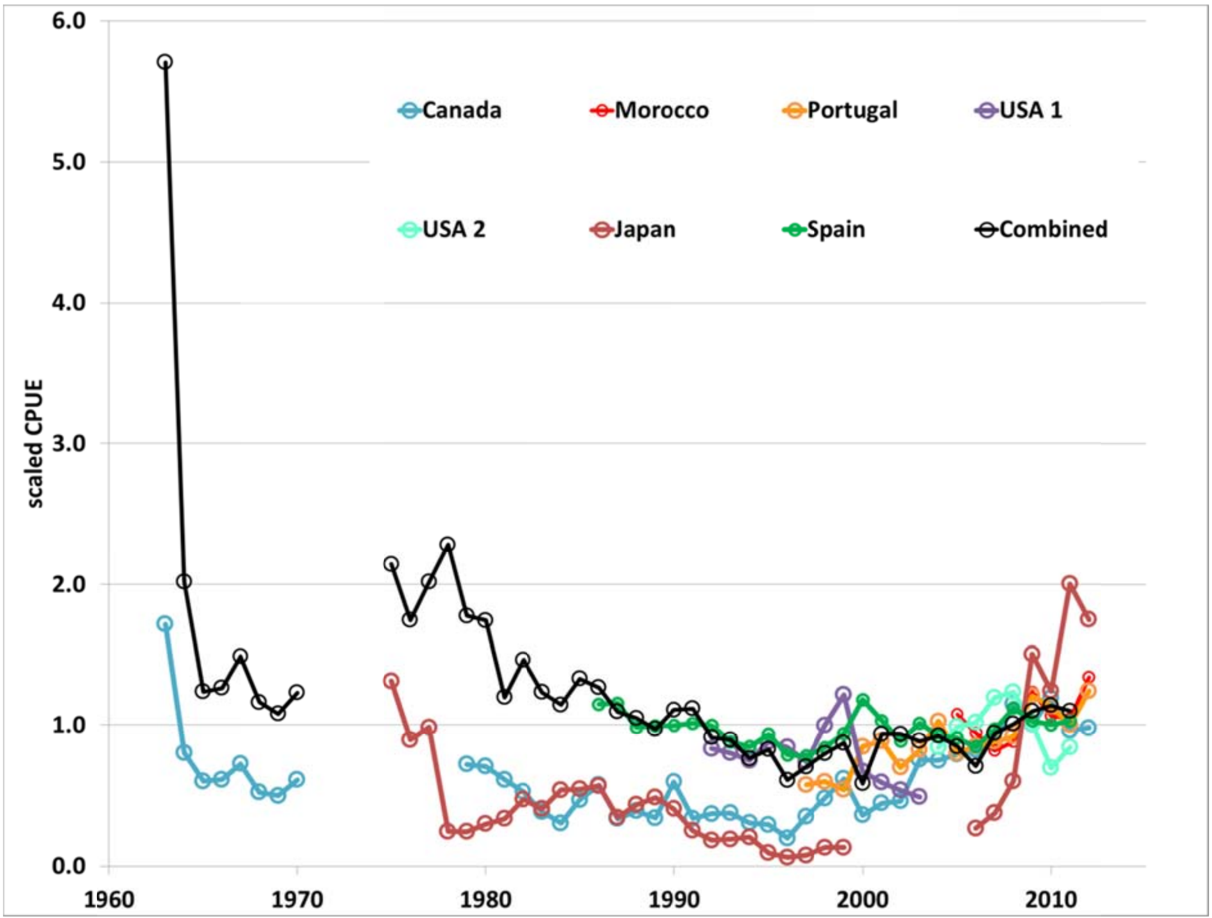
SWO-ATL-Figure 2. North and South Atlantic swordfish catches and TAC (t).



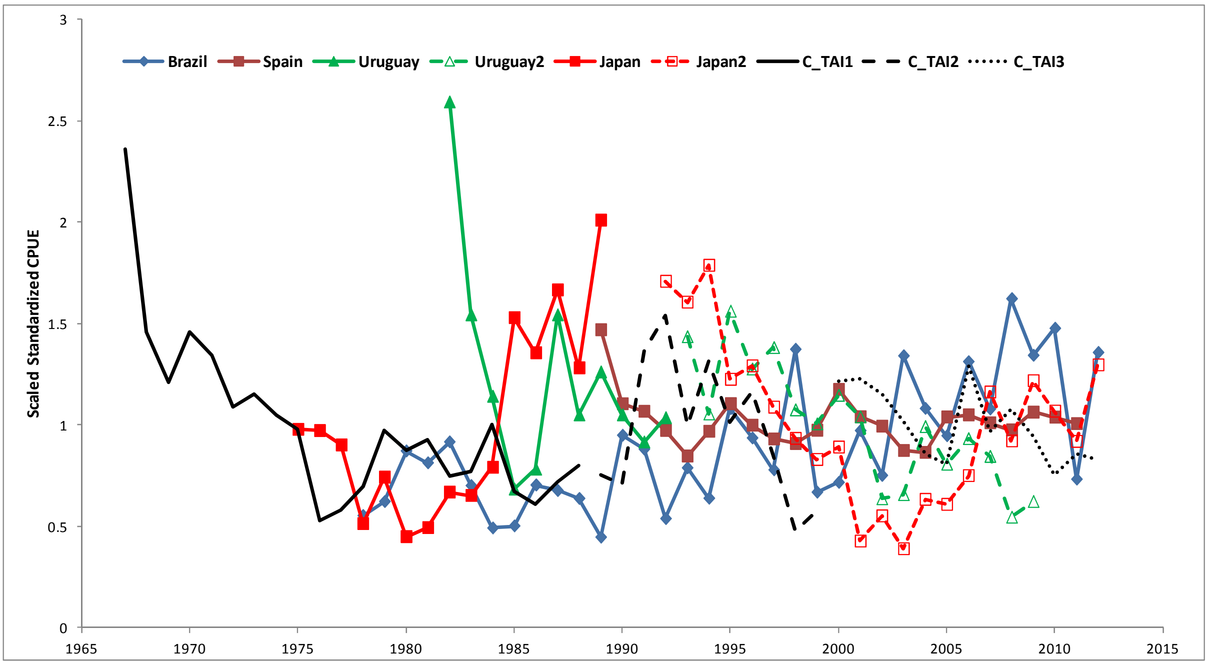
SWO-ATL-Figure 3. Trends in mean weight (kg) for the entire North and South Atlantic swordfish stocks. The information for 2010 is being reviewed and should be considered preliminary.



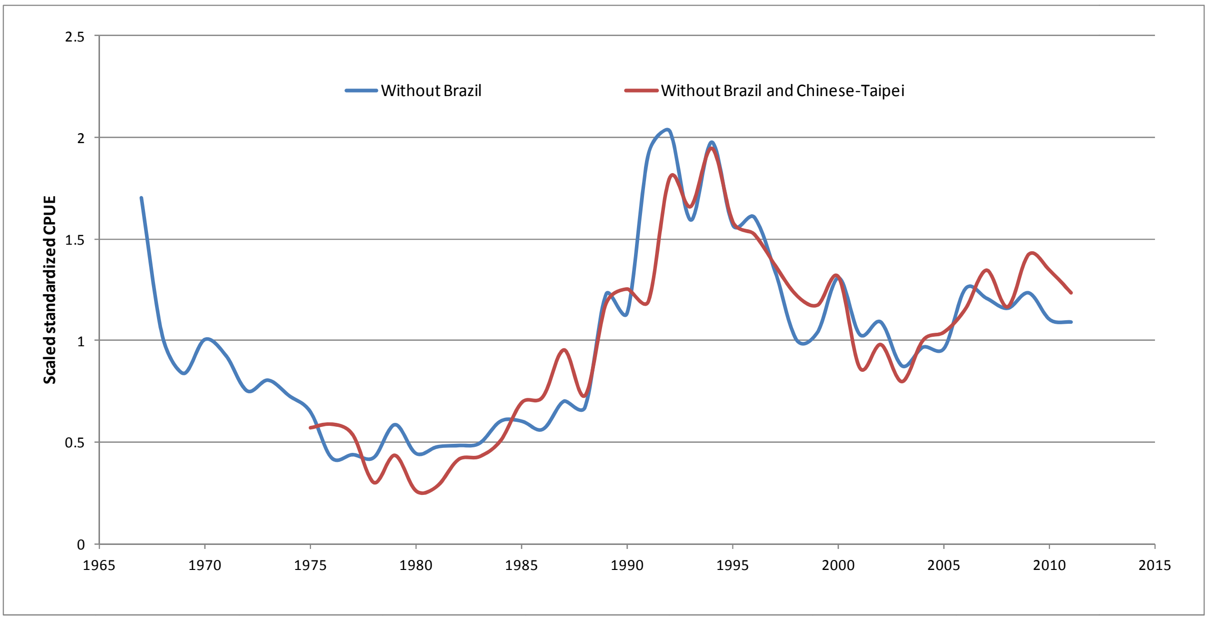
SWO-ATL-Figure 4. Swordfish reported catches (t) for North and South Atlantic, for the period 1950-2012.



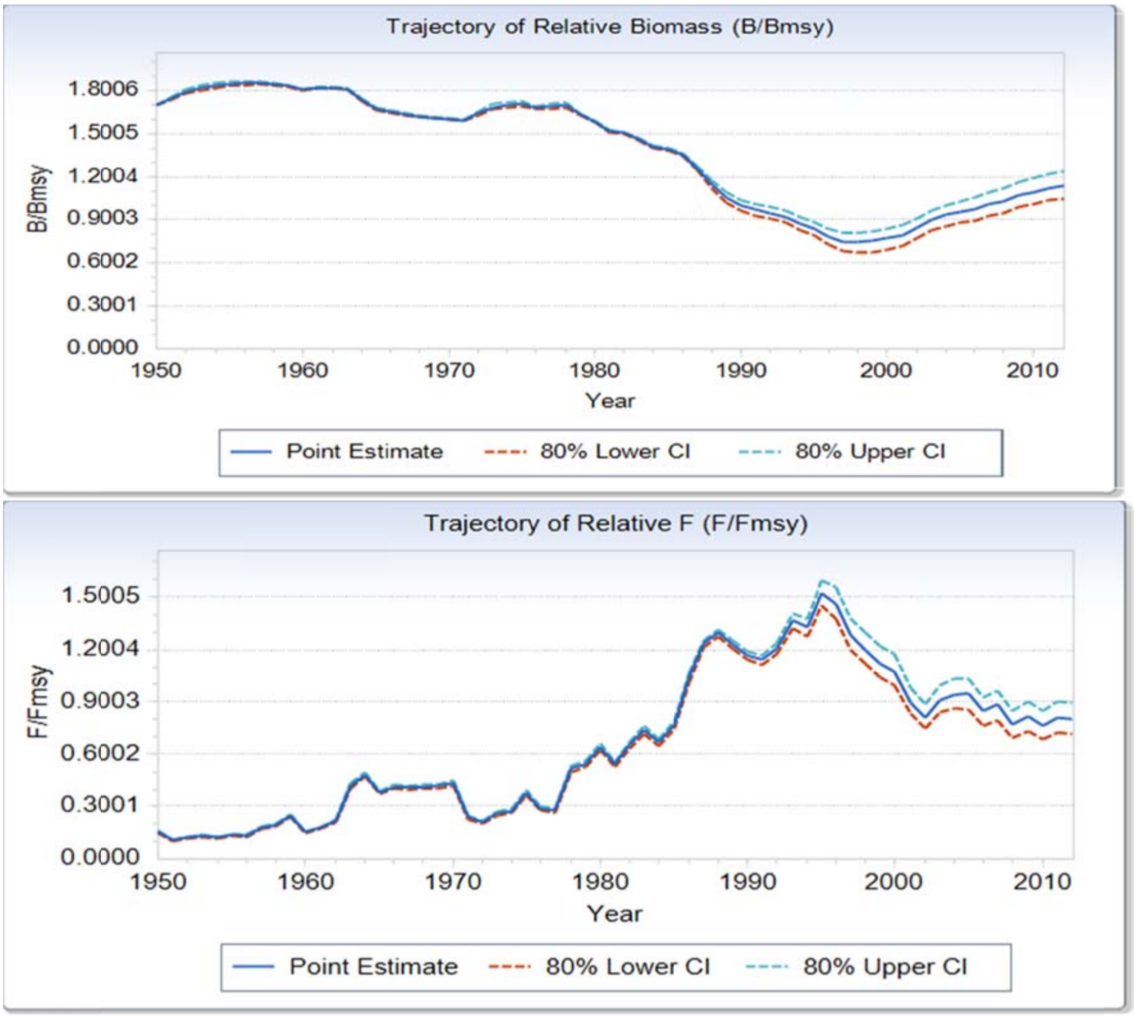
SWO-ATL-Figure 5. Standardized CPUEs series provided by CPCs for the North Atlantic swordfish and the combined index of the base production model. The CPUE series were scaled to their mean for the overlapping years.



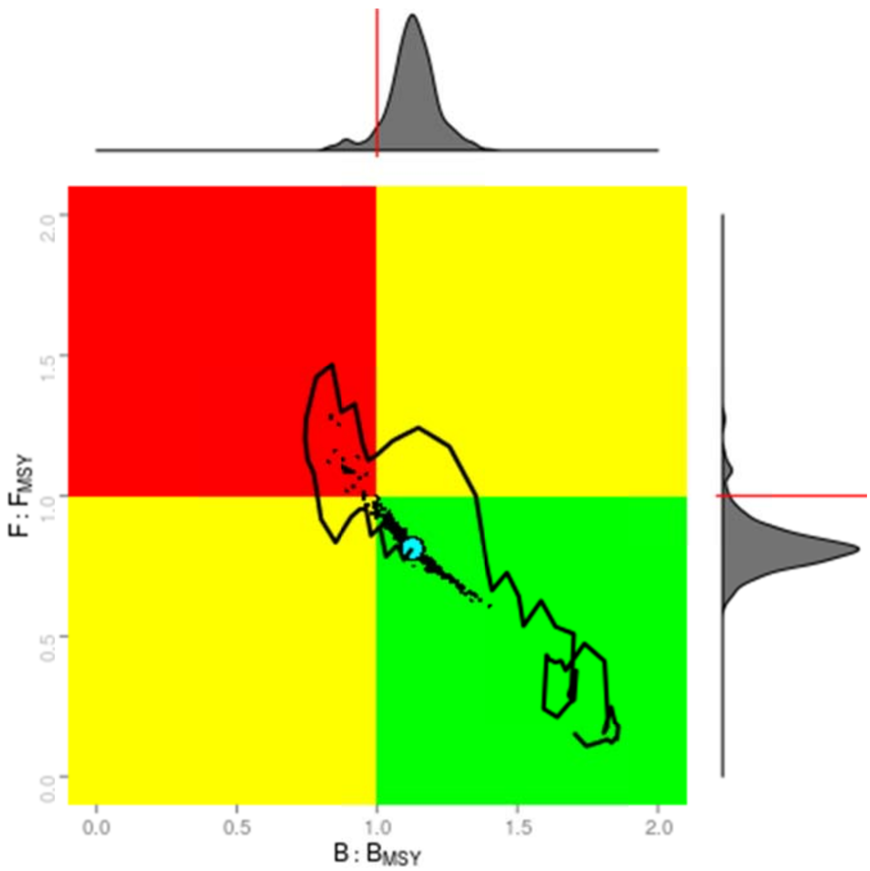
SWO-ATL-Figure 6. Standardized CPUEs series provided by CPCs for the for South Atlantic swordfish, The CPUE series were scaled to their mean for the overlapping years.

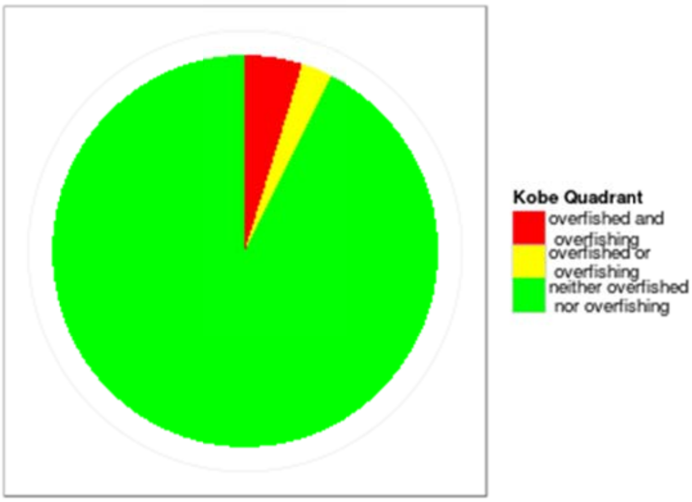


SWO-ATL-Figure 7. South Atlantic swordfish combined standardized CPUE indices.

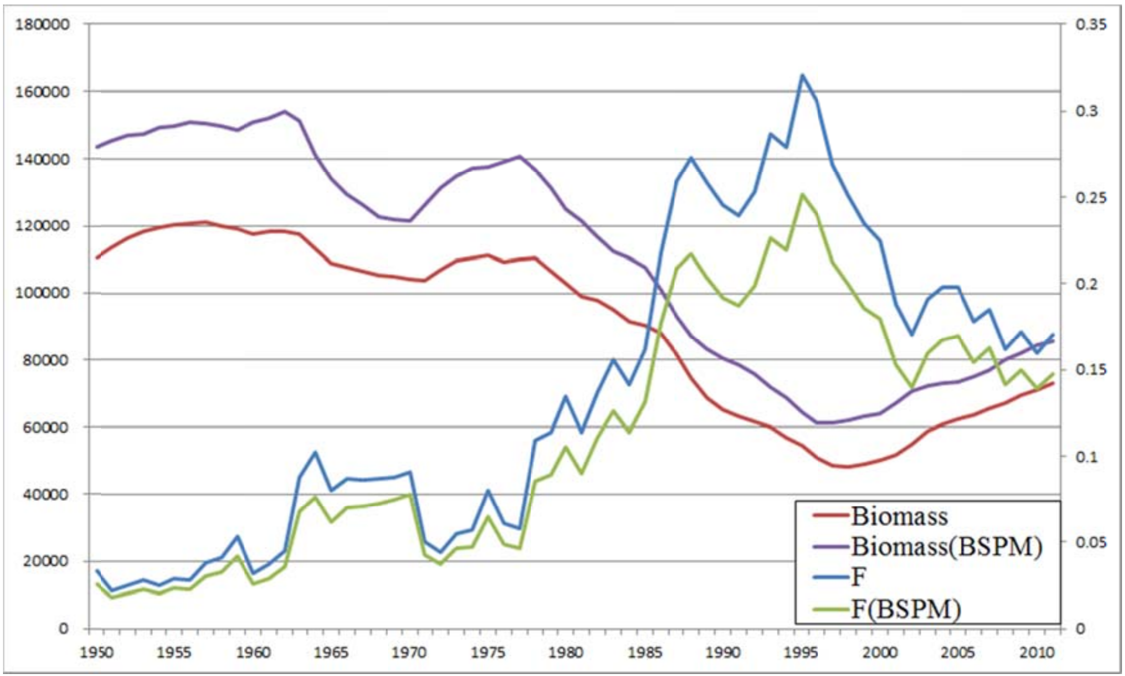


SWO-ATL-Figure 8. Results from the North Atlantic base case ASPIC model: trends in swordfish relative biomass (top) and fishing mortality (bottom) point estimates.

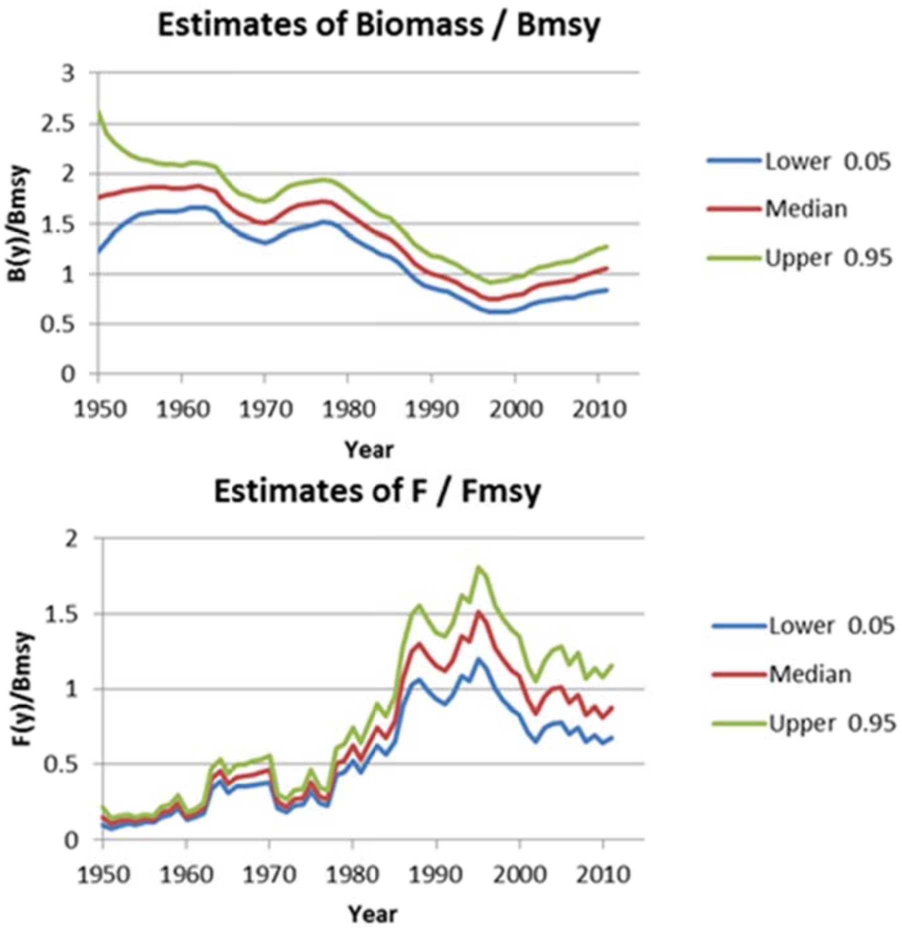




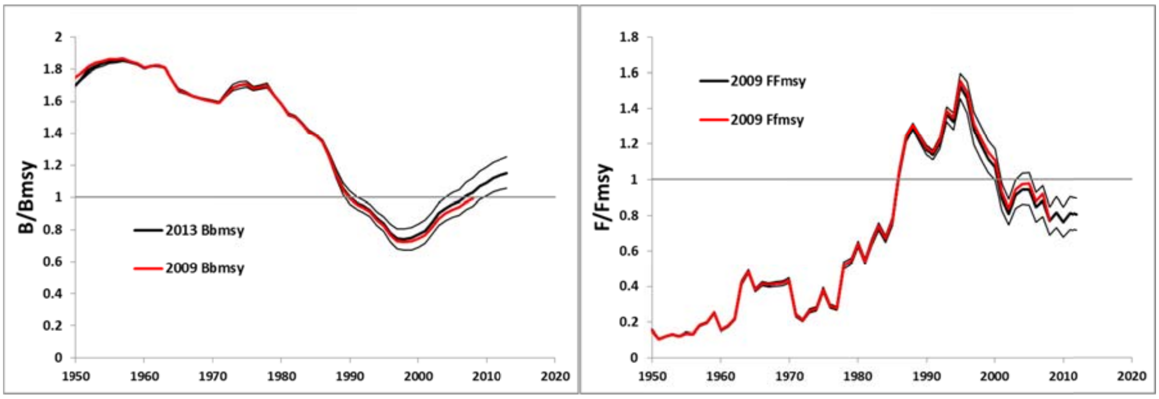
SWO-ATL-Figure 9. North Atlantic swordfish stock status trajectory (solid line) for the period 1950-2011, from the base ASPIC model (solid circle is the estimated median point). The pie chart represents the probabilities of stock being in the different color quadrates.



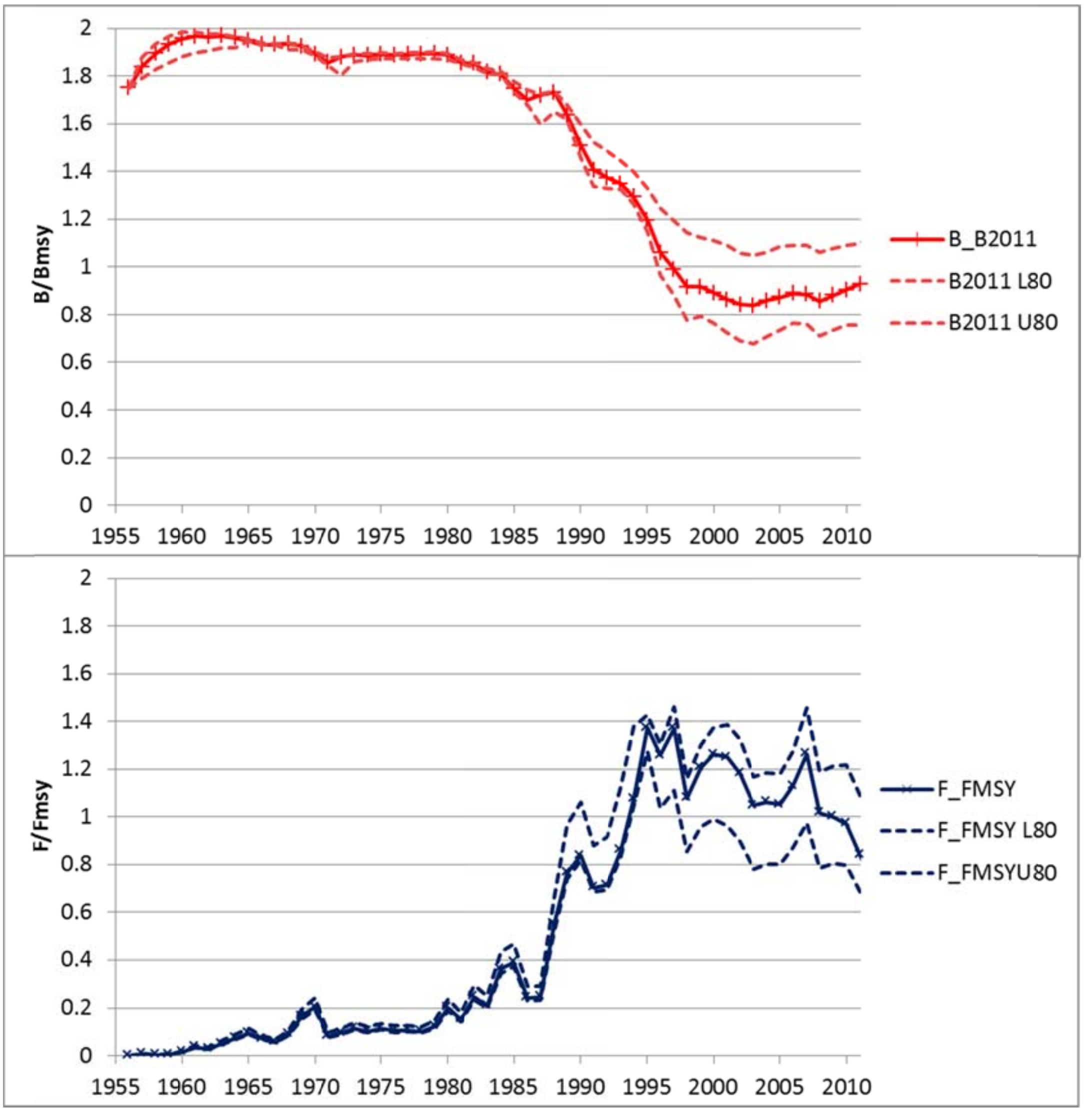
SWO-ATL-Figure 10.Trends in North Atlantic swordfish absolute biomass and fishing mortality estimates from the ASPIC and BSP2 base case models.



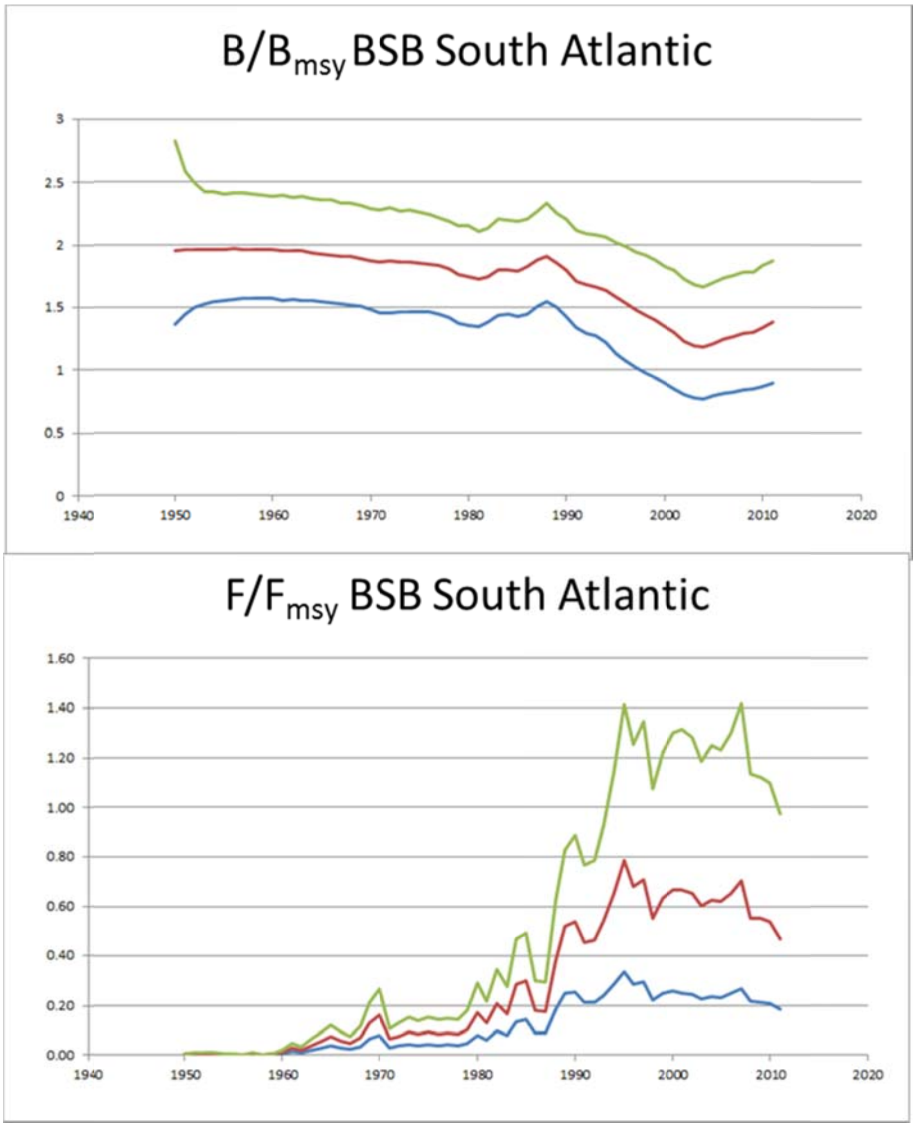
SWO-ATL-Figure 11. Plots of the ratios of i) stock biomass to B_{MSY} and ii) fishing mortality rate to F_{MSY} from the base case BSP for North Atlantic swordfish.



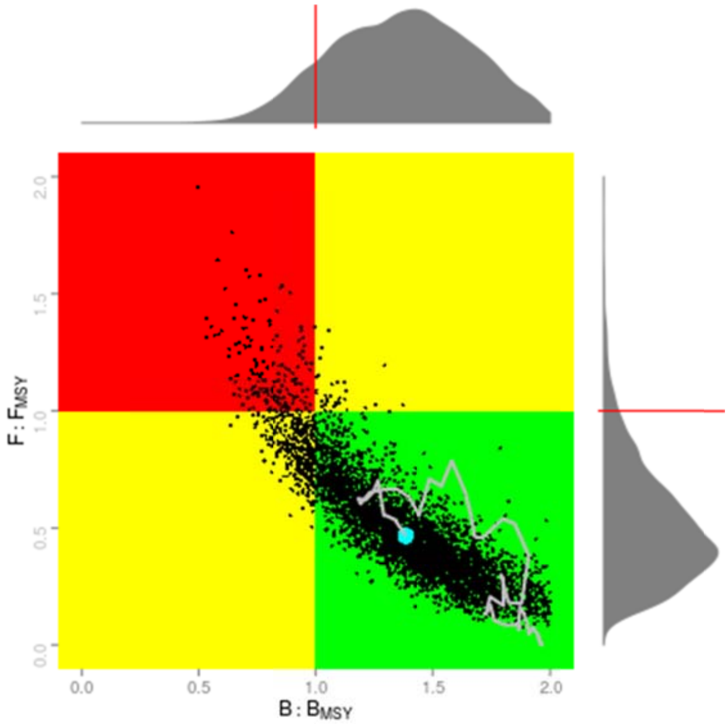
SWO-ATL-Figure 12. Comparison of the relative biomass (left) and fishing mortality (right) estimated by the North Atlantic ASPIC base case models in 2009 and 2013 assessments. Thin lines indicate the 80% confidence bounds for the 2013 estimates.



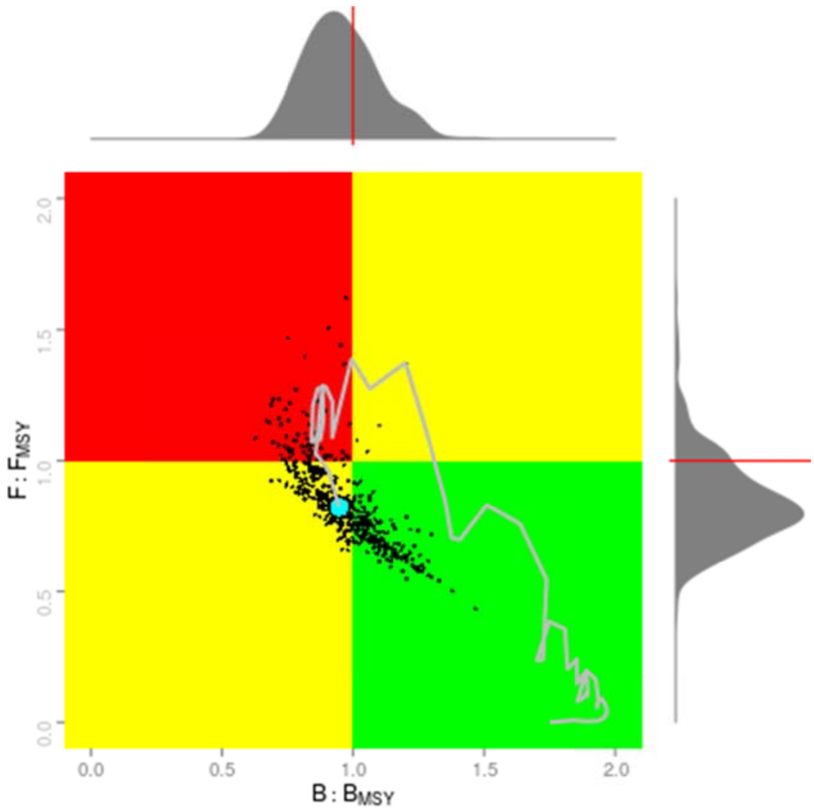
SWO-ATL-Figure 13. South Atlantic swordfish B/B_{MSY} and F/F_{MSY} estimated by ASPIC, dashed lines are the lower and upper 80 percentiles of the bootstrap runs.



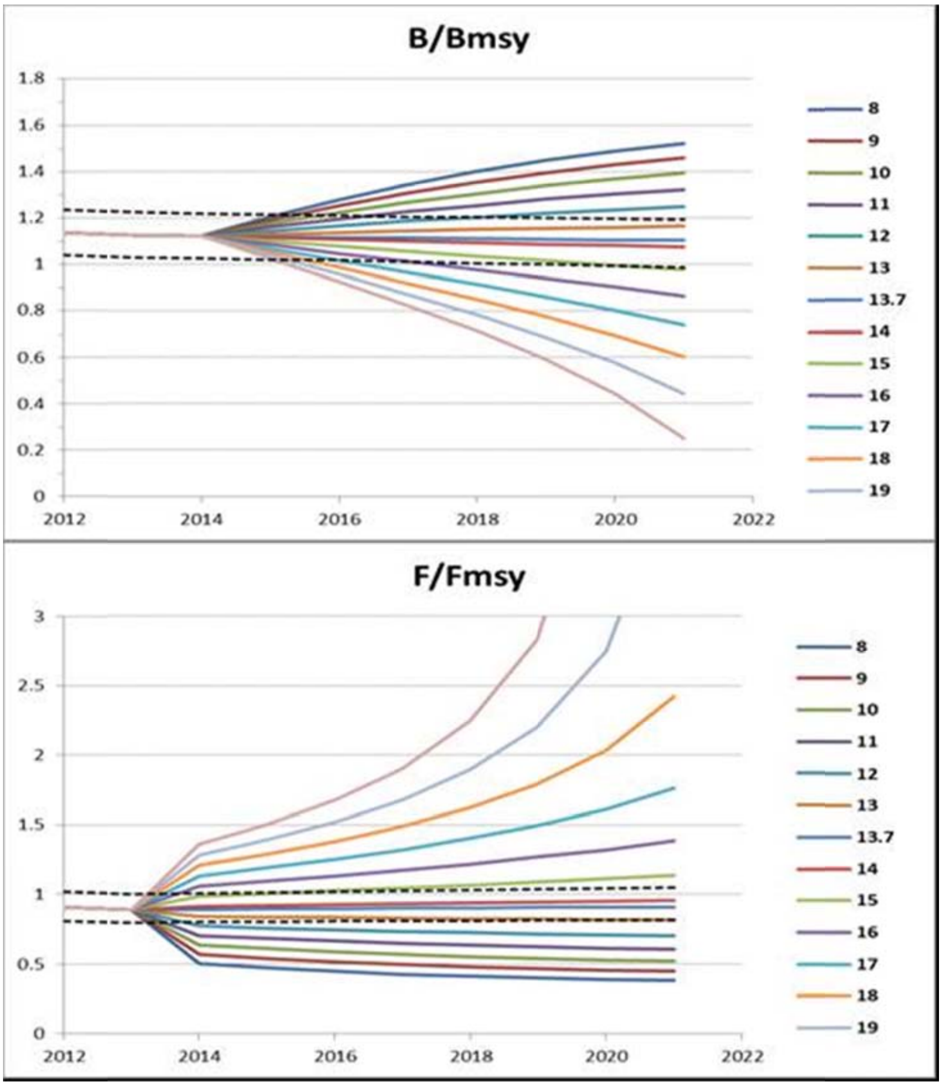
SWO-ATL-Figure 14. South Atlantic swordfish B/B_{MSY} and F/F_{MSY} estimated by BSP2. Posterior median and 90% intervals are plotted.



SWO-ATL-Figura 15. Kobe plots for the BSP reference model for southern Atlantic swordfish. The diamonds show the level of uncertainty and the line represents the trajectories of the status of the stocks of B/BMSY and F/FMSY, 1950-2011.



SWO-ATL-Figura 16. Kobe plots for the ASPIC reference model for southern Atlantic swordfish. The diamonds show the level of uncertainty and the line represents the trajectories of the status of the stocks of B/BMSY and F/FMSY, 1950-2011.



SWO-ATL-Figure 17. Median trends of the relative biomass (B/B_{MSY}) and fishing mortality (F/F_{MSY}) for the projected North Atlantic swordfish stock based on the ASPIC SP model base under different constant catch scenarios (thousand tons). The lines show the median value of bootstrap runs and the dashed lines are 80% confidence intervals around projection at 13,700 t in the projection time period and the observed catch in the historical time period. The TAC in 2012 is 13,700 t.

8.10 SWO-MED-MEDITERRANEAN SWORDFISH

In the last 15 years Mediterranean swordfish production has fluctuated without any specific trend at levels higher than those observed for much larger areas such as the North and South Atlantic. This situation supports the hypothesis that the biological and oceanographic conditions prevailing in the Mediterranean favour the high productivity of large pelagic fish. The most recent assessment was conducted in 2010 (Anon. 2011d), 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 Strait 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 be smaller than was previously thought. Results of a recently published growth study performed in the Aegean Sea were presented in the species group. Size at age estimates obtained from the study are in general agreement with those predicted by the model adopted in ICCAT. 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 fluctuated between 10,000-16,000 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 2012 catch was 9,162 t, which is about 32% lower than the mean of the last ten years. Gillnet catches show a declining trend in the last years due to the enforcement of a Mediterranean-wide driftnet ban. The ban of the Moroccan driftnet fishery, which was among the most important ones entered into force in 2012. 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 longlines and, to a lesser extent, 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 longlines capture 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 80’s, 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 than 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 (2-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. Effect 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. An additional one month closure accompanied by minimum landing size regulations, a fishing license control system, and specifications on the technical characteristics of the longline gear have been recently imposed through Recommendation 11-03. Several countries have also adopted additional fishery restrictions at the national level. 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 member countries and noted the difficulties in implementing some of the management measures, particularly that of minimum landing size.

Through Recommendation 11-03 the Commission has recently adopted additional management measures that will facilitate bringing the stock back to 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 B_{MSY} 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 (~62,000 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 two-month closure imposed in 2009 could not be evaluated during the 2010 assessment session due to incomplete 2009 data. It is expected that the impact of this closure, as well as, the additional measures imposed through Recommendation 11-03 will be evaluated during the next assessment session.

SWO-MED-6. Management recommendations

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, building upon the current Recommendation 11-03.

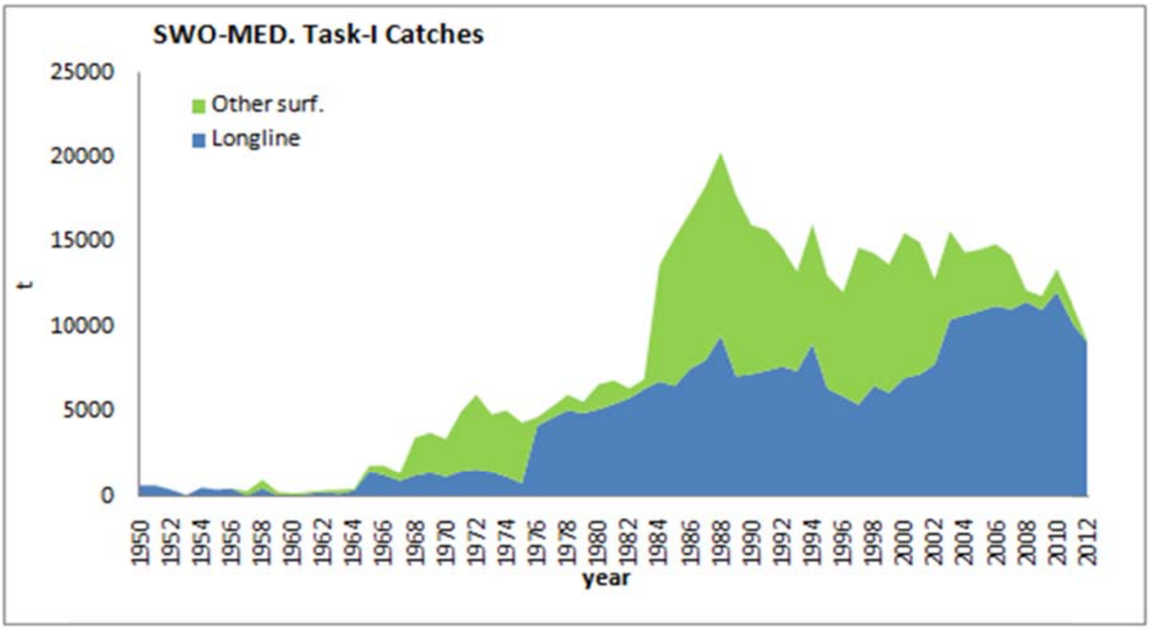
MEDITERRANEAN SWORDFISH SUMMARY

Maximum Sustainable Yield	~14,600 [1]
Current (2012) Yield	9,162 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] Three month fishery closure, gear specifications (number and size of hooks and length of gear), MLS regulations, and a license registry. [2]

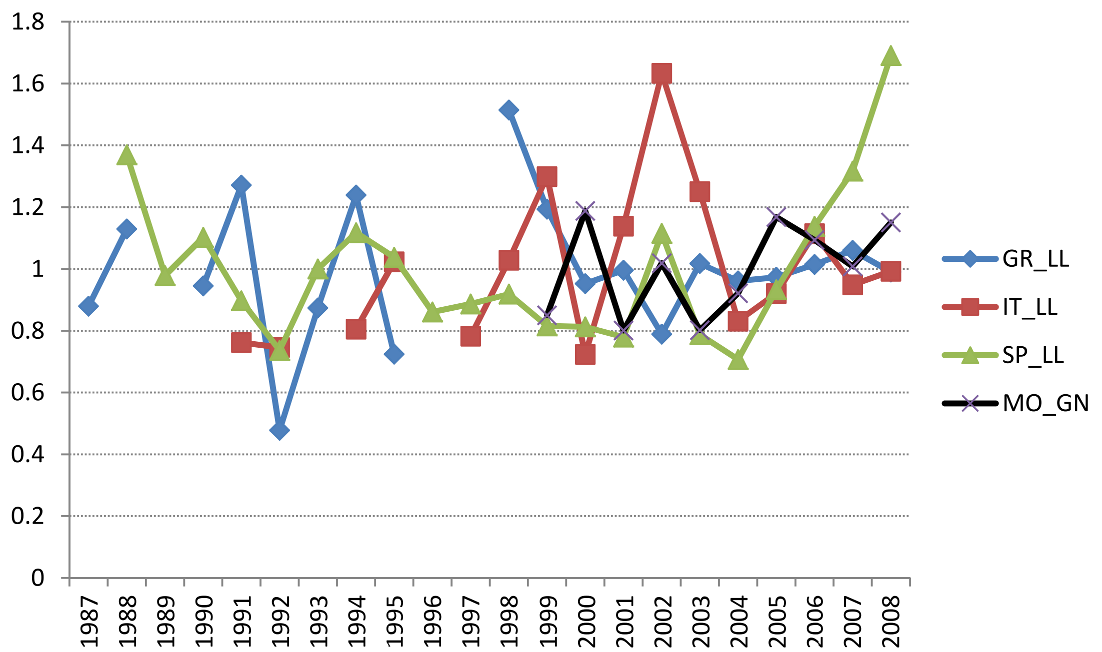
[1] Based on the age-structured analysis.
[2] Certain additional fishery restrictions are implemented at the national level.

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

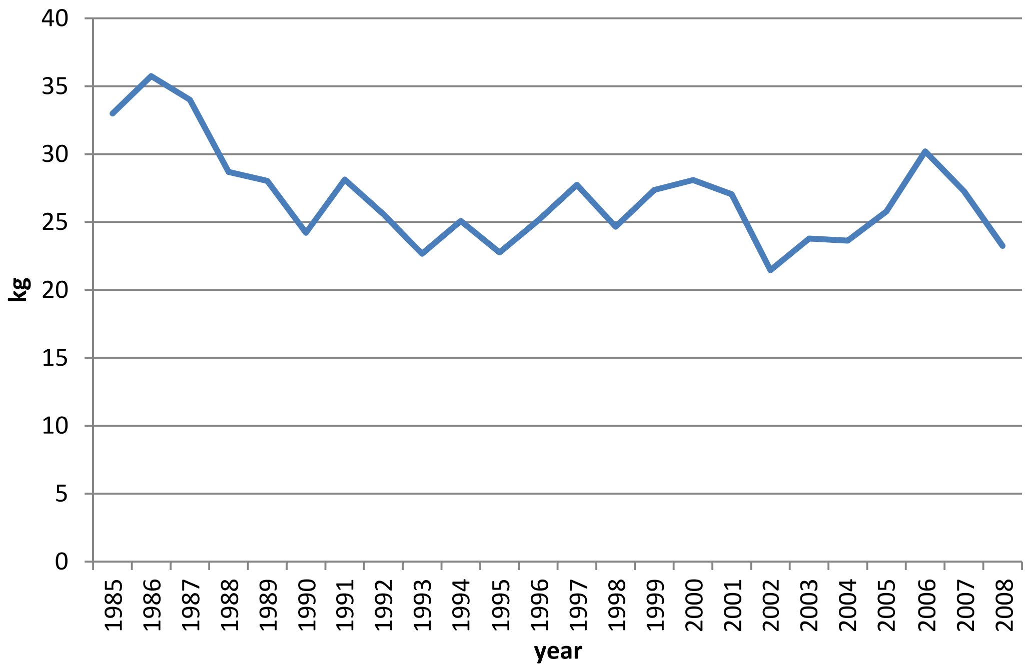
			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL	MED		20365	17762	16018	15746	14709	13265	16082	13015	12053	14693	14369	13699	15569	15006	12814	15674	14405	14600	14893	14227	12164	11840	13430	11423	9162
Landings		Longline	9476	7065	7184	7393	7631	7377	8985	6319	5884	5389	6496	6097	6963	7180	7767	10415	10667	10848	11228	11028	11465	11020	12083	10261	9101
		Other surf.	10889	10697	8834	8353	7078	5888	7097	6696	6169	9304	7873	7602	8606	7826	5047	5259	3729	3639	3649	3179	672	819	1347	1162	60
Discards		Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27	0	0	0	
		Albania	0	0	0	0	0	0	0	0	13	13	13	13	0	0	0	0	0	0	0	0	0	0	0	0	
		Algerie	2621	590	712	562	395	562	600	807	807	807	825	709	816	1081	814	665	564	635	702	601	802	468	624	216	387
		Chinese Taipei	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EU.Croatia	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	0	0	0	0	0	4	3	6	6	4
		EU.Cyprus	121	139	173	162	56	116	159	89	40	51	61	92	82	135	104	47	49	53	43	67	67	38	31	35	35
		EU.España	1762	1337	1523	1171	822	1358	1503	1379	1186	1264	1443	906	1436	1484	1498	1226	951	910	1462	1697	2095	2000	1792	1744	1591
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	12	27	0	19	0	0	14	14	16	78	81	12
		EU.Greece	1008	1120	1344	1904	1456	1568	2520	974	1237	750	1650	1520	1960	1730	1680	1230	1120	1311	1358	1887	962	1132	1494	1306	877
		EU.Italy	13010	13009	9101	8538	7595	6330	7765	7310	5286	6104	6104	6312	7515	6388	3539	8395	6942	7460	7626	6518	4549	5016	6022	5274	3856
		EU.Malta	233	122	135	129	85	91	47	72	72	100	153	187	175	102	257	163	195	362	239	213	260	266	423	532	503
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	13	115	8	1	120	14	16	0	0	0	0	0	
		Japan	4	1	2	1	2	4	2	4	5	5	7	4	2	1	1	0	2	4	0	3	1	1	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	1	0	0	
		Libya	0	0	0	0	0	0	0	0	0	0	11	0	8	6	0	10	2	0	14	0	0	0	0	0	
		Maroc	62	97	1249	1706	2692	2589	2654	1696	2734	4900	3228	3238	2708	3026	3379	3300	3253	2523	2058	1722	1957	1587	1610	1027	802
		NEI (MED)	875	979	1360	1292	1292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	28	0	0	0	
		Tunisie	80	159	176	181	178	354	298	378	352	346	414	468	483	567	1138	288	791	791	949	1024	1011	1012	1016	1013	1014
		Turkey	589	209	243	100	136	292	533	306	320	350	450	230	370	360	370	350	386	425	410	423	386	301	334	190	80
Discards		EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27	0	0	0	



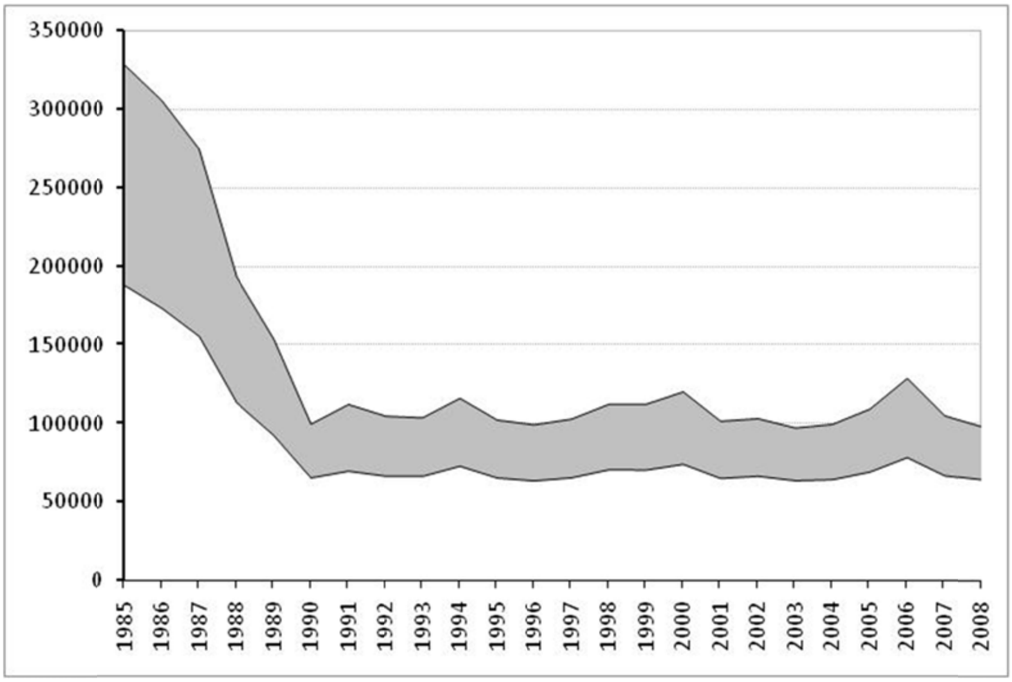
SWO-MED-Figure 1. Cumulative estimates of swordfish catches (t) in the Mediterranean by major gear types, for the period 1950-2012 (the 2012 data are provisional).



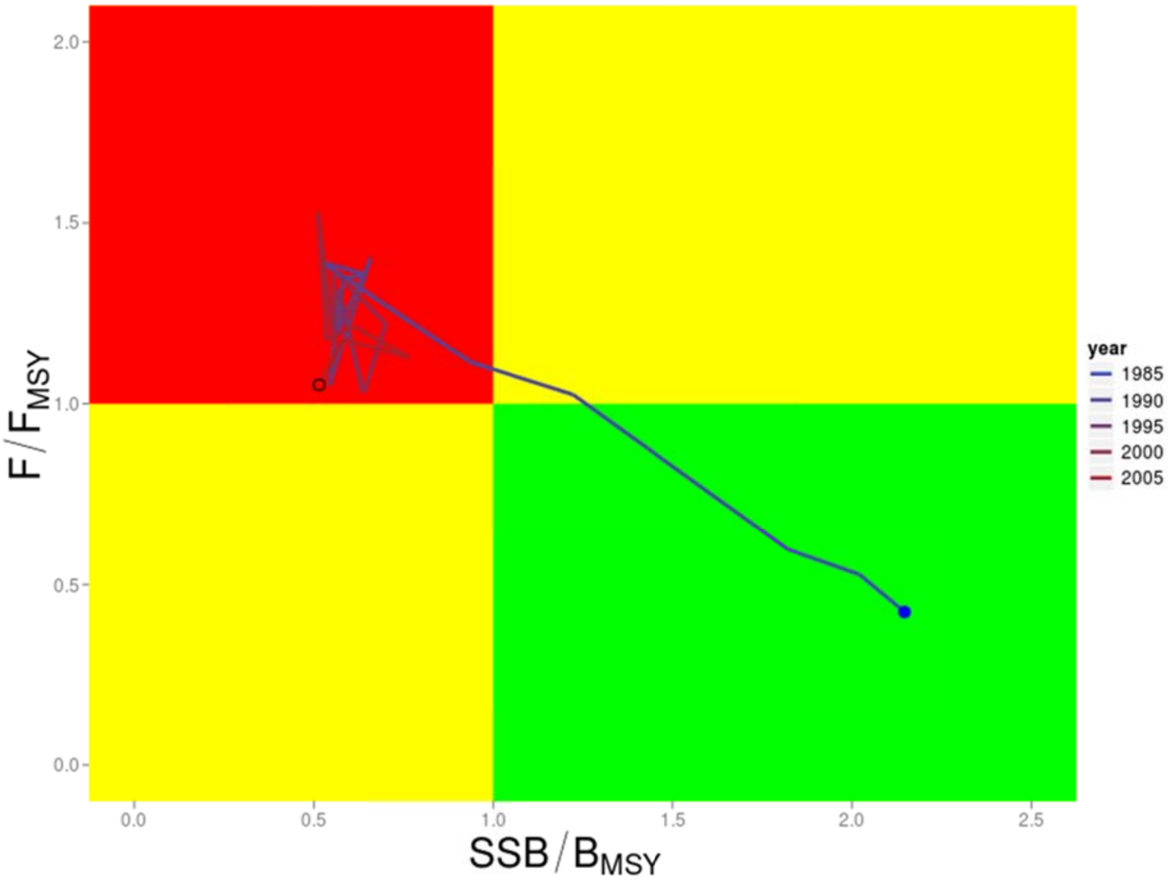
SWO-MED-Figure 2. Time series of standardized CPUE rates scaled to the corresponding mean value for the Spanish longliners (SP_LL), Italian longliners (IT_LL), Greek longliners (GR_LL), and Moroccan gillnetters (MO_GN).



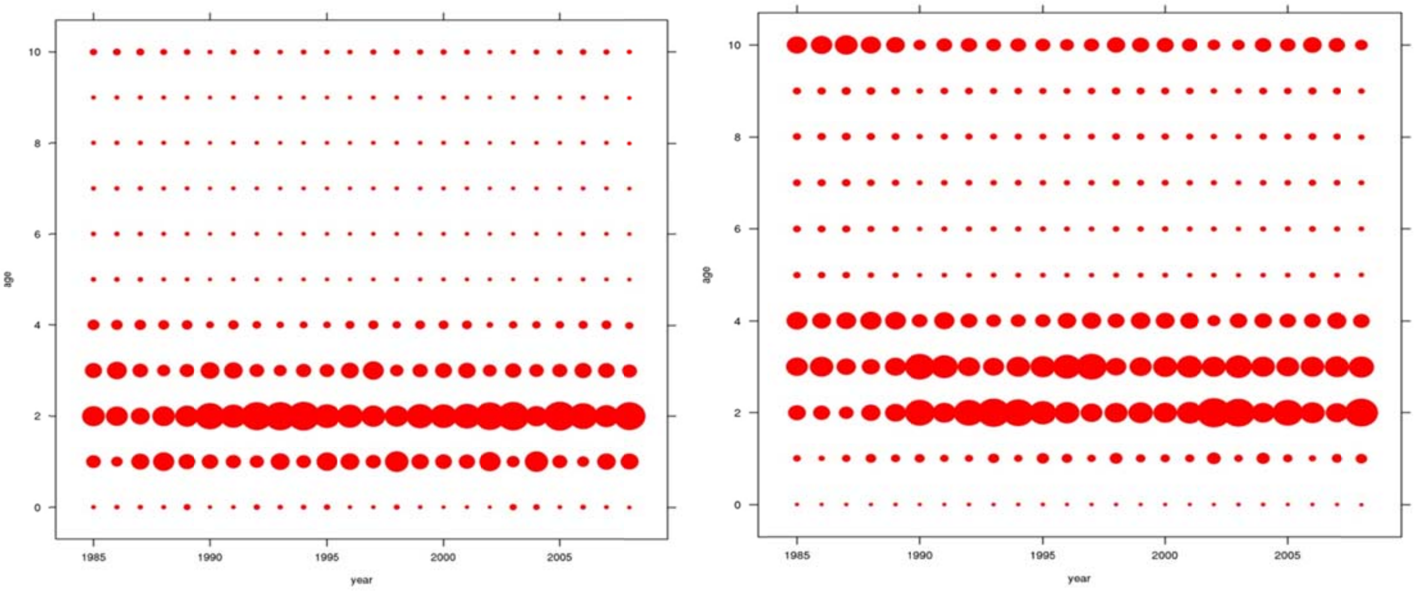
SWO-MED-Figure 3. Time series of mean fish weight in the catches.



