INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

COMMISSION INTERNATIONALE POUR LA CONSERVATION DES THONIDES DE L'ATLANTIQUE

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COMISIÓN INTERNACIONAL PARA LA CONSERVACIÓN DEL ATÚN ATLÁNTICO

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

(Madrid, Spain, October 5-9, 2009)

October 2009

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(Madrid, Spain, October 5-9, 2009)

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REPORT OF THE
STANDING COMMITTEEON RESEARCH AND STATISTICS (SCRS)
(Madrid, Spain –October 5 to 9, 2009)

1. Opening of the meeting

The 2009 Meeting of the Standing Committee on Research and Statistics (SCRS) was opened on Monday, October 5, at the Hotel Velázquez in Madrid, by Dr. Gerald Scott, Chairman of the Committee. Dr. Scott welcomed all the participants to the annual meeting. In remembrance of the ICCAT'S first Executive Secretary, Dr. Olegario Rodriguez-Martín the meeting commenced with a minute of silence. Dr Scott then introduced the Executive Secretary, Mr. Driss Meski, who opened the memorial session in honor of Dr. Rodriguez-Martín.

Following the memorial session, Mr. Driss Meski, who addressed the meeting and welcomed all the participants to Madrid. In his opening address, Mr. Meski welcomed the SCRS participants to Madrid expressed appreciation to the Kingdom of Spain for its valuable contributions to and collaboration with the Secretariat. The SCRS is tasked with a special mandate to ensure the recovery of stocks, a task that is followed closely by fishery experts throughout the world. This work means that ICCAT is considered to be one of the major RFMOs in the world. However, we must not be complacent since concerns about bluefin tuna increase year after year and the Commission seeks advice from the SCRS on how to remedy this situation. This work is important if ICCAT is to maintain its good reputation. The Executive Secretary's opening address is attached as **Appendix 4**.

2. Adoption of Agenda and arrangements for the meeting

The Tentative Agenda was reviewed and adopted (attached as **Appendix 1)**. However, item 17 "Other matters" was opened first to discuss bluefin tuna and the CITES proposal. Stock assessments were carried out this year on porbeagle (POR), swordfish (SWO), albacore (ALB) and sailfish (SAI).

The following scientists served as rapporteurs of the various species sections (Agenda Item 8) of the 2009 SCRS Report.

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

The Secretariat served as rapporteur for all other Agenda items.

3. Introduction of Contracting Party delegations

The Executive Secretary introduced the 21 Contracting Parties present at the 2009 meeting: Brazil, Canada, Cape Verde, China, Côte d'Ivoire, Croatia, European Community, Equatorial Guinea, Ghana, Japan, Korea, Mexico, Morocco, Norway, Panama, Senegal, South Africa, Turkey, Uruguay, United States, and United Kingdom (OTs). The List of Participants at the Species Groups Meetings and the Plenary Sessions is attached as **Appendix 2**.

4. Introduction and admission of observers

Representatives from the following Cooperating Entity (Chinese Taipei), intergovernmental organizations (GFCM, CARICOM), and non-governmental organizations (Birdlife, Greenpeace, Oceana, Pew Environmental Group, Maltese Aquaculture Producers, WWF) were admitted as observers and welcomed to the 2009 SCRS (see **Appendix 2)**.

5. Admission of scientific documents

The Secretariat informed the Committee that 169 scientific papers had been submitted at the various 2009 inter-sessional meetings.

Besides the scientific documents, there are seven reports of inter-sessional meetings and Species Groups, 30 Annual Reports from the Contracting Parties, and non-Contracting Cooperating Parties, Entities and Fishing Entities, a report from CARICOM, as well as various documents by the Secretariat. The List of SCRS Documents is attached as **Appendix 3**.

6. Report of Secretariat activities in research and statistics

The Secretariat presented the "Secretariat Report on Statistics and Coordination of Research in 2009" [SCI-008/2009] which summarizes activities in 2009. This document was discussed at length during the Species Groups meetings and during the session of the Sub-Committee on Statistics. The first eight tables of this document point out the improvements in data submission and the use of the electronic forms. This report also notes the Secretariat's efforts to implement the last year's recommendations from the SCRS concerning the purchase of computer software and equipment.

This document by the Secretariat also includes some tables that group together the information available in the databases, as was requested by the Commission. Given the degree of detail that these databases contain, the Secretariat prepared a document (SCRS/2009/122) relative to the dissemination of some confidential data and requests the SCRS to review the protocol and to request the Commission to approve it so as to assist the Secretariat to better disseminate this information.

The SCRS Chairman also informed the SCRS to the proposal made during the informal meeting of the Rapporteurs about setting up an Advisory Group to assist the Secretariat to better organize and disseminate the large volume of information generated. The SCRS Chairman also took the opportunity to thank the Secretariat for the excellent work accomplished in 2009 and congratulated Mr. Papa Kebe for the tremendous work carried out in recent years in the collection of statistical information.

The Executive Secretary, Mr. Driss Meski, informed the SCRS of the incorporation of Drs. Victor Restrepo and Laurie Kell to the Secretariat staff. He also noted that, after advice from the Selection Committee, Dr. John Cotter has been selected as a consultant to work with the Secretariat, under a short-term contract (6 months) to carry out the work requested on by-catches.

With regard to the ICCAT/Japan Data Improvement Project (JDIP), the Program Coordinator gave a brief summary of the activities carried out (Coordinator's Report on Activities of the ICCAT/Japan Data Improvement Project (JDIP) [SCI-009/2009]) and informed the meeting of the end of the five-year project. As a result of this project, an observer program was developed in Ghana, and sampling schemes were implemented in Tema (Ghana) and Abidjan (Côte d'Ivoire). This program has also made financial contributions towards the holding of training courses that were held in Guyana and Morocco in 2009.

The Executive Secretary, on behalf of the scientific community, thanked the Government of Japan for its financial support throughout the project, which resulted in improved data collection from some developing countries. He also informed of Japan's intention to implement another five-year project that will be mainly deal with control and surveillance measures. The terms of reference of this new project will be circulated at the end of this year.

The Secretariat also reported on the status of the funds from the United States and the European Community for improving the capacity of developing countries.

Likewise, the Secretariat informed of the activities related to the publications carried out in 2009.

7. Review of national fisheries and research programs

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

Brazil

In 2008, the Brazilian tuna longline fleet consisted of 95 vessels registered in 6 different ports. Of these, 86 were national and 9 were foreign chartered vessels. The total number of vessels decreased only by about 1.0%, from 2007, when 96 vessels were operating. The number of chartered vessels, however, decreased by about 25% from 2007, when 12 boats operated. The number of bait-boats and purse seine boats operating in 2008 were, respectively, equal to 41 and 8, showing no change in relation to 2007.

The Brazilian catch of tunas and tuna-like fish, including billfish, sharks, and other species was about 36,000t (live weight), in 2008, representing a decrease of about 23%, from 2007. The majority of the catch again was taken by bait-boats, which accounted for 60%, with skipjack tuna being the most abundant species, representing close to 95% of the bait-boat catches. Total catch of the tuna longline fishery was equal to 9,210 t, in 2008, being thus about 13% smaller than in 2007, with swordfish being again the most abundant species, with a total catch close to 3,200 t. Yellowfin tuna and blue shark, accounting for about 19% and 18% of the total longline catches, were, respectively, the second and third most caught species. The total catch of white marlin and blue marlin was, respectively, 47 t and 161t, representing a decrease of about 10% and 36%, respectively, from 2007. Part of the Brazilian catches resulted from a small scale fishing fleet based mainly in Itaipava, in southeast coast. Although made of relatively small boats of about 15m in total length, this fleet is highly mobile, operating throughout most of the Brazilian coast and targeting a variety of species with different gears, including longline, handline, troll and others surface gears. The total catch of this fleet, which targets mainly dolphin fish, in 2008, was about 1,800 t.

Several institutions directly assisted the Special Secretariat of Fisheries and Aquaculture (SEAP) in processing and analyzing data from the Brazilian tuna fishery in 2008. Besides the catch and effort data regularly collected, in 2008, a total of 22,387 fishes were measured at sea and while landing, including yellowfin= 144; bigeye= 287; albacore= 1,372; swordfish= 12,731; blue marlin= 113; white marlin= 407; skipjack= 7,208. These numbers are, however, provisional and may increase significantly, since the collected data are still being processed.

In 2008, an important shark and billfish research effort, in cooperation with US scientists, continued to be developed, including collection of vertebrae, spines, stomachs and gonads, for age and growth, feeding habits and reproduction studies, as well as habitat utilization, through PSAT tags, and gear selectivity, by the use of circle hooks, hook timers, and TDRs. During 2008, a larvae collection cruise was also conducted in cooperation with the Brazilian Navy, the Universidade Federal Rural de Pernambuco (UFRPE), and the Virginia Institute of Marine Science- VIMS, from USA. Another important research program was started in 2008 (MADE Project – Mitigating Adverse Ecological Impacts of Open Ocean Fisheries), in cooperation with EC scientists, to propose spatial and technical management measures to reduce the by-catch of pelagic sharks by pelagic longliners, including habitat utilization, through PSAT tags, and gear selectivity, by the use of hook timers and TDRs. Research on tunas (yellowfin, bigeye and albacore) continued to be developed, with the financial support of the Ministry of Fisheries and Aquaculture, including some aspects of the biology of these species, such as age and growth, reproduction and feeding, as well as studies on habitat utilization, through PSAT tags, and gear selectivity, by the use of hook timers and TDRs.

Research on the incidental catches of seabirds continued, aiming mainly at testing and implementing mitigation measures to reduce the incidental catch of seabirds in the tuna longline fishery, through partnerships between the Special Secretariat of Fisheries and Aquaculture (SEAP), seabird conservation institutions (Projeto Albatroz and IBAMA), and universities. The results from these research and statistics activities are expected to help in the reduction of the impact of tuna longline fishing activities on seabirds species caught by Brazilian fishing boats. The monitoring of sea turtles by-catch in longline fisheries began in 1998, also continued, by Projeto Tamar. In 2008, 57 cruises were monitored and several tests with the use of circle hooks were carried out with significant reductions in the catch rates of sea turtles.

In order to adequately comply with ICCAT recommendations, the Brazilian government has implemented several rules regulating Brazilian tuna fishery, although no new regulation was introduced in 2008. It is important to note, however, that in 2009 Brazil adopted a new law on fisheries and aquaculture and raised the Secretariat of Fisheries and Aquaculture to the level of Ministry.

Canada

Bluefin tuna are harvested in Canadian waters from July through December over the Scotian Shelf, in the Gulf of St. Lawrence, in the Bay of Fundy, and off Newfoundland. The adjusted Canadian quota for 2008 was 626 t. A total of 398 licensed fishermen participated in the directed bluefin fishery using rod and reel, handlines, electric harpoon and trap nets to harvest 575 t. Each fish harvested is individually tagged with a unique number and it is mandatory to have every fish weighed out at dockside.

The swordfish fishery in Canadian waters takes place from April to December. Canada's adjusted swordfish quota for 2008 was 1365 t with landings reaching 1334 t. The tonnage taken by longline was 1076.1 t while 258 t were taken by harpoon. Only 53 of the 77 licensed swordfish longline fishermen landed fish in the 2008 fishery.

The other tunas (albacore, bigeye and yellowfin) are at the northern edge of their range in Canada throughout the year. Canadian catches of these species have traditionally been a minor portion of the overall Canadian catch of large pelagic species. Porbeagle is the only shark species for which there is a directed longline fishery and the combined directed and by-catch harvests were 124 t in 2008.

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

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

Cape Verde

Tuna fishing in Cape Verde is mainly carried out by hand line in the artisanal fishery and by purse seine and pole and line in the industrial or semi-industrial fishery. There are no fishing activities targeting sharks, but these are often part of the by-catches of the longline fishery. There is an increased demand for sport fishing activity due to the development of tourism. The Fisheries Statistical Bulletin, which should be issued annually, is still undergoing some delay. The major fishing areas are the sub-marine mounts and the sub-marine slopes, around the islands. The catch data on tunas and tuna-like species in 2008 are provisional and are estimated at 15,749 tons. There has been little fluctuation, except for yellowfin tuna, as compared to the previous year. Swordfish and billfishes are caught in Cape Verdian waters, mainly by EU vessels and the sport fishery. Size frequency has remained stable, similar to previous years. The licensed foreign fleet operates in the Cape Verde EEZ, based on agreements or fishing contracts. These vessels pertain mostly to European Union or Asian countries. Research is aimed at making recommendations for the optimal and sustainable exploitation of the aquatic living resources, with a view towards attaining the economic and social objectives established in the developmental polity of the sector. Fisheries and environmental research and socio-economic studies are, therefore, an instrument of prime importance for the development of fishing. Through its Fishing Management Plan, updated in 2009, Cape Verde has suspended the prohibition on the catch of yellowfin and bigeye tunas less than 3.2 kg and has maintained the

reservation of the region within 3 nautical miles exclusively for the artisanal fishing activity and the prohibition of the foreign fleet fishing activity within 12 nautical miles. As concerns sharks, fishing for fins exclusively for the commercialization of fins is prohibited in the Cape Verde EEZ.

China

Longline is the only fishing gear used by the Chinese fishing fleet to fish tunas in the Atlantic Ocean. Thirty-eight (38) Chinese tuna longliners operated in 2008, with a total catch of 7,296.3 t including tuna and tuna-like species, and sharks (in round weight), less than that of 2007 (10,836.3 t). The target species were bigeye tuna and bluefin tuna, and their catches amounted to 5,686 t and 119 t, in 2008, respectively. Bigeye tuna was the major target species in Chinese catch, accounting for 77.9% of the total, however, it was 1,713 t lower than that of 2007(7,399 t). Yellowfin tuna, swordfish, and albacore were taken as by-catch. The catch of yellowfin tuna decreased from 1,124 t in 2007 to 649 t in 2008. The catch of swordfish was 562 t, with an increase from the previous year (558 t in 2007). The catch of albacore was 49 t, which represented a 47.9% decrease from the previous year.

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

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

Côte d'Ivoire

An international fleet lands and/or transfers its catches at the fishing port of Abidjan, which reported an overall volume of 148,550 t of tunas, broken down as follows:

- 127,300 t of tuna for the canneries and for export (107,950 t by 22 Spanish tuna vessels and 19,350 t by 5 French tuna vessels);
- 21,250 t of false tunas for sale on the local market, of which 9,150 t were landed by Spanish (8,200 t) and French (950 t) vessels, while 3 Ghanaian vessels and 9 other vessels landed 12,100 t.

The high seas artisanal driftnet caught close to 16,300 t (14,700 t of tunas and 1,600 t of billfishes). These activities are monitored by a team of 16 technicians and 2 scientists organized by the CRO in partnership with the IRD of France and the IEO of Spain. This enabled carrying out sampling and size measurements aimed at determining species composition and size structure. ICCAT, through the JDIP, contributed towards improvement of these data. As regards research, the initiative to collect biological data has not given the results expected.

Croatia

Total Croatian catch data for BFT in 2008 was 834,03 metric tons (t). Out of this figure, 98,47% was caught using purse seines (PS), amounting to 821,29 t. The remaining was caught using coastal artisanal long-lines (LL, 0,5% - 4,26 t) and hand lines (HAND, 1,03% - 8,47 t). Out of the total catch, 97,6% was caged (814,32 t) and only 2,4% landed (19,71 t). 709,08 t of live bluefin tuna were imported from Italy, France, Libya, Tunis and Morocco for farming purposes.

Total number of vessel licensed for participation in bluefin tuna fishery in 2008 was 82, out of which 63 were purse seines, 2 artisanal long-liners and 17 hand-lines. Out of 63 vessels, 33 purse seines were active in fishing.

National sampling program targeting bluefin tuna harvested from aquaculture facilities has been carried out in accordance with Rec. 06-07. Within framework of this sampling program, collection of Task II data has been done. Croatia continues to support research activities related to tuna stock management. In addition, a research on influence of tuna aquaculture facilities on wild fish population has been carried out, and findings are submitted to scientific journal for its publication. Two different projects on genotyping of tuna have been started, as well as the project aimed to evaluate possibility of BFT spawning in growth-out floating cages. Special focus was placed on studies of growth parameters in farming conditions. Results of these studies have been reported to SCRS.

Croatia operates a national observer scheme, with 100% coverage on all farm activities. In 2008 fishing season Croatia operated a scheme of fleet coverage pursuant to legislation in force. Croatia has undertaken all preparatory activities in order to implement the provisions of the ROP as stipulated by the relevant provisions of ICCAT Rec. 08-05.

By the end of 2008 Croatian authorities have started a web-based application containing data on vessels licensed for bluefin tuna fisheries and farms licensed for bluefin tuna farming, in order to secure cross-checks of verification, validation and inspection reports with the catch, transfer, caging and harvesting data.

Equatorial Guinea

Equatorial Guinea is experiencing an unprecedented moment in the exploitation of natural resources such as fishing and carrying out of diverse infrastructures. All these activities are aimed at optimum socio-economic development, which in the future can have some negative impacts on the overall marine and terrestrial environmental ecosystems, if such actions are not accompanied by a series of specific measures that guarantee the sustainability, conservation and management of these natural resources.

The fishing sector in general, and artisanal fishing and aquiculture, in particular, play an important role in solving the problems of food security from day to day, and thus improve the standard of living of the people.

Currently, there are more than a dozen foreign longliners and purse seiners whose owners are authorized to fish: The *Asociación Nacional de Armadores de Buques Congeladores*-ANABAC (National Association of Large Freezer Tuna Vessels, the *Asociación de Grandes Atuneros Congeladores*-AGAC (Association of Large Tuna Freezer Vessels), the Royal Atlantic Fishing Industry Company, Inc., and the *Asociación de Cooperativas de Armadores de Atuneros Japoneses* (Cooperative Associations of Owners of Japanese Tuna Vessels) .

The artisanal fleet comprised of about 2,000 boats is still rudimentary, with vessels constructed from carved tree trunks, and which use oars and sails. Their particular fishery uses handline, longline and sometimes troll.

Due to its important contribution to the policy of food security, the government is promoting aquaculture, by creating favorable conditions for development, and by establishing appropriate mechanisms for financing and taxation.

European Community

Eight EC countries carry out tuna fishing in the Atlantic and the Mediterranean which, in decreasing order of 2008 catches are as follows: Spain (102,000 t), France (27,800 t), Portugal (12.700 t), Italy (11,300 t), Greece (1,900 t), Ireland (1,500 t), Malta (590 t) and Cyprus (413 t). The major species caught the EC countries in 2008 were: Skipjack tuna (45,600 t), yellowfin tuna (40,800 t), albacore (21,500 t), bluefin tuna (11,400 t), swordfish (17,500 t) and bigeye tuna (11,800 t). It is noted that while the catches of tropical tunas increased slightly in 2008 (+ 28%), the catches of albacore, swordfish and bluefin tuna declined slightly in 2008. All the classic fishing gears are active in the EC: purse seine, baitboat, longline, hand line, troll, driftnet, harpoon, pelagic trawl, trap and sport fishing. The total catches in 2008 were stable compared to those of 2007, but they showed a very considerable decline compared to the high catches of more than 300,000 t that were observed 15 years ago for the EU countries during the 1990-1994 period. It should be noted that the EU has financed in large part, and routinely since 2001 the collection of biological data and a considerable amount of research on tunas of its Member States. Task I and II statistical data submitted to ICCAT by the EU countries in 2008 were overall complete and in accordance with ICCAT´s regulations. It should also be noted that the EU supports observers programs on various fleets, such as the tropical purse seine with about 10% of fishing effort monitored by the observers and, since 2009, 100% of the fishing days observed on the purse seiners fishing bluefin tuna in the

Mediterranean. Biological sampling of tropical tuna catches of European purse seiners are also carried out on a routine basis in the Abidjan canneries. It should also be noted that in 2008 and 2009 there was an appreciable improvement in the quality of the statistics on the bluefin and albacore fisheries, in particular, with the recovery of historical data on albacore. Of note is the considerable financial assistance that has been declared by the EU to support the extensive bluefin tuna research program and which will become a reality before long. Lastly, the active participation of European scientists at all the ICCAT scientific meetings should be noted, as well as the large number of 2009 SCRS documents co-authored by EU scientists.

Moreover, EC countries also carry out extensive research on tunas of a more fundamental nature, for example, on the ecosystems, the reduction of by-catches, the tuna/environment relationships, the behavior of tunas, FADs, etc. The participation of scientists from EC countries is, for example, active within the scope of the CLIOTOP/GLOBEC program which has broad objectives for its tuna research, which is quite multidisplinary and global, and which is aimed at carrying out better modeling of the sustainable exploitation of the tuna resources based on the environment and the ecosystems. Also of note is the MADE research project on the reduction of by-catches which has been implemented since 2008, financed by the EC, and which has been presented to the Sub-Committee on Ecosystems.

Ghana

The total number of vessels registered in 2008 to fish for tuna resources within the EEZ of Ghanaian waters were 29 comprising 20 Bait boats and 9 Purse seiners. These fleets collaborated extensively with each other often sharing the catch during fishing operations. Recent information shows that over 80% of fishing is collaborative hence a baitboat catch is predominantly that of a Purse seine.

The total catch for the year 2008 of the main tuna species was 64,094 t. During the year under review, Skipjack catches (58.33 %) were the most abundant followed by yellowfin (22.23 %), bigeye (14.46 %) and other tuna-like species (4.97%) respectively.

In conformity with the objectives of the Data Fund aimed at improving Data Collection and Quality Assurance [Res. 03-21], Port sampling of the three major species of tuna continued with major recovery of logbooks with the help of the JDIP programme. Though the recovery rates was rather low, plans are in place to further enhance the quality of Task II by integrating the information into the ICCAT database to improve the overall catch and species composition of the catch.

An observer programme was organized in August-November 2008 and sponsored by the JDIP programme. Just over10% of coverage was achieved. Observations indicate that biological sampling conducted onboard revealed that most sizes of all fish ranged between 35-70 cm with a few greater than 80 cm. Fishing was generally in the same narrow strip between latitude 4-5 ^{o} North Latitude and 1-5 ^{o} East Longitude. Strategies of fishing captains have not changed mainly fishing off FADs hardly ever fishing on free swimming schools.

Recent collaboration with the help of JDIP has been initiated to help sample Ghanaian vessels landing in Abidjan. An international sampler has been engaged for 2 months to help sampling in Ghana. Detailed report on these initiatives will follow at the end of the programme.

Beach sampling from artisanal drift gill nets for billfishes continued off coastline of Ghana. With relatively low catches of the white marlin 4 metric tons.

Japan

Longline is the only tuna-fishing gear deployed by Japan at present in the Atlantic Ocean. The final coverage of the logbook from the Japanese longline fleet has been 90-95 % before 2006. The current coverages for 2007 and 2008 are estimated to be about 82% both. In 2008, fishing days was 30,300 days, which was near average value in recent ten years. The catch of tunas and tuna-like fishes (excluding sharks) is estimated to be 40,413 t, which are 124 % of the past ten years average catch. The most important species was bigeye representing 50% of the total tuna and tuna-like fish catch in 2007. Observer trips on longline boats in the Atlantic were conducted and total of 732 fishing days were monitored. Fisheries Agency of Japan (FAJ) sets catch quotas for western and eastern Atlantic bluefin as well as for northern, southern Atlantic swordfish, blue marlin, white marlin and bigeye tuna, and requires all tuna vessels operating in the Atlantic Ocean to submit catch information every day (bluefin tuna) and ten-day (other tunas) period by radio or facsimile. All Japanese longline vessels operating in

the Convention Area are equipped with satellite tracking devices (VMS) onboard. In accordance with ICCAT recommendations, FAJ has taken measures to prohibit catch of undersized several tuna species and false import of Atlantic bluefin tuna, swordfish and bigeye tuna. Implementations of time and area closure at a part of the East Atlantic, the Mediterranean and the Gulf of Mexico have been regulated by the Ministerial Order. Each species statistical or catch document programs have been conducted. Records of fishing vessels larger than 24 meters in length overall (LSTLVs) have been established. FAJ dispatched patrol vessels to the North Atlantic to monitor and inspect Japanese tuna vessels and also observe fishing activities of other nations' fishing vessels, and randomly inspected landings at Japanese port to enforce the catch quotas and minimum size limit. A prior permission from FAJ is required for any Japanese tuna longline vessels to transship tuna or tuna products to reefers at foreign ports and at sea.

Korea

Recently annual catches of tuna and tuna-like species by Korean tuna longliners and purse seiners in ICCAT areas increased and ranged from 2,607 t to 4,668 t (averaged 3,275 t) from 2004 to 2008. The major species were composed of bigeye tuna (50%), yellowfin tuna (20%), bluefin tuna (16%) and swordfish (4%) during recent 5 years. Until recently, bigeye tuna and yellowfin tuna were the most important tuna species for the Korean tuna longline fishery, not only for catch size but also the higher commercial value than any other species sold in sashimi market**s**.

In 2008, one Korean purse seiner (home based in Malta) and 24 Korean longliners operated in the ICCAT area. The total catch was 4,668 t, which was an increase from the previous year. Almost 77% of the total catches was composed of two species, 2,559 t of bigeye tuna (56%) and 993 t of yellowfin tuna (21%). In particular, yellowfin tuna catches sharply increased from 507 t in 2007 to 993 t in 2008.

Korean longliners have mainly operated in the tropical area of the Atlantic Ocean and have targeted bigeye tuna and yellowfin tuna. Most tuna longliners operated from January to December in 2008 in the central Atlantic Ocean (20°N ~10°S, 10°E~45°W). However, the fishing grounds have fluctuated annually depending on the fishing condition**s** for target species and oceanographic condition and main fishing grounds concentrated in statistical area 31 and 34 of the Atlantic Ocean. One Korean purse seiner which have a home port in Malta, operated in Maltese EEZ area (34°N, 21°E) for one month in Mediterranean Sea.

In 2008, 9 observers were deployed 13 times on Korean distant-water fishing vessels by NFRDI's observer program. Of the 13 observation periods, only one observer was deployed on a tuna purse seine vessel operated in the Malta's EEZ to catch bluefin tuna in the Mediterranean. To reduce by-catch of seabird**s,** sea turtles and sharks by tuna longline fishery and purse seine fishery, Korean guide books and posters summarizing information of these species were distributed to fishing vessels with by-catch logbook sheet since 2008.

Mexico

Mexico presents the 2008 annual report on the fishing of yellowfin tuna (*Thunnus albacares*) and its incidental catch in the Gulf of Mexico within the scope of the Commission´s conservation and management. In 2008, fishing effort registered 27 vessels that carried out 317 trips in which 3,149 sets were made in 5,666 fishing days using 1,813,188 hooks. The total catch (in kilograms) was comprised mainly of the target species and, to a lesser degree, by an incidental catch, represented mainly by the following groups: (a) Other tunas (b) Billfish and billfish-like species, (c) sharks and rays, and (d) Other fish. The total reported catch was 1,429 t, of which 87% corresponded to retained catch, 10% to catch released dead, and 3% to catch freed live. As regards to the number of fish, 57% of the reported catch was discarded dead, 39% of the catch was retained, and 4% of the catch was discarded live. It should be noted that these last figures refer to the group of other fish, comprised almost entirely of mako sharks (*Alepisaurus spp.*), which are associated to the majority of the longline sets and are almost all discarded dead. Mexico ratifies the national policy of implementing the regulatory measures adopted within the framework of its national legislation, and to strengthen scientific research to improve the yield of target fishing and to reduce by-catch and, in this way, propitiate an effective administration of longline tuna fishing in the Gulf of Mexico.

Morocco

The fishing of tuna and tuna-like species reached a production of 13,391 t in 2008.

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

The collection of statistical data on fishing and effort is carried out in an exhaustive manner by the fisheries administration structures, such as the *Département des Pêches* (Department of Fishing) and the *Office National des Pêches* (National Office of Fishing), located throughout the Atlantic and Mediterranean coasts of Morocco. These same structures also assure the control of fishing operations and landings, and at the same time they monitor compliance of the regulatory measures in force, in particular, through a scientific observer program, and the monitoring of trade operations. Furthermore, there is also a control that is carried out by the *Office des Changes*, as regards the export of fishing products.

As concerns the scientific plan, the *Institut National de Recherche Halieutique*-INRH (National Institute of Fisheries Research), through its Regional Centers (5 centers) covering the entire Moroccan coast, reinforces the collection of biological data on the major species (bluefin tuna and swordfish). The Regional Center of the INRH in Tangier serves as coordinator for the collection of all these data. In recent years, monitoring of other species has been started, in particular, the tropical species (bigeye tuna, among others), with an extension of the research work towards areas located to the south of Morocco.

Considerable progress has been reported in the collection of biological data on the major tuna fisheries of Morocc, i.e., East Atlantic and Mediterranean bluefin tuna, North Atlantic swordfish, Mediterranean swordfish, and Atlantic bigeye tuna), as indicated by the series of scientific documents as well as the basic Task II data submittged in recent years by Moroccan scientists to the various SCRS meetings, for stock assessment purposes.

Norway

In light of the critical stock situation for Atlantic bluefin tuna, Norway has adopted a prohibition for Norwegian vessels to fish and land bluefin tuna in Norway's territorial waters, in the Norwegian Economic Zone and in international waters. Norway continuously works on historical data, and aims to put the data on this species into an ecosystem perspective. Comprehensive reviews of the Norwegian fishery from 1920 to 1980 and plausible causes related to the drastic decline of bluefin tuna in Norwegian waters in recent decades were presented and documented at the "World Symposium for study into stock fluctuations of Northern bluefin tuna including the historic period". Norway has participated on all major international scientific meetings concerning Atlantic bluefin tuna in 2008

São Tomé & Príncipe

Statistics

The statistical scheme is by 1º strata among the 38 landing areas and the sampling method is stratified. For more efficiency, the scheme should be improved.

The national catch (2,114.5 t) is carried out mainly by artisanal bpats and catch mainly major tunas (30%), small tunas (50%) and sailfish.

Sailfish, billfish and swordfish represent a very important economic resource for the artisanal fishery, even though statistical and biological monitoring of these species by the sector is not very efficient and requires strengthening.

It should be noted that the catch of swordfish were not estimated from sampling carried out from January to August 2009 at two sites, Neves in the north with a total of 15 t and Angolares in the south with 2.5 t.

Research and management

Sao Tome & Príncipe collaborates in the programs to protect sea turtles with specialized NGOs.

Soon Sao Tome & Príncipe will recommend sampling of the target species and other possible species considered important (pelagic and demersal).

As regards management, means will be deployed for the implementation of a fishing law, particularly the seasonal closure of fishing in some spawning areas, a reduction of fishing effort and other possible measures to be enacted with our resources and technical capacity available or acquired.

Senegal

In 2008 the industrial fleet of Senegal was comprised of 7 baitboats that mainly targeted the major tropical tunas: yellowfin tuna *Thunnus albacares* (YFT), skipjack tuna *Katsuwonus pelamis* (SKJ), and bigeye tuna *Thunnus obesus* (BET). Catches in 2008 amounted to 5,143 tons (t), comprised of 550 t of yellowfin tuna, 3,667 t of skipjack, and 926 t of bigeye tuna. The catches of these major tunas increased as compared to 2007 (3,898 t).

As regards longline fishing, only two vessels were active in 2008; their total catch is estimated at 725 t (440 t of sharks, 138 t of swordfish, 38 t of yellowfin tuna, and 18 t of billfishes.

As concerns the artisanal flet, a part of this fishery uses hand line, troll, and purse seine net to fish small tunas: Atlantic black skipjck (*Euthynnus alletteratus*); west African Spanish mackerel (*Scomberomus tritor*); plain bonito (*Orcynopsis unicolor*) and Atlantic bonito (*Sarda sarda*); wahoo (*Acanthoncybium solandri*); frigate tuna (*Auxis thazard*). The billfishes (swordfish (*Xiphias gladius*); Atlantic blue marlin (*Makaira nigricans*) and sailfish (*Istiophorus albicans*) are also caught. Total catches of small tunas and billfishes all species combined amounted to 5,040 t in 2008. Catches dropped as compared to 2007 (9,836 t).

The sport fishery mainly targets sworfish *Xiphias gladius,* Atlantic blue marlin *Makaira nigricans* and sailfish *Istiophorus albicans* during the fishing season that goes from May to December. This fishery also targets dolphin fish, tunas and other species. Catches in 2008 are estimated at 109 t of sailfish and 96 t of blue marlin.

The *Centre de Recherches Océanographiques de Dakar Thiaroye*-CRODT (Center of Oceanographic Research of Dakar-Thiaroye) is the structure in charge of research and statistics on the tunas landed regularly by national and foreign vessels (mostly French and Spanish) that have Dakar as their base port. Work consists of the collection of statistics on catch and fishing effort. The data collection scheme is based on a daily detailed survey of the vessel master during each landing, completed for the catches made from various sources (armements, *Direction des Pêches Maritimes*, etc.).

Sampling is carried out during the langings at the port of Dakar by a team of three samplers. In 2008, 218 multi-species size samples were taken by Senegalese baitboats. The number of samples made is higher than that of 2007 (157 samples). 527 samples were made on the foreign vessels (33 on French baitboats, 208 on Spanish baitboats, and 286 on Spanish purse seiners).

Billfish sampling (mainly sailfish *Istiophorus albicans)* is also carried out at the major landing centers of the artisanal fishery. Data are collected on the size frequency of fish caught by the artisanal fishery.

As regards the ICCAT conservation and management measures, these have been well monitored by Senegal. Senegal has implemented a monitoring control and surveillance system of all its fishing activities. Inspections are carried out at port and all vessels involved in illegal fishing activities are identified.

South Africa

The estimated total annual pole fleet (including rod and reel) catch (3,362 t), remained low in 2008, and well below the mean annual catch over the last decade (~ 4,900 t). Reduced catches, particularly in the bait-boat fishery, were compounded by the periodic availability of sub-adult albacore in near-shore waters, recent change of targeting to yellowfin tuna using rod-and-reel gear, and high fuel prices. In addition a total of 35 South African poling vessels also fished for Namibia for a major part of the year of which the catches accrued to Namibia. Despite the increased number of rod and reel vessels geared up to target yellowfin tuna, the season was poor with only 206 t landed compared to 607 t (dressed weight) in 2007. The nominal CPUE also declined from 339 $kg.day^{-1}$ to 183 $kg.day^{-1}$. The number of active longline vessels decreased from 29 in 2007 to 25 in 2008. The fishing effort in the Atlantic Ocean also declined from 1.2 million hooks in 2007 to 0.8 million hooks in 2008. Despite the decrease in fishing effort, catches of albacore increased from 33 t in 2007 to 107 t in 2008. Similarly, catches of bigeye tuna also increased from 70 t in 2007 to 199 t (dressed weight) in 2008. The bulk of

the longline fishing effort (3.4 million hooks) remained in the Indian Ocean, where catch rates of the target species were generally higher. Pelagic shark longline and traditional linefish catches of tuna and tuna-like species have continued to remain low in the Atlantic Ocean in 2008 (Table 1) – with most of the effort deployed in the Indian Ocean.

Although there was still little research capacity in 2008/2009 to process data etc., South Africa was able to meet its ICCAT data reporting obligations on time, this year. South Africa, with the assistance of NGOs and universities, continued to assess the impact of longline fisheries on seabirds, turtles and sharks and to investigate various mitigation and management measures, and in addition, South Africa has also embarked upon a research programme to determine the stock delineation of yellowfin in the boundary region between the Indian and Atlantic Oceans. South Africa has also started to conduct research on the age and growth of albacore and bigeye tuna, as well as the spatial distribution and movement of bigeye tuna, swordfish and blue sharks in the Atlantic and Indian Oceans.

Turkey

During the course of 2008, the total catch of tuna and tuna-like fishes amounted to 9.829 t. Turkey's total catch of bluefin tuna, albacore, Atlantic bonito and swordfish were 879 t, 208 t, 6.448 t, and 386 t, respectively. All bluefin catch was caught by 98 purse seiners, the majority of which had an overall length of 30-50 m and 200-300 GRT. BFT Fishing operation was conducted intensively off Antalya Bay and in the region between Antalya (Gazi Paşa) and Cyprus. In the Mediterranean; BFT fisheries was conducted in the region between Cyprus-Turkey and in the region Cyprus-Syria. The highest bluefin tuna catch amount was obtained in the second half (second week) of June. Recommendations and resolutions imposed by ICCAT were translated into national legislation and implemented. All conservation and management measures regarding bluefin tuna fisheries and farming are regulated by national legislation through notifications, considering ICCAT's related regulations. The Fisheries Information System has been updated in order to meet the requirements of data exchange at national and regional level.

Specific research activities towards bluefin tuna, albacore and Atlantic bonito fishery and biology were conducted. In addition to these, a tuna larval survey in the eastern Mediterranean has been carried out in 2008.

Uruguay

In 2008, the Uruguayan tuna fleet continued fishing using surface longline, with the same number of vessels as in 2007 (9). The total catch (provisional) landed and reported in 2008 by this fleet amounted to approximately 1,000 t, with swordfish the principal species caught.

Various activities were carried out in 2008 related to statistics, research and management. The *Programa Nacional de Observadores*-PNOFA (National Observer Program), which covered approximately 40% of the fleet activity. Within this program work continued aimed at training and informing the fishers and boat owners.

- Swordfish and tunas: As for other species, monitoring of catch and effort statistics continued, tags were placed and biological sampling were collected.

- Sharks: Blue shark, shortfin mako, and porbeagle. Diverse research is being carried out on the biology of pelagic sharks and the implementation of measures proposed in the Shark Action Plan.

- Sea birds: Work is currently being done to carry out the Plan of Action and developing the measures proposed therein. Research is being developed on measures to mitigate the catch of sea birds.

- Sea turtles: The project of satellite transmitters is continuing to obtain information on the migratory routes and the movements of *Caretta caretta* turtles. Furthermore, experiments are being made using circle hooks in monofilament longline.

- Management: Implementation of the *Plan de Acción Nacional para Reducir la Captura Incidental de Aves Marinas y Tiburones en las Pesquerías Uruguayas* (National Plan of Action to Reduce the Incidental Catch of Sea Birds and Sharks in the Uruguayan Fisheries). A new fishing law was developed which in the process of parliamentary approval.

United States

Total (preliminary) reported U.S. catch of tuna and swordfish, including dead discards, in 2008 was 8,322 t, a decrease of about 30 % from 12,107 t in 2007. Estimated swordfish catch (including estimated dead discards) decreased from 2,682 t in 2007 to 2,530 t in 2008, and provisional landings from the U.S. fishery for yellowfin decreased in 2008 to 2,407 t from 5,529 t in 2007. U.S. vessels fishing in the northwest Atlantic caught in 2008 an estimated 937 t of bluefin, an increase of 88 t compared to 2007. Provisional skipjack landings increased by 0.7 t to 67 t from 2007 to 2008, estimated bigeye landings decreased by 39 MT compared to 2007 to an estimated 488 t in 2008, and estimated albacore landings decreased from 2007 to 2008 by 283 t to 248 t. Tuna, billfish, and shark tagging efforts continued in 2008. The United States has a scientific observer program for its pelagic longline fleet that has been in place since 1992. From March 9th through June 9th, 2008 the longline pelagic observer program increased the coverage of the longline fleet operating in the Gulf of Mexico. The goal of this increase was to collect data to better characterize the interaction between the longline fleet and bluefin tuna during the spawning season. A total of 670 longline sets were observed (504,384 hooks) from 33 vessels which accounted for approximately 75% of the trips during that period. The United States continued efforts to implement and enforce all applicable conservation and management measures.

Cooperating Non-Contracting Parties, Entities or Fishing Entities

Chinese Taipei

In 2008, the total numbers of authorized longline vessels in the Atlantic Ocean were 109, which includes 60 vessels authorized to target on bigeye tuna and 49 vessels on albacore.

The catches of all species are declining from about 52,600 t in 1997 to about 27,407 t in 2008. Among the catches, bigeye tuna, yellowfin tuna and albacore are constituted of more than 80% of the total annual catch of tunas in the recent years. In 2008, the catch of bigeye tuna, yellowfin tuna and albacore are estimated to be 10,418 t, 1,122 t and 11,073 t in provision, respectively. The decrease of catches was mainly stemmed from a rise of oil price and subject to a decrease in fishing effort.

In 2008, Chinese Taipei continually took several measures to improve data collection including port sampling, a daily logbook reporting through the satellite for bigeye-targeted vessels, and dispatching onboard observers. There were 21 observers placed on fishing vessels in the Atlantic Ocean, in which 17 observers are on bigeye-targeted vessels. The coverage rate is 20%.

Furthermore, a number of researches have been conducted by scientists, including the topics on catch rate for albacore and swordfish, and CAA of North Atlantic albacore in 2009 and observer report summary in 2007. Those papers have contributed to various inter-sessional scientific meetings opened by ICCAT.

In addition, Chinese Taipei has provided financial support for the scientific research programs implemented by ICCAT, including €5,000 for ICCAT Enhanced Research Program for Billfish in December 2008 and €3,000 for Bluefin Tuna Research Program in July 2009.

Intergovernmental Organizations

CARICOM

Available data on 2008 landings of tuna and tuna-like fisheries are reported on behalf of The Commonwealth of Dominica, Grenada, and St. Lucia. While the species composition of tuna and tuna-like fish landings showed no dramatic changes in 2008, these counties reported an increase in the number of persons engaged in fishing and a continuing development of fishing activities around FADs. In 2009, the CRFM Large Pelagic Fish Resource Working Group completed specific tasks in support of ongoing efforts to improve collection and reporting of data on tuna and tuna-like fishing operations conducted by CARICOM and CRFM Member States. Two major donor-funded regional fisheries initiatives, involving CARICOM and CRFM States, entered an active implementation phase during 2008-09, and include activities intended to improve the overall approach to management of large pelagic fisheries in the participating States.

8. Executive Summaries on species

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

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

8.1 YFT – YELLOWFIN TUNA

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

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

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

YFT-1. Biology

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

Growth rates have been described as relatively slow initially, increasing at the time the fish leave the nursery grounds, and is supported by results from tagging data in other oceans. Nevertheless, questions remain concerning the most appropriate growth model for Atlantic yellowfin tuna. A recent study (Shuford *et al.* 2007) developed a new growth curve using daily growth increment counts from otoliths. The results of this study, as well as other recent hard part analyses, do not support the concept of the two-stanza growth model (initial slow growth) which is currently used for ICCAT (as well as other management bodies) yellowfin tuna stock assessments and was developed from length frequency and tagging data. This discrepancy in growth models could have implications for stock assessments; however, recent analyses indicate that assuming this alternative growth model would result in only moderate changes to estimates of stock status using current age-structured assessment models and assumptions of natural mortality vectors.

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

YFT-2. Fishery indicators

In contrast to the increasing catches of yellowfin tuna in other oceans worldwide, there has been a steady decline in overall Atlantic catches, with an overall decline of 45% since the peak catches of 1990 (although declining less than 1% since 2006, the last year of data available for the assessment) Recent trends have differed between the western and eastern Atlantic, with the overall catches in the west continuing to decline steeply, with reductions of 40% in only two years since 2006. In the eastern Atlantic, on the other hand, the trend has been reversed and catches increased by 13% since 2006, mainly due to substantial increases in purse seine effort but reflected in other fisheries as well.

In the eastern Atlantic where overall catches peaked in 1990, purse seine catches declined from 128,729 t in 1990 to 58,319 t in 2006, a 55% reduction, but then increased by 17% to 67,980 t in 2008 **(YFT-Table 1; YFT-Figure 2)**. Baitboat catches declined by 47% from 1990 to 2006, from 19,648 t to 10,434 t, but have increased by 12% to 11,639 in 2008. Longline catches, which were 10,253 t in 1990, have fluctuated since between 5,790 t and 14,638 t and were 7,180 t in 2006 (a 30% decrease from 1990), increasing again by 18% between 2006 and 2008 to 8,441 t. The increase in South African catches in the eastern Atlantic during 2005-2007 may be the result of a spillover of Indian Ocean fish caught just inside the Atlantic boundary, and appear to have been reduced to more typical levels in 2008. In the western Atlantic where overall catches peaked in 1994, purse seine catches have declined by 77% from 1994 to 2006, from 19,612 t to 4,442 t, and by 2008 have decreased by 53% relative to 2006 (2,067 t). Baitboat catches declined by 62% between 1994 and 2006, from 7,094 t to 2,695 t, and in 2008 were reduced by 67% from the 2006 level to 886 t. Longline catches, which were 11,343 t in 1994, have fluctuated since between 10,059 t and 16,019 t, were 14,288 t in 2006 (a 26% increase from 1990) and dropped back to 12,078 in 2008 (a 16% reduction from 2006). It was noted that Brazilian catches declined in 2008 as a result of reductions in effort and targeting; this may also be the case for Venezuela in 2007 and 2008. However, United States catches in 2008 declined substantially despite maintaining similar effort levels to previous years. The most recent available catch distribution is given in **YFT-Figure 1.** The provisional catches for 2008 (107,277 t), and suggest total Atlantic catches were nearly the same magnitude as in 2006. However, it should be noted that reports are not yet available from several Contracting and/or non-Contracting Parties, which together accounted for nearly 2,000 t in 2007. Furthermore, the Committee has requested that the Secretariat to seek clarification from Panama on recently received revisions to its official landings in 2007; Panamanian longline catches were revised from 3,019 t in 2007 to 20 t. As a consequence, it is unclear whether or not these landings are accounted for elsewhere. Additionally, a relatively high value for Panamanian longline catches in 2006 (2,804 t) was left unchanged.

The nominal effort in the purse seine fishery had been declining through 2006. As an indicator, the number of purse seiners from the European and associated fleet operating in the Atlantic had declined from 44 vessels in 2001 to 24 vessels in 2006 (last year's data included during the assessment), with an average age of about 25 years (**YFT-Figure 3)**. Since then, however, the number of purse seiners has increased by 50% to 36, 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. On the other hand, since 2006 the European and associated baitboat fleet, based in Dakar, varied in number only slightly.

Several scientific documents were presented which were descriptive of the catches by country fleets. Catch rate trends for a number of fisheries were considered during the assessment, Examination of nominal catch rate trends from purse seine data suggest that catch-per-unit effort was stable or increasing in the East Atlantic (the catch rate trends of individual country fleets differ somewhat), and was clearly declining in the West Atlantic **(YFT-Figure 4)**. If effort efficiency is estimated to have continued to increase as has been assumed in the past, adjustments for such efficiency change would be expected to result in a steeper declining trend. However, the decrease in western Atlantic purse seine catch rates could be linked to specific environmental conditions (e.g. high surface temperatures, reduced availability of prey, etc.), especially considering that decreases are also seen in skipjack catch rates, and it is therefore difficult to conclude that these rates reflect abundance trends. Baitboat catch rate trends **(YFT-Figure 5)** exhibit large fluctuations, with a somewhat declining overall trend. Such large fluctuations reflect changes in local availability, which (although of great import to the respective fisheries) do not necessarily reflect stock abundance trends (*i.e.* localized environmental changes as well as changes in migratory patterns may produce such results). Standardized catch rates for the longline fisheries **(YFT-Figure 6)** generally show a declining trend until the mid-1990s, and have fluctuated without clear trend since.

The average weight trends by fleet (1970-2006) are shown in **YFT-Figure 7**. The recent average weight in European purse seine catches, which represent the majority of the landings, has declined to less than half of the average weight of 1990. This decline is at least in part due to changes in selectivity associated with fishing on floating objects, although there have been recent indications that the mean weight of large fish caught in free schools has been declining. A declining trend is also reflected in the average weight of eastern tropical baitboat catches. Longline mean weights have also followed a generally declining trend, although estimates have been highly variable in recent years.

Apparent changes in selectivity can also be seen in the overall trends in catch at age shown in **YFT-Figure 8**. The variability in overall catch at age is primarily due to variability in catches of ages 0 and 1 (note that the catches in numbers of ages 0 and especially 1 were particularly high during the period 1999-2001). These ages are generally taken by the surface fisheries around FADs.

YFT-3. State of the stock

Since the relatively high catch levels of 2001 (164,650 t), catches have declined each year to a provisional level of 107,277 t, a reduction of 35%. Catches in 2005-2008 represent the lowest level of catches since 1974, with the catch in 2007 (99,619 t) the lowest of these. A partial explanation for this decline is the reduction in eastern Atlantic purse seine effort (reversed in 2007), but that does not explain the reduction of longline, baitboat and purse seine catches in the western Atlantic. A full stock assessment was conducted for yellowfin tuna in 2008, applying both an age-structured model and a non-equilibrium production model to the available catch data through 2006.

An age-structured virtual population analysis (VPA) was conducted using fifteen indices of abundance. The VPA, using results from the base case runs, estimates that the levels of fishing mortality and spawning biomass in recent years have been very close to MSY levels. The estimate of MSY derived from these analyses was 130,600 t. This estimate may be below what was achieved in past decades because overall selectivity has shifted to smaller fish (**YFT-Figure 8**); the impact of this change in selectivity on estimates of MSY is clearly seen in the results from VPA (**YFT-Figure 9**). The estimate of relative fishing mortality ($F_{2006}/F_{MSY)}$ was 0.84, and for relative biomass (B_{2006}/B_{MSY}) was 1.09.

The stock was also assessed with a production model (ASPIC). Analyses were conducted using either nine separate indices or using a combined index created from all available abundance indices by fleet and gear, and weighting each index by the area covered by that fishery. The estimate of MSY derived using the basic case runs of ASPIC was 146,600 t. Although the estimate of MSY was somewhat higher than that from the age structured model, the stock status results are slightly more pessimistic. The estimate of relative fishing mortality ($F_{2006}/F_{MSY)}$ was 0.89, and for relative biomass (B_{2006}/B_{MSY}) was 0.83.

Trajectories of B/B_{MSY} and F/F_{MSY} from both age structured (VPA) and the production model (ASPIC) analyses are shown in **YFT-Figure 10**. The trend estimated from VPA indicates that overfishing ($F>F_{MSY}$) has occurred in recent years, but that the current status is neither overfished ($B<B_{MSY}$) nor is there over fishing. The more pessimistic ASPIC estimates indicate that there has been both overfishing and an overfished status in recent years, but that overfishing was not occurring in 2006. Bootstrapped estimates of the current status of yellowfin tuna based on each model, which reflect the variability of the point estimates given assumptions about uncertainty in the inputs, are shown in **YFT-Figure 11**. Examination of the distribution of these estimates from both models shows that about 40% indicate a sustainable situation, in which the stock is not overfished and overfishing is not occurring (**YFT-Figure 12)**.

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

YFT-4. Outlook

Projections were made considering a number of constant catch scenarios (see **YFT-Figure 13** for the results from the age-structured model). These indicate that catches of 130,000 t or less are sustainable during the projection interval, while catches in excess of 130,000 t can lead to overfishing. Maintaining current catch levels (110,000 t) is expected to lead to a biomass somewhat above B_{MSY}.

In terms of equilibrium conditions, the various assessment model results show that increasing fishing mortality in the long term by up to 10% (depending on the model) to reach F_{MSY} would only result in equilibrium yield gains of 1% to 4% (**YFT-Figure 14**) over the expected yields at current fishing mortality levels.

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

Yearly catches of small (less than 3.2 kg) yellowfin tuna in numbers have ranged around 60-75% of purse seine catches and about 40-80% of baitboat catches since 2000, occurring primarily in the equatorial fisheries. The generally declining trends in average weight may still be a cause for concern. Minimum size limits for yellowfin tuna have been shown to be ineffective by themselves, due to difficulties related to the multi-species nature of the fishery. Yield-per-recruit analyses, the results of which are strongly dependent upon the natural mortality vector assumed, have indicated that reductions in fishing mortality on fish less than 3.2 kg could result in gains in yield-per-recruit and modest gains in spawning biomass-per-recruit. The protection of juvenile tunas may therefore be important and alternative approaches to minimum size regulations to accomplish this should be studied. Evaluations have been conducted on the relative impact of effective effort restrictions on individual fisheries in terms of yield per recruit and spawning biomass per recruit and are presented in the Report of the 2009 Inter-sessional Meeting of the Tropical Tuna Species Group [SCRS/2009/011].

YFT-5. Effects of current regulations

Recommendation 04-01 implemented a small closure for the surface fishing in the area 0º-5ºN, 10ºW-20ºW during November in the Gulf of Guinea. Although this regulation is intended to reduce small bigeye catches, the Committee recognizes that its implementation and the change from the previous moratorium to the current regulation will potentially impact yellowfin catches. Given the relatively small time-area coverage of the closure, any reduction in juvenile mortality is expected to be minimal. This expectation is supported by analyses of purse seine catches which were presented to the Committee, confirming that the new closure has been less effective than previous moratoria in reducing the proportional catch of small fish harvest and avoiding growth overfishing, at least with respect to the catches of European and associated fleets. If management objectives include reductions in juvenile mortality, there is a general agreement that larger time/area moratoria are likely to be more precautionary than a smaller moratoria, providing that the moratoria are fully complied with. As requested by the Commission, the Committee analysed the closure contained in [Rec. 08-01] and alternative closures. The response to the Commission's request is provided in a separate section of this report.

In 1993, the Commission recommended "that there be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992". As measured by fishing mortality estimates from VPA, during the 2008 assessment, effective effort in 2006 appeared to be well below (about 25-30% below) the 1992 levels, and there has been a declining trend in recent years.

YFT-6. Management Recommendations

The status of yellowfin has shown some improvement between the 2003 and 2008 assessments, which is not surprising in that catches and fishing effort have generally declined and there have been small increases in catch rates observed for some longline fisheries over the past few years. Currently, stock biomass is estimated to be near the Convention Objective and recent fishing mortality rates somewhat below F_{MSY}. Continuation of current catch levels is expected to lead to a healthy biomass, somewhat above B_{MSY}, which should provide adequate safeguard against biomass falling below the Convention objective as long as fishing effort does not substantially increase. Effort increases on the order of about 10% above current levels (in order to achieve MSY) would be expected in the long run to increase yield by only about 1-4% over what could be achieved at current effective effort levels, but with substantially increased risk of biomass falling below the Convention objective. In addition, the Commission should be aware that increased harvest of yellowfin could have negative consequences for bigeye tuna in particular, and other species caught together with yellowfin in fishing operations taking more than one species. The Committee also continues to recommend that effective measures be found to reduce fishing mortality of small yellowfin, if the Commission wishes to increase long-term sustainable yield.

ATLANTIC YELLOWFIN TUNA SUMMARY

	~130,600 t [1] (124,100-136,500)
Maximum Sustainable Yield (MSY)	~146,600 t [2] (128,200-152,500)
2006 Yield [3]	108,160 t
Current Yield[3] (2008)	107,859 t
Replacement Yield (2006)	~ 130,000 t
Relative Biomass B_{2006}/ B_{MSY}[4]	0.96 (0.72-1.22)
Relative Fishing Mortality: $F_{current}/F_{MSY}$[4]	0.86 (0.71-1.05)
$F_{current}/F_{0.1}$[5]	1.26 (1.11-1.44)
$F_{current}/F_{20\%SPR}$[5]	0.81 (0.73-0.93)
$F_{current}/ F_{30\%SPR}$[5]	1.12 (1.01-1.29)
$F_{current}/F_{40\%SPR}$[5]	1.52 (1.35-1.73)

Management measures in effect:

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

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

[1] Estimates (with 80% confidence limits) based upon results of the age-structured model (VPA).
[2] Estimates (with 80% confidence limits) based upon results of the non-equilibrium production model (ASPIC).
[3] The assessment was conducted using the available catch data through 2006. Subsequent revisions have reduced reported catch levels slightly to 107,859 t.[4] Median (25th-75th percentiles) from joint distribution of age-structured and production model bootstrap outcomes considered.
[5] Result exclusively from VPA and yield-per-recruit analyses.

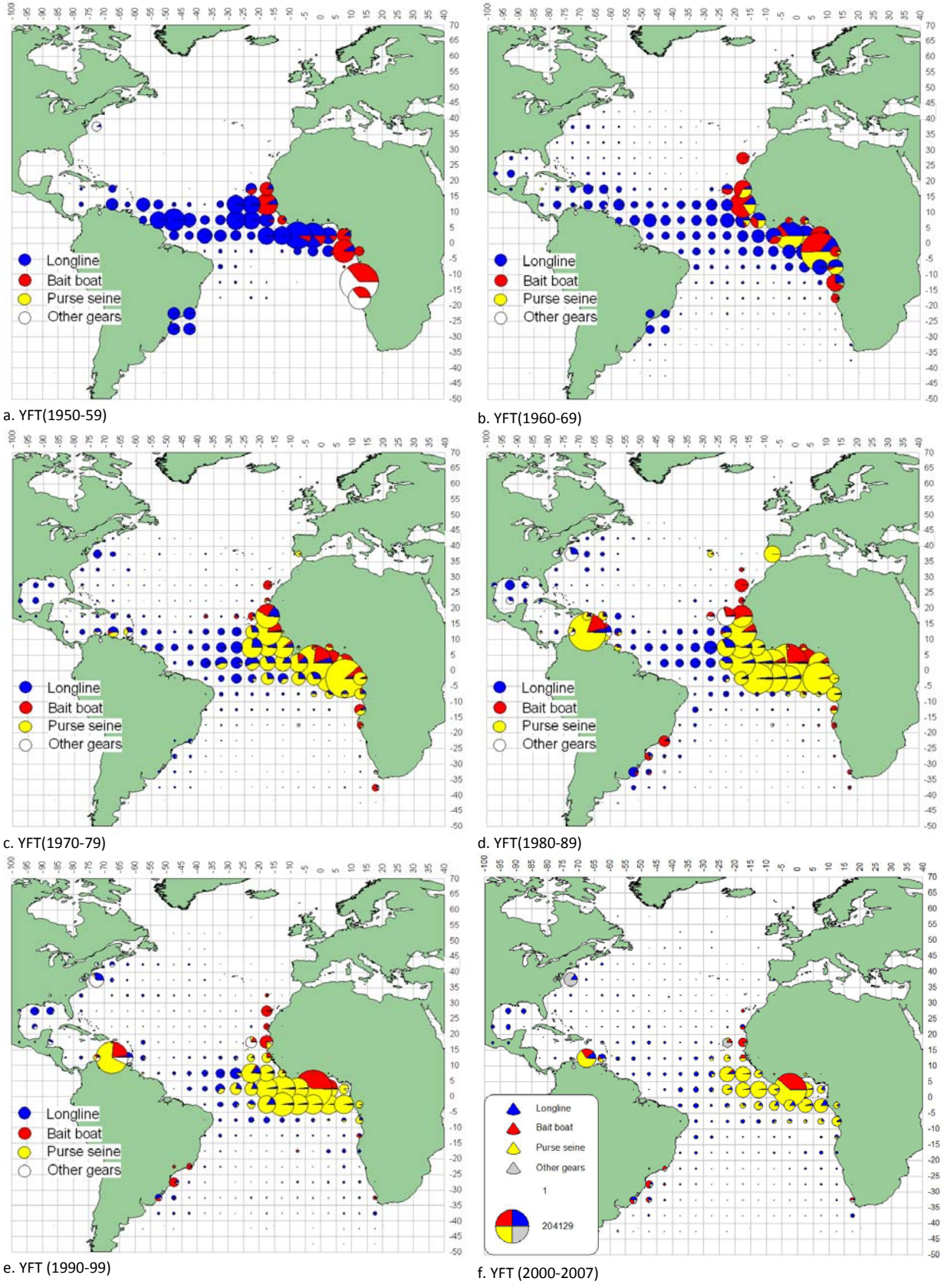
YFT-Table 1. Estimated Catches (t) of Yellowfin tuna (*Thunnus albacares*) by major area, gear and flag.

			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			114050	156619	146673	145361	136265	162247	193536	166901	163762	162753	172584	153251	153043	137218	148566	140366	136249	164650	140279	125590	119972	107234	107859	99619	107277
	ATE		76217	113803	108839	113379	101671	125345	160805	130004	126050	124009	124369	117977	119987	104877	117647	109656	101730	124363	110619	100608	88735	81166	79548	75717	90264
	ATW		37833	42815	37834	31982	34594	36902	32731	36897	37712	38745	48215	35274	33056	32341	30919	30710	34519	40287	29660	24982	31238	26068	28311	23902	17013
Landings	ATE	Bait boat	14694	16120	15301	16750	16020	12168	19648	17772	15095	18471	15652	13496	13804	12907	17330	19256	13267	19071	13432	11513	15354	12012	10434	8896	11639
		Longline	8146	9520	5779	6624	8956	7566	10253	9082	6518	8537	14638	13723	14236	10495	13872	13561	11369	7570	5790	9075	11442	7317	7180	13703	8441
		Other surf.	2407	1516	2296	2932	2646	2586	2175	3748	2450	2122	2030	1989	2065	2136	1674	1580	2424	2074	1826	2540	2928	3062	3615	2726	2203
		Purse seine	50970	86648	85464	87074	74049	103025	128729	99402	101987	94880	92050	88770	89882	79339	84771	75260	74670	95648	89572	77481	59011	58776	58319	50392	67980
	ATW	Bait boat	3698	5478	2421	5468	5822	4834	4718	5359	6276	6383	7094	5297	4560	4275	5511	5349	5649	5315	6009	3764	4868	3867	2695	2304	886
		Longline	8855	10193	18490	14291	19046	17128	18851	13667	16594	11439	11343	10059	11111	11554	11671	13326	15760	14872	11921	10166	16019	14449	14288	13292	12078
		Other surf.	2077	6150	7101	5557	3692	3293	2362	3457	3483	4842	10166	13580	6601	4801	4581	5345	5241	7027	3763	6445	7134	5118	6880	5959	1977
		Purse seine	23203	20994	9822	6665	6034	11647	6800	14414	11359	16081	19612	6338	10784	11710	9157	6523	7870	13072	7966	4607	3217	2634	4442	2341	2067
Discards	ATW	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	5	6	5
Landings	ATE	Angola	237	350	59	51	246	67	292	510	441	211	137	216	78	70	115	170	35	34	34	34	34	111	0	405	
		Belize	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	5	0	0	0	0	0	0	0	
		Benin	65	60	19	3	2	7	1	1	1	1	1	1	1	3	1	1	1	1	0	0	0	0	0	0	
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	
		Canada	0	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	2820	1901	3326	2675	2468	2870	2136	1932	1426	1536	1727	1781	1448	1721	1418	1663	1851	1684	1802	1868	3236	7154	8112	4057	7717
		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	139	156	200	124	84	71	1535	1652	586	262	1033	1030	1112	1017	1000	365
		Chinese Taipei	87	146	254	193	207	96	2244	2163	1554	1301	3851	2681	3985	2993	3643	3389	4014	2787	3363	4946	4145	2327	860	1702	931
		Congo	0	11	20	15	15	21	22	17	18	17	14	13	12	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	1467	1585	1332	1295	1694	703	798	658	653	541	238	212	257	269	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	673	213	99	302	565	175	482	216	626
		EC.España	40049	66874	61878	66093	50167	61649	68603	53464	49902	40403	40612	38278	34879	24550	31337	19947	24681	31105	31469	24884	21414	11795	11606	13584	24260
		EC.Estonia	0	0	0	0	0	0	0	234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.France	7946	12304	17756	17491	21323	30807	45684	34840	33964	36064	35468	29567	33819	29966	30739	31246	29789	32211	32753	32429	23949	22672	18940	11330	16115
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	
		EC.Latvia	0	0	0	0	0	0	0	255	54	16	0	55	151	223	97	25	36	72	334	334	334	334	334	0	
		EC.Lithuania	0	0	0	0	0	0	0	332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.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	
		EC.Portugal	1527	36	295	278	188	182	179	328	195	128	126	231	288	176	267	177	194	4	6	4	5	16	274	865	300
		Faroe 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	
		Gabon	0	0	0	0	0	0	0	0	0	12	88	218	225	225	295	225	162	270	245	44	44	44	44	0	
		Gambia	0	0	0	0	0	0	2	16	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Georgia	0	0	0	0	0	0	0	25	22	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	9039	12550	11821	10830	8555	7035	11988	9254	9331	13283	9984	9268	11720	15437	17657	25268	17662	33546	23674	18457	15054	17493	11931	15463	14250
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2906	6560	3461	3736
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
		Honduras	0	0	0	0	0	0	0	0	2	0	0	4	3	4	3	0	0	0	0	0	0	0	0	0	
		Japan	4344	5765	3634	4521	5808	5882	5887	4467	2961	2627	4194	4770	4246	2733	4092	2101	2286	1550	1534	1999	5066	3088	4206	8496	5727
		Korea Rep.	1917	1668	965	1221	1248	1480	324	259	174	169	436	453	297	101	23	94	142	3	8	209	984	95	4	573	983
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	73	73	0	0	0	0	
		Maroc	614	2270	2266	1529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	108	95	183	95	102	
		Mixed flags (FR+ES)	110	72	138	933	932	825	1056	2220	2455	2750	1898	1172	1166	981	1124	1369	1892	1427	599	992	1052	933	1063	655	626
		NEI (ETRO)	1104	0	0	2077	3140	5436	12601	4856	10921	9875	8544	8970	9567	6706	7225	5418	5448	10205	8209	5396	4294	1781	219	0	
		NEI (Flag related)	54	76	150	285	206	280	1115	2310	1315	1157	2524	2975	3588	3368	5464	5679	3072	2090	133	466	0	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	0	35	14	72	69	3	147	59	165	89	139	85	135	59	28	11
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	3183	6082	6110	3962	5441	4793	4035	6185	4161	0	1939	1368	7351
		Norway	0	0	813	418	493	1787	1790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	1653	3100	1944	1858	1239	901	1498	7976	8338	10973	12066	13442	7713	4293	2111	1315	1103	574	1022	0	1887	6170	8557	9363	6175
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	126	173	86	0	50	9	68	13	30	88	53
		Russian Federation	0	0	0	0	0	0	0	3200	1862	2160	1503	2936	2696	4275	4931	4359	737	0	0	0	0	4	42	211	
		S. Tomé e Príncipe	177	180	180	178	298	299	164	187	170	181	125	135	120	109	124	114	122	122	122	122	134	145	137	0	
		Senegal	0	0	0	0	0	2	90	132	40	19	6	20	41	208	251	834	252	295	447	279	681	1301	1262	819	588
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	11	0	0	0	0	0	
		South Africa	759	382	55	68	137	671	624	52	69	266	486	183	157	116	240	320	191	342	152	298	402	1156	1187	1063	351
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	14	0	101	209	
		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.	2168	3768	1851	1275	3207	4246	3615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	80	72	82	93	98	100	92	100	166	171	150	181	151	109	181	116	136	72	9	0	0	0	344	177	97
		Ukraine	0	0	0	0	0	0	0	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	145	483	
		Venezuela	0	634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

ATW	Argentina	0	44	23	18	66	33	23	34	1	0	0	0	0	0	0	0	0	0	0	0	327	327	0	0		
	Barbados	90	57	39	57	236	62	89	108	179	161	156	255	160	149	150	155	155	142	115	178	211	292	197	154	156	
	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	143	1164	1160	
	Brasil	2149	2947	1837	2266	2512	2533	1758	1838	4228	5131	4169	4021	2767	2705	2514	4127	6145	6239	6172	3503	6985	7223	3790	5468	2749	
	Canada	0	0	2	40	30	7	7	29	25	71	52	174	155	100	57	22	105	125	70	73	304	240	293	276	168	
	China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	628	655	22	470	435	17	275	74	68	124	284	
	Chinese Taipei	559	780	1156	709	1641	762	5221	2009	2974	2895	2809	2017	2668	1473	1685	1022	1647	2018	1296	1540	1679	1269	400	245	191	
	Colombia	0	180	211	258	206	136	237	92	95	2404	3418	7172	238	46	46	46	46	46	46	46	46	46	46	0		
	Cuba	2538	1906	2081	1062	98	91	53	18	11	1	14	54	40	40	15	15	0	0	65	65	65	65	65	0		
	Dominica	0	0	0	0	0	0	18	12	23	30	31	9	0	0	0	80	78	120	169	119	81	119	65	103	124	
	Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	220	226	226	226	226	226	226	226	0		
	EC.España	3976	1000	0	0	1	3	2	1462	1314	989	7	4	36	34	46	30	171	0	0	0	0	0	1	84	0	
	EC.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		
	EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	60	88	179	
	Grenada	146	170	506	186	215	235	530	620	595	858	385	410	523	302	484	430	403	759	593	749	460	492	502	633	756	
	Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0		
	Japan	1030	2169	2103	1647	2395	3178	1734	1698	1591	469	589	457	1004	806	1081	1304	1775	1141	571	755	1194	1159	437	541	1097	
	Korea Rep.	989	1655	853	236	120	1055	484	1	45	11	0	0	84	156	0	0	0	0	0	0	0	580	279	0	10	
	Mexico	1059	562	658	33	283	345	112	433	742	855	1093	1126	771	826	788	1283	1390	1084	1133	1313	1208	1050	938	890	956	
	NEI (Flag related)	352	450	806	1012	2118	2500	2985	2008	2521	1514	1880	1227	2374	2732	2875	1730	2197	793	42	112	0	0	0	0		
	Netherlands Antilles	173	150	150	160	170	170	170	150	160	170	155	140	130	130	130	130	130	0	0	0	0	0	0	0		
	Panama	246	0	5278	3289	2192	1595	2651	2249	2297	0	0	0	0	0	0	5	0	0	0	0	0	0	2804	227	76	
	Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	106	78	12	79	145	299	230	234	151	167	
	Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0		
	St. Vincent and Grenadines	0	0	0	0	0	1	40	48	22	65	16	43	37	35	48	38	1989	1365	1160	568	4251	0	2680	2989	2547	
	Sta. Lucia	56	79	125	76	97	70	58	49	58	92	130	144	110	110	276	123	134	145	94	139	147	172	103	82	106	
	Trinidad and Tobago	31	0	0	0	1	11	304	543	4	4	120	79	183	223	213	163	112	122	125	186	224	295	459	615	520	
	U.S.A.	2180	9735	9938	9661	11064	8462	5666	6914	6938	6283	8298	8131	7745	7674	5621	7567	7051	6703	5710	7695	6516	5568	7091	5529	2407	
	UK.Bermuda	11	42	44	25	23	22	15	17	42	58	44	44	67	55	53	59	31	37	48	47	82	61	31	30	15	
	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	1	0	0	
	UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	Uruguay	368	354	270	109	177	64	18	62	74	20	59	53	171	53	88	45	45	90	91	95	204	644	218	35	66	
	Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	681	689	661	555		
	Venezuela	21879	20535	11755	11137	10949	15567	10556	16503	13773	16663	24789	9714	13772	14671	13995	11187	10558	18651	11421	7411	5774	5097	6514	3911	3272	
Discards	ATW Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	5	
	U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	0	0	0	0	0	0	0		

Notes

Task-I catches (new figures) not included in the table: Vanuatu 2008 ATE (450 t) and ATW (873 t)



a. YFT(1950-59)

b. YFT(1960-69)

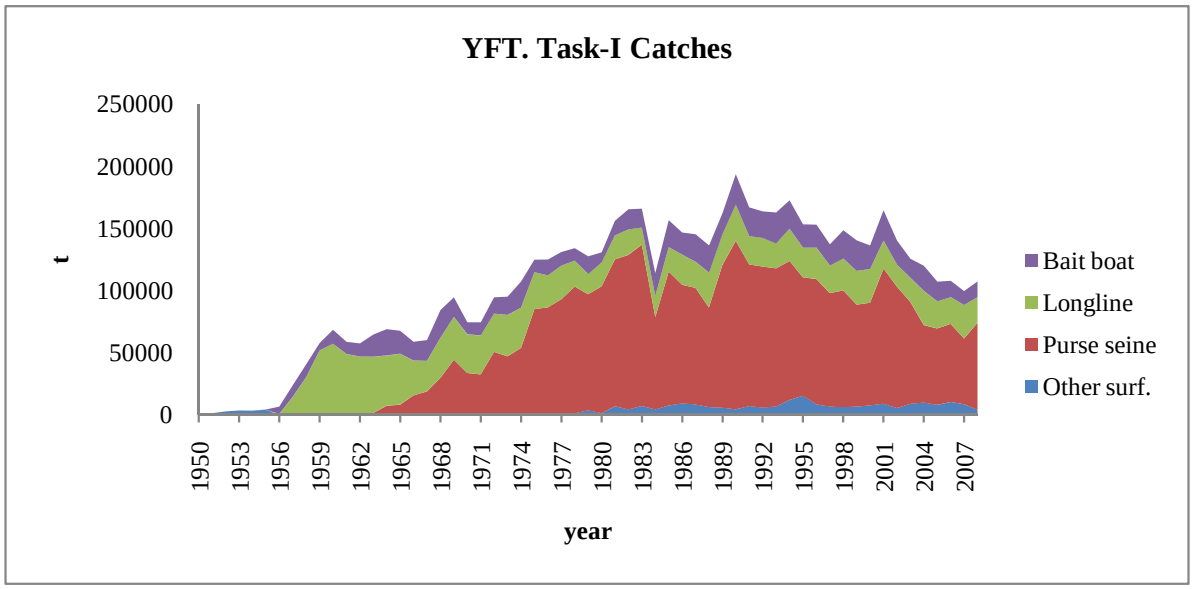
c. YFT(1970-79)

d. YFT(1980-89)

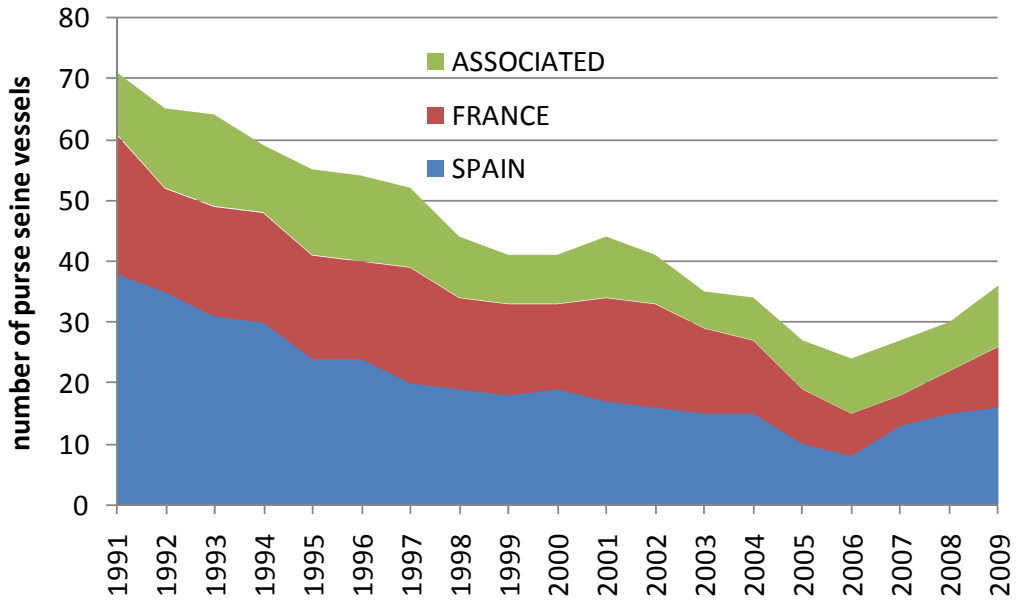
e. YFT (1990-99)

f. YFT (2000-2007)

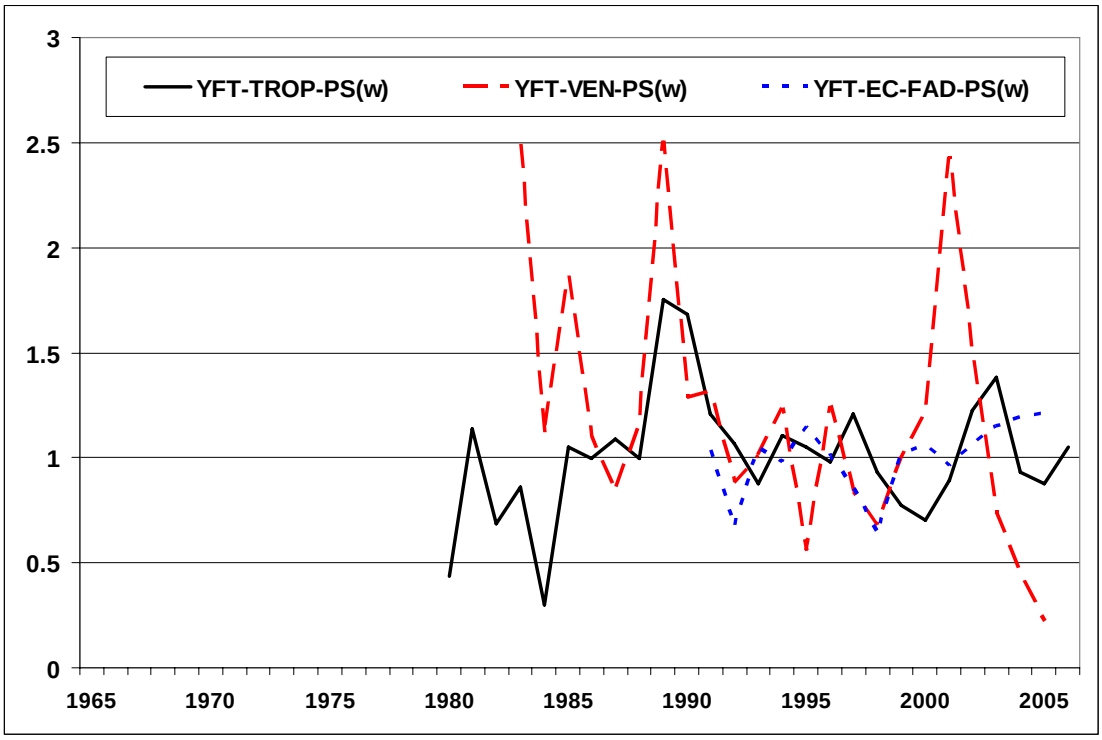
YFT-Figure 1 [a-f]. Geographical distribution of yellowfin catch by major gears and decade.