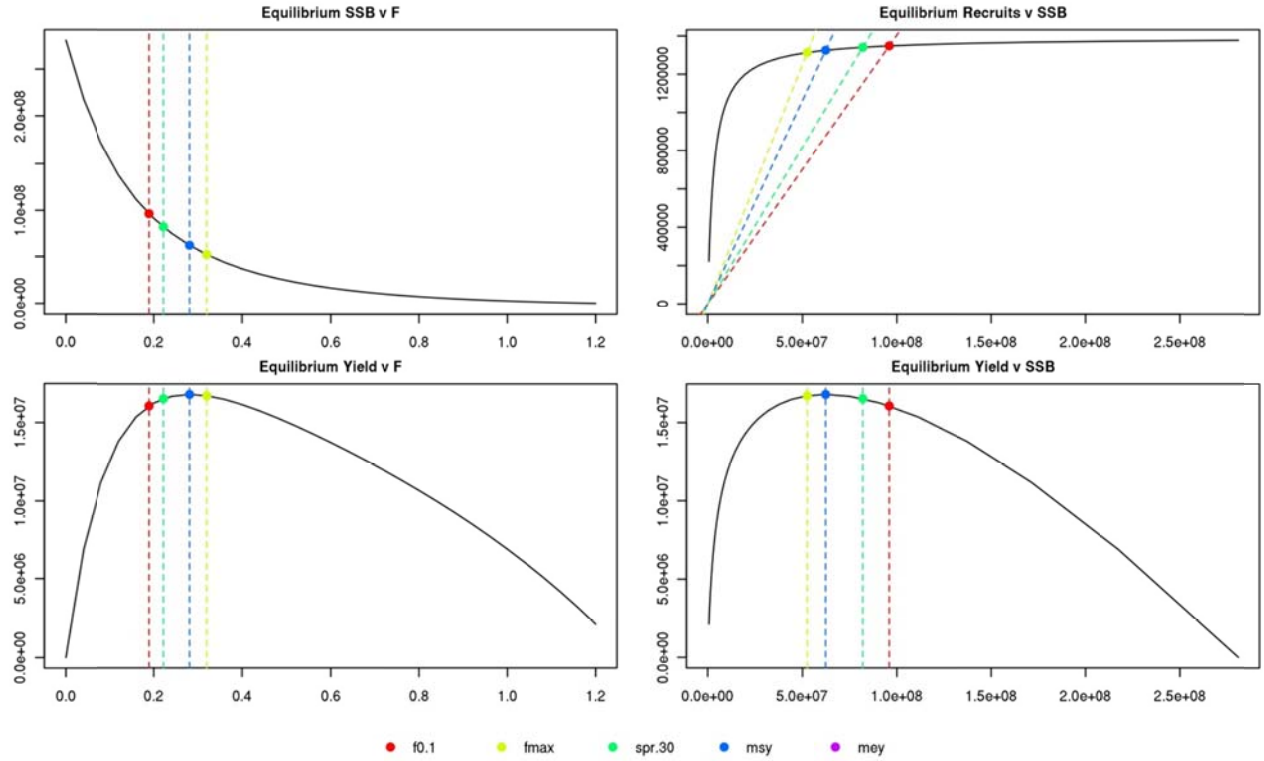
SWO-MED-Figure 4. Total and spawning stock biomass (SSB) estimates (grey color) obtained from the age-structured analysis.



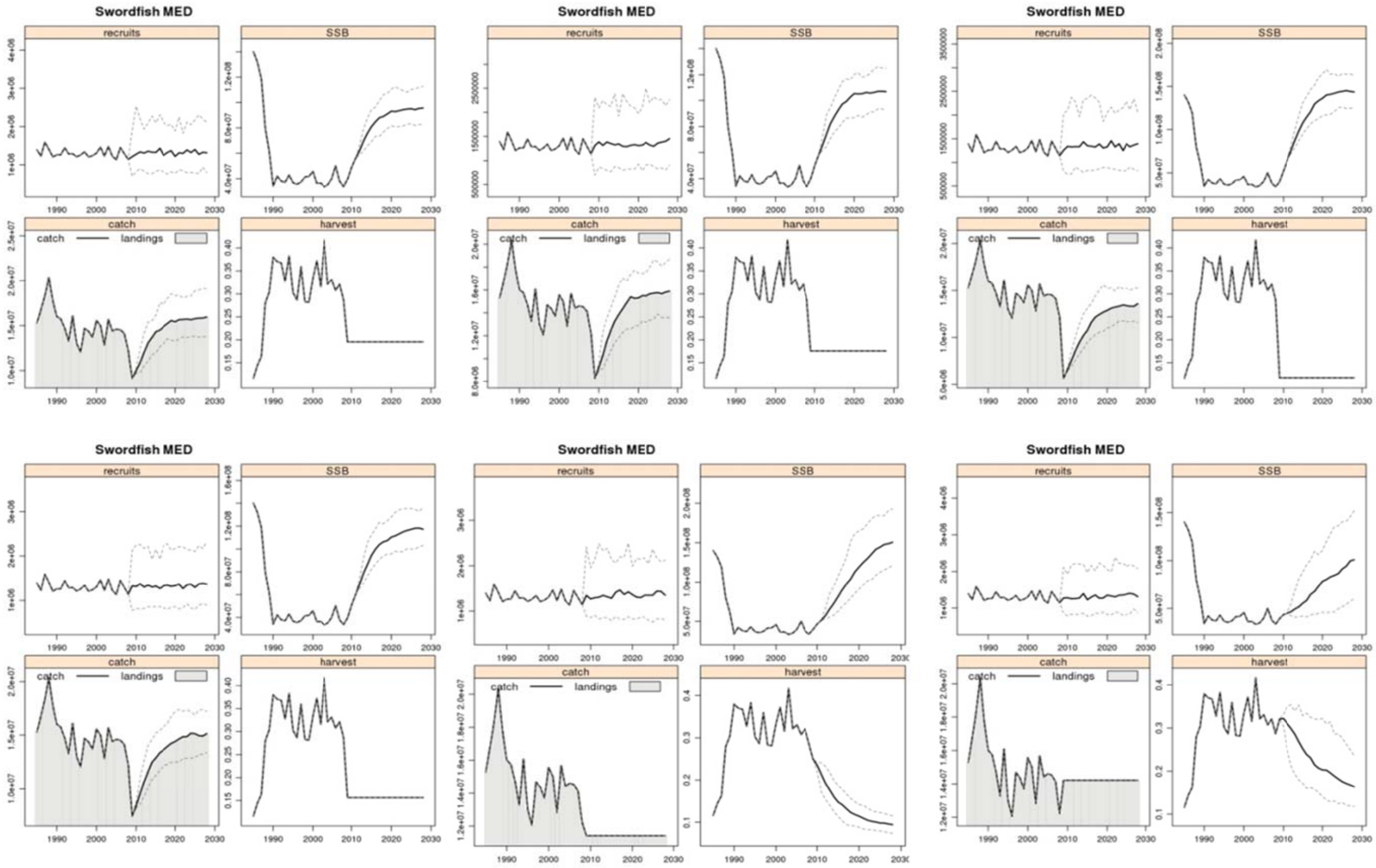
SWO-MED-Figure 5. Time trends for stock status (B/B_{MSY} and F/F_{MSY}) derived from the age-structured analysis. The open circle indicates the ratio estimates for the last assessment year (2008).



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.

8.11 SBF – SOUTHERN BLUEFIN TUNA

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is charged with assessing the status of southern bluefin tuna. The reports are available from CCSBT.

8.12 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*)
- DOL Dolphinfish (*Coryphaena hippurus*)

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 (Chavance *et al.* 2011). The amount caught is rarely reported in logbooks; however observer programs from purse seine fleets have recently provided estimates of catches of small tunas (Amandé *et al.* 2010).

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. The small tuna species can reach high levels of catches and values in some years.

Scientific collaboration among ICCAT, Regional Fisheries Organizations (RFOs) and countries in the various regions is imperative to advance understanding of the distribution, biology and fisheries 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 (Nottestad *et al.* 2013). 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.). Small tunas are the prey of large tunas, marlins, sharks and marine mammals and at the same time they are the predators of small pelagics. A new document (SCRS/2013/207) on the feeding habit of dolphin fish off the Brazilian coast was presented. These species feed also on 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 areas and spawning generally takes place near the coast in oceanic areas, where the waters are warmer. A new study conducted in the eastern coast of Tunisia has shown that the spawning area of *Auxis rochei* is offshore at the limit of the continental shelf and related to the high abundance of the Zooplankton (SCRS/2013/198). 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. Information on the migration patterns of small tuna species is very very limited, due to low tagging of these species.

In general, there is a lack of information on biological parameters for these species, especially for West Africa and the Caribbean and South America. A recent study based on the histological analysis and the gonado-somatique index of female gonads found that the spawning season of West African Spanish mackerel extends from April to July in the Gulf of Guinea (Diaha, *et al.* 2013).

New data regarding the size, the seasonal and spatial distribution of the relative abundance of blackfin tunas and dolphin fish from the Venezuelan artisanal longline fishery targeting billfish and dolphin fishes were presented to the Committee (Abid *et al.* 2013).

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 trawl (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. A new document analyzing the standardized CPUE from the Moroccan artisanal Gill net fishery in the Atlantic was presented. The preliminary analysis showed that there is no clear trend in the standardized index from 2004 to 2010 (SCRS/2012/179).

SMT-Table 1 shows historical landings of small tunas for the 1987 to 2012 period although the data for the last years are preliminary. This table does not include species reported as “mixed” or “unidentified”, as was the case in the 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 59,024 t in 2008 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 2012 is 97,274 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 1980-2010.

Despite the recent improvements in the statistical information provided to ICCAT by several countries, 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.

However, after the adoption of the ICCAT Small Tunas Research Programme in 2012, new historical catch, effort and size data from the main artisanal fisheries in the west of Africa (Senegal, Côte d’Ivoire and Morocco) were recovered and made available to the Secretariat (SCRS/2013/164, 175 and 176). A revision of the Task I data for the period 2005-2012 related to small tunas from Cape Verde was presented and accepted by the Committee (SCRS/2013/190). Furthermore, document SCRS/2013/197 presents preliminary analysis of the nominal catch of small tunas along the Tunisian coasts during the period 1995-2010.

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 years. 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. It may therefore be best to approach assessments of small tunas from the ecosystem and regional perspective since these species have limited movements as compared to the major tuna species.

SMT-5. Outlook

While there are some improvements in the availability of catch and biological data for small tuna species, particularly in the Mediterranean and the Black Sea, in 2011 the SCRS recommended a research plan for small tunas, which was adopted by the Commission in 2012. Small tuna species are of great economic value to local communities and thus the Committee should recognize the work being carried out in Senegal, Côte d'Ivoire and Morocco.

Biological information, catch and effort statistics for these species remain incomplete for many of the coastal and industrial fishing countries. Given that, many of these species are of a high socio-economic importance to coastal communities, therefore the Committee recommends that further studies be conducted on small tuna species due to the small amount of information available.

SMT-6. Effect 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.

				1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BLF	TOTAL	A+M		3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2465	4034	4756	1303	1926	1031	1937	1927	1669	1442	1548	1533	1529
	Landings	A+M	All gears	3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2465	4034	4756	1303	1926	1031	1937	1927	1669	1442	1548	1533	1529
	Discards	A+M	All gears	0	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	A+M	Brasil	229	120	335	130	49	22	38	153	649	418	55	55	38	149	1669	1	118	91	242	233	266	10	9	46	124
			Cuba	332	318	487	318	196	54	223	156	287	287	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Curaçao	70	70	70	60	60	65	60	50	45	45	45	45	45	45	45	0	0	0	0	0	0	0	0	0	
			Dominica	1	4	19	10	14	15	19	30	0	0	0	79	83	54	78	42	20	38	47	29	37	45	41	37	39
			Dominican Republic	4	564	520	536	110	133	239	892	892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.España	0	0	0	0	307	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	816	855	865	1210	1170	1140	1330	1370	1040	1040	1040	1040	1040	1040	1040	0	0	0	0	0	0	0	32	19	26
			Grenada	220	134	293	195	146	253	189	123	164	126	233	94	164	223	255	335	268	306	371	291	290	291	291	291	291
			Jamaica	0	0	0	0	0	0	0	0	148	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Liberia	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	10	9	10	10	12	6	7	6	9	5
			NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	19	15	38	11	7	53	19	20	18	22	17	15	23	24	24	0	0	0	0	0	0	0	0	0	
			Sta. Lucia	1	1	17	14	13	16	82	47	35	40	100	41	45	108	96	169	96	126	182	151	179	165	203	229	192
			Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	5
			U.S.A.	154	87	81	112	127	508	492	582	447	547	707	617	326	474	334	414	675	225	831	422	649	619	622	417	599
			UK.Bermuda	7	14	13	8	6	5	7	4	5	4	6	6	5	4	5	9	4	5	8	7	6	7	9	8	11
			UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
			Venezuela	1240	652	1150	1598	2148	1224	21	624	758	498	1034	1192	696	1902	1210	319	732	225	237	777	231	293	331	473	237
	Discards	A+M	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
BLT	TOTAL	A+M		6483	7110	11994	8777	5715	3421	5300	4301	5909	3070	3986	2646	3924	5819	6049	3798	6217	4438	4079	5701	6837	5557	9307	8835	5601
	Landings	A+M	Algerie	0	0	0	174	270	348	306	230	237	179	299	173	225	230	481	0	391	547	586	477	1134	806	970	1119	1236
			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	94
			EU.Croatia	0	0	0	24	21	52	22	28	26	26	26	26	0	0	0	0	0	0	0	0	0	0	8	13	9
			EU.España	2669	2581	2985	2226	1210	648	1124	1472	2296	604	487	669	1024	861	493	495	1009	845	1101	3083	3389	726	3812	3227	1620
			EU.France	0	0	0	8	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Greece	1400	1400	1400	1400	1400	1400	1400	1400	1426	1426	0	0	196	125	120	246	226	180	274	157	620	506	169	420	420
			EU.Italy	609	509	494	432	305	379	531	531	229	229	229	462	462	462	2452	1463	1819	866	0	0	342	732	574	653	613
			EU.Malta	8	18	21	20	11	10	1	2	3	6	6	3	1	0	0	0	0	0	0	4	12	7	11	23	3
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	28	263	494	208	166	231	300	791	867	849	322	436	654	387	55
			Maroc	811	1177	2452	1289	1644	170	1726	621	1673	562	1140	682	763	256	621	246	326	50	199	35	83	336	525	237	194
			Russian Federation	0	0	0	2171	814	70	100	0	0	0	1672	0	420	1053	468	128	102	139	22	5	23	48	67	119	366
			Serbia & Montenegro	0	0	0	13	1	0	0	2	6	6	6	7	8	8	0	0	0	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	75	87	81	84	83
			Tunisie	588	660	985	985	35	20	13	14	13	32	93	45	15	2300	932	989	1760	0	0	0	0	0	0	0	
			Turkey	0	0	0	35	0	324	77	0	0	0	0	316	316	316	316	0	284	1020	1031	993	836	1873	2436	2552	907
			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.	357	723	3634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Yugoslavia Fed.	41	42	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BON	TOTAL			46382	29721	28908	33334	21992	30528	21719	21219	25134	24519	45253	37313	27151	27637	24580	14424	15828	78766	40082	14174	14961	21171	20864	23401	43514
	Landings	ATL		22354	17766	6811	8079	6881	4531	6037	6030	7939	10441	15523	9143	5179	5400	8864	3307	4581	4391	8342	5542	4920	11149	8280	10373	5531
		MED		24028	11955	22097	25255	15111	25997	15682	15189	17195	14078	29730	28170	21972	22236	15716	11117	11247	74375	31740	8632	10042	10021	12584	13029	37983
	Landings	ATL	All gears	22354	17766	6811	8079	6881	4531	6037	6030	7939	10441	15523	9143	5179	5400	8864	3307	4581	4391	8342	5542	4920	11149	8280	10373	5531
		MED	All gears	24028	11955	22097	25255	15111	25997	15682	15189	17195	14078	29730	28170	21972	22236	15716	11117	11247	74375	31740	8632	10042	10021	12584	13029	37983
	Landings	ATL	Angola	180	168	128	102	4	49	20	9	39	32	0	2	118	118	118	0	0	138	0	931	0	1962	1997	131	267
			Argentina	2794	1327	1207	1794	1559	434	4	138	108	130	12	68	19	235	1	129	269	110	0	0	0	220	59	6	33
			Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	
			Benin	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	214	273	226	71	86	142	142	137	0	0	0	0	0	0	0	0	0	90	0	0	0	0	0	171	

	Cuba	173	26	28	0	0	0	0	0	0	0	230	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Curaçao	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	539	539	539
	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	755	0	
	Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	16	16	9	4	0	0	
	EU.Bulgaria	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EU.España	91	57	18	8	39	5	3	2	2	1	0	12	12	10	5	23	9	2	15	14	13	36	45	57	7
	EU.Estonia	668	859	187	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EU.France	395	427	430	820	770	1052	990	990	610	610	610	24	32	0	18	0	0	0	0	122	59	25	208	241	102
	EU.Germany	0	0	53	0	0	0	0	0	714	0	0	0	0	0	38	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	
	EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	56	125	91	108
	EU.Latvia	1191	1164	221	7	4	0	3	19	301	887	318	0	416	396	639	0	0	0	0	0	0	0	0	0	
	EU.Lithuania	1041	762	162	11	10	0	0	0	0	0	0	0	0	0	793	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	344	539	539	0	2047	104
	EU.Poland	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EU.Portugal	377	80	202	315	133	145	56	78	83	49	98	98	162	47	61	40	50	38	318	439	212	124	476	461	321
	EU.United Kingdom	0	0	0	0	0	0	0	0	287	0	0	0	0	0	0	0	0	0	35	0	0	30	71	113	4
	Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	0	0	0	0	0	0	0	0	
	Georgia	39	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Germany Democratic 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	
	Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Grenada	0	0	0	0	0	0	0	0	24	6	14	16	7	10	10	0	0	0	0	0	0	0	0	0	
	Jamaica	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Maroc	589	566	492	794	1068	1246	584	699	894	1259	1557	1390	2163	1700	2019	928	989	1411	1655	1053	1419	2523	109	145	235
	Mexico	356	338	215	200	657	779	674	1144	1312	1312	1632	1861	1293	1113	1032	1238	1066	654	1303	1188	1113	1063	1046	1080	1447
	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	2	0	0	0	0	0	0	0	0	0	0	0	
	Rumania	255	111	8	212	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Russian Federation	0	0	0	948	29	0	0	0	0	0	4960	0	0	574	1441	461	16	79	316	259	52	368	1042	2293	848
	Senegal	2066	869	525	597	345	171	814	732	1012	1390	2213	2558	286	545	621	195	183	484	2304	1020	1380	4029	1677	2876	1453
	Sierra Leone	10	10	10	4	6	0	0	0	0	0	0	0	11	245	44	0	0	0	0	0	0	0	0	0	
	South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	18	0	16	23	27	15	6	20	
	Sta. Lucia	1	0	3	3	3	4	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Togo	400	256	177	172	107	311	254	145	197	197	197	197	0	0	0	0	1583	1215	2298	0	0	0	0	0	
	Trinidad and Tobago	0	0	0	0	0	17	703	169	266	220	30	117	117	56	452	188	280	81	7	16	38	68	68	14	9
	U.S.A.	90	278	299	469	498	171	128	116	156	182	76	83	142	120	139	44	70	68	40	97	47	50	46	66	46
	U.S.S.R.	8882	7363	706	0	0	0	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	**0**
	Ukraine	1385	985	0	0	25	0	0	0	342	2786	1918	1114	399	231	1312	30	0	0	0	0	0	0	0	0	
	Uruguay	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Venezuela	1153	1783	1514	1518	1454	5	1661	1651	1359	1379	1659	1602	2	0	61	13	0	16	18	19	12	38	10	21	7
MED	Albania	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Algerie	625	1528	1307	261	315	471	418	506	277	357	511	475	405	350	597	0	609	575	684	910	1042	976	1009	355	353
	EU.Bulgaria	0	0	17	17	20	8	0	25	33	16	51	20	35	35	35	0	0	0	0	0	0	0	16	8	96
	EU.Croatia	0	0	0	49	128	6	70	0	0	0	25	120	0	0	0	0	0	0	0	0	0	0	59	41	31
	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	14	0	10	10	6	4	3	0	0	0	0	0	
	EU.España	962	609	712	686	228	200	344	632	690	628	333	433	342	349	461	544	272	215	429	531	458	247	518	574	442
	EU.France	10	0	1	10	5	6	0	0	0	0	0	0	0	0	27	0	0	0	0	15	34	20	23	13	12
	EU.Greece	1254	2534	2534	2690	2690	2690	1581	2116	1752	1559	945	2135	1914	1550	1420	1538	1321	1390	845	1123	587	476	531	810	810
	EU.Italy	2242	1369	1244	1087	1288	1238	1828	1512	2233	2233	2233	4159	4159	4159	4579	2091	2009	1356	0	0	1323	1131	964	1197	472
	EU.Malta	0	0	0	0	0	0	0	0	2	7	2	2	1	0	0	0	0	0	0	2	7	5	6	1	3
	Egypt	17	358	598	574	518	640	648	697	985	725	724	1442	1442	1128	1128	0	0	0	0	0	0	0	0	0	
	Libya	0	0	0	0	71	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Maroc	108	28	69	69	31	25	93	37	67	45	39	120	115	5	61	85	78	38	89	87	142	131	57	12	1

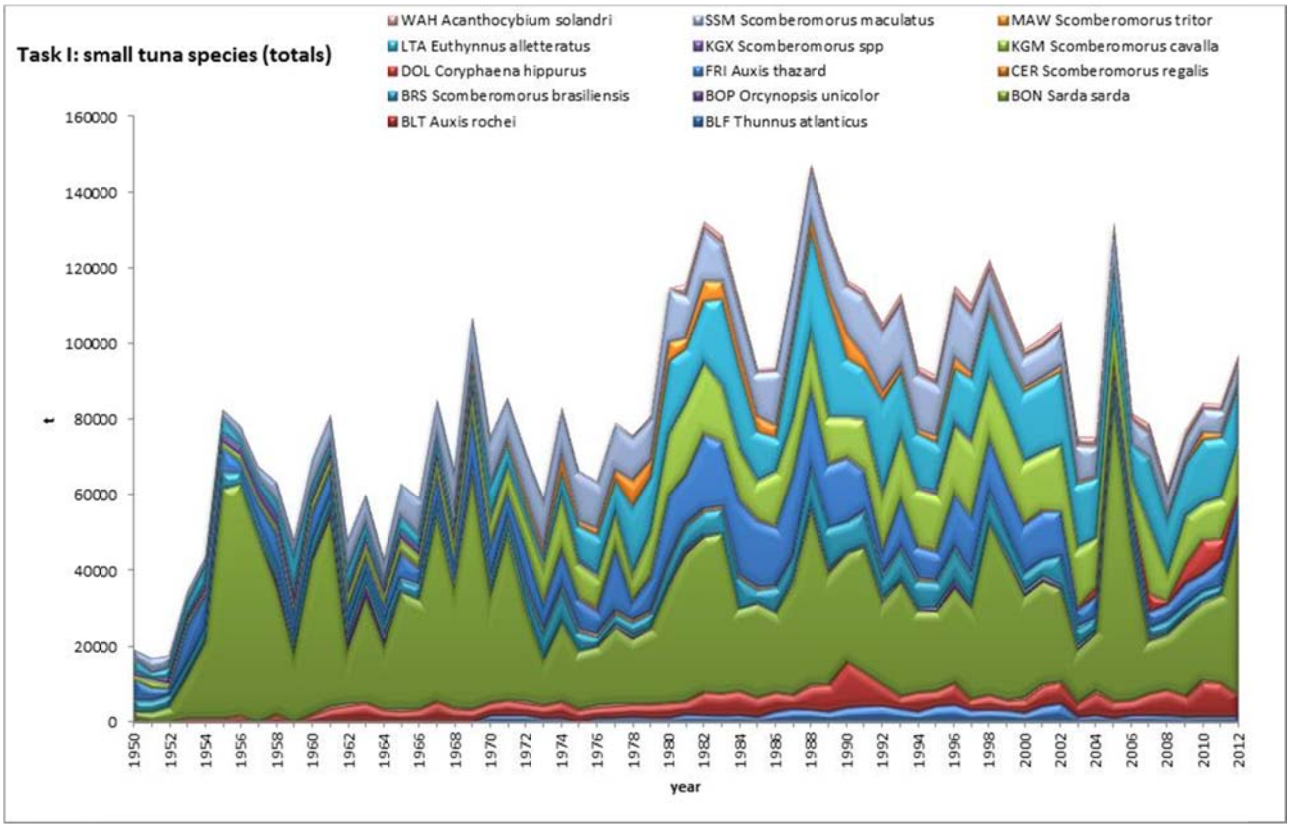
			NEI (MED)	561	342	311	311	311	300	300	300	300	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Serbia & Montenegro	0	0	0	45	0	3	2	6	10	12	12	14	17	17	0	0	0	0	0	0	0	0	0	0	
			Tunisie	600	422	488	305	643	792	305	413	560	611	855	1350	1528	1183	1112	848	1251	0	0	0	0	0	0	0	
			Turkey	17613	4667	14737	19151	8863	19548	10093	8944	10284	7810	24000	17900	12000	13460	6286	6000	5701	70797	29690	5965	6448	7036	9401	10019	35764
			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.	36	98	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BOP	TOTAL			1482	1116	473	608	641	630	791	703	2196	481	177	868	1207	1012	923	736	581	217	32	1047	533	449	289	375	686
	Landings	ATL		1474	1109	436	507	465	378	615	588	2064	254	47	651	1062	858	786	713	573	215	32	875	426	442	275	335	664
		MED		8	7	37	101	176	252	176	115	132	227	130	217	145	154	137	23	8	2	0	172	107	6	14	40	22
	Landings	ATL	All gears	1474	1109	436	507	465	378	615	588	2064	254	47	651	1062	858	786	713	573	215	32	875	426	442	275	335	664
		MED	All gears	8	7	37	101	176	252	176	115	132	227	130	217	145	154	137	23	8	2	0	172	107	6	14	40	22
	Landings	ATL	Benin	2	1	1	1	1	1	1	1	1	3	1	1	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	5	3	1	2	11	23	7	8
			Maroc	1422	1058	369	486	423	348	598	524	2003	246	28	626	1048	830	780	706	503	132	0	634	391	273	199	213	642
			Mauritania	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Senegal	0	0	16	20	41	29	16	63	60	5	18	24	14	28	6	7	70	78	29	240	33	158	53	115	14
		MED	Algerie	0	0	0	87	135	198	153	92	119	224	128	216	135	145	128	0	0	0	0	0	0	0	0	9	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.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
			Libya	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	8	7	37	14	1	14	23	23	13	3	2	1	10	9	9	20	7	1	0	172	107	6	14	30	15
			Tunisie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	
BRS	TOTAL	A+M		9510	10778	7698	8856	6051	8049	7161	7006	8435	8004	7923	5754	4785	4553	7750	5137	3410	3712	3587	2253	3305	2681	2871	2214	593
	Landings	A+M	Brasil	5063	5927	2767	1437	1149	842	1149	1308	3047	2125	1516	1516	988	251	3071	2881	814	471	1432	563	1521	1042	1281	1162	
			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	
			Grenada	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
			Guyana	0	0	0	0	0	0	0	0	211	571	625	1143	308	329	441	389	494	521	377	277	312	141	92	116	104
			Trinidad and Tobago	2704	2864	2471	2749	2130	2130	2130	1816	1568	1699	2130	1328	1722	2207	2472	1867	2103	2720	1778	1414	1472	1498	1498	936	489
			Venezuela	1743	1987	2460	4670	2772	5077	3882	3882	3609	3609	3651	1766	1766	1766	1766	0	0	0	0	0	0	0	0	0	
CER	TOTAL	A+M		219	234	225	375	390	450	490	429	279	250	250	0	3	5	1	2	1	1	1	0	0	0	0	1	0
	Landings	A+M	Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
			Dominican Republic	57	59	50	45	79	50	90	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	162	175	175	330	310	400	400	400	250	250	250	0	0	0	0	0	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	3	5	1	2	0	1	0	0	0	0	0	1	0
FRI	TOTAL	ATL		20573	16411	16738	10356	6367	12678	8407	7535	13809	14954	14197	13004	12905	12762	11627	4521	5451	4416	5071	4318	4111	5715	4362	6705	7183
	Landings	ATL	Angola	20	70	28	1	0	4	6	21	29	12	31	2	38	38	38	0	0	0	0	95	0	63	19	59	39
			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	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	1904	700	592	746	291	608	906	558	527	215	162	166	106	98	1117	860	414	532	603	202	149	313	204	347	259
			Cape Verde	86	105	75	135	82	115	86	13	6	22	191	154	81	171	278	264	344	467	606	575	824	1707	711	853	1811
			Curaçao	0	0	0	0	0	0	0	0	590	1157	1030	1159	1122	989	710	505	474	0	150	106	485	364	0	235	238
			Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	170	135	0	0	0	3	38
			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	3938	1877	2240	541	228	362	297	386	947	581	570	23	17	722	438	635	34	166	73	278	631	1094	950	877	1708
			EU.Estonia	0	0	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	3392	3008	3872	0	121	63	105	126	161	147	146	0	91	127	91	0	168	47	6	98	24	24	91	147	246
			EU.Latvia	0	0	0	243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Portugal	2	4	26	3	0	0	0	0	0	1	31	5	9	28	5	4	6	0	3	3	1	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	6	0	26	
			Germany Democratic 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	
			Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	0	0	0	0	0	
			Grenada	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	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	98	74	81	78	48	63

			Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	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	
			Maroc	194	599	1045	1131	332	274	122	645	543	2614	2137	494	582	418	441	184	542	61	48	135	179	9	19	862	554
			Mixed flags (FR+ES)	1525	1350	1728	3633	4017	9674	3107	1919	7177	6063	6342	8012	9864	9104	7748	1623	1722	1527	1739	1072	614	1131	873	1002	937
			NEI (ETRO)	381	155	237	1	4	32	68	70	180	120	309	491	291	420	186	71	180	166	9	0	0	0	0	0	
			Panama	0	0	0	243	57	118	341	328	240	91	0	0	0	0	0	0	394	975	970	1349	411	439	425	339	463
			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	1078	627	150	405	456	46	500	761	477	0	0	300	50	56	63	6	1	12	113	270	912	113
			S. Tomé e Príncipe	23	32	35	41	39	33	37	48	79	223	197	209	200	200	200	200	234	215	290	0	275	282	290	286	288
			Senegal	810	784	1084	311	201	342	319	309	0	0	0	7	0	4	0	13	288	151	83	119	383	15	217	201	341
			Trinidad and Tobago	0	0	0	0	0	17	0	56	199	368	127	138	245	0	0	0	414	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	
			U.S.S.R.	5638	5054	2739	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	0	0	0	0	0	36	48	0	43	0	0	0	0	0	0	0	0	0	
			Venezuela	2654	2670	3037	1762	368	886	2609	2601	3083	2839	2164	1631	210	444	32	113	182	42	165	52	48	54	215	508	85
DOL	TOTAL	A+M		264	306	260	291	188	174	334	334	307	295	363	349	234	303	347	564	2632	2772	1286	4748	875	5008	8934	5450	1674
	Landings	A+M	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2159	2311	761	4270	472	4400	7990	4379	641
			EU.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	73	73	0	85	166
			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.Malta	264	306	260	291	188	174	334	334	307	295	363	349	234	303	347	507	473	447	509	269	232	393	394	349	181
			Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	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	155	56	118	72	96	84
			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	479	503	562
			Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	14	16	0	0	24	0	38	40
KGM	TOTAL	A+M		14331	12153	10420	13241	14691	16331	14777	14930	17782	19660	16394	17717	16161	15360	17258	15863	12830	11766	8185	17936	7344	12533	9742	10868	12738
	Landings	A+M	Antigua and Barbuda	0	0	0	0	0	1	0	0	0	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	2029	2102	2070	962	979	1380	1365	1328	2890	2398	3595	3595	2344	1251	2316	3311	247	202	316	33	0	0	1	1	
			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	36	35	2	0	0	0	0	0	0	0	0	0	0	
			Dominican Republic	20	29	33	34	47	52	0	0	0	589	288	230	226	226	226	0	0	0	0	0	0	0	0	0	
			Grenada	0	0	0	0	0	0	0	0	2	4	28	14	9	4	5	0	0	0	0	0	0	0	0	0	
			Guyana	0	0	0	0	0	0	0	0	0	270	440	398	214	239	267	390	312	245	168	326	174	91	59	75	67
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	
			Mexico	3100	2300	2689	2147	3014	3289	3097	3214	4661	4661	3583	4121	3688	4200	4453	4369	4564	3447	4201	3526	3113	3186	3040	3130	3090
			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	7	9	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	1	4	0	0	9	1	1	0	1	1	1	2	0	1	3	4	1
			Trinidad and Tobago	752	541	432	657	0	1192	0	471	1029	875	746	447	432	410	1457	802	578	747	661	567	1043	1001	1001	720	392
			U.S.A.	7100	5681	4127	8213	9344	9616	7831	7360	7058	8720	7373	6453	6780	6603	6061	6991	7129	7123	2837	13482	3013	8247	5630	6939	9187
			UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
			Venezuela	1330	1500	1069	1228	1308	801	2484	2558	2140	2139	340	2424	2424	2424	2424	0	0	0	0	0	0	0	0	0	
KGX	TOTAL	A+M		491	105	131	225	266	301	508	512	824	156	251	1	229	48	0	15	0	1	26	16	0	2	20	16	6
	Landings	A+M	Barbados	332	68	51	45	51	55	36	42	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
			Colombia	159	37	25	7	12	21	148	111	539	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Cuba	0	0	0	0	0	0	0	0	0	0	236	0	0	0	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	5	4
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	26	16	0	2	20	7	2
			Gabon	0	0	0	0	0	0	140	145	79	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	0	0	0	0	0	0	0	0	0	0	0	
			Jamaica	0	0	0	0	0	0	0	0	0	155	0	0	44	48	0	0	0	0	0	0	0	0	0	0	
			Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Puerto Rico	0	0	0	0	53	84	86	134	106	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	14	0	0	0	0	15	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	1	1	1	1	138	0	0	0	0	0	0	0	0	0	0	1	
			Sta. Lucia	0	0	55	79	150	141	98	80	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

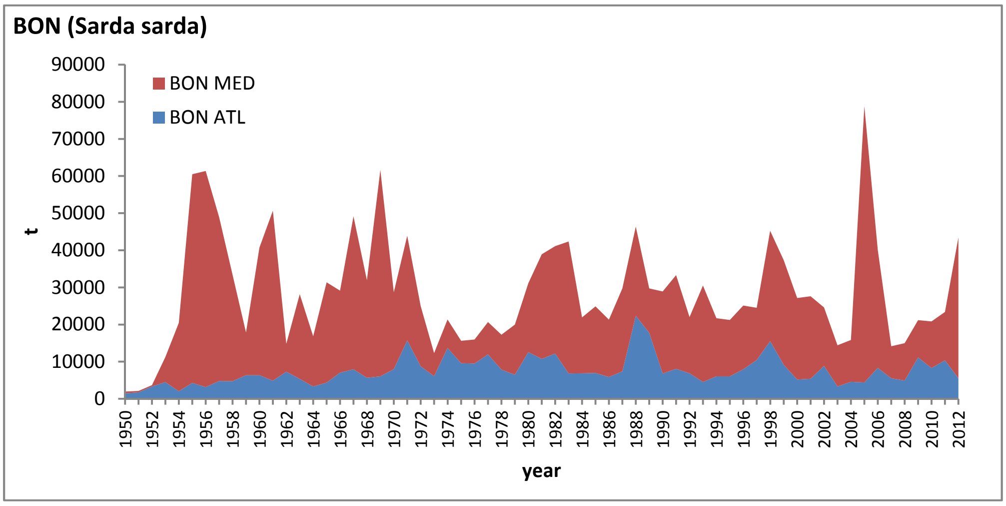
			Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ukraine	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LTA	TOTAL			26182	30791	15152	13094	24203	16562	14183	12836	14257	16310	17555	15382	18283	18666	19452	16711	15785	12253	8892	17647	14441	14094	16802	16014	14971
	Landings	ATL		23777	28756	12535	10771	22447	15296	12978	10934	12138	14706	14641	12506	14989	15803	16810	16029	14348	11212	7290	15961	12182	11990	14632	13252	11655
		MED		2405	2035	2617	2323	1756	1266	1205	1902	2119	1604	2914	2875	3294	2863	2642	682	1438	1040	1602	1686	2259	2104	2170	2763	3315
	Landings	ATL	All gears	23777	28756	12535	10771	22447	15296	12978	10934	12138	14706	14641	12506	14989	15803	16810	16029	14348	11212	7290	15961	12182	11990	14632	13252	11655
		MED	All gears	2405	2035	2617	2323	1756	1266	1205	1902	2119	1604	2914	2875	3294	2863	2642	682	1438	1040	1602	1686	2259	2104	2170	2763	3315
	Landings	ATL	Angola	1148	1225	285	306	14	175	121	117	235	75	406	118	132	132	132	0	0	2	0	4365	0	128	1759	3455	1905
			Argentina	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Benin	7	43	66	61	49	53	60	58	58	196	83	69	69	69	69	0	0	0	0	0	0	0	0	0	
			Brasil	108	74	685	779	935	985	1225	1059	834	507	920	930	615	615	615	0	320	280	0	0	0	0	0	22	581
			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	1	18	65	74	148	17	23	72	63	86	110	776	491	178	262	143	137	121	203	640	500	855	185	102	131
			Cuba	53	113	88	63	33	13	15	27	23	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Curaçao	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	38	38	76
			Côte D'Ivoire	38	4900	2800	100	142	339	251	253	250	114	108	0	108	0	0	0	0	270	298	404	1677	1041	1359	5	1062
			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	7	11	55	81	1	0	0	10	55	27	110	6	2	22	8	1	489	50	16	0	38	35	136	168	71
			EU.Estonia	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.France	0	195	0	74	13	8	54	59	22	215	21	696	631	610	613	0	10	27	12	0	1	50	35	5	30
			EU.Germany	0	0	38	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	0	0	0	0	
			EU.Latvia	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	9	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	14	69	8	0	18	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	
			EU.Portugal	86	91	2	61	73	45	72	72	218	320	171	14	50	0	2	16	19	21	24	43	10	6	5	14	4
			EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	15	23	38
			Gabon	0	0	0	0	0	0	0	0	182	0	18	159	301	213	57	173	0	0	0	0	0	0	0	0	
			Germany Democratic Rep.	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	11588	12511	323	201	11608	359	994	513	113	2025	359	306	707	730	4768	8541	7060	5738	216	4449	3188	1497	2343	2031	1094
			Israel	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	49	14	367	57	370	44	43	230	588	195	189	67	101	87	308	76	91	33	0	40	2	63	5	57	10
			Mauritania	50	50	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mixed flags (FR+ES)	1017	900	1152	2422	2678	4975	2071	1279	3359	2836	2936	3846	4745	4238	3334	1082	1148	1018	1159	715	410	1181	795	988	1783
			NEI (ETRO)	0	0	0	0	0	8	20	0	0	0	0	0	0	0	33	2	0	0	0	0	0	0	0	0	
			Panama	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Rumania	88	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	617	306	265	189	96	49	0	88	0	0	0	74	13	0	0	0	0	0	0	268	11	208
			S. Tomé e Príncipe	30	36	52	46	48	41	40	43	40	50	39	37	33	33	33	33	178	182	179	0	183	188	193	191	384
			Senegal	6343	6512	4363	3484	4011	4724	4536	3613	1972	4174	4715	1607	3546	5176	2866	4394	3508	2699	3826	3885	5108	5683	6371	4910	2769
			South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	2	2	2	0	1	10	1	0	0	1	0	0	0	0	0	0
			U.S.A.	204	129	173	228	597	1286	1142	1312	2230	2015	1546	1623	1209	1451	1366	1492	1382	765	1351	1401	963	1244	1120	1201	1499
			U.S.S.R.	1707	543	667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			UK.Bermuda	17	14	8	10	11	5	6	6	7	6	5	4	2	1	5	4	5	7	5	5	4	3	4	5	6
			Venezuela	1236	1374	1294	1963	1409	1889	2115	2115	1840	1840	2815	2247	2247	2247	2254	50	0	0	0	0	30	0	2	8	4
		MED	Algerie	0	0	0	522	585	495	459	552	554	448	384	562	494	407	148	0	158	116	187	96	142	119	131	98	6
			EU.Croatia	0	0	0	2	3	2	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	28	25
			EU.Cyprus	41	20	23	25	21	11	23	10	19	19	19	16	19	19	19	0	0	0	0	6	5	4	0	0	
			EU.España	5	0	0	0	0	0	0	15	18	9	15	0	8	82	32	0	41	262	116	202	212	86	299	488	441
			EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	0
			EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	112	69	72	183	148	165	206	206
			EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	24	38	34	0	0	486	243	365	304	669

			EU.Malta	0	0	0	8	1	8	8	8	3	3	0	0	0	0	0	0	0	0	0	1	5	8	7	5	21
			Israel	135	124	129	108	126	119	119	215	119	119	119	119	119	119	119	0	0	0	0	0	0	0	0	0	
			Libya	0	0	0	0	0	0	0	0	0	45	52	0	5	4	4	0	0	0	0	0	0	0	0	0	
			Maroc	12	0	16	0	0	0	0	1	0	1	14	8	0	0	3	1	0	9	0	331	19	24	1	0	
			NEI (MED)	200	200	200	200	200	200	200	200	200	200	200	200	0	0	0	0	0	0	0	0	0	0	0	0	
			Palestina	0	0	0	0	0	0	0	0	90	59	61	60	60	60	129	0	0	0	0	0	0	0	0	0	
			Serbia & Montenegro	0	0	0	5	0	28	21	35	22	18	20	18	16	16	0	0	0	0	0	0	0	0	0	0	
			Syria	99	121	127	110	156	161	156	155	270	350	417	390	370	370	330	0	0	0	0	193	133	163	148	155	304
			Tunisie	1908	1566	2113	1343	664	242	204	696	824	333	1113	752	1453	1036	960	657	633	0	0	0	0	0	0	0	
			Turkey	0	0	0	0	0	0	0	0	0	0	500	750	750	750	750	0	568	507	1230	785	1074	1309	1046	1437	1645
			Yugoslavia Fed.	5	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MAW	TOTAL	A+M		3921	2938	6629	3652	2423	1723	1138	1808	2831	1415	1482	909	1219	828	1345	550	283	443	210	435	422	459	2079	1103	1021
	Landings	A+M	Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	1650	249	221
			Benin	13	334	211	214	202	214	194	188	188	362	511	205	205	205	205	0	0	0	0	0	0	0	0	0	
			EU.Estonia	0	0	0	49	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	0	0	0	2	0	
			EU.Latvia	0	0	208	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EU.Lithuania	0	0	0	52	4	0	0	0	0	0	0	0	0	0	298	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	1	1	0	10	
			Gabon	0	0	0	0	0	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Germany Democratic 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	
			Ghana	1457	1457	1500	2778	899	466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Russian Federation	143	195	1032	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
			S. Tomé e Príncipe	6	4	6	5	3	5	6	6	8	7	8	5	6	6	6	6	21	12	13	0	91	94	96	95	191
			Senegal	2159	753	2432	520	1225	1019	938	1614	2635	1046	878	700	987	617	794	532	262	431	196	435	329	278	331	749	610
			U.S.S.R.	143	195	1240	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	90	0	0	0	0	0	0	0	21	0	42	12	0	0	0	0	0	0	0	0	
SSM	TOTAL	A+M		12671	13845	12782	15318	16285	16317	14490	13697	16571	15403	8641	9837	8220	8383	9414	9793	8119	10470	6282	6102	5900	6197	5974	5931	5185
	Landings	A+M	Colombia	151	112	76	37	95	58	69	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Cuba	803	746	665	538	611	310	409	548	613	613	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	0	0	0	0	0	0	0	0	0	0	
			Dominican Republic	1415	1401	1290	728	735	739	1330	2042	2042	231	191	125	158	158	158	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	9	
			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	265	0	0	0	0	0	0	0	0	0	
			Grenada	0	1	3	0	0	1	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
			Mexico	5246	7242	8194	8360	9181	10066	8300	7673	11050	11050	5483	6431	4168	3701	4350	5242	3641	5723	3856	3955	4155	4251	4128	4026	3321
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	27	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	0	0	0	0	0	0	0	0	0	0	
			U.S.A.	5056	4343	2554	5655	5663	5143	4380	3363	2866	3509	2968	3282	3893	4524	4613	4552	4477	4747	2425	2147	1746	1946	1846	1896	1864
WAH	TOTAL	A+M		1635	1527	1498	1721	1834	2670	2143	2408	2515	3085	2488	2957	2020	2296	2202	2049	2580	2141	2133	2725	1937	2152	1758	1739	2574
	Landings	A+M	Antigua and Barbuda	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Aruba	80	80	70	60	50	50	125	40	50	50	50	50	50	50	50	0	0	0	0	0	0	0	0	0	
			Barbados	332	51	51	60	51	91	82	42	35	52	52	41	41	0	0	34	45	26	41	36	27	17	30	29	22
			Benin	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	58	92	52	64	71	33	26	1	16	58	41	0	0	0	0	405	519	449	111	75	76	70	19	357	213
			Cape Verde	340	631	458	351	350	326	361	408	503	603	429	587	487	578	500	343	458	494	1058	978	702	745	470	470	445
			Curaçao	280	280	280	250	260	270	250	230	230	230	230	230	230	230	230	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	9
			Dominica	0	0	38	43	59	59	59	58	58	58	58	50	46	11	37	10	6	8	15	14	16	10	13	13	
			Dominican Republic	1	3	6	9	13	7	0	0	0	325	112	31	35	35	35	0	0	0	0	0	0	0	0	0	
			EU.España	32	18	23	28	32	22	20	15	25	25	29	28	32	38	46	48	305	237	110	66	38	73	53	87	35
			EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	
			EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	4	3	9	8	10
			Grenada	137	57	54	77	104	96	46	49	56	56	59	82	51	71	59	44	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	1	0	0	

Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	0	
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	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	91	240	120	86	111	99	210
S. Tomé e Príncipe	23	20	28	34	27	36	39	46	80	52	56	62	52	52	52	52	94	88	76	0	131	235	241	238	479
Saint Kitts and Nevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	7	0	0	0	0	0	0	
Senegal	0	0	0	0	0	64	0	0	1	0	0	5	0	0	0	5	0	1	1	0	0	2	6	0	11
St. Vincent and Grenadines	4	4	28	33	33	41	28	16	23	10	65	52	46	311	17	40	60	0	241	29	24	31	40	31	10
Sta. Lucia	0	0	77	79	150	141	98	80	221	223	223	310	243	213	217	169	238	169	187	0	171	195	199	0	
Suriname	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	588
Trinidad and Tobago	0	0	0	118	1	0	0	0	0	1	1	1	2	1	9	7	6	6	7	6	6	5	5	7	8
U.S.A.	128	110	82	134	203	827	391	764	608	750	614	858	640	633	846	789	712	558	89	1123	495	522	358	240	396
UK.Bermuda	61	63	74	67	80	58	50	93	99	105	108	104	61	56	91	87	88	83	86	124	117	101	81	100	88
UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0
UK.Sta Helena	18	17	18	12	17	35	26	25	23	0	0	0	0	0	0	0	0	0	0	0	0	29	19	31	12
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	**0**
Venezuela	141	101	159	302	333	514	542	540	487	488	360	467	4	17	13	9	7	16	13	33	9	25	28	23	38



SMT-Figure 1. Estimated landings (t) of small tunas (combined) in the Atlantic and Mediterranean, 1950-2012. The data for the last three years are incomplete.

a)


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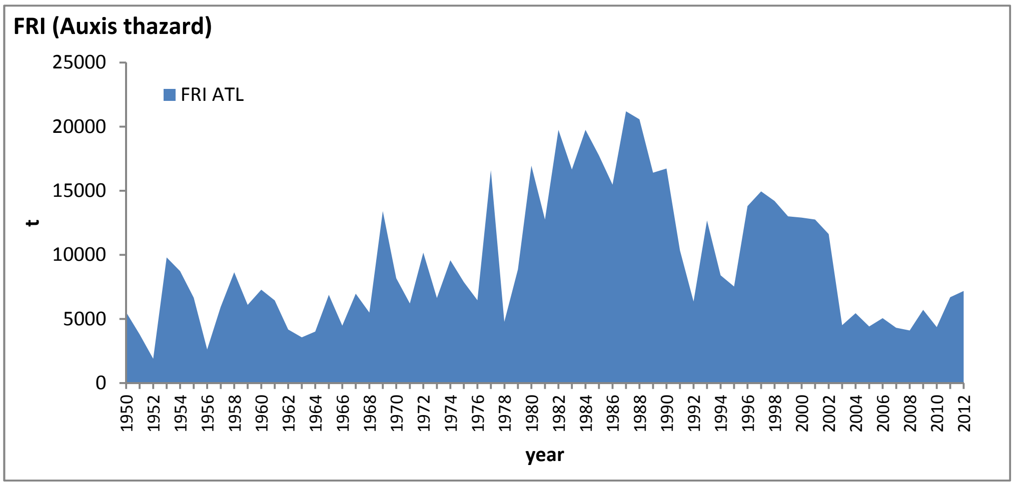
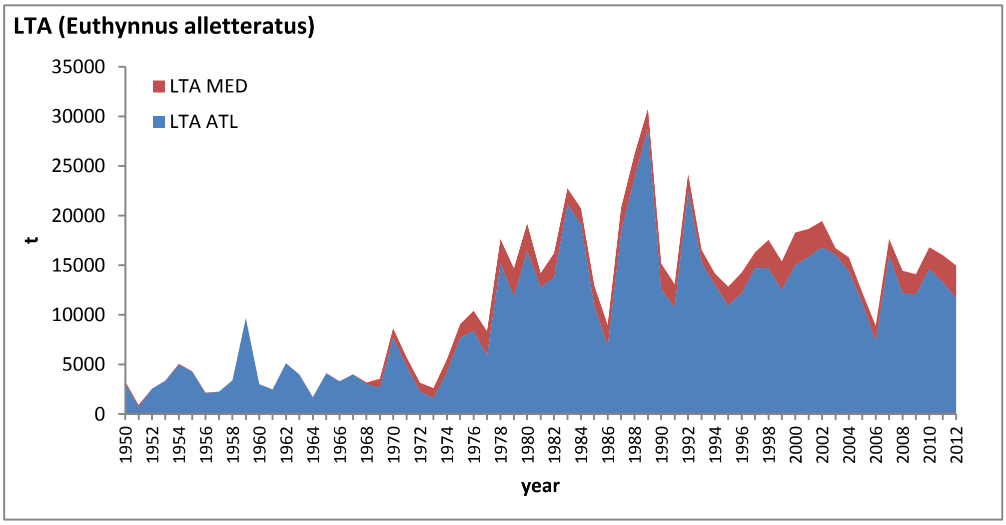
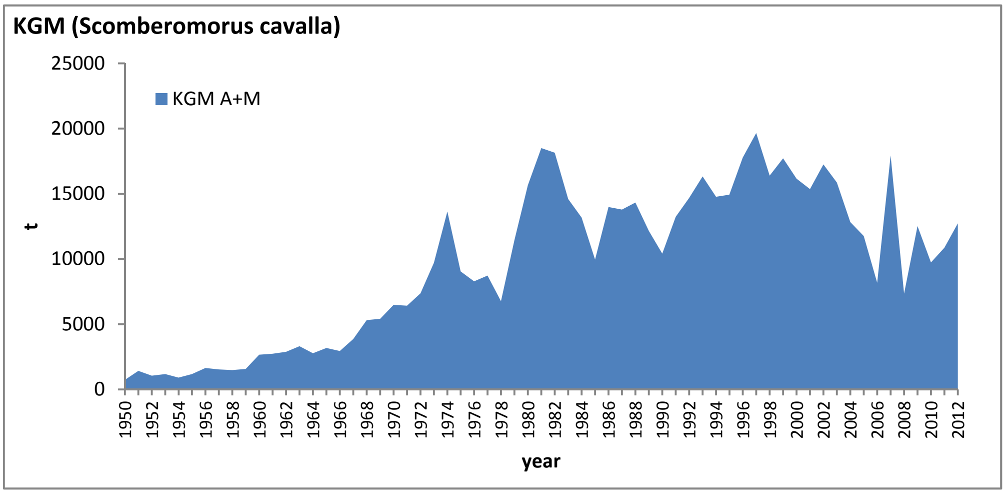


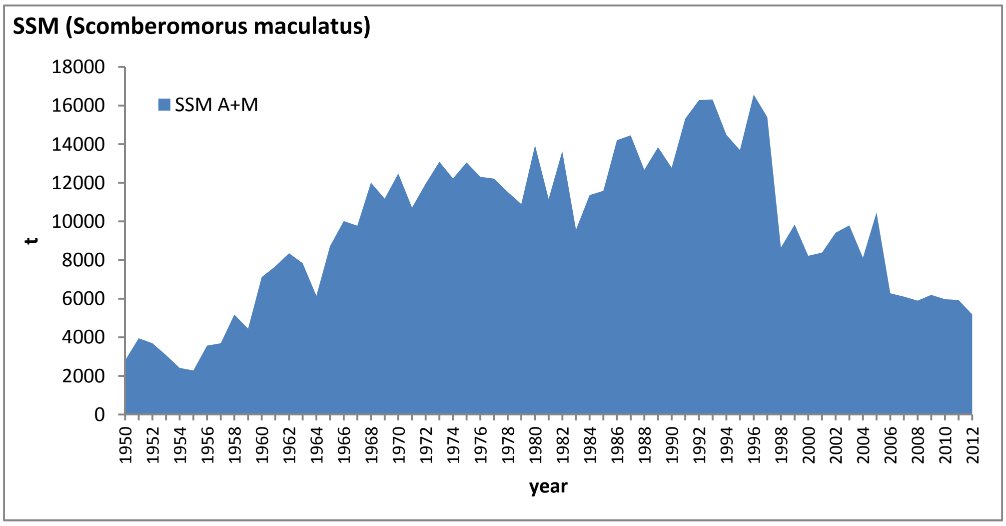
c)


SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2012. The data for the last years are incomplete.

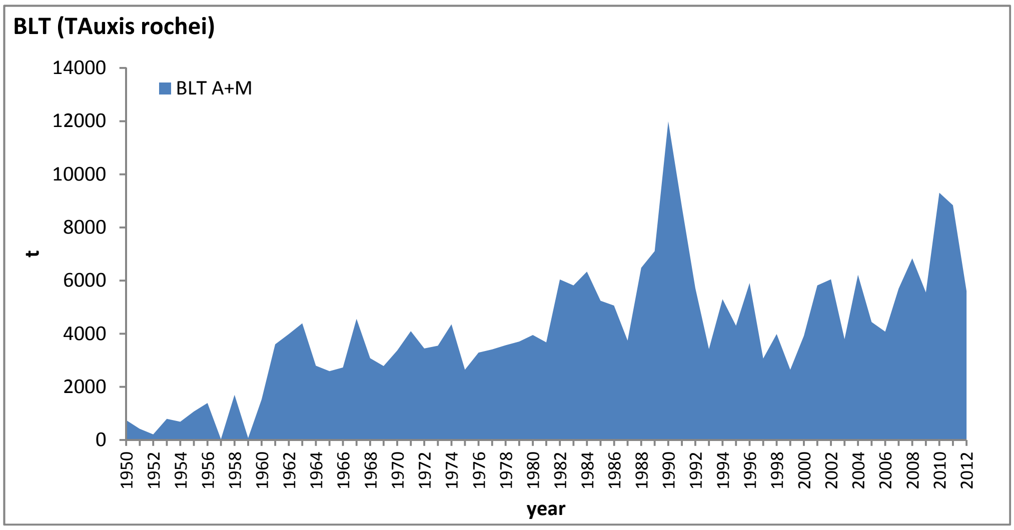
d)



e)

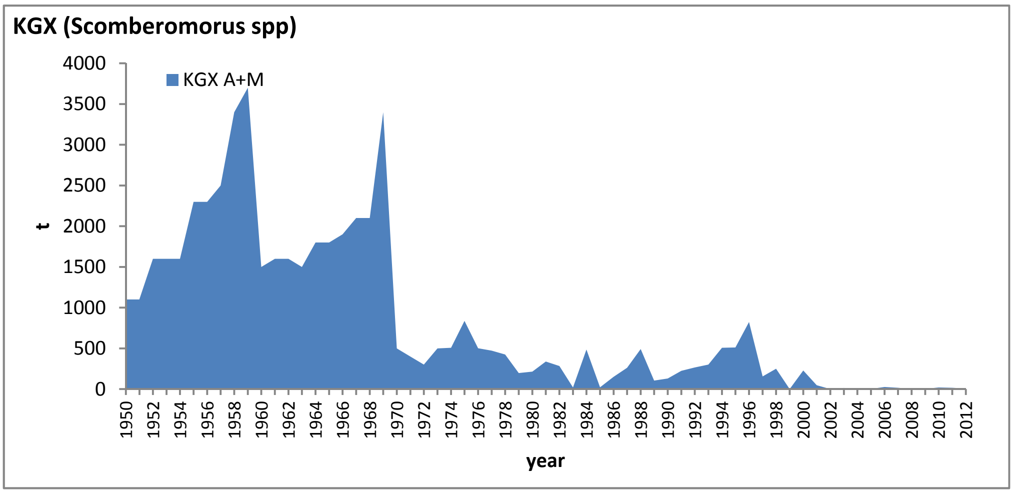


f)

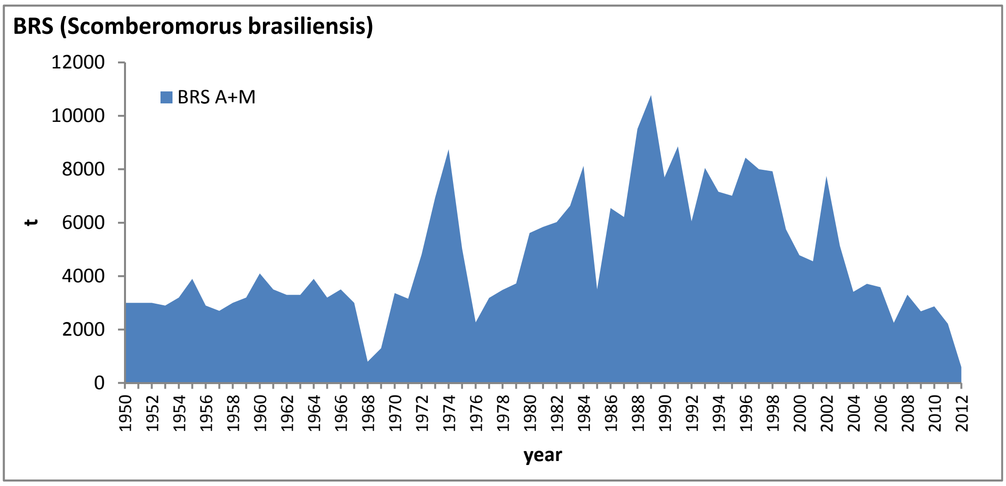


SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2012. The data for the last years are incomplete.

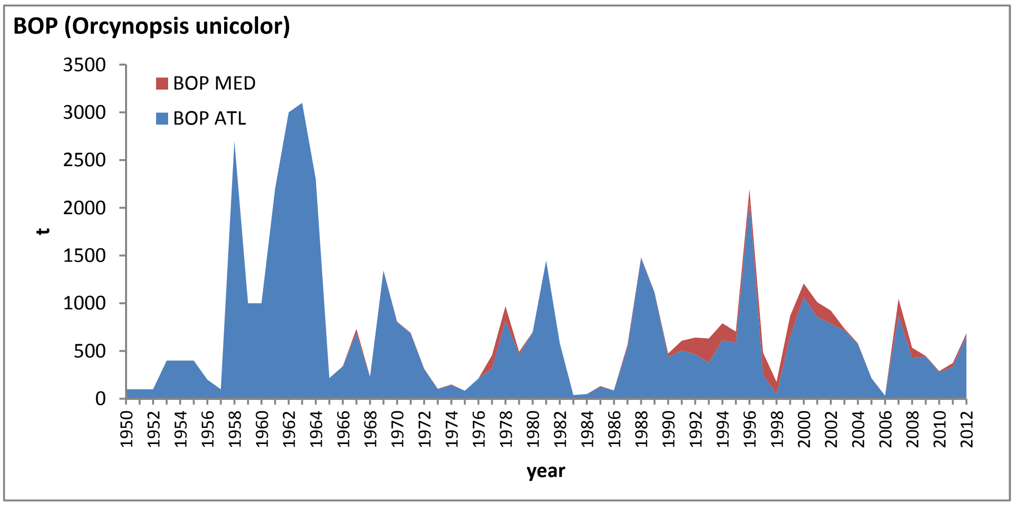
g)



h)

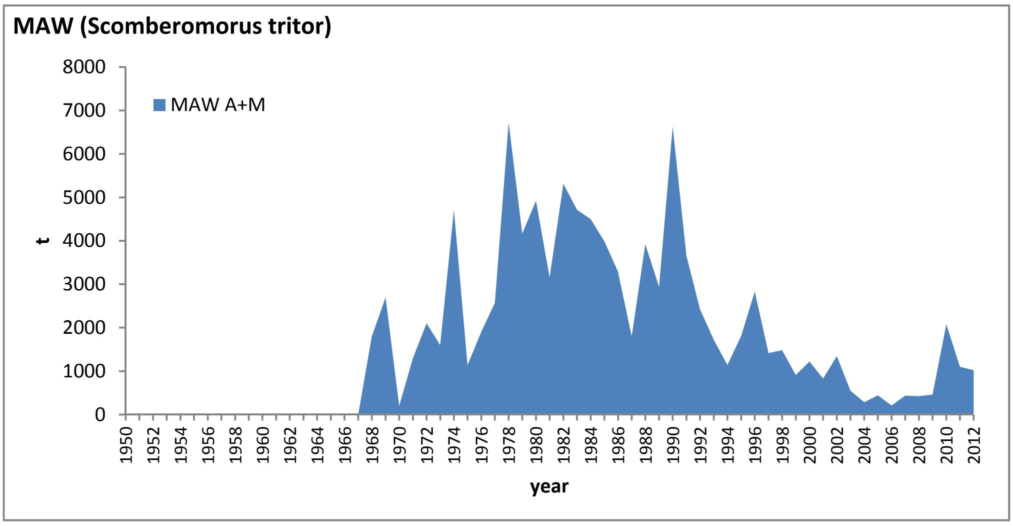


i)

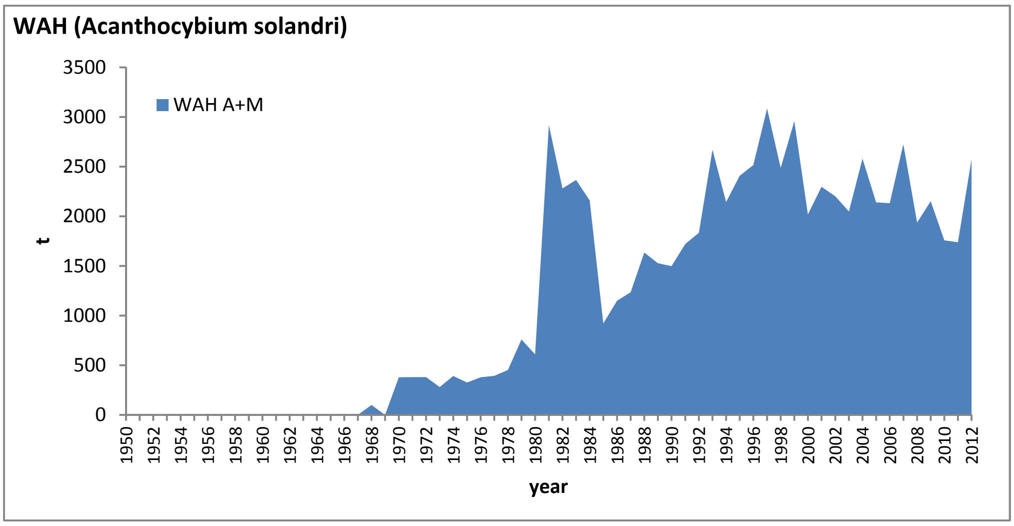


SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2012. The data for the last years are incomplete.

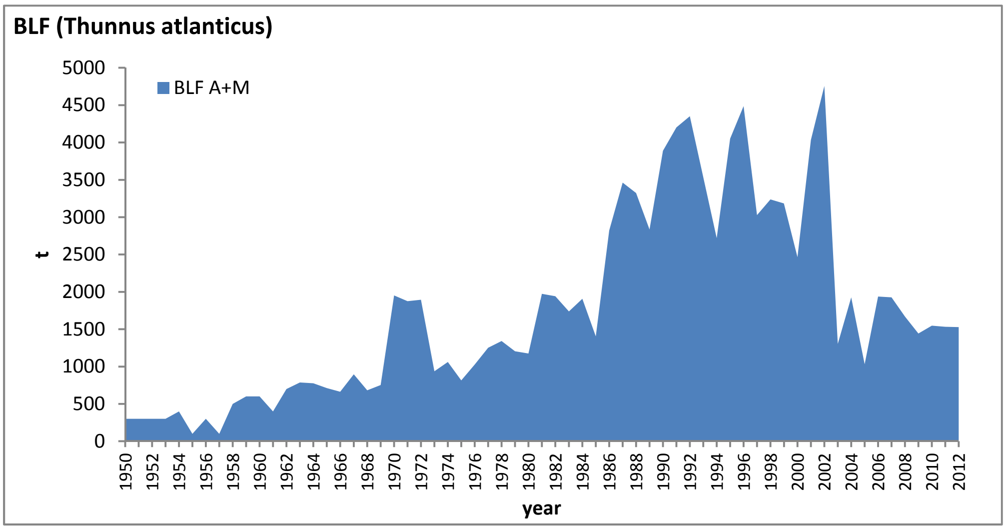
j)



k)

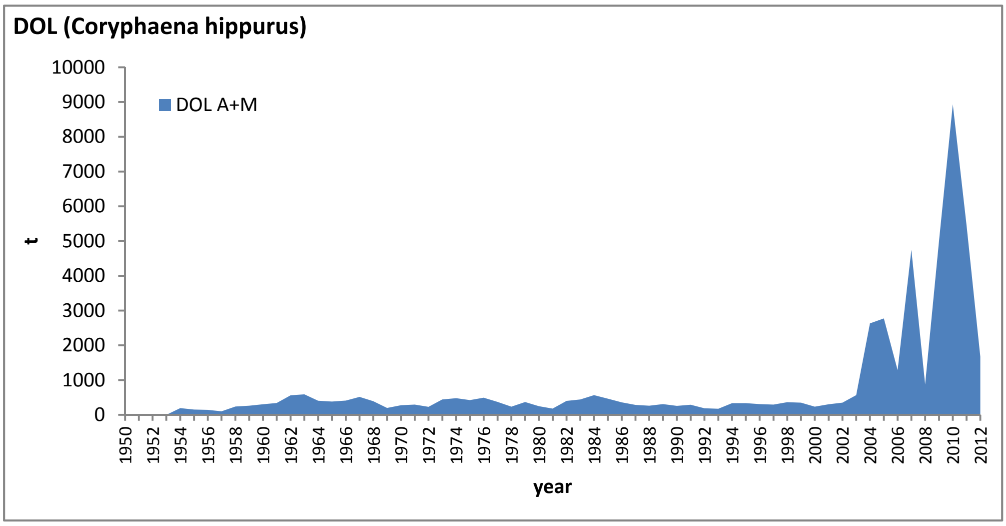


l)



SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2012. The data for the last years are incomplete.

m)



SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2012. The data for the last years are incomplete.

8.13 SHK - SHARKS

During 2013 a meeting was held to develop a Special Research Programme on sharks, as recommended at the 2012 shortfin mako assessment meeting. The Shark Research and Data Collection Programme was drafted during the meeting. Information about the status of the shortfin mako (*Isurus oxyrinchus*) is available in the 2012 report of the assessment (Anon. 2013c), while information about the status of the blue shark (*Prionace glauca*) and porbeagle (*Lamna nasus*) stocks is available in the SCRS 2008 and 2009 reports of the assessments of those species (Anon. 2009c). An Ecological Risk Assessment was also conducted for 16 shark species (20 stocks), which is detailed in the 2012 report of the Sharks Working Group.

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, and great white sharks.

Blue shark, shortfin mako and porbeagle are large pelagic sharks that show a wide geographic distribution; the first two from tropical to temperate waters worldwide, while the porbeagle has a distribution associated with cold-temperate waters. Shortfin mako and porbeagle have an aplacental viviparity with an oophagy reproductive system, which decreases their fecundity but increases the probability of survival of their young. The blue shark is placental viviparous and have an average litter size of 35 individuals, while the shortfin mako has an average litter size of around 12 and the porbeagle a litter size of usually just four individuals. Although high uncertainty regarding their biology remains, available life history traits (slow growth, late maturity and small litter size) indicate that they are vulnerable to overfishing. A behavioral characteristic of these species is their tendency to segregate temporally and spatially by size-sex, during feeding, mating-reproduction, gestation and birth processes. Tagging studies have suggested that they exhibit large-scale migratory behaviour and periodic vertical movement, but the lack of information on some components of the populations precludes a complete understanding of their distribution/migration pattern by ontogenetic stages and in some cases identifying their pupping/mating grounds. 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 and estimated catches for blue shark, shortfin mako and porbeagle are provided in **SHK-Table 1** and **SHK-Figures 1 to 2**.

A number of standardized CPUE data series for blue shark were presented in 2008. The Committee placed emphasis on using the series that pertained to fisheries that operate in oceanic waters over wide areas. **SHK-Figure 3** presents the central tendency of the available series for the two stocks of this species. During the 2012 shortfin mako stock assessment, different standardized CPUE series were presented, both for the south and north stocks. For both stocks, the series were conflicting and did not coincide with the catch tendencies (**SHK-Figures 4-5**). The Committee noted that the increase in the CPUE series could be due to an increase in abundance, an increase in catchability, in the fishing strategy or in data reporting for this species.

During the porbeagle assessment in 2009 (Anon. 2010b), 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 may not reflect the global abundance of the stock and where they refer to sharks caught as by-catch they could be highly variable. In 2010, only new information from the Japanese longline fleet on the CPUE of shortfin mako and porbeagle was presented.

With regard to the 16 species (20 stocks) included in the 2012 ERA, the Committee believes that, in spite of existing uncertainties, results are more robust than those obtained in the 2008 ERA. With this information the Committee considers it easier to identify those species that are most vulnerable to prioritize research and management measures **(SHK-Table 2)**. These ERAs are conditional on the biological parameters used to estimate productivity as well as the susceptibility values for the different fleets. The committee highlights the higher participation of scientists from diverse CPCs, who provided valuable data for this ERA.

SHK-3. State of the Stocks

The results of the stock assessments and the 2012 ERA carried out for elasmobranchs within the ICCAT Convention area are summarised below. To date, these assessments have focused only on Atlantic stocks, and not on shark stocks in the Mediterranean Sea stocks. Nevertheless, it should be noted that two Mediterranean-specific measures relevant to sharks species of interest were adopted during 2012. First, 10 elasmobranch species were strictly protected under Annex II of the Barcelona Convention (under the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean). These species include shortfin mako (*Isurus oxyrinchus*), porbeagle (*Lamna nasus*), smooth hammerhead (*Sphyrna zygaena*), scalloped hammerhead (*Sphyrna lewini*), great hammerhead (*Sphyrna mokarran*), and tope (*Galeorhinus galeus*). Under Annex II protection, these shark species can no longer be captured or sold, and plans for their recovery should be developed.

The ERA conducted by the committee was a quantitative assessment consisting of a risk analysis to evaluate the biological productivity of these stocks and a susceptibility analysis to assess their propensity to capture and mortality in pelagic longline fisheries. Three metrics were used to calculate vulnerability (Euclidean distance, a multiplicative index, and the arithmetic mean of the productivity and susceptibility ranks). The five stocks with the lowest productivity were the bigeye thresher (*Alopias superciliosus*), sandbar (*Carcharhinus plumbeus*), longfin mako (*Isurus paucus*), night (*Carcharhinus signatus*), and South Atlantic silky shark (*Carcharhinus falciformis*). The highest susceptibility values corresponded to shortfin mako (*Isurus oxyrinchus*), North and South Atlantic blue sharks (*Prionace glauca*), porbeagle (*Lamna nasus*), and bigeye thresher. Based on the results, the bigeye thresher, longfin and shortfin makos, porbeagle, and night sharks were the most vulnerable stocks. In contrast, North and South Atlantic scalloped hammerheads (*Sphyrna lewini*), smooth hammerhead (*Sphyrna zygaena*), and North and South Atlantic pelagic stingray (*Pteroplatytrygon violacea*) had the lowest vulnerabilities. More detailed analyses of productivity and susceptibility of some species, as well as improvements in the method used to estimate the overall longline effort (EFFDIS) will be conducted in 2013. The Committee observed that the data regarding night shark distribution was considered to be incomplete and therefore the results with regard to this species should be considered preliminary and requiring revision before publication.

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

The 2012 assessment of the status of North and South Atlantic stocks of shortfin mako shark was conducted with updated time series of relative abundance indices and annual catches. Coverage of Task I catch data and number of CPUE series increased since the last stock assessment conducted in 2008, with Task I data now being available for most major longline fleets. The available CPUE series showed increasing or flat trends for the finals years of each series (since the 2008 stock assessment) for both North and South stocks, hence the indications of potential overfishing shown in the previous stock assessment have diminished and the current level of catches may be considered sustainable.

For the North Atlantic stock, results of the two stock assessment model runs used indicated almost unanimously that stock abundance in 2011 was above B_{MSY} and F was below F_{MSY} (**SHK-Figure 8)**. For the South Atlantic stock, all model runs indicated that the stock was not overfished and overfishing was not occurring (**SHK-Figure 9)**. Thus, these results indicated that both the North and South Atlantic stocks are healthy and the probability of overfishing is low. However, they also showed inconsistencies between estimated biomass trajectories and input CPUE trends, which resulted in wide confidence intervals in the estimated biomass and fishing mortality trajectories and other parameters. Particularly in the south Atlantic an increasing trend in the abundance indices since the 1970s was not consistent with the increasing catches. The high uncertainty in past catch estimates and deficiency of some important biological parameters, particularly for the southern stock, are still obstacles for obtaining reliable estimates of current status of the stocks.

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. 2010b). 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 10**). 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 11**). 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.

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 12**). 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 was 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.

The SCRS welcomed the conservation and management measures adopted by the Commission recently regarding the species ranked as the most vulnerable in the 2008 and 2010 Ecological Risk Assessments and for which almost no data have been submitted (bigeye thresher, oceanic whitetip, hammerhead sharks and silky shark).

Considering the need to improve stock assessments of pelagic shark species impacted by ICCAT fisheries and bearing in mind Rec. 12-05 adopted in 2012 as well as the various previous recommendations which made the submission of shark data mandatory, the Committee strongly urges, the CPCs to provide the corresponding statistics of all ICCAT fisheries, and to the extent possible non-ICCAT fisheries, capturing these species, including recreational and artisanal fisheries. The Committee considers that a basic premise for correctly evaluating the status of any stock is to have a solid basis to estimate total removals.

During the 2009 porbeagle assessment, both porbeagle stocks in the northwest and northeast Atlantic were estimated to be overfished, with the northeastern stock being more highly depleted. In addition, porbeagle received a high vulnerability ranking in the 2008 and 2012 ERAs. 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 includes quotas and other management measures.

The Committee recommends that the Commission work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs (e.g., NAFO, CCSBT) 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 addition, stocks of mutual interest and areas of overlap, particularly species occurring in the Mediterranean Sea, should be discussed.

The Committee recommends that the Commission adopt measures that allow scientific observers to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs, skin samples, spiral valves, jaws, whole and skeletonized specimens for taxonomic work and museum collections) from currently prohibited species that are dead at haulback, provided that the samples are part of the research project approved by the SCRS. In order to obtain the approval, a detailed document outlining the purpose of the work, number and type of samples intended to be collected and the spatio-temporal distribution of the sampling work must be included in the proposal. Annual progress of the work and a final report on completion of the project shall be presented to the Sharks Species Group and the SCRS. For all of these species, biological knowledge is severely lacking therefore the Committee strongly recommended that these samples be collected

The Committee reiterates that the CPCs explore methods to estimate catches of sharks in purse seine and artisanal fisheries. Management measures should be applied to these sectors where catches of shark species are determined to be significant. Methods for mitigating shark by-catch by these fisheries also need to be investigated and applied.

Taking into consideration the continued high vulnerability ranking in the ERA, results from the modeling approaches used in the assessment, the associated uncertainty, and the relatively low productivity of shortfin mako sharks, the committee recommends, as a precautionary approach, that the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available for both the northern and southern stocks.

NORTH ATLANTIC BLUE SHARK SUMMARY

Provisional Yield (2012)		36,131 t[2]
2007 Yield		61,845 t[1]
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]
Overfished 2007 (Y/N)		No
Overfishing 2007 (Y/N)		No

[1] Estimated catch used in the 2008 assessments (Anon. 2009c).
[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

Provisional Yield (2012)		24,781t[2]
2007 Yield		37,075 t[1]
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[5]
Overfished 2007 (Y/N)		No
Overfishing 2007 (Y/N)		No

[1] Estimated catch used in the 2008 assessments (Anon. 2009c).
[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.

NORTH ATLANTIC SHORTFIN MAKO SUMMARY

Provisional Yield (2012)		4,488 t[1]
Relative Biomass	B_{2010}/B_{MSY}	1,15-2,04[2]
	B_{2010}/B_0	0,55-1,63[2]
Relative Fishing Mortality	F_{MSY}	0,029-0,104[2]
	F_{2010}/F_{MSY}	0,16-0,92[2]
Overfished 2010 (Y/N)		No[3]
Overfishing 2010 (Y/N)		No[3]
Management Measures in Effect:		[Rec. 04-10], [Rec. 07-06], [Rec. 10-06]

[1] Task I catch.
[2] Range obtained from BSP.
[3] The Committee considers that the results present a high level of uncertainty.

SOUTH ATLANTIC SHORTFIN MAKO SUMMARY

Provisional Yield (2012)		2,787 t[1]
Relative Biomass	B_{2010}/B_{MSY}	1,36-2,16[2]
	B_{2010}/B_0	0,72-3,16[2]
Relative Fishing Mortality	F_{MSY}	0,029-0,041[2]
	F_{2010}/F_{MSY}	0,07-0,40[2]
Overfished 2010 (Y/N)		No[3]
Overfishing 2010 (Y/N)		No[3]
Management Measures in Effect:		[Rec. 04-10], [Rec. 07-06], [Rec. 10-06]

1 Task I catch.
2 Range obtained from BSP.
3 The Committee considers that the results present a high level of uncertainty.

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]
Domestic management measures in effect		TACs of 185 t and 11.3 t[5]
Overfished (Y/N)		Yes
Overfishing (Y/N)		No

1 Estimated catch allocated to the Northwest stock area. Not updated as area boundaries have not been formally defined.
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]
Overfished (Y/N)		Yes
Overfishing (Y/N)		No
Management Measures in Effect:		None

1 Estimated catch allocated to the southwest stock area. Not updated as area boundaries have not been formally defined.
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]
Overfished (Y/N)		Yes
Overfishing (Y/N)		No
Domestic 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. Not updated as area boundaries have nt been formally defined.
[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.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			1835	1810	3028	4307	3643	9577	9562	9634	9560	37610	33809	35093	39101	34447	32735	35572	36304	43071	40351	47044	53900	58840	65192	73045	60953
	ATN		1835	1810	3028	4299	3536	9566	8084	8285	7258	29053	26510	25741	27965	21022	20037	22911	21740	22357	23215	26925	30722	35196	37177	38083	36131
	ATS		0	0	0	8	107	10	1472	1341	2301	8409	7238	9332	11091	13378	12682	12650	14438	20642	16957	20068	23097	23459	27799	34922	24781
	MED		0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	125	72	178	51	82	185	216	40	42
Landings	ATN	Longline	0	0	1387	2257	1583	5734	5880	5871	5467	27618	25288	24405	26473	20013	18426	21936	20304	21033	22090	25966	30443	34429	36283	37284	35916
		Other surf.	1414	1330	900	1270	1768	2696	1632	1793	1086	1255	1030	1228	1355	904	1543	975	1372	1258	1080	905	150	664	727	593	109
	ATS	Longline	0	0	0	8	107	10	1472	1341	2294	8398	7231	9305	11091	13376	12678	12645	14339	20638	16898	19998	22708	23453	27785	34531	24517
		Other surf.	0	0	0	0	0	0	0	0	0	6	4	27	0	1	4	6	99	3	59	10	375	6	14	391	264
	MED	Longline	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	44	72	83	49	81	18	50	40	41
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	0	95	2	1	167	165	0	0
Discards	ATN	Longline	421	480	741	772	184	1136	572	621	602	180	170	104	137	105	68	0	63	66	45	53	129	102	167	205	105
		Other surf.	0	0	0	0	0	0	0	0	103	0	22	4	0	0	0	0	1	0	0	0	1	1	1	2	1
	ATS	Longline	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	60	14	0	0	0	0
		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	114	461	1039	903
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	
		Canada	968	978	680	774	1277	1702	1260	1494	528	831	612	547	624	581	836	346	965	1134	977	843	0	0	0	0	1
		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	185	104	148	0	0	0	367	109	88	53	109	98
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	206	240	588	292	110	73	99	148	110
		EU.Denmark	0	2	2	1	1	0	1	2	3	1	1	0	2	1	13	5	1	0	0	0	0	0	0	0	0
		EU.España	0	0	0	0	0	0	0	0	0	24497	22504	21811	24112	17362	15666	15975	17314	15006	15464	17038	20788	24465	26094	27988	28666
		EU.France	91	79	130	187	276	322	350	266	278	213	163	399	395	207	221	57	106	120	99	167	119	84	122	115	31
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	66	31	66	11	2	0	0	0	0	0	0	0	1	3
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		EU.Portugal	0	0	1387	2257	1583	5726	4669	4722	4843	2630	2440	2227	2081	2110	2265	5643	2025	4027	4338	5283	6167	6252	8261	6509	3725
		EU.United Kingdom	0	0	1	0	0	0	0	12	0	0	1	0	12	9	6	4	6	5	3	6	6	96	8	10	8
		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	1	0	0	**0**
		Japan	0	0	0	0	0	0	1203	1145	618	489	340	357	273	350	386	558	1035	1729	1434	1921	2531	2007	1763	1227	1830
		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	537	299
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
		Panama	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	254	892	613	1575	0	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	0	0	0	0	43	134	255	56	0	5
		Suriname	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	2	1	1	0	2	8	9	11	11
		U.S.A.	355	271	87	308	215	680	29	23	283	211	255	217	291	39	0	0	7	2	2	1	8	4	9	65	56
		UK.Bermuda	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	26	10	18	7	71	74	117	98
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	259	0	236	109	0	273	243	483
		Benin	0	0	0	0	0	0	0	0	0	6	4	27	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	743	1103	0	179	1683	2173	1971	2166	1667	2523	2591	2258	1986	1274	1500	1980	1607
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	565	316	452	0	0	0	585	40	109	41	131	84
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521	800	866	1805	2177	1843	1356	1625	2138	1925
		EU.España	0	0	0	0	0	0	0	0	0	5272	5574	7173	6951	7743	5368	6626	7366	6410	8724	8942	9615	13099	13953	16978	14348
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	847	867	1336	876	1110	2134	2562	2324	1841	1863	3184	2751	4493	4866	5358	6338	7642	2424
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	239	0	0	14	0	0	
		Japan	0	0	0	0	0	0	1388	437	425	506	510	536	221	182	343	331	209	236	525	896	1789	981	1161	1483	1716
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222	125	112

		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2213	0	1906	6616	0	0	1829	207	2352	2957	1439
		Panama	0	0	0	0	0	0	0	0	0	0	0	168	22	0	0	0	0	0	0	0	521	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	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	203	51
		South Africa	0	0	0	0	0	0	0	0	0	0	23	21	0	83	63	232	128	154	90	82	126	119	125	318	158
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	**0**
		Uruguay	0	0	0	8	107	10	84	57	259	180	248	118	81	66	85	480	462	376	232	337	359	942	208	725	433
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	6	5	0	0	0	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	146	59	20	31	6	3	3	4	8	61	3	2	7	48	38	39
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	1	95	46	75	175	165	0	
		EU.Malta	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	2	2	2	1	1	2
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	2	0	5	41	14	3	0	56	22	0	0	0	2	0	
		Japan	0	0	0	0	0	0	5	7	1	1	0	0	0	0	0	1	1	2	0	0	2	0	0	0	
Discards	ATN	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
		U.S.A.	421	480	741	772	184	1136	572	618	704	180	192	100	137	106	68	0	65	66	45	54	130	103	167	206	106
		UK.Bermuda	0	0	0	0	0	0	0	3	1	0	0	8	0	0	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	60	14	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	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.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			1562	1648	1349	1326	1446	2966	2972	4870	2778	5570	5477	4097	4994	4654	5361	7324	7598	6618	6330	6911	5440	6143	6661	7023	7277
	ATN		1014	1011	785	797	953	2193	1526	3109	2019	3545	3816	2738	2568	2651	3395	3895	5174	3472	3370	4075	3559	4109	4183	3771	4488
	ATS		548	637	564	529	493	773	1446	1761	759	2019	1652	1355	2422	1996	1964	3426	2423	3130	2951	2834	1880	2034	2477	3250	2787
	MED		0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1	1	2	2	2
Landings	ATN	Longline	214	321	497	573	660	1499	1173	1633	1770	3369	3648	2645	2254	2424	3129	3792	4755	3172	3105	3901	3367	3551	3554	3197	4156
		Other surf.	795	681	278	213	254	670	331	1447	248	177	168	91	313	227	266	104	418	300	264	168	183	538	627	565	314
	ATS	Longline	548	637	564	519	480	763	1426	1748	744	1997	1642	1345	2413	1979	1949	3395	2347	3116	2907	2792	1798	2027	2476	3188	2732
		Other surf.	0	0	0	9	13	10	20	13	15	23	10	10	9	18	15	31	76	14	43	30	82	7	1	62	55
	MED	Longline	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1	1	2	2	2
		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	
Discards	ATN	Longline	5	9	10	11	38	24	21	29	1	0	0	0	0	0	0	0	0	0	0	7	9	20	2	9	18
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	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	23	28	69	114
		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	111	67	110	69	70	78	69	78	73	80	91	71	72	43	53	41	37	29
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	16	19	29	18	24
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	57	19	30	25	23	11	14	13	20
		EU.España	0	0	0	0	0	0	0	0	0	2416	2199	2051	1566	1684	2047	2068	3404	1751	1918	1816	1895	2216	2091	1667	2308
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2	0	0
		EU.Portugal	0	0	193	314	220	796	649	657	691	354	307	327	318	378	415	1249	473	1109	951	1540	1033	1169	1432	1045	1023
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	1	1	0	0	0	1	15	0	0	0
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	4	0	**0**
		Japan	113	207	221	157	318	425	214	592	790	258	892	120	138	105	438	267	572	0	0	82	131	98	116	53	62
		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	27	27
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	420	406
		Mexico	0	0	0	0	0	0	0	10	0	0	0	0	10	16	0	10	6	9	5	8	6	7	8	8	8
		Panama	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	49	33	39	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	17	21	0	0	2
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3	1	2	1	1	1	1	1	0	2
		U.S.A.	896	795	360	315	376	948	642	1710	469	407	347	159	454	395	415	142	521	469	386	375	344	365	392	383	411
		UK.Bermuda	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	20	6	11	2	35	22	20	33
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	17	2	0	32	59	78
		Brasil	0	0	0	0	0	0	0	0	83	190	0	27	219	409	226	283	238	426	210	145	203	99	128	192	196
		China P.R.	0	0	0	0	0	34	45	23	27	19	74	126	305	22	208	260	0	0	0	77	6	24	32	29	8
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	121	128	138	211	124	117	144	203	144
		Côte D'Ivoire	0	0	0	9	13	10	20	13	15	23	10	10	9	15	15	30	15	14	16	25	0	5	7	0	20
		EU.España	0	0	0	0	0	0	0	0	0	1356	1141	861	1200	1235	811	1158	703	584	664	654	628	939	1192	1535	1197
		EU.Portugal	0	0	0	0	0	0	0	92	94	165	116	119	388	140	56	625	13	242	493	375	321	502	336	409	176
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	11	0	0	
		Japan	525	618	538	506	460	701	1369	1617	514	244	267	151	264	56	133	118	398	0	0	72	115	108	103	132	212
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	13	7
		Namibia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	459	0	509	1415	1243	1002	295	23	307	377	586

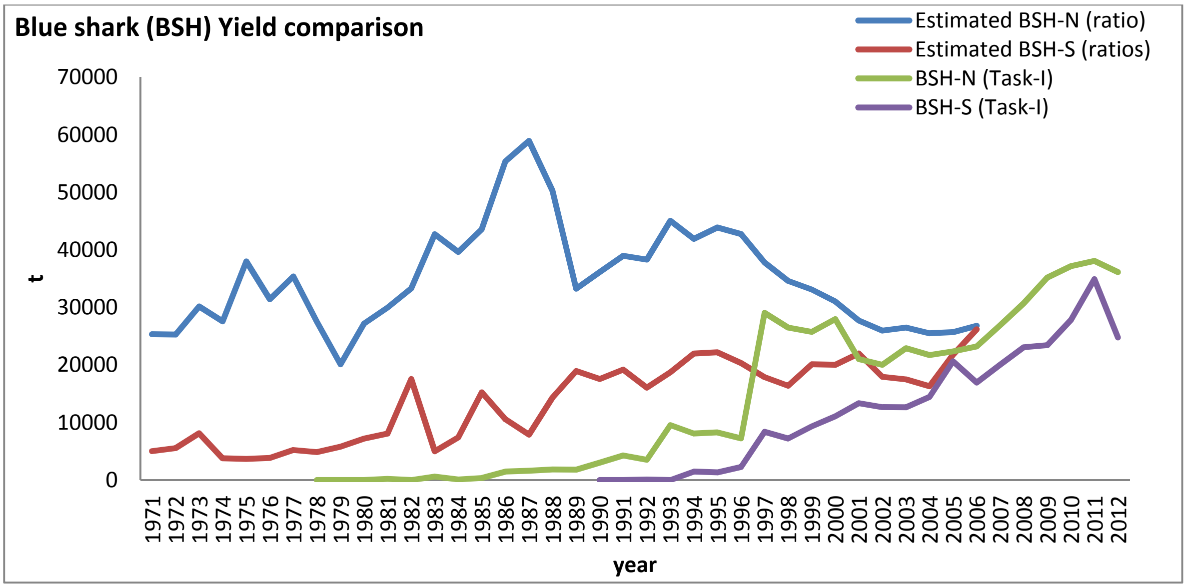
		Panama	0	0	0	0	0	0	0	0	0	0	0	24	1	0	0	0	0	0	0	0	10	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	34
		South Africa	0	0	0	0	0	0	0	0	0	0	19	13	0	79	19	138	126	125	99	208	136	100	144	211	92
		U.S.A.	0	0	0	0	0	0	0	0	0	2	1	0	2	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	0
		Uruguay	23	19	26	13	20	28	12	17	26	20	23	21	35	40	38	188	249	146	68	36	41	106	23	76	36
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	12	13	1	0	0	0	0	
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	
		EU.España	0	0	0	0	0	0	0	0	0	6	7	5	3	2	2	2	2	2	4	1	0	0	1	2	2
		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.Portugal	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0	0	15	5	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	
		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	0
Discards	ATN	Mexico	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	5	9	10	11	38	24	21	28	1	0	0	0	0	0	0	0	0	0	0	7	10	20	2	9	18
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	2	0	0	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	12	0	0	0	0	

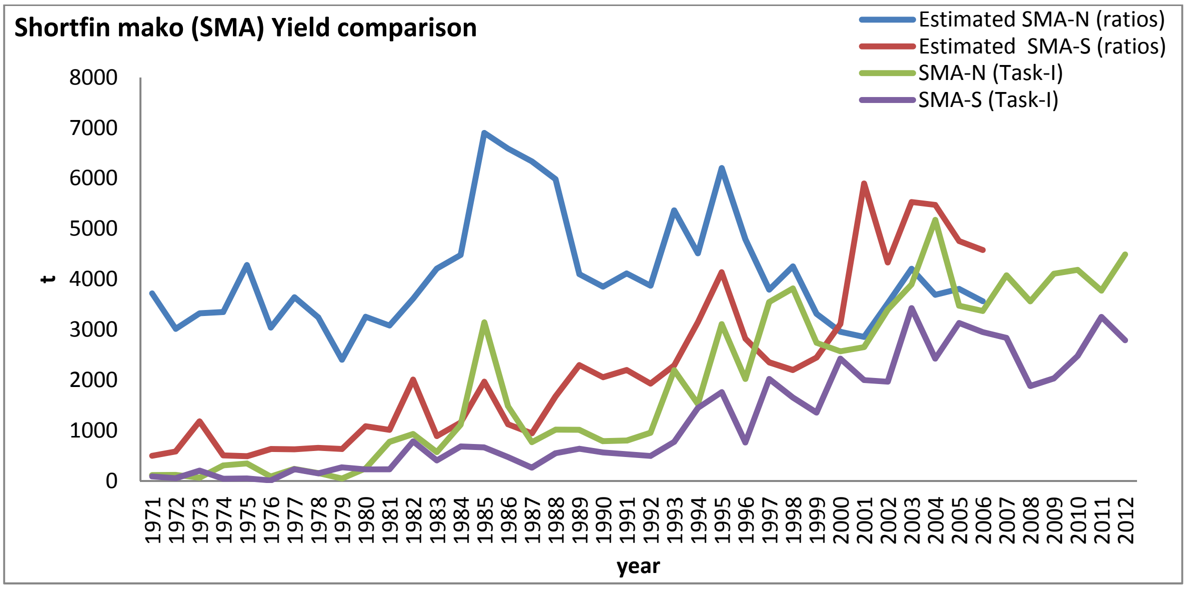
POR-Table 1. Estimated catches (t) of porbeagle (*Lamna nasus*) by area, gear and flag.

			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
TOTAL			1025	1013	1309	1990	2603	1910	2729	2140	1560	1859	1469	1403	1469	999	848	648	745	571	507	525	611	484	136	90	188
	ATN		1024	1013	1309	1990	2603	1909	2726	2136	1556	1833	1451	1393	1457	998	838	604	725	539	470	512	524	421	119	68	157
	ATS		1	0	0	0	0	1	2	3	3	26	17	10	11	1	11	43	17	31	37	13	85	62	16	21	30
	MED		0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2	1	1	0	1
Landings	ATN	All gears	1024	1013	1309	1990	2601	1909	2725	2136	1556	1833	1451	1393	1457	998	838	604	725	539	470	512	524	421	117	67	157
	ATS	All gears	1	0	0	0	0	1	2	3	3	26	16	9	11	1	11	43	17	31	37	13	85	62	16	21	30
	MED	All gears	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2	1	1	0	1
Discards	ATN	All gears	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	
	ATS	All gears	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
Landings	ATN	Canada	83	73	78	329	813	919	1575	1353	1051	1334	1070	965	902	499	237	142	232	202	192	93	124	62	83	30	33
		EU.Denmark	33	33	46	85	80	91	93	86	72	69	85	107	73	76	42	0	0	0	0	0	0	0	0	0	2
		EU.España	69	42	26	47	15	21	52	19	41	25	25	18	13	24	54	27	11	14	34	8	41	77	0	0	**0**
		EU.France	446	341	551	300	496	633	820	565	267	315	219	240	410	361	461	303	413	276	194	354	311	228	0	2	4
		EU.Germany	0	0	0	0	0	0	0	0	0	0	0	0	17	1	3	0	0	0	0	0	0	0	0	0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	8	2	6	3	11	18	0	4	8	7	3	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	
		EU.Portugal	3	2	2	1	0	0	0	0	0	0	0	0	7	4	10	101	50	14	6	0	3	17	7	0	0
		EU.Sweden	3	3	2	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	
		EU.United Kingdom	3	15	9	0	0	0	0	0	0	0	1	6	8	12	10	0	0	24	11	26	15	11	0	0	0
		Faroe Islands	373	477	550	1189	1149	165	48	44	8	9	7	10	0	0	0	0	0	0	0	0	0	0	0	0	
		Iceland	0	0	0	0	1	3	4	6	5	3	4	2	2	3	2	1	1	0	1	0	1	0	1	0	
		Japan	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	12	10	13	13	14	78
		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
		Norway	11	25	43	32	41	24	24	26	28	17	27	32	22	11	14	19	0	8	27	10	12	10	12	11	17
		U.S.A.	0	2	2	5	1	50	106	35	78	56	13	3	1	1	1	0	1	0	0	0	1	1	1	11	21
	ATS	Benin	0	0	0	0	0	0	0	0	0	4	0	4	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	2	
		Chile	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	2	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	2	2	2	7	1	2	9	4	0	3	5	4	13	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	
		EU.Poland	0	0	0	0	0	0	1	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	4	2	0	0	0	0	0	0	
		Falklands	0	0	0	0	0	0	0	0	0	0	1	0	0	0	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	
		Japan	1	0	0	0	0	1	0	0	3	14	0	1	0	0	0	0	0	0	0	5	41	34	8	7	17
		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	3	0	5	13	2	4	0	8	34	8	28	34	3	40	14	6	12	12
	MED	EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	2	0	0	0	
		EU.Malta	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0	0	1	0	0	1
Discards	ATN	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	
		U.S.A.	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	
	ATS	Uruguay	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	

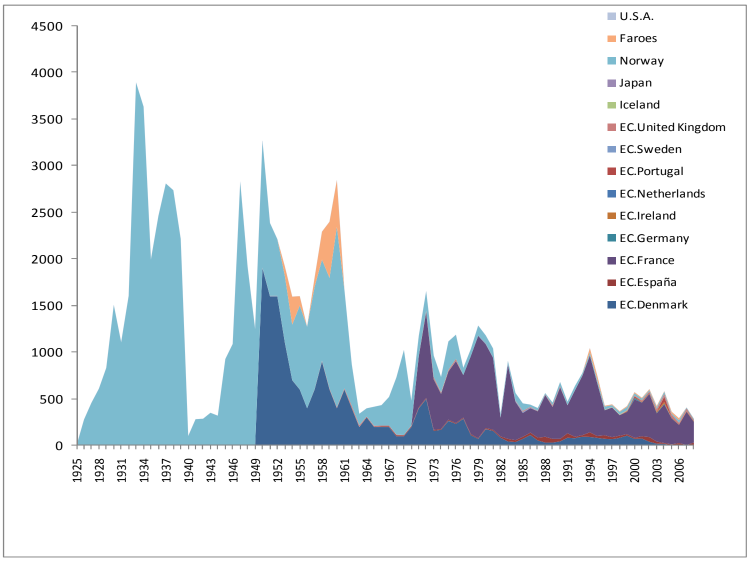
SHK-Table 2. Vulnerability ranks for 20 stocks of pelagic sharks calculated with three methods: Euclidean distance (v1), multiplicative (v2), and arithmetic mean (v3). A lower rank indicates higher risk. Stocks listed in decreasing risk order according to the sum of the three indices. Red highlight indicates risks scores 1-5; yellow, 6-10; blue, 11-15; and green, 16-20. Productivity values ranked from lowest to highest.

Stock	v_1	v_2	v_3
BTH	3	1	1
LMA	5	3	2
SMA	1	8	2
POR	2	7	4
CCS	11	4	5
FAL SA	12	5	6
CCP	15	2	6
OCS	4	13	8
FAL NA	8	11	8
ALV	9	14	11
BSH NA	6	19	10
DUS	17	6	12
SPK	14	10	13
BSH SA	7	20	14
TIG	10	16	15
PLS SA	18	9	16
SPL NA	16	12	16
SPZ	13	17	18
SPL SA	19	15	19
PLS NA	20	18	20

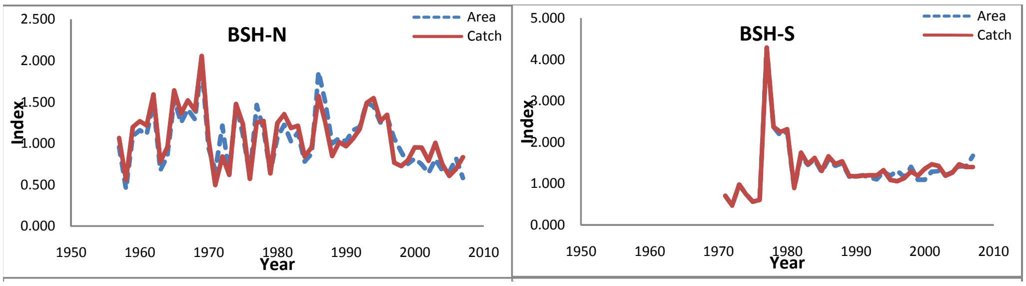




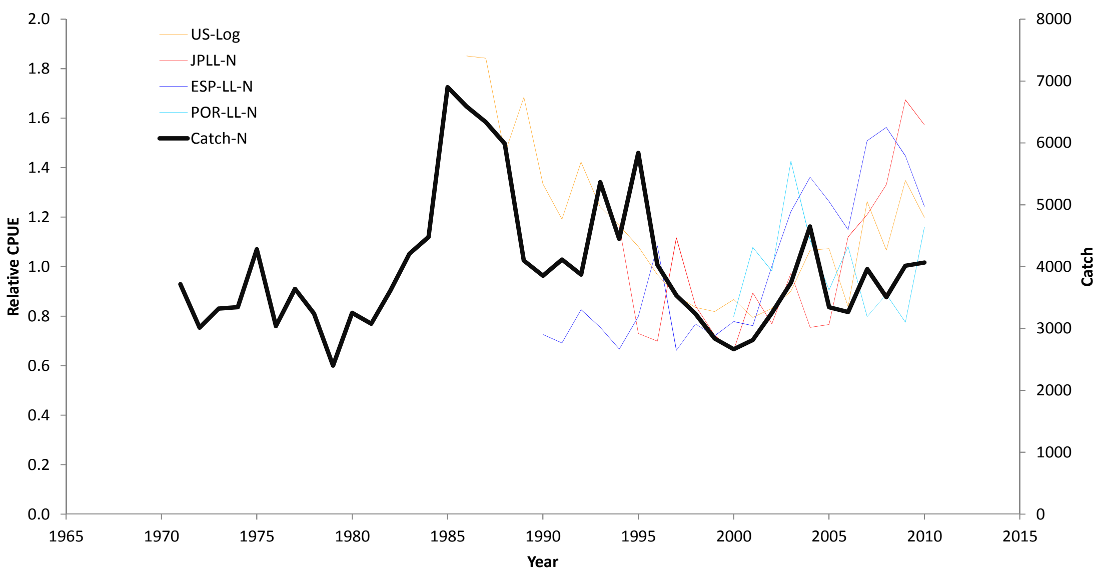
SHK-Figure 1. Blue shark (BSH) and shortfin mako (SMA) catches reported to ICCAT (Task I) and estimated by the Committee (2012 landings are considered provisional).



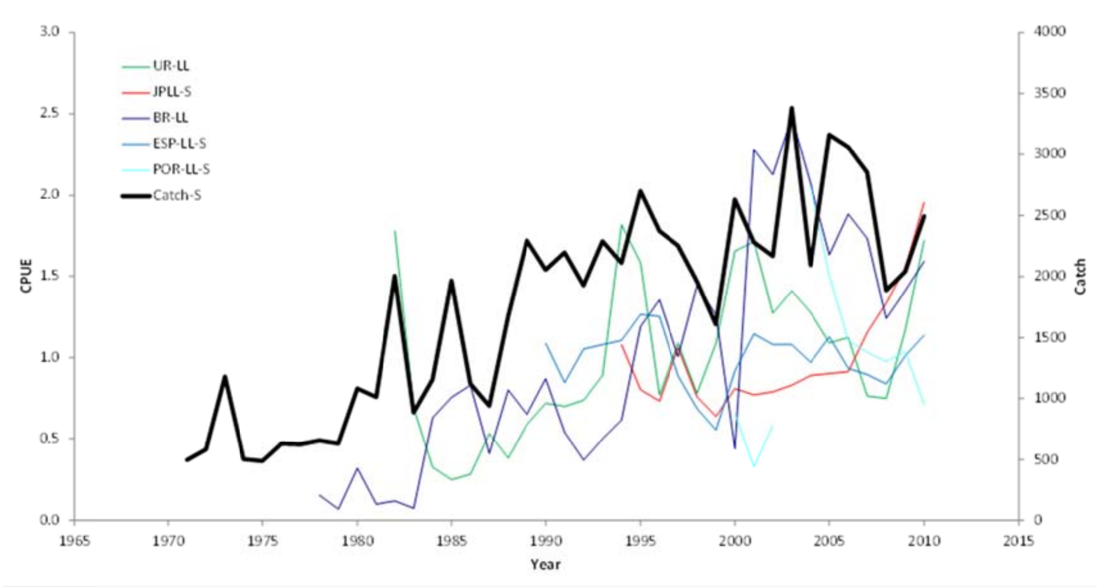
SHK Figure 2. Catch by flag of porbeagle sharks from the northeastern Atlantic used in the assessment. While these catches are considered the best available, they are believed to underestimate the pelagic longline catches for this species.



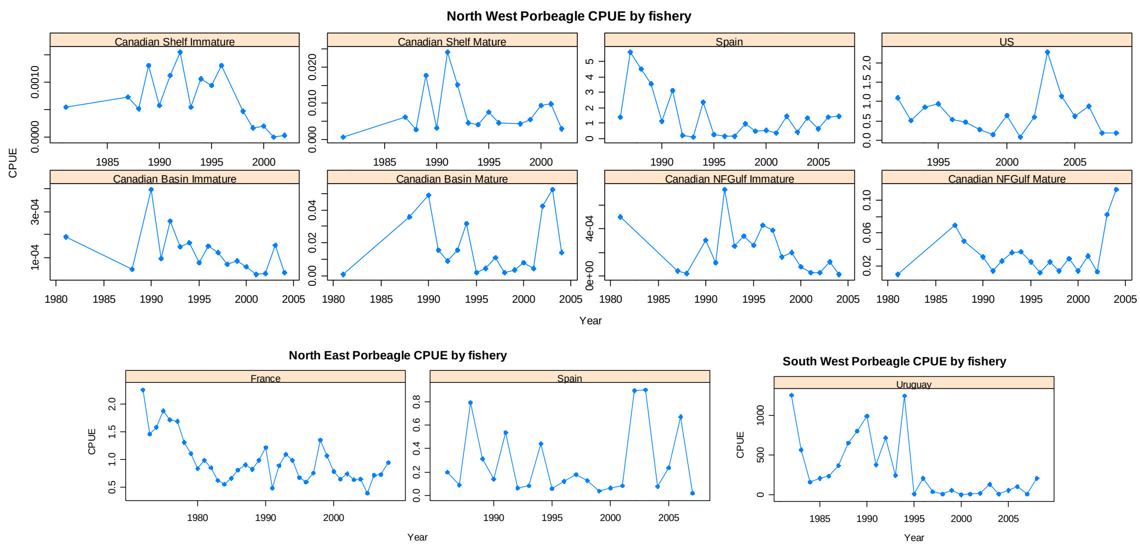
SHK-Figure 3. Average trends in the CPUE series used in the assessments of blue shark (BSH). The averages were calculated by weighting the available series either by their relative catch or by the relative spatial coverage of the respective fisheries.



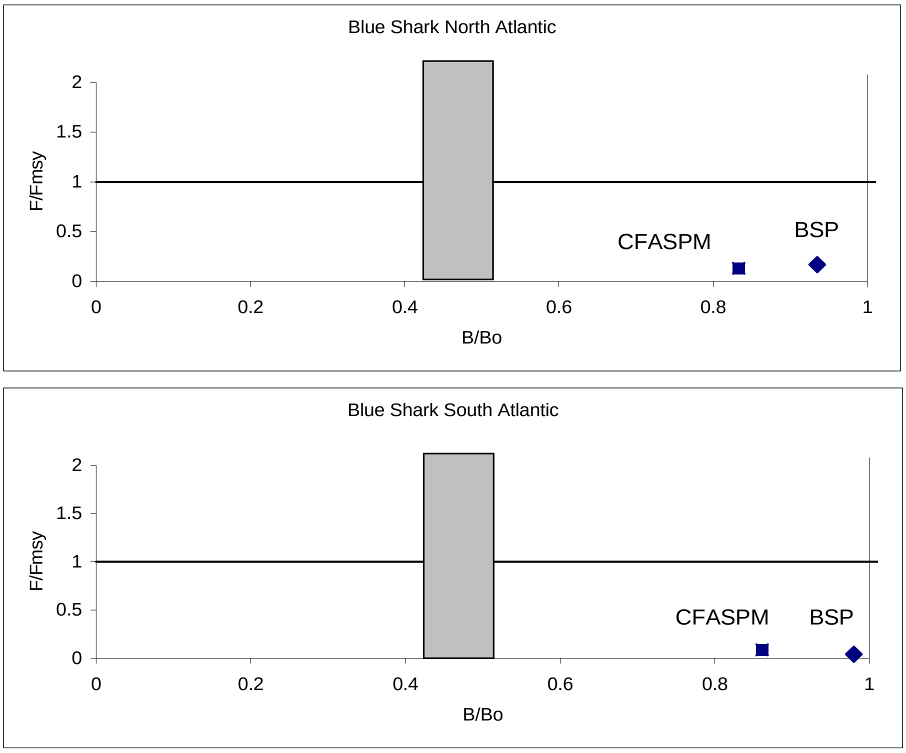
SHK-Figure 4. Indices of abundance for North Atlantic shortfin mako shark, along with total catches input into the BSP model.



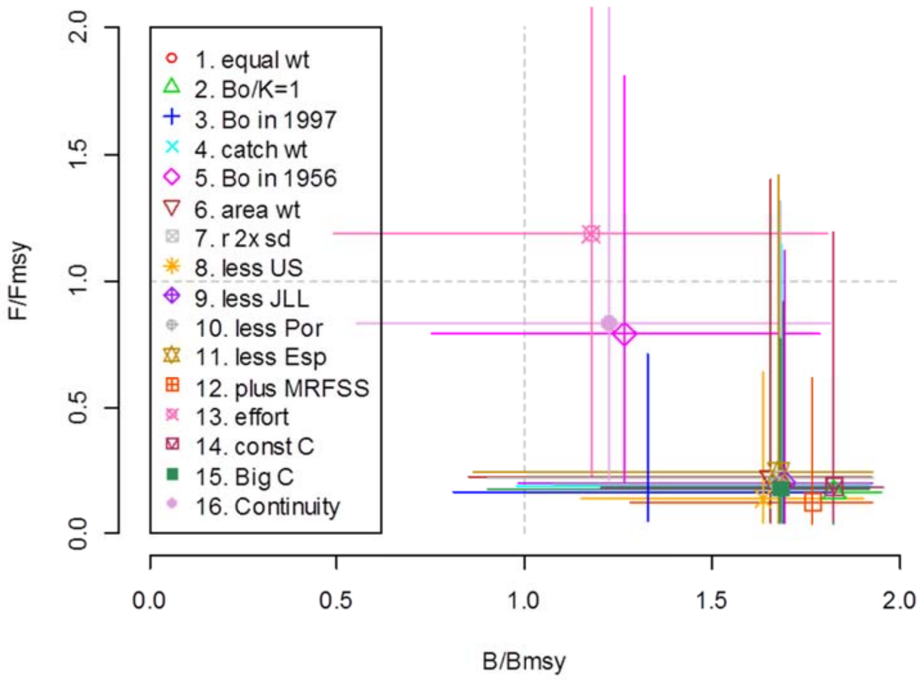
SHK-Figure 5. South Atlantic catches and indices of abundance input to the BSP model.



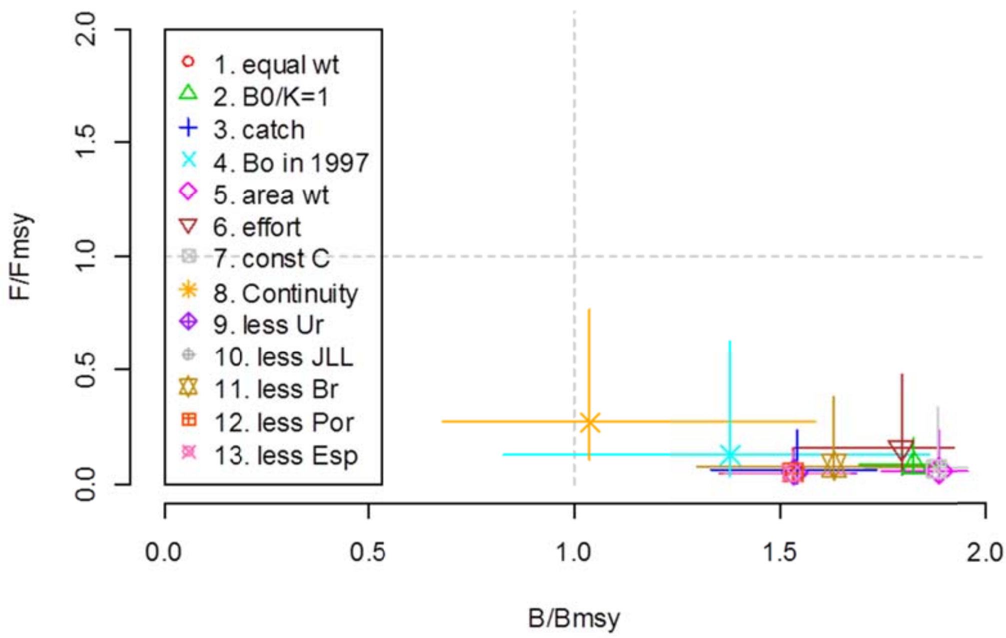
SHK-Figure 6. CPUE series for the porbeagle used in the last assessment NW stock (upper figures), NE stock (lower left figures) and SW stock (lower right figure).



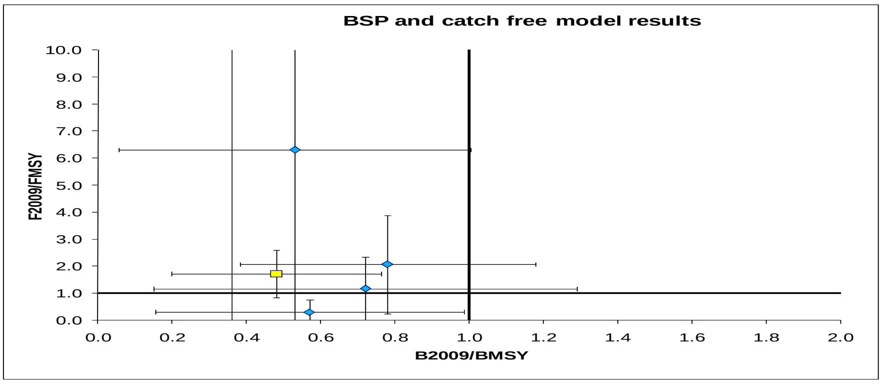
SHK-Figure 7. Phase plots summarizing base scenario outputs for the current stock status of blue shark (BSH). BSP=Bayesian surplus production model; CFASPM=catch-free, age-structured production model. The shaded box represents the area at which the biomass at MSY is estimated to be reached. Any points 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.



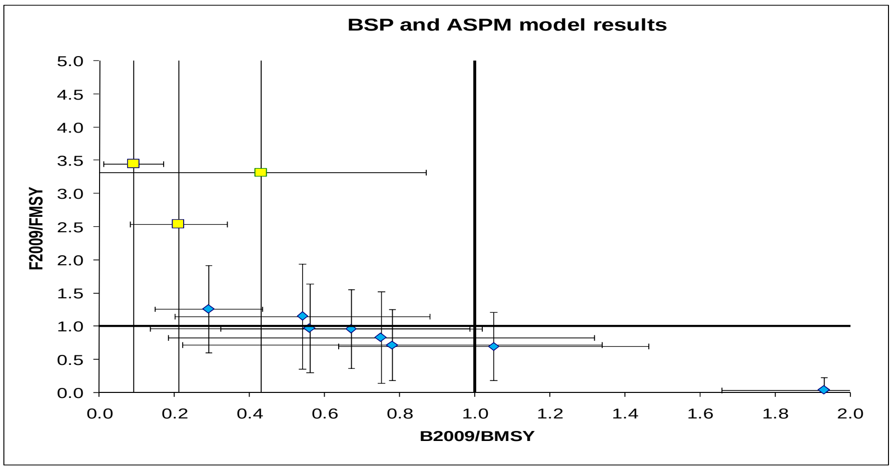
SHK-Figure 8. For North Atlantic shortfin mako sharks, median biomass relative to B_{MSY} and median fishing mortality rate relative to F_{MSY}, with 80% credibility intervals, from BSP model.



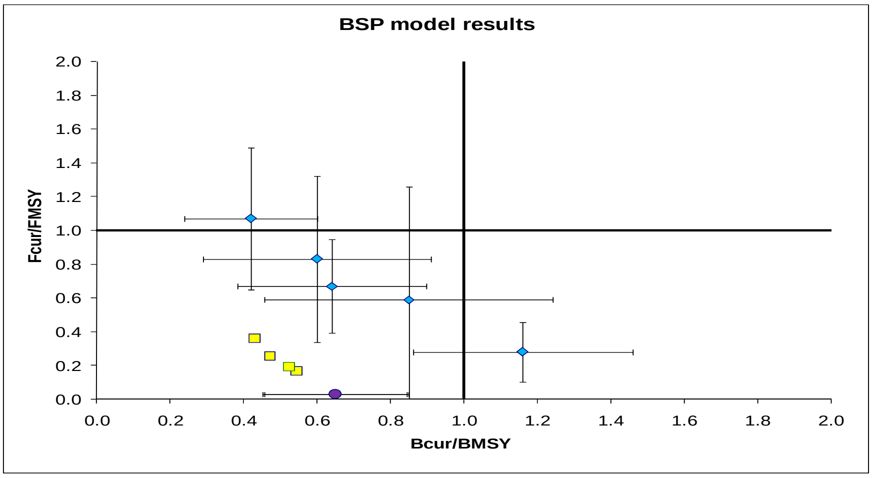
SHK-Figure 9. For South Atlantic shortfin mako sharks, median biomass relative to B_{MSY} and fishing mortality rate relative to F_{MSY}, with 80% credibility intervals.



SHK-Figure 10. 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 11. 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 12. 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 (circle), 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 SCRS meetings

The reports of the inter-sessional meetings held in 2013 were presented.

9.1 Meeting of the ICCAT Working Group on Stock Assessment Methods

The Meeting of the Working Group on Stock Assessment Methods (WGSAM) was held in Madrid, Spain, 11-15 March 2013. The main objective of the meeting was to help develop stock assessment model diagnostics, provide definitions for establishing limit reference points using of Management Strategy Evaluation and to revise the Terms of References for Peer Review of stock assessments. The latter included identification and selection of invited experts.

Discussion

It was noted that a review of the algorithms used for estimating effort in the EFFDIS database is planned for the future and that stock assessment models for bluefin tuna are being not being developed by this group but by the group on Bluefin Tuna Stock Assessment Methods. It is planned to have a meeting on MSE for all stocks at the next Commission meeting.

The Detailed Report of the WGSAM meeting is presented as document SCRS/2013/010.

9.2 Tropical Tunas Species Group Inter-sessional Meeting

The Inter-sessional Meeting of the Tropical Tuna Species Group was held in Tenerife, Spain, 18-21 March 2013. The objective of the meeting was to establish the Terms of Reference to design the Atlantic Ocean Tropical Tagging Program (AOTTP).

Discussion

Collaboration across the geographical range of tropical tuna stocks was stressed, particularly since these species are sensitive to climatic effects and that simulation of tagging programmes showed the need to cover all areas where fish may be found and caught. While funding will take place at a regional level there is a need to cover the whole of the tropical Atlantic. The response to the commission on FADs is addressed in section 16.

The Detailed Report of the Tropical Species Group inter-sessional meeting is presented as document SCRS/2013/011.

9.3 Atlantic Albacore Data Preparatory Meeting and Stock Assessment Meetings

The North and South Atlantic Albacore Data Preparatory Meeting was held in Madrid, Spain, 22-26 April 2013. The main objective of the meeting was to review and prepare the data required to carry out stock assessments on North and South Atlantic stocks.

At the assessment of the North and South Atlantic albacore stocks held in Sukarrieta, Spain, 17-24 June 2013, an assessment was carried out on the stocks of North and South Atlantic albacore and advice was prepared within the Kobe framework was prepared and a provisional limit reference of 40% of B_{MSY} was proposed. Progress was made in using the assessment of management strategies to evaluate the limit reference point as part of a harvest control rule.

Discussion

Recent estimates of recruitments have appeared to declined; however changes in the distribution of fishing fleets could have resulted in a bias in the stock assessment. It was also pointed out that it was difficult to fully evaluate the effect of these changes and potential biases since the data used to create the maps were incomplete and these should be updated if possible.

The Detailed Reports of the Albacore Data Preparatory Group meeting and the North and South Atlantic Albacore Stock Assessment Session are presented as documents SCRS/2013/013 and SCRS/2013/016, respectively.

9.4 Bluefin Meeting on Biological Parameters Review

The Bluefin Meeting on Biological Parameters Review meeting was held in Tenerife, Spain, 7-13 May 2013. The Group assessed the results of research on biology and other stock parameters carried out within the framework of the GBYP.

Discussion

The Tenerife meeting showed that improved estimates of Task II (catch-at-size size) data may be obtained based on observer data from fattening cages and that this is one of the items on the work plan for 2014 along with improving Task II data.

The Detailed Report of the Bluefin Meeting on Biological Parameters Review is presented as document SCRS/2013/014.

9.5 Bluefin Stock Assessment Methods Meeting

The Bluefin Stock Assessment Methods Meeting was held in Gloucester, Massachusetts, USA, 20-22 July 2013. The main objective of this meeting was to review GBYP contributions towards understanding of bluefin tuna stocks in its different aspects (biology, stock structure, etc.) and establish a detailed multi-annual work plan to carry out stock assessments required by the Commission and assess management procedures based on an operating model developed for Atlantic bluefin tuna.

Discussion

The details of the plan are dealt with under the Bluefin Work Plan for 2014.

The Detailed Report of the Bluefin Stock Assessment Methods meeting is presented as document SCRS/2013/018.

9.6 Atlantic Swordfish Data Preparatory and Stock Assessment Meetings

The Atlantic Swordfish Data Preparatory Meeting was held in Madrid, Spain, 3-10 June 2013. The main objective of the meeting was to review and prepare the necessary data to carry out the assessments of the stock of North and South Atlantic swordfish.

The Atlantic Swordfish Stock Assessment Session was held in Olhào, Portugal, 2-10 September 2013. The assessment was carried out, advice within the Kobe framework was prepared, and a provisional limit reference of 40% of B_{MSY} was proposed for the North stock.