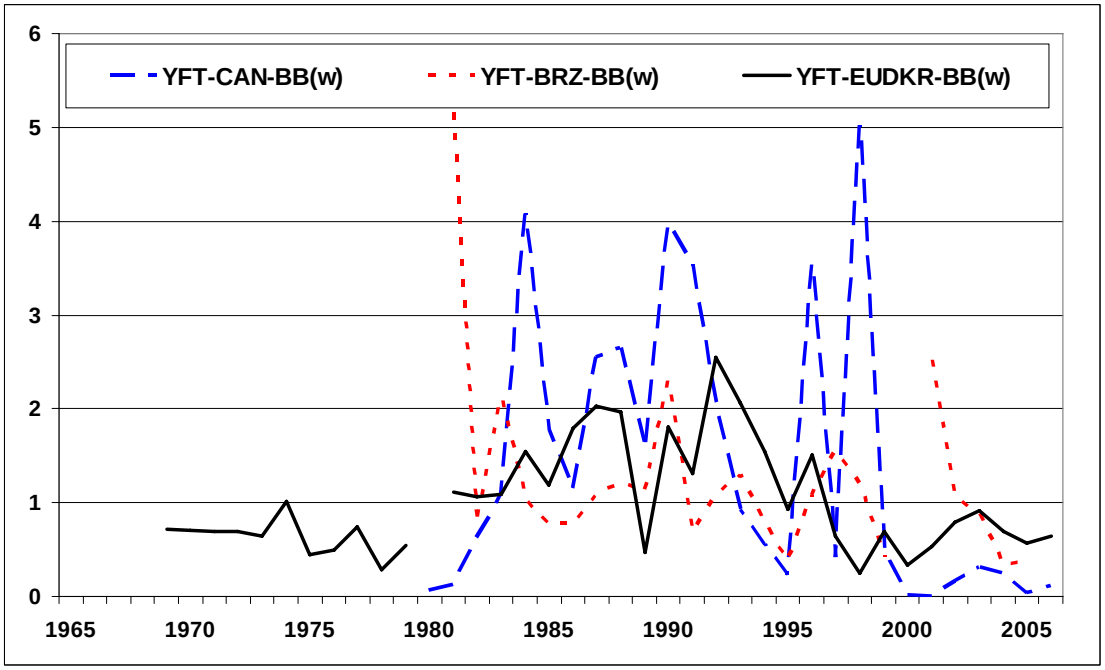
YFT-Figure 2. Estimated annual catch (t) of Atlantic yellowfin tuna by fishing gear, 1950-2007.



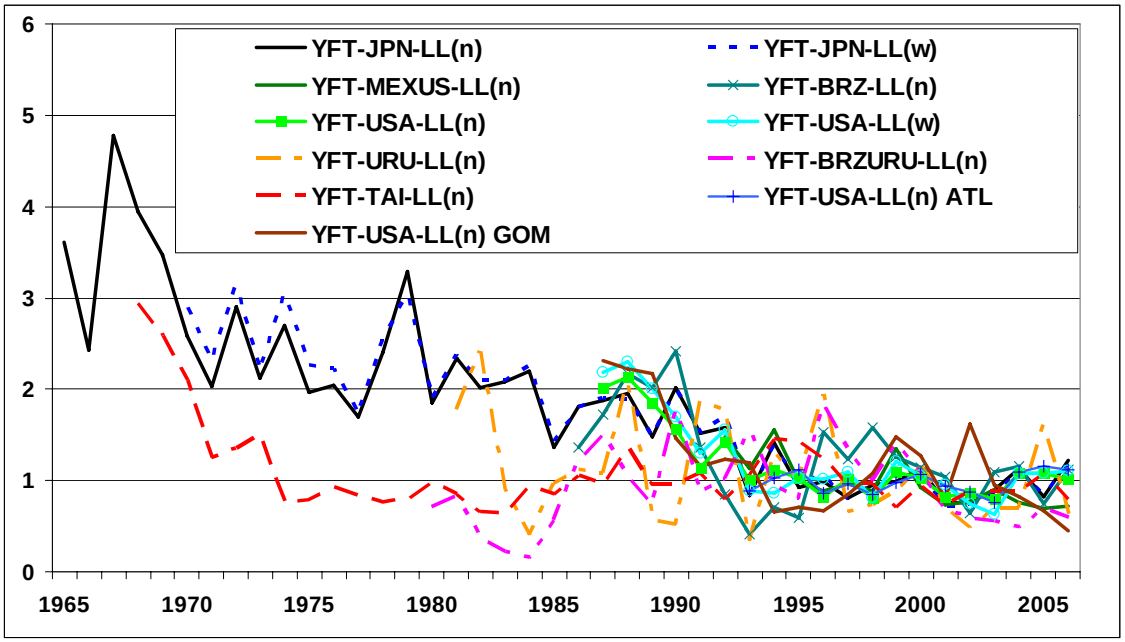
YFT-Figure 3. Trend in number of purse seine vessels from European and associated fleets operating in the eastern Atlantic during 1991-2009.



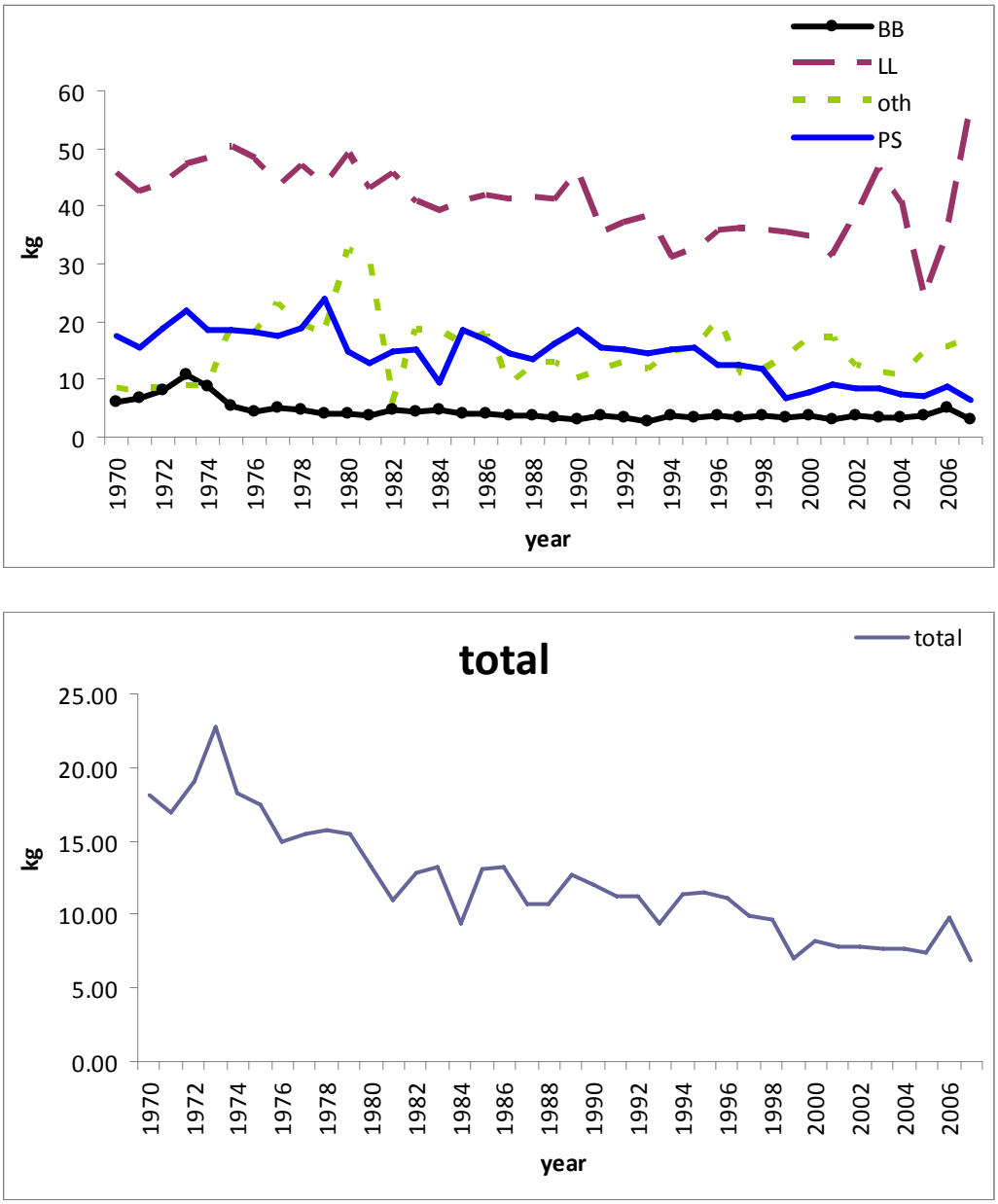
YFT-Figure 4. Yellowfin nominal catch rate trends from purse seine fleets, in weight. The Venezuelan trend (YFT-VEN-PS) reflects catches from the western Atlantic; the remaining two series YFT-TROP-PS (EU tropical) and YFT-EC-FAD-PS (EU tropical FAD sets) reflect catches in the eastern Atlantic.



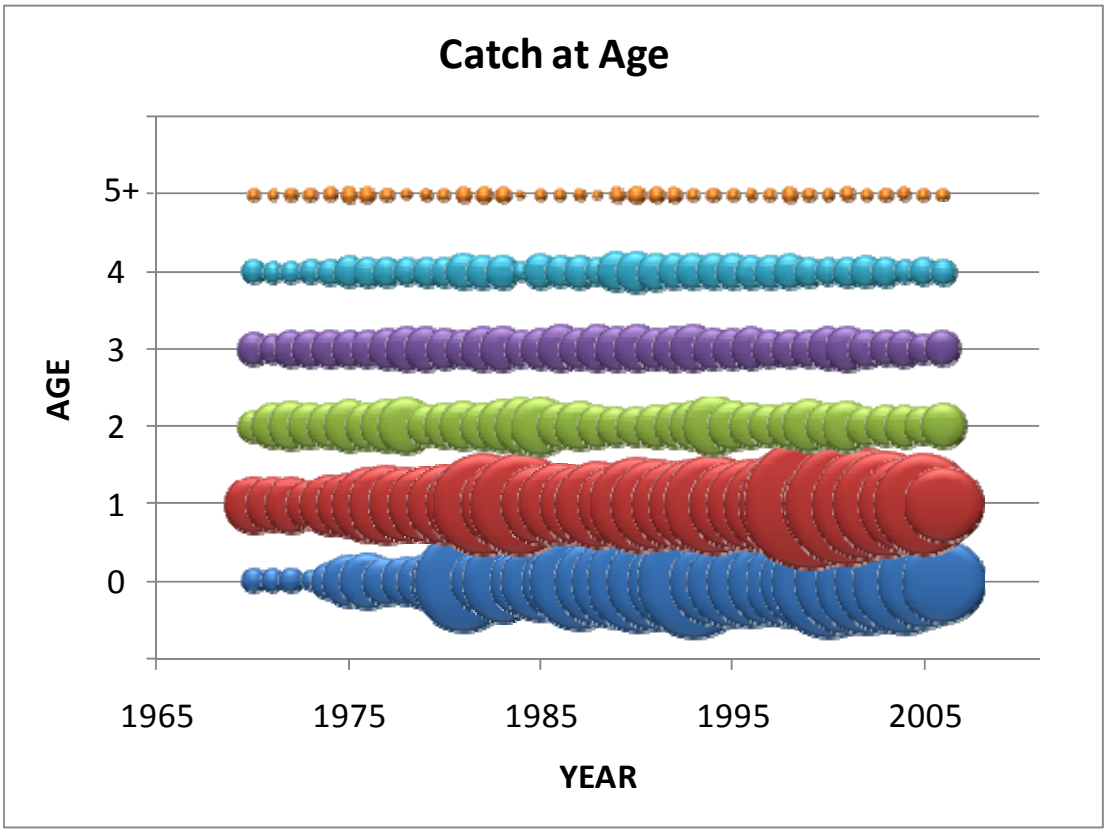
YFT-Figure 5. Yellowfin standardized catch rate trends from baitboat fleets, in weight. The Brazilian trend (YFT-BRZ-BB) reflects catches from the western Atlantic; the remaining two series YFT-CAN-BB (Canary Islands) and YFT-EUDKR-BB (EU Dakar based) reflect catches in the eastern Atlantic.



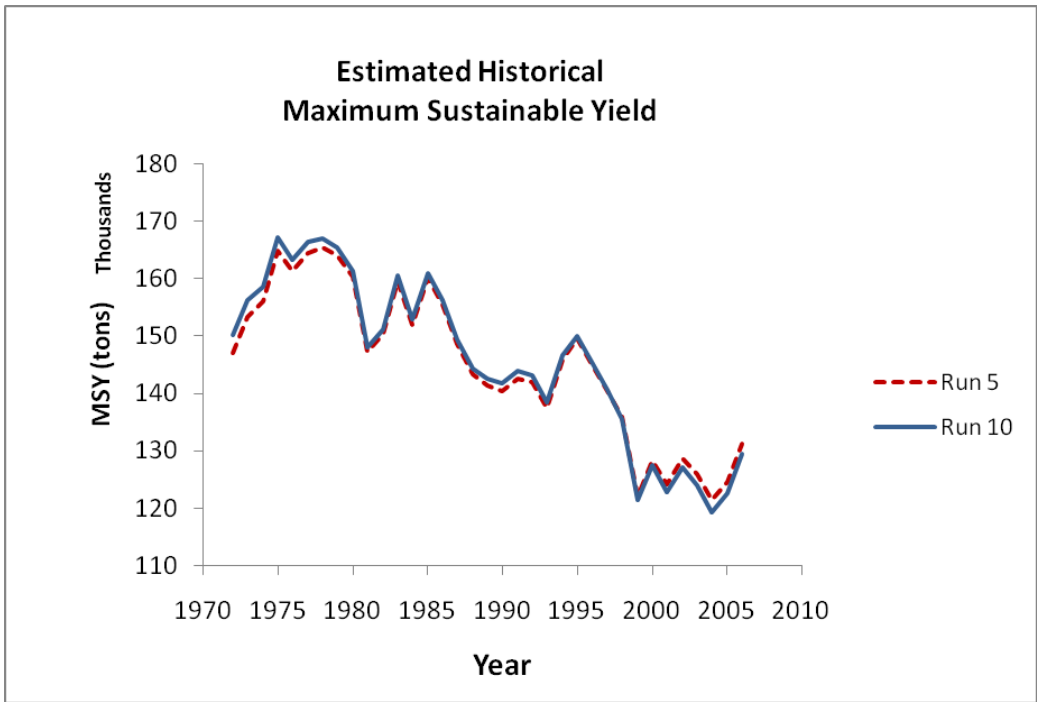
YFT-Figure 6. Yellowfin standardized catch rate trends from longline fleets, in weight and numbers. The Japanese (YFT-JPN-LL) and Chinese Taipei (YFT-TAI-LL) trends reflect catches from throughout the Atlantic; the remaining series reflect catches in the western Atlantic. Series are identified using abbreviations for the flags; indices developed jointly include a Mexico-USA series (MEXUS) and a Brazil-Uruguay series (BRZURU).



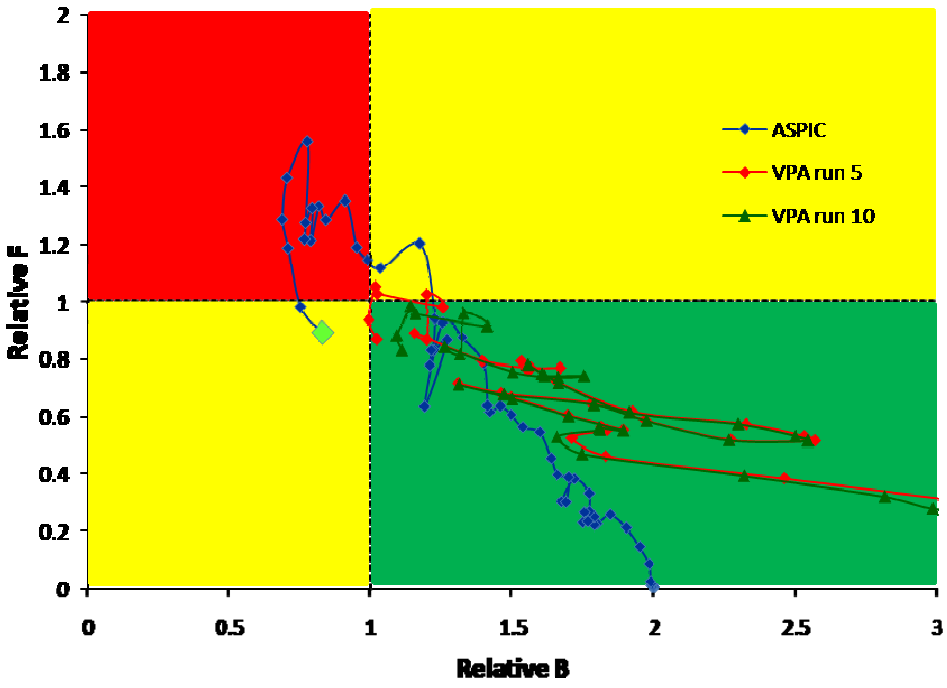
YFT-Figure 7. Trend in yellowfin tuna average weight by gear group (top) and total (bottom) calculated from available catch-at-size data. Purse seine averages are calculated across all set types (floating object and free school).



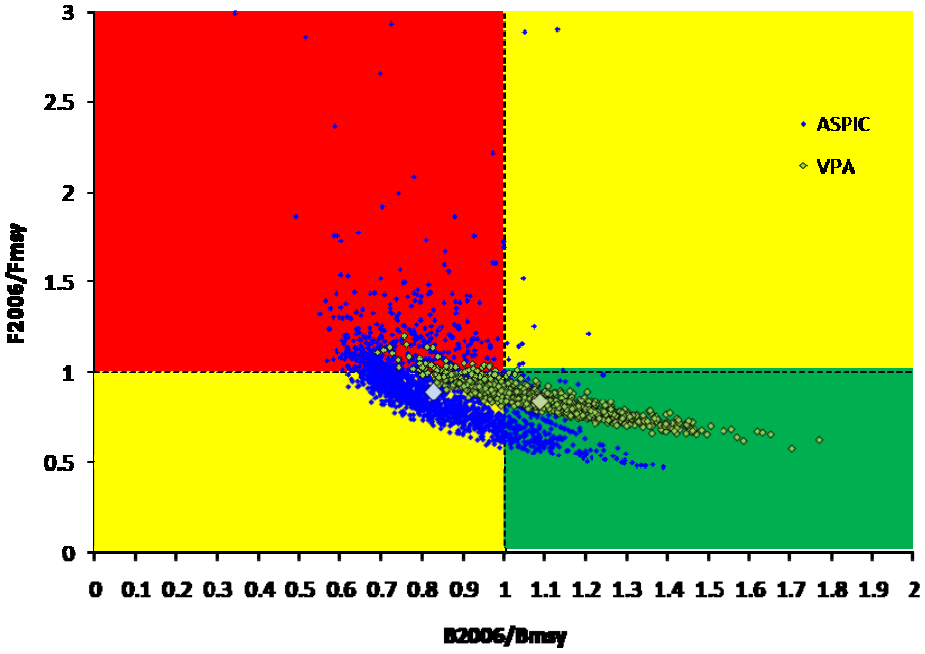
YFT-Figure 8. Relative distribution of Atlantic yellowfin catches by age (0-5+) and year (bubble size is proportional to total catches), in number.



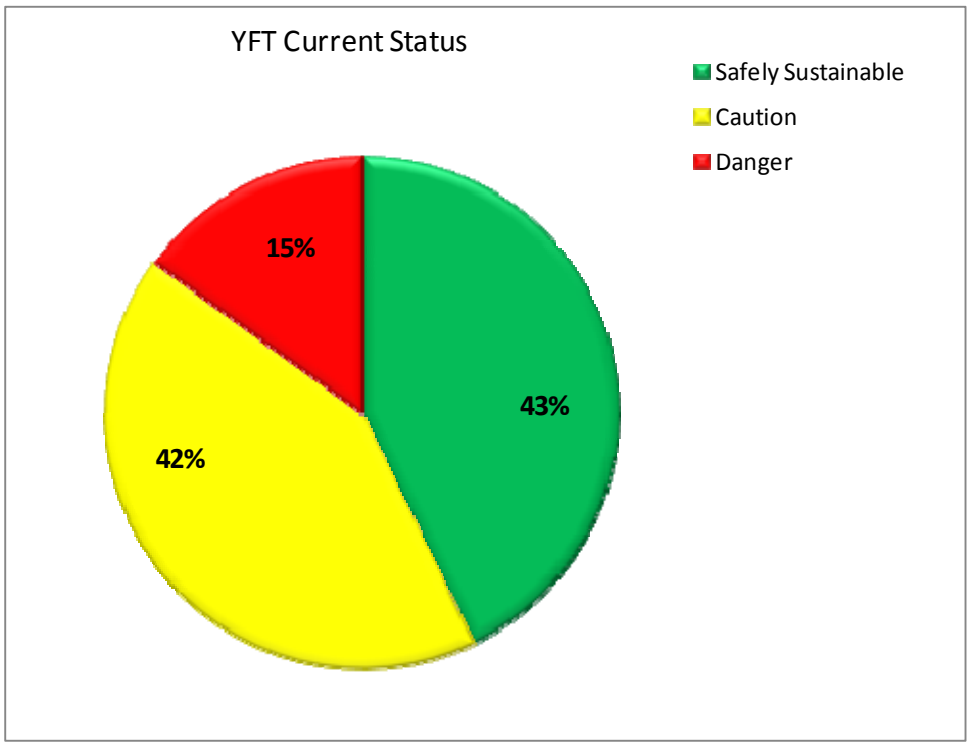
YFT-Figure 9. Estimates of historical MSY values for Atlantic yellowfin obtained through the age-structured model analysis, which considers the changes in selectivity that have occurred.



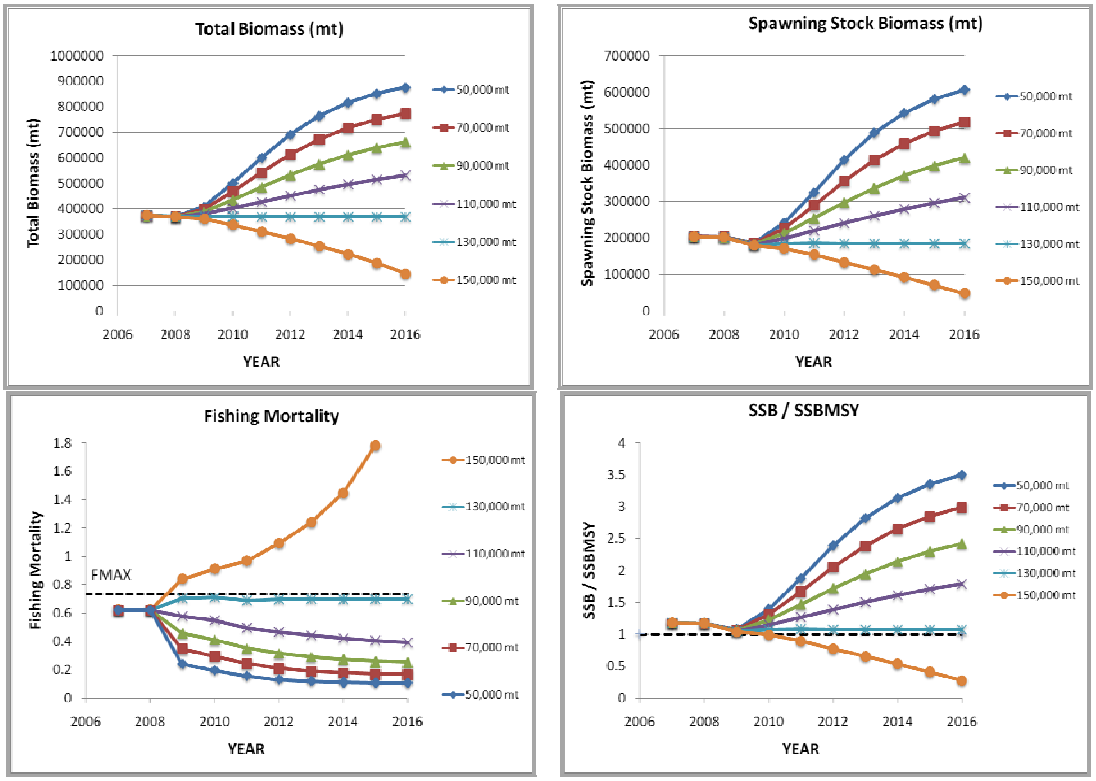
YFT-Figure 10. Stock status trajectories of B/B_{MSY} and F/F_{MSY} from age structured (VPA runs 5 and 10) and production model (ASPIC) analyses. VPA runs 5 and 10 estimate selectivity vectors for each abundance index using fleet-specific catch-at-age, differing only in that Run 5 estimates steeply dome-shaped selectivity patterns for longline and EU tropical PS indices and Run 10 fixes these as flat-topped patterns. The age structured analysis started in 1970 and the production model in 1950. Current status is indicated by the large point at the end of each time-series.



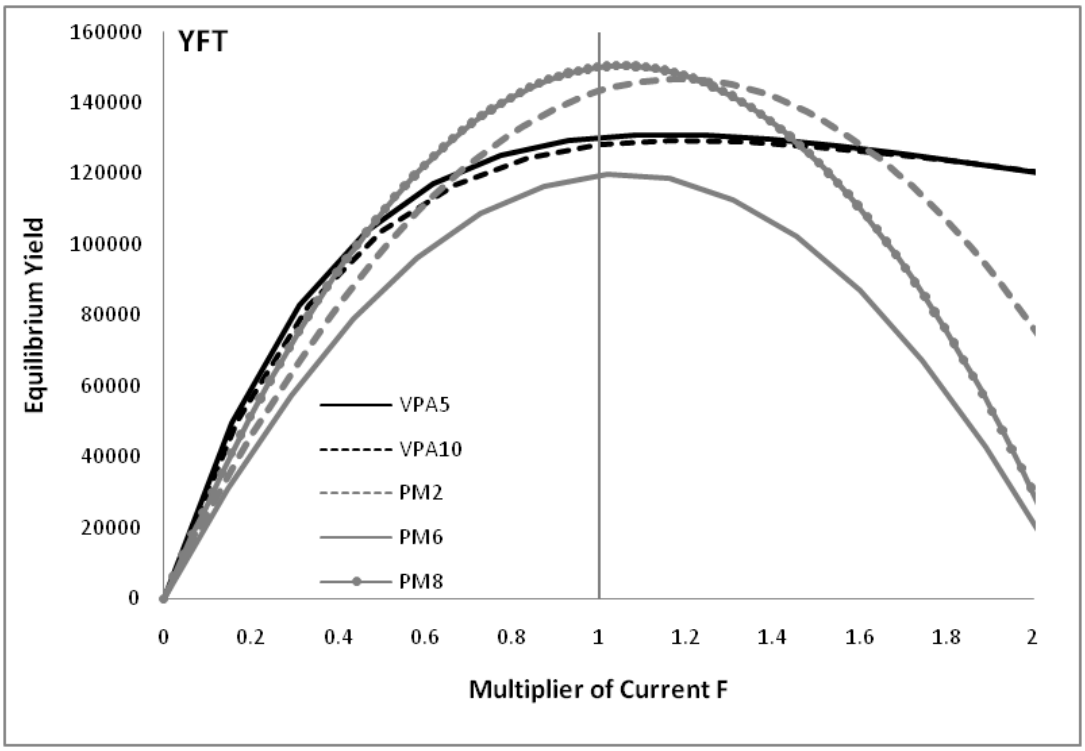
YFT-Figure 11. Current status of yellowfin tuna based on age structured and production models. The median point estimate for each model is shown as a large diamond and the clouds of symbols depict the bootstrap estimates of uncertainty for the most recent year.



YFT-Figure 12. Summary of current status estimates for the yellowfin tuna stock based on age structured and production models making use of the catch and effort data through 2006.



YFT-Figure 13. Constant catch projection results using the results of age-structured (VPA) analyses.



YFT-Figure 14. Relationship between equilibrium yield (t) and fishing mortality estimated from various models (VPA refer to age-structured models and PM refers to surplus production models). The X-axis has been scaled for each model such that a value of 1.0 represents that model's estimate of current (2006) fishing mortality.

8.2 BET- BIGEYE TUNA

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

BET-1. Biology

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

In 2009, there were no documents that directly dealt with bigeye tuna, but a recent study concerning bigeye discards and by-catch ("*faux poisson*") provided new information for European and associated purse seine fleets. **SKJ-Figure 4** shows the estimated catches of tropical tunas landed in Abidjan (Côte d'Ivoire) as "*faux poisson*".

A paper was presented that analyzed the trend of fishing effort and catches of bigeye, yellowfin and skipjack by European and associated purse seine fleets during 1994 to 2008. The total nominal fishing effort and bigeye catch of this fleet has declined until 2006, but increased in 2007 and 2008. The percentage (in number of fish) of small bigeye (<53cm. FL) in the total bigeye purse seine catch declined in 1998 and 1999, and remained relatively stable thereafter. In 2007 that percentage was nearly 80%.

BET-2. Fisheries indicators

The stock has been exploited by three major gears (longline, baitboat and purse seine fisheries) and by many countries throughout its range of distribution **(BET-Figure 1)**. The size of fish caught varies among fisheries: medium to large for the longline fishery, small to large for the directed baitboat fishery, and small for other baitboat and for purse seine fisheries. Average weights are 45-50 kg, 20-30 kg and 3-4 kg for these three types of fisheries **(BET-Figure 2)**, respectively. There is a declining trend in overall mean weight since 1990 and the most recent value was slightly less than 8 kg.

The total annual catch **(BET-Figure 3)** increased up to the mid-1970s reaching 60,000 t and fluctuated over the next 15 years. In 1991, catch surpassed 95,000 t and continued to increase, reaching a historic high of about 132,000 t in 1994. Reported and estimated catch has been declining since then and fell below 100,000 t in 2001, and reached 65,873 t in 2006, which is the lowest recorded level since 1988. The total catch increased in 2007 reaching 79,597 t. The preliminary estimate for 2008 was 69,821 t.

After the historic high catch in 1994, all major fisheries exhibited a decline of catch while the relative share by each fishery in total catch remained relatively constant. These reductions in catch are related to declines in fishing fleet size (purse seine and longline) as well as decline in CPUE (longline and baitboat). However, in 2007 and 2008 an increase in the number of tropical purse seiners has been observed and this tendency continued in 2009.

The major baitboat fisheries are located in Ghana, Senegal, the Canary Islands, Madeira and the Azores. The tropical purse seine fleets operate in the Gulf of Guinea and off Senegal in the East Atlantic and off Venezuela in the West Atlantic. In the eastern Atlantic, these fleets are comprised of vessels flying flags of Ghana, EC-France, EC-Spain and others which are mostly managed by EC companies. In the western Atlantic the Venezuelan fleet dominates the purse-seine catch of bigeye. While bigeye tuna is now a primary target species for most of the longline and some baitboat fisheries, this species has always been of secondary importance for the other surface fisheries. Unlike yellowfin, bigeye tuna are mostly caught while fishing on floating objects such as logs or man-made fish aggregating devices (FADs). There are two major longline fisheries, operated by Japan and Chinese Taipei, whose combined catch accounted for 38% of the total catch in weight in 2007. While Chinese Taipei's catch remained relatively stable since the mid-1990s (averaging about 18,000 t per year), Japan's catch declined after a high of 1994 catch of 38,500 t to the lowest amount (14,026 t) in 2005 since 1979. Catches recovered after 2006. China and the Philippines joined this fishery in 1993 and 1998, respectively, and currently account for about 8,000-10,000 t per year in combination.

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

BET-3. State of the stock

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

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

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

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

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

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

BET-4. Outlook

Stock projections were conducted, assuming a catch of 71,000 t in 2006 (this was the best preliminary estimate at the time of the assessment. The reported catch for 2008 is preliminary and incomplete and likely over 70,000 t if unreported catches continued at about the level of 2007) and varying levels of the constant catch thereafter. It should be noted that the *Recommendation by ICCAT on a Multi/Year Conservation and Management Program for Bigeye Tuna* [Rec. 04-01] potentially allows for substantially more catch as compared to the assumed 2006 catch level or the estimated MSY. The projection results suggest that the biomass of the stock would possibly decline further with constant catches of 90,000 t or more. Some increase in biomass, leading to the rebuilding of the $B_{MSY,}$ is expected with catches which amount to less than 85,000 t **(BET-Figure 8)**.

BET-5. Effects of current regulations

Recommendation by ICCAT on a multi-year conservation and management program for bigeye tuna [Rec. 04-01] sets a number of regulations for 2005-2008 including an overall TAC for major countries set at 90,000 t as well as a specific limit for the number of vessels for several countries. The overall catch in 2007 (79,597 t) and the estimated catch for 2008 (69,821 t) are well below the TAC.

Recommendation 04-01 also implemented a new, smaller closure for the surface fishing in the area 0º-5ºN, 10ºW-20ºW during November in the Gulf of Guinea. The Committee examined the percentages of the small bigeye based on the catch-at-size information created at the time of 2007 assessment. Based on that information, the percentage of small bigeye is at about 70% in number of fish and there is a general increasing trend (**BET-Figure 9**). Considering that the new closed area is much smaller in time and area than the previous moratorium time/area, and is located in an area which historically has lower effort anyway, this regulation is likely to be less effective in reducing the overall catches of small bigeye by the surface fishery. This expectation is supported by analyses of purse seine catches which were presented to the Committee, confirming that the new closure has been less effective than previous moratoria in reducing the proportional catch of small bigeye, at least with respect to the catches of European and associated fleets. If the management objectives include a decrease in juvenile mortality, a broader time area moratoria would probably be more precautionary than a smaller moratoria, provided the moratoria is fully complied with. As requested by the Commission, the Committee analysed the closure contained in [Rec. 08-01] and alternative closures. The response to the Commission's request is provided in a separate section of this report.

BET-6. Management recommendations

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

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

ATLANTIC BIGEYE TUNA SUMMARY	
Maximum Sustainable Yield	90,000 t-93,000 t [1] (68,000- 99,000) [2]
2006 Yield	65,873 t
Current (2008) Yield[3]	69,821 t
Replacement Yield (2006)	Slightly below MSY[1]
Relative Biomass (B_{2006}/B_{MSY})	0.92[1] (0.85-1.07)[2]
Relative Fishing Mortality	
F_{MSY}	0.20[1] (0.07-0.33) [2]
F_{2005}/F_{MSY}	0.87[1] (0.70-1.24) [2]
Conservation & management measures in effect:	[Rec. 04-01] replaced [Rec. 79-01 and Rec. 99-01] after June, 2005. Rec. [08-01] extended [04-01] through 2009 − Total allowable catch for 2005-2009 is set at 90,000 t for major country and entity. − Limits on numbers of fishing vessels less than the average of 1991 and 1992. − Specific limits of number of longline boats; China (45), Chinese Taipei (98), Philippines (8). − Specific limits of number of purse seine boats for Panama (3). − No purse seine and baitboat fishing during November in the area encompassed by 0º-5ºN and 10º W- 20ºW.

[1] Base Case production model (Logistic) results based on catch data 1950-2005.
[2] 80% confidence limits.
[3] Reports for 2008 should be considered provisional.

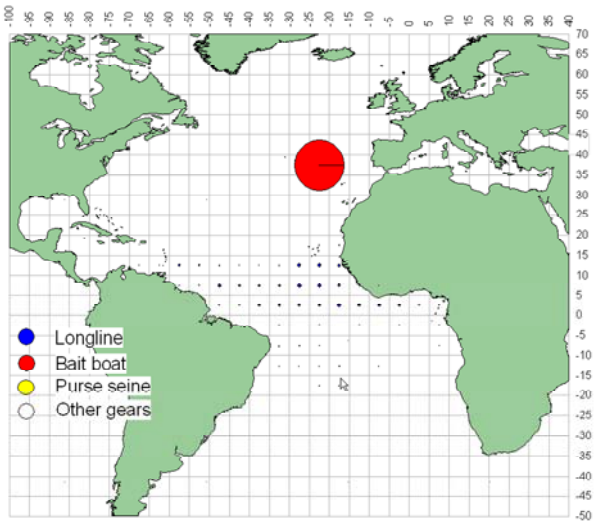
BET-Table 1. Estimated Catches (t) of Bigeye tuna (*Thunnus obesus*) by major area, gear and flag.

		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL ATL		71092	78241	65447	57141	66148	78376	84901	96074	99374	112572	133630	126778	121689	109289	110443	128305	103651	94291	77177	91955	86940	72353	65873	79597	69821
	Bait boat	11439	17651	15618	13458	9710	12672	18280	17750	16248	16467	20290	25552	19059	21037	21381	25868	12634	15842	8367	13437	18879	15092	14671	15377	12366
	Longline	43303	52595	39942	35570	47766	58389	56537	61556	62403	62871	79004	74877	74930	68310	71856	76527	71193	55265	46438	54466	48396	38035	34182	46232	41704
	Other surf.	247	415	550	626	474	644	293	437	607	652	980	567	357	536	434	1377	1226	1628	1479	1321	1248	630	562	435	215
	Purse seine	16103	7580	9336	7487	8198	6671	9791	16331	20116	32582	33355	25782	27343	19406	16771	24533	18599	21556	20894	22731	18417	18595	16457	17553	15536
Discards	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	
	Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	476	75	0	0	
	Argentina	0	100	41	72	50	17	78	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	24	17	18	18	6	11	16	19	27	18	14	14
	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	60	70
	Benin	0	0	15	6	7	8	10	10	7	8	9	9	9	30	13	11	0	0	0	0	0	0	0	0	
	Brasil	656	419	873	756	946	512	591	350	790	1256	601	1935	1707	1237	644	2024	2768	2659	2582	2455	1496	1081	1479	1593	958
	Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	
	Canada	0	0	11	144	95	31	10	26	67	124	111	148	144	166	120	263	327	241	279	182	143	187	196	144	130
	Cape Verde	167	112	86	60	117	100	52	151	105	85	209	66	116	10	1	1	2	0	1	1	1	1092	1437	1147	1068
	China P.R.	0	0	0	0	0	0	0	0	0	70	428	476	520	427	1503	7347	6564	7210	5840	7890	6555	6200	7200	7399	5686
	Chinese Taipei	925	1220	1125	1488	1469	940	5755	13850	11546	13426	19680	18023	21850	19242	16314	16837	16795	16429	18483	21563	17717	11984	2965	12116	10418
	Congo	0	8	19	10	10	14	15	12	12	14	9	9	8	0	0	0	0	0	0	0	0	0	0	0	
	Cuba	447	239	171	190	151	87	62	34	56	36	7	7	5	0	0	0	0	0	16	16	0	0	0	0	
	Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	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	5	0	0	0	0	0	0	
	EC.España	13617	10340	10884	9702	8475	8263	10355	14705	14656	16782	22096	17849	15393	12513	7115	13739	11250	10134	10524	10969	8251	7618	7464	6608	7229
	EC.France	4254	4615	4266	3905	4161	3261	5023	5581	6888	12719	12263	8363	9171	5980	5624	5529	5949	4948	4293	3940	2926	2816	2984	1629	1130
	EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	33	0	0	
	EC.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	
	EC.Portugal	4354	6457	7428	5036	2818	5295	6233	5718	5796	5616	3099	9662	5810	5437	6334	3314	1498	1605	2590	1655	3204	4146	5071	5505	3422
	EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	
	FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	28	6	0	2	3
	Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	8	0	0	0	0	0	0	0	
	Gabon	0	0	0	0	0	0	0	0	0	1	87	10	0	0	0	184	150	121	0	0	0	0	0	0	
	Ghana	2162	1887	1720	1178	1214	2158	5031	4090	2866	3577	4738	5517	5805	9829	13370	17764	5910	12042	7106	13557	14901	13917	9141	13267	9269
	Grenada	0	0	0	0	0	0	0	65	25	20	10	10	0	1	0	0	0	0	0	0	0	0	0	10	31
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1003	923	836	998
	Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	
	Honduras	0	0	0	0	0	0	0	0	44	0	0	61	28	59	20	0	0	0	0	0	0	0	0	0	
	Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
	Japan	24870	32103	23081	18961	32064	39540	35231	30356	34722	35053	38503	35477	33171	26490	24330	21833	24605	18087	15306	19572	18509	14026	15735	17993	17704
	Japan (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Korea Rep.	8989	10704	6084	4438	4919	7896	2690	802	866	377	386	423	1250	796	163	124	43	1	87	143	629	770	2067	2136	2599
	Liberia	0	0	0	0	0	206	16	13	42	65	53	57	57	57	57	57	57	57	57	57	0	0	0	0	
	Libya	0	0	0	0	0	0	0	0	508	1085	500	400	400	400	400	400	400	31	593	593	0	0	4	0	
	Maroc	120	30	0	8	0	0	0	0	0	0	0	0	0	0	0	700	770	857	913	889	929	519	887	700	802
	Mexico	0	0	0	0	0	0	0	0	0	1	4	0	2	6	8	6	2	2	7	4	5	4	3	3	1

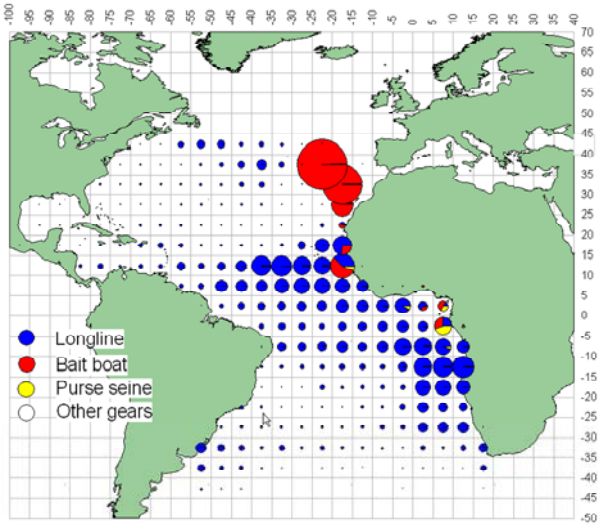
	Mixed flags (FR+ES)	40	26	50	339	339	300	384	807	893	1000	690	426	424	357	409	498	688	519	218	361	383	339	386	238	228
	NEI (ETRO)	157	0	0	85	20	93	959	1221	2138	4594	5034	5137	5839	2746	1685	4011	2285	3027	2248	2504	1387	294	81	0	
	NEI (Flag related)	369	354	758	1406	2155	4650	5856	8982	6151	4378	8964	10697	11862	16569	24896	24060	15092	8470	531	0	0	0	0	0	
	NEI (UK.OT)	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Namibia	0	0	0	0	0	0	0	0	0	0	715	29	7	46	16	423	589	640	274	215	177	307	283	41	146
	Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	1893	2890	2919	3428	2359	2803	1879	2758	3343	0	416	252	1721
	Norway	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Panama	3165	4461	5173	5616	3847	3157	5258	7446	9991	10138	13234	9927	4777	2098	1252	580	952	89	63	0	1521	2310	2415	2922	2263
	Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1154	2113	975	377	837	855	1854	1743	1816	2368	1874
	Puerto Rico	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	13	38	4	8	91	0	0	0	0	1	1	26	
	S. Tomé e Príncipe	0	0	0	0	5	8	6	3	4	4	3	6	4	5	6	5	4	4	4	4	11	6	4	0	
	Senegal	0	0	0	0	0	0	0	15	5	9	126	237	138	258	730	1473	1131	1308	565	474	561	721	1267	805	926
	Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	162	0	0	0	0	0	
	Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	0	0	0	
	South Africa	60	102	168	200	561	367	296	72	43	88	79	27	7	10	53	55	249	239	341	113	270	221	84	171	226
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	1	3	0	0	4	2	2	1	1216	506	15	103	18	0	114	567	171
	Sta. Lucia	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	2	0	2	0	0	0
	Togo	52	18	24	22	7	12	12	6	2	86	23	6	33	33	33	0	0	0	0	0	0	0	0	0	
	Trinidad and Tobago	41	22	0	0	1	19	57	263	0	3	29	27	37	36	24	19	5	11	30	6	5	9	12	27	69
	U.S.A.	539	639	1085	1074	1127	847	623	975	813	1090	1402	1209	882	1138	929	1263	574	1085	601	482	416	484	991	527	488
	U.S.S.R.	1233	870	1071	1887	1077	424	95	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	0	0	0	0	1	1	0	0	0
	UK.Sta Helena	19	0	0	5	1	1	3	3	10	6	6	10	10	12	17	6	8	5	5	0	0	0	25	18	28
	Uruguay	714	597	177	204	120	55	38	20	56	48	37	80	124	69	59	28	25	51	67	59	40	62	83	22	27
	Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	109	52	132	
	Venezuela	4142	2918	1136	349	332	115	161	476	270	809	457	457	189	274	222	140	226	708	629	516	1060	243	261	318	122
Discards	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	

Notes

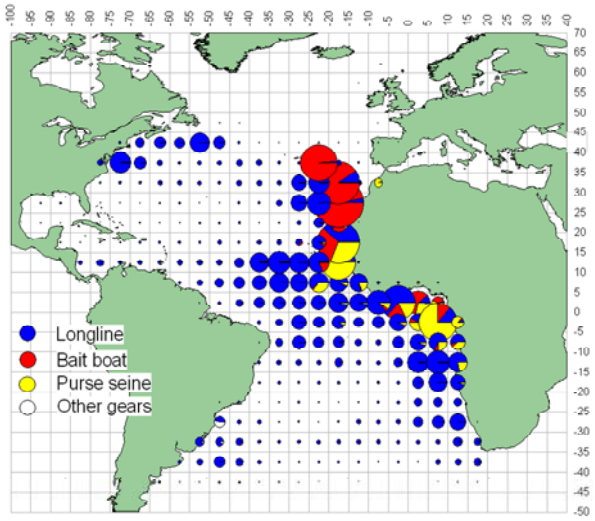
Task I catches (new figures) not included in the table: Vanuatu 2008 ATL (91 t).



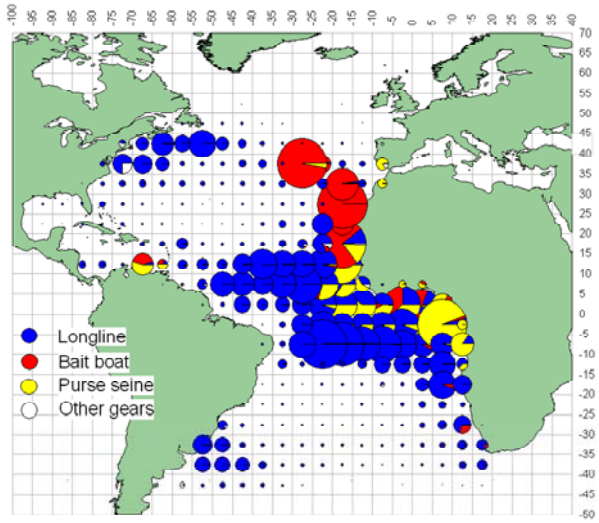
a. BET(1950-59)



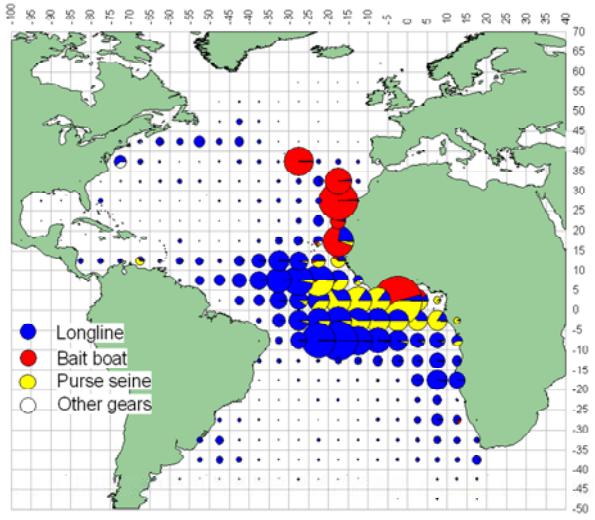
b. BET(1960-69)



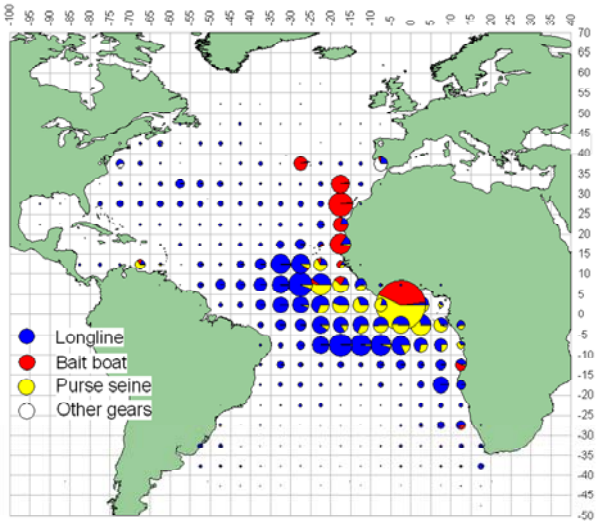
c. BET(1970-79)



d. BET(1980-89)

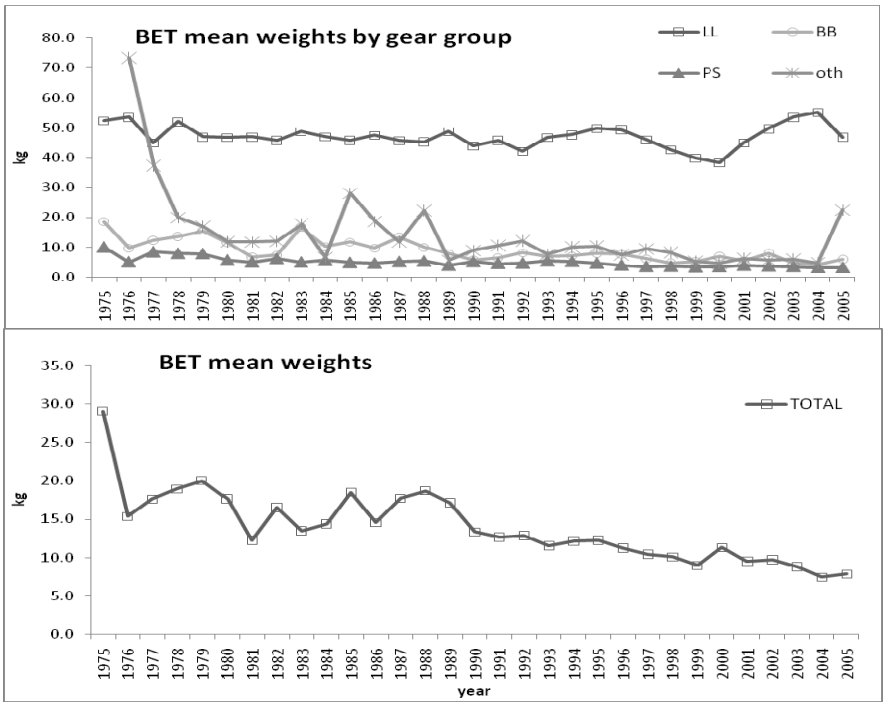


e. BET (1990-99)

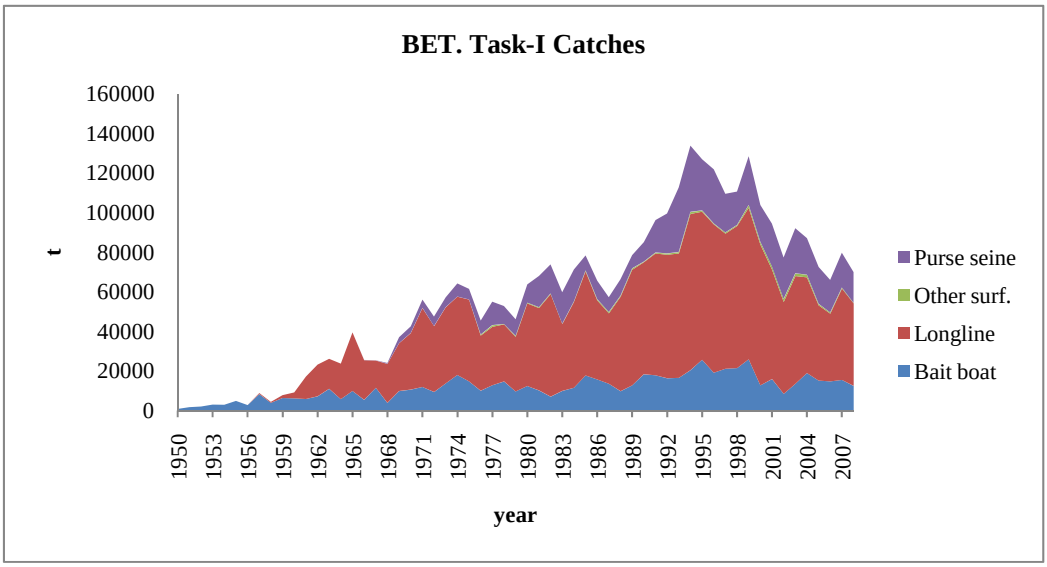


f. BET (2000-2006)

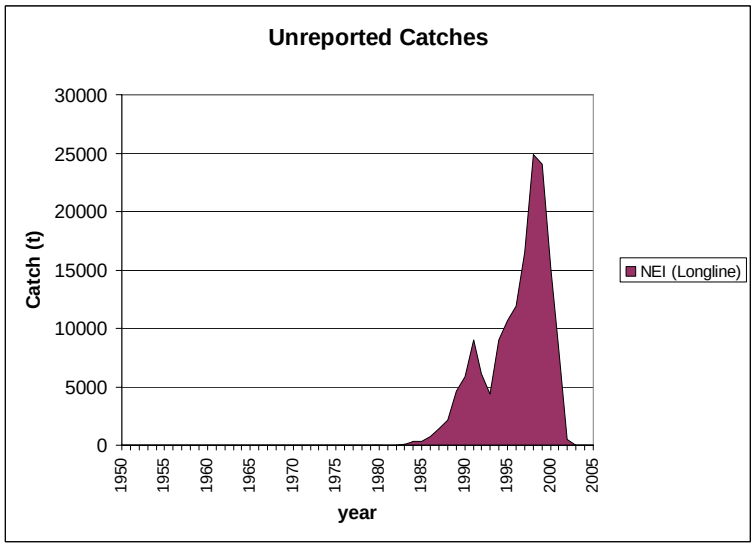
BET-Figure 1. Historical development of the area distribution of bigeye catches by fishing gear. The most recent period (2000-2006) is shown below on the right. Ghana's catches have been included in the same 5x5º square, as no detailed information on the spatial distribution of these catches is available.



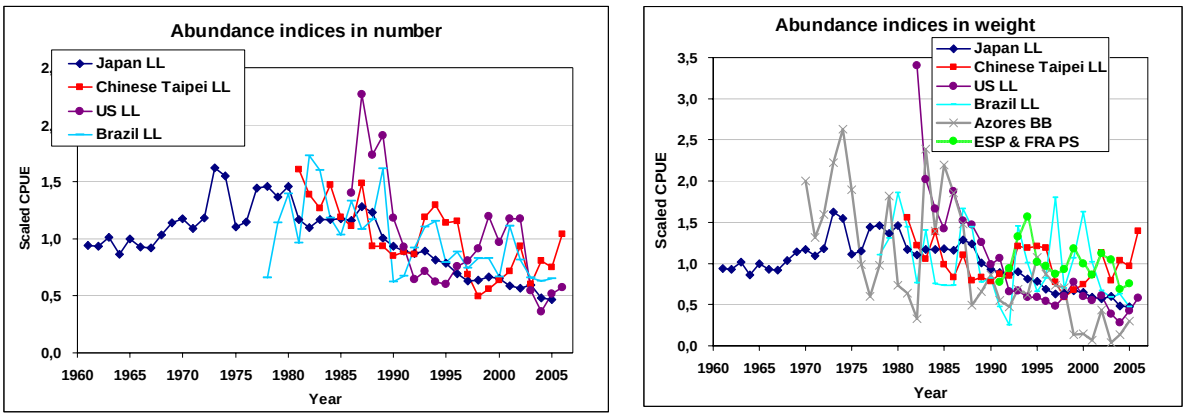
BET-Figure 2. Trend of mean weight for bigeye by major fisheries (1975-2005) based on the catch-at-size data.



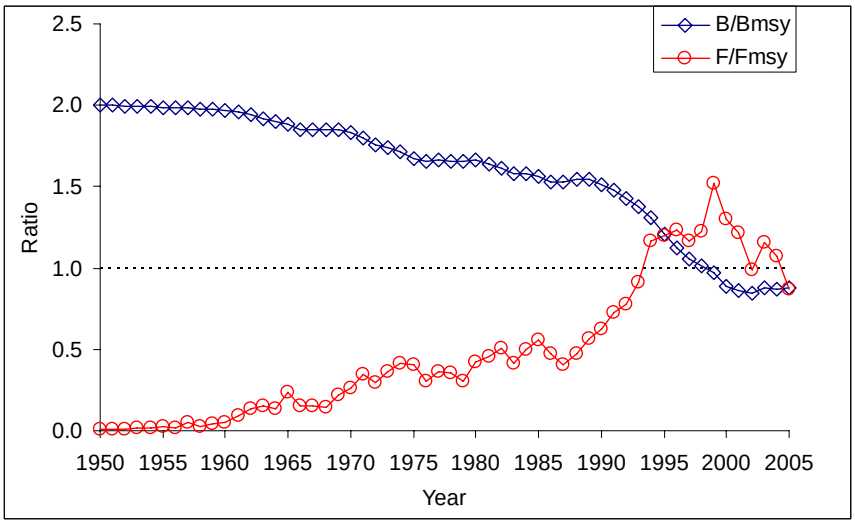
BET-Figure 3. Trend of bigeye catches (1950-2007) by major tuna fishery. For other countries, fleet size limitation (average number of boats in 1991 and 1992) was set.



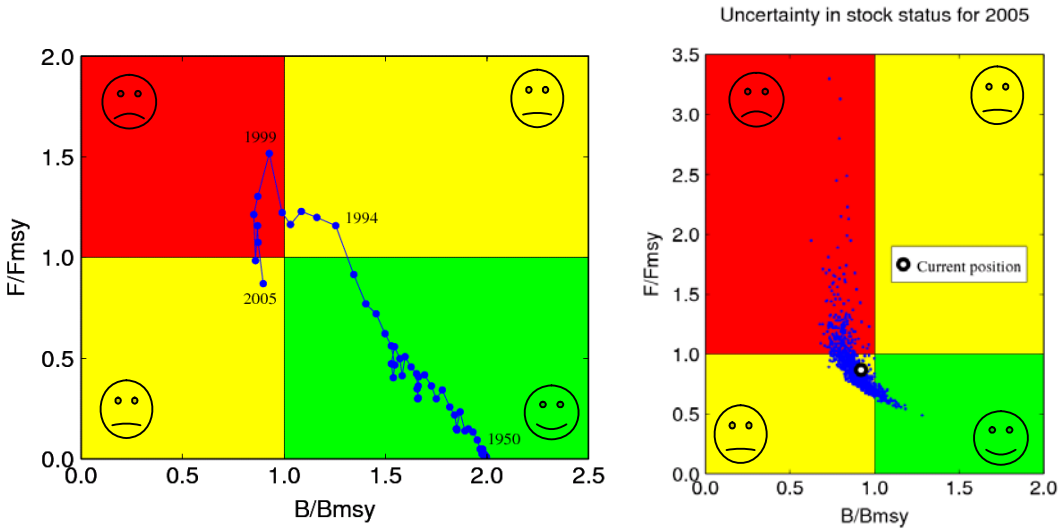
BET-Figure 4. Estimated longline IUU catches recorded as NEI in the ICCAT database.



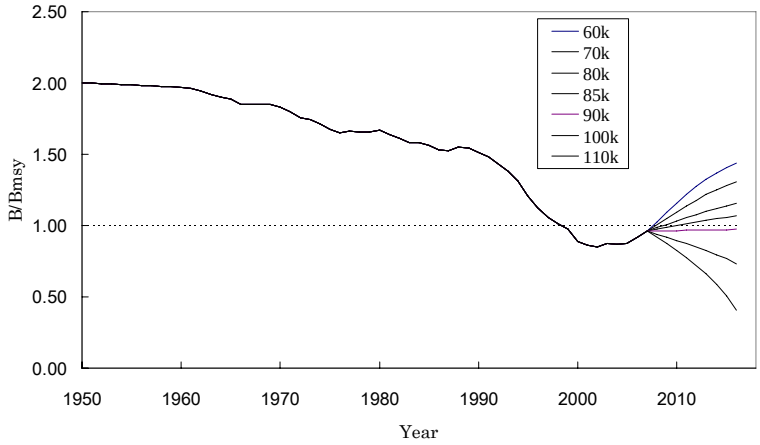
BET-Figure 5. Abundance indices provided for the 2007 assessment.



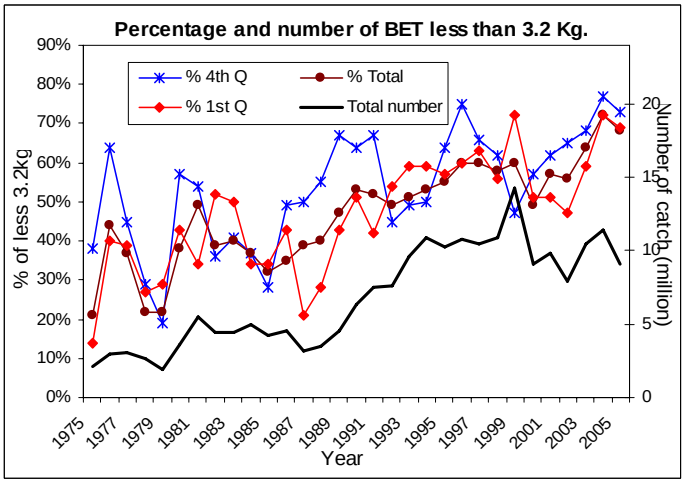
BET-Figure 6. Trajectories of B/B_{MSY} and F/F_{MSY} estimated from the assessment.



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



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



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

8.3 SKJ – SKIPJACK TUNA

Stock assessments for eastern and western Atlantic skipjack were conducted in 2008 using available catches to 2006. Skipjack had only been assessed previously in 1999. Consequently, this report includes the most recent information on the state of the stocks on this species.

SKJ-1. Biology

Skipjack tuna is a gregarious species that is found in schools in the tropical and subtropical waters of the three oceans **(SKJ-Figure 1)**. Skipjack is the predominant species under FADs where it is caught in association with juvenile yellowfin tuna, bigeye tuna and with other species of epipelagic fauna. One of the characteristics of skipjack is that from the age of one it spawns opportunistically throughout the year and in vast sectors of the ocean. A recent analysis of tagging data from the eastern Atlantic confirmed that the growth of skipjack varies according to the latitude. However, this difference in the growth rate is not as great as that which had been previously estimated.

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

SKJ-2. Fisheries indicators

The total catches obtained in 2008 in the entire Atlantic Ocean (including estimates of skipjack in the *faux-poisson* landed in Cote d'Ivoire by the EC-purse seiners) were close to 149,000 t **(SKJ-Table 1**, **SKJ-Figure 2)** which represents the catch average of the last five years.