The Detailed Reports of the Atlantic Swordfish Data Preparatory meeting and the Atlantic Swordfish Stock Assessment Session are presented as documents SCRS/2013/015 and SCRS/2013/019, respectively.

9.7 Sharks Species Group Inter-sessional Meeting

The Inter-sessional Meeting of the Sharks Species Group was held in Mindelo, Cape Verde, 8-12 April, 2013. The main objective of the meeting was to develop the Special Research Programme on Sharks framed within the SCRS Science Strategic Plan foreseen for the period 2015-2020.

Discussion

The importance of the Special Research Programme and that it should be framed within the SCRS Science Strategic Plan foreseen for the period 2015-2020 was agreed.

The Detailed Report of the Sharks Species Group inter-sessional meeting is presented as document SCRS/2013/012.

10. Report of Special Research Programs

10.1 Atlantic-wide Research Program for Bluefin Tuna (GBYP)

Dr. Antonio Di Natale, Program Coordinator, presented the report on the Atlantic-wide Bluefin Tuna Research Programme (GBYP) activities carried out in 2013, including the report of the GBYP Operational Meeting on tagging, biological and genetic sampling and analyses.

The SCRS Chairman recognized the good work conducted by the GBYP team and the ICCAT Secretariat as well as the coordinated work of the CPC research institutions and scientists. The efforts in obtaining fisheries independent data was also welcomed by the Committee.

The Program Coordinator clarified that the role of the program is to provide the requested data in the best format and of the best quality possible. It is then the responsibility of the species group to use data. The future modeling activities have explicitly been planned to utilize the information. It was also noted that a comprehensive modeling work plan has been presented and provided which not only outlines future activities but also their priorities. These plans will prove invaluable for stating to the Commission where the project currently stands and where it will be in 2015 as well as the need for stable funding to fulfill the specific tasks required to provide better scientific advice for management. The need to continue some research within the necessary time frame for providing reliable data was also reported.

The ongoing issue of annual contributions was briefly discussed and it was again stressed that from an administrative perspective, the funding is based on an annual cycle and the grants need to be closed every year.

The intention of having a Larval workshop was presented and it was clarified that the intention is to have scientists work together to provide a plan for this survey to be conducted outside the GBYP.

Lastly, it was noted that the first two years the GBYP reports have provided qualitative estimates of the various sources of uncertainty associated with the current assessment procedures. These reports are available on the ICCAT webpage. A current study to provide more quantitative estimates of uncertainty should be completed by January 2014.

The Committee noted the importance of the continuity of the bluefin research. It was proposed to search for procedures to ensure stable funding for the current GBYP, recommending that this issue will be further discussed by the Commission.

The report was adopted and is attached as **Appendix 5.**

Dr. Alain Fonteneau presented the findings of the mid-term review of the GBYP. This report is available as SCRS/2013/178). This report is overall a very positive analysis of the GBYP, while making various recommendations aimed at improving the good valuation of its results or to complete the current research of the GBYP. This report also recommends that the multiple data from the GBYP and from other sources (observers) be fully available to the scientists for analysis and to carry out the synthesis of these multiple statistical and biological results. The report concludes that priority should be given in carrying out a synthesis on bluefin tuna subpopulation structure and movements. It also notes that some additional research should be envisaged to improve the quality of the bluefin stock assessments, and stresses the need to plan, from now on, future research that will be necessary for the GBYP.

The external report was welcomed and the importance of external review in order to improve the work of the programme was also welcomed. It was pointed out that a response document of the GBYP Steering Committee had already been prepared to address some of the issues but that this process has proved to be very positive.

The ICCAT Executive Secretary responded to the comments, stressing that the project has not been without its difficulties. It was stressed that the Secretariat has to work within the constraints of ICCAT regulations and has to act accordingly when facilitating the programme. It was also stressed that the GBYP has imposed a big administrative burden on the Secretariat and has placed great demands on the professional staff. Despite these issues, the programme has always been discussed and debated openly and every effort has been made to ensure that the project runs smoothly and efficiently.

It was noted that there is a need to provide clear information on the progress made under the GBYP as well as how the information collected has been used or will be used by the SCRS or why some data hasn't been utilized at this stage and thus explain to Commission. In addition, with regards the list of research topics or projects still to be carried out to improve the knowledge on bluefin tuna and introduced as recommendations or the GBYP mid-term review report, needs for clear priorities and the establishment of a work-programme associated to possible time schedule and budgetary considerations were also raised.

The Secretariat presented a report of the recommendations from the Bluefin Species Group regarding integration of the GBYP data to the ICCAT databases. These recommendations are relevant to annual catch estimates of eastern bluefin (1950-2011) to be added to the total removals estimates (e.g. Task I). Also there were presented specific recommendations for adding Catch and effort and Size data obtained under the GBYP projects to the ICCAT corresponding databases. These recommendations are included as **Appendix 10**.

The SCRS expressed the importance of this data and priority for made it available the Working Group for upcoming analyses.

Regarding the availability of data, the Secretariat pointed out that all data collected under GBYP have been processed and validated by the Secretariat. Part of these data will be integrated in the ICCAT database following the procedure defined in **Appendix 10,** while other parts of the data are pending the review and approval by the SCRS. It was pointed out that the SCRS and Commission had already held two meetings to address exactly this issue. Firstly an SCRS/COM meeting held in Tenerife set priorities for the project as a whole, whilst a meeting held in Gloucester, USA set scientific priorities. The meetings are both covered in explicit points under the SCRS Agenda.

10.2 Enhanced Research Program for Billfish

The report of the Program for Enhanced Research on Billfish, together with the proposed budget for 2014, was presented by the Program Coordinator, Dr. David Die.

The ICCAT Enhanced Research Program for Billfish continues to achieve its objectives of supporting the work of the SCRS in providing scientific advice on the status and outlook of Atlantic billfish stocks. During 2013 this program continued to support the collection of biological data and fishery statistics in selected fleets and also enhanced its support for the collection and processing of genetic samples that aim to define the extent of misidentification of white marlin and spearfish species. The program depends for its functioning on the provision of Commission funds and the generous monetary and non-monetary contributions of others that have contributed to its success.

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

10.3 Small Tunas Research Program

The report of the Small Tunas Research Program was presented by the Program Coordinator, Dr. Noureddine Abid. The ICCAT Small Tunas Year Program (SMTYP) proposed by the SCRS in 2011, was adopted by the Commission in 2012. The main objective of the first two years of this program is the recovery of historical statistical and biological data in the main fishing areas, with a focus on the priority species identified by the ICCAT/GFCM in 2008 (Anon. 2009a). This program has a wide geographical sampling coverage, including the Mediterranean, the Black Sea, West Africa, Caribbean area and South-west Atlantic.

In 2013, the first year of this programme, relevant historical Task I and Task II data dating back to 1984, were collected from the main artisanal fisheries targeting small tunas in West Africa: Senegal, Côte d'Ivoire and Morocco.

This program will continue in 2014, with the aim of recovering historical statistical data in the South-west Atlantic and the Mediterranean Sea. It is also planned to support biological sampling in the artisanal fisheries of West Africa. The reinforcement of the data collection will allow holding an inter-sessional meeting in 2015 for the analysis of all recovered data in order to initiate an assessment of the stocks of these species.

The CPC delegations strongly supported the programme and recognized the importance of the work to facilitate the collection of information on these species. Small tuna species are of great economic value to local communities and thus the Committee recognized the work being done in Senegal, Côte d'Ivoire and Morocco.

Due to the importance of the programme, several delegations (Algeria, Angola, Tunisia and Turkey) expressed their willingness to participate in the future.

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

11. Report of the Sub-Committee on Statistics

Dr. Gerald Scott, Convener of the Sub-Committee on Statistics, presented the Sub-Committee's Report (**Appendix 8**), which held its session in Madrid, September 23 and 24, 2013. Despite the good participation of scientists, Dr. Scott highlighted the importance that the CPCs' Statistical Correspondents be present at this meeting where important issues regarding official Data submission are discussed.

The Committee noted the large number of items on the Sub-Committee agenda and the extensive discussions, resulting in the report being adopted by correspondence.

The role of this Sub-Committee was reviewed, in particular regarding its participation in the SCRS Strategic Plan that it is being developed. It was recommended that, inasmuch as possible, the SCRS provide scientific advice to the Commission's bodies which deal with fishery monitoring and statistics, including comments on the meeting's agenda, and requesting feedback from the Commission on the usefulness of such advice.

Following the issues raised in the Secretariat Report on Statistics and Research (SCI-008), the Sub-Committee recommended to be fully versed with the Secretariat forms and protocols for improving issues related to data submission. The Sub-Committee informed on the continuing improvement in data submission from the CPCs, although noting the increased workload for the Secretariat Statistics staff due to the submission of many preliminary versions, incomplete data and/or improper forms and formats.

The Sub-Committee endorsed strengthening the criteria for acceptance or rejection to be applied to data submission obligations of CPCs in reference to Statistical Task I, Task II and tagging data. A criteria filter scheme was presented that will be applied in 2014, indicating that only filter 1 (see **Addendum 1 to Appendix 8**) will be used for the acceptance of incoming data.

The Committee renewed its recommendation to deal with increasing requirements for support to the SCRS on databases with a limited staff at the Secretariat and reiterated the recommendation made in previous years of an increase equivalent of 1 additional person-year to the Statistics department. The Sub-Committee was concerned that the proposed budget for the upcoming period will imply a substantial reduction in database management support for the SCRS.

The Sub-Committee reported on the tagging activities and discussions during 2013, and informed on the meeting of the *ad-hoc* Tagging Working Group, whose report is presented as **Addendum 5 to Appendix 8**. The Sub-Committee discussed and stressed the importance of additional sources of information such the VMS to the scientific groups. The Committee endorsed the Bluefin Species Group recommendations regarding VMS use and requested that higher resolution information be provided to the SCRS.

The Sub-Committee also commented on the Commission request regarding monitoring of artisanal fisheries and data submissions. It was noted that multiple programs aimed at artisanal fisheries have been implemented around the world, and the SCRS could benefit from external expertise and how to coordinate with on-going initiatives. It was noted that ICCAT already has diverse initiatives supported by various funds and programs (JDMIP, Enhance Billfish Program, Data Funds) that have successful results in specific fisheries and times. The Committee endorses more strategic investments and wider discussion to ensure long-term monitoring of artisanal fisheries.

The SCRS endorsed the Sub-Committee's recommendation on VMS data use for scientific purposes and the request for higher resolution of VMS transmission, as well extending the VMS requirements beyond the Mediterranean fleets. The EU commented on the importance of including all observer data collected under different programs and making them available for the SCRS. The need was reiterated that the information collected by the ICCAT Regional Observer Programmes not be limited to compliance issues but also include the collection of scientific information. The Secretariat clarified that under the Terms of Reference for the new Tropical Observer Regional Program contract, the role of the Observer will include compliance monitoring as well as scientific data collection in line with the protocols for standardization of tropical tuna purse seine fleets observer programmes agreed by tuna RFMOs.

12. Report of the Sub-Committee on Ecosystems

An Inter-sessional Meeting of the Sub-Committee on Ecosystems was held in Madrid, Spain, July 1-6, 2013. During this meeting, the Sub-Committee discussed the following:

– Tasks pertaining to by-catch:

- Review estimates of sea turtle by-catch in ICCAT fisheries from CPC data and other sources.
- Review estimates of sea turtle by-catch in non-ICCAT fisheries from CPC data and other sources.
- Assess relative magnitude of turtle by-catch in ICCAT vs. non-ICCAT fisheries.
- Review the preliminary findings of the sea turtle ERA presented by the external contractor. Make recommendations regarding the final parameterization and outputs of the model.
- Review sea turtle available by-catch mitigation and safe-release protocols measures, and make recommendations as necessary.
- Prepare response to the Commission regarding Rec. [10-09].
- Review other matters related to by-catch and by-catch mitigation.

Discussion

The Committee recognized the important work done by the sub-committee and welcomed the plan to work closely with CPCs in the ongoing work to improve the ERA. It was noted that there is still work to be done to improve the advice that can be given to the commission based on this study. The effect of FADs on both sea turtle and shark by-catch was also acknowledged. It was recognized that this mortality is often cryptic as animals become entangled in hanging nets and are thus not observed. The committee recognized the need to provide advice on the design of FADs that would lessen their impact on by-catch species. It was noted that although much work remains to be done on the sea turtle ERA, the Sub-Committee on Ecosystems must also deal with recommendation 10-09 that requires that the committee provide information on the effectiveness of by-catch mitigation techniques on seabirds. It was noted that the Agreement on the Conservation of Albatrosses and Petrels (ACAP) have done significant work in this area, and ICCAT could strongly benefit from working closely with them to address this issue.

The ISSF expressed interest in possibly supporting a workshop in the first quarter of 2014 to address issues relating to the collection of longline observer data. The focus would be to discuss similarities and minimum standards for data collection by LL observer programmes as well as identification of best practices. A similar meeting, facilitated by the ISSF, was held in 2012 regarding purse seine observer programmes and it proved to be very productive and this work would be invaluable for longline data collection harmonization.

The Committee was informed that a new version of forms for collecting observer data have been created and it is intended that these be used as soon as possible once they have been reviewed by all affected parties.

– Tasks pertaining to ecosystems:

- Populate a list of indicators reflecting stated fishery resource, ecological, economic and social objectives.
- Determine which indicators of ecosystem status can be used in a traffic light report card.
- Identify a suitable domain as a test case for implementing the Ecosystem Based Fisheries Management (EBFM) approach.
- Review the progress that has been made in implementing ecosystem values in enhanced stock assessments or an EBFM.
- Review conceptual models for EBFM that explore the potential impact of perturbations on the model elements, reveal data gaps, identity important relationships and identify thresholds for change within the system.
- Investigate ways of including ecosystem values in the standardization and assessment of the stocks assessed by the SCRS Species Working Groups.

Discussion

The Committee recognized the work being done to bring attention to ecosystem matters which are of increasing importance and yet are still somewhat difficult to define and quantify and thus have often been neglected. The subcommittee was encourage to coordinated more closely with other species groups to take advantage of the work being done on aspects such as environmental effects on species distributions as well as other environmental studies. The Sub-Committee could then work in a more stepwise process, with less ambitious aims but more practical in the short term. This would also hopefully increase the participation by CPCs in this subcommittee. Coordination with other RFMOs was also encouraged, especially those already dealing with environmental and ecosystem issues.

The Detailed Report of the Inter-sessional Meeting of the Sub-Committee on Ecosystems is presented as document SCRS/2013/017.

A summary of the inter-sessional meeting is attached as **Appendix 9**.

13. Report of the Working Group of Fisheries Managers and Scientists in support of the W-BFT stock assessment

The report was presented; the substantive issues were discussed under the GBYP and in the Bluefin Tuna Species Group.

14. Consideration of plans for future activities

14.1 Review of the development of the Strategic Plan on Science

The SCRS Chair presented the work carried out in the development of the SCRS Strategic Plan on Science. Based in the inputs provided by the SCRS Officers, Dr. Santiago identified the core values to consider in the plan, i.e., Integrity, Independence, Cooperation, Commitment, Ability and Transparency and presented the timetable for the full development of the Strategic plan.

Discussion

The SCRS agreed that the Strategic Plan was an excellent proposal and noted that ICCAT will be the only tRFMO that will have such a holistic scientific vision.

14.2 Annual Work Plans

The Rapporteurs summarized the Work Plans for 2014 for the various Species Groups, the Working Group on Stock Assessment Methods, the Sub-Committee on Statistics and the Sub-Committee on Ecosystems. These Plans were adopted and are attached as **Appendix 4**.

Discussion

It was clarified that if the Commission insists on a bluefin stock assessment in 2014 then due to lack of man/womanpower, the 2015 assessment will have to be postponed to 2016. It was agreed to organise a side event at the beginning of the Commission meeting in South Africa to explain how catch regulations can be based on a Harvest Control Rule with target and limit reference points. This was unanimously agreed to be an excellent proposal.

14.3 Inter-sessional meetings proposed for 2014

Taking into account the assessments mandated by the Commission and the Committee's recommendations for research coordination, the proposed inter-sessional meetings for 2014 are shown as in **Table 14.3**. The Committee noted that the schedule needs to maintain some flexibility in order to account for any changes that may result from the deliberations held by the Commission in November 2013 and the meetings scheduled by other RFMOs.

Uruguay expressed its wish to host the Sharks Species Group inter-sessional meeting. The European Union also expressed its wish to host the following SCRS meetings: Stock Assessment Methods Working Group (Dublin, Ireland) and the Mediterranean Swordfish Assessment (Crete, Greece). Also Bermuda and Senegal expressed their wishes to host the Sub-Committee on Ecosystems and the Tropical Species Group meetings, respectively. Finally, Mexico expressed its wish to host the Billfishes Species Group inter-sessional meeting.

Table 14.3. Proposed calendar of ICCAT scientific meetings in 2014.

ICCAT MEETINGS 2014																																					
	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	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		
										BSP TRAINING COURSE																											
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
																	SHARKS														METHODS						
Apr			31	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				
			STRAT. PLAN																					BFT													
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	
																	BILLFISHES																				
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
										MED-SWO ASSESS.																					SKJ ASSESSMENT						
Jul			30	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			
																								SC-ECOSYSTEMS													
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
																															SPECIES GROUPS						
Oct			29	30	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				

SCRS meetings

14.4 Date and place of the next meeting of the SCRS

The next meeting of the Standing Committee on Research and Statistics (SCRS) will be held in Madrid, Spain, September 29 to October 3, 2014; the Species Groups will meet from September 22 to September 26, 2014 at the ICCAT Secretariat.

15. General recommendations to the Commission

15.1 General recommendations to the Commission that have financial implications

Eastern and western Atlantic bluefin tuna

- The Commission adopted several recommendations concerning the Atlantic-wide Research Programme for Bluefin Tuna (GBYP). The SCRS recommends that all CPCs concerned support these provisions, in particular, by ensuring regular funding and providing assistance for the necessary permits concerning the GBYP activities in their territorial waters or airspace.

- The Commission should consider expanding support for fishery independent data collection in the western Atlantic. The GBYP scientific tagging and aerial survey programs do not include the western Atlantic owing to insufficient funding.

- The Commission should reconsider the merits of a research TAC set aside to fund the GBYP. A research allocation of 250 to 300 t would fully support the current GBYP research enterprise and secure the future of long term research activities such as aerial surveys and scientific tagging programs (which is not the case under the current funding mechanism).

- The next full assessment for bluefin tuna, which will employ new methods and new information is scheduled for 2015. The Committee recommends an inter-sessional meeting in early 2014 to update the catch-at-size statistics with new information from farms and other sources, review tagging data, complete outstanding tasks from the 2013 Biological Parameters meeting in Tenerife, and focus on incorporating the new information into appropriate stock assessment models. The Committee recommends that CPCs make the necessary arrangements to ensure the presence of their national scientists at both meetings. There will also be a need for several external experts to assist with the interpretation of those data, particularly the principal investigators of several key studies.

Swordfish

- Model expertise: During the 2013 Atlantic swordfish stock assessment, alternatives model approaches provided added confidence to the Swordfish Species Group’s determination of stock status. Consequently, the Group expresses continued interest in exploring multiple models approaches that fully exploit the currently collected data and recommends that the Secretariat continue to support external expertise to assist the Group with its modeling work using other modelling platforms.

- In the recent Atlantic swordfish stock assessment, alternative model approaches provided added confidence to the determination of stock status. Consequently, the Swordfish Species Group expressed continued interest in exploring multiple models approaches, that fully exploit the currently collected data, and recommends that the Secretariat continue to support external expertise to assist the Group with its modelling work during the Mediterranean swordfish stock assessment.

Tropicals

- Considering no skipjack stock assessment has been carried out since 2008, the recent increase in the catches of this species, the large proportion of catches under FADs, the expansion of the purse seine fleets to new fishing areas, and the need to update the biological and statistical information, the Tropical Species Group proposes that the two skipjack stocks be assessed in 2014.

- Considering the progress realized in the logbook data collection and in the sampling scheme at landing by Ghana after the adoption of the protocols used for surface fisheries by European Union scientists and the participation of Ghana in the yearly EU meeting devoted to tuna statistics, the Group recommends to maintain funding for the participation of one/two Ghanaian scientists to these joint-meetings between EU scientists and scientist partners from the eastern Atlantic region.

- Due to the scientific relevance of a large tropical tuna tagging program in terms of stock assessment and to gauge the accuracy of time-area regulation measures, the Species Group recommends developing a feasibility study for the implementation of the AOTTP as soon as possible as well as developing the AOTTP Research Programme.

Billfishes

- The Committee strongly supports the Enhanced Billfish Research Program (EBRP) and the continued acquisition of new biological information for genetic species identification and non-industrial fishery information as well as the investigation of new and original approaches to reduce marlin mortality. Without continued effort in these areas, it is very unlikely that the SCRS will be able to reduce the uncertainty in its scientific advice. The Committee recommends that the Commission and all CPCs concerned reaffirm their commitments to EBRP by funding the 2014 budget in full.

Sharks

- The Committee recommends a meeting of a small group of SCRS scientists be held in 2014 to define the operative aspects of the Program on the Collection of Data and Research on Sharks.

Small Tunas

- Reconduct the ICCAT annual SMT Research Programme for 2014 to further improve statistical and biological data related to these species (the details of this program are attached to the Small Tunas Work Plan);

- The CPCs should make the necessary arrangement to ensure a large participation of their national scientists at the ICCAT Small Tunas Species Group meeting.

Working Group on Stock Assessment Methods (WGSAM)

- Reimbursement for invited experts and external reviewers could be based on the standard time frames and rates developed by the CIE. Invited external experts and peer reviewers should follow the Terms of Reference prescribed by the WGSAM in 2013.

Sub-Committee on Statistics

- More focused discussions on artisanal fisheries be conducted intersessionally Strategic investments in the short-term may make improvements, but more discussion needs be carried out to avoid duplication and improve utility. Generally, these fisheries do not have by-catch or discards and are usually multi-specific. These discussions should draw on expertise of other sub-regional and regional management bodies and evaluate how best to coordinate with other on-going initiatives. The first step in focusing this discussion is to develop an inventory of the recent and on-going initiatives to improve artisanal fishery data collection activities amongst the CPCs. It is recommended that a contract be made to develop such an inventory.

- The Committee recommended an increase in the Secretariat staff equivalent to 1 additional person-year to support the increasing demands placed on SCRS to meet the needs of the Commission.

Sub-Committee on Ecosystems

- The Committee recommended supporting external expertise to assist the Sub-Committee to develop the scientific tools required to implement EBFM approaches.

The estimated cost to implement the recommendations above is detailed in the Table below.

	Objective	Budget required (€)
SCSTAT	Contract to develop an inventory of the recent and on-going initiatives to improve artisanal fishery data collection activities amongst the CPCs.	**20,000.00**
SWO	External expert for Med-SWO assessment.	**2,500.00**
SCECO	External experts to help develop the scientific tools required to implement EBFM approaches.	**10,000.00**
TROP	Peer reviewer.	**12,000.00**
TROP	Participation of one/two Ghanaian scientists to these joint-meetings between UE scientists and scientist partners from the eastern Atlantic region.	**5,000.00**
TROP	Feasibility study for the implementation of the AOTTP.	**3,000.00**
BFT	Participation in the inter-sessional meeting of two persons with special skills about farms/trade data.	**20,000.00**
SMT	SMTYP: recovery of historical task II data in other areas and biological sampling activities in west Africa.	**75,000.00**
SHARKS	A meeting of a small group of SCRS scientists to define the operative aspects of the Program on the Collection of Data and Research on Sharks.	**10,000.00**
SCSTAT	Increase equivalent to 1 additional person-year to support the increasing demands placed on SCRS to meet the needs of the Commission	**60,000.00**
TOTAL		**217,500.00**

15.2 Other recommendations

Albacore

- The Albacore Species Group recommends that further elaboration of the MSE framework be developed for albacore. Among other things, work should be promoted towards including a more complete range of uncertainties, including observation, process, model, and implementation errors. This would permit better characterization of uncertainty in current and future stock condition. Moreover, such a framework would help establish priorities between the main components of the Albacore Research Program (biological parameters, fishery data, models). The MSE framework would also help the Albacore Species Group simplify the process of updating management advice (e.g., through the use of simpler models).

- Several research lines should be pursued. First, the biological parameters used in the assessment should be reviewed. Accurate biological parameters are very important for stock assessment purposes and for the process of estimating limit reference points for albacore stocks. Albacore biological parameters are in many cases based on old studies and it is important to assess whether these parameters have changed over time or if current observations are consistent with estimates from old studies. Second, the group recommended further studies on the effect of environmental variables on CPUE trends of surface and other fisheries. Finally, the Species Group also recommends further research to better characterize the nature and, if possible, quantify potential mixing rates between the Atlantic and the Indian Oceans.

Eastern and western Atlantic bluefin tuna

Reliable evaluation of Atlantic bluefin tuna stock status is hindered by the lack (or low quality) of catch, catch-effort and size statistics over time for some of the major fleets.

- Effort to improve the temporal and spatial coverage for detailed size and catch-effort statistics of the main fisheries, especially in the Mediterranean, should be continued and even increased, using new technologies (e.g. stereoscopic camera for size data and VMS data for effort).

- The sampling effort for biological tissues (otolith, muscle, spine…) carried out through GPYP or other national programs should be also continued and increased in some fisheries to improve ageing and stock mixing rates (see SCRS/2013/011). Effort in 2014 should focus on the analysis of the data that have been collected to update size and age conversion relationships and to give most probable hypotheses regarding population structure prior to the 2015 stock assessment.

- A complete revision of Task I (aggregated catch, by gear/fleet) and Task II (catch-effort, size) data has to be done for bluefin tuna by including new sources of information (BCDs, trade statistics…), following the outputs from experts contracted by the GBYP.

North and South Atlantic swordfish

- Model validation: The Swordfish Species Group recommends that methods be developed to evaluate indices of stock abundance based on fisheries dependent data, e.g., by using simulation and cross validation based on detailed data such as log books and sales records.

- Impact of management on CPUE series: As fishery-dependent time series of CPUE are absolutely critical to all ICCAT assessments, it is essential to maintain their continuity. To this end and, to the extent possible, any management action that may affect catchability should either: (a) be phased in over a series of years so that there is overlap, allowing the effect of the action to be estimated; or (b) have the effect of the action be assessed experimentally, e.g., experiments testing the effects of a new hook type. This will achieve two valuable purposes in: (a) maintaining the integrity of CPUE time series; and (b) allow for the direct estimation of the efficacy of the management action.

Mediterranean swordfish

- Participation in the Swordfish Species Group has been problematic in recent years. It is essential that CPCs involved in the Mediterranean swordfish fisheries make the necessary arrangements to ensure the presence of their national scientists at the assessment meeting.

Tropicals

- The Committee endorsed the adoption of the amendments to Rec. [11-01] proposed during the Working Group on Integrated Monitoring Measures held in Sapporo in July 2013 and which are in line with an improvement of the information collection on FADs and on its use.

- The Tropical Tunas Species Group recommends that the Ghanaian Statistics Task Group review the Task I and II (including a detailed description of the assumptions) for the period 2006-2012, to be presented to the Group at the skipjack stock assessment session in 2014.

- Considering the multi-species nature of the tropical surface fishery, the tropical Group recommends that for species not assessed during a given year, a series of fishery indicators be systematically presented by CPC participants at the stock assessment session of the species evaluated or during the respective species group. Bearing in mind the relevance of the information provided by the catch-at-size matrix (CAS) to calculate several fishery indicators (such as mean weight, apparent Z, proportion of juveniles/adults, etc.), the tropical Group recommends that the ICCAT Secretariat update the CAS for the main fleets on a regular basis, at reasonable intervals (e.g., every two years) and taking any necessary decision.

Billfishes

- One of the main problems with the assessment of white marlin was that the Task I catches were in- complete, resulting in under-estimates of total removals. This situation resulted in recreational and artisanal fisheries being poorly sampled, a problem that is exacerbated in the billfish catches coming from the Caribbean Sea. The solution to this persistent problem must start with the Committee being more involved with the regional management bodies and local government entities that exist in the area.

Sharks

- The Committee recommends that the Commission adopt measures to enable scientific observers to collect biological samples (vertebrae, tissue, reproductive tracts, stomachs, skin samples, coil valves, jaws, whole fish or skeletons for taxonomic studies and museum collections) from the shark species that are currently prohibited which are dead in the set, provided that such samples are for a research project approved by the SCRS. To obtain approval, the proposal should include a detailed document that describes the objective of the work, the number and type of simple that need to be collected and the time-area distribution of the sampling. A report should be submitted to the Sharks Species Group and the SCRS on the annual progress of the work and a final report should be submitted upon termination of the project. For all these species there is an important lack of biological knowledge, for which the Committee strongly that such samples be collected.

- Considering the need to improve the stock assessments on pelagic sharks affected by the ICCAT fisheries and taking into account Rec. 12-05 adopted in 2012, as well as previous recommendations that make mandate the collection of shark data, the Committee strongly recommends that the CPCs provide statistics on all the ICCAT fisheries and, inasmuch as possible, non-ICCAT fisheries, that catch these species, including artisanal and recreational fisheries. The Committee considers that a basic premise to correctly assess the state of any stock is to rely on a solid basis to estimate the total extractions.

Small tunas

- All countries should report Task I and Task II data;

- National scientists should review their small tuna catches and try to classify them by species using ICCAT SMT identification sheets. CPCs should report catches of frigate tuna (FRI) in the Mediterranean as bullet tuna (BLT).

Working Group on Stock Assessment Methods (WGSAM)

- Diagnostics should be evaluated for assessment models. Suitable diagnostics may vary between assessment models, but model appropriate diagnostics should be presented to help evaluate the quality of management advice arising from the assessments.

- For years in which stock assessments are to be conducted, in order to enhance quality assurance of scientific advice, working groups are required to prepare detailed work plans in order to provide guidance for the meeting preparations and to ensure complete and timely availability of required data and model inputs, as well as to facilitate the coordination of responsibilities within the working group as and/or with the Secretariat.

Sub-Committee on Ecosystems

- The Sub-Committee recognized the value of the unpacking exercise to define SCRS ecosystem objectives. It is recommended that the Co-Convener of the Sub-Committee on Ecosystems meet with the SCRS Officers to develop a list of conceptual eastern bluefin tuna fisheries management objectives.

- The SCRS recommended that the Sub-Committee continue its collaboration with the Sargasso Sea Alliance with regard to the analysis of the ecological importance of the Sargasso Sea for tuna and tuna-like species and ecologically associated species.

16. Responses to Commission's requests

16.1 Review the content of FAD Management Plans elaborated by CPCs and define a format for FAD information from logbooks Rec. [11-01], paragraphs 25 and 19

The multi-annual conservation and management programme for bigeye and yellowfin tunas [Rec. 11-01] requires that the Secretariat transmit the content of the FAD management plans of the CPCs that use this fishing mode to the SCRS. In its current form, the management plan for FADs is comprised of a mandatory component (which includes the number of FADs deployed per vessel, their descriptions and their identification codes) as well as an optional component.

In 2012, six flag States submitted FAD management plans and only three of these included the required information, such as the number of FADs likely to be deployed by each vessel (see the updated table attached). In 2013, two of these six flag States have updated their management plans. However, besides being incomplete, the nature of the information received in these management plans was not considered by the SCRS at its 2012 meeting as suitable to help in the stock assessments or to enable improving the advice that it submits to the Commission. The Committee therefore recommended that the Commission review the nature of its requirements regarding the monitoring of the FADs set forth in [Rec. 11-01] (paragraphs 18-19 and Annexes 1 and 2 of the Recommendation). In this regard, two main types of information that should be collected and reported were identified: an inventory of the FADs and the activities under FADs ("logbook for FADs": markings, deployments and retrievals of FADs, etc.) and a registry of visits to FADs by the fishing vessels (and by the supply vessels) ("logbook": visits to FADs and catches from fishing operations made on FADs). These two types of information should be linked through the FAD identification or its marking.

The Committee then informed on “Draft Recommendation by ICCAT amending the recommendation on a multi-annual conservation and management program for bigeye and yellowfin tunas” discussed by the Commission at the 8th Meeting of the Working Group on Integrated Monitoring Measures held in Sapporo in 2013 and included as Appendix 3 to the report of the meeting. This Appendix is a proposal to amend Recommendation 11-01 which will be considered by Panel 1 at the 2013 annual Commission meeting. The Committee endorsed adoption of the amendment concerning fishing operations on FADs (of the type requested by other tRFMOs) since this type of data are essential for the SCRS to carry out studies related to this fishing mode.

However, the Committee recommends that more detailed information, including the identification codes, data on trajectory, frequency of visits and the duration in the water of the FADs with instrumented buoys, be fully available to the national scientists according to the conventional confidentiality protocols. This type of information is needed to better quantify the fishing effort associated with FAD fishing, and thus the indices of abundance related to this fishing mode used in stock assessments, as well as in the definition of the regulatory time/area strata of a moratorium type.

FAD Management Plans Submitted by CPCs to ICCAT in Response to the Rec. [11-01]

Country	*Year submitted*	*Number of FADs*	*FAD materials*	*Deployment/Removal*	*Management measures addressed*	*All obligatory information provided?*
Ghana	2012	Over 1500	• Woven bamboo • Radio beacons	Each vessel on average employs approximately 30-40 payaols and are often changed when left for over 4-6 months at sea	• Non-use of FADS between Jan and Feb 2013 (ICCAT Rec. 11-01). • Monitoring of types and numbers are on-going at sea and quayside where officers note their construction at port. • Forestry Commission is also actively involved in the indiscriminate felling of tree including the bamboo which is manly use in the construction of FADs.	No. Plan does not actively address the number of FADs that may be deployed or FAD identifiers
Belize (Belize management plan for the regulation of fish aggregating devices)	2012		• A radar reflector must be attached to the raft section at least 2 meters above the water line • The FAD must have a portion that remains above the water line at all time (the raft section). The raft section must be painted with reflective paint and large enough to be clearly detectable from a distance of 1 kilometer (km)		Belize management plan for the regulation of fish aggregating devices (FAD) • Area/Time closure in relation with the protection of juveniles as contained in Recommendation 11-01 • 100% YFT, BET and SKJ catch retention • Each Belize flagged purse seine fishing vessel will deploy a total of 100 deployed drifting FADs. Belize flagged purse seine fishing vessels will not deploy anchored FADs on the high seas and will be subject to the regulation of other States when fishing in their jurisdictions. • Deployed drifting FADs must be clearly marked with the name of the vessel that has deployed it, the date of deployment and the FAD number. • All deployed man-made FADs must meet the minimum criteria outlined in the management plan. • Requirements for deploying FADS outlined in management plan.	Yes

			• FAD resources must be attached to the raft section (or each other) in a way that, as far as possible, prevents part of the FAD from becoming separated from each other.		• Consistent with ICCAT Recommendation 11-01, all Belize flagged purse seine fishing vessels operating on the high seas from 1 January 2013 will be subject to 100% observer coverage under their Regional Observer Program. Observers will monitor all FAD retrievals. • FAD register • The Belize Fisheries Department will review lost FAD information and may grant approval to deploy a replacement FAD depending on the situations	
EU-France	2012		About 90% of purse seine sets made on encountered objects equipped with beacons		EU-France FAD management plan • Improved knowledge of fishing on FADs - Identification and marking of FADs, Registry and tracking of tags, Recording of fishing activity on FADs. • Limit on use/number of FADs, limit the annual purchases of tags associated with the FADs to an average of 200 tags per vessel, No fishing vessel may at any time have more than 150 smart tags. • Tags are identified and tracked by satellite. • Reduction of the potential impacts of FADs on the ecosystem - Mitigation of catch on juveniles, small tunas and bycatch species associated with FADs, eco-friendly FADs, Conservation measures for sharks. • Confidentiality of data supplied by operators	Yes

EU-Spain (FAD management plan)	2012 and 2013				• Identification of FADs • Inventory of FADs • Registration of specific FAD activities • Logbook information on activity regarding FADs and FAD fishing • Monitoring and tracking of FADs • Measures to prevent loss of FADs • Measures to mitigate the capture of juveniles and bycatch species • Specific closures on FAD fisheries (Rec. 11-01) • Confidentiality of data supplied by operators	No. The plan does not address the number of FADs deployed per vessel nor does it explicitly describe the FAD design, although it does provide a definition of general FAD types.
Curaçao	2012				• Identification of FADs • FAD inventory updated quarterly • Specific activity register • Logbook entries regarding FADs • FAD monitoring with ID numbers attached to FADs • Measures to avoid loss of FADs • Measures to mitigate catch of juveniles and non-target species • Specific closures on FAD fisheries (Rec. 11-01) • Control and monitoring measures • Confidentiality of data supplied by operators	No. The plan does not address the number of FADs deployed per vessel nor does it explicitly describe the FAD design, although it does provide a definition of general FAD types.
Panama	2012				• Identification of FADs • FAD inventory updated quarterly • Specific activity register • Logbook entries regarding FADs • FAD monitoring • Measures to avoid loss of FADs • Specific closures on FAD fisheries (Rec. 11-01) • Control and monitoring measures	No. The plan does not address the number of FADs deployed per vessel nor does it explicitly describe the FAD design, although it does provide a definition of general FAD types.

					• Confidentiality of data supplied by operators	
Côte d'Ivoire	2012 and 2013	The seiner Solevant, deployed about 70 drifting FADs in Ivorian EEZ. EU vessels also employ FADs in Ivorian waters.	Raft made of bamboo covered with a net. On the raft is a GPS. The submerged part consists of a piece 1 m wide and 40 m long fixed with palm leaves and stems and made fluorescent to attract fish. They are drifting FADs. FADS are fitted with transmitters that transmit unique identifiers.		The activities to be carried as part of the implementation plan are: • Describe the different types of FADs • Check the conformity of catch reports from activities on FADs; • Perform analysis on impact of FAD use on the sustainable management of resources; • Analyze the environmental impact of FADs; • Analyze the relationship between the use of FADs and catch sizes in the short, medium and long term; • Describe the FAD design and materials; • Define the institutional and legal framework for the use of FADs • Define the specifications and requirements for the construction of FADs Define a policy: • Policy for the Reduction of bycatch and FAD use • Consideration of interaction with other gear types • Declaration on "Ownership of the FADs."	Yes

16.2 Evaluate the BFT pilot studies to estimate both the number and weight of bluefin tuna at the point of capture and caging using stereoscopic system, Rec. [12-03], paragraph 88

The 2012 Recommendation amending previous Recommendations by ICCAT to Establish a Multi-annual Recovery Plan for Bluefin Tuna in the eastern Atlantic and Mediterranean [Rec. 12-03] requests the CPCs to implement pilot studies on how to better estimate both the number and weight of bluefin tuna at the point of capture and caging including through the use of stereoscopic systems and report the results to the SCRS.

During the Bluefin Tuna Species Group held in September 2013, two papers presented the results of pilot studies involving the use of the stereoscopic camera.

In document SCRS/2013/182, the results of a pilot study involving a comparison of stereoscopic camera fork length estimates of individual fish and the same fish measured with calipers after harvesting were presented. A detailed procedure was established which, if followed correctly, would give a good level of precision and accuracy However, the effects of deviations from the steps in the procedure on the percentage error in fork length estimation were not quantified but could well be significant. The procedure presented only concerned the measurement of fork length using the stereoscopic camera software and did not attempt to establish a methodology for obtaining footage of fish in a net or cage for the purpose of counting fish or fork length determination.

Document SCRS/2013/202 describes a pilot study carried out by Libya and Korea with a stereoscopic camera on the high seas before, during and after transfer at sea and after a release event. In this study, results of fork length determination were reported. Fork length measurements of the same population of fish in the fishing net and after transfer (in the towing cage) gave significantly different average weights. The document also discussed the various practical difficulties arising during the actual deployment of the stereoscopic camera at sea and numerous factors affecting the precision and accuracy of fish counting and fork length measurement during the subsequent analysis.

The group discussed the fork length measurement procedure proposed and considered it important to establish the magnitude of the errors inherent in the various steps of the procedure as well as the errors resulting as a consequence of the deployment methodology during the collection of the footage to be used in fork length determination. At the same time, it has to be kept in mind that the procedure presented only applies to the stereoscopic camera system used in this particular study, but similar procedures (and the corresponding errors) would need to be established for other technologies and footage collection methodologies. The results of fork length estimation of the Libyan/Korean pilot study were not considered very promising and, considering the practical difficulties encountered, it is very clear that much more work would be needed to establish standardised procedures for all aspects of the stereocamera (or alternative technology) deployment in such circumstances.

The SCRS reaffirmed the importance of the fork length data coming from the stereoscopic camera for the purpose of having catch at size data for the Mediterranean purse seine fleet for use in stock assessments. 100% of Mediterranean cages had stereoscopic camera in 2013. The group also felt that an analysis of any available stereoscopic camera footage and results from CPCs should be made available to compare methodologies, results and errors in fork length measurement, whilst comparing to the procedure presented during the meeting, although it was not clear who would do this exercise.

The Committee recommends setting up a standardized protocol to set up a common procedure for the implementation and use of stereoscopic camera systems in all the Mediterranean and East Atlantic by 2014.

16.3 Evaluate the BFT national observer programmes conducted by CPCs to report to the Commission and to provide advice on future improvements, Rec. [12-03], paragraph 90

There are National Observer Programs that monitor and sample ICCAT related fisheries. Most of the data collected from these programs are used by the CPCs to comply with the ICCAT data fisheries reporting obligations, primarily of Task II size, weight and catch at size of major tuna species including bluefin tuna. For bluefin tuna fisheries in the Mediterranean there is an additional Regional Observer Program (ROP) with compliance and some scientific sampling task responsibilities.

The SCRS in 2011 requested CPCs to submit information on National Observer Programs that cover ICCAT fisheries in response to Rec. 10-10. For this purpose the Secretariat developed a form (e-form 45, Nat Obs Prog) that aimed to get an overview of the programs, type of data collected, indication of coverage, species and format of the databases. The response to this form request has been relatively sporadic (12 CPCs in 2012, 14 CPCs this year). The form questionnaire asks if bluefin tuna fisheries are monitored, and whether there is any particular or special coverage for bluefin tuna. The form was not intended to collect any data coming from the national Observer Programs.

The next step will be to use the general information collected with this form to develop a database with a format that can accommodate the different formats/inputs from the various National Observer Programs. This database development is actually being drafted and coordinated under the Ecosystems and By-catch Sub-committee, where the primary objective is to obtain data for non-target or by-catch species, rather than the main tuna species. It is important to note that most information from National Observer Programs regarding bluefin tuna are already submitted by CPCs under the Task I and Task II statistics obligations, as confirmed by national scientist during the meeting.

The CPCs that have responded to the national Observer Programs enquiry in 2013 have, in general, provided details of sampling and coverage from each program towards bluefin tuna fisheries. Appendix 2 of the Secretariat Report on Research and Statistics 2013 (SCI-008) summarizes the responses by each CPC to the National Observer Program questionnaire.

16.4 Provide updated tables of BFT growth rate in weight based on the information from BCDs and other submitted data, Rec. [12-03], paragraph. 98

The SCRS analyzed the information available for bluefin tuna growth rate in weight, and confirmed its commitment to continue the work of the Trade Group, initiated in 2012 (referring to the discussions and conclusions of the Trade Group reported in the Report of the 2012 Atlantic Bluefin Tuna Stock Assessment Session (Anon. 2013d), to establish procedures based on BCDs and other available information (stereoscopic cameras/alternative technology to accurately quantify the transferred fish, observer reports, scientific sampling, trade statistics, etc.) to confirm the catch numbers of fish and weights declared on BCDs (Task I data). This analysis should be done keeping in mind the complexity of the whole process, from the point of capture to final trade, as recorded in the BCDs and other sources of information. The ultimate objective of these procedures is to ensure that no underreporting or misreporting of catches can occur.

The framework for the analysis of market/auction data recovered by GBYP, which was discussed by SCRS during the bluefin tuna assessment in 2012 and by the GBYP Steering Committee in December 2012 (see corresponding reports), was defined by the GBYP Steering Committee.

16.5 Response to paragraph 27 of Rec. [12-03] on the creation of sanctuaries in the Mediterranean Sea for bluefin tuna

The Group determined that several factors were limiting its ability to provide guidance on the issue of creating sanctuaries for bluefin tuna. Such scientific advice is dependent upon the objectives of a time-area closure (e.g., an alternative to quota management, protection of spawning individuals). The current recovery plan gives positive and encouraging results, so a change in the management plan may not be required. If there are other motivations for creating sanctuaries other than recovery, the Committee requests that the Commission clarifies their goals.

The Committee can then evaluate the implications of these alternate goals. The potential efficiency of sanctuaries for stock recovery requires better knowledge of the population structure of bluefin since, for example, protecting certain areas/sub-stock will transfer the fishing effort to other sub-stocks. Previous studies indicated that TAC must be adjusted with respect to the design of protected areas to avoid negative impacts on the population. Advice is contingent upon a thorough sensitivity analysis. Moreover, if sanctuaries are defined as certain spawning grounds, fisheries operating within the potential protected areas would mainly be purse seiners. The socio-economic impact of such a measure will be unequal between fleets.

16.6 Review available fishery and stock indicator trends [of W-BFT] and estimated yearly catch rates [of E-BFT], Rec. [12-02], paragraph 16 and Rec. [12-03], paragraph. 50

Background: *Rec. [12-02], paragraph 16, and [Rec. 12-03], paragraph 50, requests the SCRS to estimated yearly catch rates and update the Commission of any changes annually prior to the Commission meeting.*

The indices of abundance used in the 2012 assessment were updated through 2012.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 and showed small increases in 2010 and 2011, but declined in 2012. The catch rates of adults in the U.S. rod and reel fishery remain low, but increased in 2010 to the highest level since 2002, showing a small decrease in 2011 and 2012. The catch rates of the Japanese longline fishery north of 30ºN fluctuated significantly since 2007, showing considerably high values for 2007, 2009, 2011, and 2012 fishing years. These high indices might be related to an increase in abundance of relatively small (135-150cm, 50-60 kg) and medium (180-200 cm, 115-165 kg) sized bluefin. The catch rates from the U.S. Gulf of Mexico longline fishery showed a gradual increasing trend from 1996 to 2008, a slight decrease afterwards, and a sharp increase in 2012. The catch rates in the Gulf of St. Lawrence have increased steadily since 2004 and the catch rates in 2011 were the highest in the time series considered in the 2012 assessment, and further increased in 2012. The catch rates in southwest Nova Scotia have continued to follow a general increasing trend since 2000. The Gulf of Mexico larval survey (the only fishery independent indicator) continues to fluctuate around the low levels observed since the 1980s. In view of these trends, there is no indication of a change in stock status sufficient to warrant advancing the scheduling of the next stock assessment.

Response to paragraph 50 of Rec. [12-03] on updated yearly catch rates and report of any changes

Available indicators from the Bay of Biscay baitboat fisheries (small and medium fish) shows a general increasing trend over the whole time period, with more variable values after the mid 80's, with two peaks in the 90s and one in the mid-2000s (**BFTE-Figure 2**). This CPUE index covers the longest period (1952-2011), during which changes in selectivity took place, especially during the most recent periods because of changes in management regulations. This index could not be updated because this fishery sold most of its quota to other Spanish fisheries in 2012 and 2013.

Indicators from Moroccan and Spanish traps targeting large fish (spawners) are standardized catch per unit of effort (CPUE) up to 2012 and include release individuals which, in the case of the Moroccan traps, represent more than 10,000 individuals in 2012. The Moroccan trap index was further updated up to 2013 including 32,000 released individuals. CPUE of Moroccan and Spanish traps showed an increasing trend over the last years and large fluctuations, with period of high catch rates, as in the early 1980s, late 1990s and late 2000s and periods of lower catch rates, as in the mid-1990s and mid-2000s (**BFTE-Figure 2**).

Indicators from Japanese longliners targeting large fish (spawners) in the East Atlantic (South of 40ºN) and the Mediterranean Sea displayed a recent increase after a general decline since the mid-1970s (**BFTE-Figure 2**). However, this index has not been updated since 2009 because this fleet did not operate in the Mediterranean and rarely in the East Atlantic (South of 40ºN) in recent years. Indicators from Japanese longliners targeting medium to large fish in the northeast Atlantic were available since 1990 and has been updated to 2012. This index showed an increasing trend in the last 4 years (**BFTE Figure 2**). This index becomes more valuable since the major part of Japanese catch come from this fishing ground in recent years. The size of bluefin caught in this area showed a large contribution of the 2003 year class. This high proportion of the 2003 year class and the contraction of the spatial coverage of the Japanese longliners in recent years in response to a lower number of boats and management regulations may affect the ability of this index to track changes in bluefin tuna abundance.

Catch rates of Spanish purse seiners operating in the Balearic area showed large increase over the last three years. Changes in the size composition of the catch have been observed and could be due to changes in the fishing season. Another new index from the Sardinian traps has been also provided and led to similar increase in catch rates in the recent years.

The updated CPUE indices in 2013 are thus consistent with the stock rebuilding estimated in 2012 stock assessment.

Fisheries-independent information from the aerial surveys performed on the juveniles fish in the northwestern Mediterranean Sea provide similar indications, showing a three to four-fold increase in juveniles abundance in 2009-2012 compared to 2000-2003. Note, however, that the relative abundance was lower in 2012 than in 2011, which may be partially due to bad weather conditions in 2012 that delay most of the surveys at the end of the season. However, this index has a restricted spatial coverage (i.e., the northwestern Mediterranean Sea).

16.7 Provide answers to a set of questions on EBFT addressed by Panel 2 to the SCRS [SCI-061A]

a) Discuss and assess data made available to SCRS before the bluefin tuna working group takes place, in particular, the usefulness of taking benefit from information coming from other sources than those related to Task I or Task II, e.g., catch certificates, catch-at-size series when entering and/or exiting cages, fisheries independent abundance indices like those of the GBYP, etc. as regards a likely decrease in the level of uncertainties;

This issue has been deeply discussed in the bluefin tuna data preparatory meeting in Tenerife. Based on this overview, it was concluded that:

- Size data collected in the farms since 2003 (or 2005 as the 2003 and 2004 size sampling are relatively low and geographically limited) offer a better way than currently done, to estimate CAS of bluefin tuna caught by purse seine in the Mediterranean.
- Size data collected by observers at harvesting in the farms should, however, be carefully processed and extrapolated in order to estimate fully realistic CAS of farmed bluefin tuna. Extrapolation should indeed take into account for the period of fattening, which is known to affect both the weight and size of the fish.
- This new data processing would possibly allow the SCRS to estimate new series of yearly total catches that could be different from the current Task I.
- It is probable that this new CAS estimated for the period 2003-2013 will be quite different from the current CAS for those years. This potential inconsistency between the two CAS might affect the outcomes of the stock assessment.

  To properly produce this new CAS, the SCRS plans a bluefin tuna data meeting in 2014.

b) Develop and agree on statistical protocols allowing a quality check, the validation and the inclusion into the assessment process of additional sources of information mentioned above;

The Secretariat presented a comparison of the total catch-removals between the Task I and the estimates derived from the different projects from the GBYP data recovery plan (SCRS/2013/169). The document reviewed potential duplicates of total bluefin tuna catch by flag-gear-year (strata available in Task I) and presented cases where information was available from both Task I and GBYP. In some cases the estimated GBYP total catch was greater (at least 10% greater) than the reported in Task I. **Table 16.7** summarizes those flag-fleets-years of those differences, and concluded that these additional catches should be added to Task I, unless demonstrated otherwise. Most of the increases correspond to the catches from trap and baitboat fisheries from EU-Portugal and EU-Spain for the years 1950-1990s. The Committee agreed with the conclusion that in the cases where the GBYP catch estimates were the same or less than the catches reported under Task I, it should be assumed that the GBYP catches have already been reported by the CPCs, unless clearly demonstrated otherwise. These conclusions apply to the 1950-2011 catch data.

The Committee made several other recommendations regarding data compiled and recovered under GBYP:

- Size distributions for bluefin tuna should be integrated with the ICCAT Task II SZ database, following the analyses and conclusions presented in Justel Rubio and Ortiz (2013).
- Catch and effort with fleet, gear, area, and quarterly strata definition (5x5 lat-lon, quarterly or higher resolution) should be included in the Task II CE database. This applies to data from the comparison presented in SCRS/2013/169 that is not present in the Task II CE ICCAT database.
- Data on catch and associated effort prior to 1950 (historic catches) should be made available in a format compatible with Task I.

All data should be integrated and available before the next stock evaluation, within the work plan defined for 2014/2015.

Table 16.7 Summary of the comparison between Task I and GBYP data total catch bluefin tuna. Values indicate the flag-gear and years for which the GBYP estimated bluefin tuna catch is greater (10% larger) than the corresponding reported Task I catches.

Comparison by Year, FlagName and Gear (Years where GBYP total catch is 10% larger than ICCAT task I)			
East Atlantic		**Mediterranean Sea**	
EU.España	BB	EU.España	TP
	1950		1956, 1958-1958
	1952-1971		1962-1963
	1973-1975		1966-1975
	1979-1980		1995, 2002
	1982-1993		(17 years)
	1995		
	(39 years)	EU.Italy	LL
			1998
EU.España	TP		
	1956-1971	EU.Italy	HL
	1973, 1975, 1978		1999
	1998, 1999, 2006		
	(22 years)		
Maroc	TP		
	2001		
EU.Portugal	TP		
	1962-1969		
	(8 years)		

1) *In light of fisheries and fisheries-independent abundance indices, e.g. aerial surveys, CPUE, etc., is the SCRS in a position to confirm the recovery trend of the stock detected in 2012?*

As written in the Executive Summary and also reported in the Responses to the Commission (paragraph 50 of Rec. [12-03]), the fisheries dependent (CPUE) and the fisheries independent (aerial survey on juveniles fish in the northwestern Mediterranean Sea) updated to 2012 are consistent with the stock rebuilding estimated in the last stock assessment.

2) *Would the SCRS specify the nature of the uncertainties in the 2012 stock assessment? In particular, is the SCRS in a position to quantify uncertainties in the 2012 stock assessment results, like the magnitude and the speed of the recovery?*

As mentioned in the Executive Summary, unquantified uncertainties are coming from various sources. The major ones are:

- The poor quality of fisheries information. Although the quality of the catch and effort, catch and size statistics in the eastern Atlantic and Mediterranean was often insufficient before the 1990s, it further deteriorated in the 1990s and early 2000s, especially in the Mediterranean. In the recent years the quality of data has improved, but in 2012 catch rates of key fisheries, such as purse seine, are still lacking.
- The increasing difficulties to track changes in abundance through fisheries dependent information because all CPUE indices are strongly affected by recent management measures.
- Our lack of knowledge regarding some key biological/ecological processes, especially the natural mortality, the population structure (i.e, the number and size of sub-populations that constitute the Atlantic bluefin tuna), the productivity of the stock and the dynamics of recruitment, and the impact of environmental changes on population dynamics and spatial dynamics. In addition, there is also a lack of knowledge about the fisheries dynamics that also affect the outcomes of the stock assessment (such as the selectivity patterns).

The Kobe Matrices cannot integrate these important sources of uncertainties because they remain, for the moment, unquantified. The quantification of those uncertainties will take time and imply intensive research effort, like those deployed under GBYP. The SCRS ability to precisely estimate the magnitude and the speed of the recovery depends on the above unquantified uncertainties, but also to the time needed to detect the signal of the effects of the recovery plan (which may need a few years regarding the longevity of ABFT). Therefore, the Committee is in the same position as last year and cannot better quantify the uncertainties about the speed of the recovery in the short-term.

3) *In the light of answers to the questions above, what would the recommendation of the SCRS be in updating the TAC as regards that agreed in 2012 for the year 2013 and thereafter?*

In 2013, the advice of the SCRS regarding the TAC is given below for the above reasons (as it is in section 6 of the E-BFT Executive Summary).

The implementation of recent regulations through [Recs. 12-03, 10-04, 09-06, and previous recommendations] has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years. However, given the above unquantified uncertainties, the Committee cannot give robust advice that would support a substantial change in the TAC. Nonetheless, the Committee notes that maintaining catches at around recent TACs under the current management scheme 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. A period of stabilization in the main management regulations of the rebuilding plan would allow the SCRS to better estimate the magnitude and speed of recent trends in F and SSB in the coming years.

16.8 Provide answer to the requests from the 1st Working Group WBFT Fisheries Managers and Scientists

Background: *The Working Group made a number of requests to CPCs and SCRS in order to increase the Commission's understanding of Atlantic bluefin tuna. In particular the SCRS should provide the Commission with information on how long it would take the western Atlantic bluefin tuna stock to reach spawning stock biomass levels under different total allowable catch (TACs) that would allow for the testing of the stock-recruit relationship (i.e., to see if a significant change in recruitment results from allowing biomass to reach a certain level). This information should include different probabilities, e.g., 50%, 60%, etc., (prepare tables with information from the 2012 WBFT stock assessment). The SCRS should also prepare a summary from the 2013 Bluefin Meeting on Biological Parameters Review and the Bluefin Tuna Stock Assessment Methods Meeting, including the prioritization of tasks that is to take place at the Stock Assessment Methods meeting, for presentation at the 2013 annual meeting.*

Test the stock-recruit relationship

Document SCRS/2013/191 examined the statistical power to discriminate between the high and low recruitment potential scenarios (LRS and HRS) assumed for western Atlantic bluefin tuna when the spawning stock is allowed to rebuild under various catch scenarios. Stochastic projections were conducted using the bootstrap methodology employed by the 2012 SCRS assessment of western Atlantic bluefin tuna. Tables of statistical power are generated by comparing bootstrap replicates of average recruitment projected under the two-line (LRS) and Beverton and Holt (HRS) with various degrees of depensation. The results indicate the statistical power to discriminate between the HRS and LRS will be very low with a TAC of 2,500 t even with little depensation (K=infinity) because the spawning biomass is not expected to grow substantially. The current TAC of 1,750 t could allow the spawning biomass to rebuild enough to afford moderate power to discriminate between the HRS and LRS by the year 2024. A TAC of 1,000 t or less is predicted to allow the spawning biomass to rebuild enough to afford moderate power (70-80%) to discriminate between the HRS and LRS by the end of the rebuilding period (2018) and high power (>80%) by 2025. Tables of the different probabilities requested by the Commission are presented in SCRS/2013/191 (in terms of percent statistical power)

Evaluate the research proposal [WFBT-006], submitted by Japan, and discuss possible alternative fisheries dependent and fisheries independent abundance and recruitment indices.

Two papers were presented (SCRS/2013/200, SCRS/2013/203) related to the development and improvement of fishery independent and fishery dependent indices of abundance for western Atlantic Bluefin tuna. The papers were in response to the request of the Working Group of Fisheries Managers and Scientists in support of the Western Bluefin Tuna Stock Assessment (Montreal 2013) that, based on SCRS advice, the Commission consider measures to support methodologies and sampling programs aimed at improving and developing fishery dependent and independent abundance and recruitment indices.

The initial presentation provided an overview of the justifications and benefits for developing new indices or implementing improvements to existing indices, while the second outlined the objectives and issues to be addressed in the development of a proposal. The primary concern was that although western bluefin tuna are widely distributed along the coast of North America, none of the existing indices cover all of the species range or life history stages. An example of multiple surveys (trolling, longline, and aerial) was presented to illustrate how both these issues were addressed for southern bluefin tuna.

The proposal identified four areas for development of new research/surveys or for improvements to an existing CPUE index of abundance:

- In the Gulf of Mexico it is proposed to introduce longline research targeting spawning bluefin tuna given that the current index is based on the by-catch of bluefin tuna.
- Survey/research on young of the year bluefin tuna which are known to occur in coastal waters and for which virtually no abundance information is available.
- Improvement of the U.S. rod and reel data collections through increased coverage and documentation.
- A fishery independent bluefin tuna survey in the Gulf of St Lawrence covering several months due to the changing dynamics of the fishery.

The new research is meant to complement, not replace, the existing fishery dependent indices of abundance.

A series of advantages and current sources of uncertainty or problems were identified to support the proposed development or suggested improvements. There were several perceived misconceptions associated with improvements to the rod and reel Index that required clarification. The U.S. representative provide a reference (USNMFS, 1998) to the methodology and the level of detail obtained from the large pelagic survey program through their dockside intercepts (creel survey) for multiple species including Bluefin tuna. It was further noted that information on 0 catches and releases were obtained during the intercepts. Some catch information is obtained through phone surveys, but these surveys are primarily used to estimate effort. And, changes in regulations are accounted for in the standardized index. It was however acknowledged that the statistics would improve if recent coverages (approximately 5-6%) were increased. It was further suggested that alternative methods, such as aerial surveys, be explored to document the distribution and abundance of bluefin tuna. There may also be some opportunities in the U.S. juvenile large scale tagging program, although they have been having problems finding the juveniles over the past two years.

A longline research survey focused on spawning bluefin tuna in the Gulf of Mexico would provide a new fishery independent index of abundance and increased sampling. The current index was reported to have high level of observer coverage and to collect biological samples. In recent years there has been little departure standard approach for the existing CPUE index. The Species Group identified a number of concerns associated with the implementation of a new survey/index. Who will conduct the survey? Are there gains in implementing a new survey and if so they need to be identified? Would there be an increase in bluefin tuna catch when the survey directed for spawning fish. How many bluefin tuna would be needed for the index and how would this impact the fishery? There may also be issues arising from species at risk and is it possible to release fish. Overall, there was general agreement that a new index could be useful, but the group noted there are many complexities and that implementation would require a long term commitment. Bluefin Tuna Research Quota may be an option to move forward.