The numerous changes that have occurred in the skipjack fishery since the early 1990s (such as the progressive use of FADs and the increase of the fishing area towards the west) have brought about an increase in skipjack catchability and in the biomass proportion that is exploited. At present, the major fisheries are the purse seine fisheries, particularly those of EC-Spain, Ghana, NEI, Panama, EC-France and Netherlands Antilles, followed by the baitboat fisheries of Ghana, EC-Spain, EC-Portugal and EC-France. The preliminary estimates of catches made in 2008 in the East Atlantic amounted to 127,000 t, representing an increase of 3% as compared to the average of 2003-2007 **(SKJ-Figure 3)**.

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

In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. Estimates of catches in 2008 in the West Atlantic amounted to 22,000 t, i.e. representing a decrease of 17% as compared to the trend observed for recent years **(SKJ-Figure 5)**.

It is difficult to estimate effective fishing effort for skipjack tuna in the East Atlantic, but nominal purse seine effort has decreased regularly since the mid 1990s. However, this trend seems to have inverted since a couple of years **(SKJ-Figure 6)**. It is considered that the increase in fishing power linked to the introduction of innovation technologies on board the vessels as well as to the development of fishing under floating objects has resulted in an increase in the efficiency of the various fleets, since the early 1980s. In addition to the use of an average 3% annual increase in skipjack catchability to account for these changes, a new analysis has been conducted by fixing MSY and K at levels agrees with estimates made during previous stock assessments. This method provides a range of increase in catchability from 1 to 13% per year. It is unclear, however, whether these estimates reflect 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 7**). The significant increase in the estimates of total mortality (Z) between the early 1980s and the end of the 1990s obtained from different methods, such as 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 change in the selectivity pattern observed for the purse seine fishery suggests that this fleet is targeting primarily 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 8**). Generally, it is noted that the average weight observed in the east Atlantic (close to 2 kg) is much lower than the estimates given in the other oceans (closer to 3 kg).

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

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

SKJ-3. State of the stocks

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

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

Eastern stock

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

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

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

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

Western stock

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

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

The Group attempted several 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 16)**.

SKJ-4. Effects of current regulations

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

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

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

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

Considering that the new closed area is much smaller in time and surface than the previous moratorium time/area, and is located in an area which historically has lower effort anyway, this regulation is likely to be less

effective in reducing the overall catches of small bigeye (the species for which the regulation was applied) by the surface fishery. When the fishing effort for the EC purse seine fleet was at its maximum value (period 1994-1996, i.e., before the implementation of the first moratorium), the skipjack catch from this fleet within the time and area limits defined by Rec. 04-01, was only on average at 7,180 t (i.e., 7.5% of the total skipjack catch from the EC purse seiners).

SKJ-5. Management recommendations

Although the Committee makes no management recommendations in this respect, catches should not be allowed to exceed MSY. The Commission should be aware that increasing harvests and fishing effort for skipjack could lead to involuntary consequences for other species that are harvested in combination with skipjack in certain fisheries.

ATLANTIC SKIPJACK TUNA SUMMARY

	East Atlantic	**West Atlantic**
Maximum Sustainable Yield	Around 143,000-170,000 t	Around 30,000-36,000 t
2007 Yield	113,580 t	25,443 t
Current (2008) Yield[1]	127,000 t	22,000 t
Current Replacement Yield	somewhat higher than 127,000 t	somewhat higher than 22,000 t
Relative Biomass (B_{2008}/B_{MSY})	most likely>1	most likely>1
Relative Fishing Mortality: (F_{2008}/F_{MSY})	most likely<1	most likely<1
Management measures in effect	Rec. 04-01 (effective 2005[2])	None

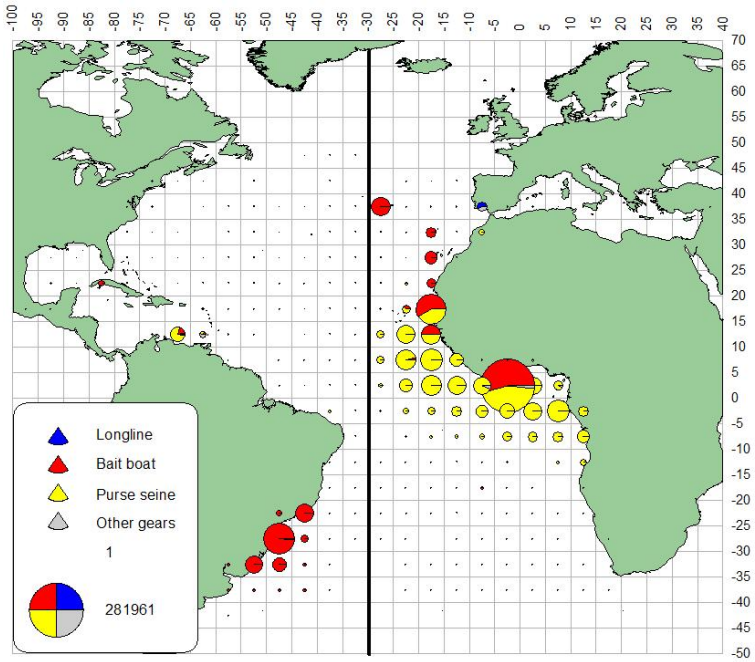
[1] Reports for 2008 should be considered provisional.

[2] Although this time area measure was implemented to reduce mortality on bigeye juvenile tuna, as a total area closure has affected all the tropical tuna species.

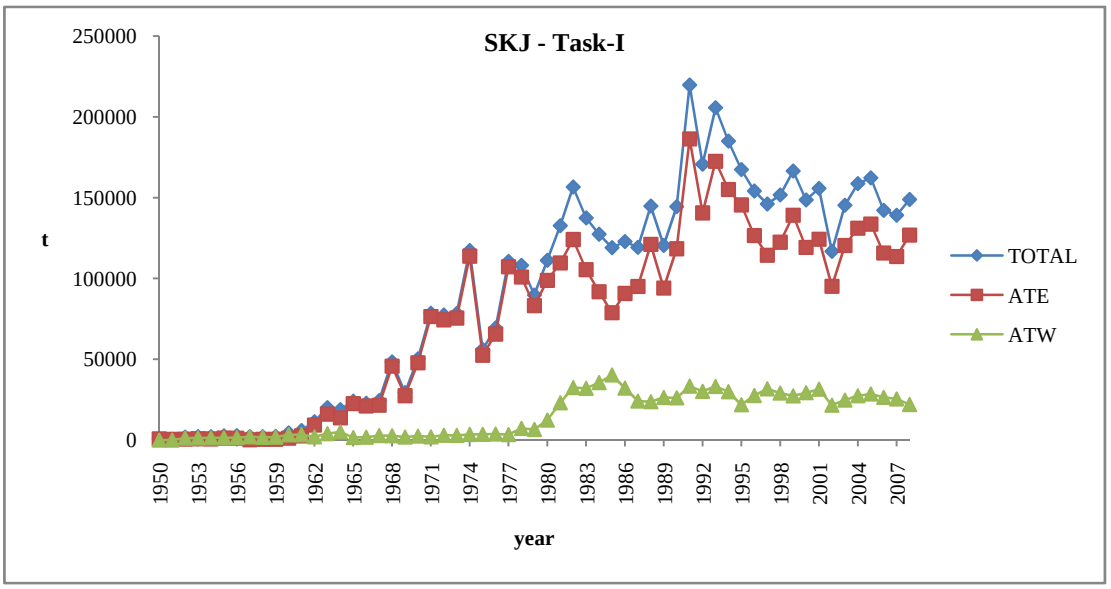
SKJ-Table 1. Estimated Catches (t) of Skipjack tuna (*Katsuwonus pelamis*) by major area, gear and flag.

			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			127376	119071	122865	119229	144796	120419	144471	219733	170708	205685	185014	167381	154127	146082	151699	166488	148605	155767	116781	145293	158707	162240	142176	139127	148872
	ATE		91770	78786	90711	95052	121060	94037	118361	186330	140554	172462	155065	145479	126557	114367	122436	139079	119209	124239	95145	120412	131085	133596	115704	113580	126794
	ATW		35596	40272	32151	24164	23736	26382	26110	33404	30155	33221	29949	21860	27562	31712	29087	27356	29307	31451	21600	24749	27461	28517	26453	25443	22011
	MED		10	13	2	13	0	0	0	0	0	2	0	43	9	4	176	53	90	77	37	132	161	127	20	104	67
Landings	ATE	Bait boat	28075	29868	30009	38803	48015	41000	36922	41611	35660	31656	37817	33691	32047	37293	42045	37696	29974	46281	27591	29847	39539	43603	41175	29720	44058
		Longline	22	6	19	6	4	9	0	5	3	2	10	3	7	47	85	42	48	53	56	66	316	458	2958	1599	1153
		Other surf.	1328	206	1638	1027	1506	1643	1357	2067	1602	1062	501	445	501	304	923	417	2423	764	681	551	816	1897	2402	2172	9419
		Purse seine	62345	48706	59045	55216	71535	51385	80082	142646	103288	139742	116737	111340	94002	76722	79383	100925	86763	77142	66817	89948	90414	87638	69170	80088	72163
	ATW	Bait boat	16771	28490	25278	18675	21057	23292	22246	23972	20852	19697	22645	17744	23741	26797	24724	23881	25754	25142	18737	21990	24082	26028	23749	22865	20617
		Longline	25	24	8	6	9	25	23	33	29	20	16	34	19	12	21	58	22	60	349	95	206	207	286	52	38
		Other surf.	842	567	1657	518	355	600	600	872	764	710	1577	2023	452	556	516	481	467	951	398	367	404	316	372	1317	455
		Purse seine	17958	11191	5208	4964	2315	2466	3241	8527	8509	12794	5712	2059	3349	4347	3826	2936	3063	5297	2116	2296	2769	1967	2045	1209	901
	MED	Bait boat	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	17	21	13	8	39	40
		Other surf.	0	13	2	13	0	0	0	0	0	2	0	43	9	4	176	53	90	77	32	12	40	16	12	28	11
		Purse seine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	103	101	99	0	38	16
Discards	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	46	131	56	80	30	85	69	66	41	13	7	3	15	52	2	32	14	14	14	14	10	0	0	0	
		Benin	10	20	11	5	3	7	2	2	2	2	2	2	2	7	3	2	2	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	1391	2030	877	2076	1456	971	806	1333	864	860	1007	1314	470	591	684	962	789	794	398	343	1097	7504	7930	6026	5700
		Cayman Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	7	4	0	0	1	3	0	5	3	2	10	3	5	47	73	39	41	24	23	26	16	10	9	14	18
		Congo	10	8	8	8	8	11	12	9	9	10	7	7	6	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	310	246	569	81	206	331	86	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1173	259	292	143	559	1259	1565	1817	8998
		EC.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	
		EC.España	46649	35100	41992	33076	47643	35300	47834	79908	53319	63660	50538	51594	38538	38513	36008	44520	37226	30954	25456	44837	38725	28139	22206	23670	35057
		EC.Estonia	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.France	12994	13645	13045	17114	16504	15211	17099	33271	21890	33735	32779	25188	23107	17023	18382	20344	18183	16593	16615	19899	21879	14850	7034	4168	4439
		EC.Germany	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	14	0	
		EC.Latvia	0	0	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Lithuania	0	0	0	0	0	0	0	221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	3974	2409	5446	8420	14257	7725	3987	8059	7477	5651	7528	4996	8297	4399	4544	1810	1302	2167	2958	4315	8504	4735	11158	8995	6057
		Gabon	0	0	0	0	0	0	0	0	0	1	11	51	26	0	59	76	21	101	0	0	0	0	0	0	
		Ghana	20697	19082	22268	24347	26597	22751	24251	25052	18967	20225	21258	18607	19602	26336	34183	40216	28974	42489	30499	24597	25727	44671	30236	34572	37387
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6389	5162	5546	6319
		Japan	1504	2098	2031	1982	3200	2243	2566	4792	2378	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
		Korea Rep.	699	153	5	6	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	885	1002	1220	1028	428	295	1197	254	559	310	248	4981	675	4509	2481	848	1198	268	280	523	807	1893	3779	1570	1291
		Mixed flags (FR+ES)	550	358	692	4663	4660	4125	5280	11101	12273	13750	9492	5862	5831	4905	5621	6845	9461	7137	2995	4959	5262	4666	5313	3275	3128
		NEI (ETRO)	927	590	540	791	2994	2263	10869	11335	12409	20291	17418	16235	16211	6161	6748	8893	7127	8122	8550	9688	11137	2873	629	0	
		Namibia	0	0	0	0	0	0	0	0	0	0	2	15	0	1	0	0	0	8	0	0	0	0	0	0	
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	7096	8444	8553	9932	10008	13370	5427	10092	8708	0	3042	1587	6436
		Norway	0	0	0	581	738	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	8312	8719	13027	12978	14853	5855	1300	572	1308	1559	281	342	0	7126	11490	13468	18821	8253
		Rumania	0	0	3	0	0	59	142	349	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	1175	1110	540	1471	1450	381	1146	2086	1426	374	0	0	0	0	0	392	1130	
		S. Tomé e Príncipe	18	20	20	20	195	196	204	201	178	212	190	180	187	178	169	181	179	179	179	117	166	143	0		
		Senegal	0	0	0	0	0	47	134	652	260	95	59	18	163	455	1963	1631	1506	1271	1053	733	1333	4874	3534	2278	3661
		South Africa	14	66	101	88	157	96	17	15	7	6	4	4	1	6	2	1	7	1	1	2	2	1	0	0	4
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	
		U.S.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.	1000	1404	1688	547	1822	1915	3635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	85	62	139	139	158	397	171	24	16	65	55	115	86	294	298	13	64	205	63	63	63	63	88	110	45
		Venezuela	0	358	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	505	101	138	90	7	111	106	272	123	50	1	0	1	0	2	0	1	0	0	0	30	0	0	0	
		Barbados	48	36	33	21	3	9	11	14	5	6	6	6	5	5	10	3	3	0	0	0	0	0	0	0	
		Brasil	13567	25101	23155	16286	17316	20750	20130	20548	18535	17771	20588	16560	22528	26564	23789	23188	25164	24146	18338	20416	23037	26388	23270	24191	20846
		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	
		Chinese Taipei	6	3	1	2	7	19	0	32	26	9	7	2	10	1	2	1	0	1	16	14	27	28	29	2	9
		Colombia	0	0	0	0	0	0	0	0	0	2074	789	1583	0	0	0	0	0	0	0	0	0	0	0	0	

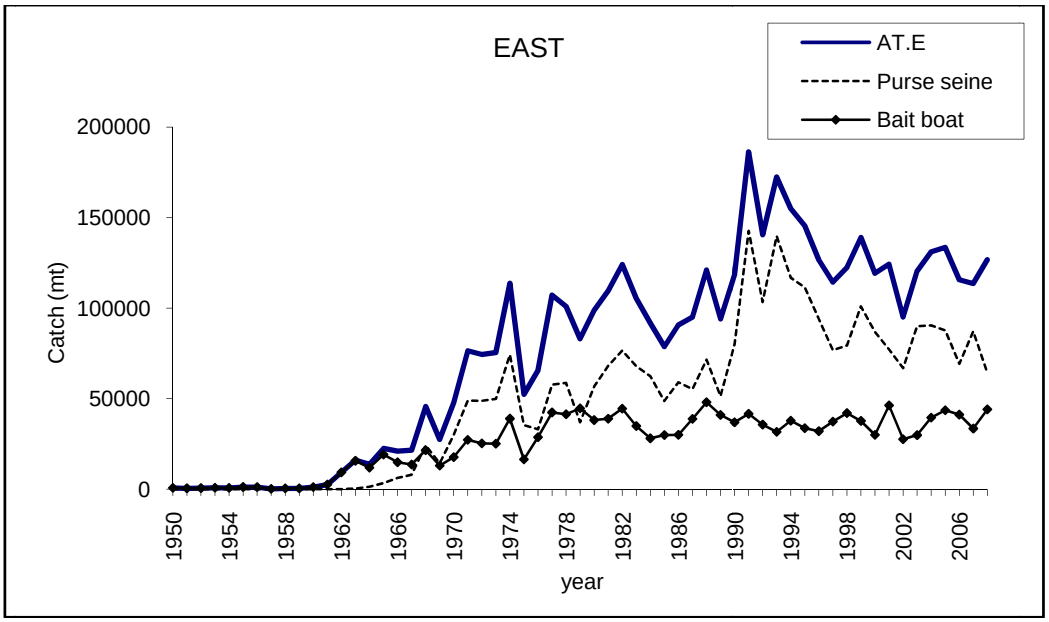
		Cuba	1248	1632	1277	1101	1631	1449	1443	1596	1638	1017	1268	886	1000	1000	651	651	651	0	0	624	545	514	536	0	
		Dominica	0	0	0	0	0	0	60	38	41	24	43	33	33	33	33	85	86	45	55	51	30	20	28	32	45
		Dominican Republic	68	204	600	62	63	117	110	156	135	143	257	146	146	0	0	0	0	0	0	0	0	0	0	0	
		EC.España	2610	500	0	0	0	0	0	1592	1120	397	0	0	0	0	0	1	1	0	0	0	0	0	0	5	0
		EC.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	
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	9
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	3	3	5	21	11	
		Grenada	12	7	9	5	22	11	23	25	30	25	11	12	11	15	23	23	23	15	14	16	21	22	15	26	20
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	62	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	1	0	0
		Korea Rep.	17	20	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Mexico	30	48	11	13	10	14	4	9	8	1	1	0	2	3	6	51	13	54	71	75	9	7	10	7	8
		Netherlands Antilles	40	40	40	40	40	40	40	40	40	45	40	35	30	30	30	30	30	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	17	28	29	27	20	66	56	53	37	42	57	37	68	97	357	92	251	251	355	90	83
		Sta. Lucia	64	53	76	60	53	38	37	51	39	53	86	72	38	100	263	153	216	151	106	132	137	159	120	89	168
		Trinidad and Tobago	2	1	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	853	1814	1115	734	57	73	304	858	560	367	99	82	85	84	106	152	44	70	88	79	103	30	61	66	67
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
		Venezuela	16526	10712	5690	5750	4509	3723	3813	8146	7834	11172	6697	2387	3574	3834	4114	2981	3003	6870	2554	3247	3270	1093	2008	921	757
	MED	Algeria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	43	89	77	0	0	0	0	0	0	
		EC.España	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	26	10	15	44	12
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	
		EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102	99	99	0	0	
		EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	29	34	17	0	0	
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Maroc	0	13	2	13	0	0	0	0	0	2	0	43	9	4	5	10	1	0	1	1	2	1	5	22	18
		Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	36
Discards	ATW	Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



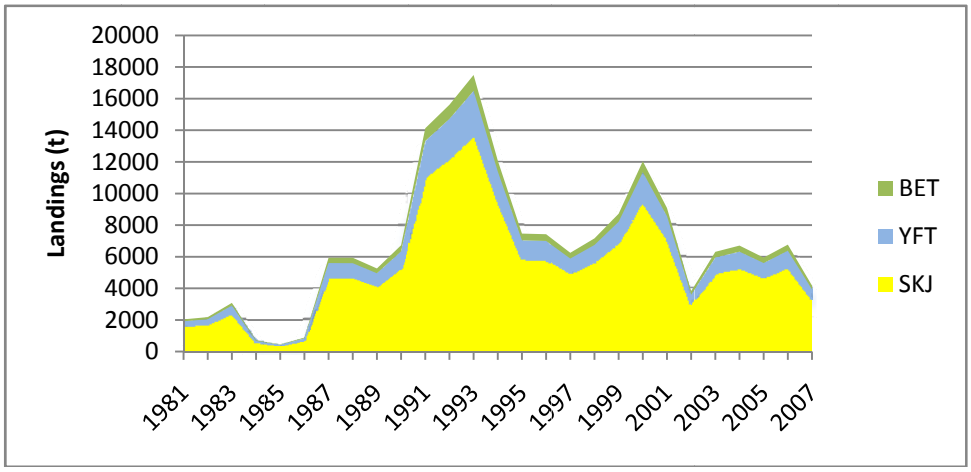
SKJ-Figure 1. Area distribution of skipjack catches in the Atlantic by fishing gear for the 2000-2007 period.



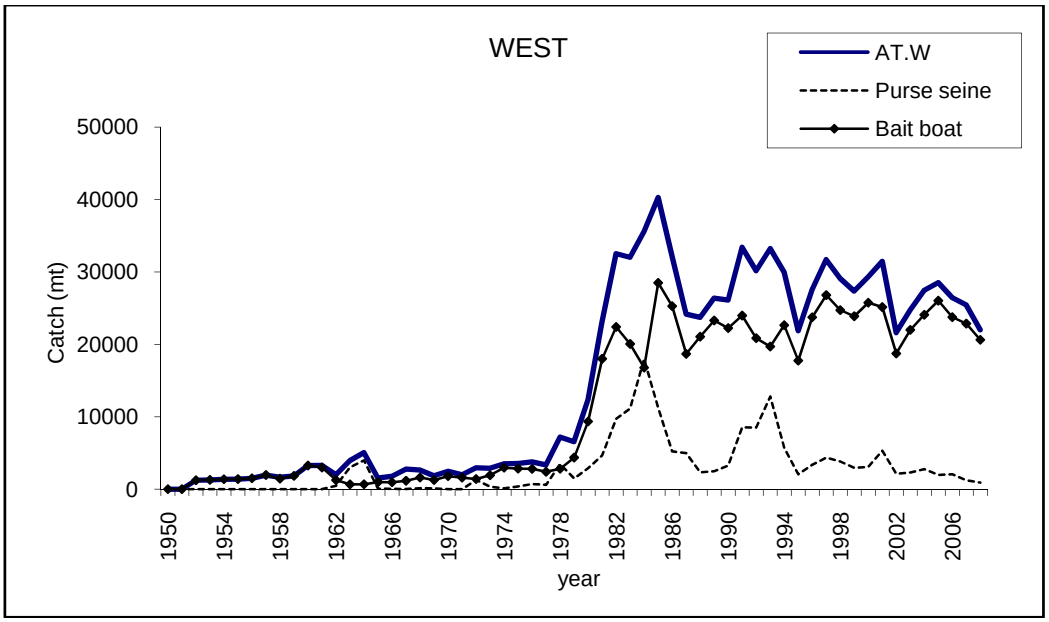
SKJ-Figure 2. Total catch (t) for skipjack in the Atlantic Ocean and by stocks (East and West) between 1950 and 2008. Estimates of skipjack in the "*faux poissons*" landed in Côte d'Ivoire were included in the skipjack trade catches in the East Atlantic (only catches to 2006 were considered for the stock assessment).



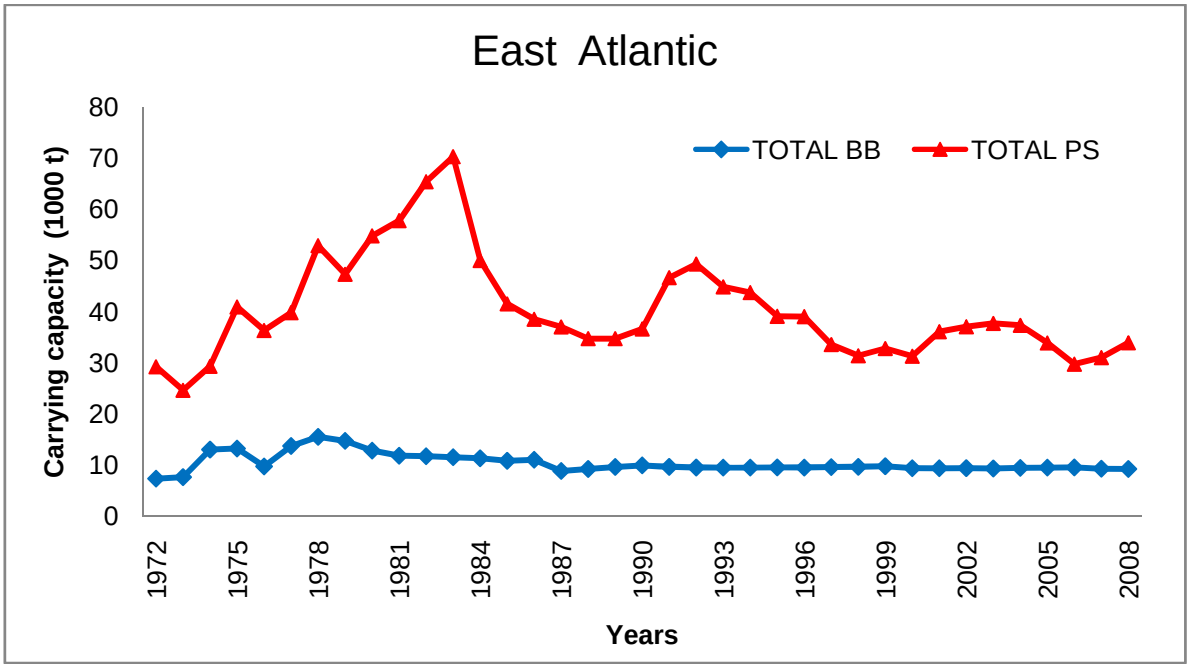
SKJ-Figure 3. Skipjack landings in the eastern Atlantic, by gear (1950-2008).



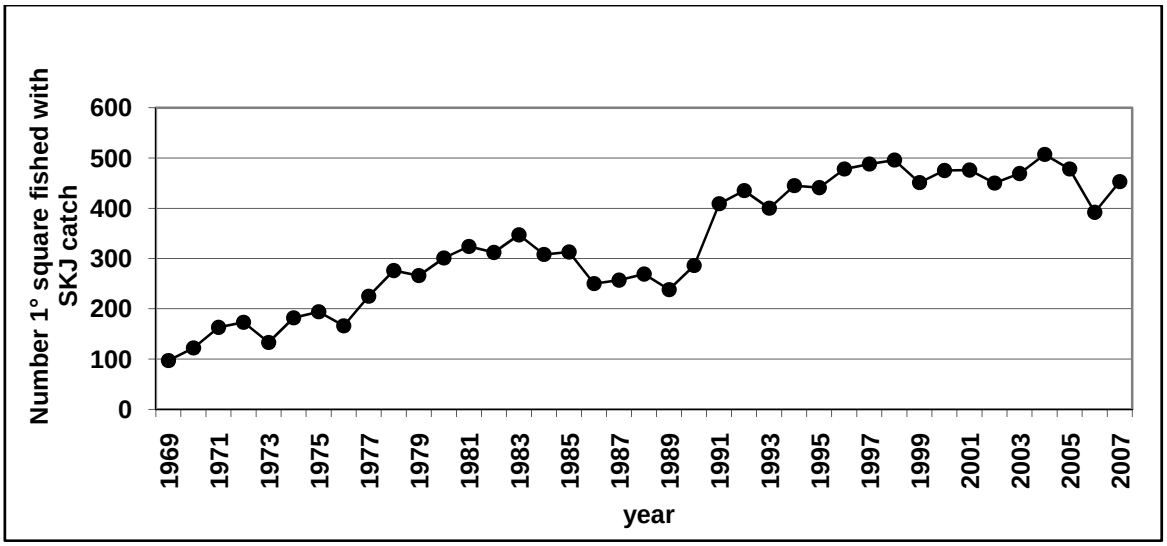
SKJ-Figure 4. Cumulative estimated landings of "*faux poissons*" for the three main species of tropical tunas in the local market of Abidjan (Côte d'Ivoire).



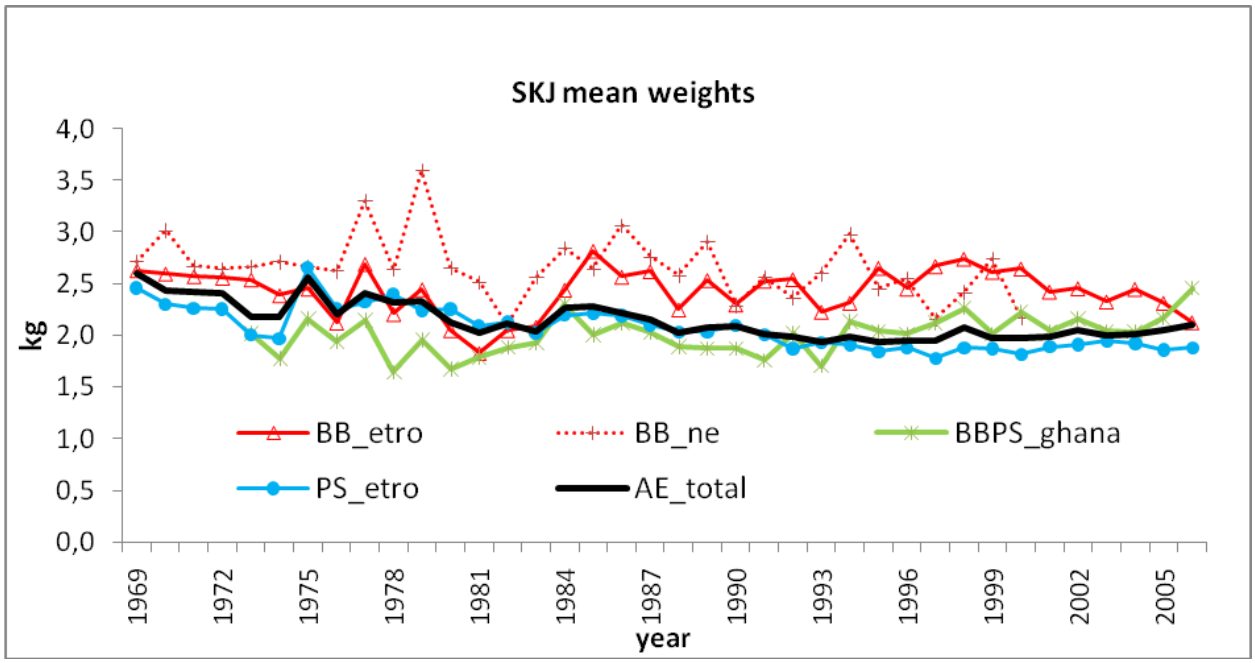
SKJ-Figure 5. Skipjack landings in the western Atlantic, by gear (1950-2008).



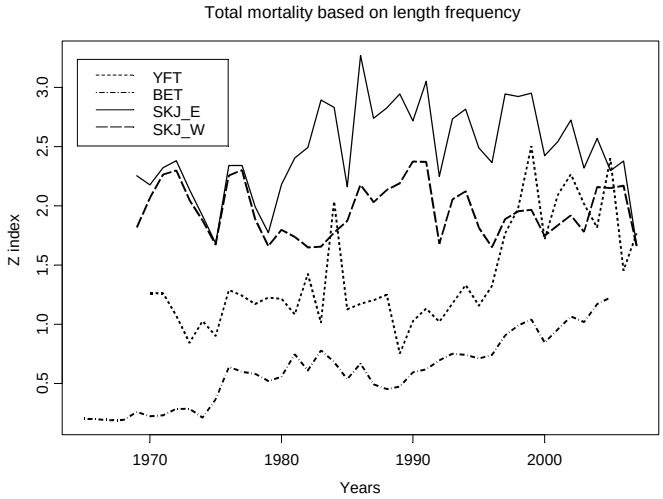
SKJ-Figure 6. Changes over time of the carrying capacity (corrected by time at sea) for the purse seiners and baitboats operating in the eastern Atlantic (1971-2008).



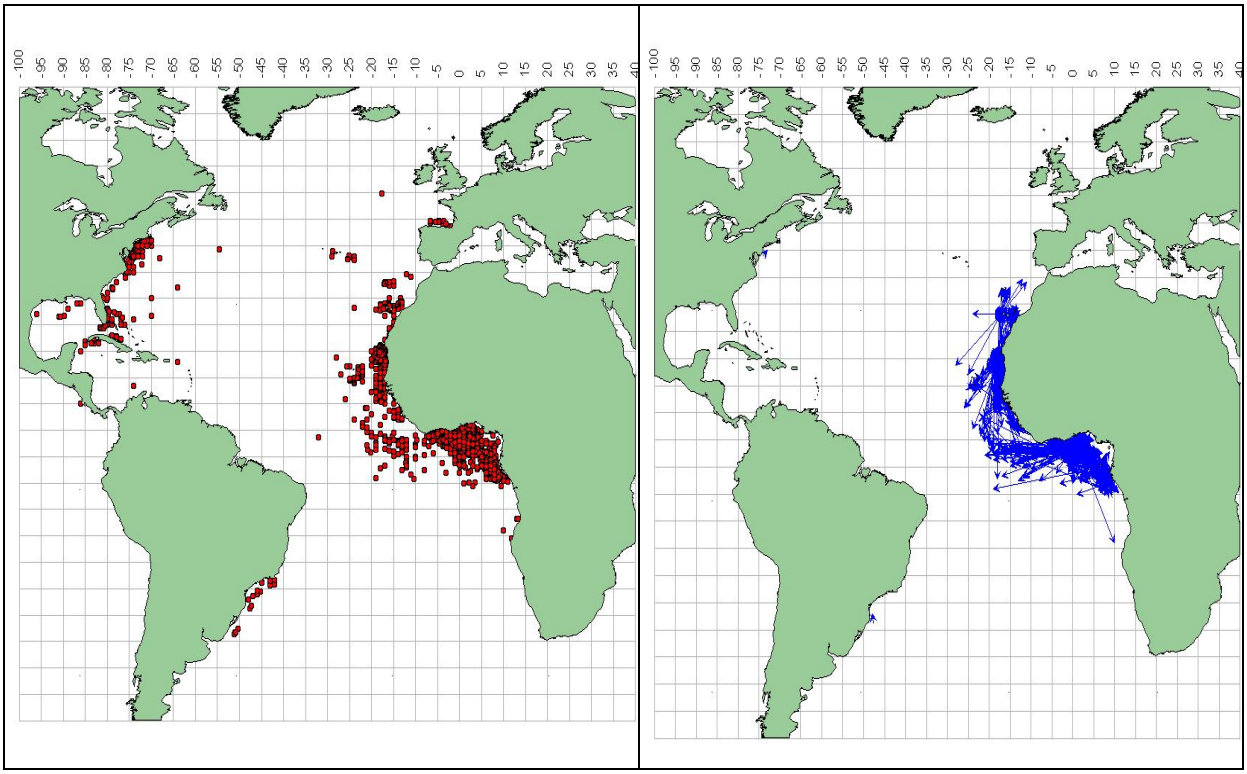
SKJ-Figure 7. Number of 1°x1° squares with catch of skipjack for the purse seiners operating in the eastern Atlantic (1969-2007). The increase observed in 1991 could be due to a modification of the species composition correction procedure of the catches implemented at this date (skipjack catches could have been attributed to squares which were not included until then).



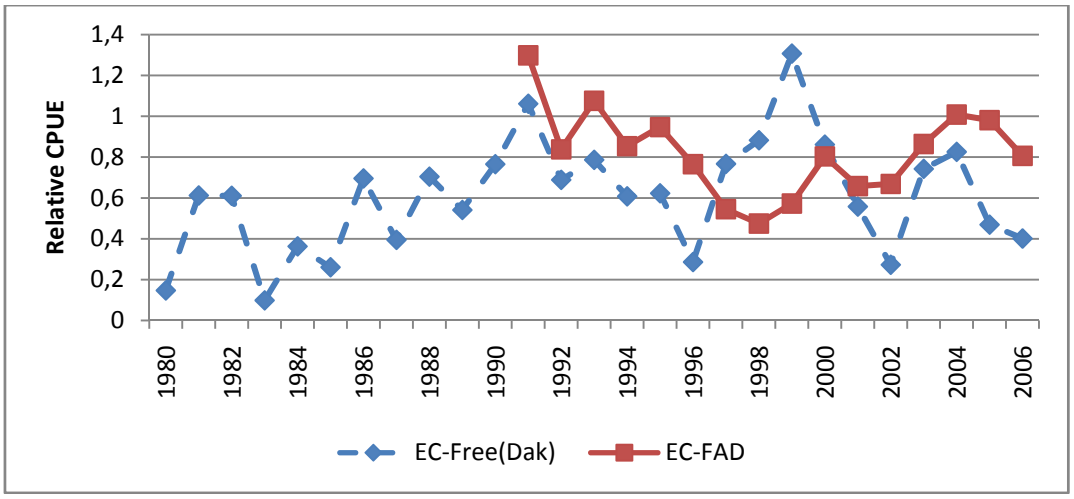
SKJ-Figure 8. Changes in time of the mean weight of the skipjack (non standardized) by major fisheries in the eastern Atlantic landed



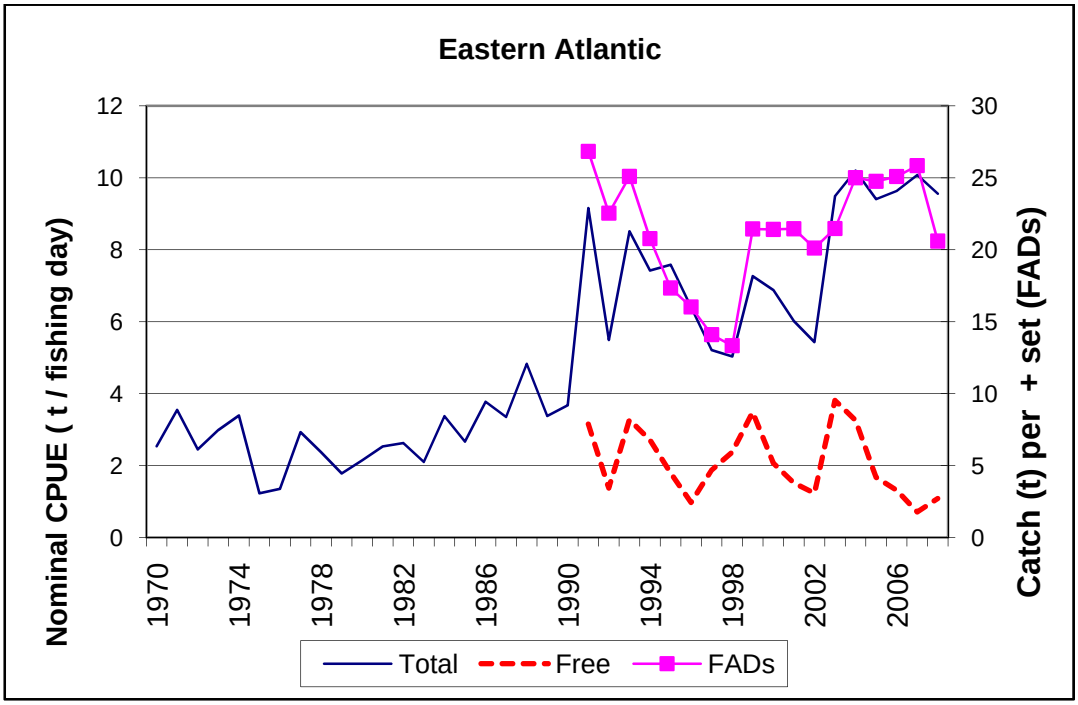
SKJ-Figure 9. Changes over the years in the apparent total mortality *Z*, calculated based on Beverton and Holt's equation, for the three main tropical tuna species in the Atlantic Ocean. YFT = yellowfin, BET = bigeye, SKJ E = Eastern skipjack, SKJ W = Western skipjack. The size at which the fish are fully recruited was fixed at 50 cm (FL).



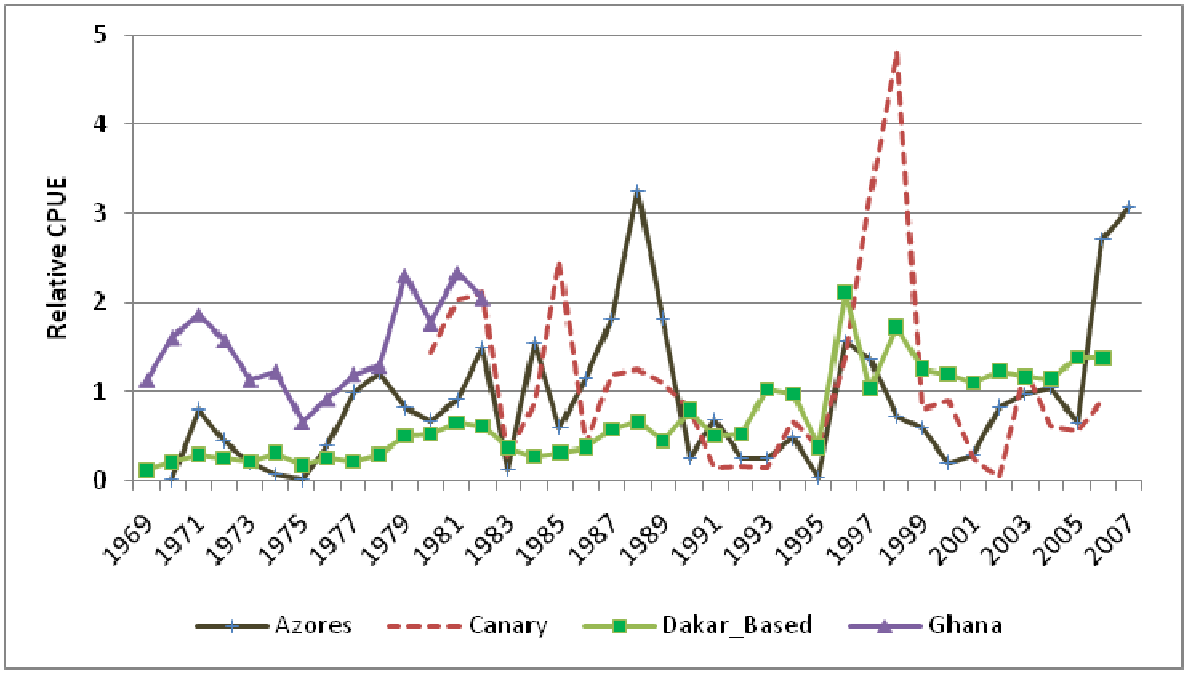
SKJ-Figure 10. Distribution of tagged and released SKJ (left panel) and apparent movement from geographical positions of recaptured fish (right panel).



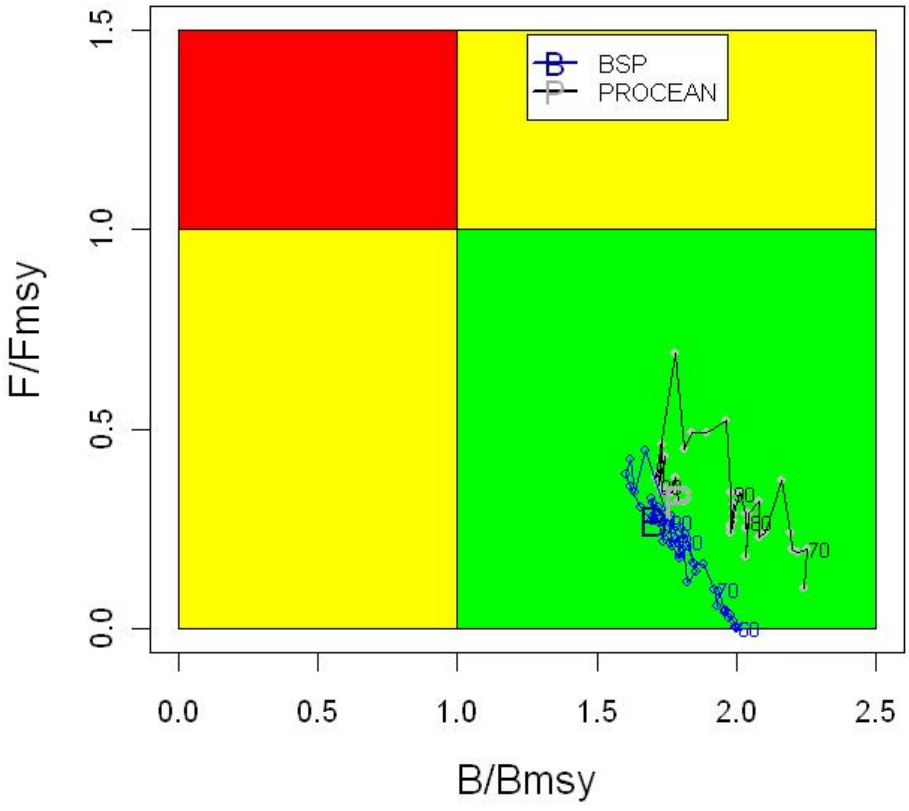
SKJ-Figure 11. Standardized skipjack CPUE for EC purse seiners in the eastern Atlantic Ocean. Free = free school off Senegal; FAD = schools associated with fish aggregating devices in the equatorial areas.



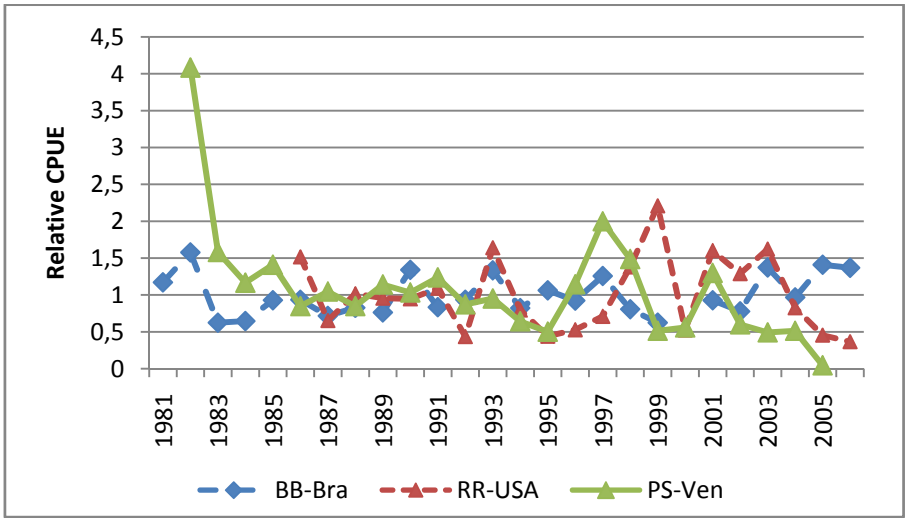
SKJ-Figure 12. Changes in nominal CPUE for the European purse seiners in the eastern Atlantic (1970-2008). Free = free schools (t / f. day) off Senegal; FADs = schools associated with fish aggregating devices (t / successful set) in the equatorial area.



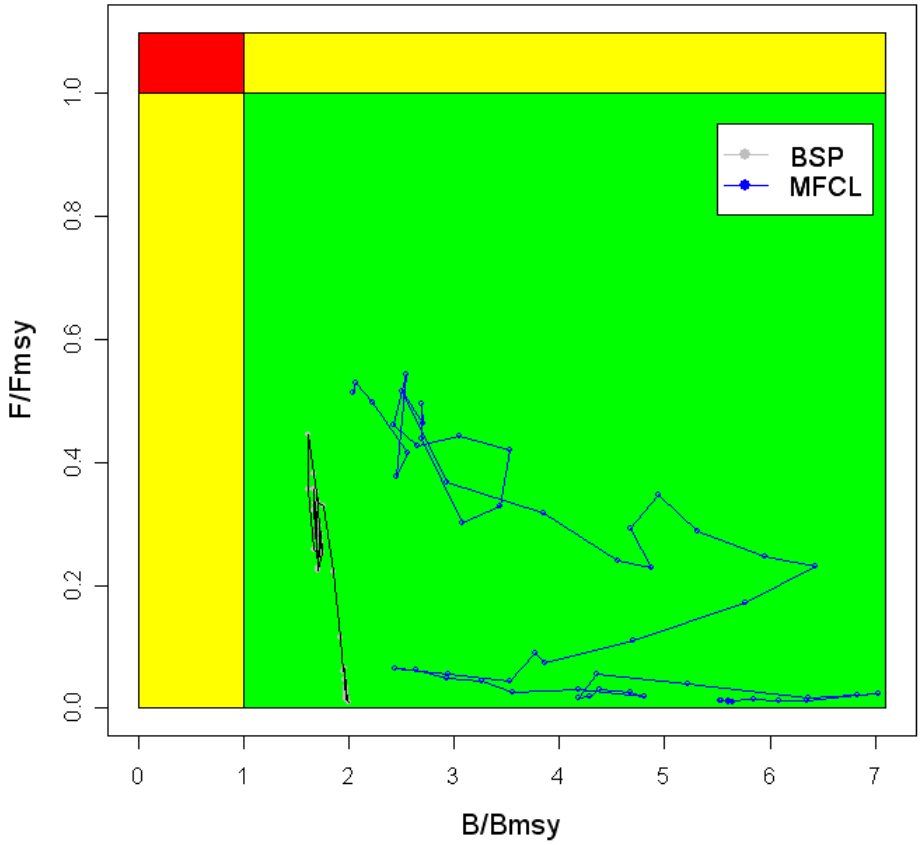
SKJ-Figure 13. Standardized CPUE for the main baitboat fleets operating in the eastern Atlantic Ocean: Azores, Canary islands (non standardized), Dakar and Ghana based baitboat.



SKJ-Figure 14. 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 15. Standardized CPUEs for Brazilian baitboats, for U.S. rod and reel recreational fleets and non standardized CPUE for the Venezuelan purse seiners in the western Atlantic Ocean.



SKJ-Figure 16. 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 2007 Commission meeting resumed in Recommendation 07-02 to conduct an assessment of the North stock in 2009. Accordingly, in July 2009 the assessment of North Atlantic albacore stock was conducted by means of applying statistical modelling to the available data. The status of the South Atlantic albacore stock is based on the 2007 assessment (Anon. 2008c). No attempt to assess the status of the Mediterranean stock has ever been made.

Complete information on the assessment of the North albacore stock can be found in the Report of the 2009 ICCAT Albacore Stock Assessment Session (SCRS/2009/015).

ALB-1. Biology

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea. On the basis of the biological information available for assessment purposes, the existence of three stocks is assumed: northern and southern Atlantic stocks (separated at 5ºN) and Mediterranean stock (**ALB-Figure 1)**. Nevertheless, there is likely intermingling of Indian Ocean and South Atlantic immature albacore which needs further research. The expected life-span for albacore is around 15 years. While albacore is a temperate species, spawning occurs in tropical waters. A new weight at length relationship for the western Atlantic fishery was presented that showed to be different from the presently used for Northern stock. Present available knowledge on habitat distribution according to size, spawning areas and maturity estimates of Atlantic albacore are based on limited studies from past decades. Exception is a revised new growth equation for the South stock. Although there is biological knowledge on the Mediterranean albacore stock these data have not yet been fully assimilated into the albacore Working Group. More information on albacore biology is published in the *ICCAT Manual*.

ALB-2. Description of fisheries or fisheries indicators

North Atlantic

The northern stock is exploited by surface fisheries targeting mainly immature and sub-adult fish (50cm to 90 cm FL) and longline fisheries targeting immature and adult albacore (60-130 cm FL). The main surface fisheries are carried out by EC fleets (Ireland, France, Portugal and Spain) in the Bay of Biscay, in the adjacent waters of the northeast Atlantic and in the vicinity of the Canary and Azores Islands in summer and autumn. The main longline fleet is the Chinese Taipei fleet which operates in the central and western North Atlantic year round. However, the Chinese Taipei fishing effort decreased in late 1980s due to a shift towards targeting on tropical tuna, then continued at this lower level to present. Over time, the relative contribution of different fleets to the total catch of North Atlantic albacore has changed, which resulted in differential effects on the age structure of the stock.

The historical time series of catch was extended back to 1930 for the troll fishery after revision of data for the assessment. Total reported landings for the North Atlantic generally began to decline after 1986, largely due to a reduction of fishing effort by the traditional surface (trolling and baitboats) and longline fisheries (**ALB-Table 1**; **ALB-Figure 2a**). Some stabilization was observed in the 1990s, mainly due to the increased effort and catch by new surface fisheries (driftnets and mid-water pair pelagic trawl) with a maximum catch in 2006 at 36,989 t and since then a decreasing trend of catch is observed in the North Atlantic.

Total catch in 2008 was 20,359 t representing a decrease compared to the 2007 yield and to the 2006 peak catch (36,989 t) and the lowest recorded during the past decades. The surface fisheries accounted for the bulk of the total catch with 17,861 t reported in 2008 (88%) **(ALB-Table 1)**. The reported catch for EC-France in 2008 was 3,009 t, similar to 2007. The reported catch for EC-Spain in 2008 was 12,750 t from troll fleet and baitboat fleets in the summer Cantabrian Sea fishery and the baitboat fishery in the Canary Islands. It represents a decrease of 13 % from the catch declared in 2007. In contrast, EC-Ireland catches have increased by two and a half fold from 2007. Standardized catch rates of fish age 1 to 3 from the Spanish troll fleet were updated to 2008 and showed an increasing trend since 2003, peaking in 2005 and 2006 for age 1 and age 2, decreasing in 2007 and then increasing in 2008. In the case of age 3, there is a continued upward trend from 2003 to 2008. Catch rates of the Irish mid-water pelagic trawl fleet showed a steep decline in 2007 compared to the higher estimates for 2005 and

2006. The catch for EC-Portugal from the baitboat fishery amounted to 614 t in 2008, a three-fold increase compared to 2007.

In total, the 2008 longline catches were similar to 2007. The Chinese Taipei catch in 2008 was 1,107 t, a decrease of 190 t from 2007. The decrease mainly stemmed from a rise in oil prices, thus resulting in a decrease in fishing effort. Japan takes albacore as by-catch with longline gear. Japan's longline catch amounted to 437 t in 2008, which was an increase from 288 t in 2007, which was the historical low. The catch fluctuated from 300 t to 1,300 t in the last decade. Updated catch rates from Chinese-Taipei longline fishery showed the same level as in 2007.

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

South Atlantic

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

Total reported albacore landings for 2008 were 18,576 a decrease of about 1,500 t compared to the 2007 catch. The Chinese Taipei catch in 2008 was 9,966 t, a decrease of 3,180 t as compared with that of 2007. This considerable decrease was mainly stemmed from a rise of oil price thus resulted in a decrease in fishing efforts of targeting southern albacore. Chinese Taipei longliners (including boats flagged Belize and St. Vincent) stopped fishing for Brazil in 2003, which resulted in albacore only being caught as by-catch in tropical tuna-directed longline fisheries. Albacore is only caught as a by-catch in Brazilian tropical tuna-directed longline and baitboat fisheries. In 2008, the catch of the Brazilian fishery was 487 t, showing a decrease of about 9% compared to the 2007 catch. These catches are much lower than the average catch of about 4,287 t during the period 2000-2003, when albacore was a target species of the longline Brazilian fleet.

The estimated total annual pole fleet catch for South Africa was 3,362 t in 2008, similar to the average total catch over the last five years, but well below the mean annual catch over the last decade (~ 4,900 t). Reduced catches, particularly in the baitboat fishery, were compounded by: 1) the periodic availability of sub-adult albacore in near-shore waters, 2) change of targeting yellowfin tuna using rod-and-reel gear and 3) high fuel prices. In addition, better catch rates in Namibian waters resulted in 35 South African poling vessels to fish for Namibia for a number of months under charter agreements with the catches accruing to Namibia. Japan takes albacore as by-catch by longline gear. In 2008, the Japanese longline catch was 1,511 t. The catch showed a relatively large increase from 238 t in 2007 due to an increase in fishing effort in the waters off southern Africa (20-40˚S). Updated CPUEs from the longline Chinese Taipei fishery in 2008 showed the same level as in 2007.

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

Mediterranean

Reported landings accounted for 2,586 t in 2008 a decrease from the 6,546 t taken in 2007 (**ALB-Table 1** and **ALB-Figure 2c**). The majority of the catch came from longline fisheries. However the reported catch in is provisional and incomplete, particularly so in 2008.

ALB-3. State of stocks

A thorough revision of North Atlantic Task I and Task II data was conducted and a more robust method for catch-at-size analyses was implemented for the 2009 assessment session similar to that used in the 2007 assessment. In addition, catch rate analyses were improved and updated with new information for the northern albacore fisheries and a substantial effort was undertaken to implement assessment methods which do not assume that catch-at-age is perfectly known. The analyses were also conducted to incorporate longer time-series of catch, effort and size information into the assessment to guide the evaluation. The approach provided the opportunity to evaluate a range of hypothesis about how the fisheries operated over time and their impact on the population. The results of these efforts are reflected in the following summaries of stock status that analyzed data through 2007.

North Atlantic

The CPUE trends for the various surface fleets, based upon the most recent available 2007 data showed somewhat different patterns from each other. This was also the case for the different longline fleets (**ALB-Figure 4**). The Spanish age two troll CPUE series showed evidence of a relatively strong 2003 year class entering the fishery. For the Spanish age three troll CPUE series, the age signal is not as strong, leading to uncertainty about the possibility of a good year class. For the longline fleets, the general trend in CPUE indices is a decline over time, with varying rates. Given the variability associated with these catch rate estimates, definitive conclusions about recent trends could not be reached just by examining the CPUE trends alone which represent different parts of the population.

The data sets used for the analyses from 1930 to 2007 were compiled during the July 2009 stock assessment meeting. The data was classified into 10 fisheries units using the same definitions as those used in the 2007 stock assessment. The basic input data, catch, effort and catch-at-size were revised due to updates in the ICCAT Task I (**Table 1**) and Task II database. Model specification for the base case was identical to the 2007 assessment and described in detail in document SCRS/2009/108, however the model was run using the latest version of the software. Different hypothesis on the dynamics of the northern albacore stock were tested and those with clearly unrealistic outputs were discarded.

Based on the present assessment which considers catch and effort since the 1930s and size frequency since 1959, the view of the northern albacore resource status is that spawning stock size has declined and in 2007 was about one third of the peak levels estimated for the late 1940s. Estimates of recruitment to the fishery, although variable, have shown generally higher levels in the 1960s and earlier periods with a declining trend thereafter until 2007. The most recent recruitment is estimated to be the lowest for all the years of the evaluation although the magnitude of this year-class is highly uncertain in the latest year (**ALB-Figure 5**). The 2009 current assessment indicated that the stock has remained below B_{MSY} (current SSB_{2007} is approximately 62% of SSB at MSY) (**ALB-Figure 5**) since the late 1960. Corresponding fishing mortality rates have been above F_{MSY} (current ratio F_{2007}/F_{MSY} is 1.05 which is only slightly higher than F_{MSY}) (**ALB-Figure 6**).

The trajectory of fishing mortality and spawning stock biomass relative to MSY reference points, from the assessment model is shown in **ALB-Figure 6**. As the majority of the time series is in the top left quadrant (F/F_{MSY} >1 and, SSB/SSB_{MSY} <1) this could indicate the northern albacore stock has been overfished (SSB/SSB_{MSY} <1) since the mid-1980s. Uncertainty around the estimates of current F_{2007}/F_{MSY} and SSB_{2007}/SSB_{MSY} is shown in (**ALB-Figure 7**).

South Atlantic

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

The southern CPUE trends, mainly based on an updated longline standardized CPUE series up to 2007 which harvest mostly mature albacore, showed a strong declining trend in the early part of the time series, and less steep decline over the past decade; while those from the surface fishery, harvesting mostly juvenile albacore, are more recent and show no apparent trend (**ALB-Figure 8**).

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

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

Mediterranean

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

ALB-4. Outlook

North Atlantic

Using the reference points calculated by the current base case 2009 assessment model, projections (SCRS/2009/164) indicate that constant catches above 28,000 t will not result in stock rebuilding to Convention standards by 2020 (**ALB-Figure 11**).

South Atlantic

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

ALB-5. Effects of current regulations

North Atlantic

Since 2001, the Commission established a total allowable catch (TAC) of 34,500 t for this stock and, in 2003 extended it to 2007. Furthermore, a 1998 recommendation that limits fishing capacity to the average of 1993-1995, remains in force. The Committee noted that reported 2001-2004 catches had been below the TAC, but that 2005 and 2006 catches were above TAC, however, the 2007 reported catch of 21,549 t was well below the TAC. In 2007, the Commission established a new TAC for 2008 and 2009 of 30,200 t [Rec. 07-02], but included several provisions that allow the catch to exceed this level. In 2008 reported catch was 20.359 t **(ALB-Table 1).**

South Atlantic

Since 1999, the Commission established the total allowable catch (TAC) for this stock (in 2001-2003 the TAC has been set to 29,200 t and since then has been extended until 2011). The Committee noted that reported catches in 2007 and 2008 were well below the TAC.

Mediterranean

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

ALB-6. Management recommendations

North Atlantic

The total allowable catch (TAC) for the northern albacore stock until 2007 was 34,500 t. The Committee noted that the reported catches for 2005 and 2006 were over the TAC and that the 2007 catch was well below the TAC.

In 2007, the Commission implemented [Rec. 07-02], intended to reduce the TAC to 30,200 t in 2008 and 2009 and allow the rebuilding of the northern albacore stock from the overfished condition. However, it was reiterated that the fishing opportunities provided in [Rec. 07-02] allow the potential catch to exceed the TAC (**ALB-Figure 2a**). In view of the 2009 assessment, in order to achieve the Commission management objective by 2020, a level of catch of no more than 28,000 t will be required.

South Atlantic

In the case of the southern stock, the present TAC is 29,900 t. Recent catches were below the TAC level. The 2005 assessment showed that the southern stock was overfished and model projections indicated that catches, at about the 2006 level (24,452 t), will recover the stock. The observed 2007 catch was even lower. In 2008, reported catch of 18,902 t was again well below the TAC.

The Committee considered that the current management regulations are sufficient for the recovery of the southern stock. In 2007, the Commission recommended [Rec. 07-03] adopting a catch limit of 29,900 t (the lowest estimate of MSY) until 2011.

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY

	North Atlantic	**South Atlantic**	**Mediterranean**
Current (2008) Yield	20,359 t	18,902 t	2,586 t [3]
Maximum Sustainable Yield	29,000 t	33,300 t (29,900-36,700) [1]	Unknown
Replacement Yield (2007)	Not estimated	28,800 t (25,800-29,300)[1]	Not estimated
SSB_{2007}/SSB_{MSY} [2]	0.62 (0.45-0.79)[2]		Not estimated
SSB_{2005}/SSB_{MSY} [1]		0.91 (0.71-1.16)[1]	
Relative Fishing Mortality			
F_{2007}/F_{MSY} [2]	1.045 (0.85-1.23) [2]		Not estimated
F_{2005}/F_{MSY} [1]		0.63 (0.47-0.9)[1]	
Management measures in effect	[Rec. 98-08]: Limit No. of vessels to 1993-1995 average TAC: 34,500 t [Rec. 03-06] until 2007 TAC: 30,200 t [Rec. 07-02] for the 2008 and 2009 period.	[Rec. 07-03]: Limit catches to 29,900 t until 2011	None

[1] Reference points estimates based in 2007 assessment. Approximately 95% confidence bounds in the South stock.

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

[3] Provisional and incomplete.

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

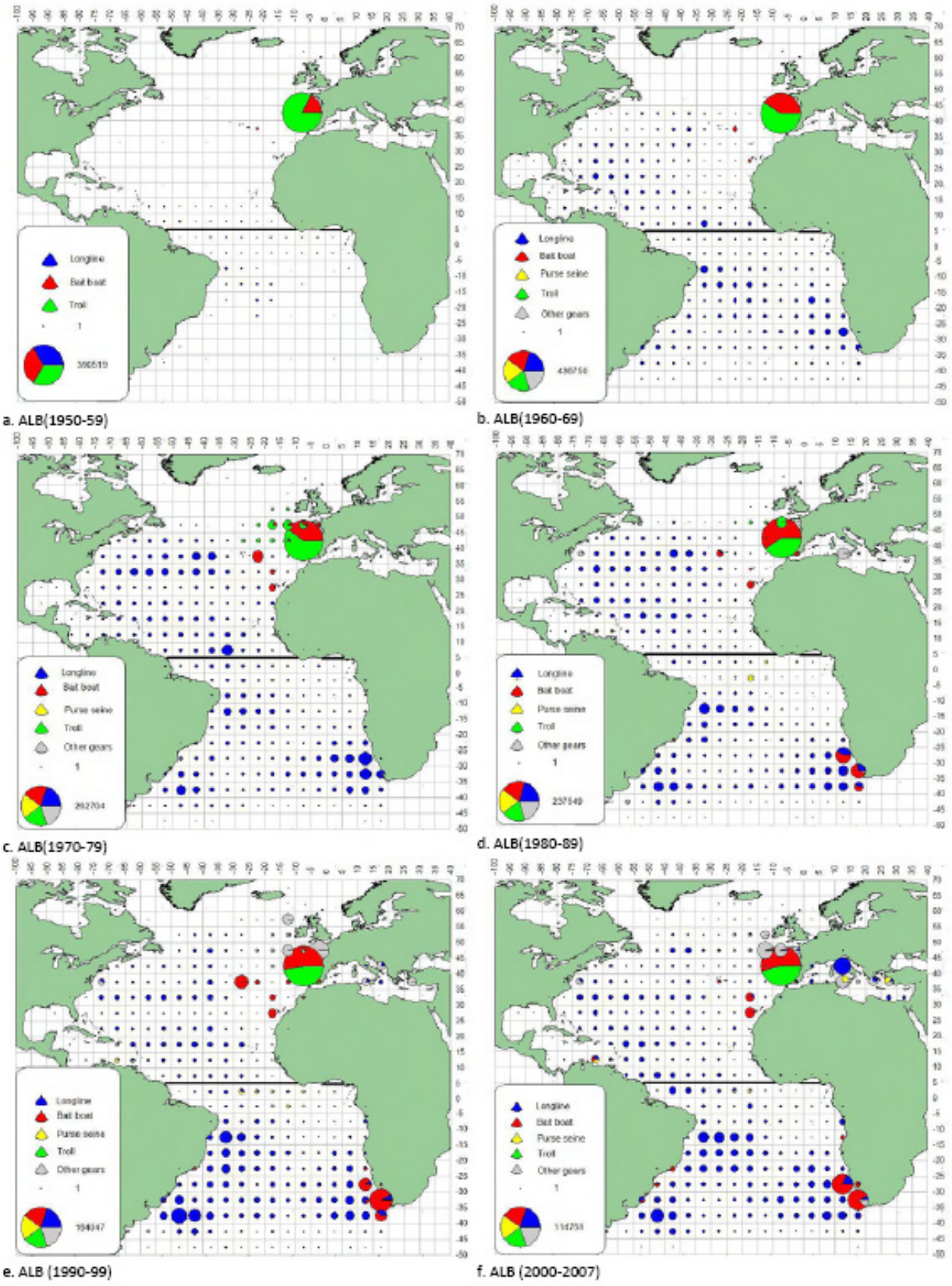
			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2007	2008*
TOTAL			59850	76052	88568	82778	67295	63342	67492	56344	69627	73086	71812	67517	60379	59585	59039	67058	71165	69916	60094	61539	53385	57728	67389	48704	41387	48827	41847
	ATN		41800	40826	47568	38153	33059	32071	36882	27949	30863	38135	35163	38377	28803	29023	25746	34551	34200	26254	22741	25644	25967	35318	36989	21863	20225	21991	20359
	ATS		14599	31097	37288	40630	30173	27212	28714	26016	36562	32813	35300	27552	28426	28022	30595	27656	31387	38796	31746	28002	22543	18881	24452	20274	18576	20269	18902
	MED		3451	4129	3712	3996	4063	4060	1896	2379	2202	2138	1349	1587	3150	2541	2698	4851	5577	4866	5608	7893	4874	3529	5947	6566	2586	6566	2586
Landings	ATN	Bait boat	8313	12589	15217	18794	15933	15374	18625	8985	12448	15646	11967	16411	11338	9821	7562	8780	12148	6104	6638	7918	8128	10458	14273	8497	7932	8497	7932
		Longline	19709	17413	21232	7296	3013	2239	2683	5315	3152	7093	7309	4859	4641	4051	4035	6710	7321	7372	6180	7699	6917	6911	5223	3109	2364	3237	2498
		Other surf.	2194	108	213	343	994	1652	3865	3999	5173	7279	7506	3555	3337	4378	6846	6817	5971	2828	422	551	697	624	625	525	274	525	274
		Purse seine	555	59	60	1	97	12	1	222	139	229	292	278	263	26	91	56	191	264	118	211	355	99	188	198	95	198	95
		Trawl	0	2	0	262	1693	2240	1033	469	2603	1779	2131	3049	2571	2877	1318	5343	3547	5374	5376	3846	2369	7001	6385	3429	4321	3429	4321
		Troll	11029	10654	10847	11457	11329	10554	10675	8959	7348	6109	5959	10226	6652	7870	5894	6845	5023	4312	4007	5419	7501	10224	10296	6105	5239	6105	5239
	ATS	Bait boat	4166	7909	6829	8181	7696	7393	5981	3454	6490	7379	8947	7091	6960	8110	10353	6709	6873	10355	9712	6973	7475	5084	5876	3374	4346	3374	4346
		Longline	9834	22672	29815	30964	21894	19407	21590	22008	27162	23947	24806	20040	21000	19547	19799	20640	24398	28039	21671	20626	14735	12977	17740	15093	12961	15087	13287
		Other surf.	234	334	400	537	398	411	1139	137	393	39	483	10	209	127	0	73	58	377	323	82	299	288	395	1762	1219	1762	1219
		Purse seine	365	182	244	948	185	0	4	416	2517	1448	1064	412	257	117	434	183	58	25	39	309	16	533	441	45	50	45	50
		Trawl	0	0	0	0	0	0	0	0	0	0	0	0	0	120	9	52	0	0	0	12	18	0	0	0		0	
	MED	Bait boat	1331	243	0	0	0	0	83	499	171	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0	0	0	0
		Longline	226	375	324	164	168	165	624	524	442	410	350	87	391	348	194	417	2800	2597	3706	4248	2345	2012	3010	4119	2520	4119	2520
		Other surf.	1753	2973	3068	3782	3879	3879	1098	1198	1533	879	766	1031	2435	1991	2426	4265	2689	2193	1755	3166	2176	1200	134	1401	42	1401	42
		Purse seine	141	274	10	50	16	16	91	110	6	559	23	0	0	0	0	0	0	0	1	478	353	317	2803	1046	24	1046	24
		Troll	0	264	310	0	0	0	0	48	50	59	129	306	119	202	45	73	0	0	117	0	0	0	0	0	0	0	0
Discards	ATN	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	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	5	8	10	13	9	7	7	7	7
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	26	22	26
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0		0	
		Canada	0	0	1	21	47	22	6	5	1	9	32	12	24	31	23	38	122	51	113	56	27	52	27	25	33	25	33
		Cape Verde	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	14	8	20	0	0	21	16	57	196	155	32	112	202	59	24	59	24
		Chinese Taipei	14923	14899	19646	6636	2117	1294	3005	4318	2209	6300	6409	3977	3905	3330	3098	5785	5299	4399	4330	4557	4278	2540	2357	1297	1107	1297	1107
		Cuba	69	20	31	15	4	1	2	0	0	0	0	0	0	0	0	0	0	0	1	322	435	424	527	0		0	
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	323	121	73	95	0	0	0	0	0	0	0		0	
		EC.España	15656	20672	24387	28206	26738	25424	25792	17233	18175	18380	16998	20197	16324	17295	13285	15363	16000	9177	8952	12530	15379	20447	24538	14582	12750	14582	12750
		EC.France	2797	1860	1200	1921	2805	4050	3625	4123	6924	6293	5934	5304	4694	4618	3711	6888	5718	6006	4345	3456	2455	7266	6585	3179	3009	3179	3009
		EC.Ireland	0	0	0	0	0	0	40	60	451	1946	2534	918	874	1913	3750	4858	3464	2093	1100	755	175	306	521	596	1517	596	1517
		EC.Portugal	775	657	498	433	184	169	3185	709	1638	3385	974	6470	1634	395	91	324	278	1175	1953	553	513	556	119	184	614	184	614
		EC.United Kingdom	0	0	0	0	0	0	0	0	59	499	613	196	49	33	117	343	15	0	0	0	0	6	19	30	50	30	50
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	7	2	0	3	0	3	0
		Grenada	0	0	0	0	0	0	0	0	0	0	0	2	1	6	7	6	12	21	23	46	25	29	19	20	15	20	15
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		Japan	576	844	470	494	723	764	737	691	466	485	505	386	466	414	446	425	688	1126	711	680	893	1336	781	291	319	288	437
		Korea Rep.	967	390	373	18	16	53	34	1	0	8	0	2	2	1	0	0	0	0	0	0	0	59	45	12		12	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	81	120	178	98	96	99	96	99
		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	
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		NEI (Flag related)	0	0	0	0	0	0	0	11	19	13	10	8	11	3	8	12	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	2551	601	525	44	0	0	0	0	29	60	117	73	11	5	0	0	0	0	0	0	0	0	96	167		298	16
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	4	0	0	0	0	0	9	0	8	19	8	19
		Sierra Leone	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	0	0		0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	704	1370	300	1555	89	802	76	263	130	263	130
		Sta. Lucia	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	1	3	2	10	0	2	2	2	2	2	2
		Trinidad and Tobago	194	318	0	0	0	0	4	0	247	0	0	0	0	2	1	1	2	11	9	12	12	9	12	18	32	18	32
		U.S.A.	2206	98	251	301	288	243	357	479	438	509	741	545	472	577	829	315	406	322	480	444	646	488	400	532	248	532	248
		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		0	
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	2	0	0	1	1	0	0	0	0	0
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	414	507	235	95		95	
		Venezuela	1076	467	187	64	137	41	95	319	205	246	282	279	315	75	107	91	1375	349	162	424	457	175	321	375	222	375	222
	ATS	Argentina	209	153	356	469	344	354	151	60	306	0	2	0	0	120	9	52	0	0	0	12	18	0	0	0		0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	8	2	0	0	0	0	0	54	32	31	32	31
		Brasil	732	382	520	395	421	435	514	1113	2710	3613	1227	923	819	652	3418	1872	4411	6862	3228	2647	522	556	361	535	487	535	487
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0		0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	89	26	30	26	112	95	100	35	25	35	25
		Chinese Taipei	7889	19643	27592	28790	20746	18386	21369	19883	23063	19400	22573	18351	18956	18165	16106	17377	17221	15833	17321	17351	13288	10730	12293	13146	9966	13146	9966
		Cuba	67	27	24	10	2	1	2	17	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		EC.España	307	155	200	807	185	0	0	280	1943	783	831	457	184	256	193	1027	288	573	836	376	81	285	367	758	908	758	908
		EC.France	7	18	35	100	0	0	0	50	449	564	129	82	190	38	40	13	23	11	18	63	16	478	347	12	50	12	50
		EC.Portugal	741	1357	1029	899	1153	557	732	81	184	483	1185	655	494	256	124	232	486	41	433	415	9	43	8	13	49	13	49
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0
		Honduras	0	0	0	0	0	0	0	0	29	0	0	2	0	7	1	6	0	0	0	0	0	0	0	0		0	
		Japan	224	623	739	357	405	450	587	654	583	467	651	389	435	424	418	601	554	341	231	322	509	312	316	244	1191	238	1511
		Japan (foreign obs.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		Korea Rep.	348	511	321	383	180	54	19	31	5	20	3	3	18	4	7	14	18	1	0	5	37	42	66	56	147	56	147
		Maroc	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	
		NEI (ETRO)	0	0	0	0	0	0	4	8	122	68	55	63	41	5	27	0	0	10	14	53	0	15	46	15		15	

		NEI (Flag related)	0	0	0	0	0	0	0	149	262	146	123	102	169	47	42	38	0	0	0	0	0	0	0	0		0	
		Namibia	0	0	0	0	0	0	0	0	0	0	1111	950	982	1199	1429	1162	2418	3419	2962	3152	3328	2344	5100	1196	1958	1196	1958
		Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	9	192	0	2	0	0	0	0	0	0	0	0	0	0	0
		Panama	0	0	280	924	0	0	0	240	482	318	458	228	380	53	60	14	0	0	0	0	0	17	0	87	0	87	5	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	52	0	13	79	13	79	
		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		0		
		South Africa	3540	6697	5930	7275	6636	6890	5280	3410	6360	6881	6931	5214	5634	6708	8412	5101	3610	7236	6507	3469	4502	3198	3735	3797	3468	3797	3468	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2116	4292	44	0	0	0	65	160	71	160	71	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	1	1	2	8	2	1	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		0		
		UK.Sta Helena	9	0	0	2	1	1	1	5	28	38	5	82	47	18	1	1	58	12	2	0	0	0	62	46	94	46	94	
		Uruguay	526	1531	262	178	100	83	55	34	31	28	16	49	75	56	110	90	90	135	111	108	120	32	93	34	53	34	53	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	1400	96		96		
	MED	EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	12	30	255	425	507	712	209	712	209	
		EC.España	1368	531	0	3	3	0	84	548	227	298	218	475	429	380	126	284	152	200	209	1	138	189	382	516	238	516	238	
		EC.France	141	250	20	60	31	31	121	140	11	64	23	3	0	5	5	0	0	0	1	0	0	0	0	2	1	2	1	
		EC.Greece	0	0	484	500	500	500	500	500	500	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448	15	448	15	
		EC.Italy	1942	3348	3208	3433	3529	3529	1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6912	3671	2248	4584	4017	2104	4017	2104	
		EC.Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	0	2	0	10	15	0	1	5	1	5	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0		
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	0	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0		
		Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	14	19	14	
		Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	30	73	852		852		
		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		0		
Discards	ATN	U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0		

*The shaded cells of the last two columns (Task I current) indicate which figures have changed since the assessment (Task I as of assessmen

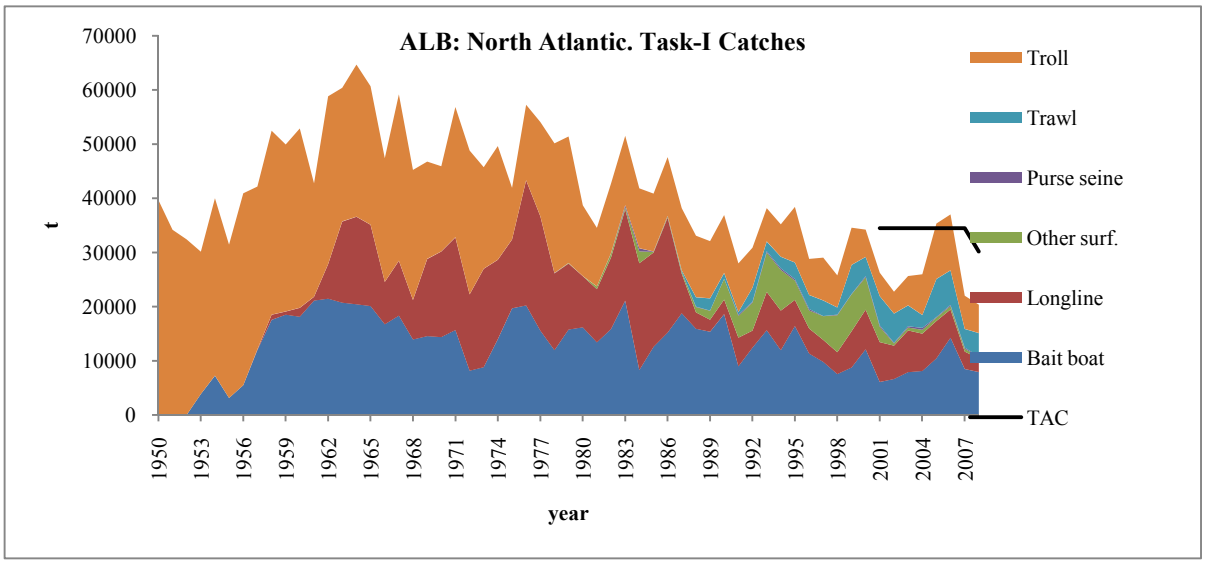
Notes

Task-I catches (new figures) not included in the table: Turkey 2008 MED (208 t), Vanuatu 2008 ATN (20 t) and ATS (131 t).

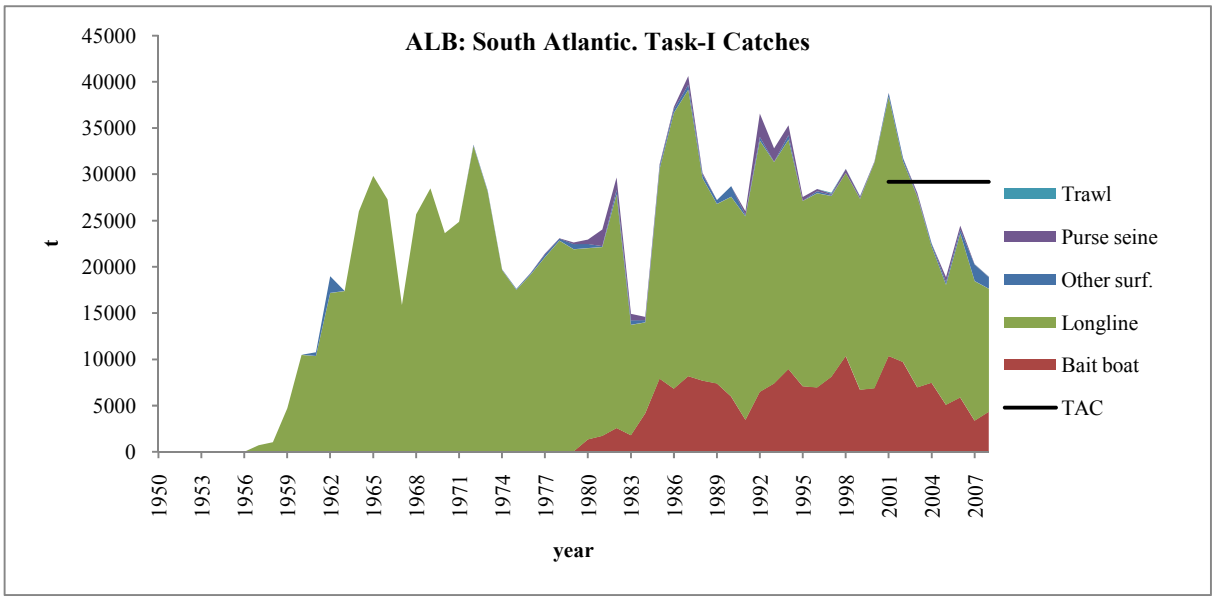


ALB-Figure 1. Geographic distribution of albacore catch by major gears and decade (1950-2007). Baitboat and troll catches are aggregated by 5ºx5º degrees in the Bay of Biscay thus the spatial representation of catch is concentrated on this area.

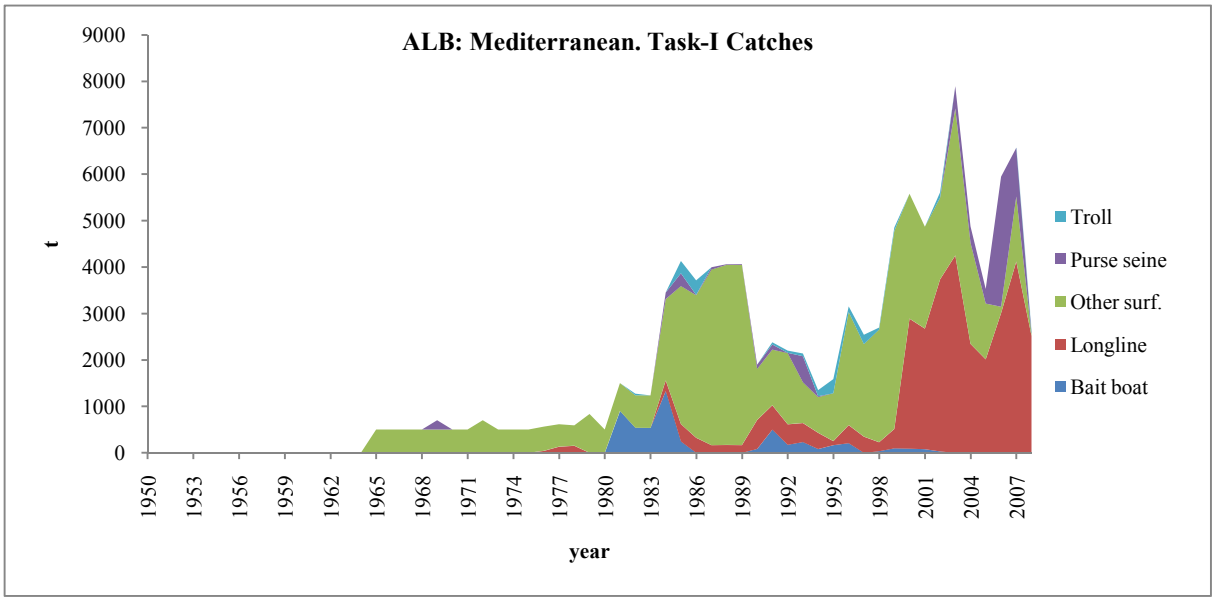
a)


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

b)

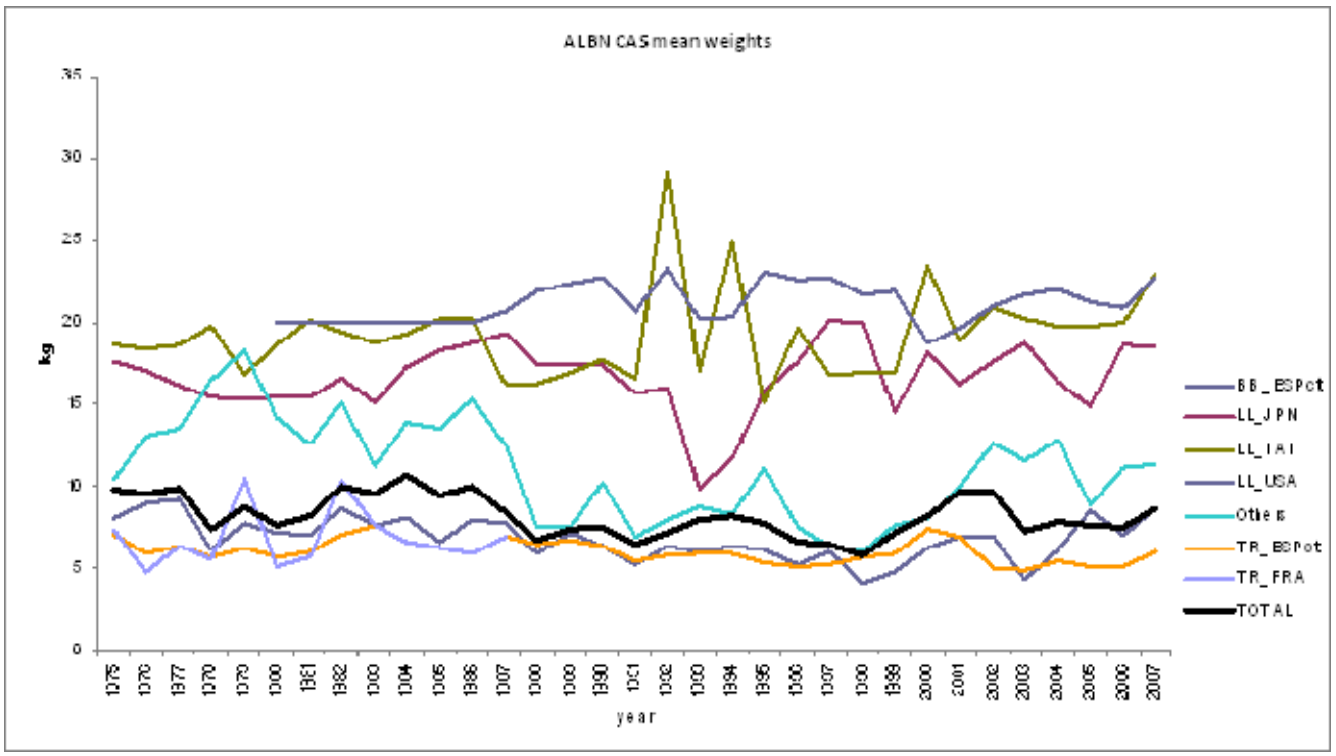

ALB: South Atlantic. Task-I Catches
t
year
Trawl
Purse seine
Other surf.
Longline
Bait boat
TAC

c)

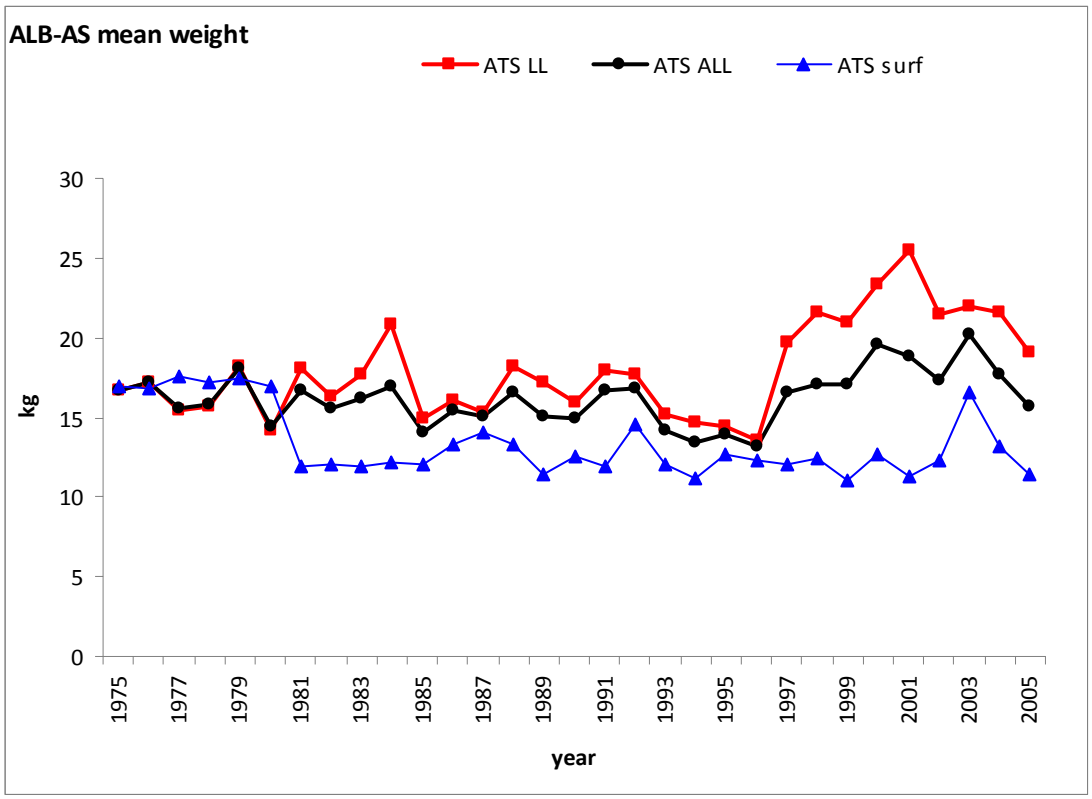


ALB-Figure 2a, b, c. Total albacore catches reported to ICCAT (Task I) by gear for the northern, southern Atlantic stocks including TAC, and Mediterranean stock.

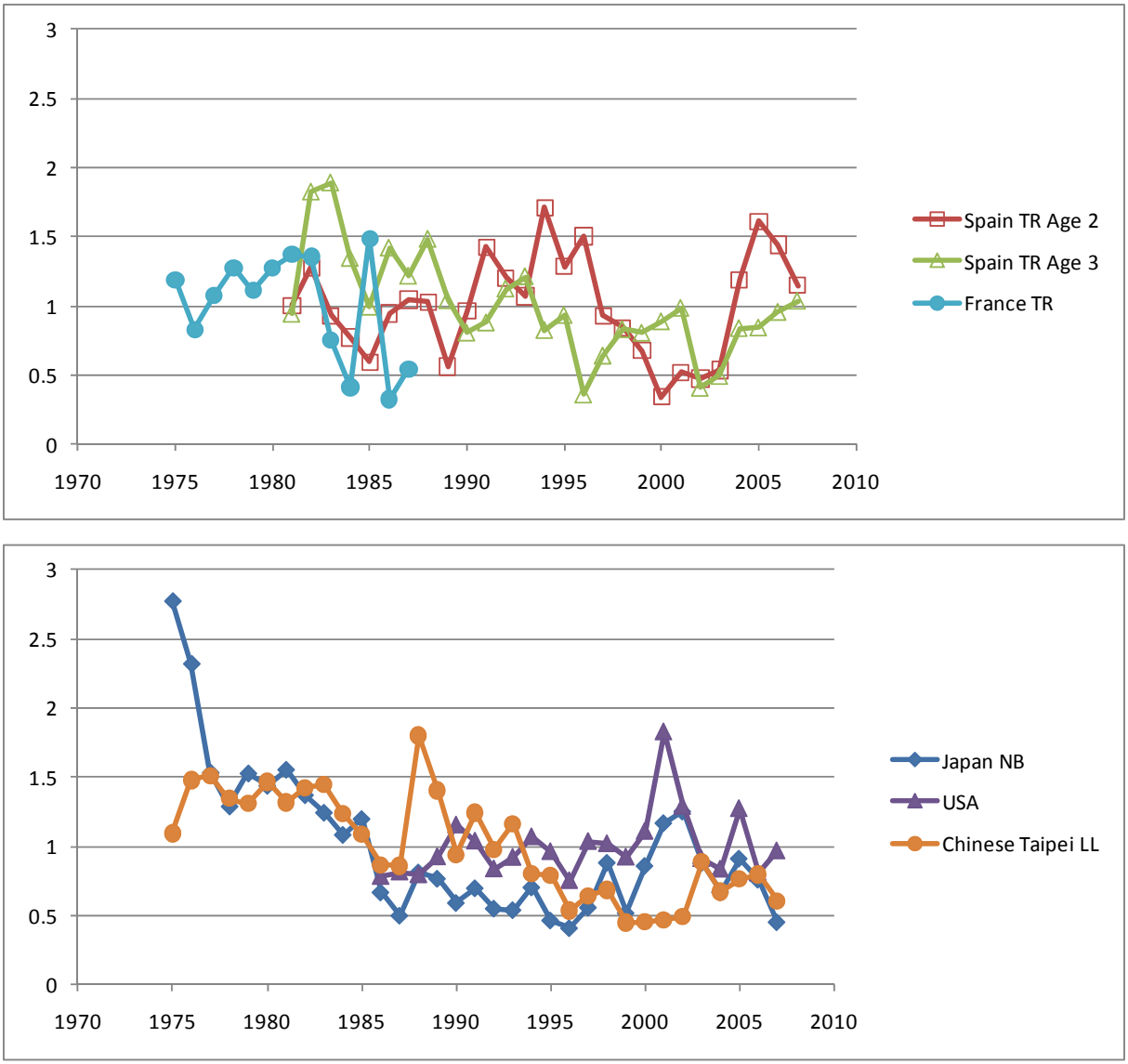
a)



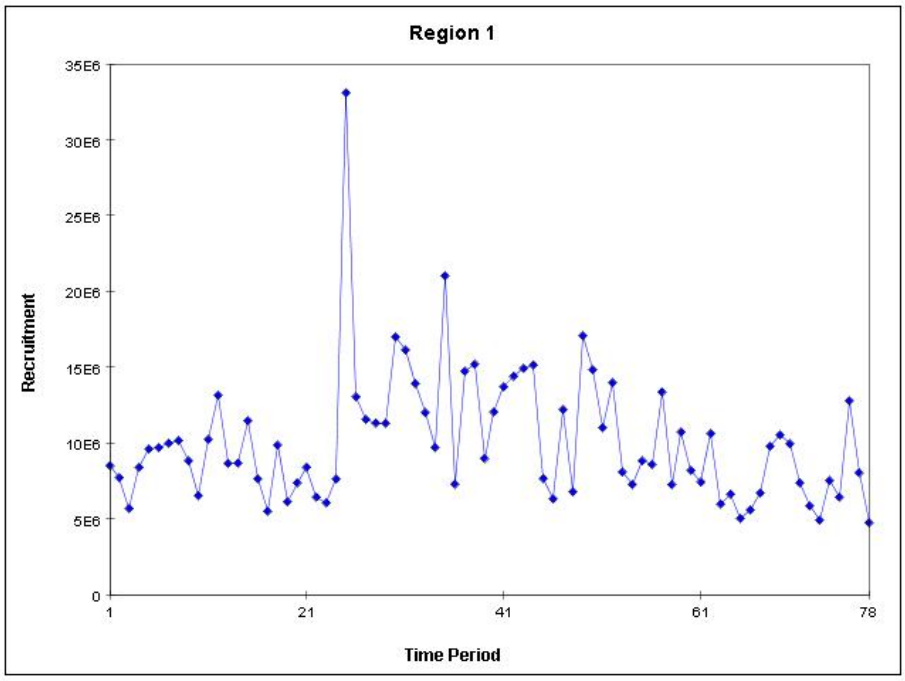
b)

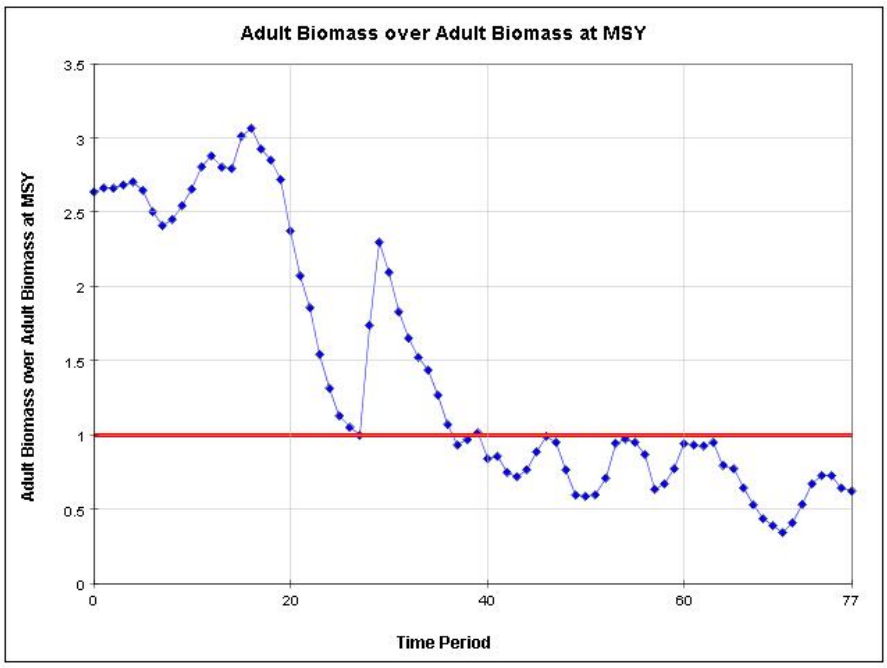


ALB-Figure 3a, b. Mean weight trend by surface and longline fisheries in North and South Atlantic stocks.

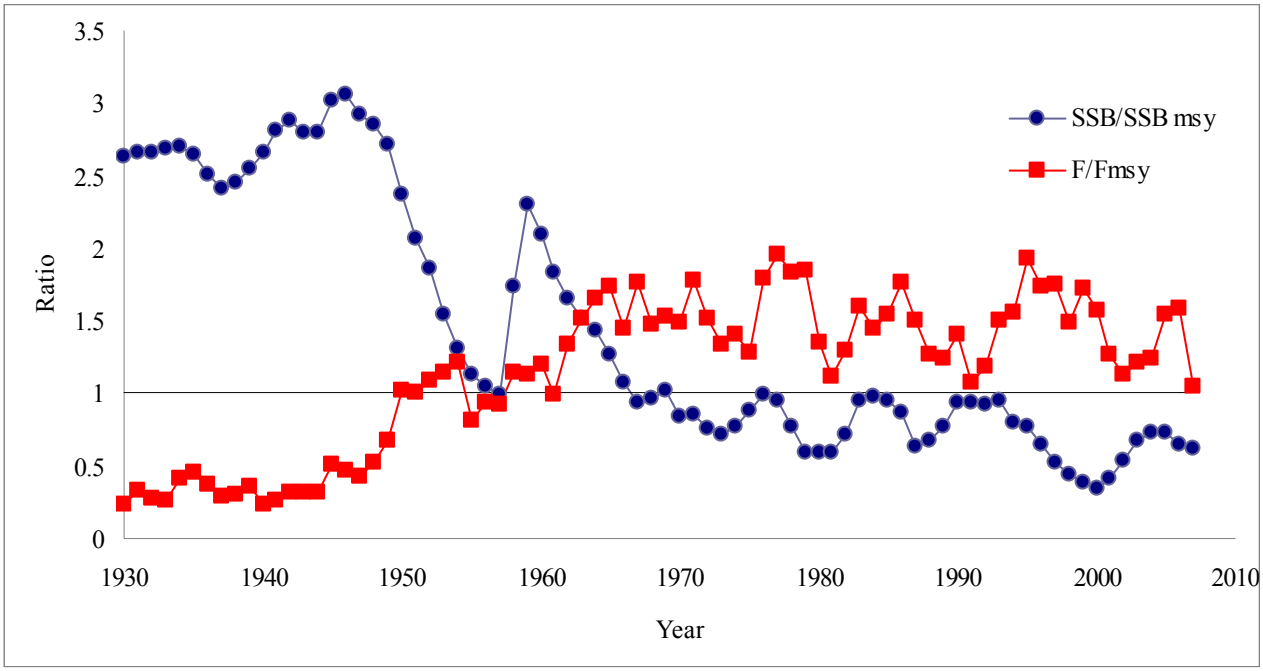


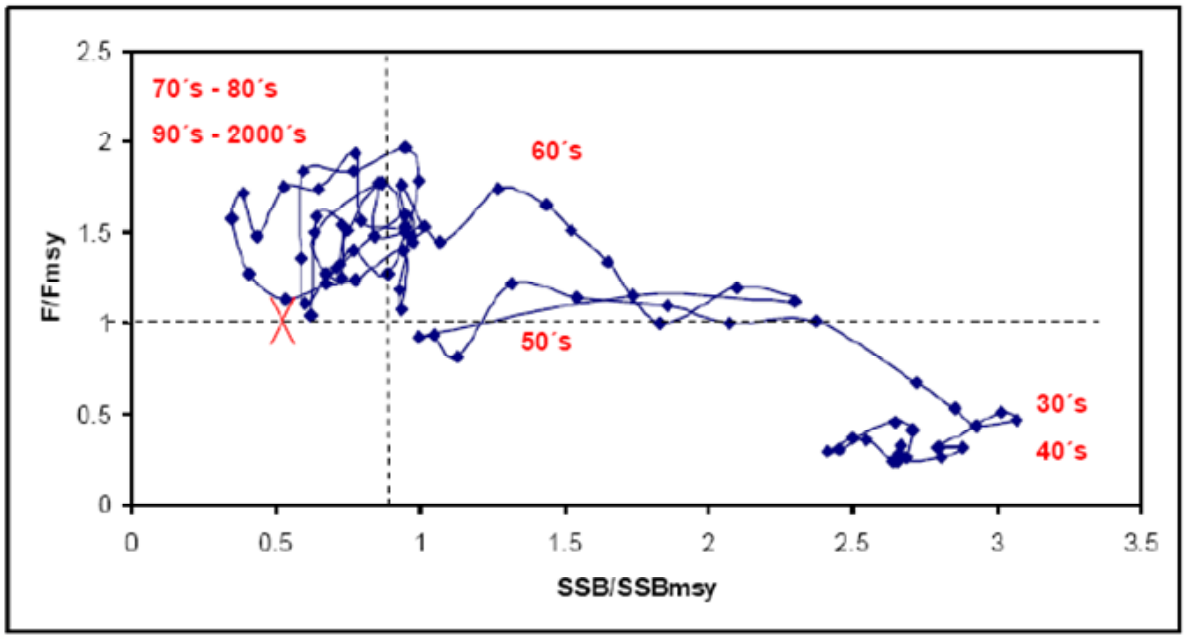
ALB-Figure 4. Standardized catch rate indices used in the 2009 northern albacore stock assessment from the surface fisheries (upper panel), which take mostly juvenile fish, and from the longline fisheries (lower panel), which take mostly adult fish.



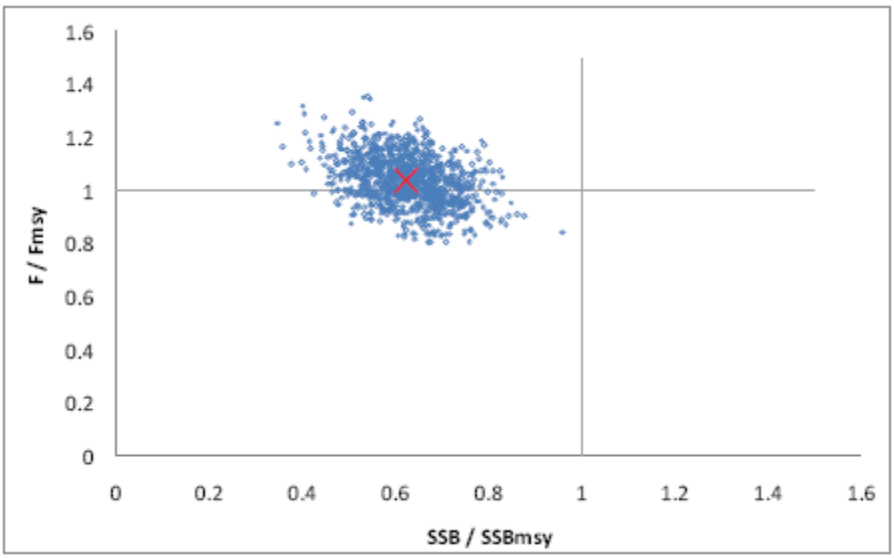


ALB-Figure 5. Estimates of northern Atlantic albacore recruitment (age 1) and spawning stock size from 1930-2007 from Multifan-CLmodel assesment. Uncertainty in the estimates has not been characterized, but the uncertainty in recent recruitment levels is considered to be higher than in the past.

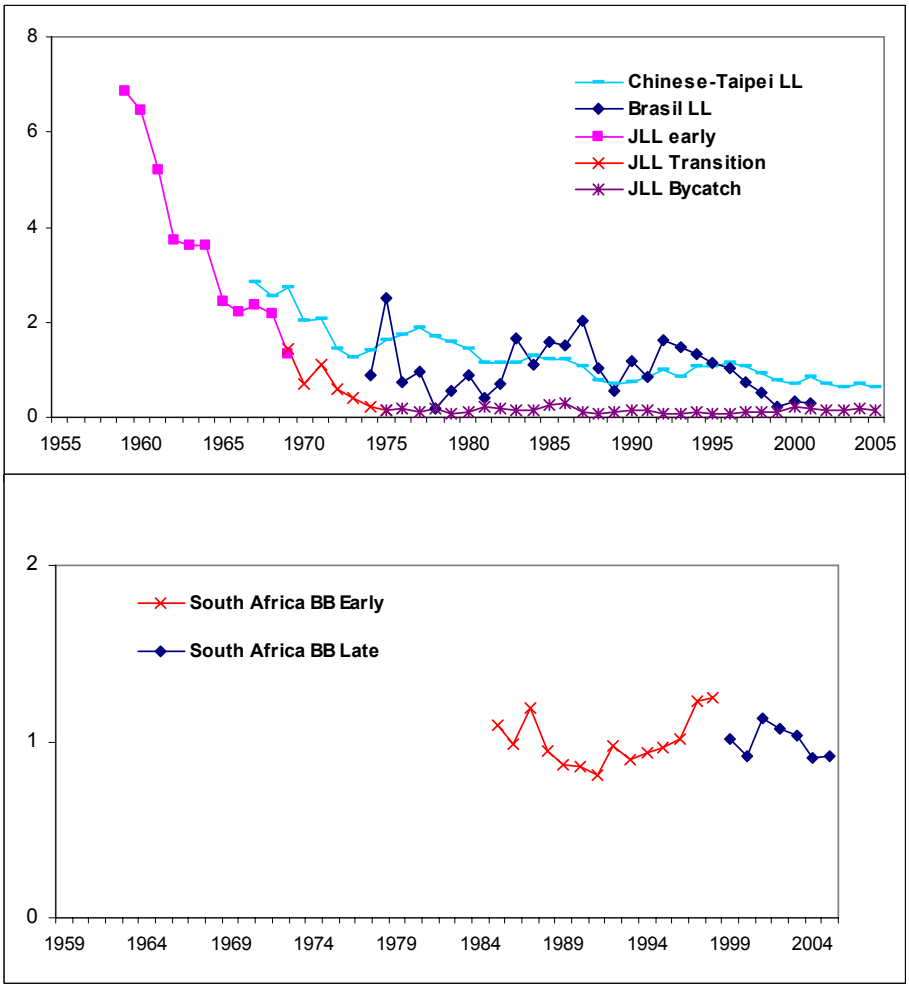




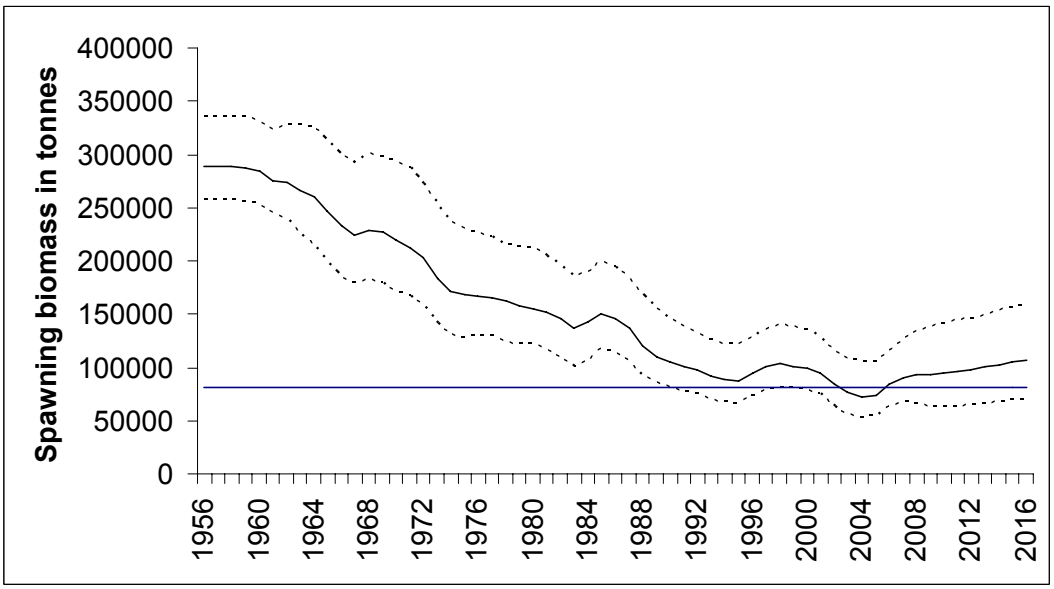
ALB-Figure 6. Stock status of northern albacore, estimated with Multifan-CL. Top: Relative biomass (B/B_{MSY}) and relative fishing mortality (F/F_{MSY}) trajectories over time. Bottom: joint trajectories of B/B_{MSY} and F/F_{MSY}. The red X cross in the lower panel represents the stock status in 2007.

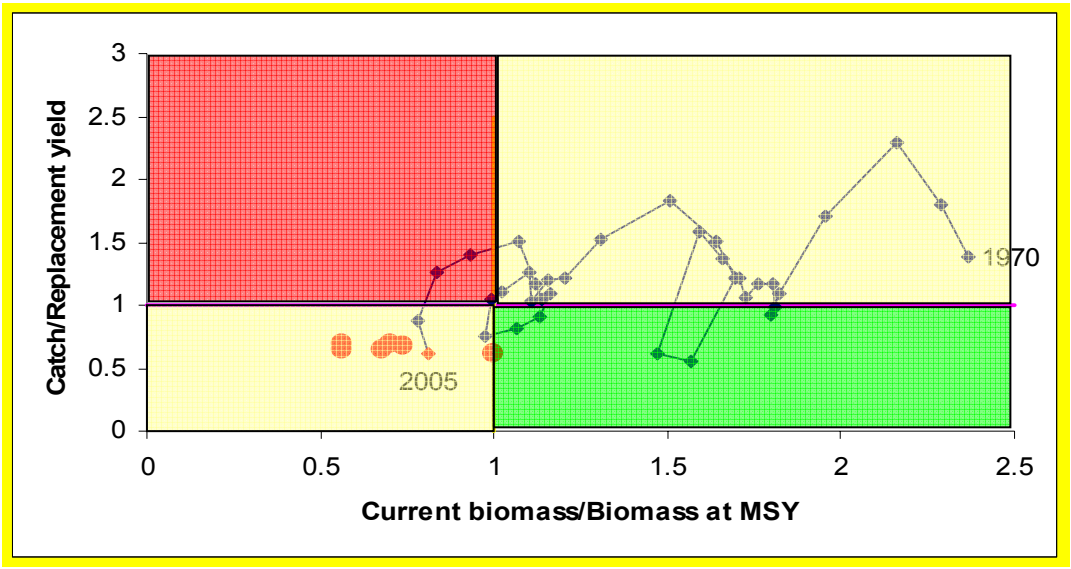


ALB-Figure 7. Uncertainty in current stock status for northern albacore, as estimated from the MULTIFAN base case model. The X represents the current (2007) estimates of fishing mortality and spawning biomass ratios, and the scatter of points depicts uncertainty in that estimate.

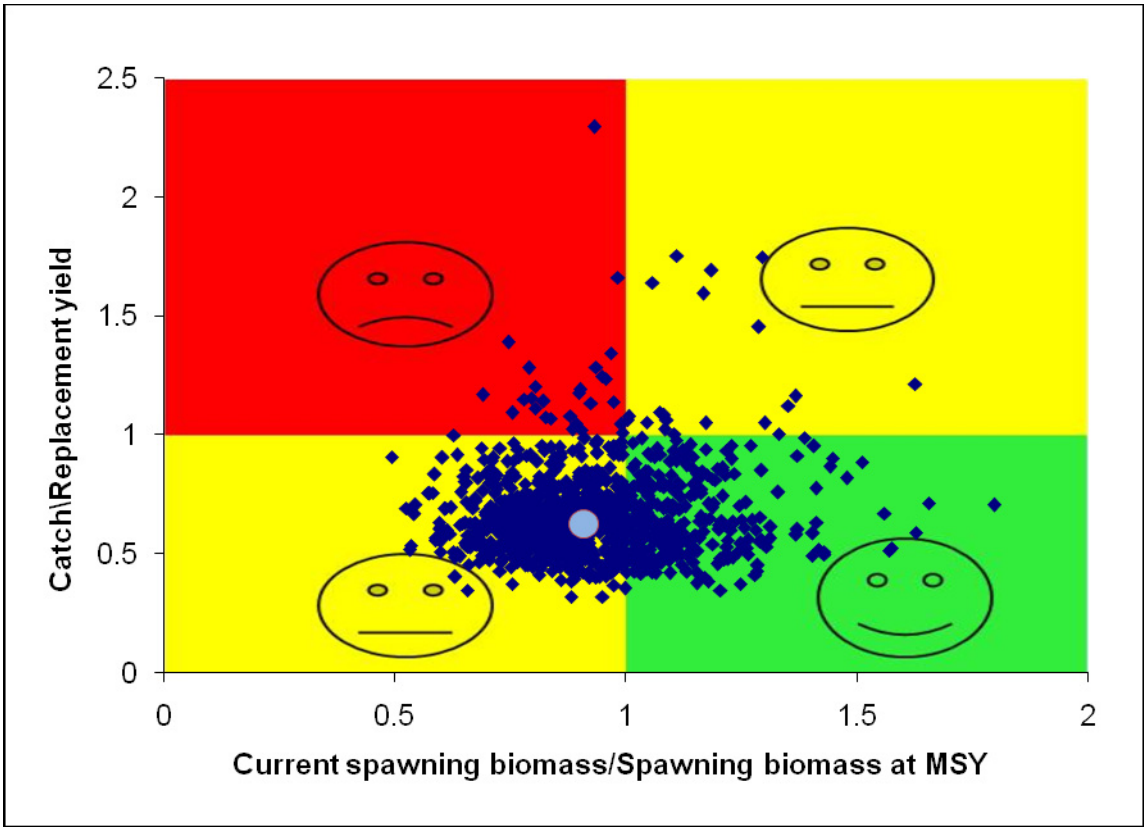


ALB-Figure 8. Standardized catch rates indices used in the 2007 southern albacore stock assessment from the longline fisheries (upper panel), which take mostly mature fish, and from the surface fisheries (lower panel), which take mostly juvenile fish.

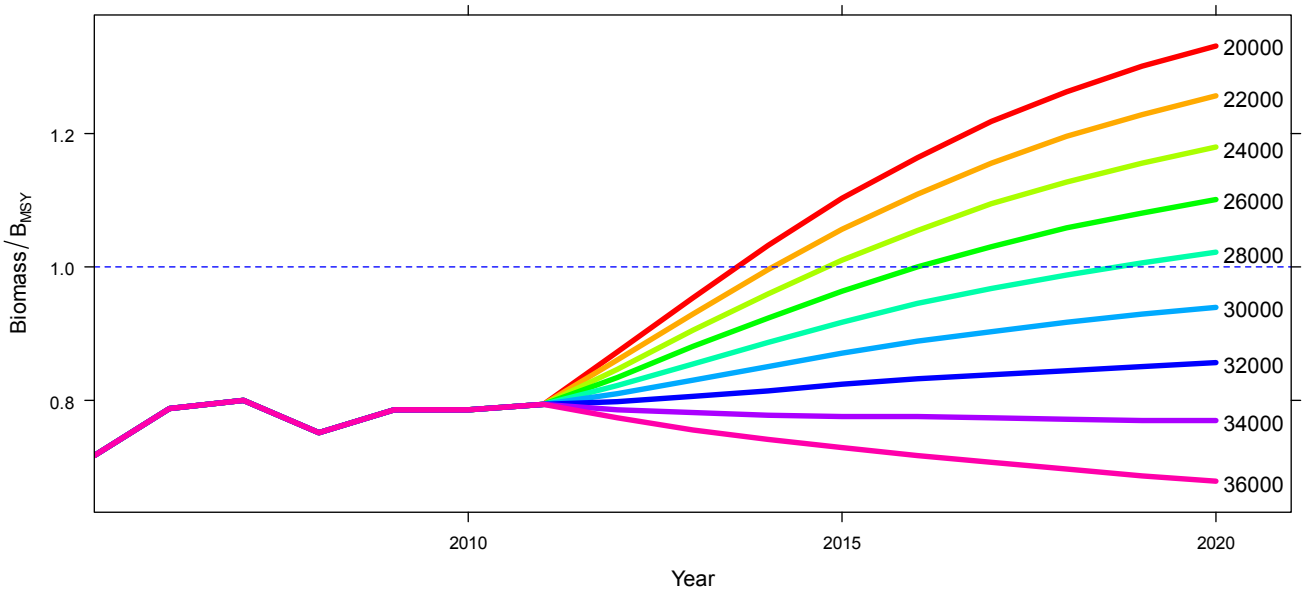




ALB-Figure 9. The upper plate indicates southern albacore spawning biomass over time, projections with a constant catch of 25,000 t over the next years and the reference B_{MSY} level with 80% confidence bounds. The lower plate indicates catch relative to replacement yield vs. current biomass relative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



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



ALB-Figure 11. Estimated projections of relative SSB (SSB/SSB_{MSY}) for different scenarios of constant catch (20,000 t – 36,000 t) assuming average recent year-class strengths for the North Atlantic albacore stock.

8.5 BFT – ATLANTIC BLUEFIN TUNA

The SCRS conducted full assessments of the status of the bluefin tuna resource in the Atlantic and the Mediterranean in 2008, but not in 2009. In the case of the western stock, the available data included catch, effort and size statistics through 2007, while for the eastern stock, data for 2007 were unavailable for analysis during the assessment session (see ICCAT Circular #1227/08). There were considerable data limitations for the eastern stock until 2007. These included poor temporal and spatial coverage for detailed size and catch-effort statistics for many fisheries, especially in the Mediterranean. Substantial under-reporting of total catches was also evident in the last decade.

The Committee strongly and unanimously supports the Bluefin Tuna Research Program that will start in 2010, and welcomed the Commission's commitment to the Program. Without such a significant and sustained effort, it would be unlikely that the Committee could improve, in the near future, its scientific diagnosis and management advice.

BFT-1. Biology

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

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

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

Remarkably, in 2009, considerable new information on the biology, the population structure and the spatial dynamics of Atlantic and Mediterranean bluefin tuna together with updated CPUE indices, fisheries independent surveys and research in farms have been presented. These new documents are summarized in SCRS/2009/192.

BLUEFIN TUNA - EAST

BFTE-2. Fishery Indicators – East Atlantic and Mediterranean

It is very well known that introduction of fattening and farming activities into the Mediterranean in 1997 and good market conditions resulted in rapid changes in the Mediterranean fisheries for bluefin tuna mainly due to increasing purse seine catches. In the last few years, nearly all of the declared Mediterranean bluefin fishery production was exported overseas. Declared catches in the East Atlantic and Mediterranean reached a peak of over 50,000 t in 1996 and, then decreased substantially, stabilizing around TAC levels established by ICCAT for the most recent period **(BFT-Table 1** and **BFTE-Figure 1)**. Both the increase and the subsequent decrease in declared production occurred mainly for the Mediterranean **(BFTE-Figure 1)**. In 2006, declared catch was about 30,647 t for the East Atlantic and Mediterranean, of which about 23,154 t were declared for the Mediterranean (note that 2007 catch reports were unavailable at the time of the assessment meeting). The 2007 and 2008 reported catches were, at the time of the meeting, at 34,514 t and 23,868 t, respectively **(BFT-Table 1)**.

Information available showed that catches of bluefin tuna from the eastern Atlantic and Mediterranean have been seriously under-reported from the mid-1990s until 2007. Lack of compliance with the TAC and underreporting of the catch undermines the conservation of the stock. An estimate made by the Committee in 2006 based on the number of vessels operating in the Mediterranean Sea and their respective catch rates, indicated that the volume of catch taken in recent years likely significantly exceeded TAC levels and probably was close to 43,000 t in the Mediterranean during the early 2000s. The Committee's evaluation in 2008 using the information from the ICCAT List of Bluefin Vessels, past catch rates and scientific knowledge of the fisheries led to an estimated 2007 catch of 47,800 t for the Mediterranean and 13,200 t for the East Atlantic, leading to a total of about 61,100 t for the eastern Atlantic bluefin tuna stock. The Committee's belief that significant underreporting was supported by examination of the information reported through various market data sources and which all led to the conclusion that the exports to the Japanese and US markets largely exceeded the reported catches. The Committee noted that up to 2007 most of the international trade of eastern bluefin went to the Japanese market, and thus such data were comparable to cross-check Task I data or estimating unreported catches. There is indication that this is no longer the case because there are other markets at present than Japan, so it is difficult to use Japanese trade data for the same purpose. Estimates of catch entered into the Mediterranean cages were about 16,000 t in 2008 which appears to be consistent with the estimates of 2008 purse seine catch (**BFTE-Table 1**).

In 2009, a much larger amount of information than in the past was available to the Committee. This included summaries of trade information, the list of authorized catching vessels, the weekly catch reports, caging declarations and the VMS data. Therefore, the Committee was able to estimate more precisely bluefin tuna catch levels in the East Atlantic and the Mediterranean Sea (**BFTE-Table 1**). The Committee's best estimate of catch for 2008 is 25,760 t, while the potential catch estimate (which may be seen as the utilized capacity under [Rec. 08-05]) is 34,120 t. The 2008 best catch estimate does not take any IUU catch into account while the potential 2008 catch estimate could include IUU from registered vessels, but not from unregistered ones. These two estimates can hardly be compared to previous "capacity" estimates because they are based on different sources of information. More importantly, they incorporate significant changes in catch rates due to the implementation of [Rec. 06-05] and [Rec. 08-05], with a much shorter fishing season, a higher size limit regulation and other controls, including individual vessel quotas for some vessels and observers on board programs. For comparison purposes with past "capacity tables" and to estimate the potential catch level that the fleet would have taken in 2008 if the rebuilding plan would have not been implemented, the Committee also considered the past catch rates (i.e. those that were used for the 2006 and 2007 capacity estimates when, among other things, the fishing season was considerably longer and the size limit lower). Using the 2008 list of vessels and past catch rates would have led to a catch capacity of 68,600 t (**BFTE-Table 1**).

Available indicators from small fish fisheries in the Bay of Biscay did not show any clear trend since the mid 1970s **(BFTE-Figure 2)**. This result is not particularly surprising because of strong inter-annual variation in year class strength.

Qualitative information from eastern fisheries since 2007 together with the preliminary results of the aerial surveys in 2009 give consistent indications of higher abundance or higher concentration of small bluefin tuna in the northwestern Mediterranean. This could reflect positive outcomes from increase minimum size regulation implemented under [Rec. 06-05] and/or recent recruitment success. However, the results remain preliminary and need to be confirmed by additional observations and quantitative analyses in future stock assessments.

Indicators from longliners and traps targeting large fish (spawners) in the East Atlantic and the Mediterranean Sea displayed a recent increase after a general decline since the mid-1970s **(BFTE-Figure 2)**. The Committee found it difficult to derive any clear conclusion from fisheries indicators in the absence of more precise information about the catch composition, effort and spatial distribution of the purse seine fisheries (which represent more than 60% of the total recent reported catch). Fisheries-independent indicators (scientific surveys) and a large scale tagging program in the Mediterranean Sea are also needed.

BFTE-3. State of the stock

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

The assessment results indicated that the spawning stock biomass (SSB) has been declining rapidly in the last several years while fishing mortality (F) has been increasing rapidly, especially for large bluefin (i.e. ages 10+, **BFTE-Figure 3**). The increase in mortality for large bluefin tuna is consistent with a shift in targeting towards larger individuals destined for fattening and/or farming. The decline in SSB is evident from the results of analyses that used both reported and adjusted (for underreporting) catch and CPUE information. These analyses indicated that recent (2003-2007) SSB is less than 40% of the highest estimated levels (at the start of the time series 1970-1974 or 1955-1959, depending on the analysis). The decline in SSB appears to be more pronounced during the more recent years, especially under the scenarios with adjusted catches, although estimates for the last years should be judged with caution due to high uncertainties and lack of data. The absolute values estimated for F and SSB remained sensitive to the assumptions of the analysis. However, it is noteworthy that results were consistent between different types of models which made use of different assumptions (Section 8.1 of SCRS/2008/019). All the analyses indicated a general increase in *F* for large fish during the last years and, consequently, a decline in SSB.

Estimates of current stock status relative to MSY benchmarks are uncertain, but lead to the conclusion that recent F was too high and recent SSB too low to be consistent with the Convention Objectives. Depending on different assumed levels of resource productivity current F was most likely at least 3 times that which would result in MSY and SSB was most likely to be about 36% or less than the level needed to support MSY **(BFTE-Figure 4)**. Even in the most optimistic evaluation of the Committee, assuming recruitment will not decrease if SSB continues to decline, substantial overfishing was occurring and spawning biomass was well below levels needed to sustain MSY. The Committee was not in a position to estimate F and SSB for 2008 and 2009, which could be done in the 2010 assessment session.

BFTE- 4. Outlook

During the last decade, there has been an overall shift in targeting towards large bluefin tuna, mostly in the Mediterranean. As the majority of these fish are destined for fattening and/or farming operations, it is crucial to get precise information about the total catch, the size composition, the area and flag of capture, time in captivity as well as growth and death in farms.

The under-reporting of catches until 2007 of both small and large fish further undermined the assessment. These factors, combined with the lack of reliable historical information for several fleets and for the Mediterranean as a whole, means the stock could not be monitored with confidence and, therefore, severe depletion could easily go undetected.

It should be noted that if the overall selectivity pattern has shifted towards larger fish **(BFTE-Figure 3)**, this could result in improved yield-per-recruit levels in the long-term if *F* were reduced to F_{MSY}. However, such changes would take many years to translate into gains in yield due to the longevity of the species. Realization of

higher long-term yields would further depend on future recruitment level, but the possibility of recruitment overfishing in the near future could not be dismissed considering the high current *F* on spawners.

Even considering uncertainties in the assessment, continuing fishing at the 2007 fishing mortality rates is expected to drive the spawning stock biomass to very low levels; i.e. to about 18% of the SSB in 1970 and 6% of the unfished SSB. This combination of high *F*, low SSB and severe overcapacity, as was estimated in the 2008 assessment, results in a high risk of fisheries and stock collapse **(BFTE-Table 1, BFTE-Figure 3)**. The outlook of the future assessments might improve if the positive signals given by some indicators in 2009 can be confirmed in the future.

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

Although the results of the projections are highly dependent on estimated state of the stock in 2007 and future recruitment levels (both being uncertain), the overall evaluation of [Rec. 06-05] is viewed by the Committee as unlikely to rebuild the stock in 15 years with 50% probability. Therefore, the Committee decided to contrast the above projections related to [Rec. 06-05] with additional management strategies, i.e. (i) $F_{0.1}$ or F_{MAX} strategies (implying short-term yields at 15,000 t or less), (ii) a closure of the Mediterranean Sea in May-June-July together with a size limit at 25 kg (as recommended by the SCRS in 2006) or (iii) a moratorium over the East Atlantic and Mediterranean Sea during 1, 3 or 5 years followed by an $F_{0.1}$ strategy. The results clearly indicated that all these alternative management strategies would have a higher probability of rebuilding the stock by 2023 and a lower probability of stock collapse in the future than [Rec. 06-05], regardless of the assumed productivity of the stock. The moratorium scenarios and $F_{0.1}$ strategy led to similar outcomes while the closure of the Mediterranean Sea in May-June-July was quite similar as the F_{MAX} strategy (note that these last two scenarios were slightly less conservative than the first ones). A preliminary analysis incorporating [Rec. 08-05] displays similar results as the 2008 SCRS analyses. The outputs are highly dependent on the productivity hypothesis, but in general, the $F_{0.1}$ and the low constant catch (8,000 t) strategies have higher probabilities of rebuilding the stock by 2023 than the F_{MAX} strategy or [Rec. 08-05].

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]. The reported catches for 2003, 2004 and 2006 were about TAC levels, but those for 2005 (35,732 t) and 2007 (34,514 t) were notably higher than TAC. However, the Committee strongly believed, based on the knowledge of the fisheries and trade statistics, that substantial under-reporting was occurring and that 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. The SCRS catch estimate for 2008 is 25,760 t. This estimate is consistent with the large decrease in the reported catch for 2008, which is about 10,000 t lower than the 2003-2007 reported catches. Although carefulness is needed when comparing this estimate to past SCRS estimates, the Committee's interpretation is that a substantial decrease in the catch occurred in the Mediterranean Sea by the implementation of the rebuilding plan and control enforcement. However, the Committee is concerned that if the fleet operated at its full capacity under [Rec. 08-05], the potential catch (34,120 t) would substantially exceed the 2008 and 2009 TAC (28,500 t and 22,000 t, respectively) and the past SCRS recommendation (15,000 t or less) (**BFTE-Table 1, BFTE-Figure 1**).

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

Based on the Committee's analysis, it is apparent that the TAC was overshot during a decade and was largely ineffective in controlling overall catch. In 2008, the SCRS best catch estimate (25,760 t) and the reported catch (23,868 t) are both under the TAC (28,500 t). This result is undoubtedly positive and encouraging, but it should be noted that the SCRS 2008 catch estimates as well as the 2008 reported catch do not take into account IUU catch which are suspected to continue at an unknown level. In 2009, the Committee could not measure the effects of [Rec. 08-05] on the stock because of the unavailability of the 2009 Task I and Task II. The Committee will attempt to fully evaluate the current management scheme ([Rec. 08-05]) in 2010 within the limits of the information made available to it. In the meantime, the Committee reiterates its past advice: unless fishing mortality rates are substantially reduced in the near future, further reduction in spawning stock biomass is likely to happen leading to a risk of fisheries and stock collapse.

BFTE-6. Management Recommendations

The available information indicated that the 2007 fishing mortality rate was, under the 2004-2007 overall fishing pattern, more than three times the level which would permit the stock to stabilize at the MSY level. The intention of [Rec. 06-05] and [Rec. 08-05] are seen as a step in the right direction, but as previously noted, the Committee consider that it is unlikely to fully fulfill the objective of the plan to rebuild the stock to the MSY level by 2023.

To address the various sources of uncertainties in the scientific diagnosis, especially regarding the data quality and availability, the Committee has investigated different quantitative approaches and it has considered a variety of scenarios for the projections. On this basis, the best advice of the Committee is currently to follow an $F_{0.1}$ (or another adequate F_{MSY} proxy) strategy to rebuild the stock, because such strategies appear much more robust than [Rec. 06-05] and possibly to [Rec. 08-05] (according to preliminary analyses) to a wide range of uncertainties about the data, the current status and future productivity. These strategies would imply much lower catches during the next few years (on the order of 15,000 t or less), but the long-term gain could lead to catches of about 50,000 t with substantial increases in spawning biomass. For a long lived species such as bluefin tuna, it will take some time (> 10 years) to realize the benefit. The Committee further believes that a time area closure could greatly facilitate the implementation and the monitoring of such rebuilding strategies.

Clearly, an overall reduction in fishing effort and mortality, as stated in 2008, is needed to reverse current trends. The 2007 fishing capacity largely exceeds the 2007 TAC, but the 2008 catch capacity might be under 2008 TAC if illegal fishing did not occur. However, the potential catch capacity is clearly above TAC. Therefore, management actions need to be pursued to mitigate the impacts of overcapacity as well as to eliminate illegal fishing. Deferring effective management measures will likely result in even more stringent measures being necessary in the future to achieve the Commission's objectives.

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY

Yield for 2008	Reported[1]: 23,868 t	Best SCRS estimate for 2008: 25,760 t. Potential catch estimated by SCRS for 2008: 34,120 t
Yield for 2007	Reported[1]: 34,514 t	SCRS Estimate for 2007: 61,000 t
Short-term Sustainable Yield[2]		
F_{MAX}	15,000 t or less	
$F_{0.1}$	8,500 t or less	
Long-term potential yield[3]	about 50,000 t	
SSB_{2007}/SSB_{FMAX}		
High recruitment (1990s)	0.14	
Low recruitment (1970s)	0.35	
F_{2007}/F_{MAX}[4]		
Reported catches	3.04	
Adjusted catches	3.42	
TAC (2007-2010)	29,500 - 28,500 - 22,000 - 19,950 t	

[1] Corresponds to the reported catches on the October 2, 2009.
[2] Approximated as a 4-years average yield expectation from the 2010-2013 constant F_{MAX} or $F_{0.1}$ projections.
[3] Approximated as the average of long-term yield at F_{MAX} or $F_{0.1}$ that were calculated over a broad range of scenarios including contrasting recruitment levels and different selectivity patterns (estimates from these scenarios ranged between 29,000 t and 91,000 t).
[4] The recruitment levels do not impact the F ratio.

BLUEFIN TUNA - WEST

BFTW-2. Fishery indicators

The total catch for the West Atlantic peaked at nearly 20,000 t in 1964, mostly due to the Japanese longline fishery for large fish off Brazil and the United States purse seine fishery for juvenile fish (**BFT-Table 1**, **BFTW-Figure 1**). Catches dropped sharply thereafter with the collapse of the longline fishery off Brazil and decline in purse seine catches, but increased again to average over 5,000 t in the 1970s due to the expansion of the Japanese longline fleet into the northwest Atlantic and Gulf of Mexico and an increase in purse seine effort targeting larger fish for the sashimi market. The total catch for the West Atlantic including discards has generally been relatively stable since 1982 due to the imposition of quotas. However, since a total catch level of 3,319 t in 2002 (the highest since 1981, with all three major fishing nations indicating higher catches), total catch in the West Atlantic declined steadily to a low of 1,638 t in 2007 and then increased in 2008 to 2,015 t. (**BFTW-Figure 1**). The decline through 2007 was primarily due to considerable reductions in catch levels for United States fisheries. Since 2002, the Canadian annual catches have been relatively stable at about 500-600 t (733 t in 2006); the 2006 catch was the highest recorded since 1977. The 2008 Canadian catch was 576 t. Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons. The overall number of Japanese vessels engaged in bluefin fishing has declined from more than 100 boats in recent years to 45 boats in 2008, of which 15 boats operated in the West Atlantic. After reaching 2,014 t in 2002 (the highest level since 1979), the catches (landings and discards) of U.S. vessels fishing in the northwest Atlantic (including the Gulf of Mexico) declined precipitously during 2003-2007. The United States did not catch its quota in 2004-2008 with catches of 1,066, 848, 615, 858 and 937 t, respectively. It was noted that not all nations have adopted a calendar year to manage their quota.

The indices of abundance used in last year's assessment were updated through 2008 **(BFTW-Figure 2)**. 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 moderately strong year-classes estimated for 2002 and 2003. The catch rates of older juveniles and adults in the United States rod and reel fishery continue to remain low, increasing only slightly in 2008. The catch rates of the Japanese longline fishery increased markedly in 2007, but decreased in 2008 back to the levels observed in 2005 and 2006. The catch rates from the U.S. Gulf of Mexico longline fishery continue to show a gradual increasing trend, whereas the Gulf of Mexico larval survey continues to fluctuate around the low levels observed since 1980s. The catch rates in the Gulf of St. Lawrence have increased rapidly since 2004 and the catch rates in 2007 and 2008 are the highest in the time series. The catch rates in southwest Nova Scotia have continued to follow a slightly increasing trend since 2000, with catch rates in 2008 being amongst the highest since the early 1990s

BFTW-3. State of the stock

The 2008 assessment was consistent with previous analyses in that spawning stock biomass (SSB) declined steadily between the early 1970s and 1992. Since then, SSB has fluctuated between 18% and 27% of the 1975 level (**BFTW-Figure 3**). The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets (**BFTW-Figure 3**). Fishing mortality on spawners (ages 8 and older) declined markedly between 2002 and 2007. Estimates of recruitment were very high in the early 1970s (**BFTW-Figure 3**), and additional analyses involving longer catch and index series suggested that recruitment was also high during the 1960s. Since 1977, recruitment has varied from year to year without trend. The Committee noted that a key factor in estimating MSY-related benchmarks is the highest level of recruitment that can be achieved in the long term. Assuming that average recruitment cannot reach the high levels from the early 1970s, recent F (2004-2006) is about 30% higher than the MSY level and SSB is about half of the MSY level (**BFTW-Figure 4**). Estimates of stock status are more pessimistic if a high recruitment scenario is considered (F/F_{MSY}=2.1, B/B_{MSY}=0.14).

One important factor in the recent decline of fishing mortality on large bluefin is that the TAC has not been taken during this time period, due primarily to a shortfall by the United States fisheries that target large bluefin. Two plausible explanations for the shortfall were put forward previously by the Committee: (1) that availability of fish to the United States fishery has been abnormally low, and/or (2) the overall size of the population in the Western Atlantic declined substantially from the level of recent years. While there is no overwhelming evidence to favor either explanation over the other, the 2008 base case assessment implicitly favors the first hypothesis (regional changes in availability) because a large recent reduction in SSB is not estimated. Nevertheless, the Committee notes that there remains substantial uncertainty on this issue and more research needs to be done.

The SCRS cautions that the conclusions of the 2008 assessment do not capture the full degree of uncertainty in the assessments and projections. An important factor contributing to uncertainty is mixing between fish of eastern and western origin. Limited analyses were conducted of the two stocks with mixing. Depending on the types of data used to estimate mixing (conventional tagging or isotope signature samples) and modeling assumptions made, the estimates of stock status varied considerably. However, these analyses are preliminary and more research needs to be done before mixing models can be used operationally for management advice. Another important source of uncertainty is recruitment, both in terms of recent levels (which are estimated with low precision in the assessment), and potential future levels (the "low" vs "high" recruitment hypotheses which affect management benchmarks). Finally, the growth curve assumed in the analyses may be revised based on new information that has been collected.

BFTW-4. Outlook

A medium-term (12-year) outlook evaluation of changes in spawning stock size and yield over the remaining rebuilding period under various management options was conducted in 2008. Future recruitment was assumed to fluctuate around two alternative scenarios: (i) average levels observed for 1976-2004 (70,000 recruits, the low recruitment scenario) and (ii) levels that increase as the stock rebuilds (MSY level of 160,000 recruits, the high recruitment scenario). The Committee has no strong evidence to favor either scenario over the other and notes that both are reasonable (but not extreme) lower and upper bounds on rebuilding potential.

The outlook for bluefin tuna in the West Atlantic with the low recruitment scenario (**BFTW-Figure 5**) is similar to that from the 2006 assessment (Anon. 2007a). A total catch of 2,100 t is predicted to have at least a 50% chance of achieving the convention objectives of preventing overfishing and rebuilding the stock to MSY levels by 2019, the target rebuilding time. The outlook under the high recruitment scenario (**BFTW-Figure 5**) is more pessimistic since the rebuilding target would be higher; a total catch of less than 1,500 t is predicted to stop overfishing in 2009, but the stock would not be expected to rebuild by 2019 even with no fishing.