The development of a recruitment monitoring program for young-of-the-year bluefin tuna along the coast of the USA was seen as a positive move forward as there is a lack of information on this size group of fish. However, young of the year Bluefin tuna are thought to be distributed over a wide geographical area and the logistics of implementing such research would difficult and the costs high. Furthermore in recent years this age group has been difficult to find, although it might be possible to target slightly older fish. Trolling surveys suggested by Japan represents one possible approach, however, alternative methods could also be explored (e.g., aerial surveys or rod and reel).

Development of a fishery independent bluefin tuna survey in the Gulf of St Lawrence with extended temporal coverage could be beneficial. There are concerns about the current index relating to the changing dynamics of the fishery and the proportional representation of the stock. Currently there is interest in Canada in exploring options for the development and implementation of a fishery independent index in the Gulf of St. Lawrence.

In summary there was a general consensus within the Bluefin Tuna Species Group on the need for fishery independent indices of abundance for western bluefin tuna given the uncertainties associated with existing CPUE fishery dependent indices. The Bluefin Tuna Species Group encourages Japan to prepare a detailed draft proposal for presentation to the Commission in November 2013 taking into consideration the species group discussions. The Committee also noted that aerial surveys, acoustic surveys and scientific tagging studies might be viable alternatives to the proposals discussed above. Pilot studies have already been conducted, particularly for aerial surveys and tagging of juvenile western Atlantic bluefin tuna and it should be possible to conduct a cost-benefit analysis that compares the relative merits of the various alternatives.

16.9 Develop Limit Reference Point for Swordfish, Rec.[11-02], paragraph 4

Should the Commission wish to implement an interim limit reference point for the North Atlantic Swordfish, then $0.4*B_{MSY}$ will be consistent with the interim proposed for the North Atlantic Albacore and other tuna stocks (Preece *et al*., 2011). The current TAC of 13,700 t would translate to a target fishing mortality rate of $0.90*F_{MSY}$. Given that the stock is above B_{MSY}, most biomass thresholds under consideration in a harvest control would have little impact upon management advice in the short term and therefore the Committee will develop a more thorough evaluation of harvest control rules before providing a more complete response.

16.10 Evaluate the number of discards and releases of silky sharks with indication of status (dead or alive) provided by CPCs and report on the sources of silky shark mortality in ICCAT fisheries, including silky shark discard mortality rates, and provide an analysis and advice regarding the benefits of a range of specific silky shark management options, Rec. [11-08], paragraph 9

In response to the Commission’s request to evaluate the number of discards and releases of silky sharks with indication of status and sources of shark mortality in ICCAT fisheries the following analyses and advice are provided by the Committee.

Information on status (at-vessel, prior to boarding) and fate (action taken) of silky sharks in pelagic longlines was available from scientific observer programs of CPCs specifically provided for the 2012 pelagic shark ERA. At-vessel mortality of silky sharks from fleets with greater than 200 observations was a little over 50% for the Portuguese (55%) and USA (56%) fleets, and 38% for the Venezuelan fleet. Total mortality for those fleets ranged between 84 and 100% of the silky sharks caught.

For purse seine, the estimated bycatch of sharks (including silky shark) in the Atlantic is less than 1% of the total target catch with a total bycatch of sharks around 0.9 t per 1,000 t of target species (Amande *et al*., 2011; SCRS/2010/141). Various studies in other regions have examined mortality of silky sharks in purse seines (Poisson *et al*., 2012). For example, overall mortality of silky sharks caught by the French PS fleet in the Indian Ocean was 81%, with at-vessel mortality of 67% and post-release mortality of 58%. A ‘best practices’ manual for fishers has been prepared that aims to increase survival rates of sharks caught by purse seine vessels. In a more recent study, an unobserved mortality of silky sharks entangled in FADs has been estimated to be significant in the Indian Ocean (Filmater *et al*., 2013), which raises a particular concern for this species. Possible management options relate to reducing mortality in Fish Aggregating Devices (FADs) have been also proposed with the use of non-entangling FADs. For example, IOTC Resolution 13-08 calls upon CPCs with vessels fishing on FADs to submit management plans that include, inter alia, initiatives or surveys to investigate and if possible minimise catches of non-target species, and to design and deploy FADs following guidelines aimed at reducing entanglement of sharks, marine turtles, and other species. At its annual meeting in 2013, ICCAT could consider adopting similar measures to require the use of non-entangling FADs, as well as more complete reporting on FAD designs and deployment (as was recommended by the 2013 meeting of the Working Group on Integrated Monitoring Measures).

The Shark Research and Data Collection Programme (SRDCP) that is currently under development should address this issue more comprehensively in the future.

16.11 Analyze the potential benefits and applicability of the use of time/area closures as a tool for marlin conservation, Rec. [11-07], paragraph 4.

The Working Group discussed the issue and concluded that the time available was not sufficient to carry-out a proper analysis of the potential benefits and applicability of the use of time/area closures as a tool for marlin conservation. Accordingly the Working Group decided to hold an inter-sessional meeting to revise all data available on billfish and to prepare a response to the Commission on this particular issue. During the discussion, the Working Group outlined a plan to address the question which is included in the Working plan for 2014.

16.12 Review the methods used for estimating live and dead discards of blue marlin and white marlin/spearfish and provide advice on any improvements needed, Rec. [12-04], paragraph 8

The Working Group could not assess the methods used for estimating live and dead discards of blue marlin and white marlin/spearfish because CPCs did not report on the methodology.

16.13 Review existing regional or individual CPC data collection programs, including capacity building programs, for artisanal fisheries and provide a plan to work with relevant regional and sub-regional international organizations and CPCs to expand such programs or implement them in new areas to improve data on billfish catches in these fisheries, Rec. [12-04], paragraph 9

Artisanal fisheries are small-scale fisheries for subsistence or local consumption, sometimes small markets, generally using traditional fishing techniques and small boats. They occur around the world (particularly in developing nations) and are vital to livelihoods and food security (Jacquet and Pauly, 2008). In the ICCAT Convention area, artisanal fisheries can harvest substantial amounts of tuna and tuna-like species and in some cases estimated catch represent a relatively large proportion of the total removals of some ICCAT species. Due to their characteristics, artisanal fisheries are more difficult to monitor than industrialized fisheries, which generally make use of centralized landing and off-loading facilities. In many developing nations, infrastructure and resources available for research, management, and monitoring of artisanal fisheries are severely limited. Sustaining efforts to collect the data necessary to describe the impact and management of artisanal fisheries can be challenging.

Several CPCs reported on data collection initiatives for their artisanal fisheries, several of which were dependent upon strategic investments from outside sources, including from data and capacity building funds from ICCAT. The case studies presented to the Committee (see Sub-Committee on Statistics Report) show the complexities of collecting artisanal data. While some programs are very successful, in general, CPCs face difficulties to set in place and maintain monitoring systems for artisanal fisheries. Often data collection is good over a short period, but difficult over the longer term. The Committee was made aware of several other projects, beyond the scope of ICCAT, that are also seeking to improve artisanal fishery data collection. This demonstrates that there are complexities and difficulties that need to be overcome, and these can potentially be addressed by coordinating with other external projects, instituting some successful programs that have been done within ICCAT, and building on work already being conducted. It is important ICCAT liaises with these initiatives and makes the maximum use of the information collecting structures that are already in place.

The Committee recommended that such interactions with these initiatives be started after first conducting an inventory of such initiatives and then by engaging in dialogue with the concerned CPCs, sub-regional international organizations, and funding sources, as appropriate.

16.14 Evaluate the national observer programmes conducted by CPCs to report the Commission and to provide advice on future improvements, Rec. [10-10] paragraph 6.

The SCRS noted that the response rate to the obligation to report on national observer programs continues to be quite low, considering the number of observer programs that should be in place. The Committee was made aware of additional responses to the forms circulated by the Secretariat in 2011 to obtain information regarding the data collected by CPC observer programmes as needed for the SCRS to provide a response to the Commission on the issue. The Secretariat has received on average 14 responses over the past two years to the requests for information circulated to CPCs. Some CPCs provided information on their observer programmes data collection but not in the format specified in Form CP45. The information provided in the Appendix 2 of the Secretariat Report on Statistics and Coordination of Research both this year and in 2012 reflects if the specified information is being collected. It does not imply the data are available to the Secretariat at this stage although several CPCs have sent their actual observer data in the format in which it is captured by their national programmes. During 2013, the Secretariat has updated the forms (presented in 2012 to the Sub-Committee on Ecosystems) for the submission of observer programme data, which are currently being reviewed by the Sub-Committee on Ecosystems. The standard form should facilitate the submission of both aggregated and highly dis-aggregated data to accommodate the needs of individual CPCs. The Sub-Committee recommended this standard form, once adopted by SCRS, be made available to all CPCs to standardise the submission of observer data and facilitate its incorporation into a database to be maintained by the ICCAT Secretariat.

16.15 Evaluate and provide advice on alternative methods to collect by-catch and discard data on artisanal fisheries that are not subject to ICCAT's minimum standards for scientific observer programs [Rec. 11-10].

Recommendation by ICCAT on Information Collection and Harmonization of Data on By-catch and Discards in *ICCAT Fisheries* [Rec. 11-10], among other items, requires for artisanal fisheries that are not subject to ICCAT's minimum standards for scientific observer programs (Rec. 10-10) or recording of catch requirements (Rec. 03-13) that CPCs implement measures to collect by-catch and discard data through alternative means and describe these efforts in their Annual Reports, beginning in 2012. The SCRS shall evaluate these measures in 2013 and provide advice to the Commission on this matter.

Regrettably, limited information has been provided on this particular topic thus far, possibly due to complications in addressing this issue as noted in section 16.13. Additionally, in numerous artisanal fisheries, by-catch and discards are not common, as these fisheries are frequently for subsistence or local consumption and virtually all catch is utilized. In these cases, shore-based sampling of landings would provide an adequate method to document and characterize catch composition and disposition. As in prior meetings of the Committee, the use of electronic observation systems was recommended as an approach that could be used to supplement and, in some cases, substitute for human observers in cases where space for on-board observers is limited and at-sea data collection is needed to monitor by-catch. However, these methods are not limited to collection of by-catch data since they also form a basis for documenting the composition and disposition of the total catch. Another alternative method used in numerous fisheries could involve operating observer vessels at sea to monitor catch and discards of fishing vessels, although the costs of such monitoring could be substantially higher than monitoring by electronic means.

16.16 Evaluation of data deficiencies pursuant to Rec. [05-09]

The current data catalogues by major species which allow visualization of gaps, but provide no information on quality or quantity of the data, are provided for further review as Appendix 1 to the "Secretariat Report on Statistics and Coordination of Research in 2013". The impacts of these gaps and inadequacies are best evaluated when stock assessments are conducted. In 2013, North and South Atlantic albacore and North and South Atlantic swordfish stocks were assessed and the deficiencies and their impacts on these most recent stock assessments are provided below.

Data deficiencies and impact on albacore stock assessment

Northern and southern albacore stocks were assessed in 2013. The Albacore Species Group reviewed the data available during its data preparatory and stock assessment meetings. For the North Atlantic stock, the T2 catalogues indicate relatively complete coverage during the last 10 years for the five most important fisheries However, this information was not submitted in a timely fashion, which created additional work and delayed the overall flow of the work plan. Moreover, some missing T2 datasets were identified for the earlier time periods and for some less important fisheries, which were requested by the Species Group.

The SCRS noted that although the catalogues reflect a relatively positive coverage for main fleets in the last years, the quality of the information is far from optimum in many cases, especially, but not limited to, that information needed to run statistical models (e.g., MFCL, SS3) with multiple fleets and long timeframes (1930-2011). Stock assessments using these models are hindered by the following issues:

- Chinese Taipei size frequencies in the North Atlantic show patterns along the time series that are unlikely to reflect population dynamics. The full time series needs to be revised, and those patterns explained or corrected.

- French mid-water trawl and other fisheries, historical series of catch, effort, catch at size, geographical distribution and other related fisheries information needs to be obtained and reported.
- Spatial dynamics of important longline fisheries (namely Japanese and Chinese Taipei) needs to be better described and incorporated into the CPUE standardization.
- The level of bycatch in longline fisheries needs to be characterized, following the Uruguayan example.

In the case of the southern albacore stock, the catalogues again showed relatively acceptable coverage for the five most important fleets (except for Namibia, which has not provided T2CE information for years with significant Task I data). This stock was assessed with production models, and thus, the stock assessment is mainly hindered by the following issues:

- Spatial dynamics of longline fisheries (especially Japanese and Chinese Taipei) need to be better characterized and incorporated into the CPUE standardization.
- The level of by-catch in longline fisheries needs to be characterized, following the Uruguayan example.
- Main CPCs need to participate in the data preparatory and assessment process for the Group to be able to make informed decisions.

Data deficiencies and impact on swordfish stock assessment

North and South Atlantic swordfish were also assessed in 2013. The main sources of uncertainty associated with the lack of data that were identified during the assessment included:

- Uncertainty of stock structure, in particular, the classification of swordfish caught near the boundaries of the stocks.
- Information on the number of fish caught, the numbers of discarded dead and released alive, and limited information on mortality of swordfish discarded alive; these are particularly important given the level of discarding due to the minimum size regulatory recommendation.
- Unreported catches.
- With regards to fisheries dependent indices of abundance, there were identified problems with targeting and changes in main target species for the main longline fleets through the Atlantic. Lack of detailed information from the fishery operations prevent for properly account for these changes in the standardization procedures. The SCRS recommended the investigation of alternative forms of analyses in the South Atlantic, in particular that deal with both the By-catch and Target patterns, such as age- and spatially-structured models.
- Given the poor understanding of population dynamics of swordfish in the South Atlantic, the Group should develop a long term plan for an enhanced program of research, focussing on independent estimates of fishing mortality, fraction mature by age, growth by sex and stock, movement and migrations, and improving available indices of abundance.
- For the South Atlantic in particular, some attempt should be made to use stock assessment methods that can reconcile the contradictory trends in the target and by-catch CPUE series for the south (e.g., age/spatially-structured models). Given that no time series reliably spans the key time period before and after the increase and decrease in landings, the SCRS recommends the exploration of a combined index for the South Atlantic considering spatial weighting, data imputation (Carruthers *et al*., 2010) and using raw data with covariates that define targeting similar to the approach in the North.

16.17 Response to the Commission regarding Rec. 10-09 on the Bycatch of Sea Turtles in ICCAT Fisheries

In 2010, the Commission recommended that:

1) SCRS initiate an assessment of the impact of the incidental catch of sea turtles resulting from ICCAT fisheries as soon as possible and no later than 2013 [Rec. 10-09; paragraph 5].
2) After the initial assessment is complete and the results presented to the Commission, SCRS shall advise the Commission on the timing of future assessments [Rec. 10-09; paragraph 5]
3) The SCRS shall also provide advice to the Commission on approaches for mitigating sea turtle by-catch in ICCAT fisheries, including reducing the number of interactions and/or the mortality associated with those interactions [Rec. 10-09; paragraph 4].

4) As appropriate, the Commission and its CPCs should, individually and collectively, engage in capacity building efforts and other cooperative activities to support the effective implementation of this recommendation, including entering into cooperative arrangements with other appropriate international bodies.

With regard to the mitigation of sea turtle bycatch in ICCAT fisheries, the SCRS recommends the following:

1) The SCRS reiterates the previous Commission recommendations [10-09] that:

   a) Purse seine vessels operating in the ICCAT Convention area avoid encircling sea turtles to the extent practicable, release encircled or entangled sea turtles, including on FADs, when feasible, and report interactions between purse seines and/or FADs and sea turtles.

   b) Pelagic longline vessels operating in the ICCAT Convention area carry on board safe-handling, disentanglement and release equipment capable of releasing sea turtles in a manner that maximizes the probability of their survival.

   c) Fishermen on pelagic longline vessels flagged to that CPC operating under their flag use the equipment specified in item b (above) to maximize the probability of sea turtle survival and are trained in safe-handling and release techniques.

   d) CPCs include in their Annual Reports other relevant actions taken to implement FAO's Guidelines to Reduce Sea Turtle Mortality in Fishing Operations with respect to ICCAT fisheries.

2) Furthermore, to reduce by-catch mortality of sea turtles, the SCRS specifically recommends that:

   a) Regarding safe-handling practices:

      i) When a turtle is to be removed from the water, an appropriate basket lift or dip-net be used to bring aboard sea turtles that are hooked or entangled in gear. No turtle should be hauled from the water by a fishing line attached to, or entangled upon the body of a turtle.

      ii) Vessel operators or crew assess the condition of sea turtles that are caught or entangled prior to release. Those turtles that are not able to swim, unconscious or unresponsive should be brought/maintained onboard and assisted in a manner consistent with maximizing their survival prior to release. These practices are described further in the FAO's Guidelines to Reduce Sea Turtle Mortality in Fishing Operations.

      iii) That turtles handled in fishing operations or by national observer programs (e.g. tagging activities) be handled in a manner consistent with the FAO's Guidelines to Reduce Sea Turtle Mortality in Fishing Operations.

b) Regarding the use of line cutters:
   i) Longline vessels carry on board line-cutters and use these when safe de-hooking is not possible to release sea turtles.
   ii) Other types of vessels that use gear that may entangle sea turtles should carry on board line-cutters and use these tools to safely remove gear, and release sea turtles.
c) Regarding the use of de-hooking devices:
   i) Longline vessels carry on board de-hooking devices to effectively and safely remove hooks from sea turtles. The Sub-Committee also recommends that when a hook is swallowed, no attempt be made to remove the hook. Instead, the line should be cut as close to the hook as possible.

With regard to the assessment of impact of ICCAT fisheries on sea turtles, the SCRS initiated an Ecological Risk Assessment (ERA) for sea turtles in 2013. Progress to date includes:

3) In 2013 ICCAT provided a short-term contract that supported the development of a preliminary ERA for sea turtles species encountered by ICCAT fisheries. The ERA used data provided to the Secretariat by CPCs in 2011 and 2012, and as collated under a short-term contract funded by ICCAT in 2012 and other data sources compiled by the contractor.
4) At its inter-sessional meeting in 2013, the Sub-Committee on Ecosystems reviewed the ERA progress to date and made important recommendations to improve the assessment over the short (before 10/2013), medium (2014-2015) and long-term (2015+), including a request for updated/additional data from the CPCs.
5) The SCRS will continue to improve the ERA and will advise the Commission on its plan for future sea turtle impact analyses at the 2014 meeting.

17. Other matters

17.1 Collaboration with other international organizations

The Committee expressed its support for collaborations between ICCAT and other organizations. It was acknowledged that this will improve the capacity and improve the information and analysis available for scientific advice. It was noted that several organizations had already conducted extensive work on areas of interest to ICCAT and the SCRS could take advantage of these analyses.

The Committee was informed that two draft MOUs between ICCAT and the Agreement on the Conservation of Albatrosses and Petrels (ACAP) and the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) have been formulated, and the Committee recommended that these MOUs be presented to the Commission in due time for their appreciation, in line with previous request by the Sub-Committee on Ecosystems that ICCAT cooperation with the IAC be strengthened via a MOU.

17.2 Consideration of SCRS participation in meetings outside the Committee

The Committee also discussed the need for the SCRS Chair to attend inter-sessional meetings of the Commission that are of scientific interest to the SCRS. It was expressed that the Chairman's attendance at Commission inter-sessional meetings will benefit the scientific work conducted by the SCRS as well as the dialogue between the SCRS and the Commission. The attendance of representatives of ICCAT at other meetings and conferences of scientific importance to the work of the SCRS was also discussed and it was highlighted the interest that ICCAT participate in those meetings identified as being of greatest importance to ICCAT, bearing in mind the already extensive ICCAT meetings schedule that exists.

18. Adoption of Report and closure

The Chair thanked the SCRS for its hard work this year and expressed its concern that the discussions conducted by the Committee during the week were, in some cases, beyond scientific approaches. Dr. Santiago reminded the Committee the importance for the SCRS to maintain its independence and to base its advice on scientific arguments only.

Dr. Santiago thanked the Secretariat staff for all their excellent work and appreciated its professional attitude. Dr. Santiago then expressed thanks to the interpreters, and apologized for having made them work long hours.

The Executive Secretary closed the meeting and thanked the Chair for the trust he had placed in the Secretariat. M. Meski then thanked the Secretariat staff for their efforts in supporting the SCRS work before and during the meeting. He then stated that the Secretariat's work does not end now as they need to prepare for the Commission. Mr. Meski thanked the interpreters for their hard work this week and wished everyone a safe journey home.

The Report of the 2013 SCRS meeting was adopted and the 2013 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:

   YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack, ALB-Albacore, BFT-Bluefin, BUM-Blue marlin, WHM-White marlin, SAI-Sailfish, SWO-Atl. Swordfish, SWO-Med. Swordfish, SBF-Southern bluefin tuna, SMT-Small tunas, SHK-Sharks

9. Report of inter-sessional SCRS meetings

   9.1 Meeting of the ICCAT Working Group on Stock Assessment Methods
   9.2 Tropical Tuna Species Group Inter-sessional Meeting
   9.3 Atlantic Albacore Data Preparatory and Stock Assessment Meetings
   9.4 Bluefin Meeting on Biological Parameters Review
   9.5 Bluefin Tuna Stock Assessment Methods
   9.6 Atlantic Swordfish Data Preparatory and Stock Assessment Meetings
   9.7 Sharks Species Group Inter-sessional Meeting

10. Report of Special Research Programs

    10.1 Atlantic-wide Research Programme for Bluefin Tuna (GBYP)
    10.2 Enhanced Research Program for Billfish
    10.3 Small Tunas Research Program

11. Report of the Sub-Committee on Statistics
12. Report of the Sub-Committee on Ecosystems
13. Report of the Working Group of Fisheries Managers and Scientists in support of the W-BFT stock Assessment
14. Consideration of plans for future activities

    14.1 Review of the development of the Strategic Plan on Science
    14.2 Annual Work Plans
    14.3 Inter-sessional meetings proposed for 2014
    14.4 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 Review the content of FAD Management Plans elaborated by CPCs and define a format for FAD information from logbooks Rec. [11-01], paragraphs 25 and 19.

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* Responses derived from the results of the 2013 stock assessments for North and South Atlantic albacore and North and South Atlantic swordfish are included in Agenda Item 8.

16.2 Evaluate the BFT pilot studies to estimate both the number and weight of bluefin tuna at the point of capture and caging using stereoscopical systems, Rec. [12-03], paragraph 88.

16.3 Evaluate the BFT national observer programmes conducted by CPCs to report the Commission and to provide advice on future improvements, Rec. [12-03], paragraph 90.

16.4 Provide updated BFT growth rate tables based On the information from BCDs and other submitted data, Rec. [12-03], paragraph. 98.

16.5 Response to paragraph 27 of Rec. [12-03] on the creation of sanctuaries in the Mediterranean Sea for bluefin tuna.

16.6 Review available fishery and stock indicator trends [of W-BFT] and estimated yearly catch rates [of E-BFT], Rec. [12-02], paragraph 16 and Rec. [12-03], paragraph. 50.

16.7 Provide answers to a set of questions on EBFT addressed by Panel 2 to the SCRS.

16.8 Provide answer to the requests from the 1st Working Group on WBFT Fisheries Managers and Scientists.

16.9 Develop Limit Reference Point for Swordfish, Rec. [11-02], paragraph 4.

16.10 Evaluate the number of discards and releases of silky sharks with indication of status (dead or alive) provided by CPCs and report on the sources of silky shark mortality in ICCAT fisheries, including silky shark discard mortality rates, and provide an analysis and advice regarding the benefits of a range of specific silky shark management options, Rec. [11-08], paragraph 9.

16.11 Response to the Commission: Analyze the potential benefits and applicability of the use of time/area closures as a tool for marlin conservation. Rec. [11-07], paragraph 4.

16.12 Review the methods used for estimating live and dead discards of blue marlin and white marlin/spearfish and provide advice on any improvements needed, Rec. [12-04], paragraph 8.

16.13 Review existing regional or individual CPC data collection programs, including capacity building programs, for artisanal fisheries and provide a plan to work with relevant regional and sub-regional international organizations and CPCs to expand such programs or implement them in new areas to improve data on billfish catches in these fisheries, Rec. [12-04], paragraph 9.

16.14 Evaluate the national observer programmes conducted by CPCs to report the Commission and to provide advice on future improvements, Rec. [10-10], paragraph 6.

16.15 Evaluate and provide advice on alternative methods to collect by-catch and discard data on artisanal fisheries that are not subject to ICCAT’s minimum standards for scientific observer programs [Rec. 11-10].

16.16 Evaluation of data deficiencies pursuant to Rec. [05-09].

16.17 Response to the Commission on the By-Catch of Sea Turtles in ICCAT Fisheries [Rec. 10-09)].

17. Other matters

17.1 Collaboration with other international organizations

17.2 Consideration of SCRS participation in meetings outside the Committee

18. Adoption of report and closure

Appendix 2

LIST OF PARTICIPANTS

SCRS CHAIRMAN

Santiago Burrutxaga, Josu
SCRS Chairman - Head of Tuna Research Area, AZTI-Tecnalia, Txatxarramendi z/g, 48395 Sukarrieta (Bizkaia), Spain
Tel: +34 94 6574000 (Ext. 497); 664303631, Fax: +34 94 6572555, E-Mail: jsantiago@azti.es; flarrauri@azti.es

CONTRACTING PARTIES

ALGERIA

Kacher, Mohamed
Directeur du Centre National de la Recherche et de Développement de la Pêche et de l'Agriculture, Ministère de la Pêche et des Ressources Halieutiques, Centre National de la Recherche et de Développement de la Pêche et de l'Agriculture Argel
Tel: Fax: E-Mail:

Kouadri-Krim, Assia
Chef de Bureau, Ministère de la Pêche et des Ressources Halieutiques, Direction des Peches Maritimes et Oceanique, Rue des Quatre Canons, 1600 Alger
Tel: +213 21 43 3939, Fax: +213 21 43 31 97, E-Mail: dpmo@mpeche.gov.dz; assia_krim@hotmail.com

ANGOLA

Airosa Ferreira, Júlia
Ministère de la Pêche, Direcçao Nacional Pescas, P.O. Box 83. Edificio Atlantico, Av. 4 de fevereiro, Luanda
Tel: +244 923 346843, E-Mail: fjairosa@gmail.com; julia.ferreira@minpescas.gov.ao

Kilongo N'singi, Kumbi
Instituto Nacional de Investigaçao Pesqueira, Rua Murthala Mohamed; C.Postal 2601, Ilha de Luanda
Tel: +244 2 30 90 77, E-Mail: kkilongo@gmail.com

BRAZIL

Gomes Pimenta, Eduardo
Universidade Veiga de Almeida, Estrada de Perynas, s/nº1, Cabo Frio, Recife
Tel: +55 22 2647 5275 ramal 244, E-Mail: epimenta@uva.br

Hazin, Fabio H. V.
Universidade Federal Rural de Pernambuco - UFRPE / Departamento de Pesca e Aqüicultura - DEPAq, Rua Desembargador Célio de Castro Montenegro, 32 - Apto 1702, Monteiro Recife - Pernambuco
Tel: +55 81 3320 6500, Fax: +55 81 3320 6512, E-Mail: fabio.hazin@depaq.ufrpe.br;fhvhazin@terra.com.br

Macedo Gomes De Mattos, Sergio
Ministry of Fisheries and Aquaculture, Secretaria Especial de Aquicultura e Pesca, SBS, Quadra 2, Bloco J, Edif. Carlton Tower - 7º andar, 70070-120 Brasilia, DF Pernambuco
Tel: +55 61 2023329, Fax: +55 61 202 33909, E-Mail: sergio.mattos@mpa.gov.br

Travassos, Paulo*
Universidade Federal Rural de Pernambuco - UFRPE, Laboratorio de Ecologia Marinha - LEMAR, Departamento de Pesca e Aquicultura – DEPAq, Avenida Dom Manoel Medeiros s/n - Dois Irmaos, CEP 52.171-900 Recife, Pernambuco
Tel: +55 81 3320 6511, Fax: +55 81 3320 6515, E-Mail: p.travassos@depaq.ufrpe.br

CANADA

Hanke, Alex
Scientific, St. Andrews Biological Station/ Biological Station, Fisheries and Oceans Canada531 Brandy Cove Road, St. Andrews New Brunswick E5B 2L9
Tel: +1 506 529 4665, Fax: +1 506 529 5862, E-Mail: alex.hanke@dfo-mpo.gc.ca

Melvin, Gary
Biological Station - Fisheries and Oceans Canada, Department of Fisheries and Ocenas531 Brandy Cove Road, St. Andrews, New Brunswick E5B 2L9
Tel: +1 506 529 5874, Fax: +1 506 529 5862, E-Mail: gary.melvin@dfo-mpo.gc.ca

Whelan, Christie
Center for Science Advice, Maritimes Region, Fisheries & Oceans, 1 Challenger Dr., PO Box 1006, Dartmouth, NS B2Y4A2
Tel: +1902 426 9920, Fax: E-Mail: christie.whelan@dfo-mpo.gc.ca

* Delegates who only participated in the Species Groups.

CAPE VERDE
Marques da Silva Monteiro, Vanda
Instituto Nacional de Desenvolvimiento das Pescas, Cova de Inglesa, C.P. 132, Mindelo Sao Vicente
Tel: +238 232 13 73, Fax: +238 232 16 16, E-Mail: vanda.monteiro@indp.gov.cv

CHINA (PEOPLE´S REP.)
Guan, Wenjiang
College of Marine Sciences, Shanghai ocean University, 999 Huchenghuan RD, Linguang New City, Pudong, 201306 Shanghai
Tel: +86 21 6190 0167, Fax: +86 21 6190 0301, E-Mail: wjguan@shou.edu.cn

Song, Liming
Professor, College of Marine Sciences, Shanghai Ocean University999 Huchenghuan Rd. Pudong Area, 201306 Shanghai,
Tel: +86 021 619 00311, Fax: +86 021 619 00304, E-Mail: lmsong@shou.edu.cn

CÔTE D'IVOIRE
Amandè, Monin Justin*****
Chercheru Halieute, Centre de Recherches Océanologiques de Côte de'Ivoire, Département Ressources Aquatiques Vivantes - DRAV29 Rue des Pêcheurs, BP V 18, Abidjan
Tel: +225 21 355 880, Fax: +225 21 351 155, E-Mail: monin.amande@yahoo.fr; monin.amande@cro-ci.org

Diaha, N'Guessan Constance
Chercheur Hydrobiologiste au Centre de Recherches Océanologiques, Ministère l'enseignement supérieur et recherche scientifique, 29, rue des pêcheurs - B.P. V-18, Abidjan 01
Tel: +225 2135 5880, Fax: +225 2135 1155, E-Mail: diahaconstance@yahoo.fr

EUROPEAN UNION
Fonteneau, Alain
9, Bd Porée, 35400 Saint Malo, France
Tel: +33 4 99 57 3200, Fax: +33 4 99 57 32 95, E-Mail: alain.fonteneau@ird.fr

Addis, Pierantonio*****
Senior Researcher in Ecology, University of Cagliari, Department of Life Science and Environment, Via Fiorelli 1, 09126 Cagliari, Italy
Tel: +39 070 675 8082, Fax: +39 070 675 8022, E-Mail: addisp@unica.it

Abaunza Martínez, Pablo
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O. de Santander, San Martín s/n; Apartado 240, 39080 Santander Cantabria, Spain
Tel: +34 942 291 716, Fax: +34 942 275072, E-Mail: pablo.abaunza@md.ieo.es

Ariz Tellería, Javier
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O. de Canarias, Apartado 1373, 38080 Santa Cruz de Tenerife Islas Canarias, Spain
Tel: +34 922 549 400, Fax: +34 922 549 554, E-Mail: javier.ariz@ca.ieo.es

Arrizabalaga, Haritz
AZTI - Tecnalia /Itsas Ikerketa Saila, Herrera Kaia Portualde z/g, 20110 Pasaia Gipuzkoa, Spain
Tel: +34 94 657 40 00, Fax: +34 94 300 48 01, E-Mail: harri@azti.es

Báez, José Carlos*****
Instituto Español de Oceanografía, Centro Oceanográfico de Málaga, Puerto Pesquero de Fuengirola s/n, 29640 Málaga, Spain
Tel: Fax: E-Mail: jcarlos.baez@ma.ieo.es

Cárdenas González, Enrique
Subdirector General de Protección de los Recursos pesqueros, Ministerio de Agricultura, Alimentación y Medio Ambiente, Secretaría General de Pesca, C/ Velázquez, 144, 28006 Madrid, Spain
Tel: +34 91 347 6110, Fax: +34 91 347 6037, E-Mail: edecarde@magrama.es

Carroceda Carballal, Aránzazu*****
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía - C.O. de A Coruña, Paseo Marítimo Alcalde Francisco Vázquez, 10 - P.O. Box 130, 15001 A Coruña, Spain
Tel: +34 981 21 8151, Fax: +34 981 229 077, E-Mail: arancha.carroceda@co.ieo.es

Chapel, Vincent*
European Fisheries Control Agency - EFCA, Avenida García Barbón, 4, 36330 Vigo, Spain
Tel: +34 986 120673, Fax: +34 88612 5239, E-Mail: vincent.chapel@efca.europa.eu

Chavance, Pierre*
Tropical Tuna Observator; Director - Fisheries Biologist, Centre de Recherche Halieutique Méditerranéenne et Tropical, Avenue Jean Monnet - BP 171, 34203 Sète cedex, France
Tel: +33 4 9957 3254, Fax: +33 4 9957 3295, E-Mail: pierre.chavance@ird.fr

Coelho, Rui*
Portuguese Institute for the Ocean and Atmosphere, I.P. (IPMA), Avenida 5 de Outubro, s/n, 8700-305 Olhão, Portugal
Tel: +351 289 700 520, Fax: +351 289 700 535, E-Mail: rpcoelho@ipma.pt

Cort, José Luis
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O. de Santander, Promontorio de San Martín S/N, 39004 Santander, Cantabria, Spain
Tel: +34 942 291 716, Fax: +34 942 27 5072, E-Mail: jose.cort@st.ieo.es

Daniel, Patrick
Commission européenne - DG Mare Unité - B3, J-99 02/53, 1000 Bruxelles, BÉLGICA
Tel: +322 229 554 58, Fax: E-Mail: patrick.daniel@ec.europa.eu

Delgado de Molina Acevedo, Alicia
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O. de Canarias, Vía Espaldón, Dársena Pesquera, PCL 8, 38180 Santa Cruz de Tenerife Islas Canarias, Spain
Tel: +34 922 549 400, Fax: +34 922 549 554, E-Mail: alicia.delgado@ca.ieo.es

Fernández Costa, José Ramón*
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía - C. Costero de A Coruña, Paseo Marítimo Alcalde Francisco Vázquez, 10 - P.O. Box 130, 15001 A Coruña, Spain
Tel: +34 981 218 151, Fax: +34 981 229 077, E-Mail: jose.costa@co.ieo.es

Fromentin, Jean Marc
IFREMER - Dpt. Recherche Halieutique, BP 171 - Bd. Jean Monnet, 34203 Sète Cedex, France
Tel: +33 4 99 57 32 32, Fax: +33 4 99 57 32 95, E-Mail: jean.marc.fromentin@ifremer.fr

García, Alberto*
Instituto Español de Oceanografía de Málaga, Puerto pesquero, 29640 Fuengirola, Málaga, Spain

Garibaldi, Fulvio*
Laboratorio di Biologia Marina e Ecologia Animale Univ. Degli Studi di Genova, Corso Europa, 26, 16132 Genova, Italy
Tel: +39 010 353 30 18, Fax: +39 010 357 888, E-Mail: largepel@unige.it; garibaldi.f@libero.it

Gaertner, Daniel
I.R.D. UR nº 109 Centre de Recherche Halieutique Méditerranéenne et Tropicale, Avenue Jean Monnet - B.P. 171, 34203 Sète Cedex, France
Tel: +33 4 99 57 32 31, Fax: +33 4 99 57 32 95, E-Mail: gaertner@ird.fr

Gatt, Mark
Department of Fisheries and Aquaculture, Fort San Lucjan, Birzebbugia, Malta
Tel: +356 222 93303, Fax: +356 21 659380, E-Mail: mark.gatt@gov.mt

Goujon, Michel
ORTHONGEL, 11 bis Rue des Sardiniers, 29900 Concarneau, France
Tel: +33 2 9897 1957, Fax: +33 2 9850 8032, E-Mail: orthongel@orthongel.fr

Keatinge, Michael
BIM (The Irish Seafisheries Board), Crofton Road, Dun Laoghaire, Dublin, IRLANDA
Tel: +353 1 214 4230, Fax: +353 1 230 0564, E-Mail: keatinge@bim.ie

Lizcano, Antonio
Subdirector Adjunto de la Subdirección General de Acuerdos y Organizaciones Regionales de Pesca, Ministerio de Agricultura, Alimentación y Medio Ambiente, Secretaría General Pesca, c/Velázquez, 144, 28006 Madrid, Spain
Tel: +34 91 347 5079, E-Mail: alizcano@magrama.es

Macías, Ángel David
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O.de Málaga, Puerto pesquero s/n, 29640 Fuengirola Málaga, Spain
Tel: +34 952 197 124, Fax: +34 952 463 808, E-Mail: david.macias@ma.ieo.es

Mariani, Adriano*****
UNIMAR, Vía Torino 146, Roma, Italy
Tel: +39 06 4782 4042, Fax: +39 06 4782 1 097, E-Mail: Mariani.a@unimar.it

Martínez Cañabate, David Ángel
ANATUN, Urbanización La Fuensanta 2, 30157 Algeciras, Spain
Tel: +34 968 554141, Fax: +34 91 791 2662, E-Mail: es.anatun@gmail.com

Monteagudo, Juan Pedro
Asesor Científico, Organización de Productores Asociados de Grandes Atuneros Congeladores - OPAGAC, c/Ayala, 54 - 2ºA, 28001 Madrid, Spain
Tel: Fax: E-Mail: monteagudo.jp@gmail.com; opagac@arrakis.es

Moreno Blanco, Carlos
Subdirector General de Acuerdos y Organizaciones Regionales de Pesca, Direccion General de Recursos Pesqueros y Acuicultura, Ministerio de Agricultura, Alimentación y Medio Ambiente, C/ Velázquez 144, 2ª planta, 28006 Madrid Spain
Tel: +34 91 347 6041, Fax: +34 91 347 6042, E-Mail: cmorenob@magrama.es

Million, Julien*****
187, An Ode Bri, 29870 L'Aber Wrach, France
Tel: +33 6 7585 6119, Fax: E-Mail: julienmillion2@gmail.com

Morón Ayala, Julio
Organización de Productores Asociados de Grandes Atuneros Congeladores - OPAGAC, c/Ayala, 54 - 2ºA, 28001 Madrid, Spain
Tel: +34 91 435 3137, Fax: +34 91 576 1222, E-Mail: opagac@arrakis.es

Muniategi Bilbao, Anertz
ANABAC-OPTUC, Txibitxiaga, 24 - Entreplanta, 48370 Bermeo - Bizkaia, Spain
Tel: +34 94 688 2806, Fax: +34 94 688 5017, E-Mail: anabac@anabac.org

Murua, Hilario
AZTI - Tecnalia /Itsas Ikerketa Saila, Herrera Kaia Portualde z/g, 20110 Pasaia Gipuzkoa, Spain
Tel: +34 667 174 433, Fax: +34 943 004801, E-Mail: hmurua@azti.es

Navarro Cid, Juan José
Grupo Balfegó, Polígono Industrial - Edificio Balfegó43860 L'Ametlla de Mar Tarragona, Spain
Tel: +34 977 047700, Fax: +34 977 457 812, E-Mail: juanjo@grupbalfego.com

Ortiz de Urbina, José María
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O de Málaga, Puerto Pesquero s/n, 29640 Fuengirola Málaga, Spain
Tel: +34 952 197 124, Fax: +34 952 463 808, E-Mail: urbina@ma.ieo.es

Ortiz de Zárate Vidal, Victoria
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O. de Santander, Promontorio de San Martín s/n, 39012 Santander, Cantabria, Spain
Tel: +34 942 291 716, Fax: +34 942 27 50 72, E-Mail: victoria.zarate@st.ieo.es

Peristeraki, Panagiota **(Nota)***
Hellenic Center for Marine Research, Institute of Marine Biological Resources, P.O. Box 2214, 71003 Iraklion
Tel: +30 2810 337 830, Fax: +30 2810 337 822, E-Mail: notap@her.hcmr.gr

Peyronnet, Arnaud*****
European Commission-DG MARE D2, JII - 99 06/56Rue de lo Loi, 200, 1049 Brussels, Belgium
Tel: +32 2 2991 342, Fax: E-Mail: arnaud.peyronnet@ec.europa.eu

Rodríguez-Marín, Enrique
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, C.O. de Santander, Promontorio de San Martín s/n, 39004 Santander, Cantabria, Spain
Tel: +34 942 291 716, Fax: +34 942 27 50 72, E-Mail: rodriguez.marin@st.ieo.es

Rojo, Vanessa
Oficina Española de Pesca - Dakar, Muelle diez, Dakar, Senegal
E-Mail: vanessarojo77@gmail. Com

Santos, Miguel Neves
Instituto Portugues do Mar e da Atmosfera -I.P./IPMA, Avenida 5 Outubro s/n, 8700-305 Olhão, Portugal
Tel: +351 289 700 504, Fax: +351 289 700 535, E-Mail: mnsantos@ipma.pt

Scott, Gerald P.
AZTI Tecnalia, 11699 SW 50th Ct, Cooper City, Florida 33330, United States
Tel: +1 954 465 5589, E-Mail: gpscott_fish@hotmail.com

Simon, Maximilien
IFREMER - Dept. Recherche Halieutique, B.O. 171 - Avenue Jean Monet, 34200 Sète, France
Tel: +33 670192434, E-Mail: maximilien.simon@developpment-durable.gouv.fr

Soto Ruiz, María*****
Ministerio de Economía y Competitividad, Instituto Español de Oceanografía, c/Corazón de María, 8, 28002 Madrid, Spain
Tel: +34 91 347 3620, Fax: +34 91 413 5597, E-Mail: maria.soto@md.ieo.es

Serra, Simone*****
Vía Torino, 146, 00184 Roma, Italy
Tel: +39 06 4782 4042, Fax: +39 06 4821 097, E-Mail: serra.s@unimar.it

Tserpes, George
Hellenic Center for Marine Research (HCMR), Institute of Marine Biological Resources, P.O. Box 2214, 71003 Heraklion Crete, Greece
Tel: +30 2810 337851, Fax: +30 2810 337820, E-Mail: gtserpes@her.hcmr.gr

FRANCE (ST. PIERRE & MIQUELON)
Laurent-Monpetit, Christiane
Chargée de Mission Pêche au Ministère des Outre-mer, Délégation Générale à l'Outre-mer, Département des politiques agricoles, rurales et maritimes27 Rue Oudinot, 75358 Paris SP07, France
Tel: +331 53692466, Fax: +33 1 53692038, E-Mail: christiane.laurent-monpetit@outre-mer.gouv.fr

GHANA
Ayivi, Sylvia Sefakor Awo
Fisheries Directorate of the Ministry of Food and Agriculture, Marine Fisheries Research Division, P.O. Box BT 62, Tema
Tel: + 233 2441 76300, E-Mail: asmasus@yahoo.com

Bannerman, Paul
Ministry of Fisheries, Marine Fisheries Research Division, P.O. Box BT 62, Tema
Tel: +233 244 794859, Fax: +233 302 208048, E-Mail: paulbann@hotmail.com

JAPAN
Itoh, Tomoyuki*****
Chief Scientist, Bluefin tuna Resources Division, National Research Institute of Far Seas Fisheries, 5-7-1 Orido Shimizu, Shizuoka 424-8633
Tel: +81 543 36 6036, Fax: +81 543 35 9642, E-Mail: itou@fra.affrc.go.jp

Kai, Mikihiko*****
Reseacher, Bluefin tuna Resources Group, National Research Institute of Far Seas Fisheries - NRIFSF, 5-7-1, Orido, Shimizu, Shizuoka 424-8633
Tel: +81 54 336 6011, Fax: +81 54 335 9642, E-Mail: kaim@affrc.go.jp

Kaneko, Morio
Assistant Director, International Affairs Division, Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries1-2-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8907
Tel: +81 3 3502 8460, Fax: +81 3 3504 2649, E-Mail: morio_kaneko@nm.maff.go.jp

Kimoto, Ai
Researcher, Bluefin Tuna Group, National Research Institute of Far Seas Fisheries, 5-7-1 Orido Shimizu, Shizuoka 424-8633
Tel: +81 543 36 6036, Fax: +81 543 35 9642, E-Mail: aikimoto@affrc.go.jp

Matsumoto, Takayuki
Senior Researcher, Skipjack and Albacore Group, National Research Institute of Far Seas Fisheries, Fisheries Research Agency (NRIFSF), 5-7-1, Orido, Shimizu, Shizuoka-city Shizuoka 424-8633
Tel: +81 54 336 6000, Fax: +81 54 335 9642, E-Mail: matumot@affrc.go.jp

Minami, Hiroshi
Chef of Ecologically Related Species Group, Tuna and Skipjack Resources Division,, National Research Institute of Far Seas Fisheries, 5-7-1 -Orido, Shimizu-ku, Shizuoka-City, Shizuoka 424-8633
Tel: +81 54 336 6000, Fax: +81 54 335 9642, E-Mail: hminami@affrc.go.jp

Ogura, Miki
Director of Tuna and Skipjack Resources Division, National Research Institute of Far Seas Fisheries, 5-7-1 Orido, Shimuzu-Ku, Shizuoka-City, Shizuoka 424-8633
Tel: +81 54 336 6000, Fax: +81 54 335 9642, E-Mail: ogura@fra.affrc.go.jp

Okamoto, Hiroaki
Chief of Skipjack and Albacore Group, Tuna and Skipjack Resources Division, National Research Institute of Far Seas Fisheries, 5-7-1 Orido, Shimuzu-Ku, Shizuoka-City, Shizuoka 424-8633
Tel: +81 543 36 6043, Fax: +81 543 35 9642, E-Mail: okamoto@fra.affrc.go.jp

Takeuchi, Yukio
Bluefin tuna Resources Group, National Research Institute of Far Seas Fisheries, Fisheries Research Agency of Japan, Mathematical Biology Section - Pelagic Resource Division7-1, 5 chome Orido, Shizuoka-Shi, Shimizu-ku
Tel: +81 543 36 6039, Fax: +81 543 35 9642, E-Mail: yukiot@fra.affrc.go.jp

Uosaki, Koji*****
Associate Director for Research, Tuna and Skipjack Resources Division, National Research Institute of Far Seas Fisheries, Fisheries Research Agency of Japan7-1, 5 Chome Orido, Shizuoka-shi, Shimizu-ku
Tel: +81 543 36 3036, Fax: +81 543 35 9642, E-Mail: uosaki@affrc.go.jp

Uozumi, Yuji
National Research Institute of Far Seas Fisheries, 5-7-1 Chome Orido, Shimizu, Shizuoka 424-8633
Tel: +81 543 36 6000, Fax: +81 543 35 9642, E-Mail: uozumi@affrc.go.jp

Yokawa, Kotaro*****
Chief, Tuna Fisheries Resources Group, Tuna and Skipjack Resources Division, National Research Institute of Far Seas Fisheries5-7-1 Orido, Shimizu-ku, Shizuoka-City Shizuoka 424 8633
Tel: + 81 543 36 6046, Fax: + 81 543 35 9642, E-Mail: yokawa@fra.affrc.go.jp

KOREA (REP.)
Kim, Zang Geun
National Fisheries Research And Development Institute, 216, Gijanghaeanro, Gijang-eup, Gijang-gun, 619-705 Busan
Tel: +82 51 720 2310, Fax: +82 51 720 2277, E-Mail: zgkim@korea.kr

Yoon, Sang Chul
National Fisheries Research and Development Institute, Fisheries Resources216, Gijanghaeanro, Gijang-eup, Gijang-gun, 619-705 Busan
Tel: +82 51 720 2334, Fax: +82 51 720 2337, E-Mail: yoonsc@nfrdi.go.kr; scyoon@korea.kr; yoonsc75@gmail.com

MEXICO
Ramírez López, Karina
Jefe de Departamento DGIPA-INAPESCA, Instituto Nacional de Pesca - SAGARPA, Av. Ejército Mexicano No.106 - Colonia Exhacienda, Ylang Ylang, C.P. 94298 Boca de Río Veracruz
Tel: +52 22 9130 4518, Fax: +52 22 9130 4519, E-Mail: kramirez_inp@yahoo.com;

MOROCCO
Abid, Noureddine
Chercheur au Centre Régional de Recherche Halieutique de Tanger, Center Regional de L'INRH á Tanger/M'dig, B.P. 5268, 90000 Drabed Tanger
Tel: +212 53932 5134, Fax: +212 53932 5139, E-Mail: abid.n@menara.ma; noureddine.abid65@gmail.com

Baibbat, Sid Ahmed*****
Biologiste Charge de suivi des thonidés, Centre de Recherche Halieutique de Laayoune, Laayoune
E-Mail: abdelmalekfaraj@yahoo.fr; baibat@hotmail.com

El Bakkali, Mohamed
Directeur Technique, Société Atuneros del Norte, Zone Portuaire Larache, BP 138
Tel: +212 539 914313, Fax: +212 539 914314, E-Mail: azizov70@gmail.com

El Marhoume, Samira
Ingénieur à la Division de la Protection des Ressources Halieutiques, Service de l'Application de la Réglementation et de la Police Administrative, Département de la Pêche Maritime, BP 476, Agdal, Rabat
Tel: +212 066 137 9157, Fax: +212 0637 688089, E-Mail: elmarhoum@mpm.gov.ma

Faraj, Abdelmalek
Directeur d l'Institut National de Recherche Halieutique, Institut National de Recherche Halieutique, Département des Ressources Halieutiques, Centre de Sidi Abderrahmane, 20000 Casablanca
Tel: +212 6 61079909, Fax: +212 6 61649185, E-Mail: faraj@ihrh.org.ma;abdelmalekfaraj@yahoo.fr

Grichat, Hicham
Chef du Service de l'Application de la Réglementation et de la Police Administrative, Ministère de l'Agriculture et de la Pêche Maritime, Departement de la Pêche Maritime, Direction des Pêches Maritimes et de l'Aquaculture, Nouveau Quartier Administratif, Haut Agdal Rabat
Tel: +212 537 68 81 19, Fax: +212 537 68 8089, E-Mail: grichat@mpm.gov.ma

Hassouni, Fatima Zohra
Chef du Service de la Gestion et de l'aménagement des Pécheries, Division de la protection des Ressources Halieutiques, Direction des Pêches maritimes et de l'aquaculture, Département de la Pêche maritime, Nouveau Quartier Administratif, Haut Agdal Rabat
Tel: +212 537 688 118, Fax: +212 537 688 189, E-Mail: hassouni@mpm.gov.ma

Kamel, Mohammed*****
Délégation des Pêches Maritimes de Tanger
Tel: +212 670 448 111, E-Mail: kamelmed@gmail.com; m_kamel@mpm.gov.ma

Rouchdi, Mohammed M.
Directeur adjoint des Pêches, Ministère de l'Agriculture et de la Pêche Maritime, Chef de la Division de la Production Halieutique 63 Bd Moulay Yoursef, Haut Agdal Rabat
Tel: +212 537 76 32 30, Fax: +212 537 77 85 40, E-Mail: oglaoui@pescabona.ma

NAMIBIA
Holtzhausen, Johannes Andries
Acting Chief Fisheries Biologist, Ministry of Fisheries &Marine Resources, NatMIRC, 10 Atlantic Str. Box 912, Swakopmund
Tel: +264 64 410 1145, Fax: +264 64 404 385, E-Mail: hholtzhausen@mfmr.gov.na

Mwilima, Aldrin Maswabi
Ministry of Fisheries & Marine Ressources, P.O. Box 912, Swakopmund
Tel: +264 64 410 1178, Fax: +264 64 404 385, E-Mail: amwilima@mfmr.gov.na

NORWAY
Albert, Thomas*****
Institute of Marine Research, P.O. Box 1870 Nordnesgaten, 33, NO-5817 Bergen
E-Mail:thomas.albert@imr.no

Nottestad, Leif
Principal Scientist, Institute of Marine Research, P.O. Box 1870 Nordnesgaten, 33, NO-5817 Bergen
Tel: +47 55 23 68 09, Fax: +47 55 23 86 87, E-Mail: leif.nottestad@imr.no

RUSSIAN FEDERATION
Leontiev, Sergei
Expert, Head of the Laboratory, FSUE-VNIRO, Russian Federal Research Institute of Fisheries & Oceanography17,
V. Krasnoselskaya, 107140 Moscow
Tel: +7 499 264 9465, Fax: +7 499 264 9465, E-Mail: leon@vniro.ru

Nesterov, Alexander
Head Scientist, Atlantic Research Institute of Marine, Fisheries and Oceanography (AtlantNIRO)5, Dmitry Donskoy Str., 236022 Kaliningrad
Tel: +7 (4012) 925322/925457, Fax: + 7 (4012) 219997, E-Mail: nesterov@atlant.baltnet.ru;

SAO TOMÉ & PRÍNCIPE
Da Conceiçao, Ilair
Licenciado em Relaçoes Públicas, Direcçao das Pescas, Responsavel pelo serviço de Estatística Pesqueira, Bairro 3 de Fevereiro, PB 59, Sao Tomé
Tel: +239 990 9315, Fax: +239 12 22 414, E-Mail: ilair1984@gmail.com

SENEGAL
Ndaw, Sidi
Chef du Bureau des Statistiques à la Direction des Pêches, Ministère de la Pêche et des Affaires Maritimes, Direction des Pêches Maritimes 1, rue Joris, Place du Tirailleur, B.P. 289, Dakar
Tel: +221 33 823 0137, Fax: +221 33 821 4758, E-Mail: sidindaw@hotmail.com; dopm@orange.sn

Ngom Sow, Fambaye
Chercheur Biologiste des Pêches, Centre de Recherches Océanographiques de Dakar Thiaroye, CRODT/ISRALNERV - Route du Front de Terre, BP 2241, Dakar
Tel: +221 33 832 8265, Fax: +221 33 832 8262, E-Mail: famngom@yahoo.com

SOUTH AFRICA
Nomxego, Lungelwa
Offshore resources Research, Depart. of Agriculture Forestry and Fisheries, Private Bag X2, Roggebaai, 8012 Cape Town
Tel: +27 021 402 3556, E-Mail: lungelwaN@daff.gov.za

West, Wendy
Inshore Resources Research, Department of Agriculture, Forestry and Fisheries, Fore trust Building, 9 Martin Hammerschlag Way, Foreshore, Cape Town
Tel: +27 21 4023120, E-Mail: WendyW@daff.gov.za

TUNISIA
Zarrad, Rafik
Institut National des Sciences et Technologies de la Mer, BP 138 Mahdia 5199
Tel: +216 73688604, Fax: +216 73688602, E-Mail: rafik.zarrad@instm.rnrt.tn

TURKEY
Ceyhan, Tevfik
Associate Professor, Ege University, Faculty of Fisheries35100 Bornova Izmir
Tel: +90 232 311 5212, Fax: +90 232 3747450, E-Mail: tevfik.ceyhan@ege.edu.tr

Erdem, Ercan
Ministry of Food, Agriculture and Livestock, General Directorate of Fisheries and Aquaculture
Tel: +90 544 478 2091, E-Mail: ercan.erdem@tarim.gov.tr

Karakulak, Saadet
Faculty of Fisheries, Istanbul University, Ordu Cad. Nº 200, 34470 Laleli Istanbul
Tel: +90 212 455 5700/16418, Fax: +90 212 514 0379, E-Mail: karakul@istanbul.edu.tr

UNITED STATES
Brown, Craig A.
NOAA Fisheries Southeast Fisheries Center, Sustainable Fisheries Division75 Virginia Beach Drive, Miam, Florida 33149
Tel: +1 305 361 4590, Fax: +1 305 361 4562, E-Mail: Craig.brown@noaa.gov

Cass-Calay, Shannon
NOAA Fisheries, Southeast Fisheries Center, Sustainable Fisheries Division75 Virginia Beach Drive, Miami, Florida 33149
Tel: +1 305 361 4231, Fax: +1 305 361 4562, E-Mail: shannon.calay@noaa.gov

Cortés, Enric
Research Fishery Biologist, NOAA-Fisheries, Southeast Fisheries Science Center, Panama City Laboratory, 3500 Delwood Beach Road, Panama City, Florida
Tel: +1 850 234 6541, Fax: +1 850 235 3559, E-Mail: enric.cortes@noaa.gov

Díaz, Guillermo
NOAA-Fisheries, Southeast Fisheries Science Center, 1315 East-West Highway # 13562, Silver Spring, Maryland 20910
Tel: +1 301 427 8589, Fax: +1 301 713 1875, E-Mail: guillermo.diaz@noaa.gov

Die, David
Cooperative Unit for Fisheries Education and Research University of Miami, 4600 Rickenbacker Causeway, Miami, Florida 33149
Tel: +1 305 421 4607, Fax: +1 305 421 4221, E-Mail: ddie@rsmas.miami.edu

Lauretta, Matthew
NOAA Fisheries Southeast Fisheries Center, 75 Virginia Beach Drive, Miami, Florida 33149
Tel: +1 305 361 4481, E-Mail: matthew.lauretta@noaa.gov

Porch, Clarence E.
Chief, Sustainable Fisheries Division, Southeast Fisheries Science Center, National Marine Fisheries Service 75 Virginia Beach Drive, Miami, Florida 33149
Tel: +1 305 361 4232, Fax: +1 305 361 4219, E-Mail: clay.porch@noaa.gov

Prince, Eric D.
NOAA Fisheries, Southeast Fisheries Science Center 75 Virginia Beach Drive, Miami, Florida 33149
Tel: +1 305 361 4248, Fax: +1 305 361 4219, E-Mail: eric.prince@noaa.gov

Schirripa, Michael
NOAA Fisheries, Southeast Fisheries Science Center 75 Virginia Beach Drive, Miami, Florida 33149
Tel: +1 305 361 4568, Fax: +1 305 361 4562, E-Mail: michael.schirripa@noaa.gov

Walter, John
NOAA Fisheries, Southeast Fisheries Center, Sustainable Fisheries Division 75 Virginia Beach Drive, Miami, Florida 33149
Tel: +305 365 4114, Fax: +1 305 361 4562, E-Mail: john.f.walter@noaa.gov

URUGUAY
Domingo, Andrés
Dirección Nacional de Recursos Acuáticos-DINARA, Laboratorio de Recursos Pelágicos Constituyente 1497, 11200 Montevideo
Tel: +5982 400 46 89, Fax: +5982 41 32 16, E-Mail: adomingo@dinara.gub.uy

VENEZUELA
Gutiérrez, Xiomara
Ministerio de Poder Popular de Agricultura y Tierras, Instituto Socialista de la Pesca y Acuicultura, Avenida Carúpano, Sector Caiguire, Edificio Sede del INIA, al lado de la empresa CAIP, 6101 Cumaná, Estado Sucre
Tel: +58 293 431 7656, Fax: +58 293 431 7656, E-Mail: xjgutierrezm@yahoo.es

Medina, Marly
Ministerio de Poder Popular de Agricultura y Tierras, Instituto Socialista de la Pesca y Acuicultura, Avenida Carúpano, Sector Caiguire, Edificio Sede del INIA, al lado de la empresa CAIP, Cumaná Estado Sucre
Tel: +58 293 431 7656, E-Mail: marlymedina@gmail.com

Arocha, Freddy
Instituto Oceanográfico de Venezuela Universidad de Oriente, A.P. 204, 6101 Cumaná Estado Sucre
Tel: +58-293-400-2111, Móvil: 58 416 693 0389, E-Mail: farocha@udo.edu.ve; farochap@gmail.com

OBSERVERS FROM NON-CONTRACTING COOPERATING PARTIES, ENTITIES AND FISHING ENTITIES

CHINESE TAIPEI
Chang, Feng-Chen
Overseas Fisheries Development Council, 19 Lane 113, Roosevelt Road Sect. 4, 106 Taipei
Tel: +886 2 2738 1522, Fax: +886 2 2738 4329, E-Mail: fengchen@ofdc.org.tw; d93241008@ntu.edu.tw

Chou, Shih-Chin
Specialist Research and Development Section, Deep Sea Fisheries Division, Taipei Branch of Fisheries Agency70-1, Sec. 1 Jinshan S. Rd., Taipei
Tel: +886 2 3343 6175, Fax: +886 2 3343 6097, E-Mail: shihcin@ms1.fa.gov.tw

Hsu, Chien-Chung
Professor, Institute of Oceanography National Taiwan University, P.O. Box 23-13, Taipei
Tel: +886 2 3362 2987, Fax: +886 2 2366 1198, E-Mail: hsucc@ntu.edu.tw

Wu, Ren-Fen
Overseas Fisheries Development Council, Nº 19, Lane 113, Roosevelt Rd; Sec 4, 106 Taipei
Tel: +886 2 2738 1522, Fax: +886 2 2738 4329, E-Mail: fan@ofdc.org.tw

OBSERVERS FROM INTER-GOVERNMENTAL ORGANIZATIONS

International Council for the Exploration of the Seas - ICES
Maguire, Jean-Jacques
1450 Godefroy, Quebec G1T 2E4, Canada
Tel: +1 418 688 3027, E-Mail: jeanjacquesmaguire@gmail.com

OBSERVERS FROM NON-GOVERNMENTAL ORGANIZATIONS

Confédération Internationale de la Pêche Sportive - CIPS
Ordan, Marcel
President of CIPS, Confédération Internationale de la Pêche Sportive, 135 Avenue Clot Bey, 13008 Marseille, France
Tel: +33 4 9172 6396, Fax: +33 4 91 72 63 97, E-Mail: ffpmpaca@free.fr

FEDERCOOPESCA
Buzzi, Alessandro
FEDERCOOPESCA, Vía Torino, 146, 00184 Roma, Italy
Tel: +3906 4890 5284, Fax: +3906 4891 3917, E-Mail: buzzi.al@confeooperative.it

Federation of Maltese Aquaculture Producers -FMAP
Deguara, Simeon
Research and Development Coordinator, Federation of Maltese Aquaculture Producers - FMAP, 54, St. Christopher Str., VLT 1462 Valletta, Malta
Tel: +356 21223515, Fax: +356 2124 1170, E-Mail: sdeguara@ebcon.com.mt

International Seafood Sustainability Foundation - ISSF
Restrepo, Victor
Chair of the ISSF Scientific Advisory Committee, ISS-Foundation, 805 15th Street N.W. Suite 650, Washington, DC 20005, United States
Tel: + 946 572 555, E-Mail: vrestrepo@iss-foundation.org: vrestrepo@mail.com

Marine Stewardship Council - MSC
Montero Castaño, Carlos
Técnico de Pesquerías para España y Portugal del MSC, Paseo de la Habana, 26-7ª planta puerta 4, 28036 Madrid, Spain
Tel: +34 674 071 053, Fax: +34 91 831 9248, E-Mail: carlos.montero@msc.org

Oceana
Perry, Allison
Oceana, C/ Leganitos, 47, 6º, 28013 Madrid, Spain
Tel: +34 91 144 0880, Fax: +34 91 144 0890, E-Mail: aperry@oceana.org

Pew Environment Group
Warwick, Luke
Pew Environment Group, Square du Bastion 1 a boîte 5, 1050 Brussels, Belgium
Tel: +322 741 5056 940, E-Mail: lwarwick@pewtrusts.org

The Ocean Foundation
Miller, Shana
The Ocean Foundation, 1990 M Street, NW, Suite 250, Washington, DC 20036, United States
Tel: +1 631 671 1530, E-Mail: smiller-consultant@pewtrusts.org

WWF Mediterranean Programme Office - WWF
García Rodríguez, Raúl
WWF España, c/Gran Vía de San Francisco, 8 -Esc.D, 28005 Madrid, Spain
Tel: +34 91 354 0578, Fax: +34 91 365 6336, E-Mail: pesca@wwf.es

Quílez Badia, Gemma*****
WWF Mediterranean Programme Office, c/ Carrer Canuda, 37 3er, 08002 Barcelona, Spain
Tel: +34 93 305 6252, Fax: +34 93 278 8030, E-Mail: gquilez@atw-wwf.org

****

ICCAT SECRETARIAT

C/ Corazón de María, 8 – 6ª Planta, 28002 Madrid - Spain
Tel: +34 91 416 5600; Fax: +34 91 415 2612; E-mail: info@iccat.int

Meski, Driss
Pallarés, Pilar
Kell, Laurence
Ortiz, Mauricio
Moreno, Juan Antonio
De Bruyn, Paul
Palma, Carlos
Parrilla Moruno, Alberto Thais
Seidita, Philomena
Campoy, Rebecca

JDMIP/ICCAT
Mishima, Mari

Interpreters

Baena Jiménez, Eva
Faillace, Linda
Leboulleux del Castillo, Beatriz
Liberas, Christine
Linaae, Cristina
Meunier, Isabelle

De Andrés, Marisa
García-Orad, María José
Peyre, Christine
Pinet, Dorothee
Fiz, Jesús
Gallego Sanz, Juan Luis
García Piña, Cristóbal
García Rodríguez, Felicidad
Moreno, Juan Ángel
Peña, Esther

GBYP Program
Di Natale, Antonio
Idrissi, M'Hamed

Appendix 3

LIST OF 2013 SCRS DOCUMENTS

Number	*Title*	*Author(s)*
SCRS/2013/010	Report of the 2013 Meeting of the ICCAT Working Group on Stock Assessment Methods *(Madrid, Spain - Match 11-15, 2013).*	Anon.
SCRS/2013/011	Report of the 2013 Tropical tuna species group inter-sessional meeting *(Tenerife, Spain - March 18-21, 2013).*	Anon.
SCRS/2013/012	Report of the 2013 Sharks species group inter-sessional meeting *(Mindelo, Cape Verde - April 8-12, 2013).*	Anon.
SCRS/2013/013	Report of Albacore data preparatory meeting (*Madrid, Spain - April 22-26, 2013*).	Anon.
SCRS/2013/014	Report of Bluefin meeting on biological parameters review (*Tenerife, Spain - May 7-13, 2013*).	Anon.
SCRS/2013/015	Report of Swordfish data preparatory meeting (*Madrid, Spain - June 3-106, 2013*).	Anon.
SCRS/2013/016	Report of the 2013 Albacore stock assessment session *(Sukarrieta, Spain - June 17-24, 2013).*	Anon.
SCRS/2013/017	Report of the 2013 inter-sessional meeting of the Sub-committee on Ecosystems *(Madrid, Spain - July 1-6, 2013).*	Anon.
SCRS/2013/018	Report of the 2013 bluefin stock assessment methods *(Goucester, USA - July 20-22, 2013).*	Anon.
SCRS/2013/019	Report of the 2013 Swordfish stock assessment session *(Olhao, Portugal - September 2-10, 2013).*	
SCRS/2013/020	Preliminary report for the data processing training course in Tema, November 2012.	Damiano A., Rojo V. and Barrigah S.
SCRS/2013/021	Current methods for estimating the overall longline effort distribution (month and 5 by 5 degree squares) in the ICCAT area.	de Bruyn, P.A., Palma, C. and Gallego, J-L.
SCRS/2013/022	New Task II (catch & effort, catch at size) statistics estimated in 2013 for the Ghanaian fleet during the 1996-2005 period.	Fonteneau A., Bannerman P., Ayivi S. and Nordstrom, V.
SCRS/2013/023	Suggested revisions and clarifications to the Peer review process in ICCAT.	de Bruyn, P.A., Santiago, J. and Kell, L..
SCRS/2013/024	A Plan for The Plan.	Santiago J., de Bruyn P., Arrizabalaga H., Murua H. and Scott G.
SCRS/2013/025	Model diagnostics for Stock Synthesis 3: examples from the 2012 assessment of Spanish mackerel and cobia in the U.S. Gulf of Mexico.	Cass-Calay S.L., Tetzloff J.C., Cummings N.J. and Jeffery Isely J.
SCRS/2013/026	Catch characteristics of tropical tuna caught by Korean tuna longline fishery in the Atlantic Ocean.	Yoon S.C., Kim Z.G., Lee S., Park H. and Lee D.W.
SCRS/2013/027	Examples of Stock Assessment diagnostic.	Kell L. and Die D.
SCRS/2013/028	Some key issues to get right in peer reviews of stock assessments: lessons from the US Center of Independent Experts.	Die D.J. and Shivlani M.