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

Among the alternative models examined by the Committee in 2008, the option that excluded the Canadian Gulf of St. Lawrence index was examined further, due to the considerations of possible resource re-distribution, and the observation that the recent high values were difficult to reconcile with other available fisheries data, and could reflect the impact of a single or a limited number of strong year-classes. The levels of catch that lead to rebuilding with that alternative model are lower; 1,800 t will have about a 50% chance and 1,500 t will have a 75% chance.

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

BFTW-5. Effects of current regulations

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

The Committee previously noted that Recommendation 06-06 was expected to result in a rebuilding of the stock towards the convention objective, but also noted that there has not yet been enough time to detect with confidence the population response to the measure. This statement is also true for recommendation 08-04, which was implemented in 2009. Some of the available fishery indicators (**Figure BFTW-2)** suggest the spawning biomass of western bluefin tuna may be slowly rebuilding, however several more years of data may be required to verify this trend with reasonable statistical certainty.

BFTW-6. Management recommendations

In 1998, the Commission initiated a 20-year rebuilding plan designed to achieve B_{MSY} with at least 50% probability. The 2008 assessment indicated that the stock had not yet rebuilt as projected under the plan initially. The 2007 SSB was estimated to be 7% below the level of the Plan's first year.

In 2008, the Commission recommended a total allowable catch (TAC), inclusive of dead discards, of 1,900 t in 2009 and 1,800 t in 2010 [Rec. 08-04]. These TAC levels were projected to have a 75% chance of meeting the lower rebuilding targets under the "low recruitment" scenario **(BFTW-Table 1)**, but less than a 50% chance of meeting the higher target under the "high recruitment scenario". As noted in 2008, the TAC should be lower if the assessment is positively biased or if there is management implementation error (both of which have occurred in the past). Analyses conducted during the Joint ICCAT-Canada Precautionary workshop as well as two subsequent analyses reviewed by the Committee (SCRS/2008/089, SCRS/2008/175) suggested that the projections made during past assessments were too optimistic. This is reinforced by the observation that, halfway through the rebuilding program, biomass was still below what it was at the beginning. Accordingly, the Committee continues to strongly advise against an increase in TAC.

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

WEST ATLANTIC BLUEFIN TUNA SUMMARY (Catches and Biomass in t)	
Current (2008) Catch (including discards)	2,015 t
Assuming Low Potential Recruitment	
Maximum Sustainable Yield (MSY|R[1])	2,852 (2,680-3,032)[2]
Relative Spawning Stock Biomass:	
$B_{2007}/B_{MSY\|R}$	0.57 (0.46-0.70)[2]
Relative Fishing Mortality[3]:	
$F_{2004-2006}/F_{MSY\|R}$	1.27 (1.04-1.53)[2]
$F_{2004-2006}/F_{0.1}$	2.23 (1.82-2.72)[2]
$F_{2004-2006}/F_{max}$	1.27 (1.04-1.53)[2]
Assuming High Potential Recruitment	
Maximum Sustainable Yield (MSY)	6,201 (4,887-9,142)[2]
Relative Spawning Stock Biomass:	
$B_{2007}/B_{MSY\|R}$	0.14 (0.08-0.21)[2]
Relative Fishing Mortality[3]:	
$F_{2004-2006}/F_{MSY\|R}$	2.18 (1.74-2.64)[2]
$F_{2004-2006}/F_{0.1}$	2.23 (1.82-2.72)[2]
$F_{2004-2006}/F_{max}$	1.27 (1.04-1.53)[2]
Management Measures:	[Rec. 06-06] TAC of 2,100 t which began in 2007, including dead discards [Rec. 08-04] TAC of 1,900 t in 2009 and1,800 t in 2010, including dead discards

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

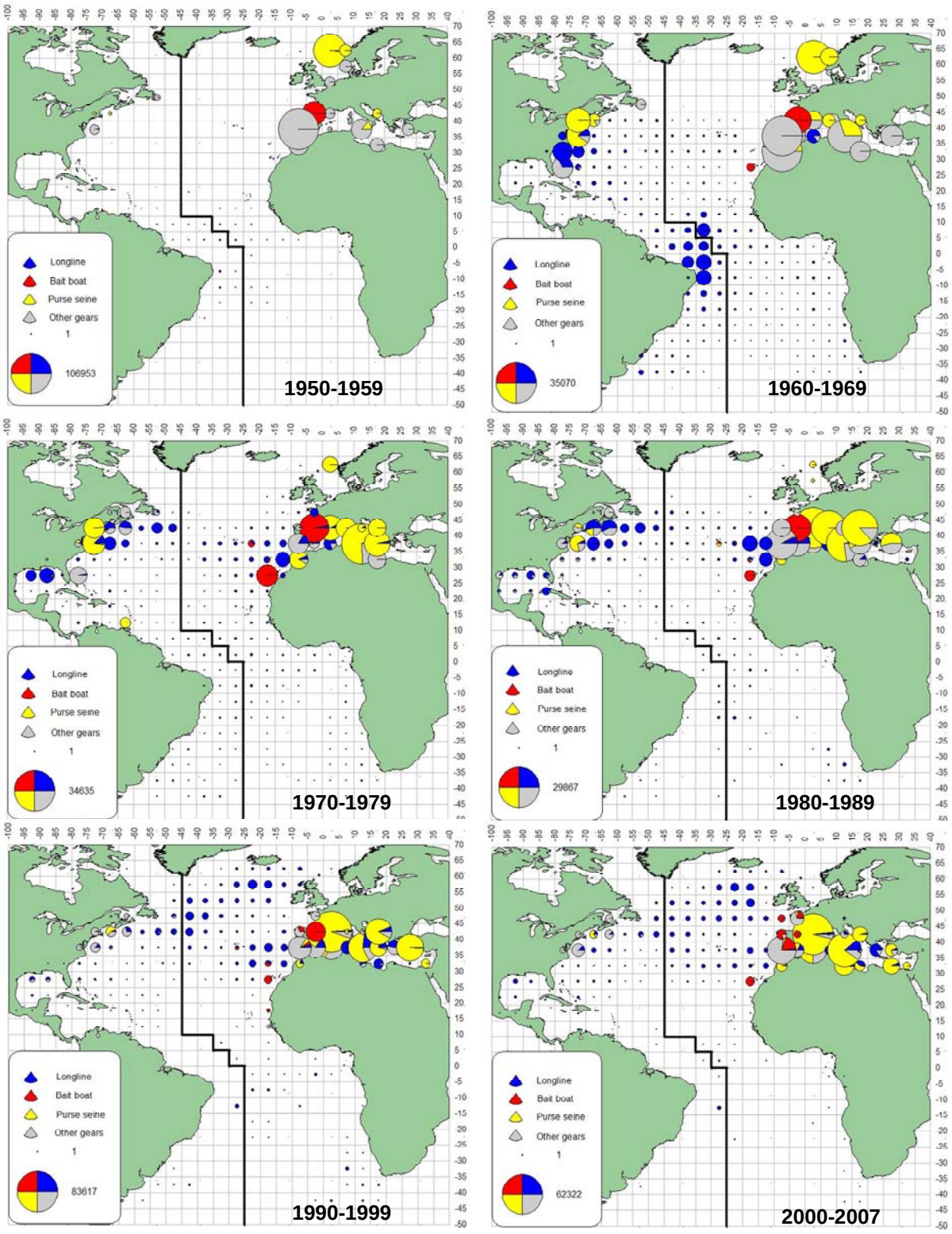
BFT-Table 1. Estimated Catches (t) of Northern bluefin tuna (*Thunnus thynnus*) by major area, gear and flag.

			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			26716	24695	21570	20723	27016	23819	26027	29350	34131	36636	48853	49714	53320	49489	42375	35228	36541	37390	37089	33469	33505	37602	32459	36151	25944
	ATE+MED		24427	22010	19247	18220	24118	21061	23247	26429	31849	34268	46740	47291	50807	47155	39718	32456	33766	34605	33770	31163	31381	35845	30647	34514	23929
	ATE		7395	4807	4687	4456	6951	5433	6040	6556	7619	9367	6930	9650	12663	13539	11376	9628	10528	10086	10347	7362	7410	9036	7493	8037	7725
	MED		17032	17203	14560	13764	17167	15628	17207	19872	24230	24901	39810	37640	38144	33616	28342	22828	23238	24519	23424	23801	23971	26810	23154	26476	16205
	ATW		2289	2685	2322	2503	2898	2759	2780	2921	2282	2368	2113	2423	2514	2334	2657	2772	2775	2784	3319	2306	2125	1756	1811	1638	2015
Landings	ATE	Bait boat	2262	2004	1414	1821	1936	1971	1693	1445	1141	3447	1980	2601	4985	3521	2550	1492	1822	2275	2567	1371	1790	2018	1116	2032	1794
		Longline	1541	551	967	924	1169	962	1496	3197	3817	2717	2176	4392	4788	4534	4300	4020	3736	3303	2896	2750	2074	2713	2406	1706	2571
		Other surf.	948	536	972	668	1221	1020	562	347	834	1548	932	1047	646	511	621	498	703	712	701	560	402	1014	1047	502	187
		Purse seine	373	86	276	0	0	0	54	46	462	24	213	458	323	828	692	726	1147	150	884	490	1078	871	332	0	
		Sport (HL+RR)	0	1	1	3	1	2	1	0	0	0	0	0	0	162	28	33	126	61	63	109	87	11	4	10	6
		Traps	2271	1630	1057	1040	2624	1478	2234	1522	1365	1631	1630	1152	1921	3982	3185	2859	2996	3585	3235	2082	1978	2408	2588	3788	3166
	MED	Bait boat	1699	278	0	0	0	0	25	148	158	48	0	206	5	4	11	4	0	0	1	9	17	5	0	0	0
		Longline	1196	1228	678	799	1227	1121	1026	2869	2599	2342	7048	8475	8171	5672	2749	2463	3317	3750	2614	2476	2564	3101	2202	2661	2254
		Other surf.	1738	3211	3544	2762	2870	3289	1212	1401	1894	1607	3218	1043	1197	1037	1880	2976	1067	1096	990	2536	1106	480	301	699	1022
		Purse seine	9888	11219	9333	8857	11198	9450	11250	13245	17807	19297	26083	23588	26021	24178	21291	14910	16195	17174	17656	17167	18785	22475	20020	22950	12641
		Sport (HL+RR)	275	507	322	433	838	457	1552	738	951	1237	2257	3556	2149	2340	1336	1622	1921	1321	1647	1392	1340	634	503	72	137
		Traps	2236	760	683	913	1034	1311	2142	1471	821	370	1204	772	601	385	1074	852	739	1177	515	221	159	115	129	95	152
	ATW	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	832	1245	764	1138	1373	698	739	895	674	696	539	466	547	382	764	914	858	610	730	186	644	425	565	420	606
		Other surf.	377	293	166	156	425	755	536	578	509	406	307	384	433	295	344	281	284	202	108	140	97	89	85	63	82
		Purse seine	401	377	360	367	383	385	384	237	300	295	301	249	245	250	249	248	275	196	208	265	32	178	4	28	
		Sport (HL+RR)	676	750	518	726	601	786	1004	1083	586	854	804	1114	1028	1179	1106	1124	1120	1649	2035	1398	1139	924	1005	1023	1130
		Traps	3	20	0	17	14	1	2	0	1	29	79	72	90	59	68	44	16	16	28	84	32	8	3	4	23
Discards	ATW	Longline	0	0	514	99	102	119	115	128	211	88	83	138	167	155	123	160	222	105	211	232	181	131	149	100	174
		Other surf.	0	0	0	0	0	14	0	0	0	0	0	0	4	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	14	3	0	0	6	0	0	0	0	0	0	
Landings	ATE	Cape Verde	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	103	80	68	39	19	41	24	0	72	119
		Chinese Taipei	3	16	197	20	0	109	0	0	0	6	20	8	61	226	350	222	144	304	158	0	0	10	4	0	
		EC.Denmark	0	37	0	0	1	0	0	0	0	37	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		EC.España	4804	3628	2876	2479	4567	3565	3557	2272	2319	5078	3137	3819	6174	6201	3800	3360	3474	3633	4089	2138	2801	3102	2033	3276	2938
		EC.France	602	490	348	533	724	460	510	565	894	1099	336	725	563	269	613	588	542	629	755	648	561	818	1218	629	253
		EC.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	
		EC.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	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	14	21	52	22	8	15	3	1	1	2	1	1
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.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	
		EC.Portugal	34	29	193	163	48	3	27	117	38	25	240	35	199	712	323	411	441	404	186	61	27	79	97	29	36
		EC.Sweden	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	12	0	0	0	0	0	0	0	0	0
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	104	118	0	0	0	0	0	0	0	
		Guinée Conakry	0	0	0	0	0	0	0	0	0	0	330	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	27	0	0	1	0	0	0	0	0	
		Japan	1514	420	739	900	1169	838	1464	2981	3350	2484	2075	3971	3341	2905	3195	2690	2895	2425	2536	2695	2015	2598	1896	1612	2431
		Korea Rep.	0	77	0	0	0	0	0	0	0	0	4	205	92	203	0	0	6	1	0	0	3	0	1	0	
		Libya	0	0	0	0	0	0	0	0	312	0	0	0	576	477	511	450	487	0	0	0	0	0	47	0	
		Maroc	171	86	288	356	437	451	408	531	562	415	720	678	1035	2068	2341	1591	2228	2497	2565	1797	1961	2405	2196	2418	1947
		NEI (ETRO)	6	3	4	0	5	6	74	4	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	85	144	223	68	189	71	208	66	0	0	0	0	0	0	0	0	0	
		Norway	243	0	31	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
		Panama	17	22	11	4	0	0	0	0	0	0	1	19	550	255	0	13	0	0	0	0	0	0	0	0	
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	118	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	Algerie	254	260	566	420	677	820	782	800	1104	1097	1560	156	156	157	1947	2142	2330	2012	1710	1586	1208	1530	1038	1511	1311
		China P.R.	0	0	0	0	0	0	0	0	0	0	97	137	93	49	0	0	0	0	0	0	0	0	0	0	
		Chinese Taipei	0	0	0	0	0	0	0	0	0	328	709	494	411	278	106	27	169	329	508	445	51	267	5	0	
		Croatia	0	0	0	0	0	0	0	1418	1076	1058	1410	1220	1360	1105	906	970	930	903	977	1139	828	1017	1022	823	834
		EC.Cyprus	10	10	10	10	10	10	10	10	10	14	10	10	10	10	21	31	61	85	91	79	105	149	110	1	132

		EC.España	2743	1460	701	1178	1428	1645	1822	1392	2165	2018	2741	4607	2588	2209	2000	2003	2772	2234	2215	2512	2353	2758	2689	2414	2465
		EC.France	3600	5430	3490	4330	5780	4434	4713	4620	7376	6995	11843	9604	9171	8235	7122	6156	6794	6167	5832	5859	6471	8638	7663	10157	2670
		EC.Greece	0	11	131	156	159	182	201	175	447	439	886	1004	874	1217	286	248	622	361	438	422	389	318	255	285	350
		EC.Italy	7140	7199	7576	4607	4201	4317	4110	3783	5005	5328	6882	7062	10006	9548	4059	3279	3845	4377	4628	4973	4686	4841	4695	4621	2234
		EC.Malta	21	21	41	36	24	29	81	105	80	251	572	587	399	393	407	447	376	219	240	255	264	346	263	334	296
		EC.Portugal	0	0	0	0	0	0	0	278	320	183	428	446	274	37	54	76	61	64	0	2	0	0	11	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	50
		Israel	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	
		Japan	1036	1006	341	280	258	127	172	85	123	793	536	813	765	185	361	381	136	152	390	316	638	378	556	466	80
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	684	458	591	410	66	0	0	0	0	0	700	1145	26	276	335
		Libya	274	300	300	300	300	84	328	370	425	635	1422	1540	812	552	820	745	1063	1941	638	752	1300	1091	1280	1358	1318
		Maroc	4	12	56	116	140	295	1149	925	205	79	1092	1035	586	535	687	636	695	511	421	760	819	92	190	641	531
		NEI (Flag related)	0	0	0	0	0	0	0	0	0	0	427	639	171	1066	825	140	17	0	0	0	0	0	0	0	
		NEI (MED)	19	0	168	183	633	757	360	1799	1398	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (combined)	0	0	0	0	0	0	0	0	0	0	773	211	0	101	1030	1995	109	571	508	610	709	0	0	0	
		Panama	0	0	0	72	67	0	74	287	484	467	1499	1498	2850	236	0	0	0	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	4	0	0	0	0	0	0	0	
		Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	41
		Tunisie	307	369	315	456	624	661	406	1366	1195	2132	2773	1897	2393	2200	1745	2352	2184	2493	2528	791	2376	3249	2545	2622	2679
		Turkey	869	41	69	972	1343	1707	2059	2459	2817	3084	3466	4220	4616	5093	5899	1200	1070	2100	2300	3300	1075	990	806	918	879
		Yugoslavia Fed.	755	1084	796	648	1523	560	940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Argentina	0	6	0	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	0	1	0	2	0	2	1	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	
		Canada	264	142	73	83	393	619	438	485	443	459	392	576	597	503	595	576	549	524	604	557	537	600	733	491	575
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Chinese Taipei	0	3	3	4	0	20	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	
		Cuba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74	11	19	27	19	0	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.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	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	10	5	0	4	3
		Japan	696	1092	584	960	1109	468	550	688	512	581	427	387	436	322	691	365	492	506	575	57	470	265	376	277	492
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	52	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	4	0	19	2	8	14	29	10	12	22	9	10	14	7	7
		NEI (ETRO)	0	0	0	0	0	30	24	23	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (Flag related)	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	429	270	49	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	0	0	0	1	3	2	14	14	14	2	43	9	3	0	0	0	0	0	0	0	0	0	0	0	
		Trinidad and Tobago	0	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.	1320	1424	1142	1352	1289	1483	1636	1582	1085	1237	1163	1311	1285	1334	1235	1213	1212	1583	1840	1426	899	717	468	758	764
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	0	0	0	0	0	0
		Uruguay	9	16	6	0	2	0	0	1	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	
Discards	ATW	Canada	0	0	0	0	0	14	0	0	0	0	0	0	0	6	16	11	46	13	37	14	15	0	2	0	1
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	514	99	102	119	115	128	211	88	83	138	171	155	110	149	176	98	174	218	167	131	147	100	173

Notes

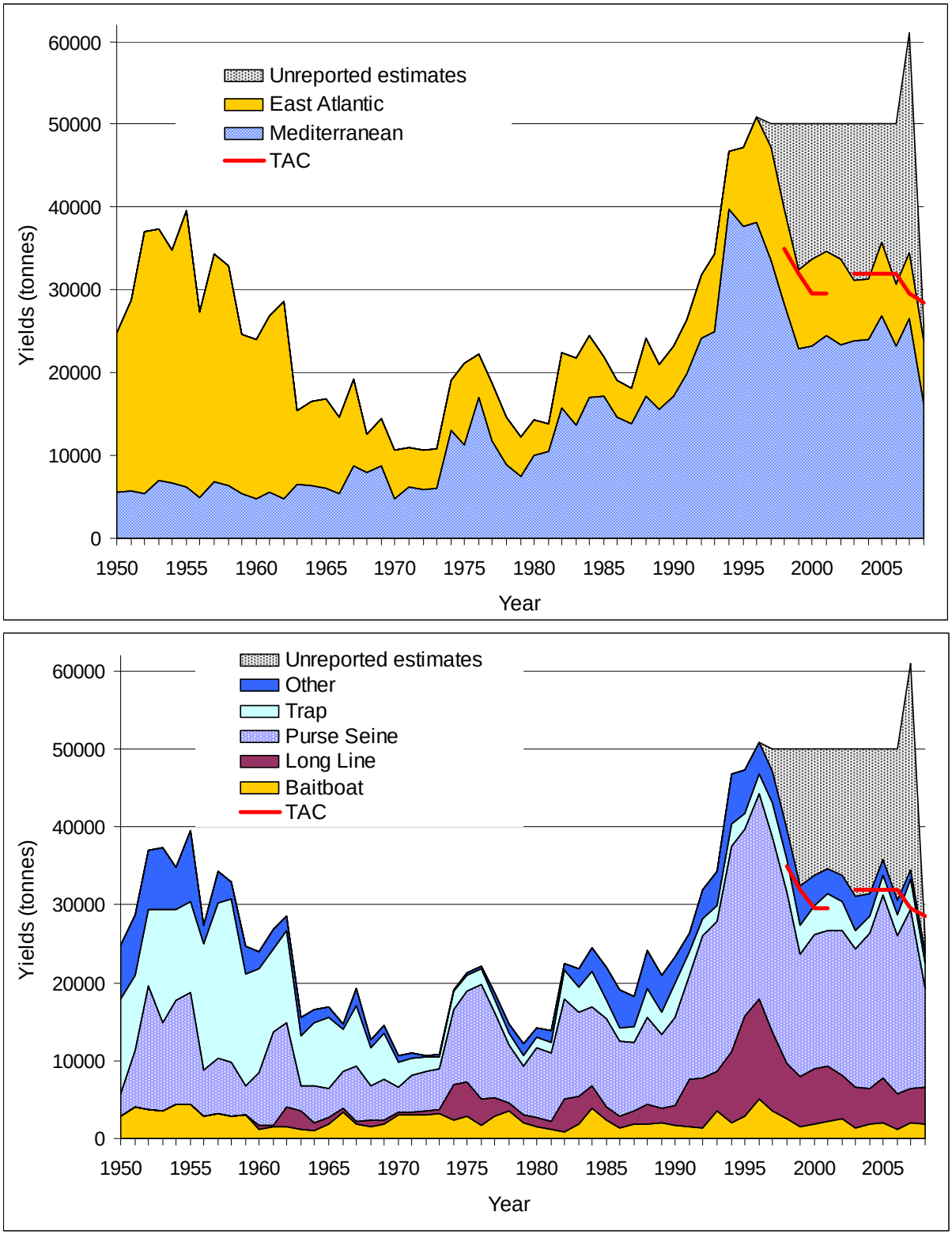
Task-I catches (updated figures) not included in the table: Turkey 2008 MED update (877 t landings; 2 t dead discards), Japan 2008 ATE update (2351 t).



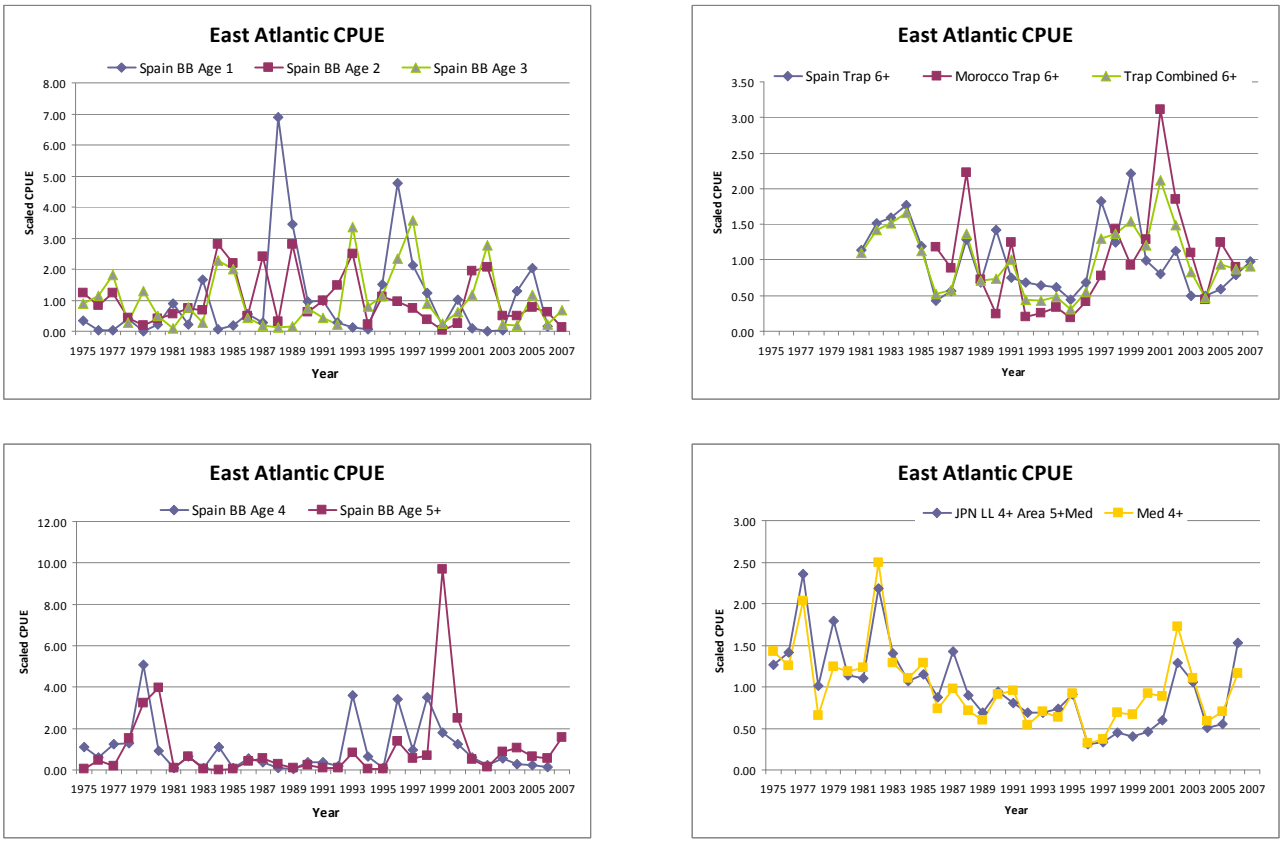
BFT-Figure 1. Geographic distribution of bluefin tuna catches per 5x5 degrees and per main gears.

BFTE-Table 1. **First column**: Fishing vessel categories. **Vessel number Column**: Total number of vessels catching bluefin tuna in the Mediterranean Sea in the East Atlantic and Mediterranean Sea in 2008 (*i.e.* active capacity) estimated on the basis of the list of authorized catching vessels, the weekly catch reports, the VMS data and the expert knowledge. **Best catch rate Column**: Best catch rates estimated by the SCRS Committee on the basis of the same sources of information as Column 2 as well as the summaries of trade information and the caging declarations. **Best Catch Est. Column**: Best SCRS catch estimate for 2008 computed as Column 2 * Column 3. This estimate does not take into account potential IUU. **Pot. Catch Rate Column**: Potential catch rates estimated by the SCRS from the same sources of information as Column 3, but without taking expert knowledge into account. **Pot. Catch Est. Column**: Potential catch estimate for 2008 computed as Column 2 * Column 5. This estimate may be seen as the utilized capacity under [Rec. 08-05] and could give a better indication of the total catch if substantial IUU fishing from registered vessels has occurred. **Past Catch rate Column**: Catch rates used by the SCRS in 2006 and 2008 when the rebuilding plan [Rec. 06-05] and [Rec. 08-05] was not yet implemented. **Past Catch est. Column**: Catch estimate computed as Column 2 * Column 7. This level would be the potential catch that the fleet could have taken in 2008 if the rebuilding plan had not been implemented. This level is given for comparison purposes with past "capacity tables".

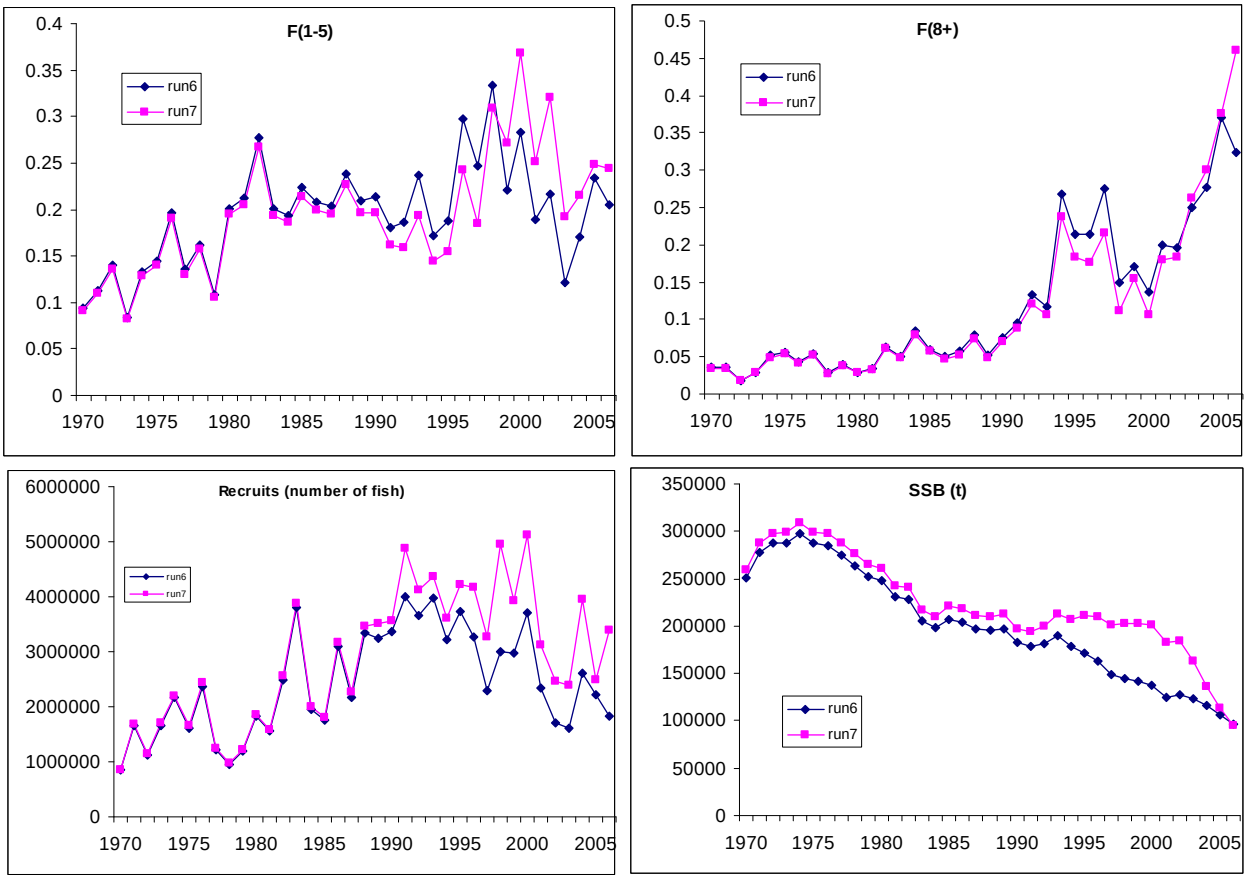
2008 East Atlantic & Mediterranean	Vessel number	Best Catch rate	Best Catch Est.	Pot. catch rate	Pot. catch est.	Past catch rate	Past catch est.
PS large	76	70.66	5370	54.95	4176	300	22800
PS medium	184	49.78	9160	57.29	10542	150	27600
PS small	57	33.68	1920	32.60	1858	40	2280
LL large	52	25	1300	16.54	860	50	2600
LL medium	22	5.68	125	6.59	145	20	440
LL small	217	5	1085	3.25	826	10	2170
Bait Boat	59	19.75	1165	19.75	1165	40	2335
Handline	139	5	695	10	1390	4	556
Trawler	49	10	490	25	1225	15	735
Trap	25	130	3250	300	7500	245	6125
Other artisanal	240	5	1200	19	4560	4	960
Grand Total	**1120**		**25760**		**34247**		**68601**



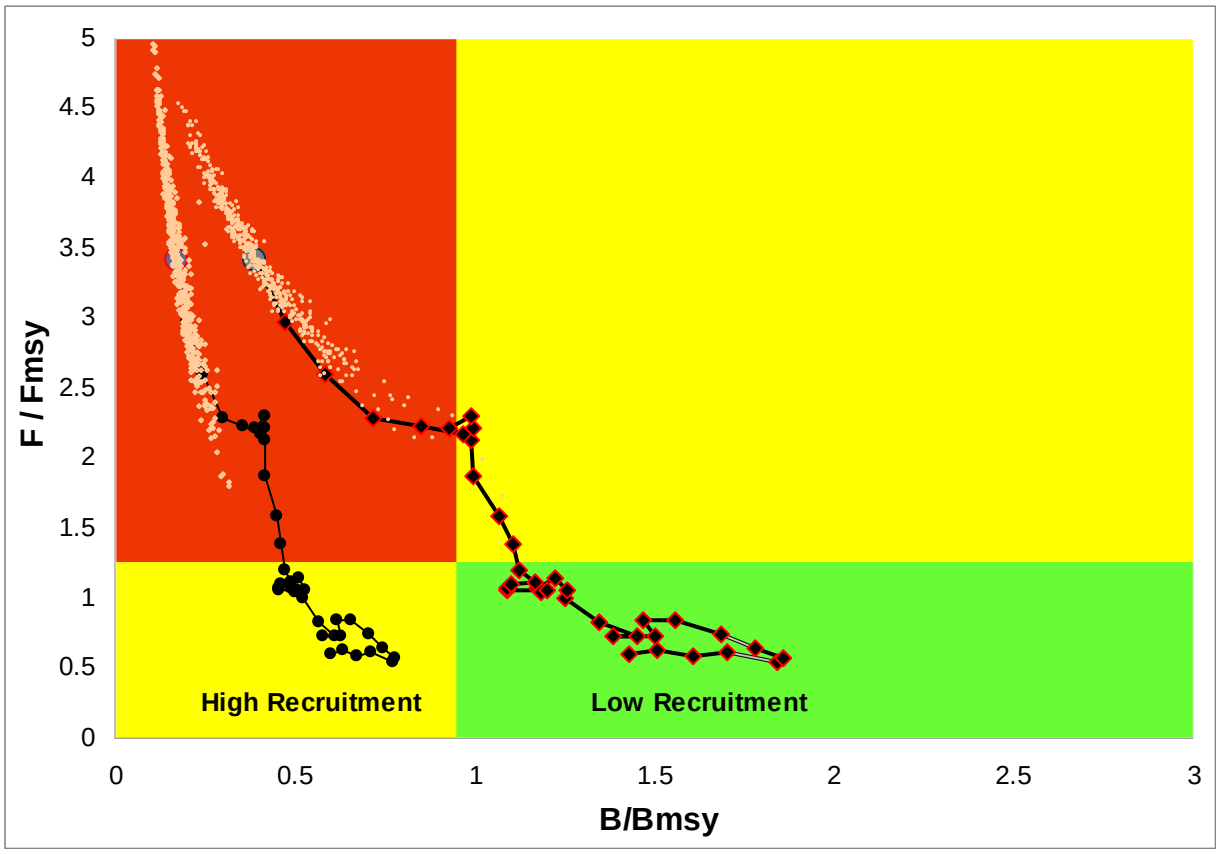
BFTE-Figure 1. Reported catch for the East Atlantic and Mediterranean from Task I data from 1950 to 2008 split by main geographic areas (top panel) and by gears (bottom panel) together with unreported catch estimated by the Committee from fishing capacity and mean catch rates over the last decade (see **BFTE-Table 1**) and TAC levels from 1998 to 2008.



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



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



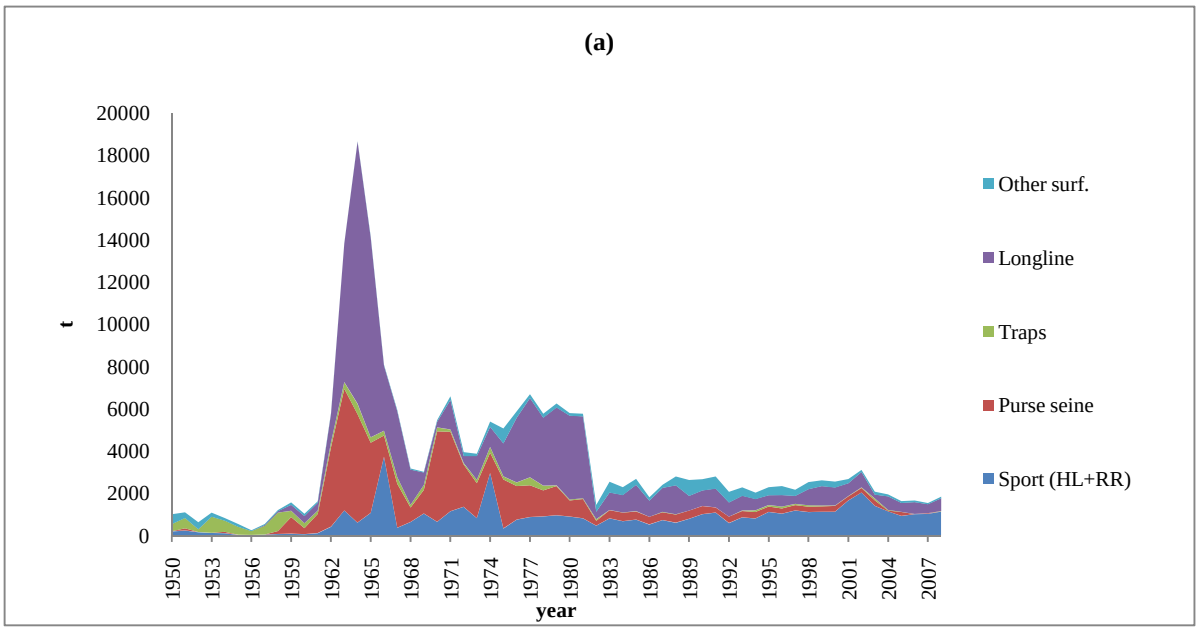
BFTE-Figure 4. Stock status estimated from VPA run 14 (i.e. equivalent to run 7 but for the 1955-2006 period) considering either high recruitment (average from the 1990s) or low recruitment (average from the 1970s) levels. The terminal year (2006) is highlighted by a larger dot. White dots represent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

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

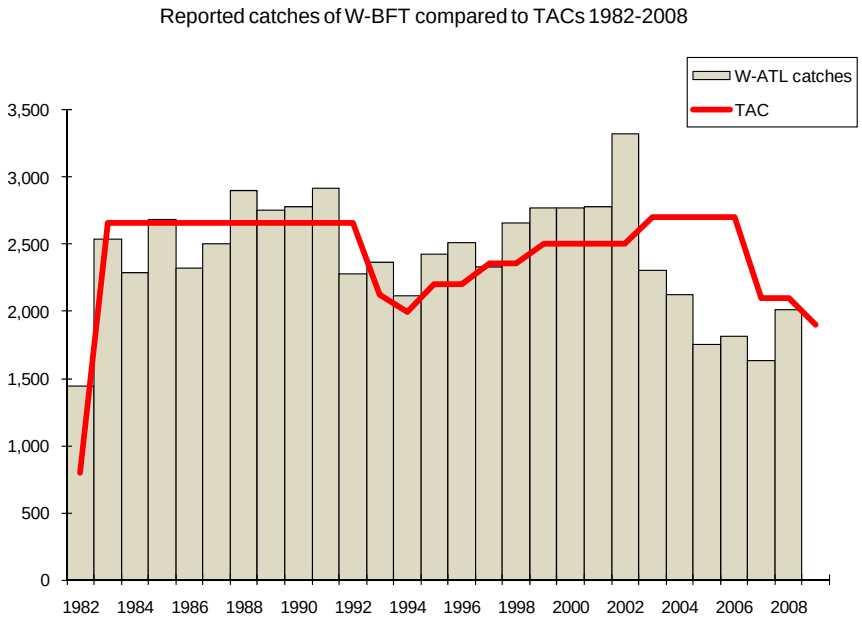
Projected Catch Level (t)	*50% Probability*		*75% Probability*	
	Low	*High*	*Low*	*High*
0	2012	No	2013	No
500	2012	No	2013	No
1,000	2013	No	2014	No
1,500	2014	No	2015	No
1,600	2014	No	2016	No
1,700	2015	No	2016	No
1,800	2015	No	2017	No
1,900	2015	No	2018	No
2,000	2016	No	2019	No
2,100	2017	No	No	No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

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

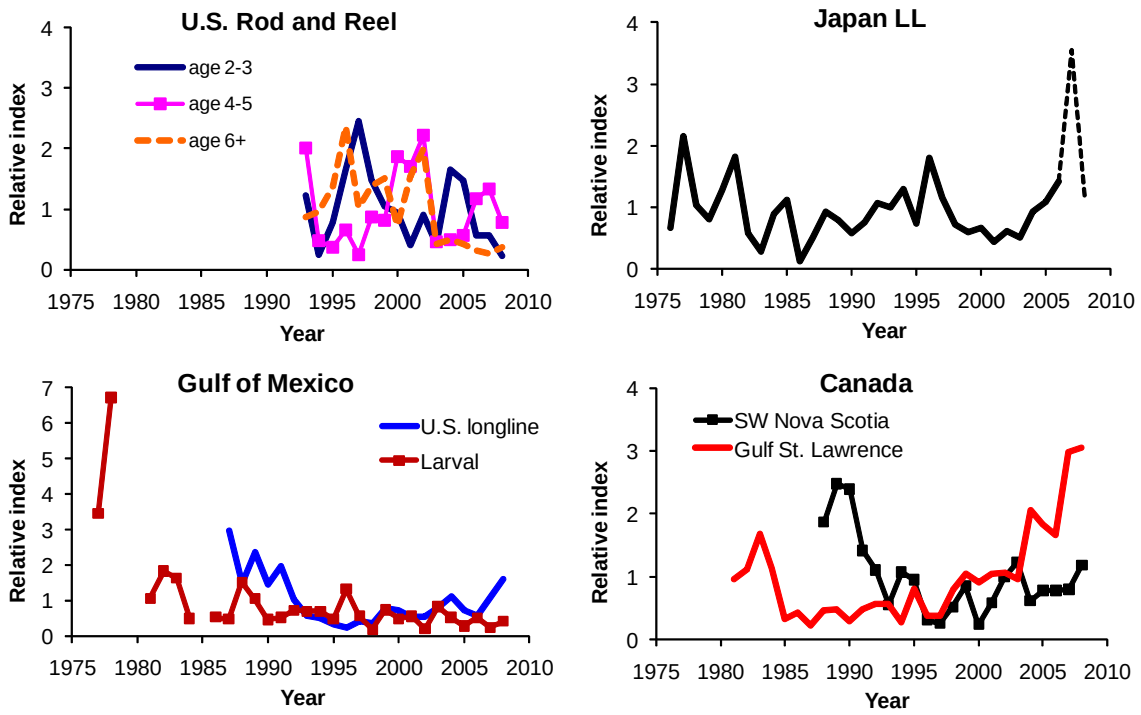
Projected Catch Level (t)	*50% Probability*		*75% Probability*	
	Low	*High*	*Low*	*High*
0	2009	2009	2009	2009
500	2009	2009	2009	2009
1,000	2009	2009	2009	2010
1,500	2009	2009	2009	2015
1,600	2009	2010	2009	2016
1,700	2009	2011	2009	2018
1,800	2009	2012	2011	2019
1,900	2009	2013	2012	No
2,000	2010	2014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



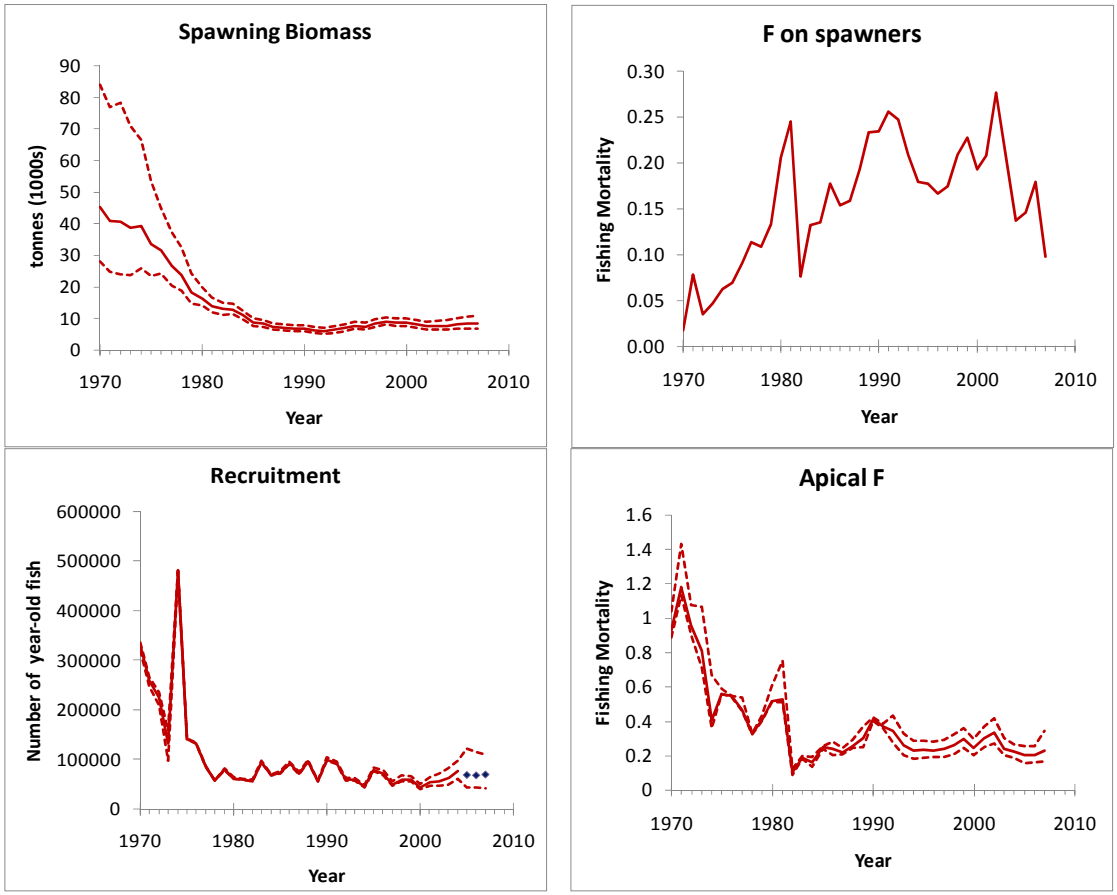
(b)



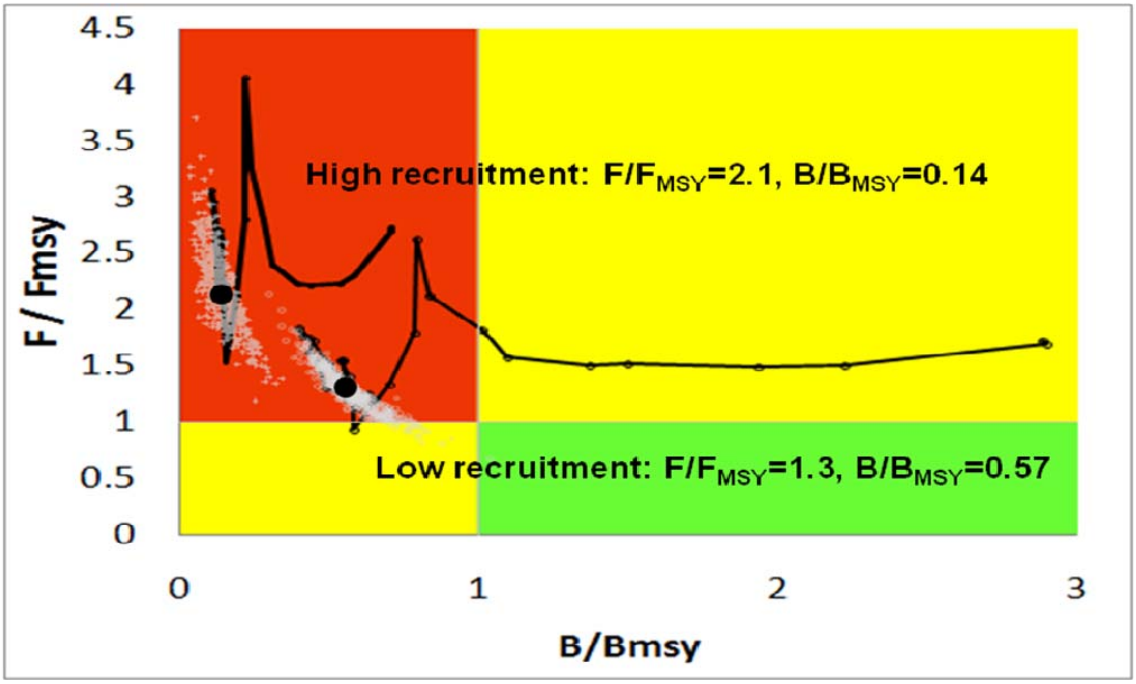
BFTW-Figure 1. Historical catches of western bluefin tuna: (a) by gear type (LL=longline, TP=trap, PS=purse seine, HL/RR= hand line/rod and reel) and (b) in comparison to TAC levels agreed by the Commission.



BFTW-Figure 2. Updated historical indices of abundance for western bluefin tuna. The dashed portion of the Japanese longline series represents the trends estimated after 2006, which were not considered reliable by the 2008 SCRS.

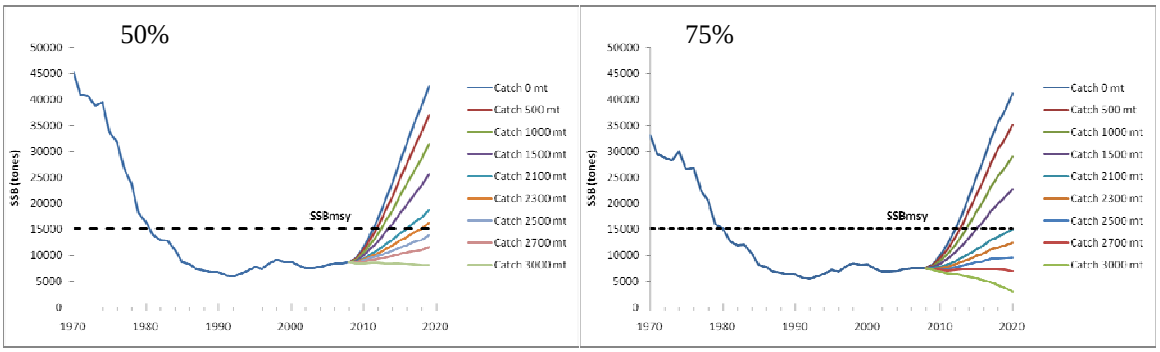


BFTW-Figure 3. Median estimates of spawning biomass (age 8+), fishing mortality on spawners, apical fishing mortality (F on the most vulnerable age class) and recruitment for the base VPA model. The 80% confidence intervals are indicated with dotted lines.

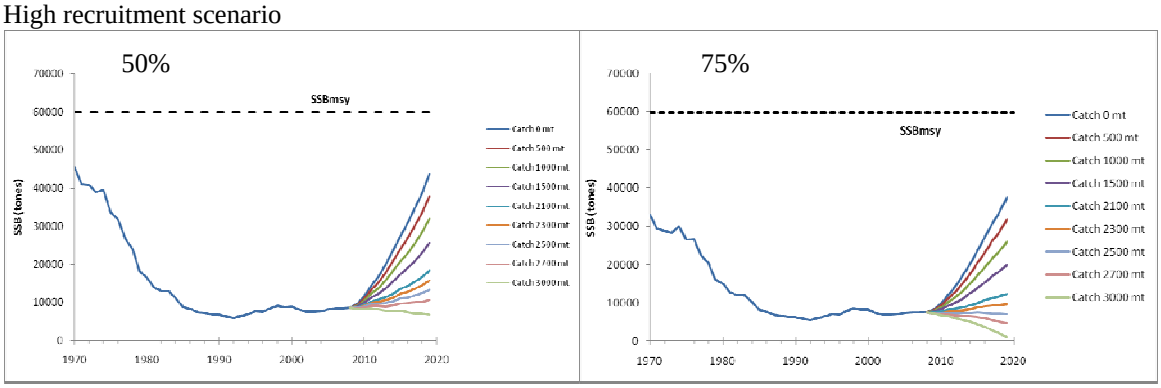


BFTW-Figure 4 Estimated status of stock relative to the Convention objectives (MSY) by year (1970 to 2007). The lines give the time series of point estimates for each recruitment scenario and the clouds of white symbols depict the corresponding bootstrap estimates of uncertainty for the most recent year.

Low recruitment scenario



High recruitment scenario



BFTW-Figure 5 Projections of spawning stock biomass (SSB) for the Base Case assessment under low recruitment (top panels) and high recruitment (bottom panels) and various levels of constant catch. The labels "50%" and "75%" refer to the probability that the SSB will be greater than or equal to the values indicated by each curve. Note that curves are arranged sequentially in the same order as the legends. The dashed horizontal lines represent the median (50%) level of SSB at MSY.

8.6 BLUE MARLIN AND WHITE MARLIN

BUM/WHM-1. Biology

The central and northern Caribbean Sea and northern Bahamas have historically been known as the primary spawning area for blue marlin in the western North Atlantic. Recent reports show that blue marlin spawning can also occur north of the Bahamas in an offshore area near Bermuda at about 32º-34º North. In the South Atlantic, offshore from southeast Brazil (17º to 18ºS and 37º to 38ºW) blue marlin spawn from March to April. Ovaries of female blue marlin caught by artisanal vessel in Côte d'Ivoire show evidence of pre-spawning and post-spawning, but not of spawning. In this area females are more abundant than males (4:1 female/male ratio). Coastal areas off West Africa have strong seasonal upwelling, and may be feeding areas for blue marlin.

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

Larval blue marlin are voracious predators and feed on copepods and cladocerans in their first feeding stages but soon switch to a piscivourous diet. Adult white marlin and blue marlin are opportunistic feeders preying on a variety of species present within their habitat.

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

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

BUM/WHM-2. Fishery indicators

It has now been confirmed that white marlin landings reported to ICCAT include roundscale spearfish in significant numbers, so that historical statistics of white marlin include a mixture of two species. The only available study where ratios of these two species have been estimated gives an overall ratio of 27% roundscale spearfish in the samples thought to represent white marlin. In some areas, however, only one species is present in these samples.

The geographic distribution of the catches is given in **BUM/WHM-Figure 1**. The Committee used Task I catches as the basis for the estimation of total removals **(BUM/WHM-Figure 2)**. In recent years some catches of billfish continue to be reported as unclassified billfish **(BUM/WHM-Figure 3)** and reporting gaps remain for some important fleets, as was identified in (Anon. 2006). Total removals for the period 1990-2004 were obtained during the 2006 assessment by modifying Task I values with the addition of blue marlin and white marlin that the Committee estimated from catches reported as billfish unclassified. Additionally the reporting gaps were filled with estimated values for some fleets. Estimates of total removals since 2005 only represent task I data.

During the 2006 marlin assessment (Anon. 2007b) it was noted that catches of blue marlin and white marlin continued to decline through 2004. Over the last 15 years, Antillean artisanal fleets have increased the use of Moored Fish Aggregating Devices (MFAD) to capture pelagic fish. Catches of blue marlin caught around MFADs are known to be significant but reports on these catches made to ICCAT are very incomplete. Recent reports from purse seine fleets in West Africa suggest that blue marlin is more commonly caught with tuna

schools associated with FADs than with free tuna schools. Task I catches of blue marlin (**BUM/WHM-Table 1)** in 2007 were 3,082 t. In 2008, Task I catches of blue marlin were 3,484 t. Task I catches of white marlin in 2007 and 2008 were 418 t and 377 t, respectively (**BUM/WHM-Table 2)**. Task I catches of white marlin and blue marlin for 2008 are preliminary. Historical reports of unclassified billfish remain an important issue in the estimation of historical removals from marlin stocks.

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

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

BUM/WHM-3. State of the stocks

Blue marlin

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

White marlin

No new information on stock status has been provided since the 2006 assessment (Anon. 2007b). The biomass for 2000-2004 most likely remained well below the B_{MSY} estimated in the 2002 assessment. During the last assessment, it was estimated that F 2004 was probably smaller than $F_{replacement}$ and probably also larger than the F_{MSY} estimated in the 2002 assessment. Over the period 2001-2004 combined longline indices and some individual fleet indices suggest that the decline has been at least partially reversed, but some other individual fleet indices suggest that abundance has continued to decline. Confirmation of these recent apparent changes in trend will require at least an additional four or five years of data, especially since the reliability of the recent information has diminished and may continue to do so. All historical indices of abundance of white marlin may inadvertently have included an unknown quantity of roundscale spearfish.

BUM/WHM-4. Outlook

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

Recent analyses suggest that the recovery of blue marlin stock might proceed faster than would have been estimated at the 2000 assessment (Anon. 2001a), provided catches remain at the level estimated for 2004. Some

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

signs of stabilization in the abundance trend are apparent in the most recent catch per unit of effort data of blue marlin (2000-2004). Similarly, some signs of a recovery trend are apparent in the most recent catch per unit of effort data for white marlin (2000-2004), although recent information suggests that these data may inadvertently have included roundscale spearfish.

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

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

BUM/WHM-5. Effect of current regulations

Recommendations [Rec. 00-13], [Rec. 01-10] and finally [Rec. 02-13] placed additional catch restrictions for blue marlin and white marlin. The latter established that "*the annual amount of blue marlin that can be harvested by pelagic longline and purse seine vessels and retained for landing must be no more than 33% for white marlin and 50% for blue marlin of the 1996 or 1999 landing levels, whichever is greater*". That recommendation established that, "All blue marlin and white marlin brought to pelagic longline and purse seine vessels alive shall be released in a manner that maximizes their survival. The provision of this paragraph does not apply to marlins that are dead when brought along the side of the vessel and that are not sold or entered into commerce". The Committee estimated the catch of pelagic longline vessels for a subset of fleets that the Committee thought would be expected to be affected by Recommendations [Rec. 00-13] and [Rec. 02-13]. Catches of these fleets represent, for the period 1990-2007, 97% of all longline caught blue marlin and 93% of all longline caught white marlin. Catches of both species have declined since 1996-99, the period selected as the reference period by the recommendations. Since 2002, the year of implementation of the last of these two recommendations, the catch of blue marlin has been below the 50% value recommended by the Commission. Similarly, the catch of white marlin since 2002 has been at about the 33% value recommended by the Commission **(BUM/WHM-Figure 4)**. This analysis represents only longline caught marlin even though the recommendations referred to the combined catch of pelagic longline and purse seine because the catch estimates of billfish by-catch from purse seine vessels are more uncertain than those from longline. Over the period considered, purse seine caught marlin represent 2% of the total catch reported by the combination of purse seine and pelagic longline.

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

BUM/WHM-6. Management recommendations

- The Commission should, at a minimum, continue the management measures already in place because marlins have not yet recovered.

- The Commission should take steps to assure that the reliability of the recent fishery information improves in order to provide a basis for verifying possible future rebuilding of the stocks. Improvements are needed in the monitoring of the fate and amount of dead and live releases, with verification from scientific observer programs; verification of current and historical landings from some artisanal and industrial fleets; and complete and updated relative abundance indices from CPUE data for the major fleets.

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

- Should the Commission wish to increase the likelihood of success of the current management measures of the marlin rebuilding plan, further reduction in mortality would be needed, for example by:
  - implementing plans to improve compliance of current regulations,

  - encouraging the use of alternative gear configurations that reduce the likelihood of deep hooking. Depending on the fisheries/fleets, such reductions may be achievable by making changes in hook type, bait type or a combination of the two,
  - broader application of time/area catch restrictions.

- Given the recent importance of the catch from artisanal fisheries, and to increase the likelihood of recovery of marlin stocks, the Commission should consider regulations that control or reduce the fishing mortality generated by these fisheries.

- While substantial research into habitat requirements of blue and white marlin have been undertaken since the last assessments, the results of this research are not yet sufficient to allow the Committee to reach scientific consensus on the best method for directly estimating MSY benchmarks for these species based on the complete time-series of data. The Commission should encourage continued research on development of methods to incorporate this information into stock assessments in order to provide a basis for increasing the certainty with which management advice can be provided.

Atlantic Blue Marlin and Atlantic White Marlin Summary

	WHM	**BUM**
B_{2004} / [1]B_{MSY}	< 1.0	< 1.0
Recent Abundance Trend (2001-2004)	Slightly upward	Possibly stabilizing
$F_{2004} > F_{replacement}$	No	Possibly
F_{2004} > [1]F_{MSY}	Possibly > 1.0	> 1.0
[2]$Catch_{recent}/Catch_{1996}$ Longline and Purse seine	0.47	0.52
[3]$Catch_{2004}$	610 t	2,916 t
Rebuilding to B_{MSY}	Potential to rebuild under current management plan but needs verification.	Potential to rebuild under current management plan but needs verification.
[1]MSY	[4] 600-1,320 t	~ 2,000 t (1,000 ~ 2,400 t)

[1] As estimated during the 2000 (Anon. 2001a) and 2002 (Anon. 2003) assessments.
[2] Catch $_{recent}$ is the average longline catch for 2000-2004.
[3] Estimate of total removals obtained by the Committee. The Task I catch reported for 2007 is 3,082 t for blue marlin and 418 t for white marlin. The preliminary Task I catch reported for 2008 is 3,484 t for blue marlin and 377 t for white marlin. Final estimates for 2005-2008 are likely to be greater.
[4] Range of estimates were obtained in the previous assessments, but recent analyses suggest that the lower bound for white marlin should be at least 600 t.

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

			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			2760	3311	2018	2144	2808	4219	4547	4151	2989	3044	4124	4062	5198	5463	5458	5086	4855	3683	2899	3556	2142	3445	2173	3082	3484
	ATN		1390	1566	1095	927	954	1525	1952	1410	1084	1071	1537	1560	1961	2011	2494	2017	2066	1072	791	1010	702	1555	754	881	1269
	ATS		1370	1745	924	1217	1855	2693	2595	2741	1905	1974	2587	2502	3237	3452	2963	3069	2789	2611	2108	2547	1439	1891	1420	2200	2214
Landings	ATN	Longline	932	1222	720	418	459	995	1607	982	625	613	1088	991	1339	1413	1300	1078	919	462	413	467	518	561	462	530	833
		Other surf.	252	174	160	190	184	197	137	225	223	217	220	343	363	440	1088	820	1051	489	240	502	119	951	193	273	202
		Sport (HL+RR)	206	169	214	181	186	143	49	62	90	113	118	73	64	60	56	38	36	97	89	22	31	18	62	36	197
	ATS	Longline	975	1362	661	964	1530	2017	1958	2286	1490	1419	1764	1679	2193	2519	2068	1977	1775	1446	896	1212	844	1002	750	1254	990
		Other surf.	394	382	262	253	324	675	634	453	414	553	821	822	1041	863	893	1090	1014	1165	1212	1334	595	887	666	938	1224
		Sport (HL+RR)	1	1	1	0	1	1	2	1	0	1	2	2	2	28	0	0	0	0	0	0	0	2	1	9	1
Discards	ATN	Longline	0	0	0	138	124	191	159	142	146	127	111	153	196	97	49	81	60	22	37	19	34	24	36	42	37
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	11	0	1	1	0	0	1
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	2	0	0
Landings	ATN	Barbados	126	10	14	13	46	3	18	12	18	21	19	31	25	30	25	19	19	18	11	11	0	0	25	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	
		Canada	0	0	0	1	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	41	48	41	51	79	133	9	31	15	17	10	49	0	4	2
		Chinese Taipei	102	148	117	52	26	11	937	716	336	281	272	187	170	355	80	44	64	65	48	66	104	38	35	30	15
		Cuba	214	246	103	68	94	74	112	127	135	69	39	85	43	53	12	38	55	56	34	3	4	7	7	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	69	75	36	44	55	58	106
		Dominican Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	41	71	29	19	23	0	207	0	0	0	0	
		EC.España	3	4	1	0	8	7	5	1	6	7	6	2	25	5	36	15	25	8	1	6	27	12	23	14	23
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	776	0	0	1
		EC.Portugal	1	8	12	8	2	1	1	4	2	15	11	10	7	3	47	8	15	17	1	31	27	24	36	56	56
		Grenada	8	11	36	33	34	40	52	64	52	58	52	50	26	47	60	100	87	104	69	72	45	42	33	49	54
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	
		Japan	351	409	174	78	206	593	250	145	193	207	532	496	798	625	656	427	442	155	125	148	174	251	199	221	536
		Korea Rep.	110	154	36	13	14	252	240	34	11	2	16	16	41	16	0	0	0	0	0	0	0	3	14	30	
		Liberia	0	0	0	0	0	0	0	0	0	0	0	87	148	148	701	420	712	235	158	115	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	12	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	3	13	13	13	13	27	35	68	37	50	70	90	86	64	91	81
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	71	134	149	178	225	330	312	202	112	7	6	0	0	0	0	
		Netherlands Antilles	50	50	50	50	50	50	50	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	38	38	0	0	0	0	0	0	0	1
		Senegal	0	0	0	0	0	1	1	4	8	0	9	0	2	5	0	0	0	11	24	32	11	1	5	5	114
		St. Vincent and Grenadines	0	0	0	0	0	1	0	0	1	2	2	2	0	1	0	0	0	0	19	0	0	0	0	1	3
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	10	5	0	18	17	21	53	46	70
		Trinidad and Tobago	20	3	43	93	45	13	11	6	1	2	16	28	14	49	15	20	51	17	16	9	11	7	14	16	34
		U.S.A.	280	295	273	291	221	124	29	33	51	80	88	43	43	46	50	37	24	16	17	19	26	16	17	9	13
		U.S.S.R.	0	0	7	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	8	9	11	6	8	15	17	18	19	11	15	15	15	3	5	1	2	2	2	2	2	2	2	2	2
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	2	0	0
		Ukraine	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	
		Venezuela	117	219	218	60	76	149	70	49	66	74	122	106	137	130	205	220	108	72	76	84	83	138	131	206	120
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
		Benin	9	10	7	4	12	0	6	6	6	6	5	5	5	5	5	5	5	0	0	0	0	0	0	0	
		Brasil	32	33	46	51	74	60	52	61	125	147	81	180	331	193	486	509	452	780	387	577	195	612	298	262	160
		China P.R.	0	0	0	0	0	0	0	0	0	0	21	25	21	27	41	68	15	61	73	72	49	47	0	61	11
		Chinese Taipei	70	165	98	265	266	462	767	956	488	404	391	280	490	1123	498	442	421	175	246	253	211	113	64	203	133
		Cuba	159	205	111	137	191	77	90	62	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	100	100	100	100	130	82	88	105	79	139	212	177	157	222	182	275	206	196	78	109	115	107	178	150	991
		EC.España	0	0	0	0	0	15	0	12	40	37	49	38	133	117	159	110	115	86	27	6	24	12	68	25	32
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	1	0	24	69	79	102
		Gabon	0	0	0	0	0	0	0	0	0	1	2	0	304	5	0	0	0	1	0	3	0	0	0	0	
		Ghana	166	150	16	5	7	430	324	126	123	236	441	471	422	491	447	624	639	795	999	415	470	759	405	683	191
		Japan	482	691	335	362	617	962	967	755	824	719	991	913	881	724	529	363	441	180	142	294	366	191	290	699	587
		Korea Rep.	234	262	60	139	361	437	84	503	13	11	40	40	103	40	2	3	1	1	0	0	1	4	19	33	
		Mixed flags (FR+ES)	118	122	135	132	137	144	199	137	116	146	133	126	96	82	80	83	79	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	103	192	214	256	323	474	449	290	162	10	8	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	33	0	0	0	0	0	0	0	0	7
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		S. Tomé e Príncipe	0	0	0	0	28	19	17	18	21	25	28	33	36	35	33	30	32	32	32	32	9	21	26	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	2	0
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	73	53	141	103	775	0	0	0	0	
		U.S.S.R.	0	7	16	22	32	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

		UK.Sta Helena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0		
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Discards	ATN	Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	0	138	124	191	159	142	146	127	111	153	196	97	50	81	60	25	49	19	35	25	36	42	38	
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0	0	0	0	0	0	0		

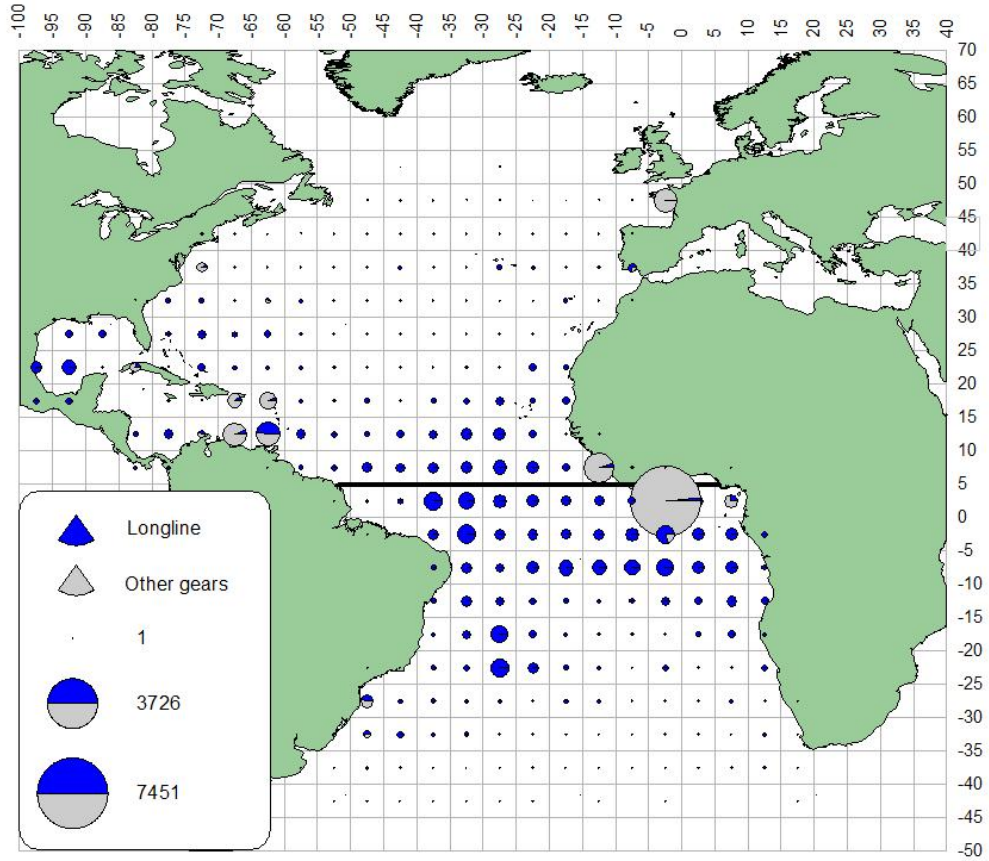
Notes

Task-I catches (new figures) not included in the table: Senegal 2007 ATN (86 t) from sport fisheries.