SCRS/2013/029	EU/Spain Fish Aggregating Device Management Plan	Delgado de Molina A., Ariz J.,Santana J.C. and Rodriguez S.
SCRS/2013/030	VPA-2Box model diagnostics used in the 2012 assessment of western Atlantic bluefin tuna (*Thunnus thynnus*).	Cass-Calay S.L. and Lauretta M.
SCRS/2013/031	A simulated capture-recapture model for estimating mortality and stock mixing rates of migratory Atlantic fishes.	Lauretta M.V.
SCRS/2013/032	A comparison of survival estimates for Atlantic marlins from mark recapture data from an artisanal fleet in Venezuela.	Die D.J., Hoenig D. M. and Marcano L.
SCRS/2013/033	An Example of a Management Procedure Based on a Biomass Dynamic Stock Assessment Model.	Kell L., Merino G., De Bruyn P., Ortiz de Urbina J.M., Arrizabalaga H., Muara H. and Santiago J.
SCRS/2013/034	An example of an Operating Model for a Management Strategey Evaluation of North Atlantic Albacore.	Kell L., Merino G., De Bruyn P., Ortiz de Urbina J.M., Arrizabalaga H., Muara H. and Santiago J.
SCRS/2013/035	An Example of a Management Strategey Evaluation of a Management Procedure Based on a Biomass Dynamic Stock Assessment Model.	Merino G., Kell L., De Bruyn P., Ortiz de Urbina J.M., Arrizabalaga H., Muara H. and Santiago J.
SCRS/2013/037	Preliminary results on habitat use of bigeye thresher (*Alopias superciliosus*) and smooth hammerhead (*Sphyrna zygaena*) sharks based on electronic tagging.	Coelho R., Santos M.N. and Fernandez-Carvalho J.
SCRS/2013/038	Reproductive biology of bigeye thresher (*Alopias superciliosus*) in the Atlantic Ocean.	Fernandez-Carvalho J., Coelho R and Santos M.N.
SCRS/2013/039	Observations on the Elasmobranchs bycatch composition and bycatch-at-size of the Portuguese pelagic longline fishery in the Atlantic Ocean.	Santos M.N., Coelho R., Lino P.G. and Fernandez-Carvalho J.
SCRS/2013/042	Some information of shortfin mako growth analysis.	Semba Y. and Yokawa K.
SCRS/2013/043	Update of standardized CPUE of albacore tuna, *Thunnus alalunga*, caught by Uruguayan longliners in the Southwestern Atlantic Ocean (1983-2012).	Pons M.
SCRS/2013/044	Incorporating Changes in Target Species in a Fisheries Stock Assessment Model: an illustration of alternative methods applied to the blue shark (*Prionace glauca*) in the Atlantic.	Carvalho, F., Ahrens, R., Murie, D., Ponciano, J. M., Aires-da-Silva, A., Maunder, M., and F. Hazin

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SCRS/2013/047	Importance des requins dans les captures de la peche artisanale aux filets maillants derivants de Côte d'ivoire.	Konan, K. J., Diaha, N., Sylla, S., Amandè, M. J. and T. G. Joanny
SCRS/2013/050	Evaluation of Canadian Sampling Program for bluefin tuna, assessment of length-weight conversions, and results of natal origin studies 2011-2012.	Busawon D.B., Neilson J.D., Andrushchenko I.,Hanke A.,Secor D.H. and Melvin G.
SCRS/2013/051	Relación entre los índices de abundancia estandarizados de las almadrabas y la oscilación del atlántico norte (NAO).	BáezZ J.C. , . Ortiz de Urbina J. M, de la SernaA J.M & Macías D
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SCRS/2013/053	Standardized north East Atlantic albacore (*Thunnus alalunga*) CPUEs from Spanish troll fleet by quarter, for the period 1981-2012.	Ortiz de Zárate V. and Ortiz de Urbina J.M.
SCRS/2013/054	Updated standardized age specific catch rates for albacore (*Thunnus alalunga*), from Spanish troll fishery in the northeast Atlantic: 1981-2011.	Ortiz de Zárate V. , Ortiz de Urbina J.M. and B. Pérez B.
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SCRS/2013/060	Standardised catch rates of albacore tuna (*Thunnus alalunga*) from the Irish mid water paired trawl fleet 2003-2012.	Cosgrove R., Minto C., Sheridan M. and Officer R.
SCRS/2013/061	Standardized CPUE for North Atlantic albacore caught by the Japanese longline fishery.	Kiyofuji, H.
SCRS/2013/062	Review of Japanese longline fishery and its albacore catch in the Atlantic Ocean.	Matsumoto T.
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SCRS/2013/066	Standardized catch indices of albacore tuna, *Thunnus alalunga*, from the United States pelagic longline fishery.	Lauretta M.V., Orbesen E.S., Schirripa M., and Diaz G.A.
SCRS/2013/067	Preliminary estimations of non-retained catch of albacore, *Thunnus alalunga*, in the southwestern Atlantic Ocean.	Domingo A., Mas F. and Forselledo R.
SCRS/2013/068	Standardized catch rates of albacore (*Thunnus alalunga*) caught by the Brazilian fleet (1978-2011).	Hazin, H. G.; Hazin, F. H.V.; and Mourato, B. L.
SCRS/2013/069	Standardization on northern Atlantic albacore (*Thunnus alalunga*) CPUE, dating from 1967 to 2012, based on Taiwanese longline catch and effort statistics.	Chang F., Tzeng T. and Yeh S.
SCRS/2013/070	Standardized CPUE of South Atlantic albacore (*Thunnus alalunga*) based on Taiwanese longline catch and effort statistics dating from 1967 to 2012.	Chang F. and Yeh S.
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SCRS/2013/074	ICCAT-GBYP activities for improving knowledge on bluefin tuna biological and behavioural aspects.	Di Natale A., Idrissi M., Justel Rubio A.
SCRS/2013/075	Length-weight relationship of Atlantic bluefin tuna caught by Japanese longline fisheries, based upon Japan's scientific observer program data, 2000-2011.	Ai Kimoto and Tomoyuki Itoh
SCRS/2013/076	On the potential use of size measurements by observers in the farm for the estimation of Mediterranean BFT catch at size.	Fonteneau A.
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SCRS/2013/080	Age determination analyses of Atlantic bluefin tuna (*Thunnus thynnus*) within the Biological and Genetic Sampling and Analysis Contract (GBYP).	Rodriguez-Marin et al.
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SCRS/2013/083	Review and preliminary analyses of farm harvested size frequency samples of eastern bluefin tuna (*Thunnus thynnus*).	Ortiz M., Justel Rubio A. and Gallego J.L.
SCRS/2013/084	Standardization of otolith-based ageing protocols for Atlantic bluefin tuna.	Secor D.H., Allman R., Busawon D., Gahagan B., Golet W., Koob E., Lastra Luque P. and Siskey M.
SCRS/2013/085	Conversion factors for Atlantic bluefin tuna fork length from measures of snout length and otolith mass.	Secor D.H., Busawon D., Gahagan B., Golet W., Koob E., Neilson J. and Siskey M.
SCRS/2013/086	Contribution of Gulf of Mexico population to US Atlantic bluefin tuna fisheries, 2010-2011.	Secor D.H., Barnett B., Allman R. and Rooker J.
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SCRS/2013/088	Atlantic bluefin tuna stock mixing within the U.S. North Carolina recreational fishery, 2011-2012.	Secor D.H., Gahagan B. and Rooker J.
SCRS/2013/089	Origin of Atlantic bluefin tuna in the Atlantic Ocean and Mediterranean Sea using d^{13}C and d^{18}O in otoliths.	Rooker J., Fraile I., Arrizabalaga H. , Kimoto A., Sakai O. , Abid N., Neves M. , Karakulak S. , Macías D. , Addis P. , Deguara S. and Tinti F. .
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SCRS/2013/093	Growth of Atlantic bluefin tuna determined from the ICCAT tagging database: a reconsideration of methods.	Ailloud L.E., Lauretta M.V., Hoenig J.M. and Walter J.F.
SCRS/2013/094	Bluefin Tuna Biological Sampling Program: Commercial and Recreational fisheries.	
SCRS/2013/095	Updated standardized joint CPUE index for bluefin tuna (*Thunnus thynnus*) caught by Moroccan and Spanish traps for the period 1981- 2012.	Abid N., Faraj A., de la Serna J.M., Macías D., Saber S. and Ortiz de Urbina J.
SCRS/2013/096	Feasibility study to assess the utilization of stereo-video systems during transfer of Atlantic bluefin tunas (*Thunnus thynnus*) to evaluate their number and size.	Mariani A., Dell'Aquila M., Scardi M. and Costa C.
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SCRS/2013/101	Standardized CPUE of swordfish, Xiphias gladius, caught by uruguayan longliners in the Southwestern Atlantic Ocean.	Pons M., Forselledo R. and Domingo A.
SCRS/2013/102	Estimations of non-retained capture of swordfish, *Xiphias gladius*, in the Southwestern Atlantic Ocean.	Forselledo R., Mas F., Pons M. and Domingo A.
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SCRS/2013/131	Estimación de las interacciones de las pesquerías de grandes pelágicos en el Mediterráneo y Estrecho de Gibraltar con mamíferos, tortugas y aves marinas. Proyecto de mitigación de estas interacciones.	de la Serna J.M.; Macias D. and Ortiz J.M.
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Appendix 4

WORK PLANS OF THE SPECIES GROUPS FOR 2014

Tropical Tunas Work Plan

Considering that the last stock assessments (SA) for the eastern and the western stocks of Atlantic skipjack were not updated since 2008 with data until 2006, the Tropical Species Group plans to evaluate these two stocks in 2014 during a nine days inter-sessional meeting. In prevision of this stock assessment meeting, Task I and II should be updated until 2013 and sent to the ICCAT Secretariat at least six weeks before the beginning of the SA meeting. Due to the amount of skipjack catches in many surface fisheries in the Eastern Atlantic, the Group will integrate the estimates by species (commercial tuna catch and *faux poisson*) in the skipjack stock assessment.

Considering the multispecies nature of the tuna tropical fisheries, the interaction between the three species and gears, and the needs to follow the trends in the exploitation rate of the stocks which have not been evaluated the same year (i.e., yellowfin and bigeye), the Group recommended that CPC participants of this stock assessment provide several fishery indicators for the three tropical tuna species. Indices such as CPUEs should be updated until 2013 for the three species and should tentatively be standardized and presented with auxiliary information within the framework defined by the Method Working Group in 2012 (see Chap. 3: *Protocols for the Inclusion or Use of CPUE Series in Assessment* in the Report of the 2012 Meeting of the ICCAT Working Group on Stock Assessment Methods). Likewise, updated CAS should be provided for skipjack, and if possible, for the two other species by the Secretariat.

Due to the importance in catches of the Ghanaian fleets, the Group expressed the need to obtain additional information on catch per vessel and % of fishing days per year of the Ghanaian purse seiners prior to adopting the preliminary Task I estimates presented during the 2013 Species Group, for the 2006-2012 period. Assuming that such a document is made available prior to the 2014 inter-sessional stock assessment meeting, most likely the skipjack stock assessment (at least three months before the stock assessment meeting), the Group recommended that the assumptions used in the corresponding 2013 SCRS document be fully evaluated and that adoption be reconsidered.

In agreement with the concept of best available science, the presence of an external participating expert during the skipjack stock assessment is highly suitable. The terms of reference will be provided by the Working Group and corresponding cost for this participation should be evaluated by the Secretariat.

During the Species Group in September 2014, the efficacy of the time-area closure on FADs [Rec. 11-01], in terms of reduction in mortality of juvenile bigeye and yellowfin tunas will be evaluated in light of the revised and updated statistics and on the best information available. Priority will be given on examining descriptive statistics concerning changes in catch and effort levels and distribution as, with only one year of data available, it is unlikely that a full evaluation of the efficacy of the closure will be possible.

Atlantic Ocean Tuna Tagging Programme (AOTTP)

During previous meetings of the SCRS (2010 and 2012), a tagging plan was developed that described a five year Atlantic Ocean Tuna Tagging Program. Last year the Group proposed to update and develop this document to reflect current tagging objectives, priorities and the budget including the voluntary contribution provided by the United States in support of the Tropical Tunas Tagging Program scheduled. The detailed scientific design for the program required to achieve the objectives agreed in the inter-sessional tropical tuna meeting in 2013, was presented in the SCRS 2013 and the Group agreed on the following work plan for the Atlantic Ocean Tuna Tagging Program (see Addendum 1 to Appendix 4 for more information on AOTTP Task force work plan):

- To prepare and submit a project proposal and a funding request for DG Mare to carry out feasibility study for the implementation of the Atlantic Ocean Tropical Tagging Programme. ***Responsibility***: AOTTP task force/ ICCAT Secretariat. Deadline: before end of 2013 SCRS meeting
- To launch the feasibility study for the implementation of the Atlantic Ocean Tropical Tagging Programme. ***Responsibility***: ICCAT. Deadline: end of 2013/beginning 2014.

- To provide assistance to those who will carry out the feasibility study for the implementation of the Atlantic Ocean Tropical Tagging Programme and present to the 2014 Skipjack Assessment Meeting. ***Responsibility***: AOTTP Task Force and the Working Group. Deadline: Skipjack stock assessment meeting.
- Based on the results of the feasibility study to develop a proposal for the AOTTP programme including objectives, plan of work, timeline and budget to be presented during the inter-sessional stock assessment meeting and finalized in 2014 SCRS. ***Responsibility***: AOTTP Task Force. ***Deadline:*** First draft for skipjack stock assessment meeting; final version for 2014 SCRS meeting.
- Communicate with possible donors to seek their willingness to fund such a project and identify procedures to mobilize the funds. ***Responsibility***: Consultant + AOTTP Task Force. ***Deadline:*** First report skipjack stock assessment meeting/final 2014 SCRS meeting.
- To organize a peer-review meeting with external expertise to review the AOTTP proposal. ***Responsibility***: Tropical Tunas Working Group. ***Deadline***: Before 2014 SCRS meeting.

Addendum 1 to Appendix 4

AOTTP Task Force Work Plan

In 2010, the SCRS recommended the implementation of a large-scale Atlantic Ocean Tuna Tagging Programme (AOTTP) and several delegations endorsed the proposal during the 17th Special Meeting of the Commission and invited all Contracting Parties to contribute financially to its implementation. During its inter-sessional meeting held in March 2013 in Tenerife, Canary Islands (Spain), the Tropical Tuna Species Group revised the list of AOTTP objectives and a Task Force was created to discuss and prepare a comprehensive proposal for the AOTTP.

Today, large uncertainty remains in the stock assessment of tropical tuna stocks in the Atlantic Ocean. A tuna tagging programme at the scale of the tropical Atlantic Ocean would allow ICCAT to acquire the needed missing parameters in order to improve stock assessment analyses and reduce their uncertainty.

Such large-scale programs have been conducted in the Pacific and in the Indian Ocean with great success and today the data resulting from those programs are routinely used in stock assessment analysis and contribute to improve scientific advices for the adoption of management measures by the WCPFC and IOTC.

The Task Force created to undertake the preparatory work of the AOTTP is currently formed by the SCRS Chair, the Tropical Tuna Species Coordinator, the Tropical tuna rapporteurs and a consultant to coordinate its activities and is open to any scientists that would like to participate in the work. Objectives of the task force include: (i) the development of a comprehensive project proposal for the AOTTP built on the lessons learned from the programs in the Pacific and Indian Oceans, and from previous tagging activities in the Atlantic; (ii) the development of Terms of Reference for a Feasibility Study on the implementation of the AOTTP; and (iii) to identify potential donors and contributors to the program. Document SCRS/2013/195 presented a work plan for the Task Force.

Definition of AOTTP objectives and priorities

The basis for the development of a program at the scale of the AOTTP is a clear definition of objectives. A list of objectives was proposed by the SCRS in 2010, and was later reviewed by the tropical tuna species group and the Task Force.

The overall objective of the AOTTP is to improve the sustainability of tropical tuna resources by providing the best science available to ICCAT.

Its specific objectives are:

1. To estimate of recent exploitation rates for tropical tunas stocks in the Atlantic Ocean;
2. To integrate tagging information into specialized stock assessment models;
3. To assess the effectiveness of management measures (*e.g*. time are closures, FAD management, *etc*.);
4. To provide training and capacity building to developing Contracting Parties of ICCAT in tagging; data collection and tagging data/stock assessments analysis.

The specific outputs for the project and priorities are:

a) Confirmation of the current stock structure for the three species of tropical tuna, and analysis of their movements across the Atlantic Ocean, *High*
b) Estimation of recent fishing mortality rates independently from CPUE, *High*
c) Estimation of the level of interactions between surface and longline fisheries, *High*
d) Estimation of age-area-sex specific growth rates, *High*
e) Estimation age-specific natural mortality rates, *High*
f) Estimation of tag-shedding and tag reporting rates by gear and flag, *High*
g) Training of scientists from ICCAT developing Contracting Parties to design and implementation of tagging experiments and tagging data analysis, *High*
h) Study the effect of: (i) drifting FADs on the movement patterns and biology of skipjack (at all stages) and of bigeye and yellowfin juveniles; (ii) the associated school fishing technique in some baitboat fisheries; as well as (iii) the residence time of tunas around seamounts, *Medium*
i) Contribute to stock assessment of small tunas, in particular Atlantic bonito and blackfin tuna, *High*
j) Study the link between environmental conditions and distributions and abundance of tropical tunas, *Medium*
k) Habitat and Behaviour: describe the habitat used by tropical tunas, *Medium*
l) Interaction between tropical tunas: is productivity of tropical tunas independent of the productivity of each stock? *Low*
m) Survival rates for released fish: estimate post-tagging mortality, *Low*
n) Spawning: improve knowledge on spawning patterns, *Low*

Design and implementation of the AOTTP

The Group recalled that, due to its large-scale, the AOTTP should be carefully designed and planned in order to ensure the best environment to achieve its objectives. Tuna tagging programs in the Pacific and Indian Oceans included a large-scale project and a suite of different small-scale operations to achieve particular objectives. The Group noted that the best structure to be given to the AOTTP should depend on the objectives and level of funding, and noted that the Task Force should study the different possible scenarios. In particular small-scale operations could allow the release of fish where the availability of tuna or bait is too low for a baitboat vessel or where the size class of the fish makes then less available to pole-and-line gear.

The Group noted that during tagging programmes, tag recovery is often underestimated while it is the main contributor to the tagging data collected. For the development of the AOTTP, the Group recommended that special attention is given to the recovery activities in order to ensure that resources allow to maximize the return of good quality data.

In particular, the Group noted that in all tuna tagging programs, reporting rates from longline fleets are very low. In the Atlantic, several of these fleets are well monitored through observer programs and the Group recommended that special attention be given to the fleet, such as: (i) quality of the data should be good; and (ii) based on the returns from these fleets, reporting rates could be inferred for other longline fleets.

The Group recalled that while the aim of the program is to reinforce the management capacity of ICCAT, developing countries in the region will also beneficiaries of the AOTTP. In fact, tuna fisheries are contributing to the economy and the food security of the coastal countries of the Atlantic Ocean, and their sustainable management is of prime interest to maintain these contributions. In addition, the AOTTP will bring capacity building to scientists from coastal countries in the region and contribute to their training regarding design and implementation of tagging project as well as the understanding of the stock assessment process.

The Group noted the different tag types that are used for large-scale tagging programs, and that the AOTTP should use a combination of the different types of tagging (conventional, chemical and electronic) in order to achieve the different objectives of the program. In addition, the Group recommended that genetic and PIT tagging are studied to review the status of the methodology and technology and see whether these types of tagging could be applied to a large-scale program and included in the AOTTP.

The Group recalled the necessity to collect auxiliary information in order to estimate tag shedding and tag reporting rate. Such information is collected by double tagging experiment (for tag shedding), tag seeding operations and/or comparison of return rates with a control group (for tag reporting rate). Regarding estimation of shedding rate, the Group noted that methods should be studied to ensure the independence between the two tags.

Basic biological information for small tuna in the Atlantic is largely unknown, while this species are important for coastal states as they contribute to the local economy and food security of coastal populations. The Group reiterated that the AOTTP will also be a good opportunity to contribute to estimate basic biological parameters for these species, and in particular Atlantic bonito and blackfin tuna, such as growth, stock structure and movements which would contribute to future stock assessment analyses. However, the Group agreed that tagging of such species should not divert the AOTTP from its main target. The Group suggested that a review of the species composition should be made in order to assess if those species could be tag in the same time as the main tropical species, or if their tagging would require dedicated tagging operation under the AOTTP framework.

Feasibility study

The Group was informed that the EU could potentially fund a Feasibility Study for the AOTTP in 2013 and recommended that the Task Force develops terms of references and that the ICCAT Secretariat prepare a proposal to the EU and request for the funding of such activity, recognizing that a Feasibility Study would be necessary for the development of the project proposal for the AOTTP.

Funding

The Group noted that total financial needs for a project such as the AOTTP should be in the order of magnitude of the programs implemented in the Pacific and Indian Ocean, i.e., €12-15 million, depending on the structure of the project and its objectives.

The Task Force will also be responsible to identify potential donors interested in participating in the funding of the AOTTP, and identify the process to mobilize the funds from the different sources.

The Group noted that only Senegal has sent a letter of interest to the European Union so far, and Cape Verde and Côte d’Ivoire have prepared a letter that should be sent in the near future. However, the Task Force reminded the Group that the submission of these letters is essential to initiate the request for funding to the European Union, as potential contributors to the AOTTP. The Group recommended that all developing coastal countries from the Atlantic send a letter of interest regarding the implementation of a large-scale tuna tagging programme in the Atlantic Ocean to the European Union within the best delays. The Group noted the interest of Brazil to participate in the programme and recommended that the Task Force follows this up.

Simulation study

Documents SCRS/2013031 and SCRS/2013/189 presented the results of tagging simulation studies for tropical tunas in the Atlantic. The simulations study the influence of different scenarios on the estimations bias of the key parameters estimated from tagging experiments, *i.e.* natural and fishing mortality.

The Group recognized the interest of such study to use at different levels of the development and implementation of a large-scale tuna tagging program. In fact, such simulations can be used during the design of the program to test the different release and recovery scenarios in terms of numbers of fish released, species composition of the releases and areas of release. The Group noted that the simulation model is using one fishery and two areas (North and South) and recommended that the model is further developed to include several fisheries and an eastern-western stratification, to increase its resolution and its usefulness for the design and implementation of the program. The Group noted that scientists had difficulties to estimate natural mortality from the tagging data of the Indian Ocean and recommended that the authors of the simulation contact them to discuss issues arising from their analyses.

Albacore Work Plan

In 2013, the North and South albacore stocks were evaluated and an interim Limit Reference Point was proposed for the northern stock, as well as several alternative HCRs that allow the Commission to choose desired levels of risk and recovery timeframes. Several models were used, including age structured and statistical catch at age models that required substantial data preparatory work by the Secretariat and other members of the Group. In the process, the Group identified several recommendations for future work that will guide the work of the Group during 2014. The main objective will be to prepare the next assessments for these stocks (not scheduled yet), by reducing uncertainty around datasets and parameters on one hand, and developing robust management procedures that cope with the uncertainty that remains. No inter-sessional meetings are envisaged.

The list of actions, responsibilities and deadlines is as follows:

- Revise North Atlantic size data for Chinese Taipei longliners including all the historical period, and explain the patterns.
  Responsibility: Chinese Taipei. ***Deadline***: September 2014. ***Deliverable:*** SCRS document.

- Describe North and South spatial dynamics of Japanese and Chinese Taipei longline fisheries, their temporal changes and analyse their effect on the standardized CPUE series.
  Responsibility: Japan and Chinese Taipei. ***Deadline:*** September 2014. ***Deliverable:*** SCRS document.

- Complete and revise French mid-water trawl historical series of catch, effort, catch at size, geographical distribution and other related information.
  Responsibility: EU-France. ***Deadline:*** July 31, 2014. ***Deliverable:*** SCRS document.

- Further elaborate North Atlantic albacore MSE framework to consider a broader range of uncertainties and test alternative management procedures against different indicators. This will allow simplifying the process of updating management advice, as well as enhancing dialogue with the Commission on the most robust HCRs.
  Responsibility: EU-Spain, with involvement from the Secretariat and collaboration with the Swordfish Working Group. ***Deadline:*** September 2014. ***Deliverable:*** SCRS document.

- Revise the Albacore Research Program goals, structure and budget, and establish priorities. ***Responsibility:*** Albacore Species Group. ***Deadline:*** September 2014.

- Collate Mediterranean albacore biological data that have likely been collected in different data collection programs (e.g. EU/DCR). Also, to the extent possible, extend back in time the available CPUE series. ***Responsibility:*** CPCs. ***Deadline:*** September 2014. Deliverable: SCRS document.

- Development and testing of data poor methods for data poor stocks (i.e., Mediterranean albacore). ***Responsibility:*** EU-Spain, with involvement from the Secretariat. ***Deadline:*** September 2014. ***Deliverable:*** SCRS document.

Bluefin Tuna Work Plan

Recommendation [10-04] states "In 2012, and thereafter every three years, the SCRS will conduct a stock assessment for bluefin tuna for the western Atlantic and eastern Atlantic and Mediterranean and provide advice to the Commission on the appropriate management measures, inter alia, on total allowable catch levels for those stocks for future years."

The Atlantic-wide Research Program for Bluefin tuna (GBYP) and various National programs have produced, and continue to produce, a great deal of new information on the biology and fisheries for bluefin tuna. In preparation for the planned 2015 assessment, time and resources of the SCRS are thus required to validate these data and to incorporate them in the ICCAT database as well as working on updated biological parameters and new modeling approaches. Therefore, the SCRS planned for several meetings in the 2012 work plan. The first two took place in 2013 and aimed at updating the biological parameters and comparing various modeling platforms. For 2014, the SCRS plans a data preparatory meeting to incorporate the new catch and effort information in ICCAT databases and continuing working on new modeling platforms.

Recommendation [12-03] for the eastern Atlantic and Mediterranean bluefin tuna states "In 2014 the SCRS will conduct an update of the stock assessment and provide advice to the Commission.../... Furthermore, the SCRS shall work towards the development of new assessment modeling approaches and inputs, in a view to minimize uncertainties, which shall be used in a stock assessment in 2015 and thereafter every three years."

The Group expressed concern regarding the above Recommendation, mostly because the SCRS may have not the resources to update the assessment of the East Atlantic and Mediterranean bluefin tuna in 2014 while also undertaking the difficult task of preparing for the 2015 assessment. In this regard, the Commission may wish to consider how the limited resources of the SCRS can be most effectively utilized. This dilemma has been debated by the SCRS, which considers that any update of East Atlantic and Mediterranean stock assessment should include updated Task I and II databases. To accommodate priorities to improve the scientific advice by 2015 and last commission request, the SCRS proposes the following work plan for 2014:

1. Update fishery indicators in accordance Rec. [12-03], paragraph. 50 (to be done during the annual species group meeting preceding the SCRS plenary in Madrid in 2014).
2. Conduct an Inter-sessional Preparatory Workshop in early 2014 (6 days) that will focus on the following:
   a) Revise Task II by validating and integrating the catch at size statistics with new information from farms and other sources of information.
   b) Revise Task I (aggregated catch, by gear/fleet) data by including new sources of information from BCDs and trade statistics (i.e. outputs from experts contracted by the GBYP).
   c) Review tagging past and recent data for bluefin tuna.
   d) Complete outstanding tasks from the Biological Parameters meeting in Tenerife (age-length relationships, morphometric conversions, natural mortality, reproduction, etc.).
3. Continue a series of workshops and related activities (to be sponsored by the GBYP and various national programs) in accordance with recommendations from the Biological Parameters Meeting (Tenerife) and the Bluefin Methods meeting (Gloucester) including:
   a) Establish a reference collection for otoliths and hard parts and calibrate age estimates among readers.
   b) Larval biology workshop.
   c) Continue the development of new modeling platforms that can better take into account various sources of uncertainties.

There is thus a considerable amount of work to be done in 2014, i.e., validating and incorporating 10,000s of new files into the current ICCAT databases, calibrating and updating all the size and age conversion methods and continuing the development of new modeling platforms.

Therefore, if the 2014 Bluefin Tuna Species Group is able to incorporate these new sources of information into Task I and II databases and to complete the biological parameters by June 2014 the), the SCRS proposes that an additional inter-sessional meeting be planned in September 2014 to update the eastern Atlantic bluefin tuna stock assessment. However, even if the new data are available this stock assessment is unlikely to reduce substantially most of the unquantified uncertainties.

However, if the 2014 bluefin tuna species Group cannot complete these tasks by the end of the workshop (or slightly later), the SCRS proposes postponing the East Atlantic bluefin tuna stock assessment to 2015, as previously planned.

Nonetheless, if the Commission still considers updating the 2014 assessment to be of higher priority, then most of the activities under item (2) and some of item (3) above should be postponed to 2015 and the corresponding 2015 assessment would be postponed until 2016. Note that the eastern Atlantic bluefin tuna stock assessment is postponed to 2016; this will have some implication on the western Atlantic bluefin tuna stock assessment due to mixing issues.

Billfish Work Plan

Organize an intersessional meeting for the purpose of analyzing existing billfish data (Task I and Task II); tagging data as well as the diverse range of studies that have been conducted on biology and other aspects of billfish life-history, for use in future evaluations. Identify information gaps and uncertainties in the data. Develop a strategy to obtain the information required for assessment. It is proposed the meeting be held in May, 2014.

Data review of biological and fishery indicators of all billfish. In the case of sailfish the Working Group noted that the last assessment was in 2009 and therefore, such a review could potentially be followed by a sailfish stock assessment meeting in 2015.

The Working Group will conduct an analysis of available biological, catch and effort information, by area and quarter, in order to identify time-areas on which to focus analyses regarding the potential utility of time-area closures.

These analyses will consider, at a minimum: (1) potential billfish catch reduction, by species; (2) impact on targeted catches; (3) the biology and life history of the billfish species, in order to identify areas of special concern; and (4) the potential consequences of resulting shifts in effort. This plan will require that the Secretariat provide updated CATDIS and EFFDIS through the most recent years possible in advance of the meeting. CPC scientists should prepare data and documents describing relevant biology, movements and habitat preferences for billfish.

Providing that CPCs report on the methodology used for estimation of dead and live discards of marlins, the Working Group will analyze the information submitted in order to provide a response to the Commission on this matter.

Swordfish Work Plan

Assessments for North and South Atlantic swordfish were conducted in 2013. The next assessment is proposed for 2016.

For the Mediterranean stock, the last assessment was conducted in 2010. The next assessment should take place during 2014, using data up to 2013 to allow a preliminary evaluation of the imposed management measures after 2008.

Proposed work

North and South Atlantic

A list of recommended work has been provided in the Report of the 2013 ICCAT Atlantic Swordfish Stock Assessment Session (SCRS/2013/019). Among those recommendations, the following were identified as high priority areas where continued efforts are required:

Catch and effort data and reporting deadlines

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 scientists from Japan, Chinese Taipei, Canada, Spain, Portugal and the United States (North Atlantic) and Japan, Chinese Taipei, Spain, Uruguay and Brazil (South Atlantic), as well as any others CPCs, coordinate their work before the meeting (possibly using videoconference), with the goal of updating the index prior next assessment (or presenting the results as document at 2014 SCRS meeting). Future data preparatory meetings should focus on resolving the conflicting indices to the extent possible prior to the next assessment. Consideration should be given to aggregating the CPUE trends by area (rather than the current method of aggregating by nation). For the South Atlantic in particular, some attempt should be made to use stock assessment methods that can reconcile the contradictory trends in the target and by-catch CPUE series for the south (e.g., age/spatially-structured models).

Discards

Information on the number of fish caught, and the numbers discarded (dead and released alive) should be reported in order to quantify discarding in all months and areas so that the effect of discarding and releasing can be fully included in the next stock assessment. These data must be reported by the ICCAT deadlines for submission of Task I and II data.

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 Group recommended the investigation of alternative forms of analyses in the South Atlantic, that deal with both the By-catch and Target patterns, such as age- and spatially-structured models. Results should be presented as documents at 2014 SCRS meeting.

Weight-length relationships

The Group recognized that the newly-adopted length-weight relationships for swordfish require validation with new field information. National scientists are requested to collect and submit observed values of length (LJFL) and round weight data to the Secretariat to facilitate this task.

South Atlantic Swordfish Research Plan

Given the poor understanding of population dynamics of swordfish in the South Atlantic, the Group should develop a long term plan for an enhanced program of research, focusing on independent estimates of fishing mortality, fraction mature by age, growth by sex and stock, movement and migrations, and improving available indices of abundance. Within the context of the SCRS Strategic Plan, this deficiency could be addressed.

Environmental effects

Given the possibility of spatial and environmental effects being partially responsible for the conflicting directions of some of the influential indices of abundance, the Group should further study into this hypothesis during the coming year, use existing PSAT data to compliment this work, and to determine how best to formally including these environmental covariates into the overall assessment process. The United States is willing to take a lead role in this investigation and likely collaborators would include scientist from Canada, Japan, and Spain as their indices were the most appropriate for this work. Moreover, the review of historical size data and fishery data is necessary to decide appropriate modelling structure, which should be conducted by national scientists and the ICCAT Secretariat. Expected deliverables would include quantified reduction in the conflicting indices of abundance from the temperate and tropic regions, which in turn should lead to a more stable assessment. Other products could include an increased understanding of the distribution of Swordfish and perhaps a revisiting of the geographic structure of the data and the assessment. These works should be done before the next stock assessment.

Informative priors for carrying capacity

Given the sensitivity of assessment results in general to prior distributions for carrying capacity in situations where the data are uninformative, the group recommends that informative priors for K be developed based upon factors such as habitat area, population density and other life history factors. While borrowing a prior based upon the posterior for K from another assessment, e.g. using the posterior for K from the North for the South may be scientifically justified; the Group recommends that future decisions such as this be based upon scientific analyses similar to the development of a prior for r.

– *Mediterranean*

Past considerations relevant to the 2014 stock assessment

Catch and effort

All countries catching swordfish (directed or by-catch) should report catch, catch-at-size (ideally by sex) and effort statistics by as small an area as possible (2x2 degree rectangles for longline, and 1x1 degree rectangles for other gears), and by month, particularly for the major fleets.
Responsibility: All CPCs; ***Deadline:*** one month prior to the meeting.

Discards

It is recommended that at least the order of magnitude of unreported catches and discards be estimated by major fleets.
Responsibility: All CPCs; ***Deadline:*** one month prior to the meeting.

CPUE indexes

The Group notes that it is important to collect size data together with the catch and effort data to provide meaningful CPUEs by biomass and age for the major fleets.
Responsibility: national scientists; ***Timeframe:*** 15 days prior to the meeting.

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. ***Responsibility:*** national scientists; ***Timeframe:*** 15 days prior to the meeting.

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.
Responsibility: national scientists; ***Timeframe:*** 15 days prior to the meeting.

Other considerations relevant to the Mediterranean stock assessment

Alternative Stock Assessment Models

Results of the previous assessment that was based on XSA were highly dependent on the selection of the plus group. The application of additional methods should be explored based on the trials made during the 2013 assessment of the Atlantic stocks.
Responsibility: Secretariat and national scientists; ***Timeframe:*** during the meeting.

– *Participation*

Participation in the Swordfish Species Group has been problematic in recent years. The Group recommends that CPCs that can make valuable contributions to the assessment make the necessary arrangements to ensure the presence of their national scientists at the assessment meeting.
Responsibility: CPCs and national scientists; ***Timeframe:*** 15 days prior to the meeting.

Small Tunas Work Plan

The following recommendations should be taken into account for improving statistical and biological data as well as the structure of small tuna populations. The improvement in the data would allow conducting assessment in the future in order to provide ICCAT with appropriate management advice for fisheries targeting small tuna.

- All countries should report Task I and Task II data and make effort to improve knowledge on the biology and the stock structure and other relevant aspects of these species;
- National scientists should review their small tuna catches and try to classify them by species, using ICCAT small tunas species identification sheets;
- National scientists should analyse historical data on small tunas collected under the ICCAT Small Tunas Research Program and present the results to the 2014 SCRS: trends in historical catches, effort and CPUE, develop simple indicators of stock sustainability, such as proportion of juveniles within the catch;
- The tasks outlined in the work plan should be conducted by scientists of CPCs in 2014. These improvements to the existing data and information would facilitate an intersessional meeting in 2015 to take inventory of the information as well as allow preliminary analyses of these data.

- Support the extension of the tagging project for tropical tunas to small tunas. The inclusion of small tunas will not significantly increase the budget and will provide an excellent opportunity to improve the current knowledge on the stock structure and biological parameters of small tuna species.
- Encourage studies on stock structure and species distribution;
- Collaborate, as much as possible through joint working groups with RFOs (GFCM, CRFM, and CECAF) to improve and exchange basic fisheries data on small tunas;

Sharks Work Plan

Organize an inter-sessional meeting for the purpose of analyzing existing shark data (TI and TII), tagging data as well as the diverse range of studies that have been conducted on biology and other aspects of shark life-history, for use in future evaluations. Identify information gaps and uncertainties in the data. Develop a strategy to obtain the information required for assessment. It would be advantageous to include the participation of other RFBs and RFMOs (e.g. ICES GFCM) to increase the expertise available for this work.

There is also a need to finalize the research plan, especially with regard to economic requirements as well as prioritization of research.

The group will analyse and explore the methodology used in the project which provided advice for the implementation of the EU POA (SCRS/2013/165) to estimate total sharks catches.

It is noted that the last assessment of BSH was in 2008. This meeting should thus be followed by a BSH data preparatory meeting and assessment in 2015.

This activity complements the Research Plan and need for future assessments and responses to requests from the Commission.

Work Plan for Working Group on Stock Assessment Methods (WGSAM)

The Working Group discussed the future work plan and retained mainly the following actions:

- WGSAM recommends reviewing the protocols and algorithms for estimating Effort distribution (5x5) for longline (EFFDIS), and extended to purse seine and baitboat gears, currently prepared by the Secretariat. The Working Group should also include estimates of uncertainty on these products. It is suggested that published estimates in the ICCAT Web page, include also detailed description of the estimate assumptions and uncertainty related to these products to make aware the potential users of their limitations.

- The Commission expects risk-based advice on management measures as prescribed in the Kobe II Strategy Matrix and as embedded in its Decision Framework (Rec. 11-13). An important aspect of providing such scientific advice is adequate quantification of uncertainty in stock condition and future prospects under future management option scenarios. With the advent of more commonly applied, highly parameterized stock assessment models, the computational investment in quantifying uncertainty in stock status and future prospects is quite heavy. This is also the experience at other tRFMOs and a number of approximations for quantifying both process and observational uncertainty are being applied to develop risk-based management advice. Guidance on the evolution of and possibility of harmonizing methods to apply for uncertainty characterization across species groups should be provided by WGSAM.

- Including during the agenda items of 2014 some of the Horizontal Themes identified during the process of elaborating the SCRS Strategic Plan in 2013, particularly those related to participation and capacity building and quality control of the stock assessments and management advice.

- WGSAM recognized that there is a trend in recent assessments conducted by the SCRS to use multiple modelling methods to estimate the status of the stock relative to ICCAT conservation benchmarks. While WGSAM agrees the use of multiple approaches is a good practice, situations have arisen where the different methods give results that are not consistent yet equally plausible. Having guidance from the WGSAM on best practices to reconcile or combine such results would be very helpful (see, for example, ICES 2007).

- The evaluation of Limit Reference Points (LRP) and Harvest Control Rules (HCR) through the use of Management Strategy Evaluation (MSE) is increasingly being recognized by global tuna RFMOs as an effective means to advance their fishery management process. The 2013 assessments of albacore and swordfish were used as examples of how an MSE process could possibly be formally included in the management of those stocks. The WGSAM plans to continue this effort by (1) continuing to refine the methods within the MSE process, (2) introduce MSE more assessments when and where appropriate, and (3) foster lines of communication that keep managers informed of their benefits and weaknesses.

Sub-Committee on Ecosystems Work Plan

Proposed work plan for the Sub-Committee on Ecosystems in 2014 as pertains to by-catch:

Continue with the assessment of the impact of ICCAT fisheries on sea turtles as initiated in 2012 to this end, the Group agreed that future work on this matter should be conducted by a coordinated group of scientists from the participating CPCs. It was acknowledged that individual CPCs have access to information/expertise and data which is not available to the Sub-Committee on Ecosystems for a variety of reasons. Such a coordinated study with CPC scientists providing information to improve the ERA could address this issue. This work would be coordinated by the Chair of the Sub-Committee on Ecosystems as well as the by-catch coordinator. Objectives to be achieved include:

1. Review the inputs to the ERA, ensuring we have the best possible information available on:
   i) Productivity
   ii) Horizontal distribution
   iii) Vertical distribution of fishing gear
   iv) Vertical distribution of species
   v) Post-capture mortality
   vi) Selectivity/length frequencies

2. Reviewing the suggestions made in section 9.3 and 9.4 of the 2013 Sub-Committee on Ecosystems Report and incorporating these improvements where possible/relevant.
3. Provide revised advice based on the updated ERA.
4. Review seabird by-catch mitigation measures as described in Rec. 11-09.

Possible timetable

1. Contact relevant CPCs - November 2013
2. Deadline for submission of components of ERA (list under point 1) - April 2014
3. Deadline for incorporation into ERA - June 2014
4. Presentation of updated ERA-Sub-Committee on Ecosystems meeting 2014 (preferably in August / September)

Proposed work plan for the Sub-Committee on Ecosystems in 2014 as pertains to ecosystems:

The Sub-Committee determined that the following ecosystem related activities would be important to complete in 2014:

General objectives:

Develop linkages with other RFMOs that conduct scientific studies, provide management and have developed the tools or are currently developing the tools that will allow them to implement the EBFM approach within ICCATs management area (e.g. tRFMOs, GFCM, NAFO and ICES).

Specific objectives:

1. Define the domains within ICCAT for which EBFM frameworks must be developed.
2. Refine the framework (conceptual/operational objectives, indicators, reference levels) that will allow the implementation of the EBFM approach.
3. Assess the importance of the Sargasso Sea ecosystem to ICCAT species as per Resolution 12-12.
4. Populate a list of indicators reflecting stated fishery resource, ecological, economic and social objectives.
5. Determine which indicators of ecosystem status can be used in a traffic light report card.

6. Review the progress that has been made in implementing ecosystem values in enhanced stock assessments or an EBFM.
7. Review conceptual models for EBFM that explore the potential impact of perturbations on the model elements, reveals data gaps, identifies important relationships and identifies thresholds for change within the system.

Work Plan of the Sub Committee on Statistics

- A methodology is formulated to identify better ways to characterize uncertainty in unquantifiable aspects of data submissions (related to quality control). This should be done in a way that builds upon the SCRS capacity to advise the Commission on how this uncertainty impacts the scientific advice for fishery management that can be provided. Subsequent to the Sub-Committee meeting, an *ad hoc* Working Group met to initiate work on this topic and made some progress. In order to further this work, an inter-sessional discussion on refining the methodology and evaluating additional methods to characterize this uncertainty will be held. The agenda for this discussion will be developed intersessionally.

- More focused discussions on artisanal fisheries be conducted intersessionally Strategic investments in the short-term may make improvements, but more discussion needs be carried out to avoid duplication and improve utility. Generally these fisheries do not have by-catch or discards and are usually multi-specific. These discussions should draw on expertise of other sub-regional and regional management bodies and evaluate how best to coordinate with other on-going initiatives. The first step in focusing this discussion is to develop an inventory of the recent and on-going initiatives to improve artisanal fishery data collection activities amongst the CPCs. It is recommended that a contract be made to develop such an inventory.

Appendix 5

ICCAT ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA (GBYP) ACTIVITY REPORT FOR 2013

(LAST PART OF PHASE 3 AND FIRST PART OF PHASE 4)

1. Introduction

The Atlantic-wide Research Programme for Bluefin Tuna (GBYP) was officially adopted by SCRS and the ICCAT Commission in 2008, and it started officially at the end of 2009, with the objective to:

a) Improve basic data collection, including fishery independent data;
b) Improve understanding of key biological and ecological processes;
c) Improve assessment models and provision of scientific advice on stock status.

The total budget of the programme was estimated at about 19 million Euros in six years, with the engagement of the European Community and some other Contracting Parties to contribute to this programme in 2009 and in the following years. The initial year had a budget of 750,000 Euros, the second phase had a total budget of 2.502.000 Euros (against the original figure of 5,845,000 Euros and a revised figure of 3,476,075 Euros), while the third phase had a budget of 1,925,000 Euros (against the original figure of 5,845,000 Euros and a revised figure of 4,417,980 Euros), The fourth phase has a budget of 2,500,000 Euros (against the original figure of 5,195,000 Euros and a revised figure of 3,792,000 Euros).

Phase 1 and Phase 2 activities were jointly committed by the European Community (80%), Canada, Croatia, Japan, Libya, Morocco, Norway, Turkey, United States of America, Chinese Taipei and the ICCAT Secretariat, while in Phase 3 contributions have been requested to China, Algeria, Korea and Tunisia. In Phase 4 the ICCAT Secretariat included also Egypt, Albania, Syria and Iceland among the funders. Some CPCs never provided their contribution. Several private entities provided funds or in kind support; the detailed list is available on http://www.iccat.int/GBYP/en/Budget.htm.

The GBYP activity is supported by a twin programme carried out by NOAA-NMFS, which is focusing the research activities on the western Atlantic Ocean.

2. Coordination activities

Phase 3 activities officially ended on January 19, 2013. Phase 4 officially initiated on 21 January 2013 and will be completed by 20 January 2014.

Six Calls for Tenders were issued in Phase 3, signing a total of 8 contracts. A total of 14 deliverables (periodic reports) were produced in the framework of the EC Grant Agreement. A total of 6 Calls for tenders were issued in the first part of Phase 4, providing 16 contracts so far. The administrative and desk workload behind all coordination duties was extremely heavy. In the last part of Phase 3 and in the first part of Phase 4 of GBYP, the coordination staff participated officially in 14 meetings in various countries. The detailed report is available in document SCRS/2013/144.

A mid-term review of ICCAT-GBYP was carried out in Phase 4 and the report is available as SCRS/2013/178.

3. Steering Committee

The members of the Steering Committee are the Chair of SCRS, Dr. Josu Santiago, the BFT-W Rapporteur, Dr. Clay Porch, the BFT-E Rapporteur, Dr. Jean-Marc Fromentin, the ICCAT Executive Secretary, Mr. Driss Meski, and an external expert, Dr. Tom Polacheck, who was duly contracted.

The activity of the Steering Committee included continuous and constant e-mail contacts with the GBYP coordination, which provided the necessary information. In the last part of Phase 3 and in the first part of Phase 4 the Steering Committee held two meetings (December 12-14, 2012 and September 28-29, 2013), discussing various aspects of the programme, providing guidance and opinions. The reports of the Steering Committee are available at: http://www.iccat.int/GBYP/en/scommittee.htm.

4. Data mining and data recovery

The data mining and data recovery activity continued following the objectives recommended by the Steering Committee. A complete and detailed overview of the data recovered so far is now available (see SCRS/2013/073 and SCRS/2013/169). Task II data collect by GBYP are now in the ICCAT BFT data base.

In Phase 4, one Call for Tenders was issued so far, but contracts are still to be released at the moment of this report. The market and auction data provided to GBYP as a donation in kind will be analysed in the last part of Phase 4.

5. Aerial survey

A study for assessing the feasibility of a large-scale of an aerial survey was conducted in the last part of Phase 3, under the modelling tasks. This study was extremely important for taking a decision about the activities in Phase 4 and it was decided to carry out an extended survey if a sufficient number of permits will be available.

The ICCAT-GBYP issued a Call for Tenders and four contracts were awarded. A training course for pilots, professional spotters and scientific observers was held at the Secretariat on 4 June 2013. The survey was conducted in most of the Mediterranean areas thanks to the cooperation of various ICCAT CPCs, but permits were not available for Algeria, Libya, Albania, Montenegro and Syria air spaces. Besides several operational difficulties and constraints and thanks to the strong cooperation of the four Companies in charge of the survey, finally it was possible to get all final reports.

The aerial survey data have been analysed, providing an external contract, and the final report was recently made available (see http://www.iccat.int/GBYP/en/asurvey.htm). The data collected in Phase 4 confirmed the validity of the approach adopted in Phase 1 and 2 and showed an increasing abundance of spawners in the areas where the time frame was within the limits. At the same time, this last survey was extremely useful for better planning future aerial surveys.

6. Tagging

Thanks to the tags acquired in previous Phases, it was not necessary buying additional conventional tags in Phase 4, while it was necessary to buy a total of 9,845 applicators for double-dart conventional tags and 35 mini-PATs, for carrying out the activities in Phase 4.

6.1 Conventional tagging activity

The tagging activity in Phase 3 was partly reported during the SCRS and the Commission meeting in 2013, because it was completed during the extension period. The final report of the tagging activity is on http://www.iccat.int/GBYP/Documents/TAGGING/PHASE%203/GBYP_TAGGING_FINAL_REPORT_PHASE_3.pdf. The tagging activity in Phase 3 faced several operational problems, mostly due to causes of "*force majeure*" (bad weather, lack of fish at the surface in the selected areas, fishery technical accidents, etc.).

The tunas conventionally tagged in each area in Phase 3 are as follows: 3413 in the Bay of Biscay (41% double tagging), 1489 in the area of the Strait of Gibraltar (80.4% double tagging); 313 in the western Mediterranean, including the opportunistic tagging by sport fishers (27.8% double tagging), and 97 in the central Mediterranean Sea. In total, 7,995 conventional tags were implanted on 5312 bluefin tunas.

The tagging activity in Phase 4 was defined by the Steering Committee on 12-14 December 2012, including tagging by baitboats for juveniles and tentative tagging by purse-seiners for juveniles, by purse-seiners for adults and in traps for adults, in various areas on the Atlantic and the Mediterranean. The Call for tenders was issued on March 6, 2013 and 5contracts were awarded to four Consortia and one Company.

Even in this fourth year the field activity had some problems, mostly caused by the high level of technical difficulties. At the moment on which this report was set-up, the tagging activity was completed in the Moroccan traps (258 tagged fish, with 46.9% double tagging), in the Sardinian traps (207 tagged fish, with 3.4% double tagging), in the Tyrrhenian Sea by PS (70 tagged fish) and in the Adriatic Sea by PS (1,169 tagged fish, with 41.1 double tagging). An additional 2,579 tunas have been tagged so far in the Bay of Biscay (51.8 % double tagging) and 265 tunas have been tagged in the Strait of Gibraltar (45.7% double tagging); in both areas the activity is still going on.

6.2 Electronic tagging activity

The tagging activities in Morocco, which were conducted thanks to the support of the Moroccan Fishery Authorities, were carried out with a cooperative agreement of the tuna industry, the Moroccan tuna traps, the INRH and the WWF-MedPO.

The electronic tagging activities conducted in Morocco in Phase 2 and 3 (37 adult bluefin tuna were tagged) were submitted to SCRS and the Commission in 2012 and the report is available at: http://www.iccat.int/GBYP/Documents/TAGGING/PUBLICATIONS/SCRS-12-143_ICCAT-GBYP_Pop-up_Tagging.pdf. Two further documents were presented during the meeting in Tenerife in May 2013. Other 7 tunas were electronically tagged in Phase 4 in Morocco.

The results provided by these tags are showing that only a variable percentage of the bluefin tuna spawners arriving in spring to the Moroccan coasts are entering into the Mediterranean Sea, while the others move to various Atlantic areas. Some of the tagged tunas went also to very far areas from where bluefin tuna was not noticed since decades. These results are clearly showing the great interest in going on with electronic tagging activities in the future Phases of GBYP, in order to provide inputs for a more realistic management of the bluefin tuna stocks and populations.

Another 71 mini-PATs have been implanted so far on juveniles in the Bay of Biscay and in the Straits of Gibraltar in Phase 3 and Phase 4, and the results are progressively coming to GBYP. Several premature detachments have been noticed, even if the anchors were improved in Phase 4.

In the last part of Phase 3, it was also possible to implant 38 internal archival tags and so far no one has been recovered.

6.3 Tag awareness and tag reporting campaign

According to the recommendations provided by the Steering Committee in all meetings, the GBYP continued the tag awareness campaign, for the purpose of improving the tag recovery and reporting rates. .Thousands of awareness material in 12 languages (posters and stickers) was produced in Phase 3 and distributed in many countries. The details are on http://www.iccat.int/GBYP/en/AwCamp.asp. The tagging awareness campaign is coupled by a tag rewarding campaign strongly recommended by the Steering Committee, including high rewards, special T-shirts and increased annual lottery prizes. It is also considered very important to provide immediate feedback to the tagging teams and the tag recovery person, informing both of them about the history of each tag and this work is continuously carried out by GBYP.

For improving information and awareness about the tagging programme, ICCAT-GBYP is developing contacts with various stake-holders organizations and with journalists. Information on GBYP is now present on various web pages, while some articles on the press have been promoted.

Meetings with ICCAT ROPs were also organized every year, for informing them about the ICCAT-GBYP tag recovery activity and for asking them to pay the maximum attention to tags (including natural marks) when observing harvesting in cages or any fishing activity at sea.

A total of 95 conventional tags, 10 mini-PATs, 3 archival tags and 1 commercial tag from bluefin tunas have been reported to ICCAT-GBYP up to the date, showing a substantial improvement of the total number of reported tags (see detail on document SCRS/2013/177).