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

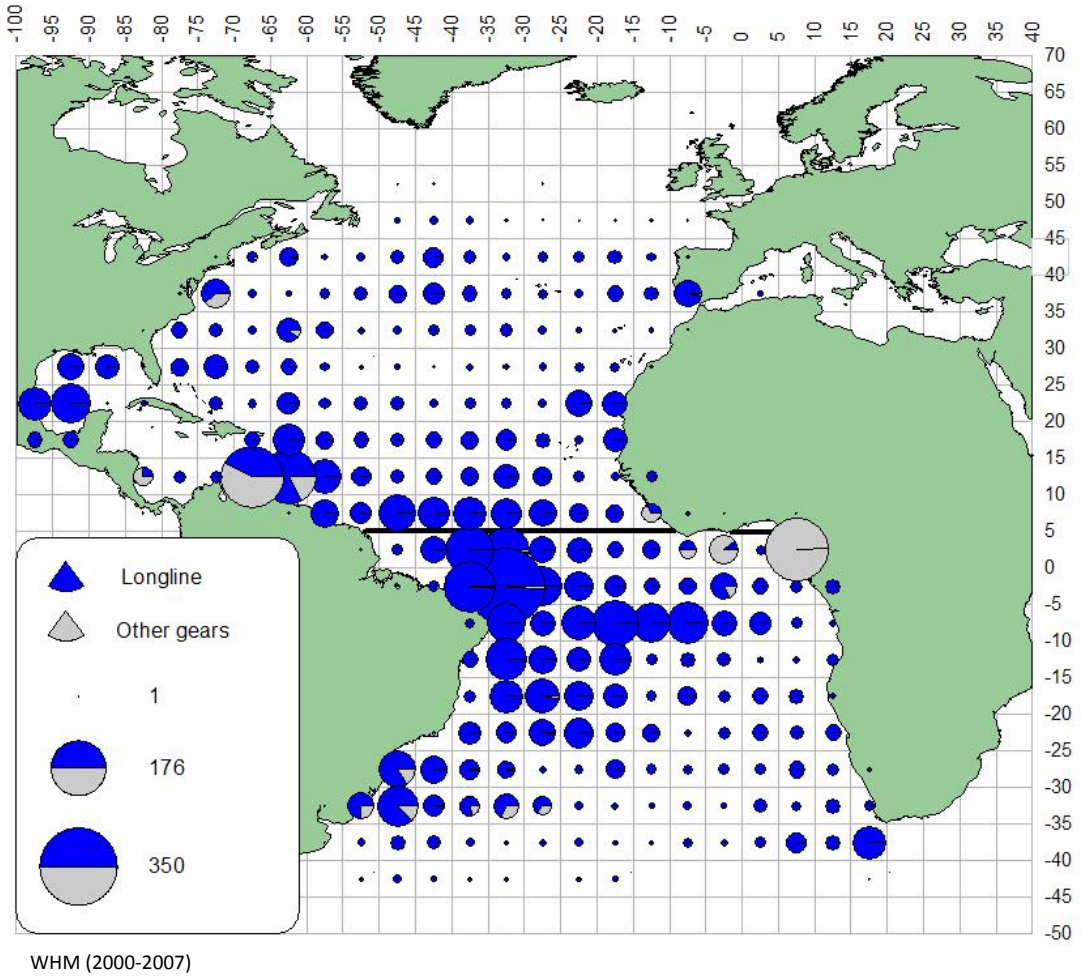
			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			1213	1729	1638	1551	1395	1828	1659	1627	1462	1544	2111	1760	1572	1406	1682	1569	1329	888	889	680	594	597	385	418	377
	ATN		665	861	933	648	435	376	407	239	610	543	660	639	669	483	529	492	448	353	287	242	252	258	184	146	117
	ATS		548	867	705	904	960	1453	1252	1388	853	1002	1451	1121	904	922	1152	1077	881	534	602	438	342	339	201	273	260
Landings	ATN	Longline	583	790	840	494	196	241	266	108	466	413	531	473	554	431	475	399	375	308	226	196	204	226	151	109	88
		Other surf.	17	29	61	54	150	11	40	21	35	34	57	48	31	10	17	29	31	24	22	28	20	14	21	28	17
		Sport (HL+RR)	66	43	32	38	29	16	21	19	21	30	30	18	20	9	6	6	2	4	6	1	1	1	2	1	2
	ATS	Longline	471	825	654	870	832	1333	1152	1328	805	950	1417	1086	859	828	979	1021	827	471	496	394	318	304	166	245	246
		Other surf.	77	42	51	34	128	119	96	60	48	52	33	31	40	57	173	55	54	63	107	44	23	35	34	9	13
		Sport (HL+RR)	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	
Discards	ATN	Longline	0	0	0	62	60	107	81	90	88	66	42	100	64	33	31	57	41	16	29	17	27	17	9	8	9
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0	0	0
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	2	19	1
Landings	ATN	Barbados	0	0	0	0	117	11	39	17	24	29	26	43	15	41	33	25	25	24	15	15	0	0	33	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		Canada	0	0	0	1	0	0	0	0	0	0	4	4	8	8	8	5	5	3	2	1	2	5	3	2	
		China P.R.	0	0	0	0	0	0	0	0	0	0	6	7	6	7	10	20	1	7	4	2	1	4	0	0	1
		Chinese Taipei	96	128	319	153	0	4	85	13	92	123	270	181	146	62	105	80	59	68	61	15	45	19	16	1	1
		Costa Rica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	14	0	0	1	0	0	0	0	
		Cuba	241	296	225	30	13	21	14	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	
		EC.España	9	14	0	0	61	12	12	9	18	15	25	17	97	89	91	74	118	43	4	19	19	48	28	32	10
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	11	30	3	2	0
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	8	14	33	10	12	11	17
		Japan	52	45	56	60	68	73	34	45	180	33	41	31	80	29	39	25	66	15	10	21	23	28	27	10	24
		Korea Rep.	18	147	37	2	2	82	39	1	9	4	23	3	7	5	0	0	0	0	0	0	0	4	0	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	8	4	3	4	3	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	2	8	8	3	5	6	11	18	44	15	15	28	25	16	13	14
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	23	43	47	57	72	105	100	64	36	2	2	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	44	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Trinidad and Tobago	13	2	28	61	29	7	6	3	0	1	11	18	8	32	10	13	4	2	5	12	6	6	5	12	10
		U.S.A.	81	75	116	124	42	10	17	13	11	19	13	7	12	8	5	5	1	3	6	1	1	1	1	0	2
		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	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	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	1	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Venezuela	155	155	151	154	42	47	79	47	187	226	148	171	164	90	80	61	25	72	110	55	55	60	26	52	26
	ATS	Argentina	0	4	4	0	0	8	9	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	
		Brasil	61	87	143	93	149	204	205	377	211	301	91	105	75	105	217	158	105	172	407	266	80	244	90	52	47
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	3	4	3	4	5	10	1	13	19	6	6	4	0	10	3
		Chinese Taipei	124	172	196	613	565	979	810	790	506	493	1080	726	420	379	401	385	378	84	117	89	127	37	28	53	37
		Cuba	153	216	192	62	24	22	6	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	5	1	2	2	3	1	1	1	1	3
		EC.España	0	0	0	0	1	1	0	17	6	12	2	19	54	4	10	45	68	18	2	3	45	10	23	14	21

		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	19	0	35
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
		Ghana	54	15	22	6	88	68	31	17	14	22	1	2	1	3	7	6	8	21	2	1	1	1	0	0	4
		Honduras	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	24	81	73	74	76	73	92	77	68	49	51	26	32	29	17	15	17	41	5	12	13	6	11	11	13
		Korea Rep.	44	225	34	25	17	53	42	56	1	4	20	20	52	18	0	0	0	0	0	11	40	3	0	113	96
		Mixed flags (FR+ES)	22	23	25	25	25	27	37	11	10	12	11	9	7	7	9	8	7	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	91	171	190	228	288	421	399	258	144	9	7	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	1
		S. Tomé e Príncipe	0	0	0	0	14	16	19	26	24	17	21	21	30	45	40	36	37	37	37	37	21	33	29	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	2	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	65	44	16	6	1	1	1	1	3	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	
Discards	ATN	Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	0	62	60	107	81	90	88	66	42	100	64	33	32	57	41	17	33	17	27	17	10	8	10
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	19	1
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	1	0	0	0	0	0	0	

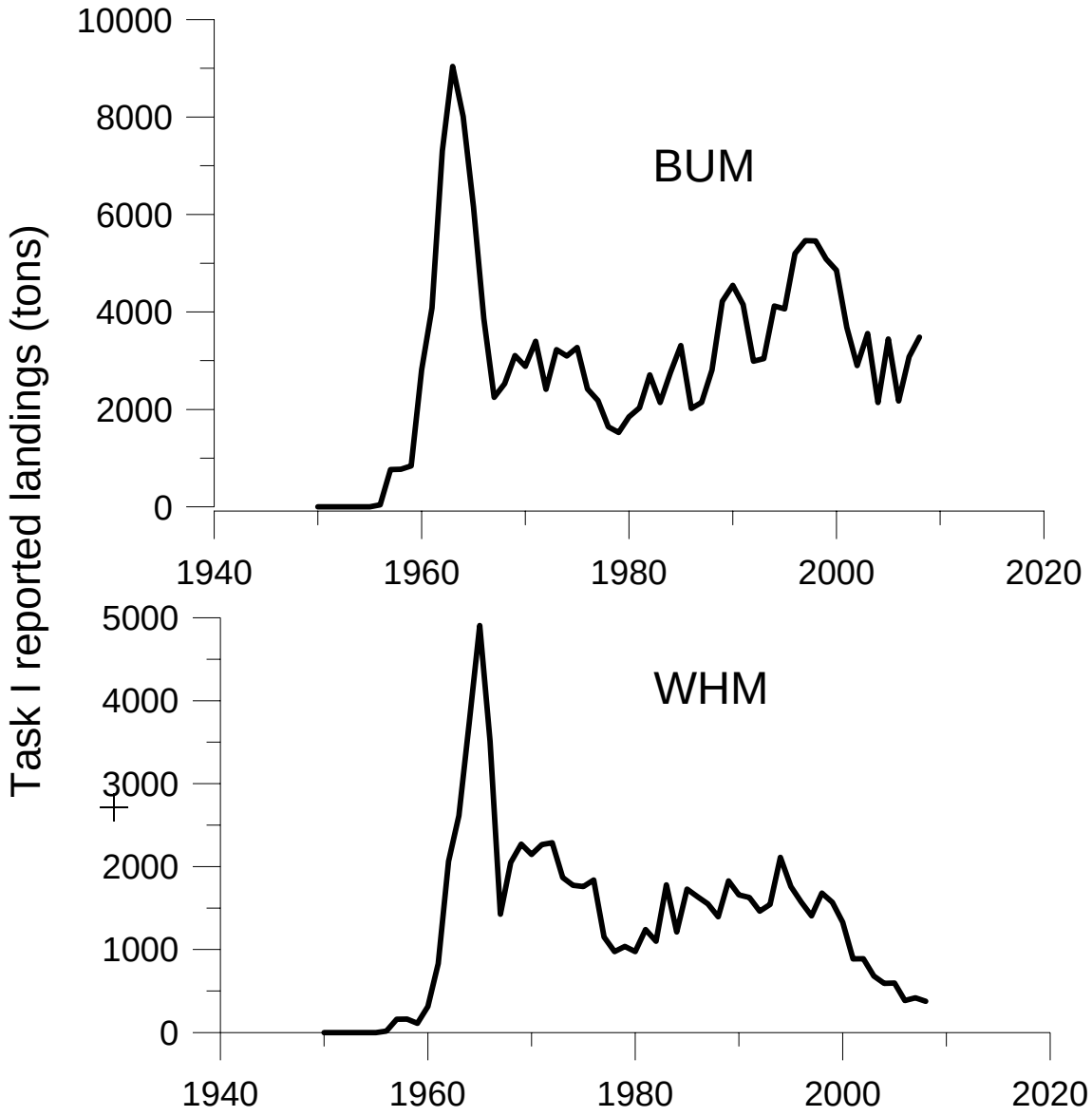


BUM (2000-2007)

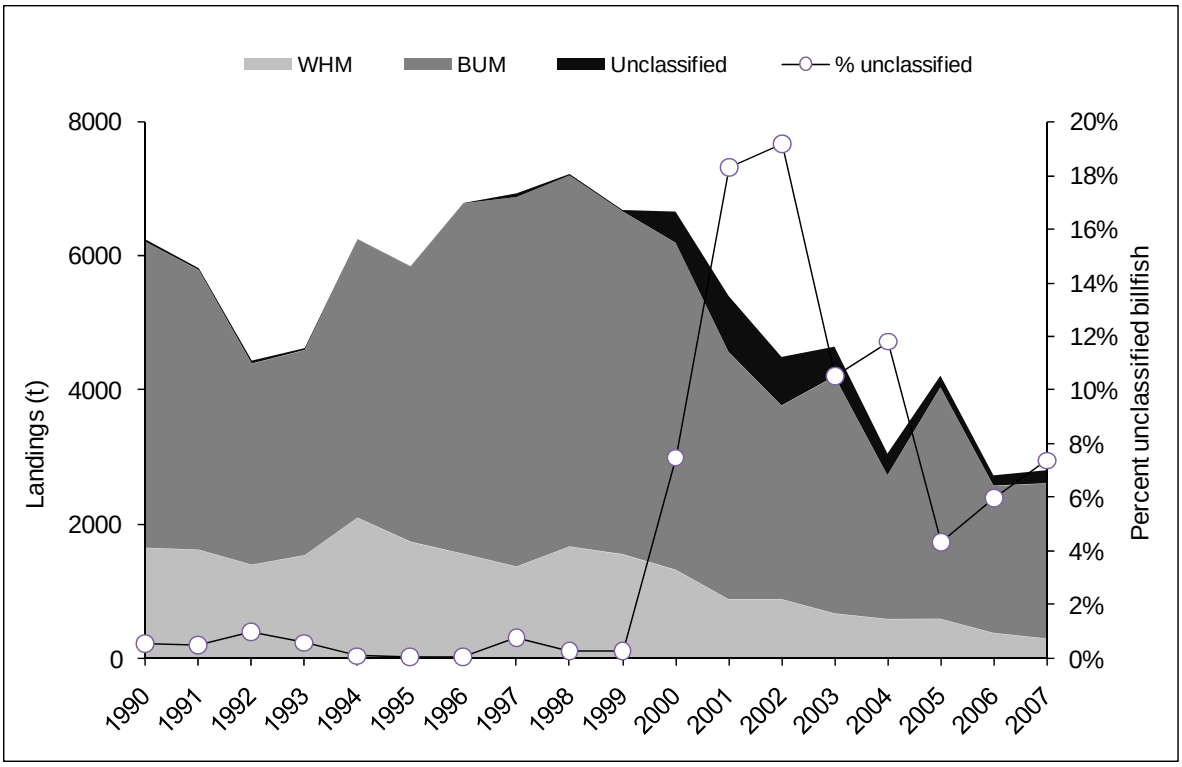
BUM/WHM-Figure 1a. Geographic distribution of mean blue marlin catch (2000-2007) by major gears.



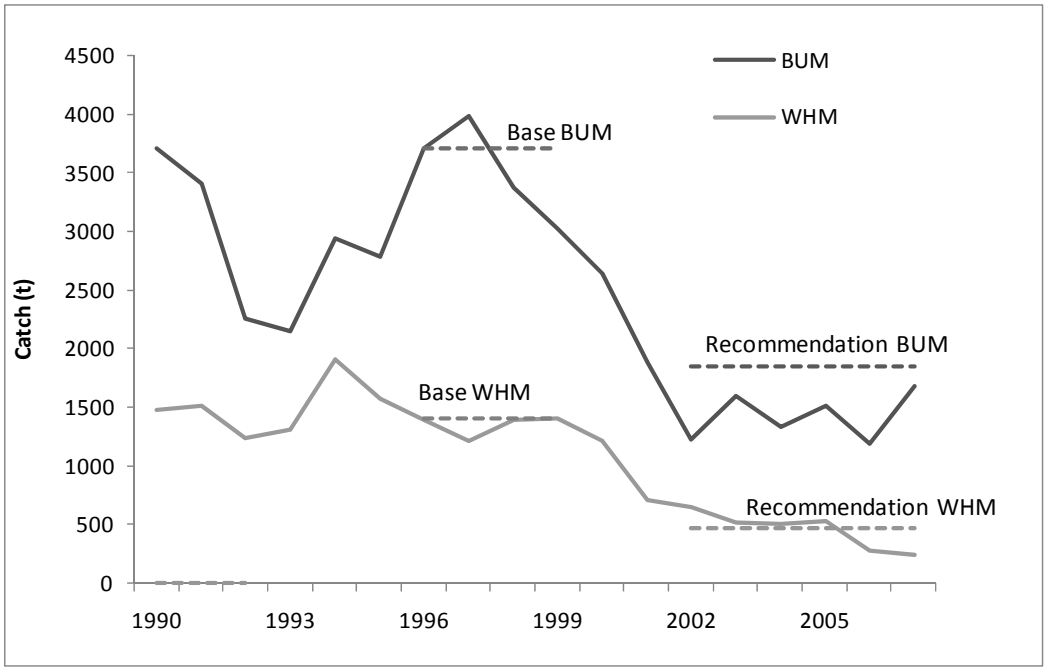
BUM/WHM-Figure 1b. Geographic distribution of mean white marlin catch (2000-2007) by major gears.



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



BUM-WHM-Figure 3. Total catch of blue marlin, white marlin, and unclassified billfish for 1990-2006, and ratio (percentage) of unclassified billfish to the total blue marlin and white marlin catch.



BUM-WHM-Figure 4. Estimates of pelagic longline catch for blue marlin and white marlin for the period 1990-2007 and reference catch levels relevant to ICCAT recommendations [Rec. 00-13] and [Rec. 02-13]. Base is defined as the maximum of either the 1996 or 1999 catch of marlins, whichever is greatest. Recommendation calls for a reduction in marlin catch in comparison to this base. The reduction recommended for blue marlin was 50% and for white marlin 67%.

8.7 SAI - SAILFISH

Sailfish *(Istiophorus platypterus)* has a pan-tropical distribution. ICCAT has established, based on life history information on migration rates and geographic distribution of catch, that there are two management units for Atlantic sailfish, eastern and western **(SAI-Figure 1)**. The first successful assessment that estimated reference points for eastern and western sailfish stocks was conducted in 2009.

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 Straits of Florida and the southern Gulf of Mexico indicated that habitat preferences from satellite tagged sailfish were primarily within the upper 20~50 m of the water column. The tag data also indicated common short-term movements to depths in excess of 100 m, with some dives as deep as 350 m. Sailfish is the most coastal of all billfish species and conventional tagging data suggest that they move shorter distances than the other billfish (**SAI-Figure 2**). Sailfish grow rapidly and reach a maximum size of 160 cm for males and 220 cm for females, with females reaching maturity at 155 cm. Sailfish reach a maximum age of at least 17 years.

Sailfish spawn over a wide area and year around. In the North, evidence of spawning has been detected in the Straits of Florida, and off the Venezuelan, Guyanese and Surinamese coasts. In the southwest Atlantic, spawning occurs off the southern coast of Brazil between 20° and 27°S, and in the east Atlantic, off Senegal and Côte d'Ivoire. Timing of spawning can differ between regions. From the Florida Straits to the areas off Guyana sailfish spawn in the second semester of the year, whist in the southwestern Atlantic and the tropical eastern Atlantic they spawn late and early in the year.

SAI-2. Description of the fisheries

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

Reports to ICCAT estimate that the Task I catch for 2008 was 1,274 t and 1,255 t, respectively, for the east and west region **(SAI-Figure 3)**. Task I catches of sailfish for 2008 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 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 suggest 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, adoption of circle hooks, and catch and release strategies in sport fisheries.

SAI-6. Management recommendations

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

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

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

ATLANTIC SAILFISH SUMMARY

	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	600-1,100[1] t	1,250-1,950[1] t
Recent Yield (2007)	1,188 t	2,281 t
B_{2006}/B_{msy}	Possibly < 1.0	Likely < 1.0
F_{2007}/F_{msy}	Possibly > 1.0	Likely > 1.0
2008 Replacement Yield	not estimated	not estimated
Management Measures in Effect	None[2]	None[2]

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

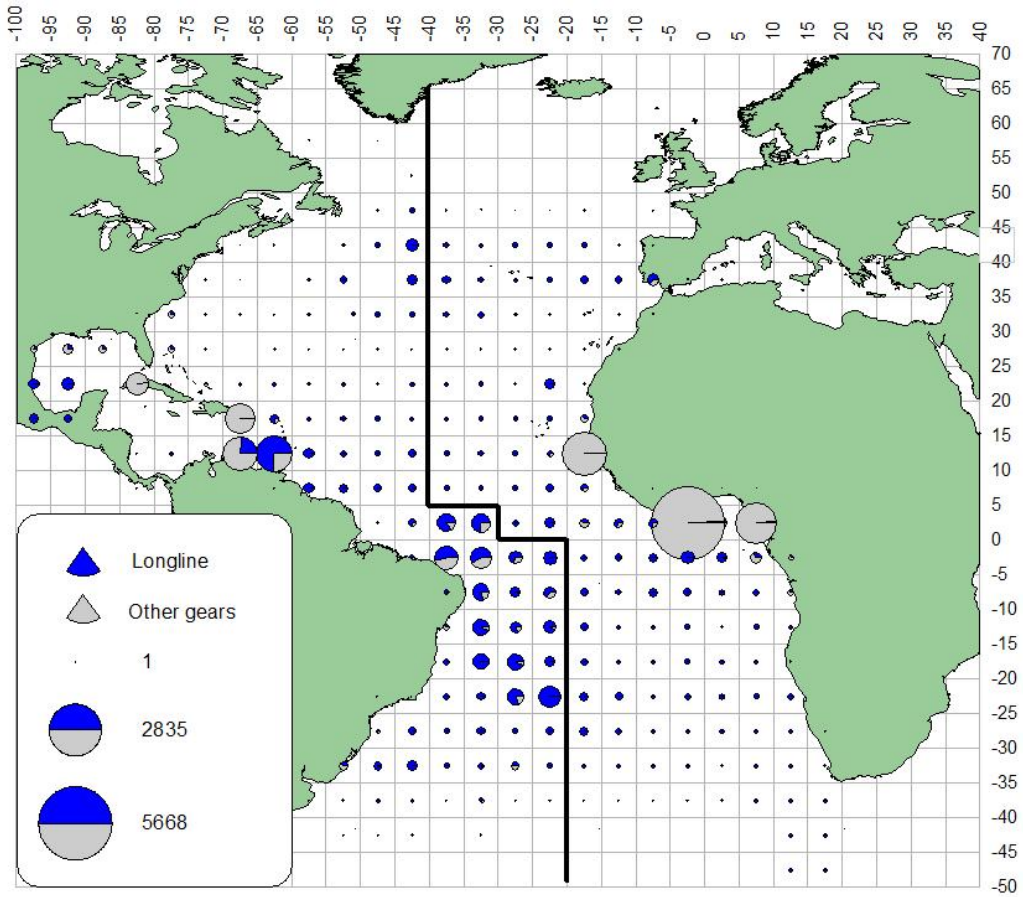
SAI-Table 1. Estimated Catches (t) of Atlantic sailfish (*Istiophorus albicans*) and spearfish by major area, gear and flag.

			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			3713	3421	3386	3761	3446	2814	3582	2698	3286	3504	2415	2479	2995	2601	2847	2852	3303	3663	3661	3396	3658	3444	2619	3465	2971
	ATE		2492	2328	2105	2590	2148	1750	2359	1500	1943	2111	1236	1332	1925	1432	1436	1454	1769	2188	1642	2068	2252	1989	1574	2277	1708
	ATW		1221	1093	1281	1171	1297	1064	1223	1198	1344	1393	1179	1147	1070	1168	1411	1398	1534	1475	2019	1328	1407	1455	1045	1188	1263
Landings	ATE	Longline	224	148	140	136	132	152	153	71	267	552	215	287	239	301	349	384	242	306	374	295	274	319	482	580	580
		Other surf.	2107	1940	1394	1870	1479	1153	1249	1000	983	1111	954	910	1504	644	859	883	976	1114	1170	1491	1758	1527	1047	1629	1128
		Sport (HL+RR)	161	240	571	584	537	445	957	429	692	448	67	135	182	488	228	186	551	767	98	282	219	143	46	68	0
	ATW	Longline	512	506	489	451	560	417	380	242	375	599	466	361	289	328	563	549	811	1002	1303	883	757	1083	663	723	979
		Other surf.	173	274	295	187	208	238	514	521	599	498	468	410	482	433	553	615	602	401	603	440	642	368	374	452	267
		Sport (HL+RR)	536	313	496	491	472	352	267	371	333	233	217	348	230	350	267	163	76	60	106	0	0	0	2	6	7
Discards	ATW	Longline	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	3	5	8	9
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	
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	0	0	
		Benin	53	50	25	32	40	8	21	20	21	20	20	20	19	6	4	5	5	12	2	2	5	3	3	4	
		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	3	3	3	3	5	9	4	5	11	4	4	8	0	8	1
		Chinese Taipei	8	9	1	5	6	7	13	10	215	420	101	155	65	150	117	178	120	101	124	74	30	50	73	112	104
		Cuba	115	19	55	50	22	53	61	184	200	77	83	72	533	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	40	40	40	40	66	55	58	38	69	40	54	66	91	65	35	80	45	47	65	121	73	93	78	52	448
		EC.España	4	7	9	19	28	14	0	13	3	42	8	13	42	38	15	20	8	150	210	183	148	177	200	257	206
		EC.Portugal	0	0	0	0	0	0	0	0	1	2	1	2	1	2	27	53	11	3	8	13	19	31	136	43	49
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		Gabon	0	0	0	0	0	0	0	0	0	3	3	110	218	2	0	0	0	0	0	4	0	0	0	0	
		Ghana	1658	1485	925	1392	837	465	395	463	297	693	450	353	303	196	351	305	275	568	592	566	521	542	282	420	342
		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	63	84	71	37	57	57	63	16	42	58	45	52	47	19	58	16	26	6	20	21	70	50	62	144	220
		Korea Rep.	34	29	2	20	15	17	16	30	3	3	6	6	14	5	0	0	0	0	0	0	0	0	0	0	
		Liberia	0	0	0	0	0	0	0	0	0	0	0	33	85	43	136	122	154	56	133	127	106	122	118	115	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	
		Mixed flags (FR+ES)	354	364	403	394	408	432	595	174	150	182	160	128	97	110	138	131	98	44	39	44	41	35	32	36	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	27	51	57	69	86	127	120	77	43	3	2	16	7	8	10	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		S. Tomé e Príncipe	0	0	0	0	78	86	97	84	78	81	88	92	96	139	141	141	136	136	136	136	515	346	292	384	
		Senegal	163	241	572	596	587	552	1040	466	860	462	162	167	240	560	260	238	786	953	240	673	567	463	256	616	338
		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	4	0	0	0	1	5	
		Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	9	22	36	23	62	55	95	135	47	31	71	
		U.S.A.	0	0	0	0	0	0	0	2	4	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	0	0	2	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATW	Aruba	30	30	30	23	20	16	13	9	5	10	10	10	10	10	10	10	10	0	0	0	0	0	0	0	
		Barbados	0	0	0	0	0	69	45	29	42	50	46	74	25	71	58	44	44	42	26	27	26	42	58	42	
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	12	
		Brasil	121	187	292	174	152	147	301	90	351	243	129	245	310	137	184	356	598	412	547	585	534	416	139	123	222
		China P.R.	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	9	4	3	1	0	1	0	0	0	1
		Chinese Taipei	45	39	64	31	300	171	83	73	33	223	233	38	37	4	129	33	22	57	70	25	19	41	22	53	28
		Cuba	169	130	50	171	78	55	126	83	70	42	46	37	37	40	28	196	208	68	32	18	50	72	47	56	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	1	0	3	3	4
		Dominican Republic	49	46	18	40	44	44	40	31	98	50	90	40	40	101	89	27	67	81	260	91	144	165	133	147	
		EC.España	0	0	0	0	0	0	0	8	13	13	19	36	5	30	42	7	14	354	449	196	181	113	148	184	393

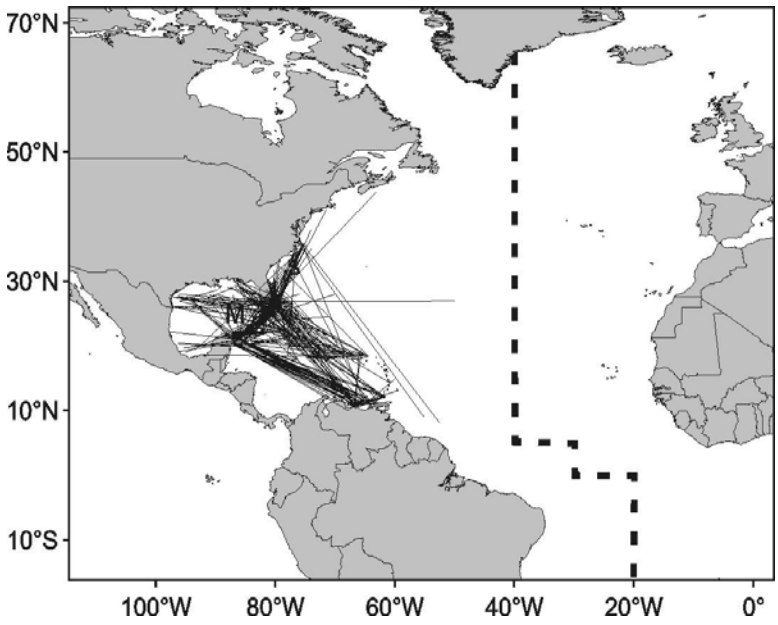
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	2	12	12	110	19	53	101	
		Grenada	66	164	211	104	114	98	218	316	310	246	151	119	56	83	151	148	164	187	151	171	112	147	159	174	216	
		Japan	34	38	28	6	22	22	25	73	1	2	8	2	4	17	3	10	12	3	3	8	5	22	4	1	37	
		Korea Rep.	52	72	14	1	3	17	25	1	3	6	8	8	22	8	0	0	0	0	0	0	0	0	0	0		
		Mexico	0	0	0	0	0	0	0	0	0	2	19	19	10	9	65	40	118	36	34	45	51	55	41	46	45	
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	15	27	30	36	46	67	64	41	23	1	1	9	4	4	6		
		Netherlands Antilles	21	10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15	0	0	0	0	0	0	0		
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0		
		St. Vincent and Grenadines	0	0	0	0	0	0	2	1	4	4	4	2	1	3	0	1	0	2	164	3	86	73	59	18	13	
		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	4	
		Trinidad and Tobago	58	14	25	35	24	10	7	3	3	1	2	1	4	10	25	37	3	7	6	8	10	9	17	13	32	
		U.S.A.	495	282	462	454	451	324	242	343	294	202	179	345	231	349	267	163	76	58	103	0	0	0	0	0	3	
		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	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		
		Venezuela	81	81	77	80	22	24	24	65	71	206	162	93	155	175	248	169	83	126	159	133	158	178	184	248	154	
Discards	ATW	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11	7	5	7	4	5	7	9	

Notes

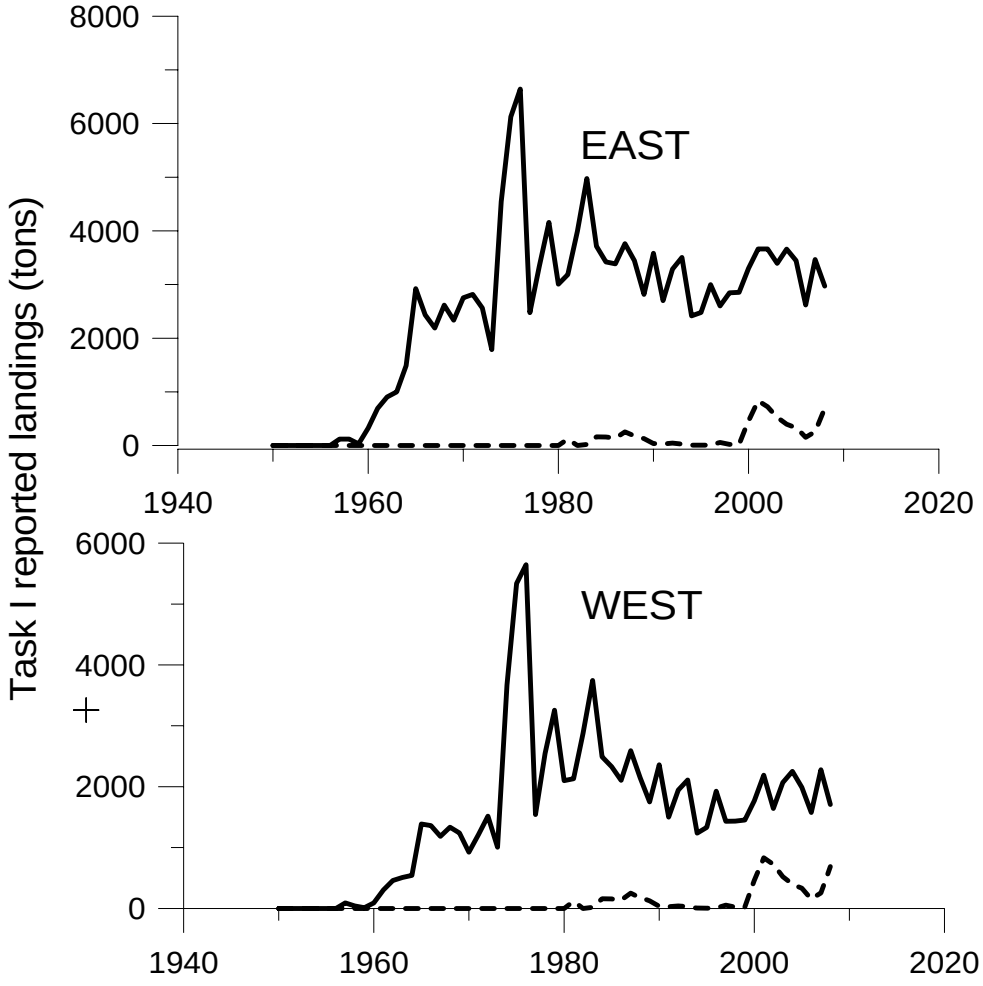
Task-I catches (new figures) not included in the table: Senegal 2007 ATN (86 t) and 2008 ATN (108 t) from sport fisheries



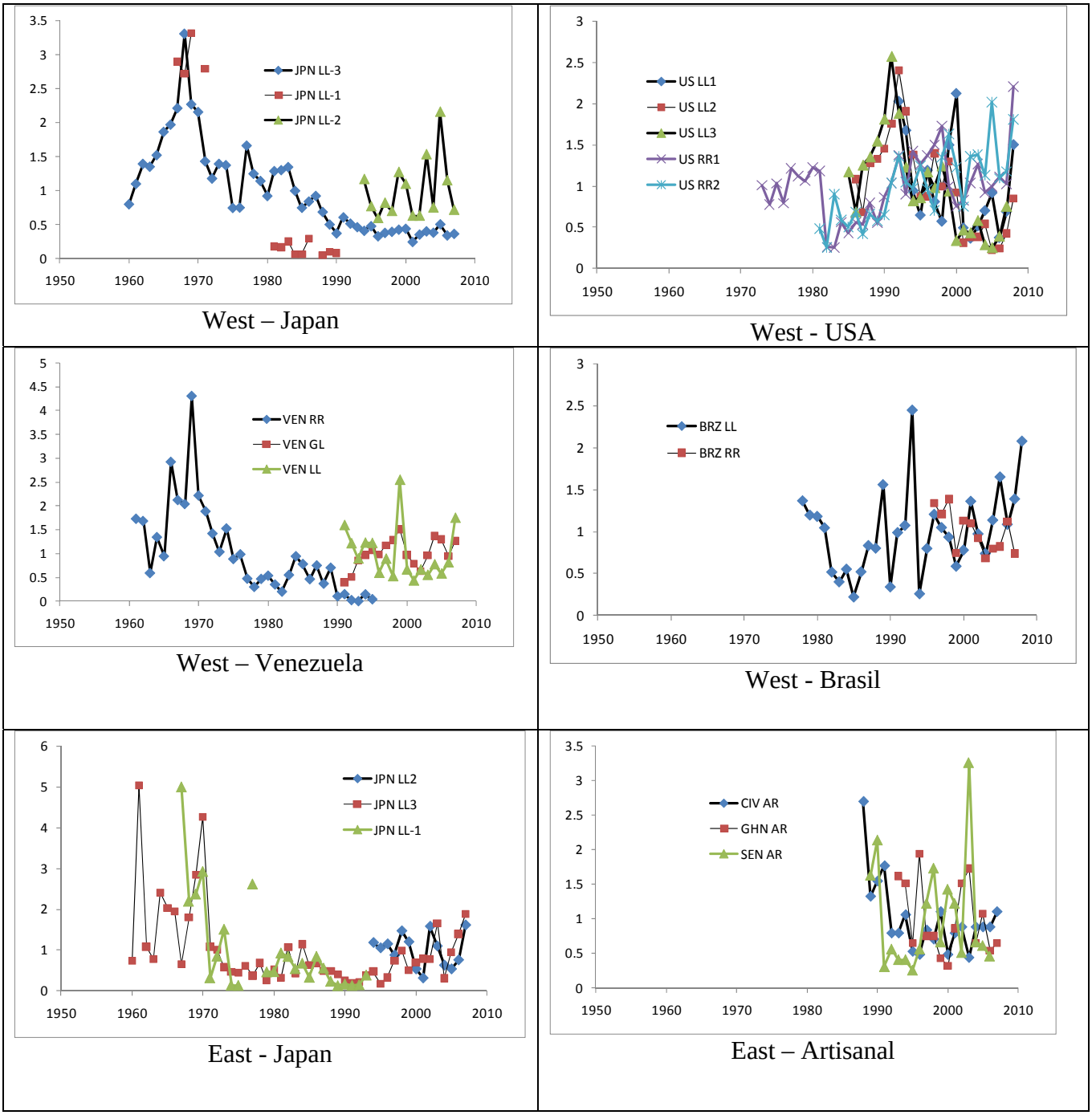
SAI-Figure 1. Geographic distribution of the mean sailfish catch (2000-2007) by major gears.



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



SAI-Figure 3. Task I catches of sailfish for each of the two Atlantic stocks, East and West. Also shown for reference (dashed line) are the catches of Atlantic-wide unclassified billfish, these include catches that do not contain area information.



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

8.8 SWO-ATL-ATLANTIC SWORDFISH

The last assessment for Atlantic swordfish was conducted in 2009 (Anon. 2009). Other information relevant to Atlantic swordfish is presented in the Report of the Sub-Committee on Statistics, included as **Appendix 8** to this SCRS Report, and recommendations pertinent to Atlantic swordfish are presented in Section 15.

SWO-ATL-1. Biology

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

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

Two documents pertaining to swordfish biology were presented during the 2009 assessment. Document SCRS/2009/111 was a preliminary report of a study regarding the population structure and admixture of swordfish in the Mediterranean and Atlantic Ocean. Four nuclear genetic markers were developed and used to assign individuals to inferred ancestral populations. This research confirmed the current ICCAT assumption of three distinct populations.

SCRS/2009/115 provided an update on the ongoing Canadian research program using pop-up satellite archival tags (PSAT). A three-year study began in 2005 and concentrated tagging effort on fish in the Georges Bank area. More recently, tagging effort has shifted to the Grand Banks off Newfoundland. Results of tag deployments to date indicate that fish tagged in Canadian summer foraging grounds overwinter in the Caribbean Sea. Swordfish also appear to exhibit fidelity to their feeding sites.

SWO-ATL-2. Fishery indicators

Due to the broad geographical distribution of Atlantic swordfish **(SWO ATL-Figure 1)** in coastal and off-shore areas (mostly ranging from 50ºN to 45ºS), this species is available to a large number of fishing countries **(SWO ATL-Figure 2)**. Directed longline fisheries from Canada, EC-Spain, and the United States have operated since the late 1950s or early 1960s, and harpoon fisheries have existed at least since the late 1800s. Other directed swordfish fisheries include fleets from Brazil, Morocco, Namibia, EC-Portugal, South Africa, Uruguay, and Venezuela. The primary by-catch or opportunistic fisheries that take swordfish are tuna fleets from Chinese Taipei, Japan, Korea and EC-France. The tuna longline fishery started in 1956 and has operated throughout the Atlantic since then, with substantial catches of swordfish that are produced as a by-catch of tuna fisheries. The largest proportion of the Atlantic catches is made using surface-drifting longline. However, many additional gears are used, including traditional gillnets off the coast of western Africa.

Total Atlantic

The total Atlantic estimated catch (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2008 (21,859 t) represented a significant decline from that in 2007 (27,941 t), due to socio-economic factors as well as changes in the target species for some fleets. As a small number of countries

have not yet reported their 2008 catches and because of unknown unreported catches, this value should be considered provisional and subject to further revision.

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

North Atlantic

For the past decade, the North Atlantic estimated catch (landings plus dead discards) has averaged about 11,332 t per year (**SWO-ATL-Table 1** and **SWO-ATL-Figure 3**). The catch in 2008 (10,752) represents a 53% 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 some years to the South Atlantic or out of the Atlantic. In addition, some fleets, including at least the United States, EC-Spain, EC-Portugal and Canada, have changed operating procedures to opportunistically target tuna and/or sharks, taking advantage of market conditions and higher relative catch rates of these species previously considered as by-catch in some fleets. Recently, socio-economic factors may have also contributed to the decline in catch.

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

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

South Atlantic

The historical trend of catch (landings plus dead discards) can be divided in two periods: before and after 1980. The first one is characterized by relatively low catches, generally less than 5,000 t (with an average value of 2,300 t). After 1980, landings increased continuously up to a peak of 21,930 t in 1995, levels that match the peak of North Atlantic harvest (20,236 t). This increase of landings was, in part, due to progressive shifts of fishing effort to the South Atlantic, primarily from the North Atlantic, as well as other waters. Expansion of fishing activities by southern coastal countries, such as Brazil and Uruguay, also contributed to this increase in catches. The reduction in catch following the peak in 1995 resulted from regulations and partly due to a shift to other oceans and target species. In 2008, the 11,108 t reported catches were about 51% lower than the 1995 reported level (**SWO-ATL-Figure 3**).

As observed in the 2006 assessment, the CPUE trend from targeted and non-targeted fisheries show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock (**SWO-ATL-Figure 6**). It was noted that there was little overlap in fishing area and strategies between the by-catch and targeted fleets used for estimating CPUE pattern, and therefore the by-catch and targeted fisheries CPUE trends could be tracking different components of the population.

Discards

Since 1991, several fleets have reported dead discards (see **SWO-ATL-Table 1**). The volume of Atlantic-wide reported discards since then has ranged from 215 t to 1,139 t. The most recent (2008) reported level of dead discards is 244 t, a reduction of 79% from the peak level reported for 2000.

SWO-ATL-3. State of the stocks

North Atlantic

Results from the base case production model are shown in **SWO-ATL-Figure 7.** The estimated relative biomass trend shows a consistent increase since 2000. The current results indicate that the stock is at or above B_{MSY}. The relative trend in fishing mortality shows that the level of fishing peak in 1995, followed by a decrease until 2002, followed by small increase in the 2003-05 period and downward trend since then. Fishing mortality has been below F_{MSY} since 2005. The results suggest that there is greater than 50% probability that the stock is at or above B_{MSY}, and thus the Commission's rebuilding objective [99-2] has been achieved (**SWO-ATL-Figure 8**). However, it is important to note that since 2003 the catches have been below the TAC's greatly increasing the chances for a fast recovery. Overall, the stock was estimated to be somewhat less productive than the previous assessment, with the intrinsic rate of increase, *r*, estimated at 0.44 compared to 0.49 in 2006.

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

South Atlantic

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

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

SWO-ATL-4. Outlook

North Atlantic

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

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

South Atlantic

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

For the catch only model projections, constant catch scenarios were evaluated ranging from 10,000 to 17,000 t, incremented by 1,000 t for a period of 10 years. For 2009, all projection scenarios assumed a catch equal to the

average catch for 2006-2008 (13,658 t). In general, catches of 15,000 t will result in the biomasses being higher than B_{MSY} 80% of the time. **SWO-ATL-Figure 15** summarizes the probability of $B>B_{MSY}$ and $F<F_{MSY}$ for the constant catch scenarios indicated over time. Catches in the order of 17,000 will result in a probability of 0.67 of the biomass being above B_{MSY} in ten years.

SWO-ATL-5. Effects of current regulations

In 2006, the Committee provided information on the effectiveness of existing minimum size regulations. New catch regulations were implemented on the basis of Rec. 06-02, which entered into effect in 2007 (Rec. 08-02 extended the provisions of Rec. 06-02 to include 2009).

Catch limits

The total allowable catch in the North Atlantic during the 2007 to 2008 period was 14,000 t per year. The reported catch during that period averaged 11,536 t and did not exceed the TAC in any year. Reports for 2008 are considered provisional and subject to change.

The total allowable catch in the South Atlantic for the years 2007 through 2008 was 17,000 t. The reported catch during that period averaged 13,365, and did not exceed the TAC in any year. Reports for 2008 are considered provisional and subject to change.

Minimum size limits

There are two minimum size options that are applied to the entire Atlantic: 125 cm LJFL with a 15% tolerance, or 119 cm LJFL with zero tolerance and evaluation of the discards.

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

Other implications

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

SWO-ATL-6. Management recommendations

North Atlantic

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

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

South Atlantic

Until sufficiently more research has been conducted to reduce the high uncertainty in stock status evaluations for the southern Atlantic swordfish stock, the Committee emphasizes that annual catch should not exceed the provisionally estimated MSY (15,000). Considering the unquantified uncertainties and the conflicting indications for the stock, the Committee recommends a more precautionary Fishery Management approach, to limit catches to the recent average level (~15,000 t), which are expected to maintain the catch rates at about their current level.

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	**South Atlantic**
Maximum Sustainable Yield[1]	13,730 t (13,020-14,182)[3]	~15,000t[4]
Current (2008) Yield[2]	10,752 t	11,108 t
Relative Biomass (B_{2009}/B_{MSY})	1.05 (0.94 - 1.24)[3]	Likely >1
Relative Fishing Mortality F_{2008}/F_{MSY}[1]	0.76 (0.67 - 0.96)[3]	Likely <1
Management Measures in Effect:	Country-specific TACs [Rec. 06-02 and Rec. 08-02]; 125/119 cm LJFL minimum size.	Country-specific TACs [Rec. 06-03]; 125/119 cm LJFL minimum size.

[1] Base Case production model (Logistic) results based on catch data 1950-2008.
[2] Provisional and subject to revision.
[3] 80% bias corrected confidence intervals are shown.
[4] Provisional and preliminary, based on production model results which included catch data from 1970-2008.

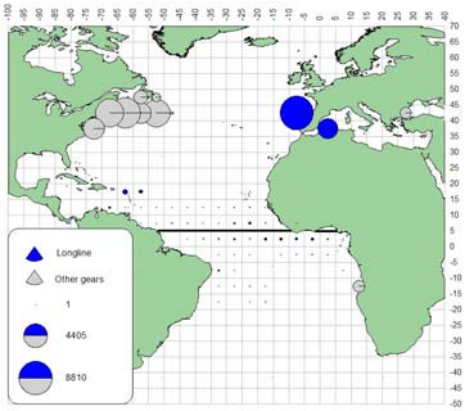
SWO-ATL-Table 1. Estimated Catches (t) of Atlantic Swordfish (*Xiphias gladius*) by gear and flag.

			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL			21953	23969	24380	26266	32685	34305	32976	28826	29207	32868	34459	38803	33511	31567	26251	27123	27180	25139	23758	24064	25237	25609	25718	27941	21859
	ATN		12791	14383	18486	20236	19513	17250	15672	14934	15394	16738	15501	16872	15222	13025	12223	11622	11453	10011	9654	11431	12160	12446	11473	12320	10752
	ATS		9162	9586	5894	6030	13172	17055	17304	13893	13813	16130	18958	21930	18289	18542	14027	15502	15728	15128	14104	12633	13077	13162	14245	15621	11108
Landings	ATN	Longline	12664	14240	18269	20022	18927	15348	14026	14208	14288	15641	14309	15764	13808	12181	10778	10449	9642	8425	8664	9988	11393	11498	10840	11499	10052
		Other surf.	127	143	217	214	586	1902	1646	511	723	689	484	582	826	393	961	643	672	685	374	820	447	615	409	540	461
	ATS	Longline	8920	8863	4951	5446	12404	16398	16705	13287	13176	15547	17387	20806	17799	18239	13748	14823	15448	14302	13576	11712	12485	12915	13723	14958	10684
		Other surf.	242	723	943	584	768	657	599	606	637	583	1571	1124	489	282	269	672	278	825	527	920	591	248	522	572	418
Discards	ATN	Longline	0	0	0	0	0	0	0	215	383	408	708	526	562	439	476	525	1137	896	607	618	313	323	215	273	229
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	26	12	9	4	1	6	8	5	7	10	8	8	9
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	91	6
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	0	0	33	16	16	12	13	19	10	10	10	10	39	27	39
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	
		Canada	499	585	1059	954	898	1247	911	1026	1547	2234	1676	1610	739	1089	1115	1119	968	1079	959	1285	1203	1558	1404	1348	1334
		China P.R.	0	0	0	0	0	0	0	0	0	73	86	104	132	40	337	304	22	102	90	316	56	108	72	85	92
		Chinese Taipei	164	152	157	52	23	17	270	577	441	127	507	489	521	509	286	285	347	299	310	257	30	140	172	103	82
		Cuba	206	162	636	910	832	87	47	23	27	16	50	86	7	7	7	7	0	0	10	3	3	2	2	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
		EC.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	
		EC.España	6315	7441	9719	11135	9799	6648	6386	6633	6672	6598	6185	6953	5547	5140	4079	3996	4595	3968	3957	4586	5376	5521	5448	5564	4366
		EC.France	1	4	4	0	0	0	75	75	75	95	46	84	97	164	110	104	122	0	74	169	102	178	92	46	14
		EC.Ireland	0	0	0	0	0	0	0	0	0	7	0	0	15	15	132	81	35	17	5	12	1	1	3	2	2
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.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	
		EC.Portugal	14	22	468	994	617	300	475	773	542	1961	1599	1617	1703	903	773	777	732	735	766	1032	1320	900	949	778	747
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	2	3	1	5	11	0	2	1	0	0	0	0	0	0	0	
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	36	48	0	82	48
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	
		Grenada	0	0	0	0	56	5	1	2	3	13	0	1	4	15	15	42	84	0	54	88	73	56	30	26	43
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
		Japan	665	921	807	413	621	1572	1051	992	1064	1126	933	1043	1494	1218	1391	1089	161	0	0	0	575	705	656	907	661
		Korea Rep.	32	160	68	60	30	320	51	3	3	19	16	16	19	15	0	0	0	0	0	0	0	51	65	175	157
		Liberia	0	24	16	30	19	35	3	0	7	14	26	28	28	28	28	28	0	0	0	0	0	0	0	0	
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	
		Maroc	81	137	181	197	196	222	91	110	69	39	36	79	462	267	191	119	114	523	223	329	335	334	341	237	430
		Mexico	0	0	0	0	0	0	0	0	0	6	14	0	22	14	28	24	37	27	34	32	44	41	31	35	34
		NEI (ETRO)	0	0	0	0	76	112	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	0	0	14	3	131	190	185	43	35	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	44	5	0	8	0	22
		Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		Senegal	0	0	0	0	0	1	0	6	6	0	0	0	0	0	0	0	0	0	0	0	108	108	0	38	38
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	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	2	2	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	3	0	3	23	0	4	3	1	0	1	0	22	22	7	7	7	0	51	7
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0	2
		Trinidad and Tobago	26	6	45	151	42	79	66	71	562	11	180	150	158	110	130	138	41	75	92	78	83	91	19	29	48
		U.S.A.	4749	4705	5210	5247	6171	6411	5519	4310	3852	3783	3366	4026	3559	2987	3058	2908	2863	2217	2384	2513	2380	2160	1873	2463	2331
		U.S.S.R.	16	13	18	4	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	1	1	5	5	3	3	2	0	0	1	1	0	3	4
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	7	0	3
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	29	14	0	
		Venezuela	23	51	84	86	2	4	9	75	103	73	69	54	85	20	37	30	44	21	34	45	53	55	22	30	11
	ATS	Angola	26	228	815	84	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	
		Argentina	0	361	31	351	198	175	230	88	88	14	24	0	0	0	0	38	0	5	10	8	0	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	17	8	0	0	0	0	0	0	120	32

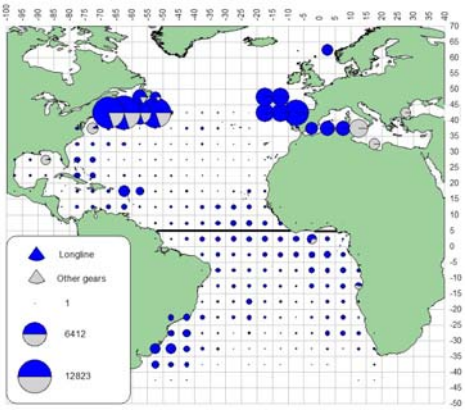
		Benin	86	90	39	13	19	26	28	28	26	28	25	24	24	10	0	3	0	0	0	0	0	0	0	0	
		Brasil	468	562	753	947	1162	1168	1696	1312	2609	2013	1571	1975	1892	4100	3847	4721	4579	4082	2910	2920	2998	3785	4430	4153	3407
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	534	344	200	423	353	278	91	300	473	470
		Chinese Taipei	199	280	216	338	798	610	900	1453	1686	846	2829	2876	2873	2562	1147	1168	1303	1149	1164	1254	745	744	377	671	727
		Cuba	1161	1301	95	173	159	830	448	209	246	192	452	778	60	60	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	10	10	10	10	12	7	8	18	13	14	20	19	26	18	25	26	20	19	19	43	29	31	39	17	20
		EC.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	
		EC.España	0	0	66	0	4393	7725	6166	5760	5651	6974	7937	11290	9622	8461	5832	5758	6388	5789	5741	4527	5483	5402	5300	5283	4073
		EC.Lithuania	0	0	0	0	0	0	0	0	0	0	794	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	1	0	0	380	389	441	384	381	392	393	380	354	345	493	440	428	271
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	0	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	
		Ghana	15	25	13	123	235	156	146	73	69	121	51	103	140	44	106	121	117	531	372	734	343	55	32	65	
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	
		Honduras	0	0	0	0	0	0	0	0	3	0	0	6	4	5	2	8	0	0	0	0	0	0	0	0	
		Japan	4395	4613	2913	2620	4453	4019	6708	4459	2870	5256	4699	3619	2197	1494	1186	775	790	685	833	924	686	480	1090	2223	658
		Korea Rep.	625	917	369	666	1012	776	50	147	147	198	164	164	7	18	7	5	10	0	2	24	70	36	94	176	223
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	0	0	856	439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	730	469	751	504	191	549	832	1118	1038	518
		Nigeria	69	0	0	0	0	0	0	0	3	0	0	0	9	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	29	105	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	8	1	1	4	58	41
		S. Tomé e Príncipe	0	0	0	0	216	207	181	179	177	202	190	178	166	148	135	129	120	120	120	120	126	147	138	138	138
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	
		South Africa	23	8	5	5	4	0	0	5	9	4	1	4	1	1	240	143	328	547	649	293	295	199	186	207	142
		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	10	7
		Togo	0	6	32	1	0	2	3	5	5	8	14	14	64	0	0	0	0	0	0	0	9	10	2	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	171	396	160	179	142	43	200	21	15	0	0	0	0
		U.S.S.R.	158	60	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	20	4	0	0	0	0	0	
		Uruguay	1927	1125	537	699	427	414	302	156	210	260	165	499	644	760	889	650	713	789	768	850	1105	843	620	464	370
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	26	6	6
Discards	ATN	Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	5	52	35	50	26	33	79	45	106	38	61	39
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	598	567	319	263	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	0	0	0	0	0	215	383	408	708	526	588	446	433	494	490	308	263	282	275	227	185	220	199
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	6
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	0	

Notes

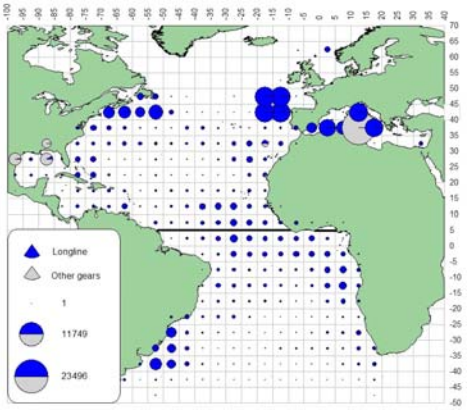
Task-I catches (new figures reported after the stock assessment) not included in the table: Barbados update for 2003, 2004 and 2005 (respectively, 21 t, 25 t and 44 t) in ATN; Côte D'Ivoire 2008 ATS (159 t); Ghana 2008 ATS (177 t); Japan update for 2007 (889 t in ATN and 1422 t in ATS) and 2008 (986 t in ATN and 803 t in ATS); Senegal update for 2007 ATN (142 t) and 2008 (138 t); Vanuatu 2008 ATS (3 t).



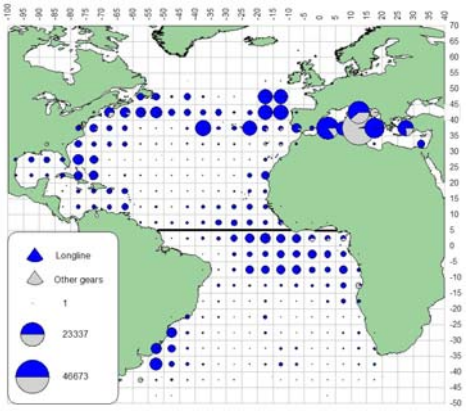
a. SWO(1950-59)



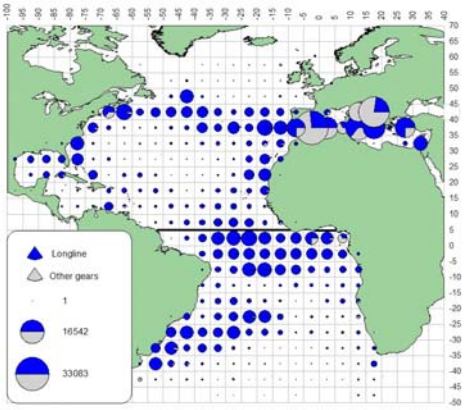
b. SWO(1960-69)



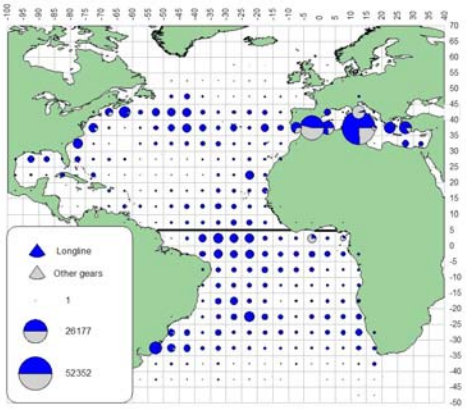
c. SWO(1970-79)



d. SWO(1980-89)

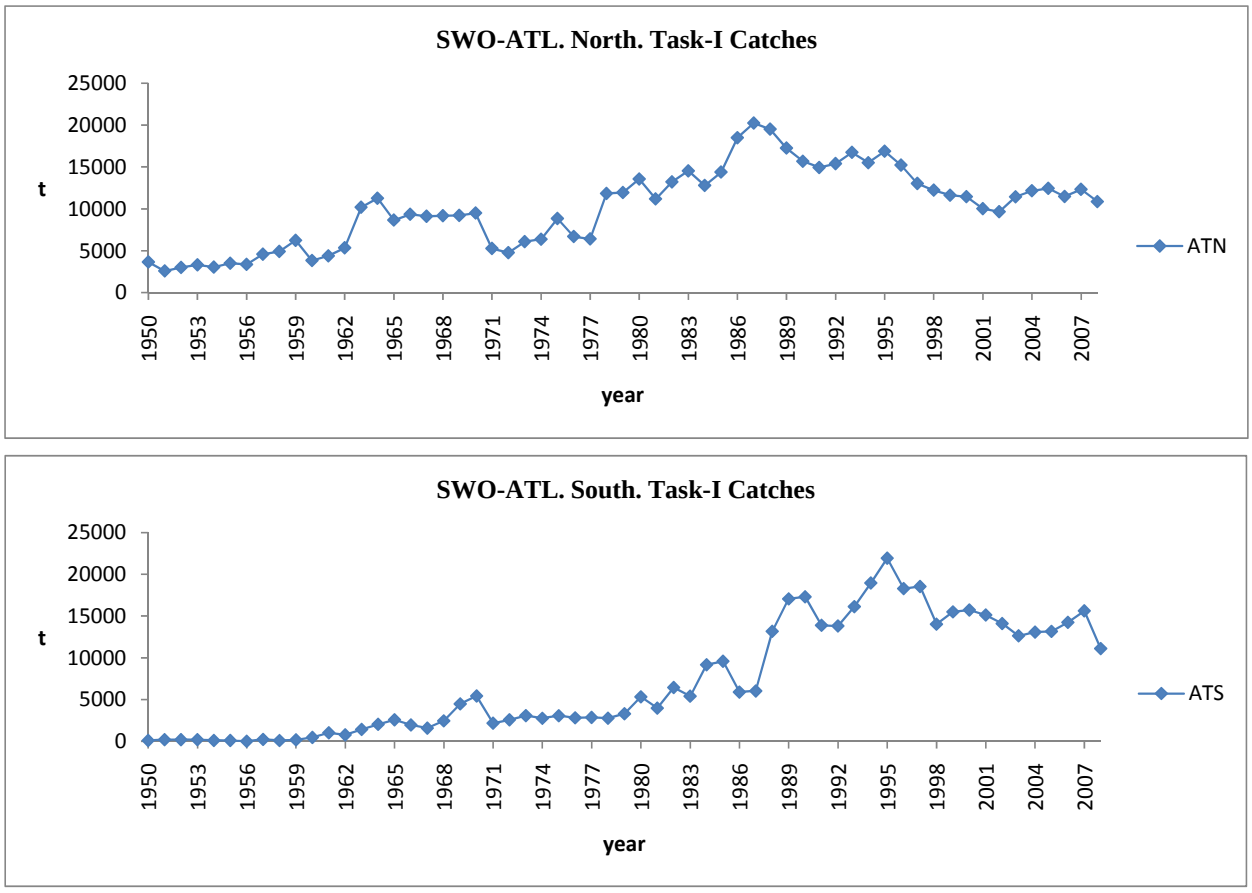


e. SWO (1990-99)

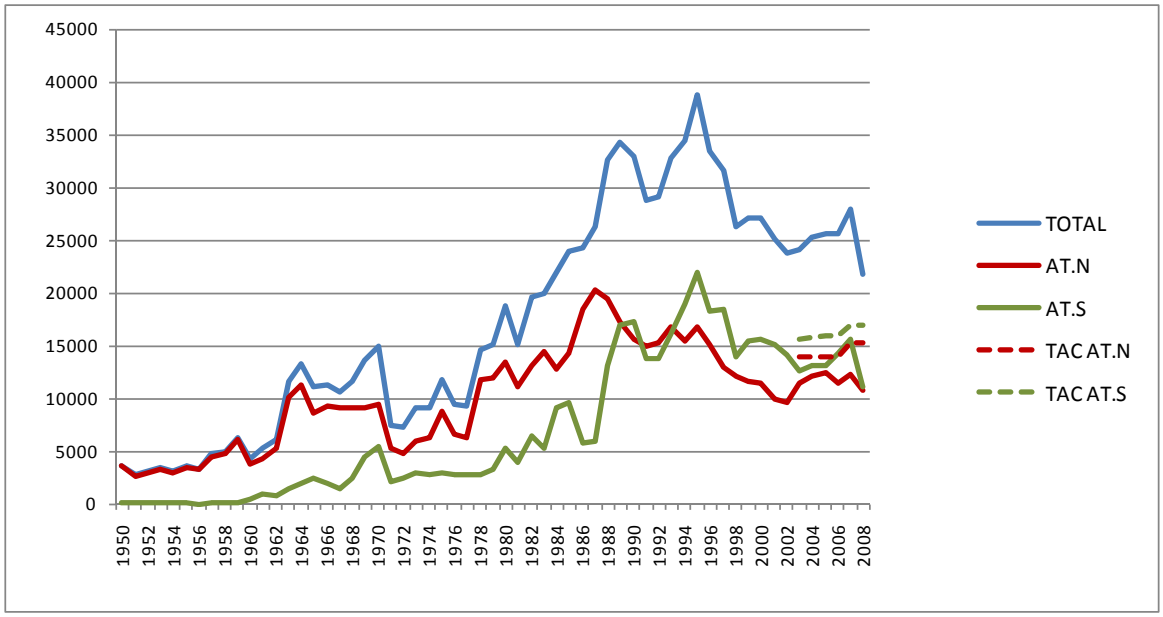


f. SWO (2000-2007)

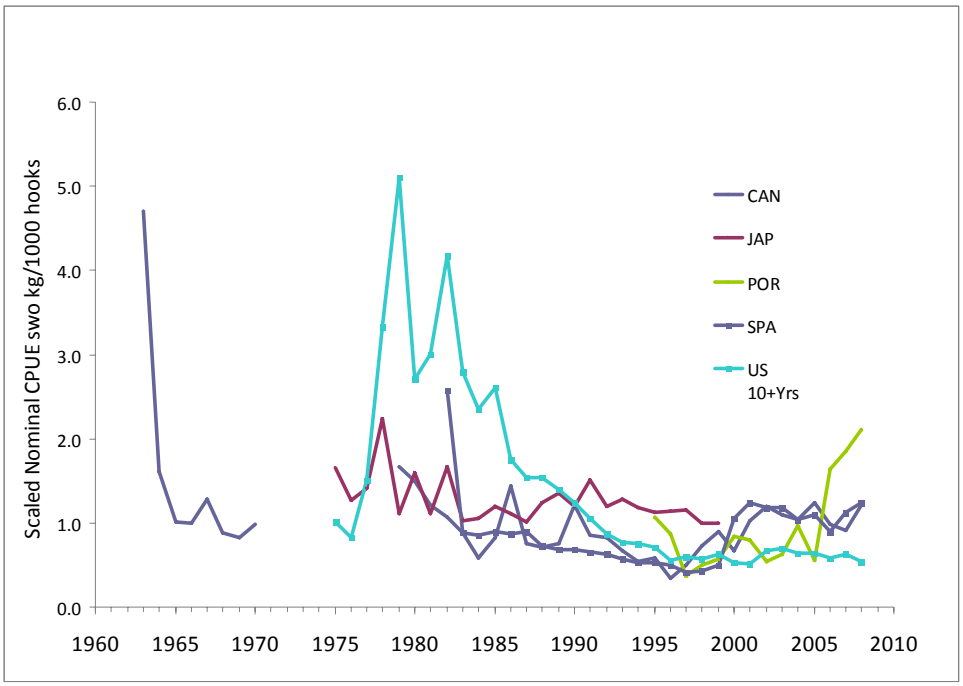
SWO-ATL-Figure 1. Geographic distribution of swordfish cumulative catch (t) by gear, in the Convention area, shown on a decadal scale. The more contemporary period (2000 to 2007) is shown on the bottom right.



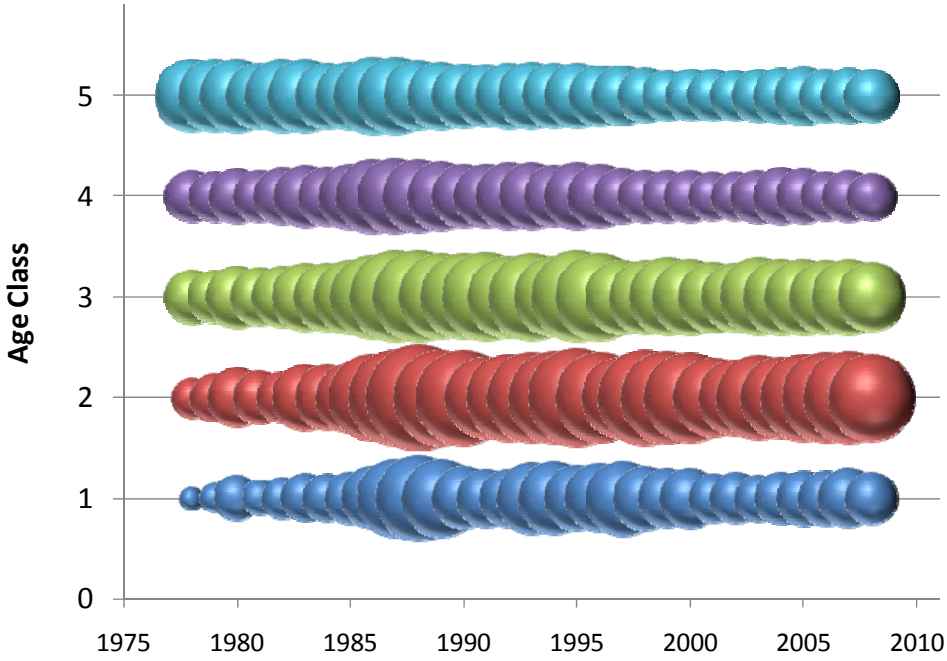
SWO-ATL-Figure 2. North and South Atlantic swordfish catch (t) by flag.



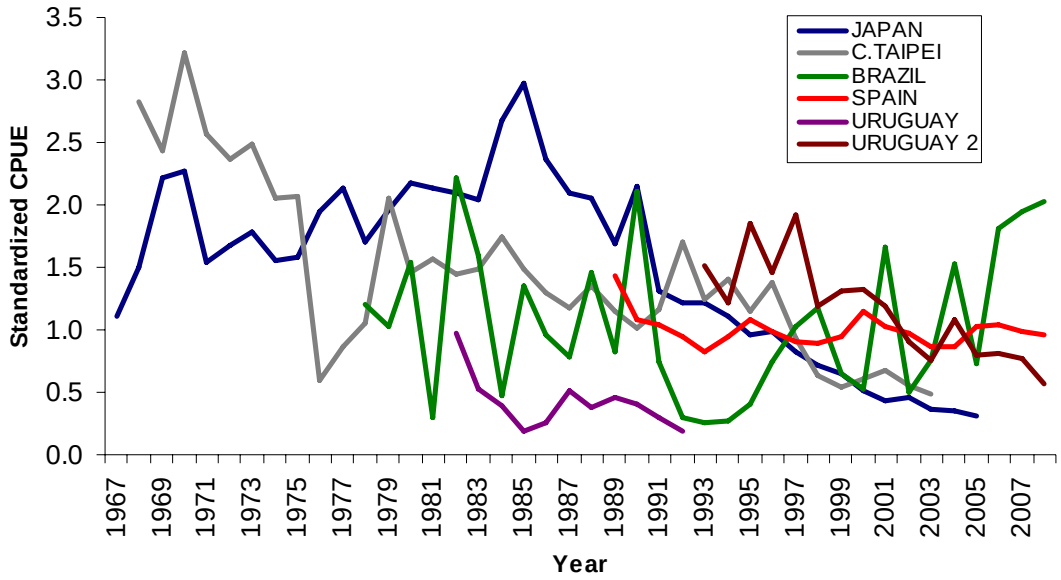
SWO-ATL-Figure 3. Swordfish reported catches (t) for North and South Atlantic, for the period 1950-2008 and the corresponding TAC.