7. Biological and genetic sampling and analyses

The activities carried out in Phase 2 and in the first part of Phase 3 have been already reported to the SCRS and the Commission in 2012. All activities for the biological studies in Phase 3 are now available at:

> http://www.iccat.int/GBYP/Documents/BIOLOGICAL%20STUDIES/PHASE%203/Bio_Consortium_FinalReport_GBYP_Phase3.pdf.

An SCRS meeting was organized in May 2013 in Tenerife for reviewing the bluefin tuna biological parameters and the report is available at: http://www.iccat.int/Documents/Meetings/Docs/2013-BFT_BIO_ENG.pdf. The results are also on documents SCRS/2013/074, SCRS/2013/080, SCRS/2013/089, SCRS/2013/094, all presented at the Tenerife meeting.

In total, 4,759 bluefin tunas have been sampled in Phases 2 and 3, providing 3,113 otoliths, 2521 spines, 626 gonads, 4,395 muscles/fins, for a total of 10,655 biological samples. Of these samples 44% have been analysed so far.

The first results, that can be still considered preliminary, are extremely interesting and very promising:

- genetic analyses shows that there are possibly several sub-population components of the eastern Bluefin tuna stock, including two components in the Mediterranean Sea, but results need to be confirmed by a larger number of samples, extending the sampling to areas which have not been sampled;
- microchemistry analyses showed that stock components are well separated; mixing in the Mediterranean Sea is minimal, but the presence of important percentages of bluefin tuna from different areas in central-North Atlantic and in Atlantic Morocco needs to be much more investigated and checked at least in two other years before having more solid results
- Age-length key (ALK) was improved, using most of the samples; a larger number of samples and cross-checked results are essential for getting more robust correlations.

Samplings are continuing in Phase 4, carried out by all institutions already engaged in tagging activities in the various areas. A call for tenders for both sampling and analyses was issued in 6 March 2013, receiving one offer from a large Consortium of 13 entities and 7 sub-contracted entities, belonging to 13 countries.

8. Modelling approaches

In Phase 3, the activity included the Risk Assessment and two studies to Support the Stock Assessment (a) Statistical conversion of catch-at-size to catch-at-age; and b) Data Imputation). Furthermore, it was decided to add a study on the use of Aerial Survey data. Two Calls for tenders and 4 contracts were released in Phase 3. The final reports are available on http://www.iccat.int/GBYP/en/modelling.htm.

A Call for Tenders was issued in Phase 4, including three activities: a) quantitative risk assessment, b) a study on statistically based stock assessment methods and, c) development of biological hypotheses for the use within MSE. Two contracts were awarded and the results should be available at the end of Phase 4.

In Phase 4, two meetings were held on modeling: The first meeting was held in May 2013 in Tenerife to prepare a first discussion draft document (see:

http://www.iccat.int/GBYP/Documents/MODELLING/PHASE%204/tenerife_Modelling.pdf
and
http://www.iccat.int/GBYP/Documents/MODELLING/PHASE%204/Tenerife_gbyp-modelling_draft_proposal.pdf).

A second meeting was held in July 2013 in Gloucester, where a detailed planning of bluefin tuna modeling activities has been agreed for the submission to SCRS.

9. Legal framework

ICCAT adopted the Rec. 11-06 in its meeting in Istanbul on November 2011, which allows for a “research mortality allowance” of 20 t of bluefin tuna by year for GBYP and for the use of any fishing gear in any month of the year in the ICCAT Convention area for GBYP research purposes. For implementing the recommendation, the ICCAT Secretariat is releasing a circular in each year of GBYP activity.

A total of 61 ICCAT-GBYP RMA certificates have been issued in Phase 3, using a total of 4,332.8 kg of bluefin tuna. A total of 37 ICCAT-GBYP RMA certificates have been issued so far in Phase 4, using 2,639.3 kg of bluefin tuna in 2013 (provisional data).

10. Cooperation with ROP

The GBYP coordination, together with the ICCAT Secretariat, is maintaining and improving the contacts with the ROP observers, for strengthening the cooperation and providing opportunities. The ROPs observers are engaged for directly checking bluefin tuna at the harvesting for improving the tag recovery and reporting and for noticing any natural mark. Specific forms were provided to ROPs.

11. GBYP web page

The ICCAT-GBYP web page, which was created in the last part of Phase 1, is usually regularly updated with all documents produced by GBYP; in some cases, due to the huge workload, some sets of documents are posted all together. The updating also includes the budget page, where all contributions (monetary of in kind) are regularly listed, to ensure full transparency. The ICCAT-GBYP web page was recently fully revised and improved.

12. Following activities

The GBYP Steering Committee, the mid-term review and the various GBYP meetings provided a list of recommendations on various issues; several of them are essential for fulfilling the duties. Further recommendations will be provided this year by SCRS and then will be forward to the Commission.

In addition, GBYP considers essential better defining the following points:

a) *Evolution of the Atlantic-Wide Research Programme for Bluefin Tuna:* according to the current situation, which demonstrated the impossibility to reach the funding level approved by the ICCAT Commission for the various years of the GBYP and, as a consequence, the impossibility to carry out the various activities as originally planned, and the need to have a sufficient number of years for obtaining the necessary results, a programme revision is now necessary, finding the right balance among funding possibilities, research needs and duration. The funding system shall be better defined and improved, in order to ensure the regular development of the activities.

b) *Data recovery and data mining:* Task II data will be finally included in the ICCAT BFT data base; the few conflicting Task I data must be revised as soon as possible by the concerned CPCs and national scientists. Market and auction data shall be revised and made available to scientists as soon as possible.

c) *Aerial survey:* it is considered essential continuing the survey on spawning aggregations in selected areas, for providing a trend to be used in models; the prediction model using the SST data should be further developed.

d) *Tagging:* electronic tagging should be strongly improved, while conventional tagging should be carried out taking advantage of the experiences in Phase 4. The tag awareness activity shall be firmly continued, improving media communication.

e) *Biological and genetic sampling and analyses:* sampling should be continued, covering the less sampled areas; the analyses of the available samples should be improved; age analyses should be cross checked for validation.

f) *Modelling:* new additional efforts should be devoted for finding the best approaches for using fishery independent data and innovative approaches for better quantify uncertainties. The proposed plan should be adopted and enforced as soon as possible.

For GBYP Phase 5, the Steering Committee recommended the following activities:

1. *Data recovery:* the data analysis shall continue; the trade and marked data will be further analysed in depth after the preliminary work carried out in Phase 4. A data preparatory meeting is planned before updating the assessment.

2. *Biological and genetic sampling and analyses*: it will be necessary to complete the analyses of the samples already collected and stored, developing sampling in the areas where it was not possible to sample so far or where sampling was not sufficient. An ageing calibration shall be carried out, with cross reading among various laboratories of a reference set of samples (otoliths and spines). The GBYP will co-fund a workshop on bluefin tuna larvae.

3. *Conventional tagging*: it is necessary to ensure a continuation of the activities, following the same strategy adopted in Phase 4 and enlarging the purse-seine tagging to juveniles in the Tyrrhenian Sea. The baitboats in the Bay of Biscay will be used also for assessing the recapture rates.

4. *Electronic tagging*: will be continued, using both miniPATs and internal archival tags, with a priority for the Moroccan traps. Tag awareness and recovery: must be further strengthened, through the effective support and assistance of national scientists, more focused activities and by contracting various persons for specifically increase awareness in farms.

5. *Aerial survey on spawning aggregations:* shall be continued, revising the “outside” areas and slightly enlarging the “inside areas”, possibly including some important South Mediterranean areas which were not surveyed in Phase 4. A calibration exercise will be necessary, along with another training course.
6. *Modelling approaches:* An external high-level expert shall operate as coordinator of the modelling group; an external expert will be hired full-time for initial model development and coding; two meetings will be necessary in Phase 5.

The total necessary budget for Phase 5 is set at 2,650,000 Euros.

The GBYP will continue encouraging and supporting additional research activities carried out by various CPCs.

Appendix 6

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH

(Expenditures/Contributions 2013 & Program Plan for 2014)

Summary and Program objectives

The ICCAT Enhanced Research Program for Billfish continued its activities in 2013. The Secretariat coordinates the transfer of funds and distribution of tags, information, and data. The General Coordinator of the Program is Dr. David Die (USA); the East Atlantic coordinator is Mr. Paul Bannerman (Ghana), and the West Atlantic coordinator is Dr. Eric Prince (USA).

The original plan for the ICCAT Enhanced Research Program for Billfish (IERPB, SCRS 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 IERPBF 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 2012 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 coming, in recent years, 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 since 2009 there were also annual contributions from Chinese Taipei.

2013 Activities

The following is a summary of the activities of the Program. Nine observer trips, representing 110 longline sets onboard Venezuelan longline vessels, were monitored by July 2013 in comparison to the fifteen that were monitored during 2012. Sampling of Venezuelan artisanal catches also continued in the central coast of Venezuela and about 1,400 trips on the first half of 2013, in comparison 3,870 trips were monitored in 2012. During the first part of 2013, three sport fishing tournaments were also monitored. Biological sampling from both the pelagic longline and artisanal Venezuelan fisheries has continued collecting biological samples of sailfish for reproductive studies, and for white marlin and spearfish for genetic identification. Last year in Venezuela this program recovered 6 tagged billfish, however, this year this program already recovered 10 tagged billfish by July 2013. During this period the total number of tagged billfish reported in the western Atlantic has been 16.

The IERPB supported characterization of billfish catches on-board small scale vessels in Brazil, tissue sampling for genetic identification in Brazil and Uruguay and biological sampling for reproduction and growth in Bermuda, and Venezuela.

In West Africa the program continued to support a review of billfish statistics in Ghana, Senegal and Côte d'Ivoire. In Ghana a frame survey was conducted to update the current catch assessment indicators for the artisanal sector of the fishery. A total of 976 dugout canoes using small drift gill nets were registered as against 520 in the last survey of 2004. This increment of approximately 47% of drift gill net canoes will help in obtaining in future more reliable estimates on catch and effort data for improved Task I. In Côte d'Ivoire there has been a focus on the biological sampling of blue marlin, the most commonly caught species by the artisanal fishery. Improvements of catch and effort records from these countries are reflected in the Task I tables for billfish that were used in the recent marlin assessments 2011 and 2012.

Documents SCRS/2013/032, SCRS/2013/167, SCRS/2013/192, SCRS/2013/204, SCRS/2013/205 and SCRS/2013/206 were produced with the benefit of direct or indirect support of the IERPB.

2014 Plan and activities

The highest priorities for 2014 are to support those established by the billfish workplan, specifically the collection and preparation of data relevant to the identification of white marlin and spearfishes and the collection of biological data on sailfish and spearfishes:

- support the collecting and processing of samples of billfish for genetic studies,
- support the monitoring of the Uruguayan, Venezuelan and Brazilian longline fleets through onboard observers, reporting of conventional tags, and biological sampling,
- support the collection of biological samples in West Africa
- support the monitoring of billfish catches from West African artisanal fishing fleets.

All these activities depend on successful coordination, sufficient financial resources and adequate in-kind support. Details of IERPB funded activities for 2014 are provided below. Some of these will complement general improvements in data collection made with the support of the ICCAT data improvement program and the JDMIP that are especially relevant to the collection of billfish statistics from fleets from West Africa and the Caribbean.

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.

Eastern Atlantic

Monitoring and sample collection will be supported for the artisanal fisheries of Ghana, Côte d'Ivoire, Sao Tome 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 IERPB.

Tagging

The program will need to continue to support the 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 2014. This program aims 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 processing spines (from Venezuela, Uruguay, Brazil, Spain, and the United States) collected in the past with the support of the IERPB. Additionally, during the 2014 the program will continue to provide sample kits for collection of mucus samples for genetic identification of white marlin and spearfish. These sample kits and corresponding instructions will start to be distributed to scientific observers on-board longline and purse seine fleets from Ghana, EU-Spain, Uruguay, Venezuela, Brazil, Japan, and EU-France during the last trimester of 2013. Samples collected this way will be processed for genetic identification by IERPB experts based in the USA.

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. In preparation for the next sailfish assessment, the emphasis of biological sampling for age, growth, and reproductive studies will be directed at sailfish and spearfishes.

Coordination

Training and sample collection

Program coordinators need to travel to locations not directly accessible to promote IERPB activities and ICCAT data requirements regarding billfish. This includes travel to West African countries, as well as the Caribbean and South America by the general coordinator and the coordinator from the west. Strong coordination between activities of the IERPB, the JDMIP and the ICCAT data fund 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 SCRSC 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 need to be sent to the program coordinators and ICCAT to obtain reimbursement. These funding requests need to be done according to the ICCAT protocol for the use of funds from ICCAT (see Addendum 2 to Appendix 7 to the ICCAT, 2012).

2013 Budget and Expenditures

This section presents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 2013. The Billfish Working Group developed a budget of €49,800.00 for the IERPB (**Table 1**). The contributions made to the IERPB for the 2013 program were €31,212.00 from the regular ICCAT budget and €8,000 from Chinese Taipei. Carryover funds remaining from previous year were €21,552.83 thus total funds available for 2013 were €60,764.83 **(Table 2)**. As a consequence all planned activities of the program were able to be carried out. Expenditures to date in 2013 have been €14,429.11 but €26,993.00 are already committed to other activities that have either taken place in 2013 or will take place between October and December. The estimated balance of the program at the end of 2013 will be €13,010.72 **(Table 1)**.

In-kind contributions to the program continued to be made during 2013. INIA and the University of Oriente (Venezuela), Universidad Federal Rural de Pernambuco (Brazil), and Instituto Dirección Nacional de Recursos Acuáticos (Uruguay) have provided personnel time and other resources as in-kind contributions to the at-sea biological sampling program, thereby reducing the amount of funds needed for this activity from the ICCAT billfish funds. Travel costs and personnel time of the program coordinators were absorbed by the U.S. National Marine Fisheries Service, University of Miami, Ghana department of fisheries and by the ICCAT Data fund.

2014 Budget and requested contributions

The summary of the 2014 proposed budget, totaling €50,800.00 is attached as **Table 3**. The program is predicted to have a balance of €13,010.72 by the end of 2013 and therefore requests the Commission to provide a contribution of €31,212.00 for 2014 (see **Table 4**). The requested contribution from ICCAT is necessary to fully implement the IERPB 2014 working plan. To achieve all its objectives of 2014 the program will continue to require contributions of €8,000.00 from other sources, such as those so generously provided lately by Chinese Taipei.

The consequence of the Program failing to obtain the requested budget will be to stop or reduce program activities for 2014 including: (1) sampling and processing of genetic, age and growth collection and processing of genetic samples important (2) at-sea observer trips in Venezuela and Brazil; (3) biological sampling and collection of statistics of catches from fleets in the western and eastern Atlantic (4) promotion of conventional tagging activities, including distribution of tag recovery incentives. All these activities are critical to continue the improvement of the information available to the SCRS for the assessment of billfish, including the preparation for a sailfish assessment in 2014.

Conclusion

The IERPB is an important mechanism towards completing the goal of having the highest quality information to assess billfish stocks. The IERPB has been credited for major improvements in the data supporting the last ICCAT billfish assessments, because the IERPB is the only program that exclusively focuses on billfish. The Program needs to continue to facilitate the collection of biological and fishery information on all billfish; however, in 2014 it will focus on improving the biological information on sailfish, spearfishes and the identification of white marlin and roundscale spearfish. The IERPB Program will continue to require support from ICCAT and other sources to operate and to address the needs of the Commission.

Table 1. Summary budget for 2013 for the ICCAT Enhanced Research Program for Billfish.

Source	*Euros (€)*
Balance transferred from 2012	21,552.83
Income (ICCAT Regular Budget and others)	39,212.00
Expenditures and obligations (for details see **Table 2)**	-47,754.11
Estimated BALANCE at the end of 2013	**13,010.72**

Table 2. Detailed 2013 Budget & Expenditures (as of September 23, 2013).

		Euros (€)
Balance transferred from 2012		21,552.83
Income	**Total**	38,600.00
	ICCAT Commission	31,212.00
	Chinese Taipei	8,000.00
Total Budget		**60,764.83**
Expenditures		**-33,700.47**
		-
	Sampling Venezuela	-8,356.00
	Sampling Ghana	-3,000.00
	Sampling Senegal	-3,000.00
	Bank charges	-73.11
Balance (as of September 23, 2013)		**46,335.72**
Funds obligated until end of 2013		**-33,325.00**
	Sampling Cote d'Ivoire	-3,000.00
	Sampling Brazil	-5,000.00
	Sampling Uruguay	-2,000.00
	Sampling Venezuela	-2,825.00
	Tag reward	-500.00
	Processing genetic samples	-20,000.00
	Bank charges	-100.00
Total estimated expenditures for 2013		**-47,754.11**
Estimated balance December 31, 2013		**13,010.72**

Table 3. Summary budget of the ICCAT Enhanced Research Program for Billfish for 2014.

Source	*Euros (€)*
Balance at start of Fiscal Year 2014 (estimated)	13,010.72
Income (requested from ICCAT Regular Budget)	31,212.00
Other contributions)	8,000.00
Expenditures (see **Table 4)**	50,800.00
BALANCE	1,422.72

Table 4. Detail of expenditures planned for 2014.

Source	Amount (€)
STATISTICS & SAMPLING	
West Atlantic shore-based sampling:	
Venezuela	6,000.00
West Atlantic at-sea sampling:	
Venezuela	6,000.00
Brazil	5,000.00
East Atlantic shore-based sampling:	
Senegal	3,000.00
Ghana	3,000.00
Sao Tome	2,000.00
Côte d'Ivoire	3,000.00
Processing of genetic samples *	5,000.00
Collection of genetic samples *	2,000.00
Lottery rewards – tagging billfish	500.00
COORDINATION	
Coordination travel	4,000.00
Mailing genetic samples	1000.00
Bank charges	300.00
GRAND TOTAL	**50,800.00**

Authorization of all these expenditures depends, on sufficient funds being available by ICCAT and from other contributions.
* Number of samples collected and processed will depend on the final budget of the program.

Appendix 7

ICCAT SMALL TUNAS YEAR PROGRAM (SMTYP)

Overview

The status of small tuna stocks in the ICCAT Convention area is generally unknown. Nevertheless, these species have a high socio-economic relevance for a considerable number of local communities at the regional level, which depend on landings of these species for their livelihoods.

Fisheries statistics and biological data, which can provide a basis for assessing these resources thus providing the Commission with appropriate scientific advice for their sustainable exploitation, are generally unavailable for these species.

To deal with this issue and to achieve the objectives established by the 2008 Joint ICCAT GFCM Working Group (Anon. 2009a), an ICCAT Year Research Program for Small Tunas (SMTYP) was proposed by the SCRS in 2011 and adopted by ICCAT in its annual meeting in Agadir (Morocco). The main objective of the first two years of this program is the recovery of historical statistical and biological data in the main fishing areas, with a focus on the priority species identified by the ICCAT/GFCM in 2008. This program has a wide geographical sampling coverage:

- Mediterranean and Black Sea: Bullet tuna, Atlantic bonito, little tunny and plain bonito;
- West Africa: Atlantic bonito, little tunny, tuna, West African Spanish mackerel, frigate tuna, wahoo;
- Caribbean area and south-west Atlantic: Blackfin tuna, king mackerel and Serra Spanish mackerel and dolphinfish.

Activities carried out in 2013

During the first year of the ICCAT SMTYP, a Call for Tenders for the recovery of historical statistical and biological data in the major fishing areas of these species was launched by the Secretariat.

Three CPCs were awarded contracts to conduct a recovery plan for small tunas: Senegal, Côte d'Ivoire and Morocco. The efforts undertaken under this research program resulted in collecting historical Task II data from artisanal fisheries fishing for small tunas in those countries.

Table 1 summarizes the type of data collected, their corresponding time series, as well as the species for which these data were collected for each country. Documents SCRS/2013/175, SCRS/2013/176 and SCRS/2013/164, which were elaborated under this program, explain in detail, the methodologies used for the collection, quality check and validation of these historical data for each country.

Planned activities for 2014

For the second year of this program, it is planned to continue the collection of historical statistical data of small tunas in other areas: West Atlantic and the Mediterranean Sea. This reinforcement of data mining would be necessary as well as an intersessional meeting in 2015 for the analysis of the whole database to be presented to the 2015 SCRS meeting.

It is also highly recommended to support biological sampling, including the size sampling of small tunas in the main landing ports of these species in North West Africa. Nevertheless, these objectives could not be achieved without a financial support from ICCAT. **Table 2** gives the estimated costs related to the activities planned for 2014.

Table 1. The historical data recovered during 2013 by each country under ICCAT SMTYP.

CPCs	*Species*	*Type data*	*Time series*
Senegal	Little tunny Atlantic bonito, West African Spanish mackerel Frigate tuna	Task II data: Catch/effort Sampling size	1990-2012
Côte d'Ivoire	Little tunny Atlantic bonito West African Spanish mackerel Frigate tuna Wahoo	Task I data Task II data: Catch/effort Sampling size	1990-2011
Morocco	Little tunny Atlantic bonito, Frigate tuna Plain bonito	Task II data: Catch/effort	1984-2011

Table 2. Estimated costs related to activities planned for 2014 under the ICCAT SMTYP.

Planned activities	*Estimated costs (€)*
1. Recovery Task I and Task II data in the Mediterranean and the West Atlantic: - Eastern Mediterranean: Turkey, Greece - Central Mediterranean: Tunisia, Italy - Western Mediterranean: Spain - South West Atlantic & Caribbean sea: Venezuela & Brazil	 €15,000 €15,000 €7,500 €15,000
2. Supporting biological sampling in the North West Atlantic: size and biological data: - Senegal - Côte d'Ivoire - Morocco	 €7,500 €7,500 €7,500
Total	**€75,000**

Appendix 8

2013 REPORT OF THE SUB-COMMITTEE ON STATISTICS

(ICCAT Secretariat, 23-24 September, 2013)

1. Opening, adoption of Agenda and meeting arrangements

The Sub-Committee on Statistics met at the ICCAT Secretariat (Madrid, Spain) on September 23-24, 2013. The meeting was chaired by Dr. Gerald Scott while Dr. Alex Hanke and Dr. Paul de Bruyn served as rapporteurs. The Agenda was discussed, accepted and adopted by the Sub-Committee **(Addendum 1 to Appendix 8).**

2. Review of fisheries and biological data (new and historical revisions) submitted during 2013

The Secretariat presented information contained in the 2013 Secretariat Report on Research and Statistics related to fisheries and biological data submitted for 2012, including revisions to historical data.

2.1 Task I (nominal catches and fleet characteristics)

Overall, a relatively high proportion of Task I catch reports for 2012 were received by the Secretariat by this year's reporting deadlines (representing about 80% for the Task catch data, Table 2 of the Secretariat Report on Statistics and Coordination on Research in 2013) although a lower proportion of CPCs (about 50%) reported Task 1 fleet characteristics (Table 1 of the Secretariat Report). Historically the reporting of Task I fleet characteristics has always been poor making it of very low utility for analyses.

The Secretariat noted that excessive time is now spent quality controlling data submissions from CPCs so that respective ICCAT databases can be updated. There are increasing difficulties in deciding which of the voluminous statistical datasets received, are properly qualified (well formatted, complete, enough resolution) for acceptance, and those decisions have implications for issues of compliance (SCRS report cards and species catalogues). Noting that there are currently no objective rules about this subject, the Secretariat presented a proposal to the Sub-Committee for applying "Criteria for Acceptance of Statistical Data Received Under Official Formats" (**Addendum 2 to Appendix 8**). It is based on a two filter (filter I and II) set of simple rules.

This proposed approach will allow the Secretariat to identify submissions that do not fulfil the requirements for inclusion in the ICCAT databases. This is a quality assurance step that is normally the responsibility of CPCs and applies to all statistical and tagging forms. The first (filter I) considers the gross features of the submission (submission on a standard form, proper header information and a completed details section with ICCAT codes). Data will only be accepted for recently defined and accepted sampling areas (i.e., ICCAT stock sampling areas). If complete, the data are accepted, otherwise the data are not accepted and the CPC is asked to properly resubmit. Data that were returned would not be assigned the initial submission date. This filter will enhance the quality of the data submitted and will reduce the Secretariat's work load associated with managing the data.

There has also been a noticeable increase in the frequency of CPCs submitting data to meet compliance deadlines, with the intent of revising it later. The filter described above will not limit CPC's from submitting data in this way and the Secretariat will assume the data was submitted in good faith so future revisions will not affect the compliance date. The filter only addresses the issue of the structural completeness of the submission. All things considered, the Group recommended that filter I was an appropriate measure to implement in 2014 for all data received in response to the ICCAT reporting requirements for statistics.

The second filter (filter II) is a more strict examination of the data submission that has passed filter I as it considers details of the submission such as the completeness and correctness of the data for each field name. The Sub-Committee discussed if the quality control checks for filter II should only include items that are mandatory for reporting (e.g., reporting of size data using stock sampling areas) instead of 'recommended' (e.g., reporting of size data by 5x5 degree squares) so submitted data sets are not needlessly flagged. However, it was recognized that there is a need to define minimum requirements going forward so that data quality can be more fully characterized. Thus, there is a need to distinguish between compliance with what is mandatory and non-accepted data sets for quality assurance reasons. Consequently, for 2014, reporting of the date of acceptance of a data submission will be based on filter I while filter II will be beta tested and used as a diagnostic tool. This should give CPCs time to adjust to the new policy and to evaluate the performance of the criteria proposed for filter II.

2.2 Task II (catch & effort and size samples)

The Secretariat indicated that the volume but not necessarily the quality of Task II data has been increasing (Appendix 1 of the Secretariat Report). **Figure 1** is indicative of the tendency of the proportion of CPCs providing Task II size and catch effort data over the recent five years.

Relative to the operation of the filter, the different reporting requirements by species must be recognized so, for example, species with no stock sampling areas are to use billfish areas. In terms of checks on temporal and spatial resolution, the minimum requirements have been identified by the SCRS and shall be applied. As specified above, the Sub-Committee recommended that filter II be applied to Task II data submissions in order to evaluate its performance.

It was suggested that the filtered data should be available to scientists prior to SCRS and it may be possible to comply with this request provided the CPCs send data in correct formats. The filters may ensure that this is possible in the future. However if the Secretariat continues to carry the burden of processing problematic data, this deadline of data availability will be complicated. It was clarified that the most recent year data for species stocks not undergoing an assessment have never been presented to scientists prior to SCRS, but are always available once the data catalogues (as in the Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) are available. Nevertheless, it was considered important that these provisional T2SZ and T2CE data used to build catalogues needs to be made available at the start of the species groups meetings. It was thus agreed that once the catalogues included in the Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) are produced, underlying data can be made available at start of species group meetings.

Document SCRS/2013/179 evaluated the CAS between longline and purse seine size frequency distribution estimates from fleets fishing yellowfin tuna in the Atlantic and Indian Oceans. The document showed that within the Indian Ocean distributions by gear type were similar whereas within the Atlantic Ocean they were very different. There was uncertainty as to whether the differences were real or a reflection of sampling bias for longline, purse seine, or the use of different protocols to estimate CAS or a combination of all these three factors. Sampling in purse seine is more comprehensive than longline and there are geographical differences in the sampling.

It was recommended that sampling designs should be revisited for longline and purse seine and improvements made especially in terms of sample size and its reporting. Longline samples should be increased. Also, we must ensure that the CAS data all conform to the same standard with 1 to 2 cm resolution on fork length and monthly temporal resolution and 5 degree spatial resolution. Lastly, given that pre dorsal lengths (LD1) are easily obtained and have a linear relationship with total length (FL), it is recommended that appropriate conversion factors be developed for this metric. Also, taking note that the LD1-FL relationship presently used to convert LD1 to FL frequencies is based on a small (<2000 yellowfin) and old (1975) sample: this sample needs to be widely reinforced and updated with a new biological sampling done in Abidjan.

The Sub-Committee indicated that in order to proceed with recommending improvements to the sampling designs for size frequency, an analysis of the sampling rates by fleet was needed. It was recommended that the Secretariat provide the information available for future consideration by the Sub-Committee.

2.3 Tagging

A number of issues related to tagging data were identified in the Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report). Release information is often absent for the recovery data that are reported and fewer species and specimens are being tagged (other than bluefin tuna under the GBYP). Submissions of tagging data from CPCs may include duplicates from previous years requiring additional time spent in quality assurance and control. Also, conventional tag recoveries (and releases) for a number of species are so low that it is difficult to conduct lotteries to reward people for recovering the tags. Also it was noticed that in few countries, in particular in the Caribbean area, it is difficult to make reward payments. The Sub-Committee noted that it is critical to get cooperation from this community as they report the most tag returns.

The Secretariat informed the Sub-Committee on the need of following the administrative rules established for auditors. However, it was also pointed out that it would be possible to consider alternatives (e.g., make the reward payment through intermediate institutions) to facilitate this process.

The Sub-Committee recommended that better guidelines for data transmission, awareness and reward policies etc. need to be agreed and adhered to. It was determined that prizes for reporting returns need to be maintained because of the value associated with the recovery of tagging data. The Sub-Committee also discussed that stricter rules regarding the reporting of tagging of ICCAT related species in ICCAT areas are needed. Resolution on these issues has been deferred to the *ad hoc* Working Group on Tagging in order to resolve issues and recommend approaches to improve data transmission and exchange. The *ad hoc* Working Group on Tagging met during the 2013 Species Group week. The report of the meeting is attached as **Addendum 6 to Appendix 8**.

The Sub-Committee noted that there is little that can be done about the diminishing voluntary tagging operations in general. The Sub-Committee also noted that although tagging efforts have declined the tags from fish still at liberty from older tagging efforts are extremely important to recover since they represent fish at large for long time periods and provide important information, especially related to growth and mortality.

Focused scientific tagging efforts that are well designed and adequately funded such as the GBYP tagging and an anticipated Atlantic-wide tropical tuna tagging programme (AOTTP) should result in increasing tag returns in the near future. The Sub-Committee was informed that a Coordinator for the AOTTP Task Force work has been appointed to coordinate and to assist in accomplishing the first steps in the development of the program.

2.4 GBYP data (trade information and others)

Data recovery/data mining is one of the main tasks of ICCAT GBYP and, within this work, a large amount of data previously not available to the ICCAT bluefin tuna data base have been recovered.

A comparison between the ICCAT bluefin tuna data base and GBYP recovered data was carried out and a few conflicts with the ICCAT Task I data have been noticed. According to the ICCAT data rules, these conflicts must be examined and resolved by the competent CPC and their national scientists participating in bluefin tuna species Working Group, providing the final decision of ICCAT.

The Sub-Committee acknowledged the revision work carried out by the bluefin tuna experts at the Tenerife meeting in May, and recommends that the GBYP recovered Task II (catch and effort, frequencies, etc.) be incorporated into in the ICCAT bluefin tuna data base, according to the existing rules. The GBYP data sets have been presented to the bluefin tuna species group and they have been quality checked to avoid duplications, overlap and conflicts with the data already included in the ICCAT bluefin tuna data base. The same recommendation applies to historical total catch data prior to 1950, which have also been recovered by GBYP.

The Sub-Committee acknowledged that one of the major statistical problems for Task I and II for eastern bluefin tuna right now is with purse seine data and that the currently available statistics may not be sufficient to conduct the scientific tasks required, although there has been significant improvement in the data available. Recommendations of the Bluefin Tuna Species Group need to be taken into account after a thorough evaluation has been concluded, focusing in particular on purse seine data recovery (Task I and Task II catch-effort and size).

The analyses of market/auction data recovered by GBYP, which was discussed by SCRS during the bluefin tuna assessment in 2012, by the GBYP Steering Committee in December 2012, and during the Tenerife meeting in May 2013, will be possibly better defined by the GBYP Steering Committee before the next SCRS Plenary.

2.5 Other relevant statistics (sea-turtles data provided by CPCs and by-catch mitigation information, Rec. [10-09]. National observer programmes information, Rec. [12-03], Rec. [10-10])

The Sub-Committee noted that Table 7a presented in the Secretariat Report on Statistics and Coordination on Research in 2013 (the Secretariat Report) contains only records of data submitted in 2013. It complements the same table (Table 7) presented in the Secretariat Report on Statistics and Coordination on Research in 2012. Full details of the information provided by each CPC (the time-series of information, standardisation of catch rates etc.) are provided in the reports of the 2012 and 2013 meetings of the Sub-Committee on Ecosystems. The Sub-Committee on Ecosystems did, however, note that calls for data on sea turtles in 2012 and 2013 had a relatively limited response, with fewer than 20 CPCs submitting information on sea turtle interactions. The Sub-Committee on Ecosystems stated that in order to fully address the commission's request, CPCs need to submit data on sea turtle interactions, where available, as the requested assessment had to draw inferences from other oceans as well as make extrapolations based on the few data that were provided, which may provide a distorted picture of what is actually occurring and may bias the provision of advice. The Sub-Committee on Ecosystems expressed concern that areas highlighted as those where turtles are at risk are in fact the only areas for which data are available, whereas data poor regions may not be receiving the attention they require.

The Sub-Committee noted that the response rate to the obligation to report on national observer programs continues to be quite low, considering the number of observer programs that should be in place. The Sub-Committee was made aware of additional responses to the forms circulated by the Secretariat in 2011 to obtain information regarding the data collected by CPC observer programmes as needed for the SCRS to provide a response to the Commission on the issue. The Secretariat only received 14 responses over the past two years to the requests for information circulated to CPCs. Some CPCs provided information on their observer programmes data collection but not in the format specified in Form CP45. The information provided in the Appendix 2 of the Secretariat Report on Statistics and Coordination on Research both this year and in 2012 reflects if the specified information is being collected. It does not imply the data are available to the Secretariat at this stage although several CPCs have sent their actual observer data in the format in which it is captured by their national programmes. During 2013, the Secretariat has updated the forms (presented in 2012 to the Sub- Committee on Ecosystems) for the submission of observer programme data, which are currently being reviewed by the Sub-Committee on Ecosystems). The standard form should facilitate the submission of both aggregated and highly dis-aggregated data to accommodate the needs of individual CPCs. The Sub-Committee recommended this standard form, once adopted by SCRS, be made available to all CPCs to standardise the submission of observer data and facilitate its incorporation into a database to be maintained by the ICCAT Secretariat.

The Sub-Committee was informed that Morocco provided information on their observer program but it was not in an accepted format so their contribution was acknowledged in a footnote in Appendix 2 of the Secretariat Report on Statistics and Coordination on Research in 2013.

2.6 ICCAT biometric relationships and other conversion factors, revision and update work plan

The Sub-Committee noted the recommendation for future work on validating LD1-SFL conversion used for yellowfin (see section 2.2 discussion of SCRS/2013/179) and recommends instituting a sampling scheme to allow updating the currently applied conversion factor for estimating SFL for purse-seine caught yellowfin tuna.

The Sub-Committee noted the Swordfish Species Group considered revisions to length weight relationships for Atlantic swordfish and it also noted that the number of different types of weight and length measurements available creates difficulty when generating appropriate catch-at-size; several actions were taken by the swordfish Species Group but were considered interim solutions. Therefore, the swordfish Working Group recognized that the newly-adopted length-weight relationships for swordfish require validation with new field information. National scientists are requested to collect and submit observed values of length (LJFL) and round weight data to the Secretariat to facilitate this task. The Sub-Committee endorsed this course of action.

The Tropical Tunas Species Group, recognizing the importance in the stock assessment results of the biological parameters and other variables used, such as size distribution, conducted in 2012 (Anon., 2013a) a revision of biological parameters of yellowfin, bigeye and skipjack and identified several problems related to the values currently used by the SCRS. In particular, the Tropical Tunas Species Group identified substantial differences among oceans in the biological parameters and other variables such as size frequency distributions, used in the stock assessment. The Tropical Tunas Species Group also noticed that some of the original data used to establish relationships used were no longer available and highlighted the importance of revising these basic parameters and made several recommendations regarding the method for revising relationships as well as to ensure that the basic biological data be deposited and stored properly to guarantee their safe conservation and their future access and use by SCRS scientists. The Sub-Committee endorsed the Tropical Tunas Species Group course of actions in this regard.

The Sub-Committee noted that the GBYP and various national efforts have recovered a considerable amount of historical and recent data for use in bluefin tuna biometric relationships. The L-W relationships for eastern Atlantic and Mediterranean bluefin tuna were updated during the 2013 Bluefin Meeting on Biological Parameters (SCRS/2013/011). The results of this analysis were considered preliminary as the models developed for the eastern Atlantic and Mediterranean bluefin tuna populations were very similar and perhaps should be combined. Similar work is proceeding with data for the western stock. The Sub-Committee endorsed this course of action by the Bluefin Species Group.

2.7 Artisanal Fishery Data Collection

Artisanal fisheries are small-scale fisheries for subsistence or local consumption, sometimes small markets, generally using traditional fishing techniques and small boats. They occur around the world (particularly in developing nations) and are vital to livelihoods and food security (Jacquet and Pauly, 2008). In the ICCAT Convention area, artisanal fisheries can harvest substantial amounts of tuna and tuna-like species and in some cases estimated catch represent a relatively large proportion of the total removals of some ICCAT species. Due to their characteristics, artisanal fisheries are more difficult to monitor than industrialized fisheries which generally make use of centralized landing and off-loading facilities. In many developing nations, infrastructure and resources available for research, management, and monitoring of artisanal fisheries are severely limited and strategic investments using ICCAT capacity building, JDMIP, or other funding sources can lead to much improved information sets. Sustaining these efforts to collect the data necessary to describe the impact and management of artisanal fisheries can be challenging.

Over the recent past, ICCAT has made strategic investments in order to enhance data collection for a number of artisanal fisheries which are given in **Addendum 3 to Appendix 8**. Additionally, there are several case studies presented that have been implemented through national level funding. Nonetheless, sustaining these data collection activities or enhancing others will require coordination between funding sources as well as sub-regional organizations with common interest in monitoring these fisheries.

In 2012, the SCRS recommended a research plan for small tunas, which was adopted last year by the Commission. These small tuna species are of great economic value to local communities and thus the Committee should recognize the work being done in Senegal, Côte d'Ivoire and Morocco. These examples showed that with strategic funding, access has been facilitated to important information on some artisanal fisheries in the Convention area that would not otherwise have been possible.

These programmes have been successful in improving the data available for scientific assessment and their importance and success need to be acknowledged. Also a number of monitoring systems for artisanal fisheries are also in place and depend upon national financial support. Nonetheless, further improvement in the information obtained could also be obtained in these situations with supplemental strategic investment.

Detailed information on the different data collection systems for artisanal fisheries is collected in **Addendum 3 to Appendix 8**.

The Sub-Committee was informed that for various reasons and in a general way (some exceptions do exist), African countries, among others, face great difficulties maintaining statistical systems for their complex small-scale artisanal fisheries. Some regional organizations blame this situation on a lack of global evaluation of status and evolution of this important sector for employment and food security. The West African Economic and Monetary Union (UEMOA www. uemoa.int), an economic regional organization including eight countries of West Africa (Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, Togo, Republic of Guinea-Bissau) decided to set a programme to strengthen these statistical systems and set a regional database. This programme started to focus on a large survey on continental waters and lagoon small scale fishery (2010-2013) and will continue with an identical approach on maritime small scale fisheries (2014-2015). The general purpose of this collaborative programme is to set: (i) minimum standards on small scale data collection systems; (ii) a regional database with main indicators available; and (iii) establish a regular financial support of these programmes at the national and regional levels. Liaising with this initiative will help to define where ICCAT strategic investments would be most beneficial.

3. Review of ICCAT-DB (ICCAT relational database system)

3.1 Development status

The Secretariat presented the current status and progress made on the cloud infrastructure which dealt with the development database storage, access and analysis on the ICCAT cloud. The cloud consists of three servers on rackspace in London. Two servers (module I) are devoted to data storage and the documentation framework and a single server (module II) supports calculations using RStudio. The configuration of the servers has been completed but we still need to provide interactive access, produce documentation of the databases and configure the documentation and calculation modules to talk to each other.

The Sub-Committee indicated that it is making acceptable progress on this activity and appears to be on schedule.

3.2 Database documentation framework report

The Secretariat informed the Sub-Committee that the ICCAT-DB documentation has progressed according to the Phase 1 plan, stipulated under the four year Project (ICCAT-DB documentation framework), adopted in 2012. With the first phase accomplished, the Secretariat has planned a first publication of the documentation in the cloud website (http://tunalab.iccat.int) in the final quarter of 2013. After a period, any comments or suggestions aiming to improve this website (design or structure) are welcome.

3.3 Cloud deployment and its role in the ICCAT-DB documentation

The Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) reported that an increasing large number of computer intensive tasks have to be undertaken by the ICCAT Working Groups which can be made more efficient through application of cloud computing. In 2013, some tests were made on the ICCAT cloud-computing servers at the albacore and swordfish inter-sessional meetings and to write collaborative papers. The cloud platform tests made were considered successful in allowing SCRS scientists to collaborate intersessionally and to conduct many tasks required by stock assessment Working Groups.

The Sub-Committee acknowledged the work by the Secretariat in advancing the use of cloud computing in support of the SCRS activities and anticipates its utility in documenting the ICCAT databases.

4. National and international statistical activities

The Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) summarized the activities undertaken by the Secretariat regarding national and international statistical activities. The Sub-Committee encouraged the Secretariat to continue with these efforts.

4.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)

Following the t-RFMO Kobe recommendations, the Secretariat has been involved in the development and implementation of the Consolidated List of Authorized Vessels (CLAV) project, which comprises the current lists of authorized fishing vessels of each t-RFMO. However, the joint inter-agency initiative to further work on CLAV has not made any substantive progress. It was previously noted that funding is required for experts to work with RFMOs to achieve this which might be obtained from the FAO/GEF ABNJ project which is expected to be approved by the GEF later this year.

The Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) indicated that the Secretariat has continued to collaborate with the CWP and has participated in its 24th meeting which was held jointly with the *ad hoc* Working Group on Aquaculture (Rome, February 7-8, 2013). Regarding FIRMS, the Secretariat updated the species identifications sheets for western Atlantic and eastern Atlantic and Mediterranean bluefin tuna stocks, Atlantic white marlin and North and South Atlantic shortfin mako assessed by the SCRS in 2012 for use by FIRMS and participated in the 2013 FIRMS Steering Committee meeting. Since the last SCRS meeting, the Secretariat has also prepared the entries for the ASFA-Proquest database of the documents published in issues 4 and 5 of Vol. 65 of ICCAT's *Collective Volume of Scientific Papers*.

Additionally, the Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) reported upon continued and new collaborations with the International Seafood Sustainability Foundation (ISSF), the Inter-American Convention for the Protection and Conservation of Sea Turtles, and in ongoing projects in the Caribbean area.

The Sub-Committee acknowledged and recommended continuation of these activities.

4.2 National data collection systems and improvements

The Sub-Committee noted there was no new information reporting to the meeting.

5. Report on data improvement activities

5.1 ICCAT-Japan Data and Management Improvement Project

The Coordinator's report on activities of the ICCAT/Japan Data and Management Improvement Project (JDMIP) 2013 (Secretariat Report), dealing with the JDMIP, was introduced briefly prior to presentation in plenary. This is the fourth year of a five-year project. This past year the project conducted training courses, sampling programs in South America, the Caribbean and Ghana, and provided travel assistance to scientists attending meetings of the SCRS species groups.

The Sub-Committee acknowledged the contributions JDMIP has made to capacity building and increasing the availability of data of use for monitoring ICCAT stocks. It was recommended that an accounting of the amount of data added to the ICCAT databases through JDMIP investments be considered as one means to gauge the success of the program. The JDMIP Coordinator asked for feedback, suggestions and information on how the project can be continued and how it can be improved and noted that a Steering Committee meeting for JDMIP will be convened during the 2013 SCRS meeting to further discuss program futures.

5.2 Data Funds from [Res. 03-21] and 5.3 Data recovery activities

The Secretariat Report on Statistics and Coordination on Research in 2013 (Secretariat Report) provided a historical view of 'Data Funds' that have historically been available to improve data collection and strengthen the capacity of the scientists of some developing Parties.

In 2011, the SCRS approved a protocol for the use of data funds and other ICCAT funds. This protocol defines a wide-ranging structure for the use of the funds, which includes the improvement of statistics, training and providing support to the work of the SCRS, including participation in meetings. Likewise, the protocol includes the criteria to be followed for the allocation of funds. In 2013, a total of €127,000 were expended from the "Data Fund" in support of improvements of statistics, training, and providing support to the work of SCRS.

Table 1 summarises the activities financed by these funds in 2013.

The Sub-Committee recognised the benefits of having a protocol for the use of the different ICCAT funds. The Sub-Committee also acknowledged that the various ICCAT funds have significantly improved the SCRS work. However, it was noted that the funds anticipated for 2013 were considerably lower (by €65,000) than anticipated, which limited the work that could be achieved and also required the use of other funds to accomplish the work plans proposed for 2013. The Sub-Committee recommends that CPCs re-invest in these funds. The Sub-Committee also recommended that each of the Species Groups clarify their need for experts in their work plans and provide estimates of approximate costs involved to permit appropriate planning for use of funds.

5.4 BFT-E VMS data

At the bluefin tuna biological parameters meeting in Tenerife, it was recommended that VMS data be provided at the highest temporal resolution possible (one hour or less). Subsequent meetings discussed the use of VMS data with regard to its potential for identifying spawning grounds amongst other things. To maximize the utility of this data, The Sub-Committee endorses the recommendation to link the VMS data to the catch, effort and catch at size data (SCRS/2013/178). The Sub-Committee noted that there is a perception by some that VMS data hasn't been used, but this would appear false as evidenced by the EU using it to affect controls on fishing and catch limits and SCRS's use in determining spawning areas in the Mediterranean. Granted, ICCAT does not have the same access to the data as the EU but SCRS could make better use of higher resolution data and it can be used in conjunction with observer data collected and maintained at the Secretariat. Lastly, the Sub-Committee indicated that while the VMS data is useful, it is not a replacement for good Task II data because it does not contain explicit information on tuna catches by species or by size, as in log books data

5.5 BFT-E observer data

Through data collected by MRAG, the Secretariat is investigating ways to link VMS and observer data. Thus the Sub-Committee recommends that we need to estimate detailed C/E files based on the observers that have been deployed since 2010 on 100% of the Mediterranean bluefin tuna PS fleets. SCRS/2013/178 contains the recommendation from the review group. These data have not been neglected from a scientific use standpoint.

5.6 BFT-E weekly catch reports

The Sub-Committee determined that weekly catch reports should be evaluated for their utility in scientific investigations and should be fully available for scientific use.

5.7 Transhipment observer data

Transhipment observer data identifies the species and amount moved from vessel to vessel while at sea and the value of this information for scientific use needs to be investigated.

5.8 Electronic log books

The EU made the use of electronic logbooks mandatory last year. These can be very useful and can provide exact information. The Sub-Committee considered the scientific value of electronic logbooks and, in general, endorses their use and development. It was noted, however, that electronic logbooks were initially developed for bottom trawling and independently by each EU country and require modification to fit the characteristics of the tuna fleets. The Sub-Committee recommended that a standard electronic logbook should incorporate the same basic information provided in analogue logbooks and should be based on the most common. However, support for this data source should not come at the expense of information we currently gain from paper logbooks. It was noted that not all fisheries and fleets are required to use electronic logbooks so care must be exercised when advocating for their general use and that we need to take advantage of the information once developed.

6. Review of Secretariat yearly based fishery datasets estimations and dissemination

6.1 CATDIS

The calculation of the distribution of catch requires an improvement in the methodology, however for the current year of data, a normal update was recommended.

6.2 CAS (catch-at-size) and CAA (catch-at-age)

The Secretariat informed the Sub-Committee that updates of bigeye, skipjack and yellowfin mean weight data, from new partial (not all fleets) CAS estimate were available for each of these species. The Secretariat also pointed out that the quality of the CAS estimate for the different ICCAT stocks is still dependent on the method of substitution when sampling data are absent for a given fleet-area-time combination. Thus the Sub-Committee recommends conducting a statistical evaluation of the method of substitution when generating the CAS as well as an evaluation of the use of statistical methods for generating missing size frequency distributions. There is also a requirement for more reliable weight-frequency data to generate the CAA. The development of these tools has been deferred to the Working Group on Stock Assessment Methods.

Finally, the Sub-Committee recommended that recently adopted CAS files by species be available for Species Groups as soon as possible and on a routine basis to facilitate review.

6.3 Others (e.g. EffDIS)

EffDIS provides a spatial representation of the overall long line effort in number of hooks and compared to CATDIS has the greatest requirement for an improvement in the extrapolation methodology. These improvements were addressed by the Working Group on Stock Assessment Methods (SCRS/2013/010) which provided recommendations that were reviewed and endorsed by the Sub-Committee. Improvements will largely benefit studies evaluating the impact of ICCAT fisheries on by-catch species. Thus the utility of the recommended work should be evaluated by the Sub-Committee on Ecosystems prior to any action being taken.

7. Review of publications and data dissemination

7.1 Collective Volume of Scientific Papers

The Sub-Committee was informed that the Guidelines for authors of documents destined for the Collective Volume have not been followed in all cases. This imposes an additional burden on the Secretariat that needs to reformat the submitted documents. It was proposed and the Sub-Committee agreed that authors must maintain the standards dictated by the Guidelines or the paper will be returned to authors for reformatting or they will be maintained only as SCRS working papers. Working papers will remain in the record of individual meetings, but will not be included in the Collective Volume.

Authors are further encouraged to make use of document templates that are freely available on the ICCAT website.

The Secretariat also informed the Sub-Committee that some SCRS document numbers requested by scientists do correspond to PowerPoint presentations only. For these cases, it was proposed to create a new code number (e.g. SCRS_P_YY_#) and do not assigned an SCRS number to a presentation if not accompanied by a document. The scientific information submitted under this new code number will remain in the record of individual meetings, but will not be included in the Collective Volume.

7.2 Revise the ICCAT-Aquatic Living Resources publication agreement in view of the changes made by ALR towards Ecosystem Approach to Management content

Consideration was given to the thematic shift of ALR to more ecosystem based content. It was noted that the new theme might be too restrictive for SCRS purposes. The Sub-Committee balanced the results of the ICCAT-ALR agreement and considered it has been positive, although the number of documents published (24 SCRS documents) in ALR since 2007 has been limited. The Sub-Committee recommended that the Secretariat investigate alternative journals rather than developing its own online product but it was not recommended that we give up on ALR this year. The cooperation with ICES and the other tRFMOs could be also considered.

7.3 Development new or improve existing identification guides for frozen tuna and tuna-like species

In response to the Commission request, the Sub-Committee reviewed the identification guide for frozen tuna and tuna-like species developed by MRAG to be used in the ICCAT transhipment Observer Program. The Sub-Committee recommended that the Species Groups further review these identification sheets. Reviews conducted during the week indicated that in addition to the need to remove extraneous text related to IUCN and out of date CMMs, improvements to these guides should take into account review comments and also consider similar information produced by the WCPFC.

7.4 Update of ICCAT web contents

The Secretariat informed on the improvements in the contents of the ICCAT web page.

8. Review of progress made for a revised *ICCAT Manual*

8.1 Development of Chapter 3 on fishing gear descriptions

Good progress has been made (e.g., the longline section is finished) but some gaps remain for non-main gears (e.g., harpoon, trolling). The Sub-Committee expressed the need to complete the work on this Chapter as soon as possible.

8.2 Development of Chapter 2 on species descriptions

It was reported that this chapter is complete, which the Sub-Committee noted.

8.3 Document of "Handling of Sharks in the Purse Seine fisheries"

The Sub-Committee endorsed the recommendation by the Shark Working Group to include the document on purse seine fishery shark and ray handling (Poisson *et al*. 2012), as an Appendix to the *ICCAT Manual*.

8.4 Proposal from the Secretariat to update and convert the Statistical Data Submission guideline into a dynamic document and make more relevant in the ICCAT Web page.

The proposal was noted and endorsed without comment.

9. Consideration of recommendations from 2013 inter-sessional meetings

The Sub-Committee acknowledged and endorsed recommendations related to statistical and fishery monitoring actions made by the various 2013 inter-sessional meetings, as noted below:

Albacore

1. The Albacore Species Group recommends increasing efforts to obtain French mid-water trawl and other fisheries historical series of catch, effort, catch at size, geographical distribution and other related fisheries information. The Group also noted that the Chinese Taipei longline size sampling data showed some patterns that might not reflect changes in the population. Thus, the group requested to clarify the reasons behind the patterns in the data to the extent possible. Finally, the Group reiterated the SCRS requirement to report CAS together with the size samples when submitting Task II size information.

2. First estimates of albacore tuna discards in Uruguayan longline fisheries were made available during the data preparatory meeting (SCRS/2013/067). The Group recommended to extend these studies to other longline fisheries to obtain estimates of the amount of albacore tuna being discarded. It was also recommended that CPUE series be constructed using data from both retained and discarded albacore tuna.

3. Several countries with important albacore fisheries were not represented in the data preparatory meeting. This limited the ability of the Group to properly revise the basic fishery data and some standardized CPUEs that were submitted electronically. This resulted in unquantified uncertainties and negatively affected the successfully for achieving the objective of the meeting. To overcome this, the Group recommends that CPCs make additional efforts and be made aware of capacity building funds available for participation in and contributing to working group meetings.

Bluefin tuna

West

1. The historical catch and effort for the West Atlantic data from the Japanese longline fleet should be analyzed by main areas and groups of years that show a consistent effort distribution, rather than considering only catches of bluefin reports. The main areas of interest are the Gulf of Mexico, the waters off Brazil and the Florida-Bahamas areas from 1960 through the 1980s. Special attention should also be given to the South Atlantic, both from an historical and recent perspective.

2. Fishery independent information is needed, either through a large-scale tagging program or by developing fishery independent indices of abundance (e.g., aerial surveys), to better track trends in biomass and fishing mortality rates. Fishery-independent information is furthermore crucial to avoid biases due to management regulations in the models based on catch and CPUE.

3. It is essential to obtain representative samples of otoliths and other tissues from all major fisheries in all areas. Otoliths, spines and vertebrae can be used to provide direct estimates of the age composition of the catch, thus avoiding the biases associated with determining age from size. Moreover, otolith microconstituent data can be very useful to determine stock origin with relatively high accuracy, and thus could be a key factor to improve our ability to conduct mixing analyses.

East

1. The Bluefin Tuna Species Group recommends to check and to validate all farms data as indicated in the report and then to introduce these data in the CAS of the Mediterranean bluefin tuna, so that this considerable source of information can be used in the 2015 stock assessment.

2. The Group recommends continuing the analysis of VMS data to get better estimates of the spatial and temporal variations in the fishing effort of the main fleets and to obtain an index of abundance of the Mediterranean purse seine fleet through state-space modeling. For that purpose, the Group also recommends that VMS data be provided at the highest temporal resolution (1 hour or less) possible.

Sharks

1. The Sharks Species Group recommends that scientific observers be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs, skin samples, spiral valves, jaws, whole and skeletonized specimens for taxonomic work and museum collections) from currently prohibited sharks species that are dead at haulback, provided that the samples are part of the research project approved by the SCRS. In order to obtain the approval, a detailed document outlining the purpose of the work, number and type of samples intended to be collected and the spatio-temporal distribution of the sampling work must be included in the proposal. Annual progress of the work and a final report on completion of the project shall be presented to the Sharks Species Group and the SCRS.

2. Cape Verde expressed its desire to obtain assistance to develop a Data Collection Programme, including sampling procedures and a data processing system on the shark species caught by its fleet or landed in Cape Verde. Although sharks are not the target of the local fleet, these are an important component of their catch. The Group recommends that special funds from ICCAT be provided to this important initiative.

3. The Group recommends that in 2014 a small group of SCRS scientists be in charge of developing the biological sampling design for pelagic shark species in the Atlantic and Mediterranean. The expected budget of this action should be evaluated and proposed to SCRS for its approval.

Tropicals

1. In view of the importance of the catches of tropical tunas made in association with FADs, the Tropical Tunas Species Group seeks the support of Sub-Committee on statistics regarding the importance of reiterating to member countries and cooperating parties the need to provide detailed information on FADs as presented in Rec. 11-01 and proposed by the SCRS in 2012. The Group requests that, in the future, the Sub-Committee on statistics analyzes the progress made on the collection of data on FADs and discusses how this information may be incorporated into the ICCAT database for the purposes of stock assessments of tropical tunas and other species.

2. The Group recommends that the Sub-Committee on Statistics develop ways by which the information from VMS of tropical tuna fleets be made available to national and ICCAT scientists at the highest resolution available. The Group notes that such information is important for scientific evaluations and assessment. For this purpose, the information is not necessary in real time and could be made available with a delay of one year.

3. The Group recommends that the revised statistics on Ghana landings as developed by the working group after its inter-sessional meeting are considered by the Sub-Committee of Statistics for incorporation in the ICCAT database as accepted revisions.

Ecosystems

1. CPCs should provide sea turtle by-catch data according to Task II standards. If that is not possible, the Sub-Committee on Ecosystems recommends that CPCs provide data concerning sea turtle by-catch by species with spatial and seasonal information (e.g. 5x5) that would allow assignment to the regional management unit (RMU) and quarter.

2. The Sub-Committee recognizes the need to include information on artisanal fisheries that operate within the ICCAT Convention area and encourages CPCs to submit relevant information, especially regarding interactions with sea-turtles, birds, and sharks.

3. The Sub-Committee recommends that supplemental tagging (including electronic and conventional) of sea turtles be conducted and information on those experiments be made available to the Sub-Committee.

Swordfish

Atlantic

1. *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. Recognizing the differential growth and distribution between sexes, collecting catch-at-size information by sex is particularly important. These data must be reported by the ICCAT deadlines, even when no analytical stock assessment is scheduled. Historical data should also be provided.

2. *Timely submission of Task I and II data:* Considering that a substantial amount of data, (including revisions of many years of historic size information) was received after the deadline and taking into account the time that the Secretariat needs to incorporate, validate and compile to generate the datasets requested, the Group strongly reiterates the need for respecting deadlines and providing the data in the ICCAT standard formats. This recommendation is particularly important as the SCRS moves to incorporate more complex methods than those normally used and for which the request of data is much higher.

3. *Unreported catches:* The 2009 stock assessment report noted that the summarized form in which the s.SDS information is currently reported to ICCAT (biannual summaries of direct imports and re-exports) does not give the sufficient detail for improving estimates of potential NEI and volume of Atlantic swordfish in international trade largely due to uncertainty about the year and area of capture for swordfish products in trade, the general lack of product to live weight conversions, and the potential for double counting catches submitted on the re-export certificates. These estimates could be greatly improved if the corresponding individual statistical documents and re-export certificates were made available. These detailed data exist at national levels (with identification numbers) and an effort should be made to recover this important information, if the Commission wishes to improve the utility of the s.SDS for validating Task I data. SCRS has reiterated this advice over the past decade (see General Recommendations to the Commission, in the SCRS Reports of 2000, 2001, 2002, 2003 and 2004), but as of yet none of the detailed swordfish s.SDS information has been received by the Secretariat.

Working Group Stock Assessment Methods

1. The Working Group Stock Assessment Methods recognizes the importance of accounting for changes in fishing operations and characteristics of the main fleets from each CPC operating within the ICCAT area of competence, as these affect the efficiencies of the fleets for catching target and by-catch species. Documentation of these technological and behavioral changes is particularly important to understand the national reports of catch and effort annually submitted (Task II-CE). Taking into consideration also that CPCs are required to report fleet composition data (Task I-FC), it is recommended that CPCs present an SCRS document with the details of the fleet composition, sampling, coverage, and statistical methodology to estimate total catch, catch and effort, catch-at-size for each of the main fleet components. This report should also communicate the potential limitations and or restrictions of the data and information provided to be taking into account within any further analysis by the SCRS or the Secretariat.

10. Evaluation of data deficiencies pursuant to [Rec. 05-09]

10.1 Current data catalogues of major species by stock

The Secretariat Report on Statistics and Coordination on Research in 2013 provides the data catalogues.

10.2 Implications of identified deficiencies in future stock assessments

The Albacore Species Group reviewed the data available during its data preparatory and stock assessment meetings. For the North Atlantic stock, the Task II catalogues indicate relatively complete coverage during the last 10 years for the five most important fisheries However, this information was not timely submitted, which created additional work and delayed the overall flow of the work plan. Moreover, some missing Task II datasets were identified for the earlier time periods and for some less important fisheries, which were requested by the Species Group.

The Sub-Committee noted that although the catalogues reflect a relatively positive coverage for main fleets in the last years, the quality of the information is far from optimum in many cases, especially but not limited to that information needed to run statistical models (e.g., MFCL, SS3) with multiple fleets and a long timeframe (1930-2011). Stock assessments using these models are hindered by the following issues:

1. Chinese Taipei size frequencies in the North Atlantic show patterns along the time series that are unlikely to reflect population dynamics. The full time series needs to be revised, and those patterns explained or corrected.
2. French mid-water trawl and other fisheries historical series of catch, effort, catch at size, geographical distribution and other related fisheries information needs to be obtained and reported.
3. Spatial dynamics of important longline fisheries (namely Japanese and Chinese Taipei) needs to be better described and incorporated into the CPUE standardization.
4. The level of by-catch in longline fisheries needs to be characterized, following the Uruguayan example.