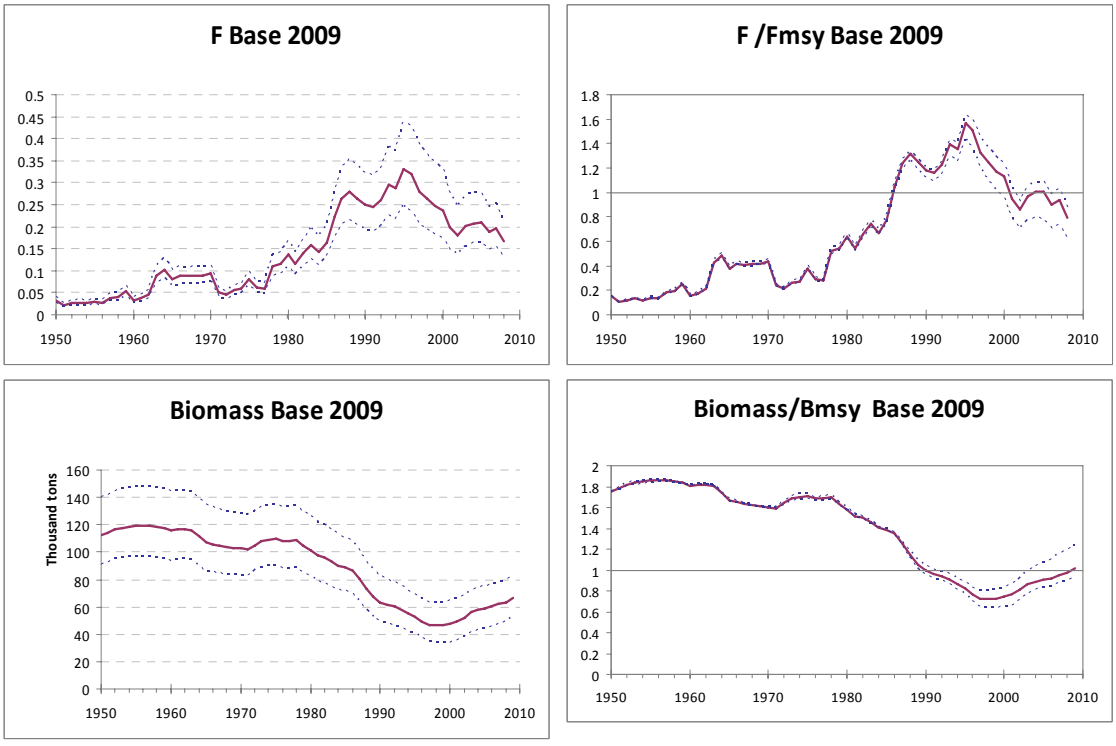
SWO-ATL-Figure 4. North Atlantic swordfish scaled nominal catch rate series used as input in the combined index of the base production model.



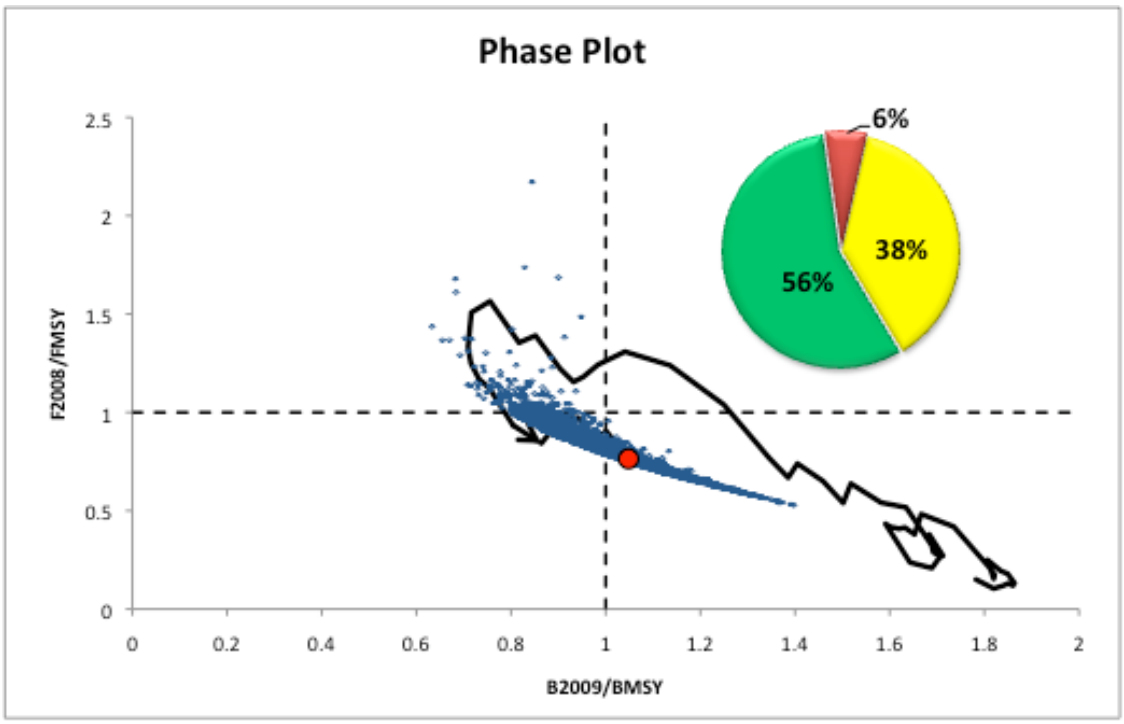
SWO-ATL-Figure 5. North Atlantic swordfish, catch at age (numbers) converted from catch at size. The area of the filled circle shows the proportional catch at age. Note: Age 5 is a plus group.



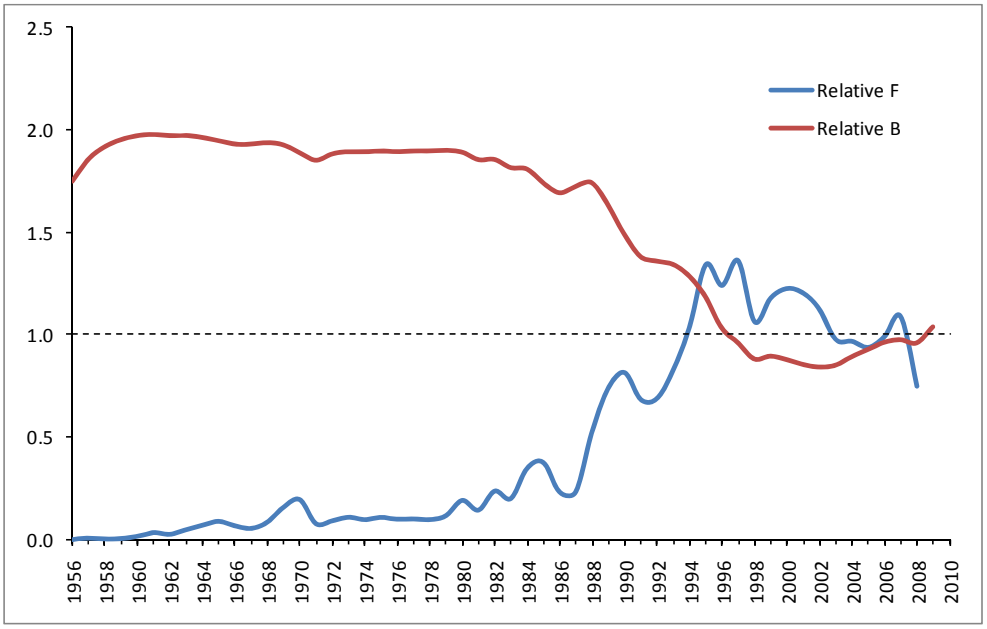
SWO-ATL-Figure 6. South Atlantic swordfish, standardized CPUE series for the production model (ASPIC) for characterizing the status of southern Atlantic swordfish (Scaled relative to mean of overlap).The series for Uruguay was treated as two series.



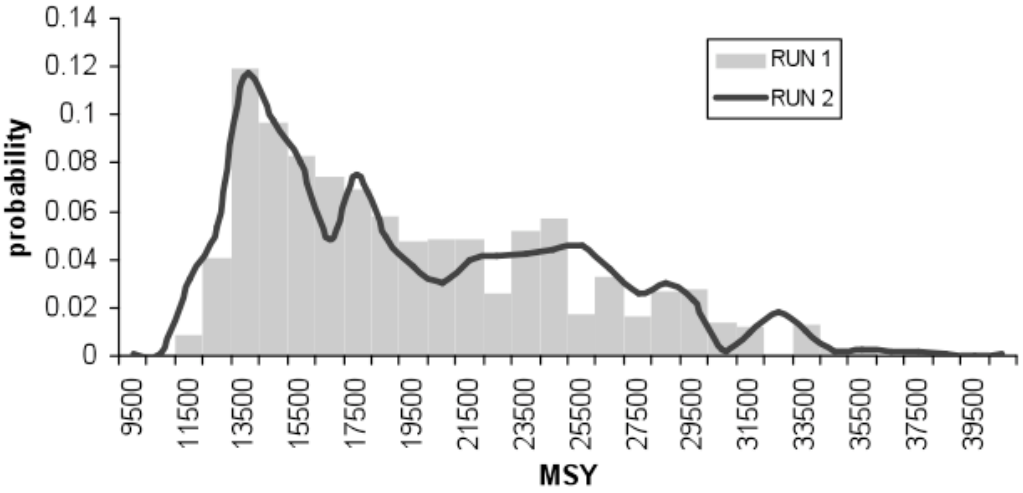
SWO-ATL-Figure 7. North Atlantic swordfish, biomass, fishing mortality and relative ratio trends for the base production model. The solid lines represent point estimates and broken lines represent estimated 80% bias corrected confidence intervals.



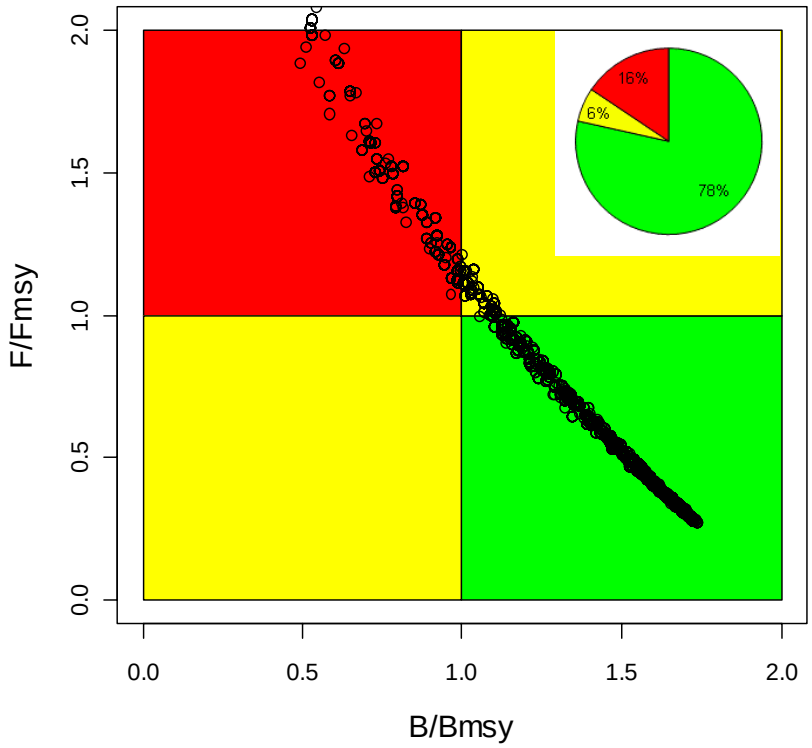
SWO-ATL-Figure 8. Summary figure of the current northern Atlantic swordfish stock status which includes different representation of the bootstraps results of the base ASPIC model: percentage, phase-plots (marked dot corresponds to the deterministic result) and stock status trajectories for the period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



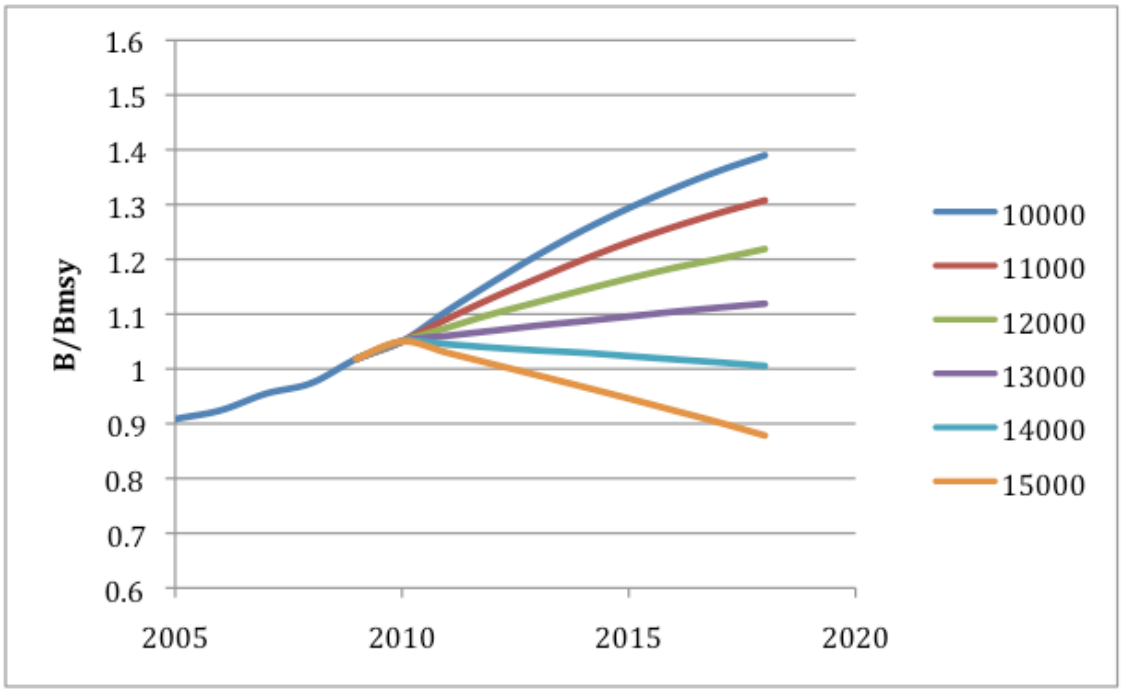
SWO-ATL Figure 9. South Atlantic, relative biomass (B/B_{MSY}) and relative fishing mortality (F/F_{MSY}) trajectories estimated by the base case production model.

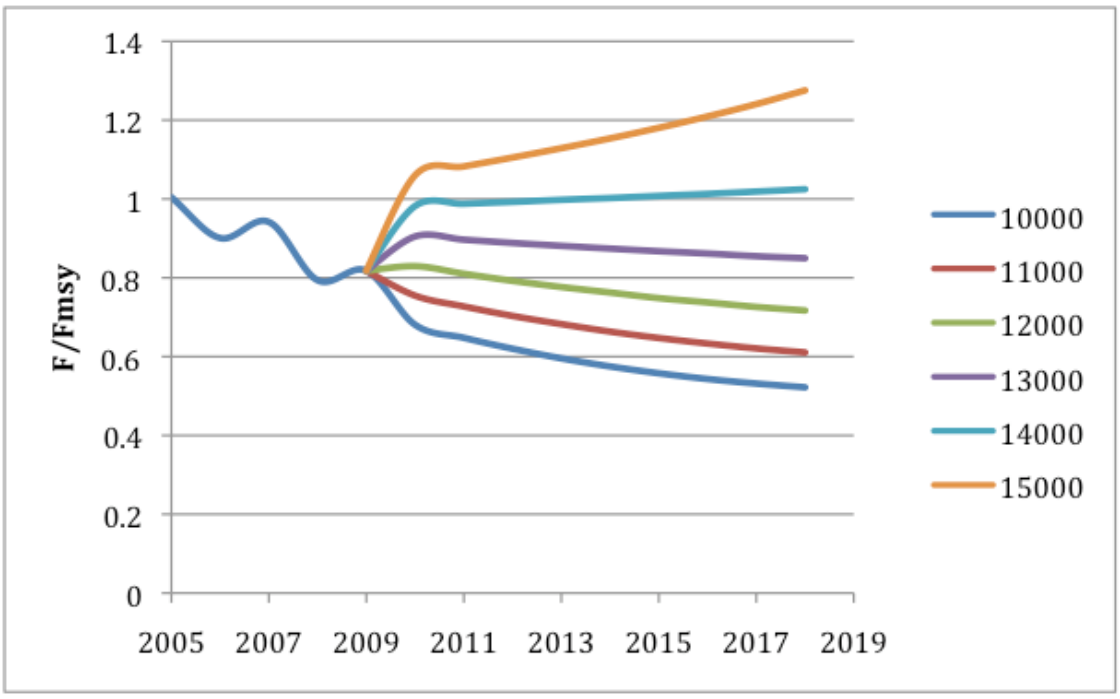


SWO-ATL-Figure 10. Posterior probability density estimates of MSY for the South Atlantic swordfish from the catch-only model fitted to catch data from 1950 to 2009. Run 1 and 2 refer to two scenarios with different assumptions for the intrinsic rate of population increase

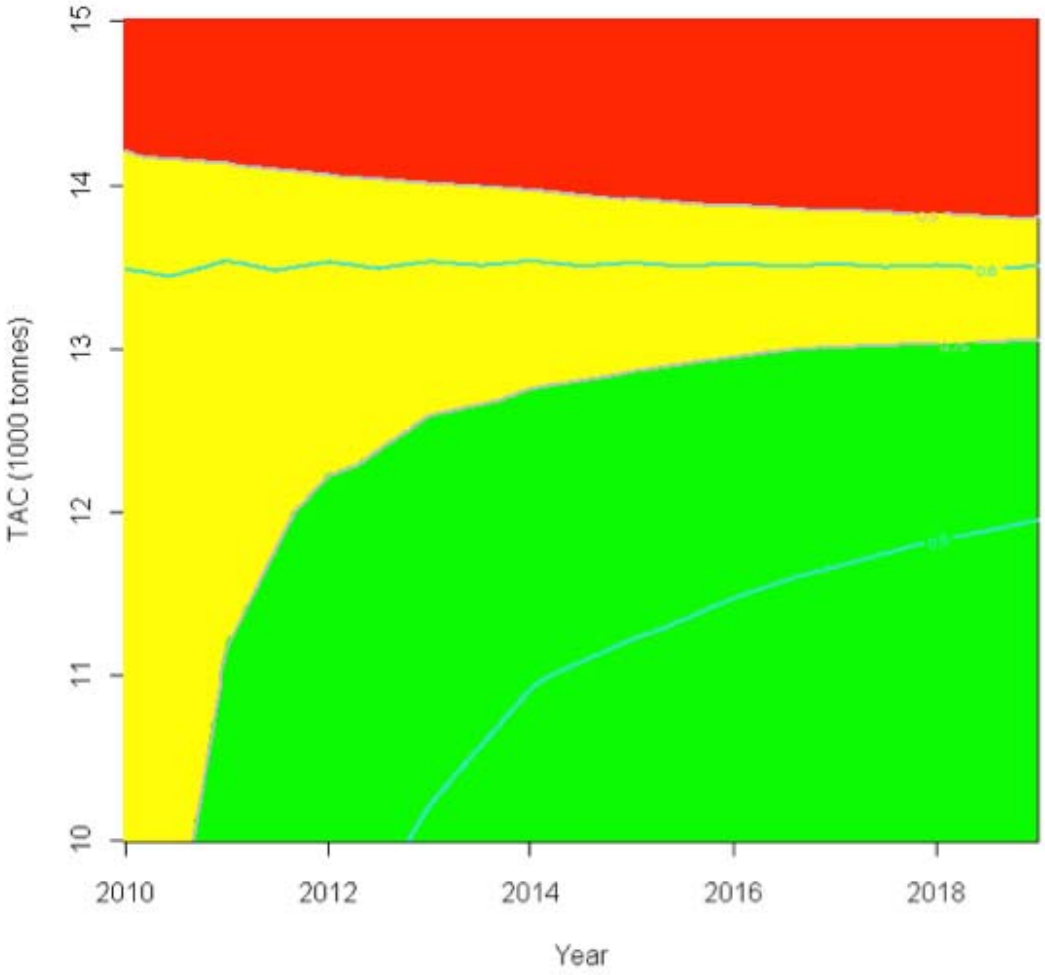


SWO-ATL-Figure 11. Summary figure of the current southern Atlantic swordfish stock status which includes the level of uncertainty on the knowledge of the state of the stock. Conditioned only on the catches**,** the model estimated a probability of 0.78 that the stock is not overfished and it is not ongoing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

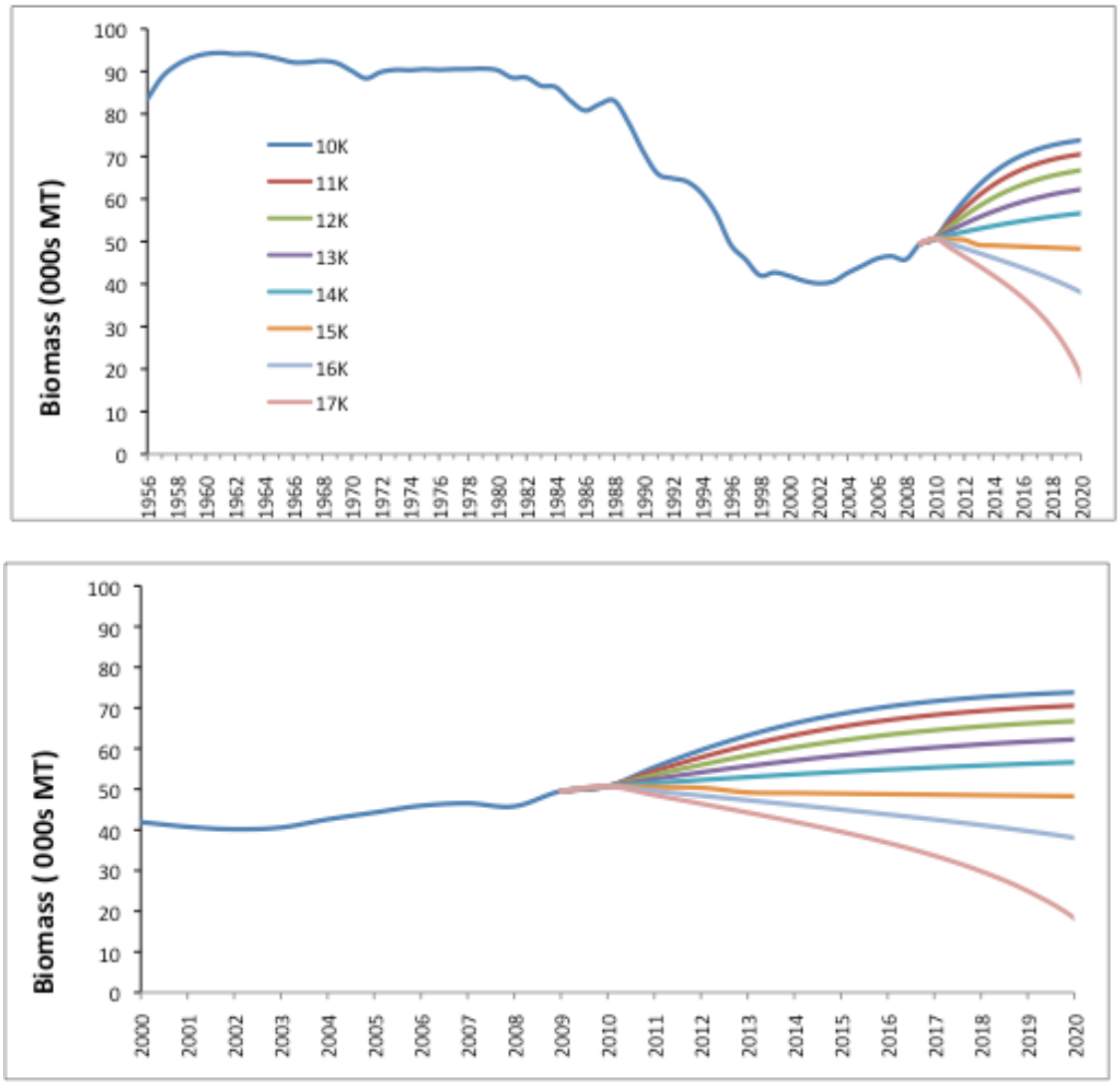




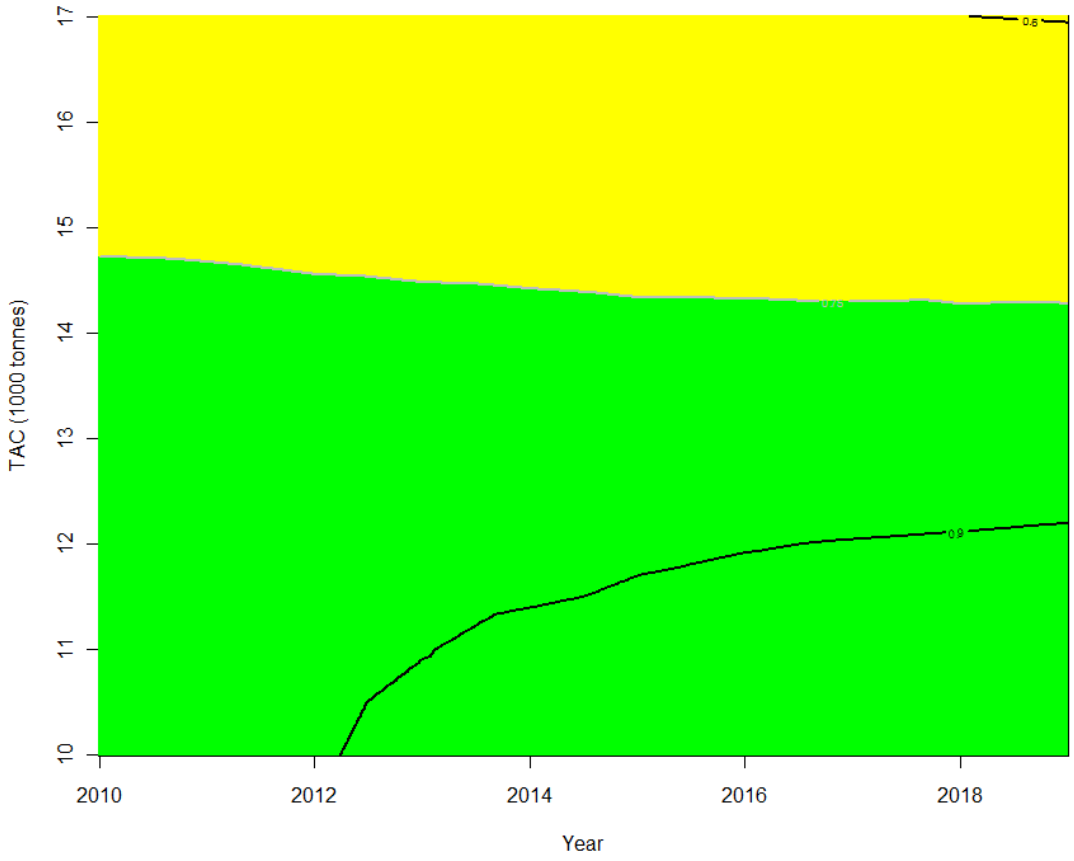
SWO-ATL-Figure 12. Projections of median relative North Atlantic swordfish stock biomass and F from the base ASPIC model under different constant catch scenarios (10\15 thousand tons) North Atlantic swordfish stock.



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



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



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

8.9 SWO-MED-MEDITERRANEAN SWORDFISH

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

SWO-MED-1. Biology

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

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

SWO-MED-2. Fishery indicators

Annual catch levels do not show any particular trend in the last decade, fluctuating between 13,000-16,000 t. Those levels are relatively high and similar to those of bigger areas such as the North Atlantic. This could be related to higher recruitment levels in the Mediterranean as compared to the North Atlantic, different reproduction strategies (larger spawning areas in relation to the area of distribution of the stock) and the lower abundance of large pelagic predators (e.g. sharks) in the Mediterranean. Updated information on Mediterranean swordfish catch by gear type is provided in **SWO-MED-Table 1** and **SWO-MED-Figure 1**. The total 2007 catch is estimated to be around to 14,000 t, while 2008 catch data are incomplete. The biggest producers of swordfish in the Mediterranean Sea in recent years are EC-Greece, EC-Italy, EC-Spain and Morocco. Furthermore, Algeria, EC-Cyprus, EC-Malta, EC-Portugal, Tunisia and Turkey have fisheries targeting swordfish in the Mediterranean. Minor catches of swordfish have also been reported by Albania, Croatia, EC-France, Japan, and Libya. The Committee recognized that there may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria; however, the data are not reported to ICCAT or FAO.

Mediterranean swordfish landings showed an upward trend from 1965-1972, stabilized between 1973-1977, and then resumed an upward trend reaching a peak in 1988 (20,365 t; **SWO-MED-Table 1, SWO-MED-Figure 1**). The sharp increase between 1983 and 1988 may be partially attributed to improvement in the national systems for collecting catch statistics. Since 1988, the reported landings of swordfish in the Mediterranean Sea have declined, and in the last decade, they remain mostly around to 14,000-15,000 t.

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

Preliminary results of experimental fishing surveys presented during the 2006 SCRS meeting indicated that selectivity of the surface longline targeting swordfish was more affected by the type and size of the bait, the

depth of the set and the distance between branch lines rather than the type (circular vs. J-shaped) and the size of the hook. In general, American-style 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 (SCRS/2009/144) 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.

A working paper (SCRS/2009/177) that presented an updated analysis of size data from the Moroccan driftnet fishery indicated that the mean size of fish has shown an increasing trend during the last decade owing to the implementation of a national minimum landing size regulation. In addition, the proportion of juveniles (less than 125 cm) in the catches has substantially decreased.

As observed in the 2007 assessment, the combined CPUE series from the main longline and gillnet fisheries targeting swordfish did not show any trend over time (**SWO-MED-Figure 2)**.

SWO-MED-3. State of the stock

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

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

SWO-MED-4. Outlook

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

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

SWO-MED-5. Effects of current regulations

ICCAT imposed a Mediterranean-wide one month fishery closure for all gears targeting swordfish in 2008, followed by a two-month closure in 2009. As already mentioned (see Section 4), it is unlikely that such short closures would result in any detectable increase either in SSB or landing levels. Several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems. The EC introduced a driftnet ban in 2002 and in 2003 ICCAT adopted a recommendation for a general ban of this gear in the Mediterranean [Rec. 03-04]. Rec. 04-12 forbids the use of various types of nets and longlines for sport and recreational fishing for tuna and tuna-like species in the Mediterranean.

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

SWO-MED-6. Management recommendations

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

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

MEDITERRANEAN SWORDFISH SUMMARY	
Maximum Sustainable Yield	14,250-15,500 [1]
2005 Yield during the assessment	14,600 t
Current (2007) Yield[2]	14,227 t
Current (2007) Replacement Yield	~12,000-14,000 t[1]
Relative Biomass (B_{2005}/B_{MSY})	0.26-0.87 [1]
Relative Fishing Mortality	
F_{2005}/F_{MSY}	1.3 (0.6-2.5) [3]
F_{2005}/F_{max}	2.9 (2.4->5) [4]
$F_{2005}/F_{0.1}$	4.6 (3.7->5)[4]
$F_{2005}/F_{20\%SPR}$	3.0 (2.6->5)[4]
$F_{2005}/F_{30\%SPR}$	4.2 (3.6->5) [4]
Management measures in effect	Driftnet ban [Rec. 03-04]
	One month fishery closure in 2008 [Rec. 07-01][5]

[1] Range indicated is average estimates from production models and age-structured models. The uncertainty in the estimates is broader than indicated.

[2] The 2008 reported catch is considered incomplete and too provisional to use in this table.

[3] Based on production model analysis using a long time series of catch effort data for which we have less confidence, range represents approximately 80% confidence region for the model assumptions.

[4] Based on age-structured analysis using a shorter times-series of catch effort data for which we have greater confidence, range represents approximately 80% confidence region for the model assumptions.

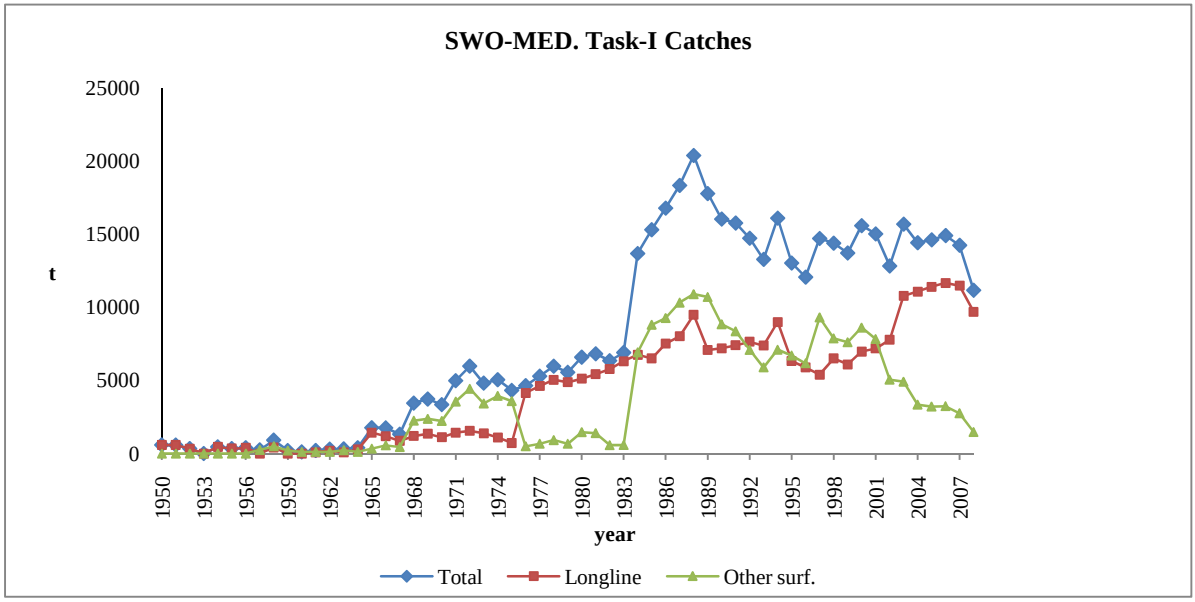
[5] Various technical measures, such as closed areas, minimum size regulations and effort controls are implemented at the national level.

SWO-MED-Table 1. Estimated Catches (t) of Swordfish (Xiphias gladius) in Mediterranean sea by gear and flag.

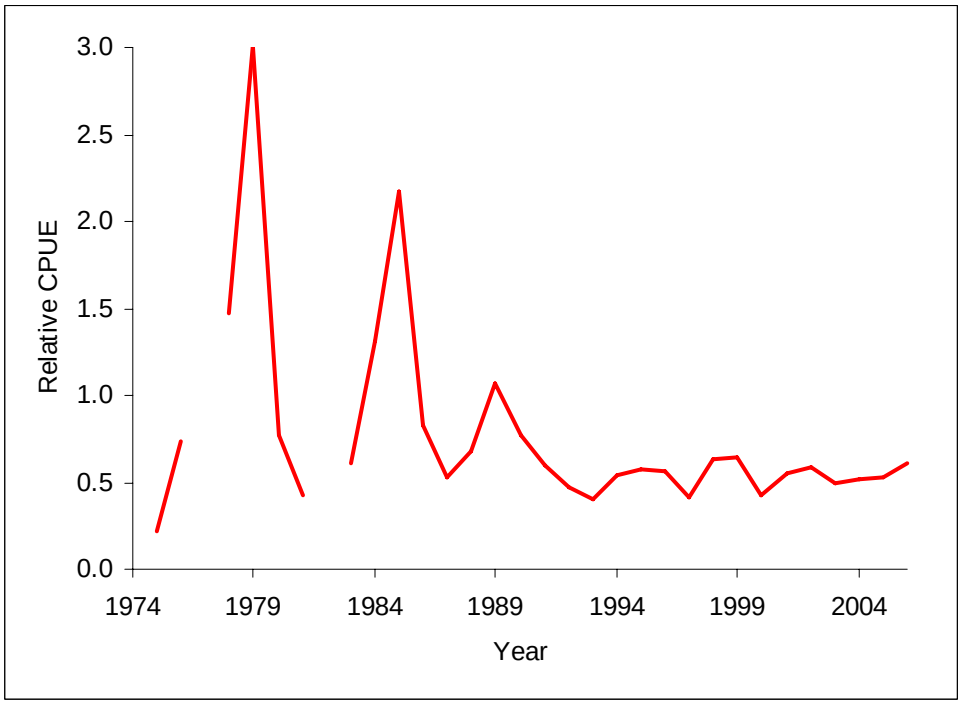
			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TOTAL	MED		13666	15292	16765	18320	20365	17762	16018	15746	14709	13265	16082	13015	12053	14693	14369	13699	15569	15006	12814	15674	14405	14600	14893	14227	11153
Landings	MED	Longline	6749	6493	7505	8007	9476	7065	7184	7393	7631	7377	8985	6319	5884	5389	6496	6097	6963	7180	7767	10765	11053	11273	11638	11451	9651
		Other surf.	6917	8799	9260	10313	10889	10697	8834	8353	7078	5888	7097	6696	6169	9304	7873	7602	8606	7826	5047	4909	3343	3214	3239	2756	1474
Discards		Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27
Landings	MED	Albania	0	0	0	0	0	0	0	0	0	0	0	0	13	13	13	13	0	0	0	0	0	0	0	0	
		Algerie	884	890	847	1820	2621	590	712	562	395	562	600	807	807	807	825	709	816	1081	814	665	564	635	702	601	802
		Chinese Taipei	0	0	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0	0	0	0	
		Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	0	0	0	0	0	4
		EC.Cyprus	63	71	154	84	121	139	173	162	56	116	159	89	40	51	61	92	82	135	104	47	49	53	43	67	67
		EC.España	1245	1227	1337	1134	1762	1337	1523	1171	822	1358	1503	1379	1186	1264	1443	906	1436	1484	1498	1226	951	910	1462	1697	2095
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	27	0	19	0	0	14	14
		EC.Greece	1081	1036	1714	1303	1008	1120	1344	1904	1456	1568	2520	974	1237	750	1650	1520	1960	1730	1680	1230	1120	1311	1358	1887	962
		EC.Italy	9360	10863	11413	12325	13010	13009	9101	8538	7595	6330	7765	7310	5286	6104	6104	6312	7515	6388	3539	8395	6942	7460	7626	6518	4549
		EC.Malta	94	172	144	163	233	122	135	129	85	91	47	72	72	100	153	187	175	102	257	163	195	362	239	213	260
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	115	8	1	120	14	16	0	
		Japan	19	14	7	3	4	1	2	1	2	4	2	4	5	5	7	4	2	1	1	0	2	4	0	3	1
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	8	6	0	10	2	0	14	0	
		Maroc	39	38	92	40	62	97	1249	1706	2692	2589	2654	1696	2734	4900	3228	3238	2708	3026	3379	3300	3253	2523	2058	1722	1957
		NEI (MED)	771	730	767	828	875	979	1360	1292	1292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	28
		Tunisie	15	61	64	63	80	159	176	181	178	354	298	378	352	346	414	468	483	567	1138	288	791	791	949	1024	
		Turkey	95	190	226	557	589	209	243	100	136	292	533	306	320	350	450	230	370	360	370	350	386	425	410	423	386
Discards		EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27

Notes

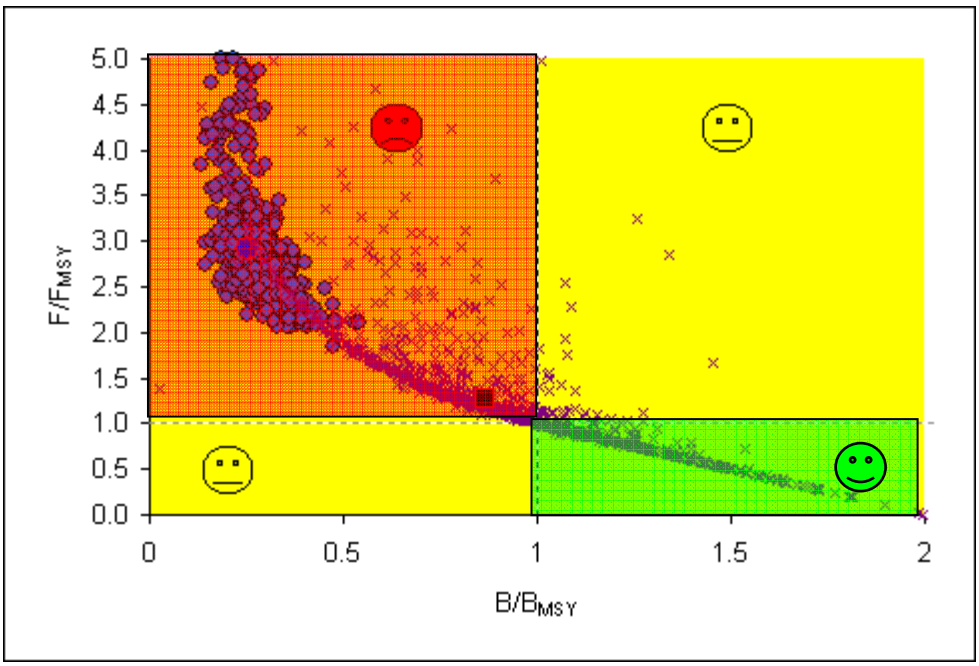
Task-I catches (new figures) not included in the table:Japan update for 2007 (3 t) and 2008 (2 t)



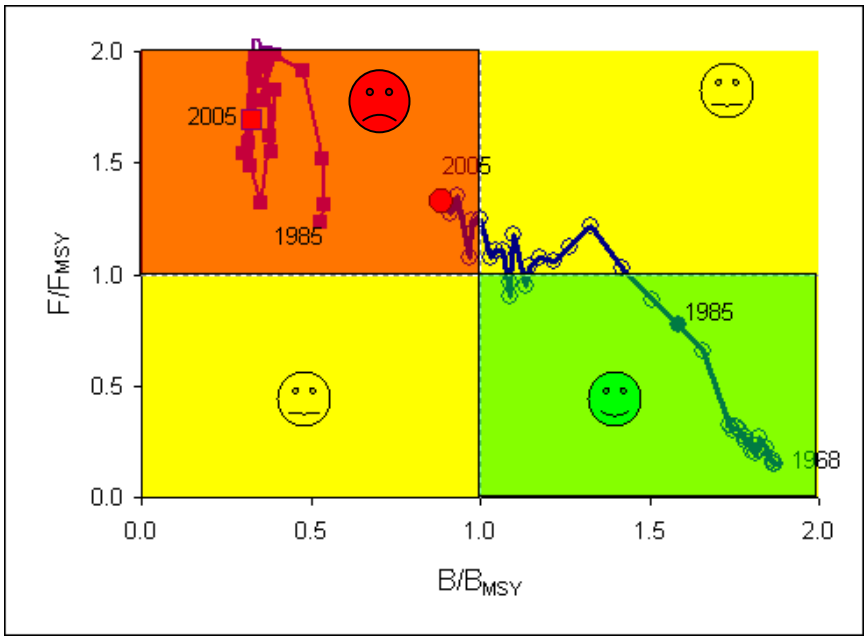
SWO-MED-Figure 1. Cumulative estimates of swordfish catches (t) in the Mediterranean by major gear type, for the 1950-2007 period (catch data for 2008 are incomplete).



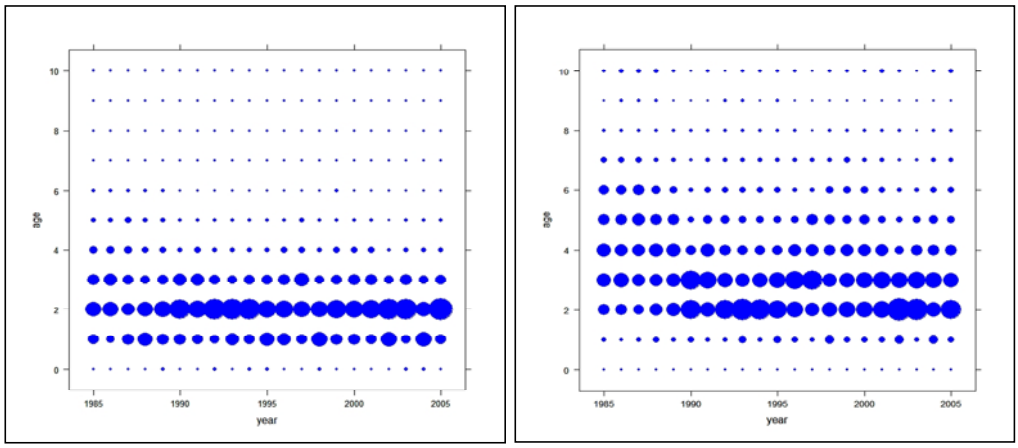
SWO-MED-Figure 2. The relative CPUE time series which results from the combined information in the Italian longline, Greek longline, Spanish longline, Japanese longline, Moroccan gillnet, and Italian gillnet time series.



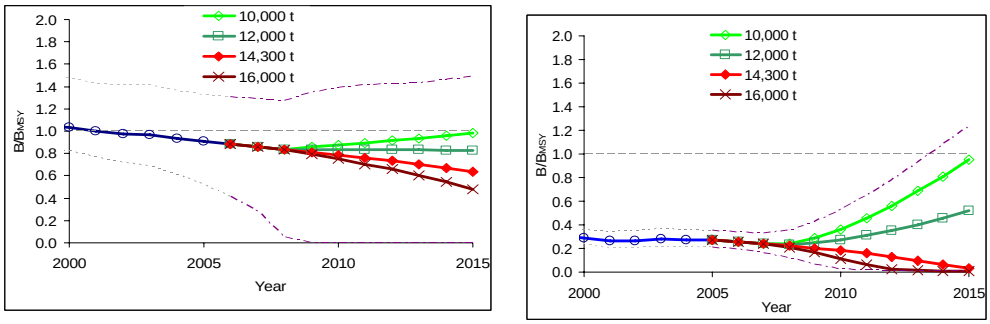
SWO-MED-Figure 3. Current (2005) stock status (B/B_{MSY} and F/F_{MSY}) outcomes from production model analysis (crosses) of a long time-series of catch and effort data for which we have less confidence and from age - structured analysis (solid circles) of a shorter time-series of catch-effort data for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



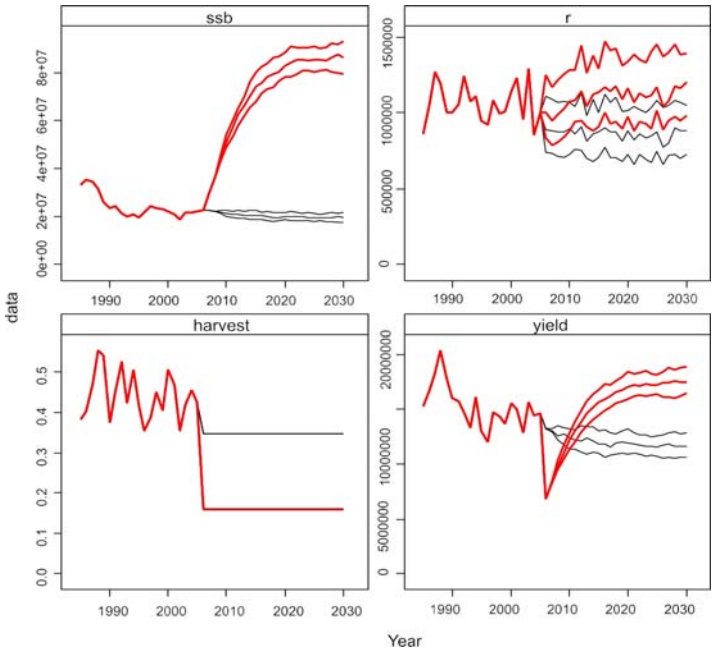
SWO-MED-Figure 4. Time trend for stock status (B/B_{MSY} and F/F_{MSY}) outcomes from production model analysis (circles) of a long time-series of catch and effort data for which we have less confidence and from age structured analysis (squares) of a shorter time-series of catch-effort data for which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



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



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



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

8.10 SBF – SOUTHERN BLUEFIN TUNA

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

8.11 SMT - SMALL TUNAS

SMT-1. Generalities

Small tunas include the following species:

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

Knowledge on the biology and fishery of small tunas is very fragmented in several areas. Furthermore, the quality of the knowledge is very different according to the species concerned. This is due in large part because many of these species are often perceived to have little economic importance compared to other tuna and tuna-like species, and owing to the difficulties in conducting sampling of the landings from artisanal fisheries, which constitute a high proportion of the fisheries exploiting small tuna resources. The large industrial fleets often discard small tuna catches at sea or sell them on local markets mixed with other by-catches, especially in Africa (SCRS/2009/147). The amount caught is rarely reported in logbooks, however observer programs from purse seine fleets have recently provided estimates of catches of small tunas (SCRS/2009/146).

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

Scientific collaboration among ICCAT, RFOs and countries in the various regions is imperative to advance understanding of the distribution, biology and fishery of these species.

SMT-2. Biology

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

Generally, the small tuna species have a varied diet with a preference for small pelagics (e.g., clupeids, mullets, carangids, etc.), crustaceans, mollusks and cephalopods. Many of these species are also prey of large tunas, marlins and sharks. The reproduction period varies according to species and spawning generally takes place near the coast in oceanic areas, where the waters are warmer. The growth rate currently estimated for these species is very rapid for the first two or three years, and then slows as these species reach size-at-first maturity. Studies about the migration patterns of small tuna species are very rarely available, due to the practical difficulties in manipulating and tagging these species.

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

It is now been confirmed that the only species of Auxis present in the Mediterranean is bullet tuna *(Auxis rochei)*. Previous landing reports of frigate tuna *(Auxis thazard)* in the Mediterranean are now considered to represent bullet tuna *(Auxis rochei)* landings.

SMT-3. Description of the fisheries

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

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

SMT-Table 1 shows historical landings of small tunas for the 1980 to 2008 period although data for last year are preliminary. This table does not include species reported as "mixed" or "unidentified", as was the case in previous years, since these categories include large tuna species. There are more than 10 species of small tunas, but only five of these account for about 88% of the total reported catch by weight. These five species are: Atlantic bonito *(Sarda sarda)*, frigate tuna *(Auxis thazard* which may include some catches of bullet tuna *(Auxis rochei)*, little tunny *(Euthynnus alletteratus)*, king mackerel *(Scomberomorus cavalla)*, and Atlantic Spanish mackerel *(Scomberomorus maculatus)* **(SMT-Figure 2)**. In 1980, there was a marked increase in reported landings compared to previous years, reaching a peak of about 147,202 t in 1988 **(SMT-Figure 1)**. Reported landings for the 1989-1995 period decreased to approximately 91,907 t, and then an oscillation in the values in the following years, with a minimum of 72,460 t in 2003 and a maximum of 129,353 t in 2005. Overall trends in the small tuna catch may mask declining trends for individual species because annual landings are often dominated by the landings of a single species. These fluctuations seem to be related to unreported catches, as these species generally comprise part of the by-catch and are often discarded, and therefore do not reflect the real catch.

A preliminary estimate of the total nominal landings of small tunas in 2008 is 55,876 t. The Small Tunas Species Group pointed out the relative importance of small tuna fisheries in the Mediterranean and the Black Sea, which account for about 28% of the total reported catch in the ICCAT area for the period 1980-2007.

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

SMT-4. State of the stocks

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

Generally, current information does not allow the Committee to carry out an assessment of stock status of the majority of the species. Some analyses will be possible in future if data availability improves with the same trend of the latest year. Nevertheless, few regional assessments have been carried out. Assessments of stocks of small tunas are also important because of their position in the trophic chain were they are the prey of large tunas, marlins and sharks and they are predators of smaller pelagic. It may therefore be best to approach assessments of small tunas from the ecosystem perspective.

SMT-5. Outlook

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

SMT-6. Effects of current regulations

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

SMT-7. Management recommendations

No management recommendations have been made.

SMT-Table 1. Estimated landings (t) reported to ICCAT for small tunas species by region and flag.

				1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
BLF	TOTAL			1908	1403	2822	3462	3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2358	4034	4756	1303	1926	1031	1937	1927	1798
		A+M		1908	1403	2822	3462	3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2358	4034	4756	1303	1926	1031	1937	1927	1798
	Landings		Brasil	203	133	172	254	229	120	335	130	49	22	38	153	649	418	55	55	38	149	1669	1	118	91	242	233	266
			Cuba	487	157	486	634	332	318	487	318	196	54	223	156	287	287	0	0	0	0	0	0	0	0	0	0	
			Dominica	0	0	0	0	1	4	19	10	14	15	19	30	0	0	0	79	83	54	78	42	20	38	47	29	37
			Dominican Republic	106	90	123	199	4	564	520	536	110	133	239	892	892	0	0	0	0	0	0	0	0	0	0	0	
			EC.España	0	0	0	0	0	0	0	0	307	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.France	821	755	729	669	816	855	865	1210	1170	1140	1330	1370	1040	1040	1040	1040	1040	1040	1040	0	0	0	0	0	
			Grenada	232	193	256	141	220	134	293	195	146	253	189	123	164	126	233	94	164	223	255	335	268	306	371	291	290
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	148	0	0	0	0	0	0	0	0	0	0	0	
			Liberia	0	0	0	0	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	10	9	10	10	12	6
			NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
			Netherlands Antilles	55	55	60	60	70	70	70	60	60	65	60	50	45	45	45	45	45	45	45	0	0	0	0	0	
			Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124
			St. Vincent and Grenadines	0	0	0	0	19	15	38	11	7	53	19	20	18	22	17	15	23	24	24	0	0	0	0	0	
			Sta. Lucia	0	0	0	2	1	1	17	14	13	16	82	47	35	40	100	41	45	108	96	169	96	126	182	151	179
			Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5
			U.S.A.	0	11	32	44	154	87	81	112	127	508	492	582	447	547	707	617	326	474	334	414	675	225	831	422	654
			UK.Bermuda	4	9	17	11	7	14	13	8	6	5	7	4	5	4	6	6	5	4	5	9	4	5	8	7	6
			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	3	0	
			Venezuela	0	0	947	1448	1240	652	1150	1598	2148	1224	21	624	758	498	1034	1192	589	1902	1210	319	732	225	237	777	231
	Discards		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BLT	TOTAL			6337	5240	5059	3740	6483	7110	11994	8777	5715	3421	5300	4301	5909	3070	3986	2646	3924	5819	6049	3798	6217	4438	4079	5701	6018
	Landings	A+M	Algerie	0	0	0	0	0	0	0	174	270	348	306	230	237	179	299	173	225	230	481	0	391	547	586	477	1134
			Croatia	0	0	0	0	0	0	0	24	21	52	22	28	26	26	26	26	0	0	0	0	0	0	0	0	
			EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.España	2301	2047	1555	631	2669	2581	2985	2226	1210	648	1124	1472	2296	604	487	669	1024	861	493	495	1009	845	1101	3083	3265
			EC.France	0	0	0	0	0	0	0	8	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Greece	2060	1419	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1426	1426	0	0	196	125	120	246	226	180	274	157	
			EC.Italy	1610	1344	1344	906	609	509	494	432	305	379	531	531	229	229	229	462	462	462	2452	1463	1819	866	0	0	342
			EC.Malta	4	1	13	5	8	18	21	20	11	10	1	2	3	6	6	3	1	0	0	0	0	0	0	4	12
			EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	263	494	208	166	231	300	791	867	849	322
			Maroc	52	48	175	178	811	1177	2452	1289	1644	170	1726	621	1673	562	1140	682	763	256	621	246	326	50	199	35	83
			Russian Federation	0	0	0	0	0	0	0	2171	814	70	100	0	0	0	1672	0	420	1053	468	128	102	139	22	5	23
			Serbia & Montenegro	0	0	0	0	0	0	0	13	1	0	0	2	6	6	6	7	8	8	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	
			Tunisie	294	367	538	606	588	660	985	985	35	20	13	14	13	32	93	45	15	2300	932	989	1760	0	0	0	
			Turkey	0	0	0	0	0	0	0	35	0	324	77	0	0	0	0	316	316	316	316	0	284	1020	1031	993	836
			U.S.A.	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			U.S.S.R.	0	0	0	0	357	723	3634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Yugoslavia Fed.	16	14	32	14	41	42	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BON	TOTAL			21907	24905	21320	29712	46382	29721	28908	33334	21992	30595	21719	21219	25134	24519	45253	35702	27151	27637	24580	14424	15828	78766	38531	14165	14713
		ATL		6849	6946	5892	7395	22354	17766	6811	8079	6881	4598	6037	6030	7939	10441	15523	7532	5179	5400	8864	3307	4580	4391	6790	5533	4671
		MED		15058	17959	15428	22317	24028	11955	22097	25255	15111	25997	15682	15189	17195	14078	29730	28170	21972	22236	15716	11117	11247	74375	31740	8632	10042
	Landings	ATL	Angola	225	120	101	144	180	168	128	102	4	49	20	9	39	32	0	2	118	118	118	0	0	138	0	931	
			Argentina	2058	1399	699	1607	2794	1327	1207	1794	1559	434	4	138	108	130	12	68	19	235	1	129	269	110	0	0	
			Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0	
			Benin	25	30	6	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	187	179	523	345	214	273	226	71	86	142	142	137	0	0	0	0	0	0	0	0	0	90	0	0	
			Cuba	0	0	0	23	173	26	28	0	0	0	0	0	0	0	230	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	6	16	16	9
			EC.Bulgaria	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.España	173	398	145	41	91	57	18	8	39	5	3	2	2	1	0	12	12	10	5	23	9	2	15	14	13

	EC.Estonia	0	0	0	0	668	859	187	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EC.France	569	492	431	331	395	427	430	820	770	1052	990	990	610	610	610	24	32	0	18	0	0	0	0	122	59
	EC.Germany	0	0	0	0	0	0	53	0	0	0	0	0	714	0	0	0	0	0	38	0	0	0	0	0	
	EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	
	EC.Latvia	0	0	0	0	1191	1164	221	7	4	0	3	19	301	887	318	0	416	396	639	0	0	0	0	0	
	EC.Lithuania	0	0	0	0	1041	762	162	11	10	0	0	0	0	0	0	0	0	0	793	0	0	0	0	0	
	EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344	539
	EC.Poland	0	0	0	0	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	0	
	EC.Portugal	56	50	168	371	377	80	202	315	133	145	56	78	83	49	98	98	162	47	61	40	50	38	318	439	212
	EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	287	0	0	0	0	0	0	0	0	0	35	0	
	Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	0	0	0	0	
	Georgia	0	0	0	0	39	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Germany Democratic Rep.	26	40	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Ghana	8	10	0	943	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Grenada	0	0	0	0	0	0	0	0	0	0	0	0	24	6	14	16	7	10	10	0	0	0	0	0	
	Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	
	Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	
	Maroc	310	268	251	241	589	566	492	794	1068	1246	584	699	894	1259	1557	1390	2163	1700	2019	928	989	1411	1655	1053	1419
	Mexico	744	212	241	391	356	338	215	200	657	779	674	1144	1312	1312	1632	1861	1293	1113	1032	1238	1066	654	1303	1188	1113
	Netherlands Antilles	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	2	0	0	0	0	0	0	0	
	Rumania	8	32	71	3	255	111	8	212	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Russian Federation	0	0	0	0	0	0	0	948	29	0	0	0	0	0	4960	0	0	574	1441	461	16	79	316	259	52
	Senegal	200	495	510	463	2066	869	525	597	345	238	814	732	1012	1390	2213	948	286	545	621	195	182	484	729	1020	1154
	Sierra Leone	5	10	10	10	10	10	10	4	6	0	0	0	0	0	0	0	11	245	44	0	0	0	0	0	
	South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	18	0	16	23	27
	Sta. Lucia	0	0	0	0	1	0	3	3	3	4	1	1	1	0	0	0	0	0	0	0	1	0	0	0	
	Togo	0	254	138	245	400	256	177	172	107	311	254	145	197	197	197	197	0	0	0	0	1583	1215	2298	0	
	Trinidad and Tobago	0	0	0	0	0	0	0	0	0	17	703	169	266	220	30	117	117	56	452	188	280	81	7	7	16
	U.S.A.	217	110	84	130	90	278	299	469	498	171	128	116	156	182	76	83	142	120	139	44	70	68	40	97	48
	U.S.S.R.	1290	2073	1085	1083	8882	7363	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Ukraine	0	0	0	0	1385	985	0	0	25	0	0	0	342	2786	1918	1114	399	231	1312	30	0	0	0	0	
	Uruguay	0	0	3	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Venezuela	748	774	1401	1020	1153	1783	1514	1518	1454	5	1661	1651	1359	1379	1659	1602	2	0	61	13	0	16	18	19	12
MED	Albania	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	
	Algerie	874	880	459	203	625	1528	1307	261	315	471	418	506	277	357	511	475	405	350	597	0	609	575	684	910	1042
	Croatia	0	0	0	0	0	0	0	49	128	6	70	0	0	0	25	120	0	0	0	0	0	0	0	0	
	EC.Bulgaria	1	1	0	13	0	0	17	17	20	8	0	25	33	16	51	20	35	35	35	0	0	0	0	0	
	EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	10	10	6	4	3	0	
	EC.España	984	1045	729	51	962	609	712	686	228	200	344	632	690	628	333	433	342	349	461	544	272	215	429	531	458
	EC.France	16	0	0	0	10	0	1	10	5	6	0	0	0	0	0	0	0	0	27	0	0	0	0	15	34
	EC.Greece	1732	1321	1027	1848	1254	2534	2534	2690	2690	2690	1581	2116	1752	1559	945	2135	1914	1550	1420	1538	1321	1390	845	1123	587
	EC.Italy	2777	1437	1437	2148	2242	1369	1244	1087	1288	1238	1828	1512	2233	2233	2233	4159	4159	4159	4579	2091	2009	1356	0	0	1323
	EC.Malta	0	0	0	0	0	0	0	0	0	0	0	0	2	7	2	2	1	0	0	0	0	0	0	2	7
	Egypt	48	62	68	35	17	358	598	574	518	640	648	697	985	725	724	1442	1442	1128	1128	0	0	0	0	0	
	Libya	0	0	0	0	0	0	0	0	71	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Maroc	75	57	51	127	108	28	69	69	31	25	93	37	67	45	39	120	115	5	61	85	78	38	89	87	142
	NEI (MED)	694	359	359	537	561	342	311	311	311	300	300	300	300	75	0	0	0	0	0	0	0	0	0	0	
	Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Serbia & Montenegro	0	0	0	0	0	0	0	45	0	3	2	6	10	12	12	14	17	17	0	0	0	0	0	0	
	Tunisie	600	482	504	500	600	422	488	305	643	792	305	413	560	611	855	1350	1528	1183	1112	848	1251	0	0	0	
	Turkey	7220	12281	10756	16793	17613	4667	14737	19151	8863	19548	10093	8944	10284	7810	24000	17900	12000	13460	6286	6000	5701	70797	29690	5965	6448
	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.	37	34	38	62	36	98	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

BOP	TOTAL			49	133	87	564	1482	1116	473	608	641	630	791	703	2196	481	177	868	1207	1012	923	736	581	217	32	1047	533
		ATL		49	124	86	538	1474	1109	436	507	465	378	615	588	2064	254	47	651	1062	858	786	713	573	215	32	875	426
		MED		0	9	1	26	8	7	37	101	176	252	176	115	132	227	130	217	145	154	137	23	8	2	0	172	107
	Landings	ATL	Benin	1	1	3	1	2	1	1	1	1	1	1	1	1	3	1	1	0	0	0	0	0	0	0	0	
			EC.Portugal	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	1	2	
			Maroc	0	83	33	487	1422	1058	369	486	423	348	598	524	2003	246	28	626	1048	830	780	706	503	132	0	634	391
			Mauritania	40	40	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Senegal	0	0	0	0	0	0	16	20	41	29	16	63	60	5	18	24	14	28	6	7	70	78	29	240	33
		MED	Algerie	0	0	0	0	0	0	0	87	135	198	153	92	119	224	128	216	135	145	128	0	0	0	0	0	
			EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
			Libya	0	0	0	0	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	0	9	1	26	8	7	37	14	1	14	23	23	13	3	2	1	10	9	9	20	7	1	0	172	107
			Tunisie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	
BRS	TOTAL			8129	3501	6549	6212	9510	10778	7698	8856	6051	8049	7161	7006	8435	8004	7923	5754	4785	4553	7750	5137	3410	3712	3587	2618	3247
	Landings	A+M	Brasil	6259	1504	5011	4741	5063	5927	2767	1437	1149	842	1149	1308	3047	2125	1516	1516	988	251	3071	2881	814	471	1432	563	1521
			Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	
			Guyana	0	0	0	0	0	0	0	0	0	0	0	0	211	571	625	1143	308	329	441	389	494	521	377	277	312
			Trinidad and Tobago	0	0	0	0	2704	2864	2471	2749	2130	2130	2130	1816	1568	1699	2130	1328	1722	2207	2472	1867	2103	2720	1778	1778	1414
			Venezuela	1870	1997	1538	1471	1743	1987	2460	4670	2772	5077	3882	3882	3609	3609	3651	1766	1766	1766	1766	0	0	0	0	0	
CER	TOTAL			680	574	500	392	219	234	225	375	390	450	490	429	279	250	250	0	3	5	1	2	1	1	1	0	0
	Landings	A+M	Dominica	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
			Dominican Republic	106	63	52	48	57	59	50	45	79	50	90	29	29	0	0	0	0	0	0	0	0	0	0	0	
			EC.France	574	511	448	344	162	175	175	330	310	400	400	400	250	250	250	0	0	0	0	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	1	2	0	1	0	0	
FRI	TOTAL			19746	17753	15476	21193	20573	16411	16738	10356	6367	12678	8407	7535	13809	14954	14197	13004	12910	12762	11627	4521	5451	4247	5009	4079	3526
	Landings	ATL	Angola	256	90	21	115	20	70	28	1	0	4	6	21	29	12	31	2	38	38	38	0	0	0	0	95	
			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	
			Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Benin	49	50	1	3	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	634	623	941	1260	1904	700	592	746	291	608	906	558	527	215	162	166	106	98	1117	860	414	532	603	202	149
			Cape Verde	0	0	0	2	86	105	75	135	82	115	86	13	6	22	191	154	81	171	278	264	344	167	404	197	582
			Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	170	135	
			EC.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.España	5746	3702	3164	4538	3938	1877	2240	541	228	362	297	386	947	581	570	23	17	722	438	635	34	166	73	278	631
			EC.Estonia	0	0	0	0	0	0	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.France	640	416	1904	3392	3392	3008	3872	0	121	63	105	126	161	147	146	0	91	127	91	0	168	47	6	98	24
			EC.Latvia	0	0	0	0	0	0	0	243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Lithuania	0	0	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Portugal	14	30	32	2	2	4	26	3	0	0	0	0	0	1	31	5	9	28	5	4	6	0	3	3	1
			Germany Democratic Rep.	40	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	4530	4500	3256	4689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	0	
			Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
			Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74
			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	198	424	302	465	194	599	1045	1131	332	274	122	645	543	2614	2137	494	582	418	441	184	542	61	48	135	179
			Mixed flags (FIS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mixed flags (FR+ES)	180	117	227	1526	1525	1350	1728	3633	4017	9674	3107	1919	7177	6063	6342	8012	9864	9104	7748	1623	1722	1527	1739	1072	614
			NEI (ETRO)	46	0	0	17	381	155	237	1	4	32	68	70	180	120	309	491	291	420	186	71	180	297	149	238	
			Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	590	1157	1030	1159	1122	989	710	505	474	0	150	106	485
			Panama	0	0	0	0	0	0	0	243	57	118	341	328	240	91	0	0	0	0	0	0	394	975	970	1349	411
			Rumania	0	0	51	15	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	1078	627	150	405	456	46	500	761	477	0	0	300	50	56	63	6	1	12
			S. Tomé e Príncipe	32	0	0	0	23	32	35	41	39	33	37	48	79	223	197	209	200	200	200	200	234	215	290	0	
			Senegal	0	0	0	0	810	784	1084	311	201	342	319	309	0	0	0	7	0	4	0	13	288	151	83	119	315
			Trinidad and Tobago	0	0	0	0	0	0	0	0	0	17	0	56	199	368	127	138	245	0	0	0	414	0	0	0	0
			U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			U.S.S.R.	5903	6055	3465	2905	5638	5054	2739	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