In the case of the southern stock, the catalogues again show relatively acceptable coverage for the five most important fleets (except for Namibia that has no T2CE information in years with significant Task I data). This stock was modelled with production models, and thus the stock assessment is mainly hindered by the following issues:

1. Spatial dynamics of longline fisheries (especially Japanese and Chinese Taipei) need to be better characterized and incorporated into the CPUE standardization.
2. The level of by-catch in longline fisheries needs to be characterized, following the Uruguayan example.
3. Main CPCs need to participate in the data preparatory and assessment process for the Group to be able to make informed decisions.

10.3 Proposals for data recovery plans and improvements on data collections systems

The Sub-Committee noted that the Kobe plots/matrix do not necessarily convey the quality of data going into them. It was noted that while data uncertainty should be captured in the estimation process, methods to further characterize unquantified uncertainties are needed. An *ad hoc* Working Group was organized to propose a methodology that could be used to address this issue. The initial proposal from that Group, which met subsequent to the Sub-Committee meeting, is provided in **Addendum 4 to Appendix 8**.

11. Review of existing data submission policy

11.1 Formats (e-FORMS improvements to account with current fishery practices)

Proposed modifications to the e-forms were reviewed including additions and deletions of some fields. Most changes to the task I e-forms were endorsed by the Sub-Committee. The exception was related to the inclusion of a field to identify Faux-Poisson catch and it was debated with no general agreement on how to proceed.

Revised Task II CE forms will reduce the number of files to be submitted by allowing the reporting of multiple years on a single form. The bid to delete school type information from the form was inappropriate for the case of Ghana which still makes use of this field. The Sub-Committee recommended that modifications must not result in a loss of information.

For the size samples and CAS data e-form, the year and species information will be moved from the header section to be fields in the actual table. That way, multiple species and years can be reported in just one form.

The Sub-Committee agreed with the changes proposed to the e-forms by the Secretariat but only for a testing year. The current ones should be kept as the official ones. The results will be evaluated next year.

Following the 2012 SCRS recommendation to study the possibility of making use of the ICCAT vessel records to complement/improve the Task I Fleet Characteristics (T1FC), the Secretariat made a short presentation in which similarities and differences among the two types of data were identified.

The Sub-Committee recognized that, despite the ICCAT vessel registry (a Commission's requirement) being nowadays more complete than the SCRS datasets counterpart (T1FC), it only covers a very recent and short time-period.

In this subject, the Secretariat proposed a change in the respective e-Form (ST01-T1FC) which could reduce CPCs' data obligations.

While the Sub-Committee appreciated the Secretariat proposal, this is a complex issue that needs to be dealt with intersessionally. Meanwhile, the Sub-Committee recommended the Secretariat continue the data recovery and improvement work (involving CPC scientists) on this dataset.

11.2 Improvements to the ICCAT coding system

Solutions were proposed to deal with the growing list of codes (both active and non-active) used in the ICCAT databases. Many codes are resulting from categorizing catch not elsewhere included (NEI). The Sub-Committee endorsed the changes provided we are able to track the total catches and show the linkages with historical codes. Also, this process should not be interpreted as an attempt to establish alternative official catches for CPCs, but rather the best scientific estimate of removals from the stocks. The Sub-Committee recommended that the Secretariat correspond with CPCs for which this process has an impact as to the nature of the change, describe its intent and acquire the consent of the affected CPC before updating the codes.

The Sub-Committee agreed that codes no longer in use will be maintained in the database but will not be available in future e-forms. Likewise, updates were suggested by certain CPCs where the incorrect code was used and adopted.

11.3 Rules applied to historical data revisions

The Sub-Committee does not recommend change to the rules applied for historical revisions.

11.4 Review of the deadlines for submitting statistics to SCRS inter-sessional meetings

The Sub-Committee does not recommend change to the rules applied for deadlines for submitting statistics.

11.5 Other related matters

No other matters related to the data submission policy were discussed.

12. Review regional or individual CPC data collection programs, including capacity building programs, for artisanal fisheries and provide a plan to work with relevant regional and sub-regional international organizations and CPCs to expand such programs or implement them in new areas to improve data on billfish catches in these fisheries, Rec.[12-04] paragraph 9.12. Future plans and recommendations.

The case studies presented in section 2.7 show the complexities of collecting artisanal data. While some programmes are very successful, in general, CPCs face difficulties to set in place and maintain monitoring systems. Often data collection is good over short period, but difficult over longer term. The Group was made aware of several other projects, beyond the scope of ICCAT that are also seeking to improve artisanal fishery data collection. This demonstrates that, instituting some successful programmes that have been done within ICCAT, there are complexities and difficulties that need to be overcome, and these can potentially be addressed by coordinating with other external projects and building on work already being conducted. It is important ICCAT liaises with these initiatives and makes the maximum use of the information collecting structures that are already in place.

The Sub-Committee recommended that such interactions with these initiatives be initiated in the inter-sessional period.

12.1 Review Collection Programs (Rec. 12-04) for billfish artisanal fisheries

Venezuela has two data collection programs to monitor billfish catches by artisanal fisheries, one for artisanal coastal drift-gillnet that targets billfish species and another for artisanal off-shore longline fleets that targets dolphinfish and billfish species. The program for the artisanal coastal drift-gillnet fishery is part of the Enhanced Billfish Research Program that has been recording species-specific catch and effort for the past 20 years. The other program, recently implemented with the support of the JDMIP, is aimed to expand and enhance the species-specific catch and effort data recording in the artisanal off-shore longline fleets.

Other data collection programs that document artisanal billfish catches also exist in the Convention area, including at least some of those noted in case studies presented in Section 2.7.

The Sub-Committee noted one of the main problems with the assessment of white marlin was that Task I catches are incomplete resulting in under-estimates of total removals. This situation results in recreational and artisanal fisheries being poorly sampled, a problem that is exacerbated in the billfish catches coming from the Caribbean Sea. The solution to this persistent problem must start with the SCRS being more involved with the regional management bodies and local government entities that exist in the area.

12.2 Scientific observer programme and ICCAT Moratorium

French and Spanish scientists in charge of observer programs on purse seine wanted to draw the attention of the Sub-Committee to the question of technical interactions between scientific observer programmes and compliance observer programmes. France and Spain set in place an observer programme on purse seiners since 2003 within the Data Collection Framework of the European Union. This program is co-financed by UE and national research institutes (IEO, AZTI and IRD). Following an ICCAT recommendation, it seeks 10% coverage with an observing effort equally distributed all over the year. This programme has a clear scientific objective and collects detailed data on fishing strategies, catches, by-catches, discards (species composition, size, sex, biological sample, etc.). This programme is working very well and is tightly coordinated between institutes which have the same data collection protocols, same software, same data quality controls and a common data base structure. Scientists contribute to SCRS on this programme with common analysis.

The setting in place of the ICCAT moratorium on FAD fishing in January and February each year requires that tuna companies to embark observers for compliance if they expect to fish in the moratorium area. In 2013, this operation has been guaranteed by the industry itself with the collaboration of research institutes: this means in fact that the regular scientific programme (seeking 10% coverage) has been extended exceptionally to 100% during this period with observers having the particular duty to verify that FAD fishing or operation does not occur.

The Sub-Committee recommends that measures are taken in order the scientific observer programmes in place are in position to be continued all the year round without any interruption during the moratorium period.

The Sub-Committee was also informed of an experimental observer program ("OCUP") to be tested on the French purse seine fleet. A summary of the presentation is provided in **Addendum 5 to Appendix 8**.

13. Evaluate and provide advice on alternative methods to collect by-catch and discard data on artisanal fisheries that are not subject to ICCAT's minimum standards for scientific observer programs [Rec. 11-10]. Since 2012, this information will be included in the Annual Reports.

It was noted that to date very limited information had been provided on this particular topic, possibly due to complications in addressing this issue. Methods discussed in sections 2.7 and 12 above, such as electronic monitoring could be tried and some of the successful case studies such as the Venezuelan system could be put forward as examples of potential ways to solve this problem. The various artisanal data collection systems mentioned above could also be used to address this issue.

As in prior meetings of the Sub-Committee, the experimental use of electronic observation systems was recommended as an approach that could be used to supplement and, in some cases, substitute for human observers in cases where space for on-board observers is limited. However, these methods are not limited to collection of by-catch data since they form a basis for documenting the composition and disposition of the total catch.

14. Other matters

SCRS Strategic Plan

Considering the outcomes of the 2011 Working Group on the Organization of the SCRS, the *Resolution on Best Available Science* [Res. 11-17] and the necessity for provision of appropriate advice to present and future requests from the Commission, the SCRS recommended in 2012 the elaboration of the 2015-2020 SCRS Science

Strategic Plan. The result of the first phase of the development of this Plan was presented. It integrates the results of a consultation with the SCRS Officers and the Secretariat as a first attempt to define the main components to be considered: mission, vision, SWOT analysis, values, goals, objectives and strategies. The latter being framed within five thematic areas: data collection, research priorities, participation and capacity building, dialog and communication, and stock assessment and advice.

As established in the roadmap adopted by the SCRS, the outcome of this first phase of the development of the Strategic Plan requires further discussion and elaboration; it was suggested that the plan should be distributed to head scientists at CPCs for comment and review.

Special Issue

A Special Issue of Fisheries Research on “Development, Testing, and Evaluation of Data-Poor Assessment and Management Methods” will be published in 2015. The proposed Special Issue will centre around the primary themes, i.e., New methods for data-poor assessment and management, Review of past uses and deficiencies, simulation testing and comparison among approaches and prospects for alternative management and data-collection protocols for data-poor stocks. It is therefore highly relevance to the work of the ICCAT and a potential avenue for publishing work conducted by the SCRS.

14.1 Review progress on prior year recommendations of the Sub-Committee on Statistics

In 2012 it was noted that historically, the Task I fleet statistics reports have been incomplete and, at times, inconsistent, making use of these data of questionable value. While recognising that the vessel registry is the list of licensed vessels and Task I fleet statistics is of active vessels, the Sub-Committee recommended cross checking the available fleet statistics reports with the ICCAT vessel register to identify gaps in reporting and to initiate discussion on methods to improve the quality (or need) of this data set. The Secretariat made good progress on this recommendation and has proposed to work toward homogenizing the data elements recorded in the various vessel lists held by ICCAT to enhance the scientific utility of a database recording vessels permitted to fish for tuna and tuna-like species in the Convention area.

In 2012, a revision of catch statistics from Venezuelan baitboats for the year 2000 was presented in Guitiérrez y Marcano (2013). The Sub-Committee endorsed the proposal to incorporate the revision into the data base. This was accomplished in time for the 2013 albacore stock assessment.

In 2012 it was noted that the tropical tuna species group would make recommendations on what additional data should be collected in the call for tenders distributed on 6 September 2012 in response to [Rec.11-01] on requirements for a regional observer program for tropical tuna fisheries. Recommendations received by the Secretariat were incorporated, but due to lack of response from the affected CPCs, it appears the ROP may not function in 2013-2014.

In 2012, the Secretariat generated a list of confidential data sets and their potential utility for scientific evaluations (Table 2 in 2012 Sub-Committee Report) (ICCAT, 2013). The Sub-Committee recommended that access to the raw level data be provided under the Commission's confidentiality policy guidelines for data sets which are likely valuable sources for scientific estimates in support of stock status evaluations so that their utility can be thoroughly investigated. Thus far, little progress on accessing these potentially scientifically valuable data sets has been made and the Sub-Committee reiterates that Species Groups begin accessing and evaluating these data.

The apparent need for supplementing available resources to support data base management needs of the SCRS (additional manpower) was again raised and recommended. This recommendation has been made for a number of years and while an additional database management support position should have been included in the 2012 and 2013 budgets of the Secretariat, it was not. In fact, the 2013 proposed budget implies a substantial reduction in database management support for SCRS needs. The Sub-Committee recommends against such a reduction in support for its activities and continues to recommend an increase equivalent to one additional person-year to support the increasing demands placed on SCRS to meet the needs of the Commission. In spite of prior recommendations to better coordinate the budget request to address SCRS support needs, no action has been taken to improve this coordination.

In 2012 it was noted that, following the t-RFMO Kobe recommendations, the Secretariat had been involved in the development and implementation of the Consolidated List of Authorized Vessels (CLAV) project, which comprises the current lists of authorized fishing vessels of each t-RFMO. Unfortunately little progress on CLAV has been achieved this year since the IOTC has reduced activity on further development of CLAV. Even though inter-sessional work on CLAV was limited, it was noted that many vessels have unique vessel identifier numbers issued by Lloyds (IMO numbers) and that the submission of this information to ICCAT has become obligatory, although infrequently reported. In 2012, the Sub-Committee recommended incorporating IMO information provided through an initiative by ISSF into the ICCAT component of CLAV, which, after verification by CPCs has been accomplished. The Sub-Committee recommended that this practice continue.

Following a Sharks Species Group 2011 recommendation, the Secretariat formally requested EUROSTAT and FAO's databases on shark statistics and this information has been received. In 2012, a need for further discussion with EUROSTAT experts to further elicit understanding of the database and its utility for addressing the Sharks Species Group request to derive comparison, was identified. The Sub-Committee was informed that some discussions were held and that discussions indicated that the work required to derive the desired comparison was quite extensive and at the moment could not be completed with the current staffing at the Secretariat.

In 2012, the Sub-Committee recommended that preliminary analysis comparing the transshipment information with the Task I data and to identify additional work that will enable more detailed analysis by SCRS scientists. The 2013 Secretariat Report on Research and Statistics (SCI-008) provided such a comparison which indicated transshipment data in some cases represented only a small fraction of the total landings of tropical tunas and is likely of limited scientific use in some cases. However, there can be substantial (30% or more) of the reported landings by certain flags documented in transhipment information indicating the possibility of obtaining significant gains in scientific information for those fleets. Further investigation of these data is recommended.

In 2012, the Sub-Committee recommended that methods should be pursued to recover important data regarding species of interest to ICCAT, including Mediterranean albacore. The Sub-Committee made a recommendation to re-table the data recovery proposal to the Commission and should this not be possible to utilise existing capacity building and data collection funds to recover information. Significant progress on recovering bluefin, billfish, and small tuna data in particular, based on strategic investments by GPYP, the Data and Capacity Building Funds, and the Enhanced Research Program for Billfish, in particular. The Sub-Committee recommends continued strategic investments to recover these vital data.

In 2012, it was noted that the *Recommendation by ICCAT on a Multi-Annual Conservation and Management Program for Bigeye and Yellowfin Tunas* [Rec. 11-01] requests the Secretariat to report on the content of the FAD Management Plans to SCRS for review at each Annual meeting. The FAD Management Plan as currently defined comprises a mandatory component (number of FADs to be deployed per vessel; description of FAD characteristics and FAD markings), and an optional component. SCRS noted that in 2012, six flag States submitted FAD Management Plans and only three of these included the mandatory information, such as the number of FADs to be deployed per vessel. Besides being incomplete, the information received in these Management Plans was not considered useful for stock assessment or for improving the SCRS's ability to advise the Commission.

While it was recommended that the Commission revisit the requirements for FAD monitoring included in [Rec. 11-01] (paragraphs 17-19 and Annexes 1 and 2 of the Recommendation), this was not accomplished at the 2012 Commission Meeting. The Sub-Committee thus recommends that this issue be addressed at the 2013 Commission meeting to come in line with obligations for FAD monitoring already agreed at other tRFMOs.

15. Future plans and recommendations

In addition to the recommendations noted above, the Sub-Committee recommended:

- More focused discussions on artisanal fisheries be conducted intersessionally. Strategic investments in the short term may make improvements, but greater discussion made to avoid duplication and improve utility should be undertaken. Generally, artisanal fisheries do not have by-catch or discards and are usually multi-specific. These discussions should draw on expertise of other sub-regional and regional management bodies and evaluate how best to coordinate with other ongoing initiatives.

- A task group be formulated to identify better ways to characterize uncertainty in unquantified aspects of data utilized in assessments. This should be done in a way that builds upon the SCRS capacity to advise the Commission on how this uncertainty impacts the robustness of scientific advice for fishery management that can be provided.

- The Sub-Committee noted that continuing difficulties are experienced due, in some cases, to Statistical Correspondents lacking adequate knowledge and expertise in providing the full dimension of data within the time-frames that CPCs are obliged to produce. The Sub-Committee recommends that CPCs take steps to assure that Statistical Correspondents are fully versed and equipped to meet data reporting obligations and that those individuals attend the Sub-Committee on Statistics Annual meeting, at a minimum.

16. Adoption of the report and closure

The report was adopted through correspondence, as agreed prior to closure of the meeting.

The Chair thanked the Sub-Committee for continued good work and also the very hard work of the Secretariat and co-Rapporteurs, after which the meeting was closed.

Table 1. Use of Data Funds from [Res. 03-21] and other ICCAT funds in 2013. This table does not include the activities funded by GBYP, EBRP or JDMIP.

Participation at meetings	*SCRS meetings*	*Meetings 11* *Countries 13* *Scientists 31*
Improvement of statistics	Validation and preparation of the 1996-2005 Ghana Task II statistics*	
	Stay of a Ghanaian scientist at the IRD center in Sète to work in the validation and processing of Ghanaian Task II data for the period following 2005*.	
	Small tuna data recovery for Senegal, Côte d'Ivoire and Morocco under the SMTYP.	
Support to the work of the SCRS	Participation of two experts to give the training course on the Stock Synthesis Assessment model (SS3).	
	Participation of two experts on large scale tagging programs in the ICCAT Inter-sessional Meeting of the Tropical Tunas Species Group.	
	Contract of an expert to coordinate the preparatory work and establish the Terms of Reference of a feasibility study on an AOTTT.	
	Albacore assessment peer review.	
	Short-term contract of a Sea Turtle Ecological Risk Assessment Expert.	
	Participation of the Swordfish General Coordinator in the Atlantic swordfish stock assessment, following his retirement.	

*These activities were considered in the plan for the improvement of Ghanaian statistics adopted by the SCRS.

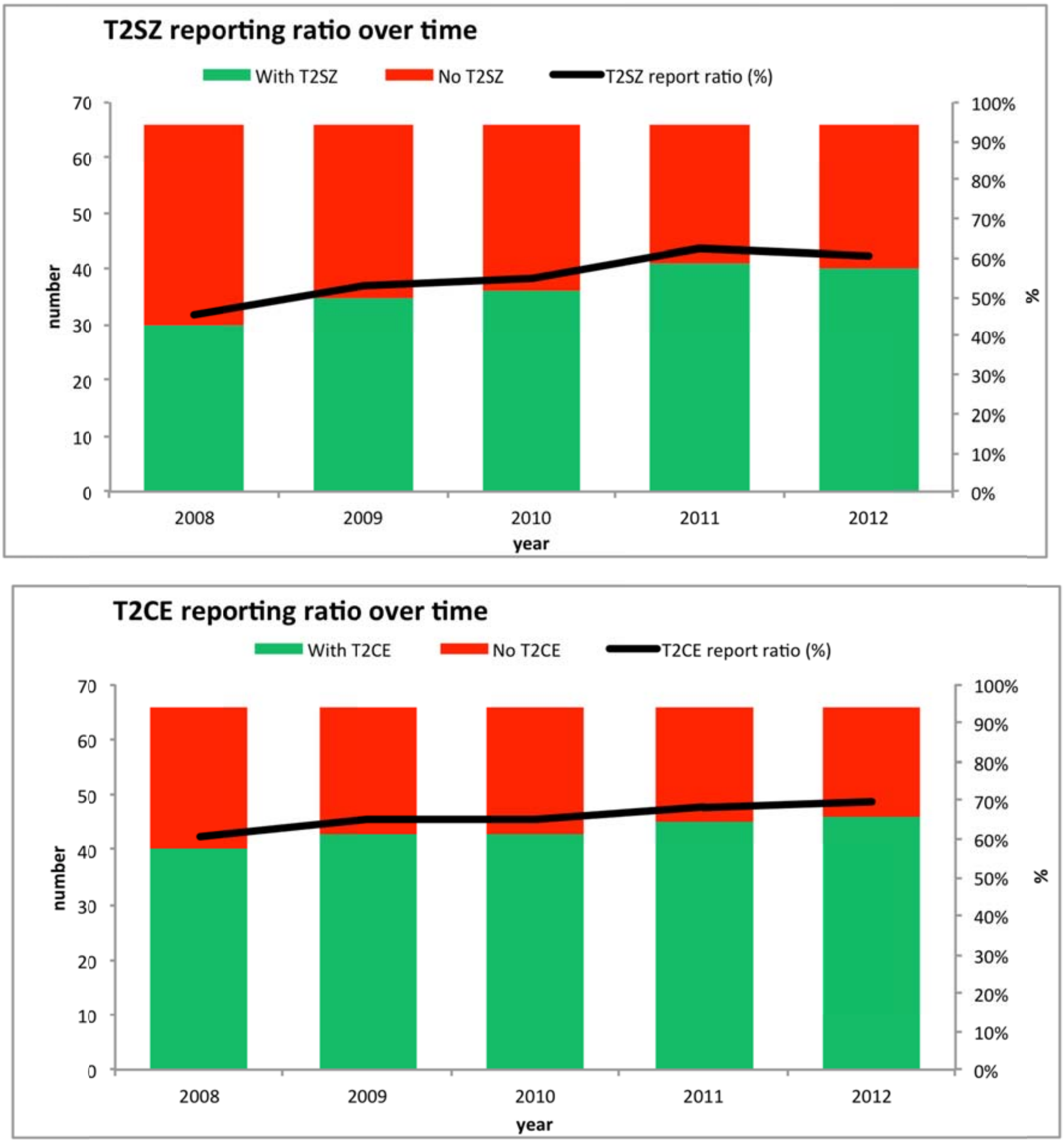

Figure 1. Tendency over time in reporting rates for Task II size (T2SZ) and catch effort (T2CE). This figure only indicates the proportion of CPCs providing information and does not provide any indication of the quality of the information.

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 2013

   2.1 Task I (nominal catches and fleet characteristics)
   2.2 Task II (catch & effort and size samples)
   2.3 Tagging
   2.4 GBYP data (trade information and others)
   2.5 Other relevant statistics (sea-turtles data provided by CPCs and by-catch mitigation information, Rec. [10-09]. National observer programmes information, Rec. [12-03], Rec. [10-10)
   2.6 ICCAT biometric relationships and other conversion factors, revision and update workplan
   2.7 Artisanal Fishery Data Collection

3. Review of ICCAT-DB (ICCAT relational database system)

   3.1 Development status
   3.2 Database documentation framework report
   3.3 Cloud deployment and its role in the ICCAT-DB documentation

4. National and international statistical activities

   4.1 International and inter-agency coordination and planning (FAO, CLAV, 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
   5.8 Electronic log books

6. Review of Secretariat yearly based fishery datasets estimations and dissemination

   6.1 CATDIS
   6.2 CAS (catch-at-size) and CAA (catch-at-age)
   6.3 Others (e.g. EffDIS)

7. Review of publications and data dissemination

   7.1 Collective Volume of Scientific Papers
   7.2 Revise the ICCAT-Aquatic Living Resources publication agreement in view of the changes made by ALR towards Ecosystem Approach to Management content
   7.3 Development new or improve existing identification guides for frozen tuna and tuna-like species
   7.4 Update of ICCAT web contents

8. Review of progress made for a revised ICCAT Manual

   8.1 Development of Chapter 3 on fishing gear descriptions
   8.2 Development of Chapter 2 on species descriptions
   8.3 Document of "Handling of Sharks in the PS fisheries"
   8.4 Proposal from the Secretariat to update and convert the Statistical Data Submission guideline into a dynamic document and make more relevant in the ICCAT web page

9. Consideration of recommendations from 2013 inter-sessional meetings

10. Evaluation of data deficiencies pursuant to [Rec. 05-09]
    10.1 Current data catalogues of major species by stock
    10.2 Implications of identified deficiencies in future stock assessments
    10.3 Proposals for data recovery plans and improvements on data quality and data collections systems
11. Review of existing data submission policy
    11.1 Formats (e-FORMS improvements to account with current fishery practices)
    11.2 Improvements to the ICCAT coding system
    11.3 Rules applied to historical data revisions
    11.4 Review of the deadlines for submitting statistics to SCRS inter-sessional meetings
    11.5 Other related matters
12. Review regional or individual CPC data collection programs, including capacity building programs, for artisanal fisheries and provide a plan to work with relevant regional and sub-regional international organizations and CPCs to expand such programs or implement them in new areas to improve data on billfish catches in these fisheries, Rec. [12-04], paragraph 9. 12. Future plans and recommendations.
    12.1 Review Collection Programs (Rec. 12-04) for billfish artisanal fisheries
    12.2 Scientific observer programme and ICCAT Moratorium
13. Evaluate and provide advice on alternative methods to collect by-catch and discard data on artisanal fisheries that are not subject to ICCAT's minimum standards for scientific observer programs [Rec. 11-10]. Since 2012, this information will be included in the Annual Reports.
14. Other matters
    14.1 Review progress on prior year recommendations of the Sub-Committee on Statistics
15. Future plans and recommendations
16. Adoption of the report and closure.

Addendum 2 to Appendix 8

Criteria for acceptance of statistical data received under official formats

This is a proposal of criteria for acceptance or rejection to be applied to data submission obligations of the CPCs in reference to Statistical Fisheries data Task I, Task II and Tagging. The Secretariat is increasingly receiving data that are not properly qualified, using incorrect codes, incomplete data, incorrect time area resolution, etc. However there is not a guideline or criteria of minimum standards for acceptance, and this greatly increase the work and delay for integrating this data.

The criteria detail below will be in effect in 2014, and introduce two levels of examination of the data, Filter 1 and Filter 2. As recommended, Filter 1 will be applied in 2014, and rejected data submission will be returned to CPCs for corrections. Filter 2 will be applied by the Secretariat, BUT will not cause a rejection. The Secretariat will report to the SCRS on the results of Filters 1 and 2 in 2014 and it will evaluate the benefits/problems. For compliance purposes, only accepted data will be taking into account. This should be clearly communicating in the Annual Circular distributed by the Secretariat.

I. Criteria Filter 1

Applies to statistical and tagging electronic forms approved by the SCRS, including ST01-T1FC, ST02-T1NC, ST03-T2CE, ST04-T2SZ, ST05-CAS, and tagging ST-TAG01, ST-TAG02 and ST-TAG03. It will be applied also to special exchange formats [properly agreed between the Secretariat and a CPC] as long as these complied with the information required in the electronic forms mention above.

- Data must come in one of the SCRS electronic forms/Exchange formats
- Header section must be complete
- Detail section must be filled-in using ICCAT codes
- Revisions/updates must be indicated in notes: COMPLETE REVISION or PARTIAL REVISION (important: if PARTIAL revision, the data to be substituted, must indicated clearly)

II. Criteria Filter 2

These criteria will be applied to individual forms to review the data provided within each type of information provided and that will comply with the approved data requested.

- ST01-T1FC (Fleet characteristics):
- Number of vessels in LOA classes should equals number in GRT classes.
- ST02-T2NC (Task I nominal catch)
- For each row, all fields must be filled-in with proper ICCAT codes
- All quantities: Landings, discards [dead/live] should be in kilograms (live weight)
- ST03-T2CE (Task II catch & effort)
- Effort cannot be NULL (rows with NULL effort are discarded)
- Use effort units by gear approved: LL: Number of hooks; PS: fishing days; etc.
- Time resolution: month
- Geographic resolution: LL (5x5 grid); all other surface fleets (1x1 grid)
- Not mix up in the same data file (by year/fleet/gear combination) different geographic grids (1x1, 5x5)
- Species catch composition should be as complete as possible (number or weight (kg))
- Revisions for one or more species should be submitted with all other species from the original data.
- ST04-T2SZ (Task II Size samples)
- Time resolution: month

- Geographic resolution:
  i) Species specific Sampling Areas (http://iccat.int/Forms/CODES_SamplingAreas.xls)
  ii) Spatial grids: 1x1, 5x5, 5x10, or 10x10
- Each size class frequency must be reported in header section, size intervals for reporting should follow a consistent and complete series (e.g. 2 cm intervals: 20-240 cm]. Size valid ranges will be defined for each species by the Working Groups.
- ST05-CAS (Catch-At-Size):
- Only for BET, YFT, SKJ, BFT, SWO (in number) – others series DISCARDED
- Only the SCRS standard format: 1cm lower limit size class intervals
- Time resolution: month or trimester
- Geographic resolution: LL (5x5 grid); all other surface fleets (1x1 grid)
- Not mix up in the same dataset (by year/fleet/gear combination) different geographic grids (1x1, 5x5)
- Tagging (all forms)
- Each specimen tagged (recovered) should have tag number(s) complete (Alfa+number)
- Dates in international format (YYYY-MM-DD)
- Latitudes/longitudes in decimal degrees
- Units of Length (cm)/weight (kg) should indicate its type of measure, and if they were measured or estimated.
- A recovery should have whenever possible the release INFO associated.

ACTIONS:

If ALL criteria Filter 1 a through d pass, then the file is processed, registered, and stored as valid.

Then the file is checked against Filter 2

If at least one or more of the criteria Filter 1 a through fail, the file is rejected. Then the Secretariat will inform the CPC of the action and the reasons for rejection.

For Compliance purposes, only the date of acceptance will be reported.

Addendum 3 to Appendix 8

Description of data collection and processing systems for example artisanal fisheries in the ICCAT Convention Area

Venezuela (SCRS/2013/112)

At-sea and port sampling to monitor the Venezuelan artisanal off-shore (VAOS) fleet targeting tuna and tuna-like species using pelagic longline gear continued for the second year of a three year project funded by the JDMIP. Sampling continued in the two key fishing communities selected for the period of March to December 2012. At-sea sampling since the beginning of the Project consisted of 52 observed trips by 7 trained Captains, totalling 573 sets. The overall main target species recorded, measured and sexed, include five billfish species (SAI, WHM, SPF, BUM, and SPG), and dolphinfish (DOL). Secondary target species include catches of silky sharks (FAL) and scalloped hammerhead (SPL) sharks. The tuna sample was mostly formed three tunas species (BLF, YFT, and BET). Port sampling activities recorded landings and operational characteristics from 61 vessels during the overall sampling period, in which all billfish and shark species were identified and length measures were recorded, and all shark specimens were sexed.

Senegal (SCRS/2013/176)

Ce rapport est produit dans le cadre du programme de recherche sur les thonidés mineurs lancé en 2013 par l'ICCAT. Le rapport présente les méthodologies de collecte d'estimation, d'identification, de récupération et de validation des données historiques de thonidés mineurs de 1970 à 2012 capturés par les principaux engins de pêche artisanale au Sénégal. Il s'agit des données relatives à la flottille artisanale, aux captures, à l'effort et aux tailles des quatre principales espèces : thonine, bonite à dos rayé, thésard blanc et auxine capturées de façon ciblée ou accessoire par les principaux engins de la pêche artisanale. Les données ont été collectées au niveau des principaux ports de débarquements de la Pêche artisanale par les enquêteurs du Centre de Recherches Océanographiques de Dakar/ Thiaroye (CRODT). Par la suite une analyse synthétique est faite sur les données récupérées.

Cote d'Ivoire (SCRS/2013/175)

Le système de collecte de données en Côte d'Ivoire est jusqu'à présent orienté essentiellement sur un certain nombre d'espèces, notamment les espèces majeurs. Il est surtout concentré depuis plusieurs années sur les sites de débarquement d'Abidjan que sont le port de pêche, le site de Zimbabwé et celui d'Abobodoumé. Le projet de reconstitution des données historiques (1984-2011) sur les thonidés mineurs en Côte d'Ivoire, effectué par le Centre de Recherches Océanologiques, a permis de mettre en évidence la nécessité d'élaborer un plan d'amélioration de la collecte des données statistiques halieutiques. Dans l'ensemble, ce système souffre d'un manque de moyens financiers et matériels qui met en mal les efforts d'amélioration et sa pérennité. Il est évident qu'une contribution nationale est primordiale, notamment à travers une synergie entre le Centre de Recherches Océanologiques et la Direction de l'Aquaculture et des Pêches afin d'optimiser le travail de collecte et de saisie effectué par leur personnel technique. Ceci passe par la définition claire des protocoles d'échantillonnage, la formation et/ou le perfectionnement des connaissances des techniciens, la validation des méthodologies et le développement de méthodes automatisées pour les traitements statistiques. Il faut néanmoins étendre la collecte de données aux sites importants déjà identifiés et évaluer l'importance des nouveaux sites. L'élaboration d'un plan de collecte de données plus performant qui prenne en compte l'ensemble des espèces capturées et des engins de production (y compris la pêche sportive) est nécessaire à l'obtention de données complètes et fiables. Un appui financier annuel et régulier de l'ICCAT contribuerait énormément à la mise en œuvre, au suivi et à la pérennisation de ce système de collecte de données statistiques en Côte d'Ivoire.

Morocco (SCRS/2013/164)

The present study consisted of the recovery of historical catch and effort data for small tunas caught by Moroccan artisanal fleet operating in the Atlantic during the period 1995-2011. Historical catch and effort data were also collected for Atlantic and Mediterranean traps for the period 1984-2011. The quality of these data is in overall satisfactory. Based on the results of this study, a revision of the Task I data is recommended before these data are validated.

Ghana

A PowerPoint presentation by Ghana highlighted some of the challenges and difficulties in recovering data from artisanal fisheries. Marine and coastal living resources including fish as a source of rich protein has been the backbone of many rural small-scale fisheries. Increased fishery overexploitation and habitat degradation are threatening the coastal and marine fisheries resources. The lack of adequate data and information on the abundance, catch, effort and price of fish species among others has culminated in low quality of information for sound management purposes. It is thus important that efforts to improve fisheries statistics be enhanced to develop further the industry.

Artisanal monitoring of small tuna species are mainly done by collecting data from the field spanning over 308 landing beaches. Sampling stations are involved with a systematic programme monitoring over 120 species (both pelagic and demersals). Some species monitored are the Frigate tuna and Black skipjack tuna among others.

All data are computed via the FAO software “code named”- ARTFISH (Stomatopoulos C. and Jarette T., 2000). The methodology follows after Barerji 1972 where sample based records are used to estimate the total catch. Estimation of Catch Effort, CPUE, Price and Value of all species are done for all coastal districts by gears and pooled to the overall total.

Very little biological sampling of the small tuna species caught by the artisanal fleet are conducted, however, these species are often caught as by-catch from the Purse Seine fleet and observed. There is room for improvement in sampling these species for more information on the dynamics of the fishery for improved fisheries management. A more pragmatic approach at monitoring is needed with adequate resources such as funds, manpower and logistics.

Cape Verde (SCRS/2013/190)

Après plusieurs années de retard dans les données statistiques de l'Institut National pour le Développement des Pêches, en raison de divers problèmes, dont celui lié au programme statistique, les données finales sont disponibles de 2005 à 2012. Sont donnés par rapport à la pêche artisanale, semi-industrielle et industrielle de la flotte Cap-verdienne pour les thons tropicaux et les thons mineurs capturés dans la ZEE du Cap Vert et au-delà. Bien que le nouveau logiciel sera appliquée seulement à partir de 2013, les données définitives mettra à jour les statistiques de l'ICCAT et à partir de maintenant nous pensons fournir à chaque année, les données finales de l'année précédente.

Addendum 4 to Appendix 8

Quality Indicators of input information to the Stock Assessment models

Scientists and Commissioners interested by the results of tuna stock assessment done by ICCAT, or by other tuna RFOs, are often questioning on the quality and uncertainties in the inputs used to assess the status of a specific species. Indeed, for ICCAT, Recommendation [05-09] requires SCRS to advise the Commission on the impacts of data deficiencies on the stock assessment advice we can provide. Also, to the degree possible, SCRS quantifies uncertainties in assessments and provides risk-based fishery management advice in the form of a Kobe 2 Decision Matrix, as required by the Commission, and which permits the Commission to apply its risk-based Decision Framework [Rec 11-19]. Never the less, there remain unquantified uncertainties which may be substantial and methods to address these and incorporate them into management advice need further elaboration. This question is fundamental as the quality and uncertainty in the inputs widely justifies the level of sophistication of the stock assessment model and conditions the uncertainties that can be quantified in the diagnosis of the status of all stock assessment results and of all KOBE2 projections.

An *ad hoc* working group (WG) which met subsequently to initiate discussion on one element of the Sub-Committee on Statistics work plan for 2014. It was agreed that this pending question should be clarified in the presentation of each stock assessment status summary.

The working group suggested developing an *ad hoc* method such as previously used by SCRS to qualitatively communicate uncertainty (see **Figure 1**) should be envisaged in order to better evaluate and show the major, unquantified uncertainties in the inputs used in stock assessment of each stock analysed by ICCAT. This method proposes to give a quality score for the basic fishery data and scientific knowledge concerning each stock. The method would be that a given table (such as **Table 1**) and/or graphic, should be carefully filled by several scientists from each Species Group (and also preferably by scientists external to the Species Group).

The working group proposed an approach to consider would be to score the information for each stock for 3 input categories: (1) fishery statistics, (2) biology, and (3) auxiliary information. In such an approach, a quality score (ranging between 0 & 10 in this case) should be attributed to each of the 4 or 5 indicators belonging to the input category (see **Table 1**). Each indicator could be weighted accounting for its estimated importance in the stock assessment model (e.g., by a weighting factor chosen by scientists) and receive an averaged quality values for the 3 inputs categories (statistics, biology & auxiliary information), while an average of these 3 values (between 0 and 10) will allow to estimate the global quality and potential influence on uncertainty associated with the stock assessment inputs for the stock.

These indicators of the quality of basic stock assessment inputs should be prepared before & independently of subsequent stock assessment and should help for the choice of an accurate stock assessment model.

The working group recommends that this preliminary proposal should be better studied and finalized by SCRS and by the Methods Working Group (for instance improving the categories used and their weighting coefficients) and to develop appropriate means for quantifying uncertainty attributed to the different input categories.

Table 1. Example of a proposed method allowing to quantitatively estimate the quality/uncertainty of the basic inputs to each stock assessment (SKJ stock given as an example).

Category	Item	Weighting factor	VALUE Best=10	Score
STATISTICS	Realistic TASK1 for the combined catches?	0,3	8	2,4
STATISTICS	TASK2 C/E: % of fisheries covered by detailed time&area strata of effort & catches	0,3	7	2,1
STATISTICS	Task2 sizes: Realistic size sampling for the main fleets: nb of tuna measured /1000 tons	0,3	8	2,4
STATISTICS	Availability of additional infos used in SA (VMS, observers,environment):	0,1	6	0,6
Total statistics				**7,5**
BIOLOGY	Good Knowledge on growth by sex and max age	0,3	5	1,5
BIOLOGY	Natural mortality at age/size & sex	0,3	3	0,9
BIOLOGY	Size/age at first maturity	0,2	8	1,6
BIOLOGY	Movements, migrations and stock/pop structure in SA	0,2	6	1,2
Total biology				**5,2**
Auxiliary Information	Consistant abundance indices	0,3	2	0,6
Auxiliary Information	Environmental variability & knowledge of its effect on the stock	**0,1**	5	0,5
Auxiliary Information	knowledge & importance of economic drivers	**0,1**	6	0,6
Auxiliary Information	Knowledge & variability of size specific selectivity	**0,2**	7	1,4
Auxiliary Information	Effects & knowledge of cryptic changes in fishing power (by gear)	**0,3**	5	1,5
Total Aux. Indicators				**4,6**
Total Species				**5,8**

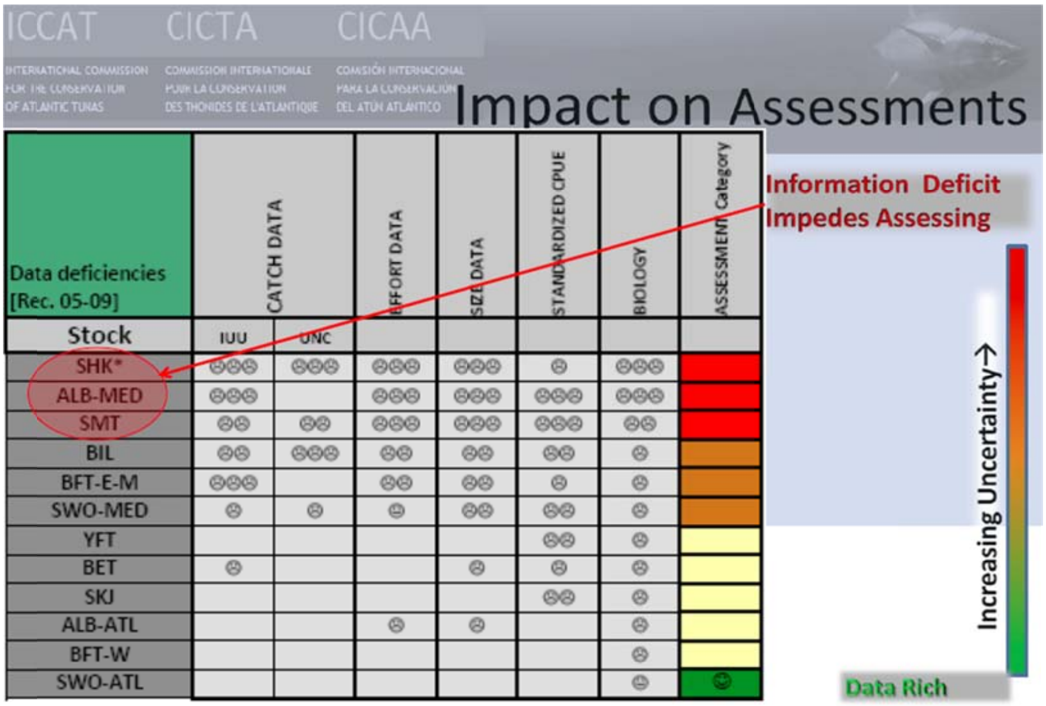

Figure 1. A graphical presentation previously used to communicate to the of the Commission, impact on stock assessment advice resulting from data deficiencies related to different elements considered in stock assessments.

Addendum 5 to Appendix 8

Program OCUP

The question of the multiplicity of requests for observation onboard fishing vessels in a recurrent problem and a presentation to the Sub Committee has been made by P. Chavance on "OCUP" experimental programme on French purse seine fishery and financed by the industry. This programme started from one year period in July 2013 and has the objective to test the feasibility of setting in place an observer body with a general assignment compounded of four different complementary tasks:

1. scientific observation;
2. control of fishing activities;
3. monitoring of good practices implementation;
4. a certification process.

The programme is conducted by Oceanic Development (a Bureau VERITAS branch) and partnership includes scientific organization, fishing industry, fishery administration, costal countries authorities, European DG Mare, tuna-RFMOs and regional organizations. The plan of operation includes employment of 30 observers with high level of qualification, the majority recruited locally and insuring 60 trips (i.e. almost 50 % coverage of French fleet in Indian Atlantic oceans). The programme includes the organization of working groups with programme partners in both oceans in order to enrich and validate the approach. At the end of the experimental year, we expect: a proof of concept of OCUP programme; a validated content for the mission of OCUP observer and precise list of tasks; a recognized and high level training programme for OCUP observers and a series of tools helping managing the programme and insuring data quality control.

The general aim of the programme is a trial whether scientific programmes can be upgraded with additional tasks and whether these sometime conflicting tasks are compatible or not. It is well noted that there may be potential conflicts of interest between compliance and scientific observer data collection and it will be interesting to see whether these conflicts of interest can be overcome. This experiment could be useful to see whether conflict of interest can be overcome. The project also aims to improve collaboration between observers and what is captured by skippers in e-logbooks.

It was noted that, for example, the EU target 10% observer coverage, but this is difficult to achieve. Reducing coverage will be undesirable from scientific view and will lead to higher uncertainty especially for rare event species. Electronic monitoring has been proposed as an alternative to improve coverage. This form of monitoring is promising and should continue to be evaluated.

Addendum 6 to Appendix 8

Report of the ICCAT SCRS *Ad hoc* Working Group on Tagging

The *ad hoc* Working Group on Tagging met in Madrid in September 26, 2013.

The following scientist participated in the meeting: Eric Prince (co-Chair West-Atlantic), Enrique Rodriguez Marin (co-Chair East Atlantic), Craig Brown (US) and ICCAT Secretariat (Pilar Pallares, Mauricio Ortiz).

Introduction

In response to a recommendation from the Sub-committee of Statistics meeting (September 23-24, 2013) and the Secretariat, the Ad-hoc Tagging Working Group meeting on September 26 to review and comment on some of the issues relating with the conventional tagging program(s) supported by ICCAT. The objective is to coordinate a plan of response and action(s) to address the concerns expressed by the Secretariat in the SCI-008 report and commented during the Sub-Committee STATs meeting.

1. Lack of reporting of Tag Releases by CPCs and institutes carrying out conventional and electronic tagging activities

This was referred as main problem within the current tagging activities supported by the Secretariat, The lack of complete report or partial reporting of releases invalid any scientific use of tagging information. It was recommended to take proactive actions to encourage the complete and detail reporting especially by scientific institutions of all tag releases as soon as possible to the Secretariat. Some possible actions considered include:

- Update the tagging ICCAT web page to clearly identify the guidelines and requirements for supporting tagging and tag distribution to institutions interested in the program
- Restrict the distribution of tags to institutions/scientist that have complied with the complete reporting of releases/recovers from prior tags provided by the Secretariat.
- Facilitate the electronic submission of release datasets directly in the ICCAT web page.
- Make more visible in the Web page the “reporting of recoveries” with color options, and re-design the tagging section in the ICCAT web page to make it more easy finding e-forms and guidelines. Use similar forms for electronic reports.
- Consider a “Tagging Newsletter with summary of activities and main findings” to promote tagging reporting.
- Make the reporting of recoveries to scientist/institutes in charge of the tagging program conditional to the complete reporting of the tagging release data.
- Prepare a form for electronic tag releases or include in the existing form for conventional tags, the option for electronic ones.

2. Awards and lottery promotion guidelines

Currently there are seven annual awards provided to conventional tag recoveries. The prices are given for temperate tunas, tropical tunas, sharks, billfish and bluefin tuna (GBYP). Due to low recoveries and decreasing in tagging activities, the number of recover tags has diminished. The Group recommends:

- Awards should continue and given if at least one recovery is qualified (date of recover within the year period)
- If there are not recoveries in a given category for the lottery year, non-winning tag-recoveries from prior year(s) should be included.

3. New tagging programs and coordination with Secretariat role and responsibilities

In response to the implementation of wide-tagging programs such the current G-BYP bluefin tagging and possible the Atlantic tropical tunas tagging project. These projects should have clear and detail specification for the role and responsibilities of the Secretariat within the projects including but not limited to:

- Tag inventory, distribution and accessories,
- Data input, maintenance and analyses, follow up, formats and data transfer protocols,
- Awards and promotion activities.

4. Transfer protocols for the US tagging datasets

The US tagging data constitute a major component of the ICCAT conventional tagging database. In 2007 a protocol of data exchange between the Secretariat and US scientist was agree to facilitate annual updates. With the incorporation in 2013 of the shark tagging database, it has been proposed the following:

- Revised the exchange protocol such us only tag updates, and new information is send by the US each year.
- Centralize in the US Miami Center the data transfer to include in a single process the data from different US Tagging programs including the Sharks tagging, the Billfish Foundation and the Miami CTC tagging programs.

5. Others

The Group will consider the need for a coordination meeting in 2014.

Appendix 9

SUMMARY OF THE REPORT OF THE INTER-SESSIONAL MEETING OF THE SUB-COMMITTEE ON ECOSYSTEMS

The inter-sessional meeting of the Sub-Committee on Ecosystems was held in Madrid (Spain), July 1 to 5, 2013.

During this meeting, the Sub-Committee discussed the following:

1. By-catch

- Ecological Risk Assessment (ERA)
  - o Presentation, discussion and revisions to the preliminary ERA
  - o Productivity and Susceptibility inputs, assumptions and experiences pertaining to ERAs.
- Sea turtle by-catch rates, by-catch mitigation and safe-release protocols
  - o Review of new information
  - o Make recommendations for addition measures as necessary
- Other Matters

Discussion

The Group is currently working to complete an Ecological Risk Assessment for sea turtles in the ICCAT Convention area in order to assess the impact of ICCAT fisheries on sea turtles. The initial work of the Sub-Committee-ECO is to provide information and guide revisions to the ERA in the short term, and later to take ownership of the work and improve the model through expert collaboration and input. To that end, the Group reviewed three papers:

- SCRS/2013/130 - Summarized information from the observer programs of Brazil and Uruguay, as well as other efforts related to the productivity and susceptibility (PSA) of sea turtles.

- SCRS/2013/134 - Described the data inputs, assumptions and results of a preliminary ERA conducted by a contractor hired to assist the Sub-Committee on Ecosystems in the development of the ERA.

- SCRS/2013/137 - Described the Namibian experience with tracking EAF/EBF implementation with Ecological Risk Assessment (ERA).

The Group acknowledged the importance of this analysis as a preliminary step towards addressing the Commission request to assess the impact of ICCAT fisheries on sea turtle populations, and made numerous short-term and longer-term recommendations to improve the analysis during 2014 and 2015.

The Group also reviewed and evaluated available incidental catch rates of sea turtles in ICCAT fisheries, by-catch mitigation strategies and safe-release protocols. Several new documents pertaining to these topics were presented to the group, including:

- SCRS/2013/128 – Described the incidental catch of sea turtles in the Chinese Taipei longline fishery.

- SCRS/2013/129 – Summarized the results of an effort to test the effectiveness of circle-hooks on catch rates of target species and incidental catch of sea turtles on a Taiwanese longline fishing vessel.

- SCRS.2013/130 – Described the incidental captures of sea turtles by the Brazilian and Uruguayan longline fisheries.

- SCRS/2013/131 – Presented estimations of the interactions with marine mammals, sea turtles and sea birds of fisheries targeting large-pelagics in the Mediterranean and Straits of Gibraltar.

- SCRS/2013/133 – Presented results on the Trans-Atlantic Leatherback INitiative (TALCIN).

- SCRS/2013/135 – Sightings and abundance of marine turtles in Azores

- A presentation was given on by-catch of turtles by the Moroccan fleet.

Upon discussion, the Group determined that there was a need to recommend additional measures to reduce mortality of sea turtles in ICCAT fisheries, and made recommendation regarding the use of line cutters, de-hookers and safe handling practices. These are detailed in the report of the 2013 Meeting of the Sub-Committee on Ecosystems.

The Group also discussed other matters related to by-catch including:

- SCRS/2013/138 described an approach to collaborative research in fisheries science capacity building. The author also elaborated on a new collaborative fisheries research fellowship program initiated at the Virginia Institute of Marine Science.

- Progress toward the ICCAT objective to assume a leadership role in developing minimum standards for harmonised longline observer data collection for the tRFMOs, including ICCAT.

    - The ICCAT Secretariat has begun to collate the forms for data collection activities of the Longline observer programs of ICCAT, WCPFC, IATTC, IOTC and CCSBT.

    - The Secretariat has also contacted the coordinators of the national longline observer programs that operate in the ICCAT Convention Area in order to obtain their data collection forms.

    - These will be used to identify and recommend minimum data collection standards.

Finally, the Sub-Committee recognized the excellent work conducted by Drs. Andrea Angel, Ross Wanless and Ronel Nel in compiling the preliminary Ecological Risk Assessment (ERA) for sea turtles. Their preparatory work expedited the work of the Sub-Committee and provided an excellent foundation for the ongoing impact assessment of sea turtle by-catch in ICCAT fisheries. The Sub-Committee acknowledged the value of this ICCAT initiative to provide financial support to hire experts to contribute to the SCRS's work and strongly recommended continuing with these productive activities.

2. Ecosystems:

- Review new information on the implementation of ecosystem based management principles.
- Review progress on the development of a test case for implementing ecosystem based fishery management.
- Discuss ways of including ecosystem values in the standardization and assessment of ICCAT assessed stocks.

Discussion

The agenda as adopted by the Group included three sections considered significant to the process of implementing an EBFM approach for which no new information was provided. It is not clear why there was a lack of participation in this section but the Group felt it may have something to do with the limited capacity by CPCs to participate in this sub-committee. Alternatively, we may lack the expertise in the SCRS to fully participate in this branch of science. The Group recommends that this be integrated in the strategic plan of the SCRS in the future so that we might increase the capacity to deal with the demands of developing the tools that will allow the implementation of the EBFM approach.

Representatives of the Ministry of Fisheries and Marine Resources of Namibia showed how an Ecological risk assessment (ERA) could be used as a method for tracking the implementation of an ecosystem approach to fisheries (EAF) management. The Group was interested in the new approach and recognized that the authors could provide valuable guidance with respect to the implementation of the EBFM approach in ICCAT fisheries.

In response to Resolution 12-12 (objective 1) on the Sargasso Sea, the Group considered detailed biological information provided on 18 different fish species whose distributions include the Sargasso Sea. With a view to being able to assess the relative significance of this ecosystem to ICCAT species, the Group asked that the detail of the report be reflected in a table that relates important life history parameters to their dependence on the

Sargasso Sea ecosystem. The table represents a preliminary assessment of the importance of the ecosystem and is also intended to be the basis for a more quantitative evaluation of the data in the future. The Group noted that a more extensive research of this ecosystem and its importance as essential habitat for tunas and tuna-like species would require an integrated collaboration of the SCRS with scientific groups specializing in the Sargasso Sea. The Group concluded that in order to accomplish objective 2 of the resolution, it would require a work plan, collaborative research and meetings to properly assess the importance of the Sargasso Sea as essential habitat for ICCAT tuna species. The Group felt that this task would not be accomplished before 2015. The Group recommends continuing the contact with Sargasso Sea research teams and the UK-Bermuda scientists to develop a scientific collaborative plan to accomplish objective 2 of Res [12-12].

The Group recognized that the basic biological and ecological data provided for the Sargasso Sea offers a useful foundation for adopting this region as a basis for a case study in implementing the Ecosystem Based Fisheries Management (EBFM) approach within ICCAT and collaboration with Sargasso Sea research teams and the UK-Bermuda scientists should continue to be supported.

The Group learned of a methodology for developing a sustainable development reporting system. The reporting system is part of an ecosystem based fisheries management framework and it explicitly links the conceptual objectives of management to operational objectives (see report for details). After an in depth evaluation of the procedure, the sub-committee recognized the value of this approach in defining SCRS ecosystem objectives (i.e. implementing EBFM in the assessments). However, the sub-committee observed that in order to move forward, it would be beneficial for the SC-ECO to obtain some guidance on operational objectives from the Commission, with the SCRS explaining its proposed methodology and plan to the Commission (including data needs).

Appendix 10

INCORPORATION OF GBYP DATA TO ICCAT DATABASE

The Secretariat and GBYP presented a comparison review of the total catch removals between the Task I and the estimates derived from the different projects of the GBYP data recovery plan (SCRS/2013/169). The document reviewed potential duplicates of total catch of bluefin tuna by flag-gear-year (strata available in Task I) and presented cases where data in Task I and GBYP matched. The analyses focused on the cases whereby the total estimated catch by the GBYP was greater (at least 10% higher) than the data reported in Task I. **Table 1** summarizes these differences in flag-fleets-years and concludes that these catches should be added to Task I, unless otherwise specified. Most of the increases correspond to the catches of EU-Portugal and EU-Spain from trap and baitboat fisheries for 1950 to the 1990s. In a particular case for the EU-Spain baitboat fishery, GBYP data were provided by two different sources. National scientists clarified that the data for the baitboat fishery in the Bay of Biscay, provided by the IEO, were hypothetically complete and reflected the total catch for the period 1950 to 1996, while the data provided by AZTI Tecnalia were selective and were exclusively intended for catch rate analyses. Therefore, for the total removals, only the information provided by the IEO should be considered.

The SCRS agreed with the conclusion that in the cases where GBYP catch estimates were equal or less than the Task I reported, such catches would be considered as having already been reported by the CPCs and, unless otherwise specified, these catches should not be added to the total removals. These conclusions apply to the catch data for 1950-2011.

The SCRS reiterated the following decisions as regards data compiled and recovered within the framework of the GBYP:

- Size and catch at size distributions for bluefin tuna should be integrated to the Task II SZ ICCAT database, maintaining the identification of fleet-gear area and data source, in accordance with the analyses and conclusions presented in SCRS/2012/116.

- Catch and effort with fleet, gear, area, and time strata definition (1x1 lat.-long., month) should be included in the Task II CE ICCAT database. This applies to data from the comparison presented in SCRS/2013/169, which are not included in the Task II CE ICCAT database.

- Data on catch and associated effort prior to 1950 (historic catches) should be available for the Species Group in a format compatible with Task I.

All data should be integrated and available before the next stock assessment, within the work plan defined for 2014/2015.

Table 1. Summary of the comparison of total catch data for bluefin tuna in Task I and GBYP. Values indicate the flag-gear and years, whereby GBYP estimated that bluefin tuna catch is higher (10% more) than the corresponding catches reported in Task I.

Comparison by Year, FlagName and Gear (Years where GBYP total catch is 10% larger than ICCAT task I)

East Atlantic			Mediterranean Sea	
EU.España	BB		EU.España	TP
	1950			1956, 1958-1958
	1952-1971			1962-1963
	1973-1975			1966-1975
	1979-1980			1995, 2002
	1982-1993			(17 years)
	1995			
	(39 years)		EU.Italy	LL
				1998
EU.España	TP			
	1956-1971		EU.Italy	HL
	1973, 1975, 1978			1999
	1998, 1999, 2006			
	(22 years)			
Maroc	TP			
	2001			
EU.Portugal	TP			
	1962-1969			
	(8 years)			

Appendix 11

OPENING ADDRESD BY MR. DRISS MESKI,
ICCAT EXECUTIVE SECRETARY
(30/09/2013)

Mr. Chairman, Scientific Delegates of the Contracting Parties, Ladies and Gentlemen:

I have the honor to welcome each of you to this meeting of the SCRS and I wish you an enjoyable stay in this beautiful city of Madrid. As usual, this meeting constitutes an excellent opportunity for a review of all that can guide our Commission and orient it in its decisions.

I would also like to take this opportunity to tell you what I perceive as the person responsible for the Secretariat through 10 annual meetings of the SCRS.

During the last 9 years, I have noted that SCRS activities have undergone an unprecedented development. This important activity has been generated by both the Commission’s requirements and by the concerns of public opinion regarding the possible deterioration of the state of the stocks of some tuna species. This development is accompanied by exaggerated requests from the Committee for support from the Secretariat.

In spite of the human and financial efforts deployed by the Secretariat, there is always a feeling that the SCRS is never satisfied and asks for more and more support from the Secretariat, often beyond its mandate. This is why I consider that the time has come to address the role of the Secretariat and to better define the nature of the support it should give to the SCRS.

According to the *Basic Texts (Rule 13 of the Rules of Procedure, Basic Texts,* 5th edition), the SCRS shall meet each year to guide the work of the Commission. It was intended to be comprised of scientists of the Contracting Parties, delegated by the Contracting Parties (CPCs) de ICCAT, with the mission to review the state of the stocks of each species under ICCAT mandate. Proposals for management measures are also developed based on the recommendations of these groups of scientists.

While there was significant participation of national scientists in the past, for the last five years or more the rate of their representation has rarely exceeded 50% each year in relation to the number of Contracting Parties. Since 2005, ICCAT has continually encouraged greater participation of national scientists of the CPCs in SCRS work and has allocated important financial means to these efforts. Such efforts have been fruitful in terms of the number of participants, but their impact on the work of the SCRS has yet to be evaluated.

The review of the Secretariat’s participation and it direct implication in support to SCRS activities shows that the workload has increased considerably in the last 10 years. At this time it can be said that Secretariat’s scientific staff are highly sought out for all levels of SCRS work, even beyond that required in accordance with the ICCAT *Basic Texts*. Their intervention touches on all aspects, with a clear trend to carry out a major part of the duties corresponding to both the SCRS Species Groups and the CPCs. This involves considerable responsibility in decision-making. This increasing workload is not only limited to the organization of meetings, whose number has been growing considerably, and all the logistics associated to these metings, but it also involves training, handling data requests and data processing, interactions with other RFMOs, FAO, etc.

It goes without saying that the Secretariat is facing two types of problems:

- The problem of the workload to respond to the increasing needs of the SCRS for the preparation of data and the logistical support for the organization of the large number of long meetings (10 days), which reached 15 in 2013.

- The second problem mainly concerns the definition of the role that the Secretariat’s scientific staff should play in the scope of the SCRS activities.

It seems to me that it is the second problem that merits serious thought in order to more clearly define the tasks assigned to the Secretariat´s scientific staff and up to what level their contribution should reach. The implication of the Secretariat staff in the SCRS deliberations could lead to a confusing situation in the interpretation of decisions. It is not a question of taking the scientific work away from the competence of the Secretariat staff, but it will put their contribution in the scope of the mission that is assigned to it.

In case it is considered imperative to expand the competence of the Secretariat´s scientific staff, the texts should be revised and the Secretariat given the human, material and financial means enabling it to carry out all the tasks that are assigned to it.

For these reasons it is extremely crucial to proceed to a possible new definition of the tasks for the CPCs and their national scientists, the SCRS and the Secretariat.

I hope the work of this session is crowned by success and helps the Commission in taking its decisions.

Thank you.

Appendix 12

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