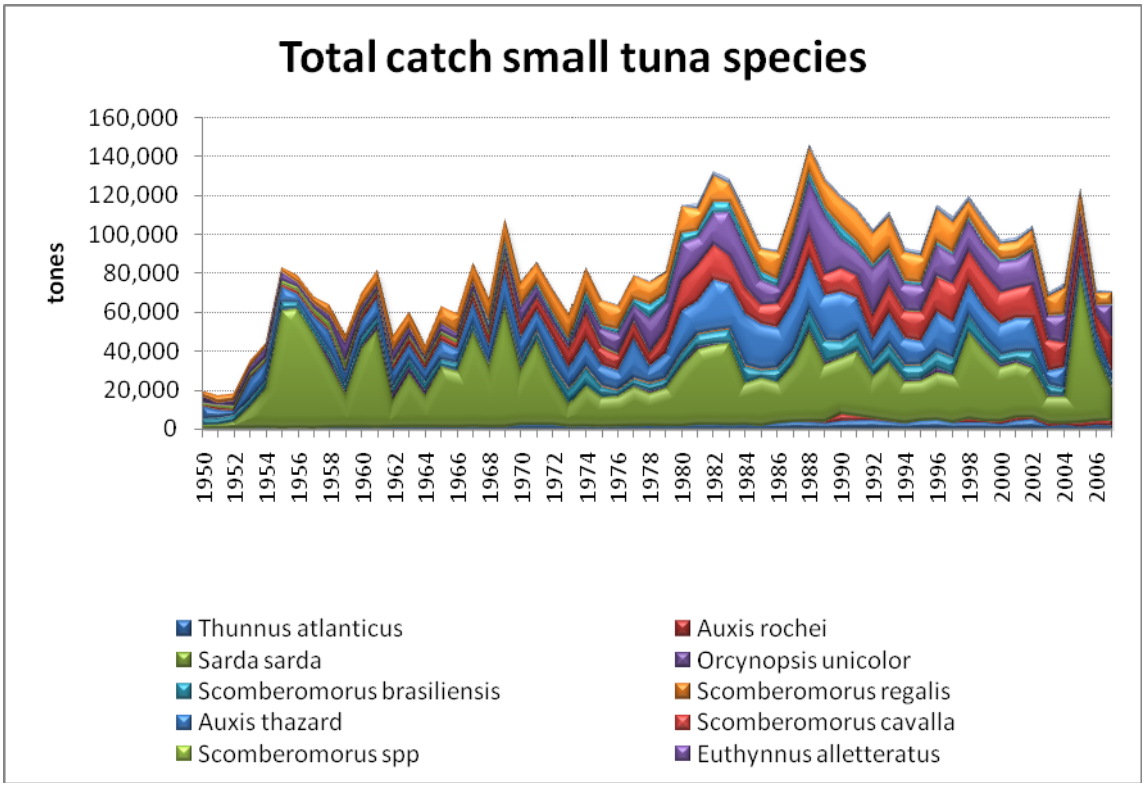
			Ukraine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	48	0	43	0	0	0	0	0	
			Venezuela	1478	1746	2109	2264	2654	2670	3037	1762	368	886	2609	2601	3083	2839	2164	1631	215	444	32	113	182	42	165	52	48
KGM	TOTAL			13182	9964	13990	13792	14331	12153	10420	13241	14691	16331	14777	14930	17782	19660	16394	17717	16161	15360	17258	15863	12830	11766	8185	18031	3755
	Landings	A+M	Antigua and Barbuda	0	0	0	0	0	0	0	0	0	1	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	2588	806	2890	2173	2029	2102	2070	962	979	1380	1365	1328	2890	2398	3595	3595	2344	1251	2316	3311	247	202	316	33	0
			Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	35	2	0	0	0	0	0	0	0
			Dominican Republic	0	0	0	0	20	29	33	34	47	52	0	0	0	589	288	230	226	226	226	0	0	0	0	0	
			Grenada	19	0	0	0	0	0	0	0	0	0	0	0	2	4	28	14	9	4	5	0	0	0	0	0	
			Guyana	0	0	0	0	0	0	0	0	0	0	0	0	0	270	440	398	214	239	267	390	312	245	168	326	174
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	
			Mexico	2164	2303	2643	3067	3100	2300	2689	2147	3014	3289	3097	3214	4661	4661	3583	4121	3688	4200	4453	4369	4564	3447	4201	3526	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	9	1	1	0	1	1	1	2	0
			Trinidad and Tobago	43	11	38	82	752	541	432	657	0	1192	0	471	1029	875	746	447	432	410	1457	802	578	747	661	661	567
			U.S.A.	7444	6011	7486	7530	7100	5681	4127	8213	9344	9616	7831	7360	7058	8720	7373	6453	6780	6603	6061	6991	7129	7123	2837	13482	3013
			UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
			Venezuela	924	833	933	940	1330	1500	1069	1228	1308	801	2484	2558	2140	2139	340	2424	2424	2424	2424	0	0	0	0	0	
KGX	TOTAL			485	22	149	261	491	105	131	225	266	301	508	512	824	156	251	1	229	48	0	15	0	1	26	16	0
	Landings	A+M	Barbados	0	0	138	159	332	68	51	45	51	55	36	42	49	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Colombia	485	22	11	102	159	37	25	7	12	21	148	111	539	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	236	0	0	0	0	0	0	0	0	0	
			EC.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	
			EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	26	16	0
			Gabon	0	0	0	0	0	0	0	0	0	0	140	145	79	0	0	0	0	0	0	0	0	0	0	0	
			Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	155	0	0	44	48	0	0	0	0	0	0	
			Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Puerto Rico	0	0	0	0	0	0	0	0	53	84	86	134	106	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	14	0	0	0	0	15	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	138	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	55	79	150	141	98	80	50	0	0	0	48	0	0	0	0	0	0	0	
			Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ukraine	0	0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LTA	TOTAL			20745	12974	8960	20759	26182	30791	12622	11214	22045	16562	14182	11701	14257	15099	15750	15382	16483	15347	18392	13747	15785	12188	8849	17354	11552
		ATL		19095	10934	6794	18335	23777	28756	10005	8891	20289	15296	12977	9799	12138	13495	12836	12506	13189	12484	15750	13065	14347	11148	7248	15668	9611
		MED		1650	2040	2166	2424	2405	2035	2617	2323	1756	1266	1205	1902	2119	1604	2914	2875	3294	2863	2642	682	1438	1040	1602	1686	1941
	Landings	ATL	Angola	1632	1433	1167	1345	1148	1225	285	306	14	175	121	117	235	75	406	118	132	132	132	0	0	2	0	4365	
			Argentina	0	11	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Benin	31	30	90	14	7	43	66	61	49	53	60	58	58	196	83	69	69	69	69	0	0	0	0	0	
			Brasil	765	785	479	187	108	74	685	779	935	985	1225	1059	834	507	920	930	615	615	615	0	320	280	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	16	160	29	14	1	18	65	74	148	17	23	72	63	86	110	776	491	178	262	143	137	40	160	348	268
			Colombia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Cuba	15	16	24	55	53	113	88	63	33	13	15	27	23	23	0	0	0	0	0	0	0	0	0	0	
			Côte D'Ivoire	0	0	20	5300	38	4900	2800	100	142	339	251	253	250	114	108	0	108	0	0	0	0	270	298	404	1677
			Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.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	
			EC.España	27	34	12	11	7	11	55	81	1	0	0	10	55	27	110	6	2	22	8	1	489	50	16	0	38
			EC.Estonia	0	0	0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.France	0	0	0	0	0	195	0	74	13	8	54	59	22	215	21	696	631	610	613	0	10	27	12	0	1
			EC.Germany	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.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	
			EC.Latvia	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Lithuania	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	69

			EC.Poland	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Portugal	0	0	80	21	86	91	2	61	73	45	72	72	218	320	171	14	50	0	2	16	19	21	24	43	10
			Gabon	0	0	0	0	0	0	0	0	0	0	0	0	182	0	18	159	301	213	57	173	0	0	0	0	
			Germany Democratic Rep.	99	40	10	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	5966	901	649	5551	11588	12511	323	201	11608	359	994	513	113	2025	359	306	707	730	4768	8541	7060	5738	216	4449	3188
			Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Israel	271	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Maroc	15	447	47	108	49	14	367	57	370	44	43	230	588	195	189	67	101	87	308	76	91	33	0	40	2
			Mauritania	60	60	50	50	50	50	50	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Mixed flags (FR+ES)	120	78	151	1017	1017	900	1152	2422	2678	4975	2071	1279	3359	2836	2936	3846	4745	4238	3334	1082	1148	1018	1159	715	410
			NEI (ETRO)	0	0	0	0	0	0	0	0	0	8	20	0	0	0	0	0	0	0	33	2	0	22	0	0	
			Netherlands Antilles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0
			Panama	0	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Rumania	266	126	81	7	88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Russian Federation	0	0	0	0	0	0	0	617	306	265	189	96	49	0	88	0	0	0	74	13	0	0	0	0	
			S. Tomé e Príncipe	101	0	0	0	30	36	52	46	48	41	40	43	40	50	39	37	33	33	33	33	178	182	179	0	
			Senegal	8408	4566	2392	2985	6343	6512	1834	1603	1854	4723	4536	2478	1972	2963	2910	1607	1746	1857	1806	1430	3507	2694	3825	3885	2972
			South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
			St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0	1	10	1	0	0	1	0	0
			U.S.A.	41	74	104	118	204	129	173	228	597	1286	1142	1312	2230	2015	1546	1623	1209	1451	1366	1492	1382	765	1351	1401	942
			U.S.S.R.	613	1040	271	61	1707	543	667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			UK.Bermuda	5	7	13	13	17	14	8	10	11	5	6	6	7	6	5	4	2	1	5	4	5	7	5	5	4
			Venezuela	644	1050	1123	1467	1236	1374	1294	1963	1409	1889	2115	2115	1840	1840	2815	2247	2247	2247	2254	50	0	0	0	0	30
		MED	Algerie	0	0	0	0	0	0	0	522	585	495	459	552	554	448	384	562	494	407	148	0	158	116	187	96	142
			Croatia	0	0	0	0	0	0	0	2	3	2	15	15	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Cyprus	31	32	13	25	41	20	23	25	21	11	23	10	19	19	19	16	19	19	19	0	0	0	0	6	5
			EC.España	32	12	5	0	5	0	0	0	0	0	0	15	18	9	15	0	8	82	32	0	41	262	116	202	210
			EC.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	
			EC.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	112	69	72	
			EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	24	38	34	0	0	486
			EC.Malta	0	0	0	0	0	0	0	8	1	8	8	8	3	3	0	0	0	0	0	0	0	0	0	1	5
			Israel	60	259	284	273	135	124	129	108	126	119	119	215	119	119	119	119	119	119	119	0	0	0	0	0	
			Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	45	52	0	5	4	4	0	0	0	0	0	
			Maroc	1	0	0	0	12	0	16	0	0	0	0	1	0	1	14	8	0	0	3	1	0	9	0	331	19
			NEI (MED)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	0	0	0	0	0	0	0	0	
			Palestina	0	0	0	0	0	0	0	0	0	0	0	0	90	59	61	60	60	60	129	0	0	0	0	0	
			Serbia & Montenegro	0	0	0	0	0	0	0	5	0	28	21	35	22	18	20	18	16	16	0	0	0	0	0	0	
			Syria Rep.	96	95	73	121	99	121	127	110	156	161	156	155	270	350	417	390	370	370	330	0	0	0	0	193	
			Tunisie	1224	1441	1590	1803	1908	1566	2113	1343	664	242	204	696	824	333	1113	752	1453	1036	960	657	633	0	0	0	
			Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	750	750	750	750	0	568	507	1230	785	1074
			Yugoslavia Fed.	6	1	1	2	5	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MAW	TOTAL		NULL	4498	3989	3292	1799	3921	2938	6626	4160	3648	2741	2070	3414	2829	2249	2001	1397	1995	1236	1927	1072	528	824	389	845	190
	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	0	0	0	
			Benin	46	50	104	17	13	334	211	214	202	214	194	188	188	362	511	205	205	205	205	0	0	0	0	0	
			EC.Estonia	0	0	0	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Latvia	0	0	0	0	0	0	208	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			EC.Lithuania	0	0	0	0	0	0	0	52	4	0	0	0	0	0	0	0	0	0	298	0	0	0	0	0	
			EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
			Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0	
			Germany Democratic Rep.	33	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ghana	3022	3000	1453	0	1457	1457	1500	2778	899	466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Russian Federation	0	0	0	0	143	195	1032	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
			S. Tomé e Príncipe	0	0	0	0	6	4	6	5	3	5	6	6	8	7	8	5	6	6	6	6	21	12	13	0	
			Senegal	1174	732	1516	1754	2159	753	2429	1028	2450	2038	1870	3220	2633	1880	1397	1187	1763	1025	1376	1054	506	812	375	845	189
			U.S.S.R.	223	206	219	28	143	195	1240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Ukraine	0	0	0	0	0	0	0	0	90	0	0	0	0	0	0	0	21	0	42	12	0	0	0	0	
SSM	TOTAL			11362	11590	14207	14461	12671	13845	12782	15318	16285	16317	14490	13697	16571	15403	8641	9837	8220	8383	9414	9793	13449	10470	6282	6102	5900

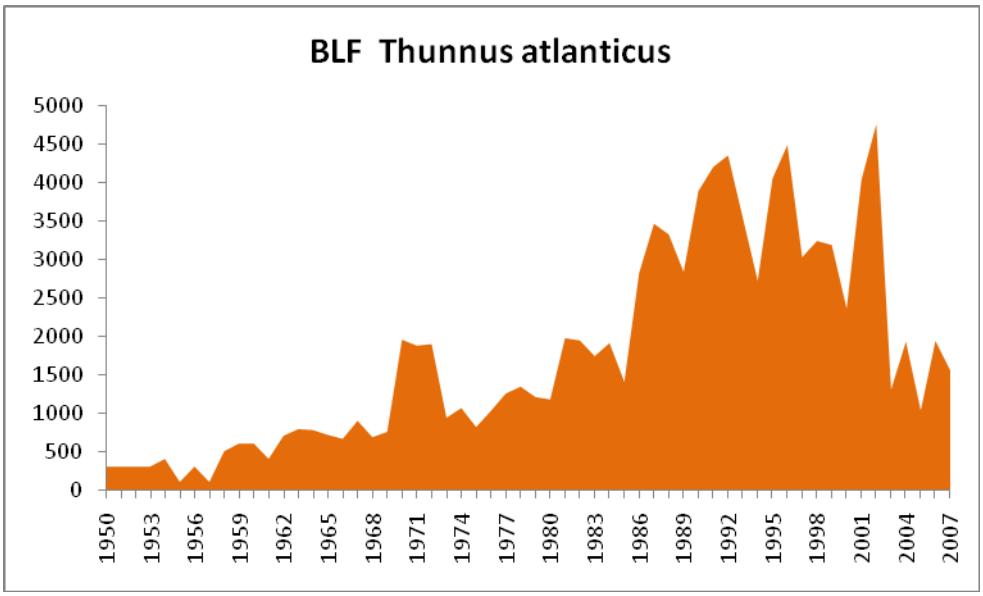
	Landings	A+M	Colombia	77	101	81	72	151	112	76	37	95	58	69	69	0	0	0	0	0	0	0	0	0	0	0	0	
			Cuba	544	443	621	1606	803	746	665	538	611	310	409	548	613	613	0	0	0	0	0	0	0	0	0	0	
			Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Dominican Republic	1058	1267	1271	1321	1415	1401	1290	728	735	739	1330	2042	2042	231	191	125	158	158	158	0	0	0	0	0	0	
			EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	265	0	0	0	0	0	
			Grenada	1	4	17	0	0	1	3	0	0	1	2	2	0	0	0	0	0	0	1	0	0	0	0	0	
			Mexico	5777	5789	6170	6461	5246	7242	8194	8360	9181	10066	8300	7673	11050	11050	5483	6431	4168	3701	4350	5242	3641	5723	3856	3955	4155
			Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5330	0	0	0	
			Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	27	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.	3905	3986	6047	5001	5056	4343	2554	5655	5663	5143	4380	3363	2866	3509	2968	3282	3893	4524	4613	4552	4477	4747	2425	2147	1746
WAH	TOTAL			2159	920	1151	1235	1635	1527	1498	1721	1834	2670	2143	2408	2515	3085	2488	2957	2020	2296	2202	2049	2580	1692	1611	2202	4644
	Landings	A+M	Antigua and Barbuda	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Aruba	115	115	120	90	80	80	70	60	50	50	125	40	50	50	50	50	50	50	50	0	0	0	0	0	
			Barbados	219	120	138	159	332	51	51	60	51	91	82	42	35	52	52	41	41	0	0	34	45	26	41	36	27
			Benin	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Brasil	0	21	141	133	58	92	52	64	71	33	26	1	16	58	41	0	0	0	0	405	519	449	111	75	76
			Cape Verde	1365	142	205	306	340	631	458	351	350	326	361	408	503	603	429	587	487	578	500	343	458	45	537	454	460
			Dominica	0	0	0	0	0	0	38	43	59	59	59	58	58	58	58	50	46	11	37	10	6	8	15	14	16
			Dominican Republic	0	0	0	0	1	3	6	9	13	7	0	0	0	325	112	31	35	35	35	0	0	0	0	0	
			EC.España	0	4	9	9	32	18	23	28	32	22	20	15	25	25	29	28	32	38	46	48	305	237	110	66	38
			EC.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	
			EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	4
			Grenada	50	51	82	54	137	57	54	77	104	96	46	49	56	56	59	82	51	71	59	44	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	35	0	0	0	3113
			Netherlands Antilles	215	245	250	260	280	280	280	250	260	270	250	230	230	230	230	230	230	230	230	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	91	240	103
			S. Tomé e Príncipe	0	0	0	0	23	20	28	34	27	36	39	46	80	52	56	62	52	52	52	52	94	88	76	0	
			Saint Kitts and Nevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	7	0	0	
			Senegal	0	0	0	0	0	0	0	0	0	64	0	0	1	0	0	5	0	0	0	5	0	1	1	0	0
			St. Vincent and Grenadines	0	0	0	0	4	4	28	33	33	41	28	16	23	10	65	52	46	311	17	40	60	0	241	29	24
			Sta. Lucia	0	0	0	0	0	0	77	79	150	141	98	80	221	223	223	310	243	213	217	169	238	169	187	0	171
			Trinidad and Tobago	0	0	0	0	0	0	0	118	1	0	0	0	0	1	1	1	2	1	9	7	6	6	7	7	5
			U.S.A.	0	13	13	57	128	110	82	134	203	827	391	764	608	750	614	858	640	633	846	789	712	558	89	1123	481
			UK.Bermuda	46	46	65	43	61	63	74	67	80	58	50	93	99	105	108	104	61	56	91	87	88	83	86	124	117
			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	3	0	
			UK.Sta Helena	23	15	15	18	18	17	18	12	17	35	26	25	23	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	
			Venezuela	125	147	113	106	141	101	159	302	333	514	542	540	487	488	360	467	4	17	13	9	7	16	13	33	9

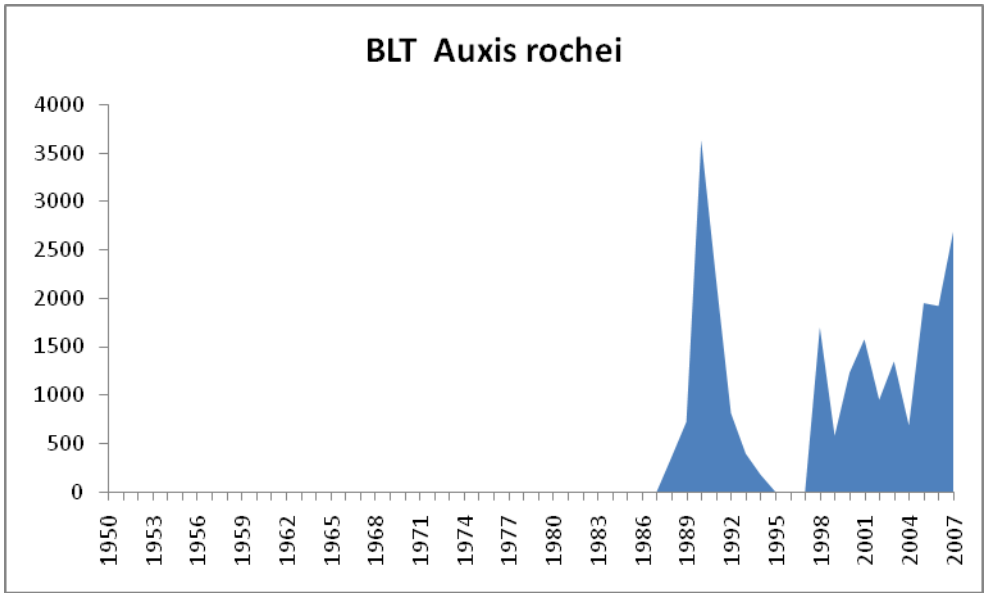
Notes

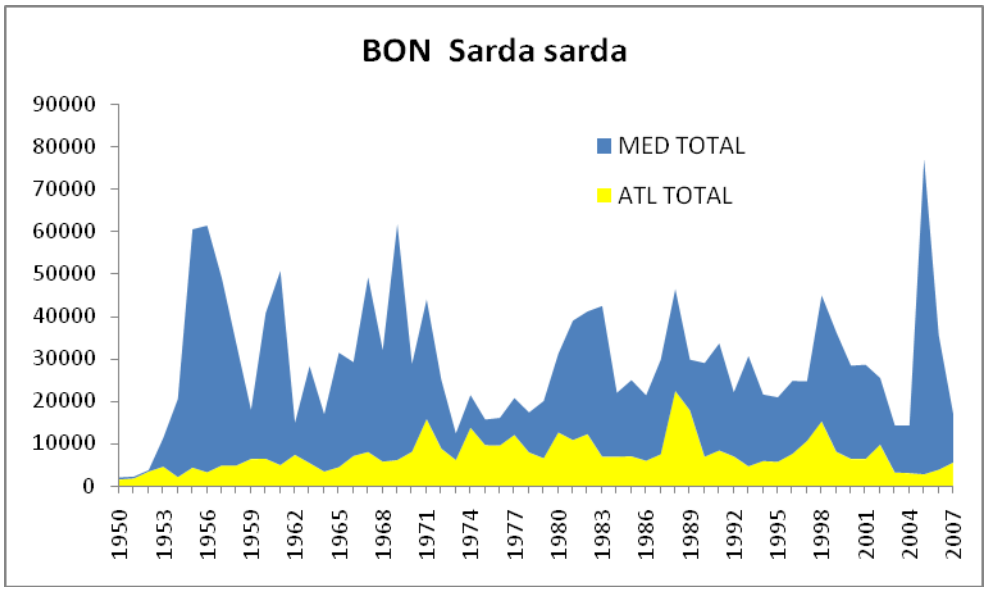
Task-I catches (new figures) not included in the table: Turley 2008 MED (BON: 6448 t; BLT: 836 t; LTA: 1074 t)

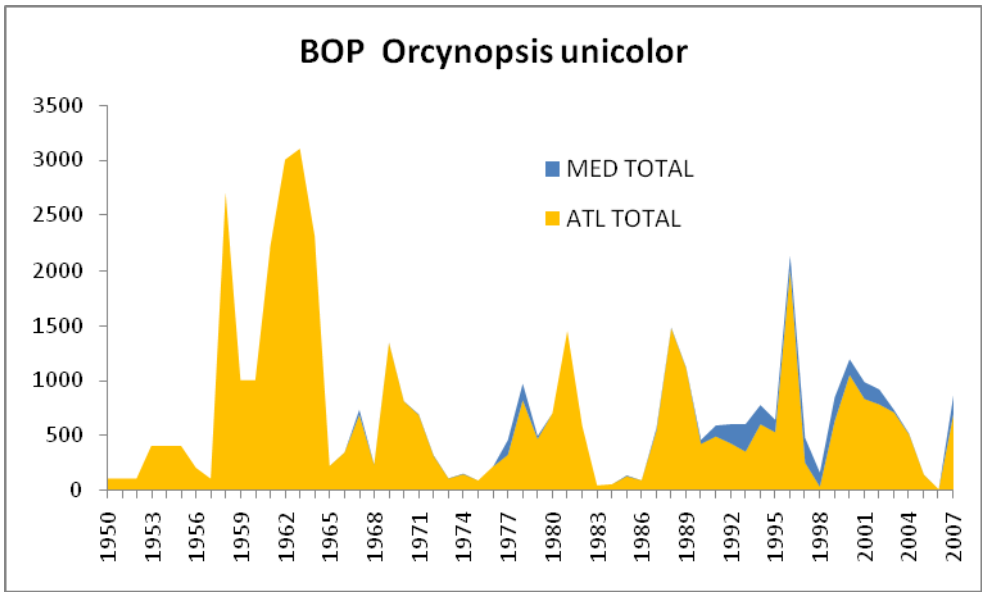


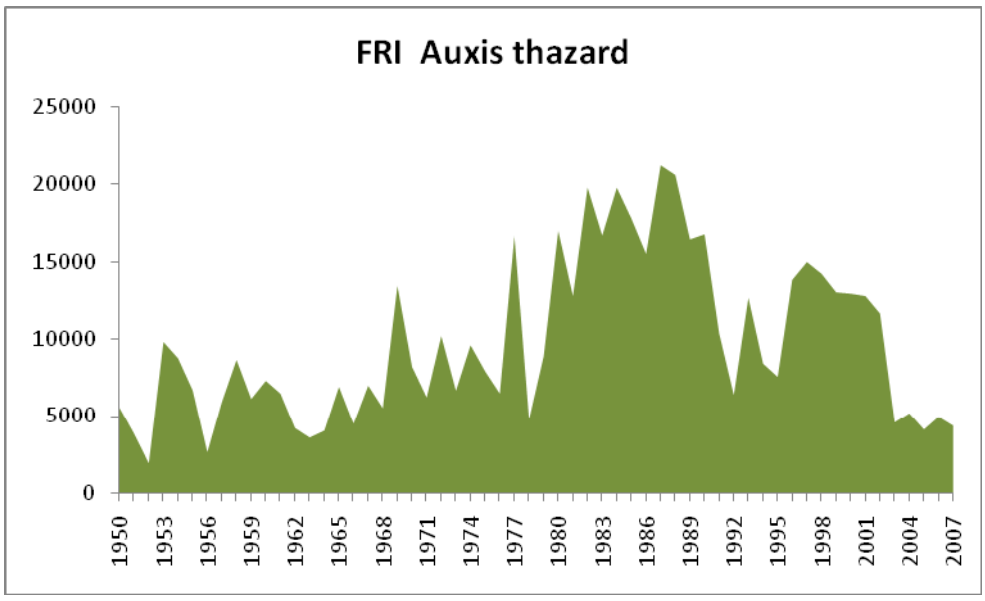
SMT-Figure 1. Estimated landings (t) of small tunas (combined) in the Atlantic and Mediterranean, 1950-2007. The data for the last years are incomplete.

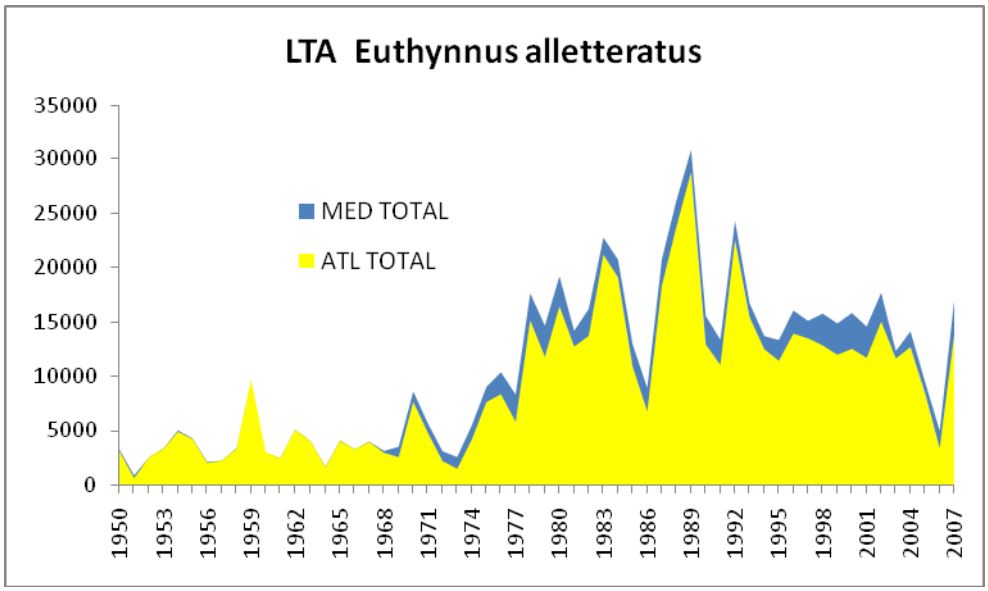

BLF Thunnus atlanticus
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

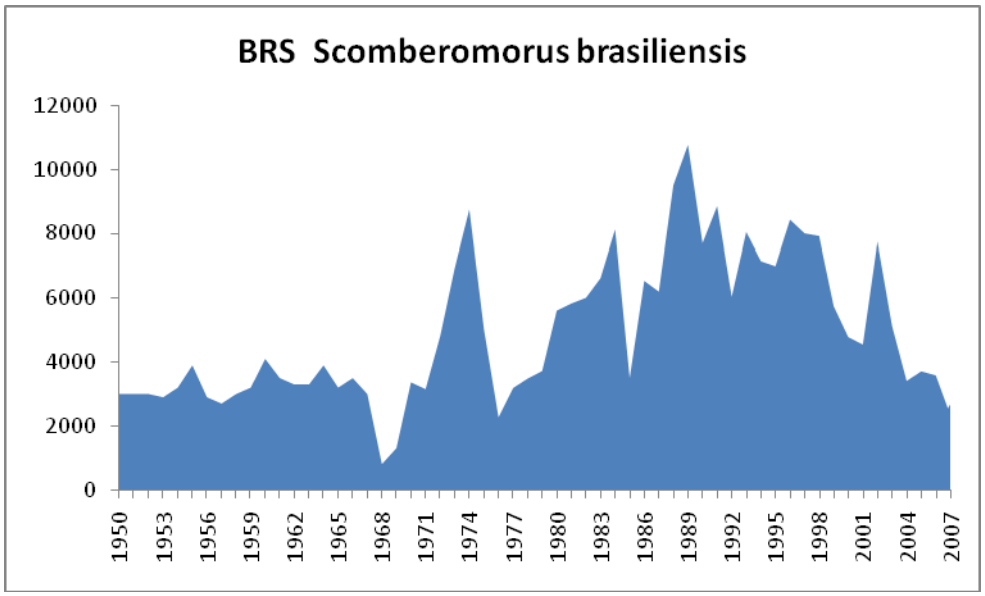

BLT Auxis rochei
4000
3500
3000
2500
2000
1500
1000
500
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

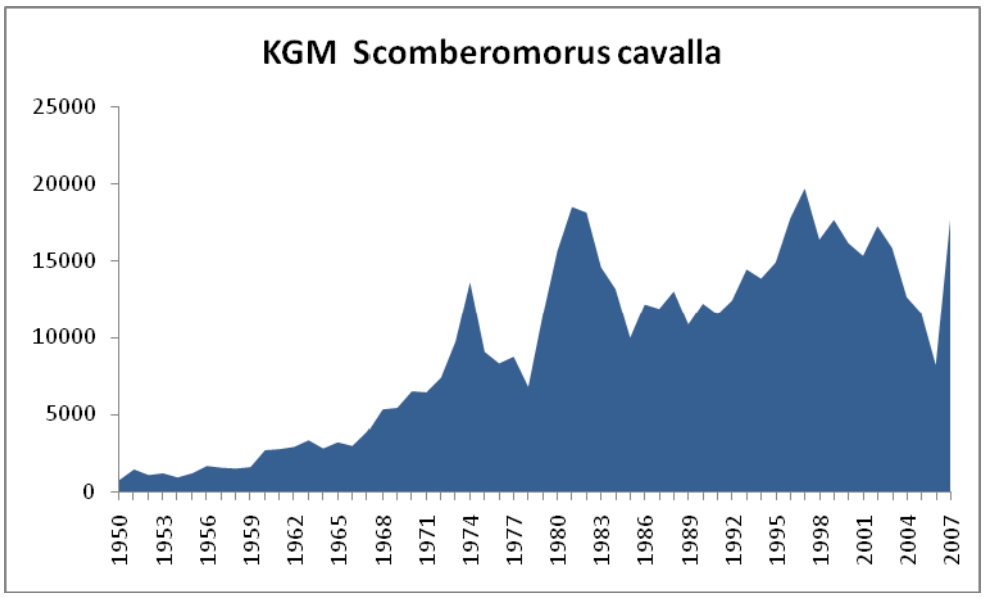

BON Sarda sarda
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
MED TOTAL
ATL TOTAL
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

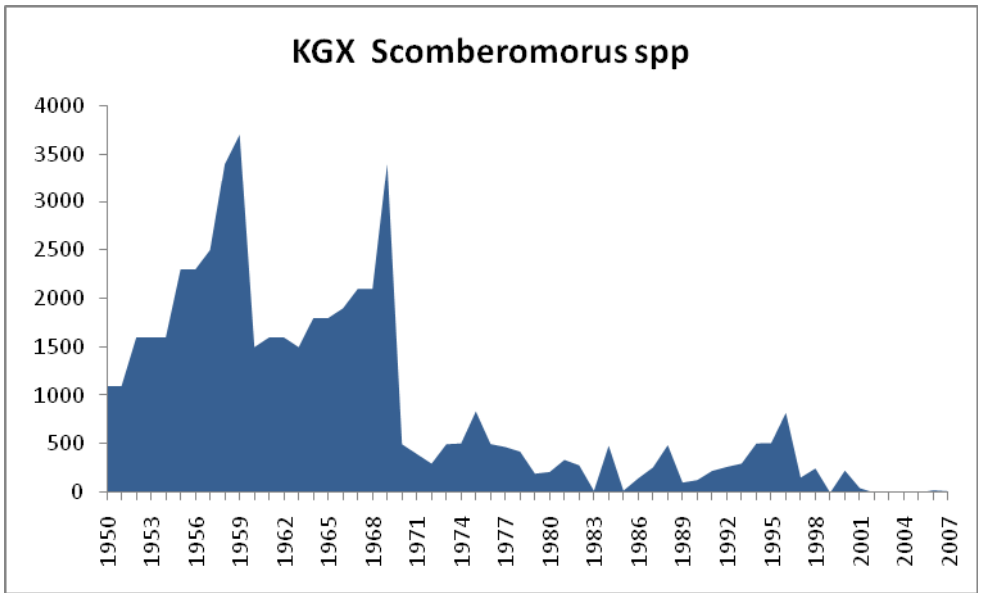

BOP Orcynopsis unicolor
3500
3000
2500
2000
1500
1000
500
0
MED TOTAL
ATL TOTAL
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007

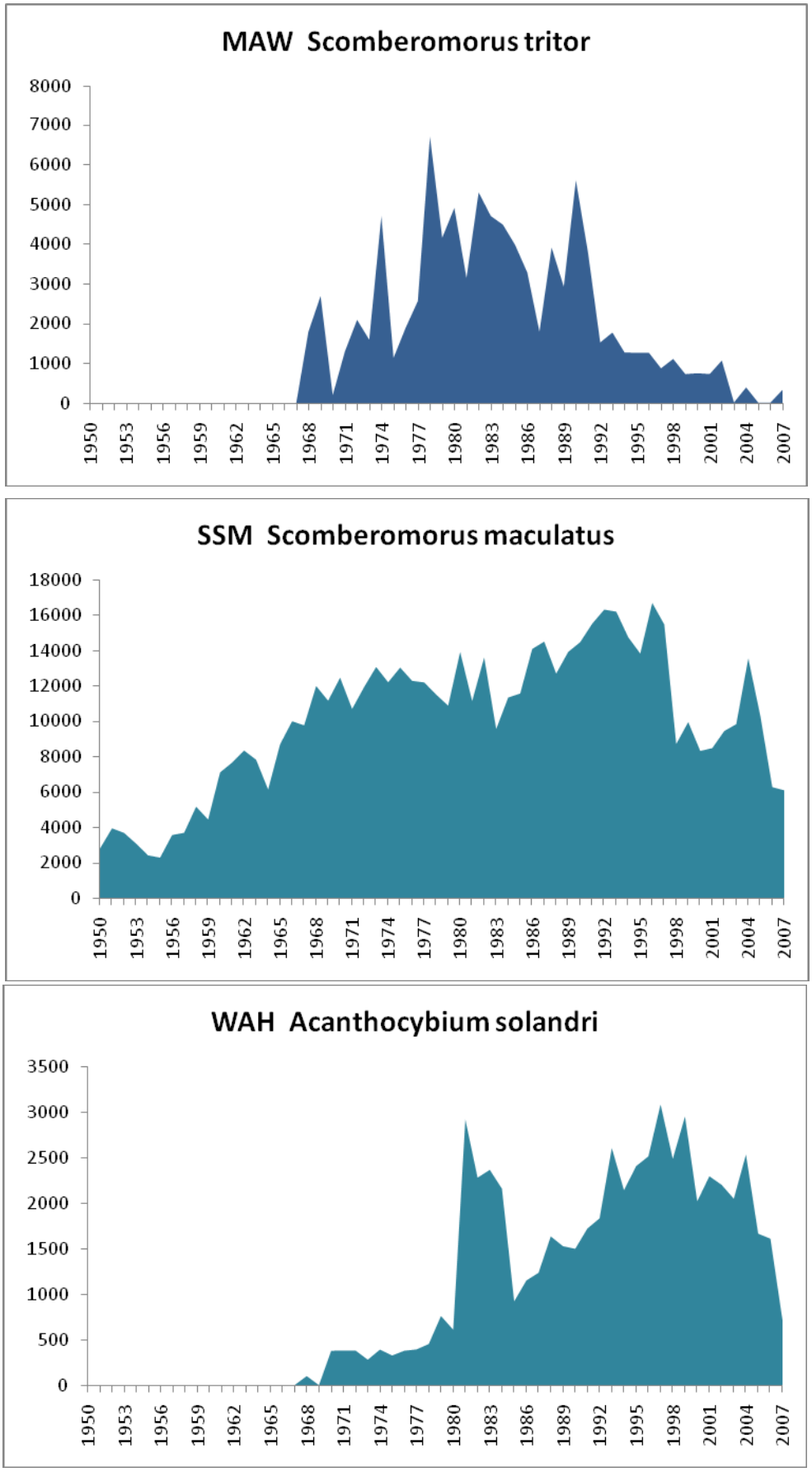

FRI Auxis thazard
25000
20000
15000
10000
5000
0
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007


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


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


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


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



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

8.12 SHK – SHARKS

In response to the *Supplementary Recommendation by ICCAT Concerning the Conservation of Sharks caught in Association with Fisheries Managed by ICCAT* [Rec. 06-10], *an updated assessment of the stocks of blue shark (Prionace glauca*) and *shortfin mako (Isurus oxyrinchus)* was conducted in 2008. Ecological risk assessments (ERA) were also conducted for nine additional priority species of pelagic elasmobranchs, for which available data are very limited (*Isurus paucus*; *Alopias superciliosus*; *Alopias vulpinus*; *Carcharhinus longimanus*; *C. falciformis*; *Lamna nasus*; *Sphyrna lewini*; *Sphyrna zygaena*; and *Pteroplatytrygon violacea*). In 2009, an assessment of porbeagle stocks was conducted jointly with ICES, in response to the *Resolution by ICCAT on Porbeagle Shark* [Rec. 08-08].

The quantity and quality of the data available (e.g., historical catches and CPUE information) to conduct stock assessments have increased with respect to those available in the first (2004) shark assessments conducted by ICCAT. However, they are still quite uninformative and do not provide a consistent signal to inform the assessment. Unless these and other issues can be resolved, the assessments of stock status for all pelagic shark species will continue to be very uncertain and our ability to detect stock depletion to levels below the Convention Objective level will remain considerably low.

A summary of the Committee's findings based on the 2008 and 2009 assessment results is presented below. Although pelagic sharks are captured in the Atlantic Ocean with a wide variety of fishing gears, the largest volume of most of the species of major concern to ICCAT are captured by pelagic longline fisheries.

The Committee assessed blue and shortfin mako sharks in 2008 assuming the existence of three separate stocks: North, South and Mediterranean. However, the data available to the Committee for the Mediterranean were not considered sufficient to conduct quantitative assessments for these species. The assessment results presented high levels of uncertainty due to data limitations. Similarly, the Committee assessed in 2009 porbeagle sharks assuming the existence of four separate stocks: Northwest, Northeast (including the Mediterranean, for which only limited information is available), Southwest and Southeast. The assessment results for the southern porbeagle stocks also presented high levels of uncertainty due to data limitations.

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

SHK-1 Biology

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

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

SHK-2. Fishery indicators

Earlier reviews of the shark database resulted in recommendations to improve data reporting on shark catches. Though global statistics on shark catches included in the database have improved, they are still insufficient to permit the Committee to provide quantitative advice on stock status with sufficient precision to guide fishery management toward optimal harvest levels. Reported catches for blue shark, shortfin mako and porbeagle are provided in **SHK-Table 1**. Given that catch reports to ICCAT are incomplete, the Committee attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets (**SHK-Figure 1 to 4)** as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in blue shark and shortfin mako assessments in 2008 and porbeagle in 2009.

A number of standardized CPUE data series for blue shark and shortfin mako were presented in 2008 as relative indices of abundance. The Committee placed emphasis on using the series that pertained to fisheries that operate in oceanic waters over wide areas. **SHK-Figure 5** presents the central tendency of the available series for the four stocks of these species.

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

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

SHK-3 State of the Stocks

Ecological risk assessments for eleven priority species of sharks (including blue shark and shortfin mako) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. Specifically, the analyses indicated that bigeye threshers, longfin makos, and shortfin makos have the highest vulnerability (and lowest biological productivity) of the shark species examined (with bigeye thresher being substantially less productive than the other species). All species considered in the ERA, particularly smooth hammerhead, longfin mako, bigeye thresher and crocodile sharks, are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end. **SHK-Table 2** provides a productivity ranking of the species considered. ERAs should be updated with improved information on the productivity and susceptibility of these species.

SHK-3.1. Blue shark

For both North and South Atlantic blue shark stocks, although the results are highly uncertain, biomass is believed to be above the biomass that would support MSY and current harvest levels below F_{MSY}. Results from all models used in the 2008 assessment were conditional on the assumptions made (*e.g.*, estimates of historical catches and effort, the relationship between catch rates and abundance, the initial state of the stock in the 1950s, and various life-history parameters), and a full evaluation of the sensitivity of results to these assumptions was not possible during the assessment. Nonetheless, as for the 2004 stock assessment, the weight of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective (**SHK-Figure 7**).

SHK-3.2. Shortfin mako shark

Estimates of stock status for the North Atlantic shortfin mako obtained with the different modeling approaches applied in 2008 were much more variable than for blue shark. For the North Atlantic, most model outcomes indicated stock depletion to about 50% of biomass estimated for the 1950s. Some model outcomes indicated that the stock biomass was near or below the biomass that would support MSY with current harvest levels above

F_{MSY}, whereas others estimated considerably lower levels of depletion and no overfishing (**SHK-Figure 7**). In light of the biological information that indicates the point at which B_{MSY} is reached with respect of the carrying capacity which occurs at levels higher than for blue sharks and many teleost stocks. There is a non-negligible probability that the North Atlantic shortfin mako stock could be below the biomass that could support MSY. A similar conclusion was reached by the Committee in 2004, and recent biological data show decreased productivity for this species. Only one modeling approach could be applied to the South Atlantic shortfin mako stock, which resulted in an estimate of unfished biomass which was biologically implausible, and thus the Committee can draw no conclusions about the status of the South stock.

SHK-3.3. Porbeagle shark

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

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

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

SHK-4. Management Recommendations

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

For species of high concern (in terms of overfishing), which are expected to have high survivorship in fishing gears after release, particularly the bigeye thresher, the Committee recommends that the Commission prohibit retention and landings of the species to avoid fishing mortality. For other species which can be easily misidentified, such prohibitions could complicate compliance monitoring and therefore, other measures might be more appropriate. For example, minimum landing lengths or maximum landing lengths would afford protection to juveniles or the breeding stock, respectively, although other technical measures such as gear modifications, time-area restrictions, or other approaches, could be alternative means to protecting different life stages, provided they are tested for effectiveness through research projects before they are implemented.

Both porbeagle stocks in the NW and NE Atlantic are estimated to be overfished, with the northeastern stock being more depleted. The main source of fishing mortality on these stocks is from non-ICCAT, directed

porbeagle fisheries that are being managed by most of the relevant Contracting Parties through quotas and other measures.

The Committee recommends that countries initiate research projects to investigate means to minimize by-catch and discard mortality of sharks, with a particular view to recommending to the Commission complementary measures to minimize porbeagle by-catch in fisheries for tuna and tuna-like species.

For porbeagle sharks, the Committee recommends that the Commission work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs to ensure recovery of North Atlantic porbeagle stocks and prevent overexploitation of South Atlantic stocks. In particular, porbeagle fishing mortality should be kept to levels in line with scientific advice and with catches not exceeding current level. New targeted porbeagle fisheries should be prevented, porbeagles retrieved alive should be released alive, and all catches should be reported.

Management measures and data collection should be harmonized among all relevant RFMOs, and ICCAT should facilitate appropriate communication.

NORTH ATLANTIC BLUE SHARK SUMMARY

2007 Yield		61,845 t[1]
Current Yield (2008)		30,545 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	1.87-2.74[3]
	B_{2007}/B_0	0.67-0.93[4]
Relative Fishing Mortality:	F_{MSY}	0.15[5]
	F_{2007}/F_{MSY}	0.13-0.17[6]

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

SOUTH ATLANTIC BLUE SHARK SUMMARY

2007 Yield		37,075 t[1]
Current Yield (2008)		23,278 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	1.95-2.80[3]
	B_{2007}/B_0	0.86-0.98[4]
Relative Fishing Mortality:	F_{MSY}	0.15-0.20[5]
	F_{2007}/F_{MSY}	0.04-0.09[6]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is $SSB/SSB_{MSY.}$
[4] Range obtained from BSP (high) and CFASP (low) models. Value from CFASP is SSB/SSB0.
[5] Range obtained from BSP (low) and CFASP (high) models.
[6] Range obtained from BSP (low) and CFASP (high) models.

NORTH ATLANTIC SHORTFIN MAKO SUMMARY

2007 Yield		5,996 t[1]
Current Yield (2008)		3,372 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	0.95-1.65[3]
	B_{2007}/B_0	0.47-0.73[4]
Relative Fishing Mortality:	F_{MSY}	0.007-0.05[5]
	F_{2007}/F_{MSY}	0.48-3.77[6]
Management measures in effect		[Rec. 04-10], [Rec. 07-06]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is $SSB/SSB_{MSY.}$
[4] Range obtained from BSP (low), AS, and CFASP (high) models. Value from CFASP is SSB/SSB0.
[5] Range obtained from BSP (low) and CFASP (high) models.
[6] Range obtained from BSP (high) and CFASP (low) models.

NORTHWEST ATLANTIC PORBEAGLE SUMMARY

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

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

SOUTHWEST ATLANTIC PORBEAGLE SUMMARY

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

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

NORTHEAST ATLANTIC PORBEAGLE SUMMARY

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

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

SHK-Table 1. Estimated catches (t) of major sharks species (BSH,SMA,POR) by major area, gear and flag.

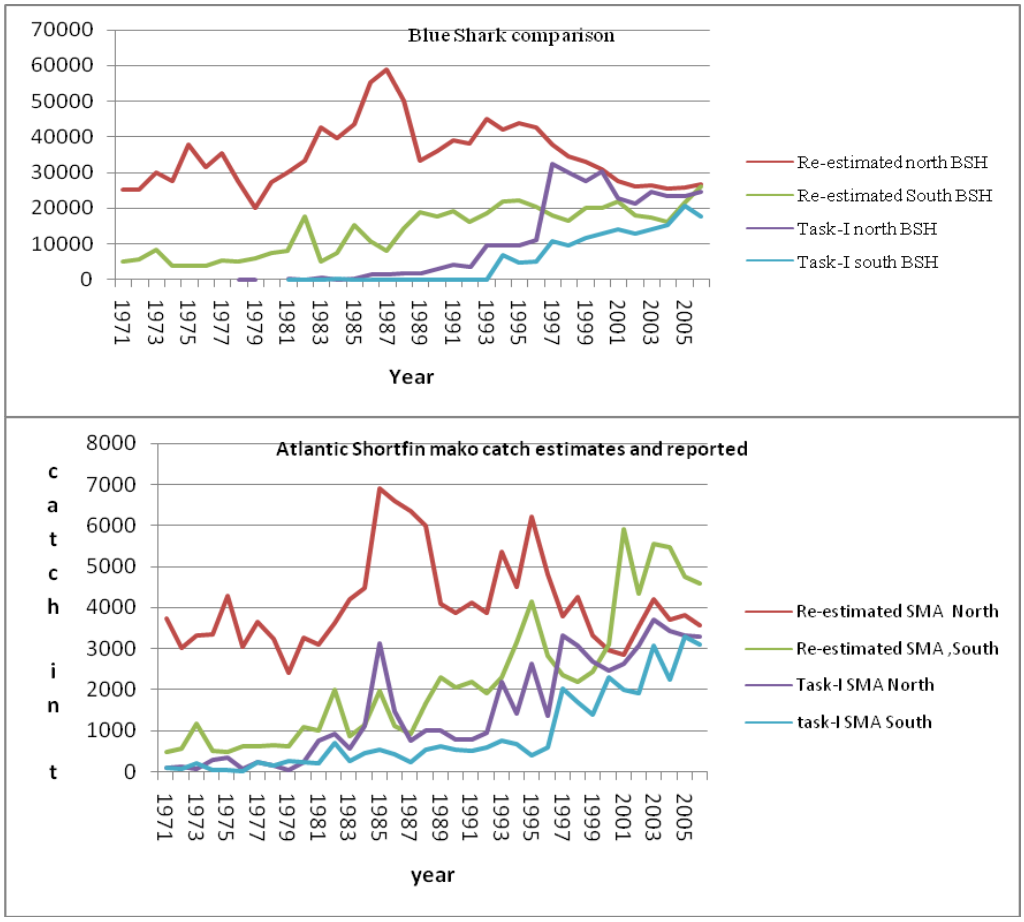
			1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
BSH TOTAL			121	380	1482	1614	1835	1810	3028	4307	3643	9577	9562	9634	9560	37610	33809	35093	39101	34447	32735	35572	36304	43071	40351	47045	53902
	ATN		121	380	1482	1614	1835	1810	3028	4299	3536	9566	8084	8285	7258	29053	26510	25741	27965	21022	20037	22911	21740	22357	23215	26917	30545
	ATS		0	0	0	0	0	0	0	8	107	10	1472	1341	2301	8409	7238	9332	11091	13378	12682	12650	14438	20642	16957	20077	23278
	MED		0	0	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	125	72	178	51	80
Landings	ATN	Longline	0	0	0	0	0	0	1387	2257	1583	5734	5880	5871	5467	27618	25288	24405	26473	20013	18426	21936	20304	21033	22090	25958	30266
		Other surf.	121	380	1482	1088	1414	1330	900	1270	1768	2696	1632	1793	1086	1255	1030	1228	1355	904	1543	975	1372	1258	1080	905	150
	ATS	Longline	0	0	0	0	0	0	0	8	107	10	1472	1341	2294	8398	7231	9305	11091	13376	12678	12645	14339	20638	16898	20007	22889
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	1	4	6	99	3	59	10	375
	MED	Longline	0	0	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	44	72	83	49	79
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	0	95	2	1
Discards	ATN	Longline	0	0	0	526	421	480	741	772	184	1136	572	621	602	180	170	104	137	105	68	0	63	66	45	53	129
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	103	0	22	4	0	0	0	0	1	0	0	0	1
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	60	14
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Landings	ATN	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	
		Canada	0	0	320	147	968	978	680	774	1277	1702	1260	1494	528	831	612	547	624	581	836	346	965	1134	977	843	0
		Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185	104	148	0	0	0	367	109
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	206	240	588	284	106
		EC.Denmark	0	0	0	0	0	2	2	1	1	0	1	2	3	1	1	0	2	1	13	5	1	0	0	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	24497	22504	21811	24112	17362	15666	15975	17314	15006	15464	17038	20788
		EC.France	14	39	50	67	91	79	130	187	276	322	350	266	278	213	163	399	395	207	221	57	106	120	99	167	119
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	31	66	11	2	0	0	0	0	0
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Portugal	0	0	0	0	0	0	1387	2257	1583	5726	4669	4722	4843	2630	2440	2227	2081	2110	2265	5643	2025	4027	4338	5283	6167
		EC.United Kingdom	0	0	0	0	0	0	1	0	0	0	0	12	0	0	1	0	12	9	6	4	6	5	3	6	6
		Japan	0	0	0	0	0	0	0	0	0	0	1203	1145	618	489	340	357	273	350	386	558	1035	1729	1434	1921	2686
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	254	892	285
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	0	0	0	0	43	134
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	2	1	1	0	2
		U.S.A.	107	341	1112	874	355	271	87	308	215	680	29	23	283	211	255	217	291	39	0	0	7	2	2	1	8
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	26	10	18	7
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	259	0	236	109
		Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	743	1103	0	179	1683	2173	1971	2166	1667	2523	2591	2258	1986
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	565	316	452	0	0	0	585	40
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521	800	866	1805	2186	1868
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	5272	5574	7173	6951	7743	5368	6626	7366	6410	8724	8942	9615
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	847	867	1336	876	1110	2134	2562	2324	1841	1863	3184	2751	4493	4866
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	239	0	
		Japan	0	0	0	0	0	0	0	0	0	0	1388	437	425	506	510	536	221	182	343	331	209	236	525	896	1945
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2213	0	1906	6616	0	0	1829
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168	22	0	0	0	0	0	0	0	521
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	21	0	83	63	232	128	154	90	82	126
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	
		Uruguay	0	0	0	0	0	0	0	8	107	10	84	57	259	180	248	118	81	66	85	480	462	376	232	337	359
	MED	EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	6	5	0	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	146	59	20	31	6	3	3	4	8	61	3	2
		EC.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	1	95	46	75
		EC.Malta	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	2	2
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	41	14	3	0	56	22	0	
		Japan	0	0	0	0	0	0	0	0	0	0	5	7	1	1	0	0	0	0	0	1	1	2	0	0	
Discards	ATN	U.S.A.	0	0	0	526	421	480	741	772	184	1136	572	618	704	180	192	100	137	106	68	0	65	66	45	54	129
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	8	0	0	0	0	0	0	0	0	
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	14
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	0	
SMA TOTAL			1793	3803	1951	1028	1562	1648	1349	1326	1446	2966	2972	4870	2778	5570	5477	4097	4994	4654	5361	7324	7487	6336	6073	6633	5062
	ATN		1112	3143	1481	766	1014	1011	785	797	953	2193	1526	3109	2019	3545	3816	2738	2568	2651	3395	3895	5063	3190	3113	3915	3372
	ATS		680	661	471	262	548	637	564	529	493	773	1446	1761	759	2019	1652	1355	2422	1996	1964	3426	2423	3130	2951	2716	1690
	MED		0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1
Landings	ATN	Longline	183	194	184	295	214	321	497	573	660	1499	1173	1633	1770	3369	3648	2645	2254	2424	3129	3792	4755	3172	3105	3898	3337
		Other surf.	929	2949	1297	462	795	681	278	213	254	670	331	1447	248	177	168	91	313	227	266	104	308	18	8	10	27
	ATS	Longline	680	661	471	262	548	637	564	519	480	763	1426	1748	744	1997	1642	1345	2413	1979	1949	3395	2347	3116	2907	2691	1690
		Other surf.	0	0	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	18	15	31	76	14	43	25	
	MED	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1
Discards	ATN	Longline	0	0	0	9	5	9	10	11	38	24	21	29	1	0	0	0	0	0	0	0	0	0	0	7	6
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1
Landings	ATN	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Canada	0	0	0	0	0	0	0	0	0	0	0	111	67	110	69	70	78	69	78	73	80	91	71	72	43
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	16
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	57	19	30	24	23
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	2416	2199	2051	1566	1684	2047	2068	3404	1751	1918	1816	1895
		EC.Portugal	0	0	0	0	0	0	193	314	220	796	649	657	691	354	307	327	318	378	415	1249	473	1109	951	1540	1021
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	1	1	0	0	0	1
		Japan	141	142	120	218	113	207	221	157	318	425	214	592	790	258	892	120	138	105	438	267	572	0	0	82	140
		Mexico	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	16	0	10	6	9	5	8	6
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	49	13
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	8	17
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	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
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3	1	2	1	1	1
		U.S.A.	971	3001	1361	540	896	795	360	315	376	948	642	1710	469	407	347	159	454	395	415	142	411	187	130	216	186
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	20	6	11	2
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	17	2
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	83	190	0	27	219	409	226	283	238	426	210	36	
		China P.R.	0	0	0	0	0	0	0	0	0	34	45	23	27	19	74	126	305	22	208	260	0	0	0	77	6
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	121	128	138	214	125
		Côte D'Ivoire	0	0	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	15	15	30	15	14	16	25	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	1356	1141	861	1200	1235	811	1158	703	584	664	654	628
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	92	94	165	116	119	388	140	56	625	13	242	493	375	321
		EC.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	
		Japan	462	540	428	234	525	618	538	506	460	701	1369	1617	514	244	267	151	264	56	133	118	398	0	0	72	127
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	459	0	509	1415	1243	1002	295
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	1	0	0	0	0	0	0	0	10
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	13	0	79	19	138	126	125	99	208	136
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	
		Uruguay	218	121	43	28	23	19	26	13	20	28	12	17	26	20	23	21	35	40	38	188	249	146	68	36	41
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	12	13	1	
	MED	EC.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0

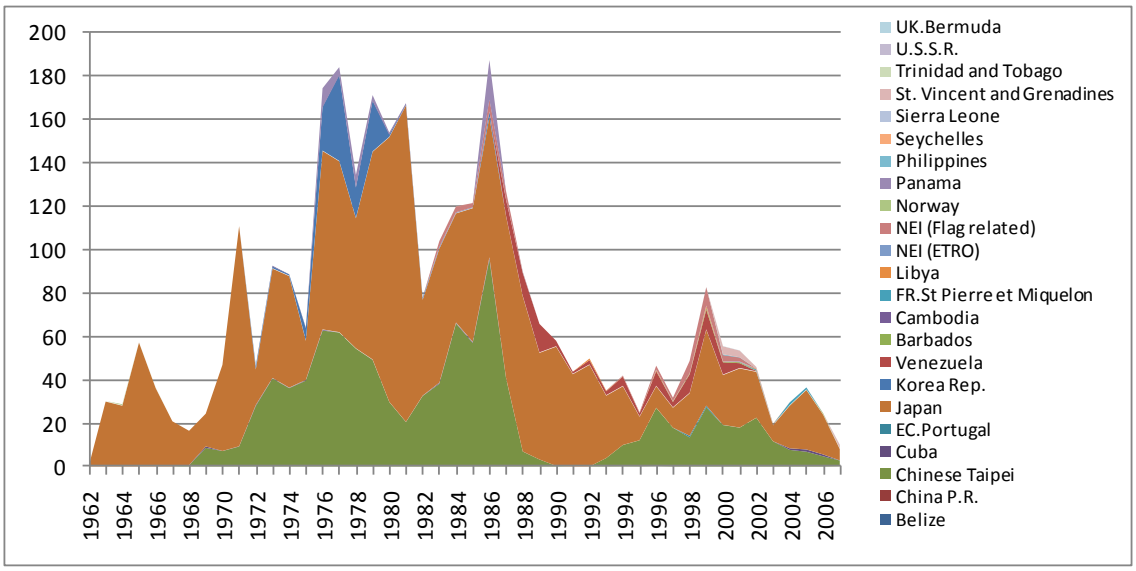
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	6	7	5	3	2	2	2	2	2	4	1	0
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0	0	15	5	0	
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	ATN	Mexico	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	0	0	9	5	9	10	11	38	24	21	28	1	0	0	0	0	0	0	0	0	0	0	7	7
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	
POR TOTAL			706	664	706	813	957	971	1282	1944	2588	1889	2676	2121	1518	1859	1469	1403	1469	999	848	648	745	571	507	515	606	
	ATN		706	664	706	813	955	971	1282	1943	2588	1888	2674	2118	1514	1833	1451	1393	1457	998	838	604	725	539	470	502	513	
	ATS		0	0	0	0	1	0	0	0	0	1	2	3	3	26	17	10	11	1	11	43	17	31	37	13	91
	MED		0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2
Landings	ATN	All gears	706	664	706	813	955	971	1282	1943	2586	1888	2673	2118	1514	1833	1451	1393	1457	998	838	604	725	539	470	502	513	
	ATS		0	0	0	0	1	0	0	0	0	1	2	3	3	26	16	9	11	1	11	43	17	31	37	13	91
	MED		0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2
Discards	ATN		0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	
Landings	ATN	Canada	20	26	24	59	83	73	78	329	813	919	1575	1353	1051	1334	1070	965	902	499	237	142	232	202	192	93	124	
		EC.Denmark	38	72	114	56	33	33	46	85	80	91	93	86	72	69	85	107	73	76	42	0	0	0	0	0	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	18	13	24	54	27	11	14	34	8	41
		EC.France	411	254	260	280	446	341	551	300	496	633	820	565	267	315	219	240	410	361	461	303	413	276	194	354	311
		EC.Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	1	3	0	0	0	0	0	
		EC.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	6	3	11	18	0	4	8	7
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	3	3	2	2	1	0	0	0	0	0	0	0	0	7	4	10	101	50	14	6	0	3
		EC.Sweden	9	10	8	5	3	3	2	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	
		EC.United Kingdom	5	12	6	3	3	15	9	0	0	0	0	0	0	0	1	6	8	12	10	0	0	24	11	26	15
		Faroe Islands	126	210	270	381	373	477	550	1189	1149	165	48	44	8	9	7	10	0	0	0	0	0	0	0	0	
		Iceland	1	0	0	0	0	0	0	0	1	3	4	6	5	3	4	2	2	3	2	1	1	0	1	0	1
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	12	11
		Norway	96	80	24	25	11	25	43	32	41	24	24	26	28	17	27	32	22	11	14	19	0	8	27	0	
		U.S.A.	0	0	0	1	0	2	2	5	1	50	106	35	78	56	13	3	1	1	1	0	1	0	0	0	1
	ATS	Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	
		Chile	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.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	
		EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	7	1	2	9	4	0	3	5	4
		EC.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Poland	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	
		Falklands (Malvinas)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		Japan	0	0	0	0	1	0	0	0	0	1	0	0	3	14	0	1	0	0	0	0	0	0	0	5	47
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Uruguay	0	0	0	0	0	0	0	0	0	0	0	3	0	5	13	2	4	0	8	34	8	28	34	3	40
	MED	EC.España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	2
		EC.Malta	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0	0
Discards	ATN	U.S.A.	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
	ATS	Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	

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

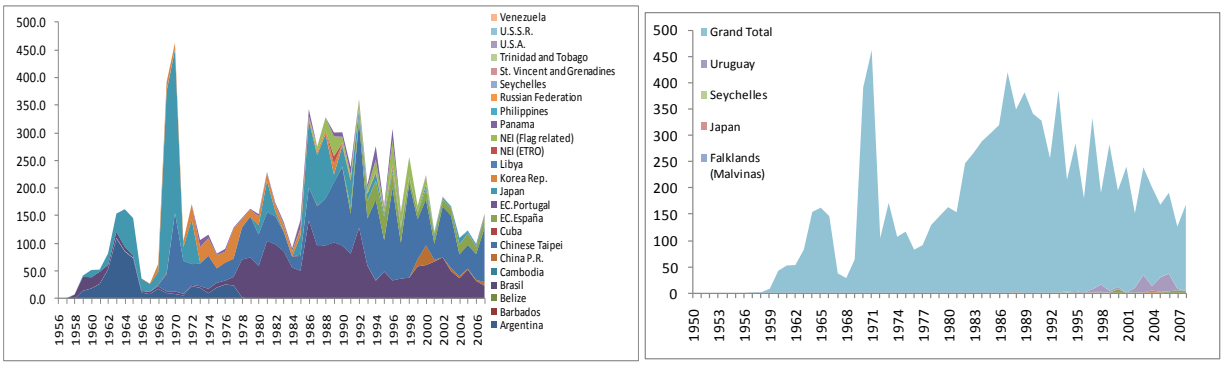
Species	*Productivity (r)*	*Productivity rank*
BTH (*Alopias superciliosus*)	0.010	1
SMA (*Isurus oxyrinchus*)	0.014	2
LMA (*Isurus paucus*)	0.014	3
POR (*Lamna nasus*)	0.053	4
FAL (*Carcharhinus falciformis*)	0.076	6
OCS (*Carcharhinus longimanus*)	0.087	7
SPL (*Sphyrna lewini*)	0.090	8
SPZ (*Sphyrna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



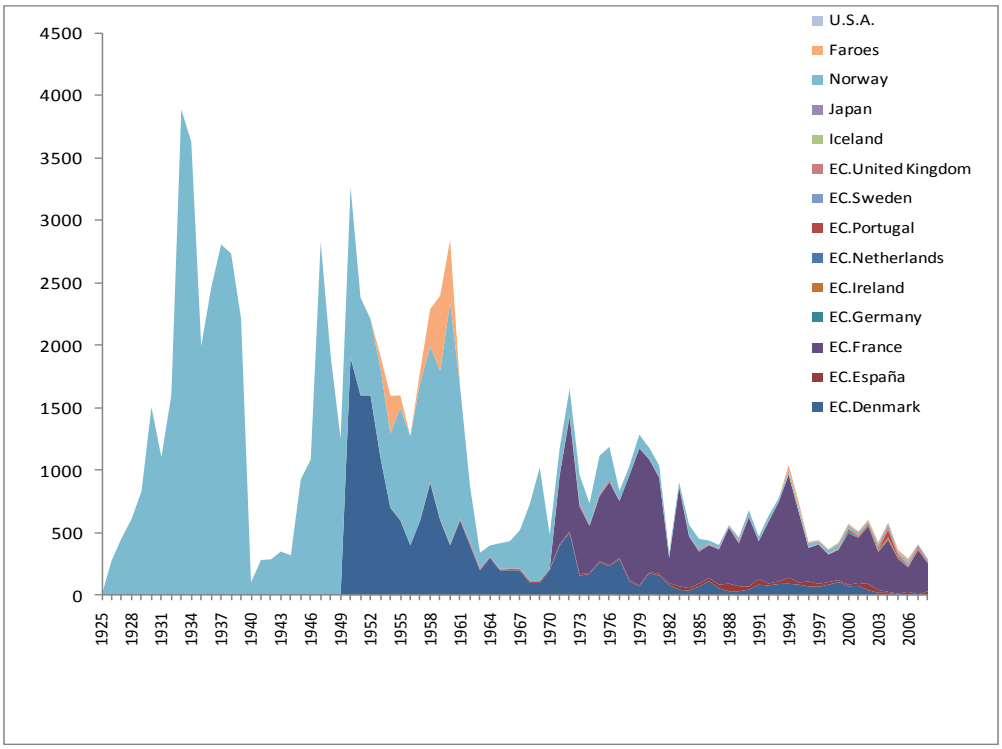
SHK-Figure 1. Blue shark and shortfin mako catches reported to ICCAT and estimated by the Committee.



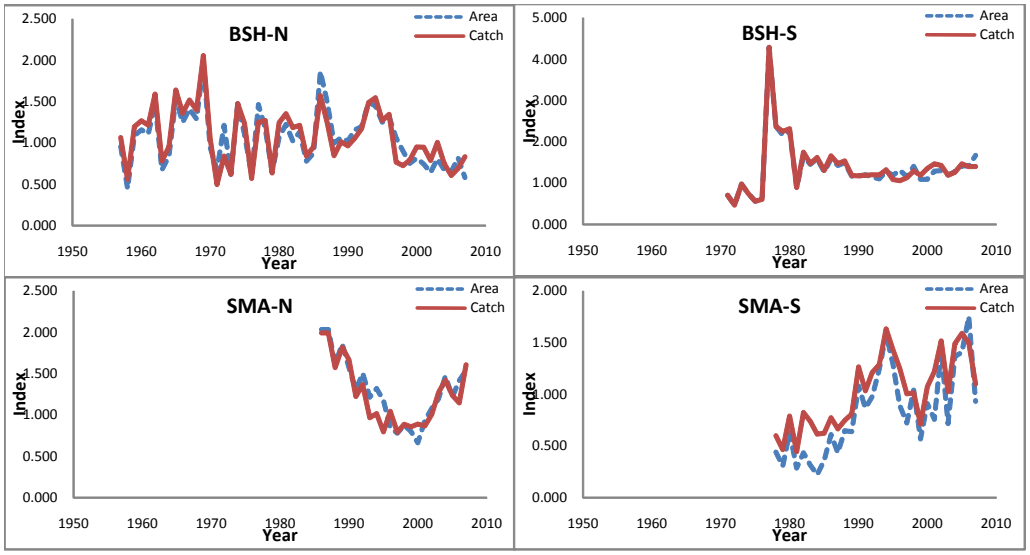
SHK-Figure 2. Estimated potential catch of porbeagle by non-reporting longline fleets using catch ratios for the NW stock. Limited observations across the time-series result in an unquantified uncertainty in the estimates.



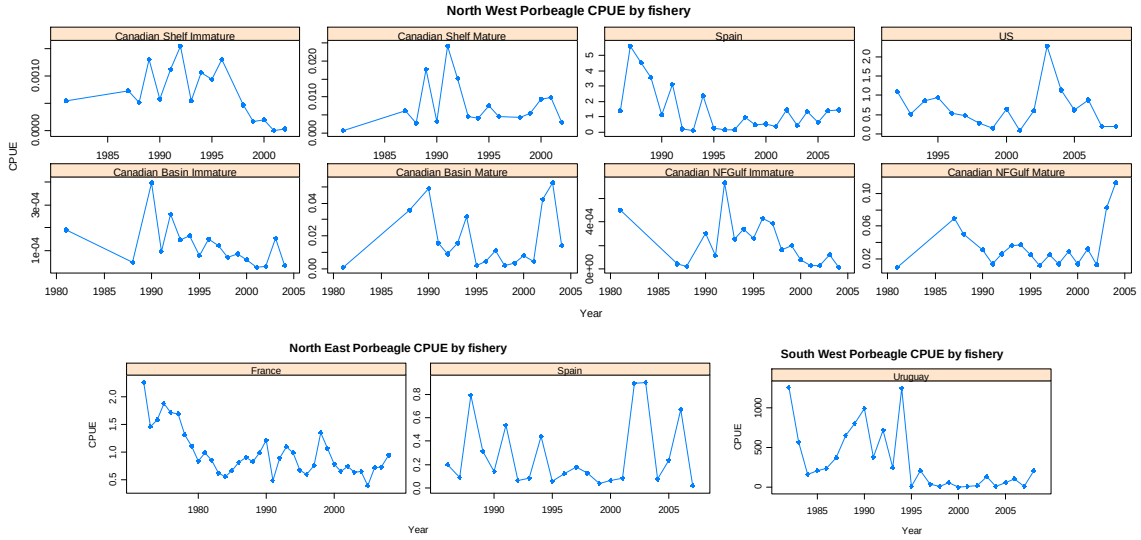
SHK Figure 3. Left plate: Estimated potential catch of porbeagle by non-reporting longline fleets using catch ratios for the SW stock. Very limited observations across the time-series result in a high but unquantified uncertainty in the estimates. Right plate: Comparison of estimates for non-reporting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



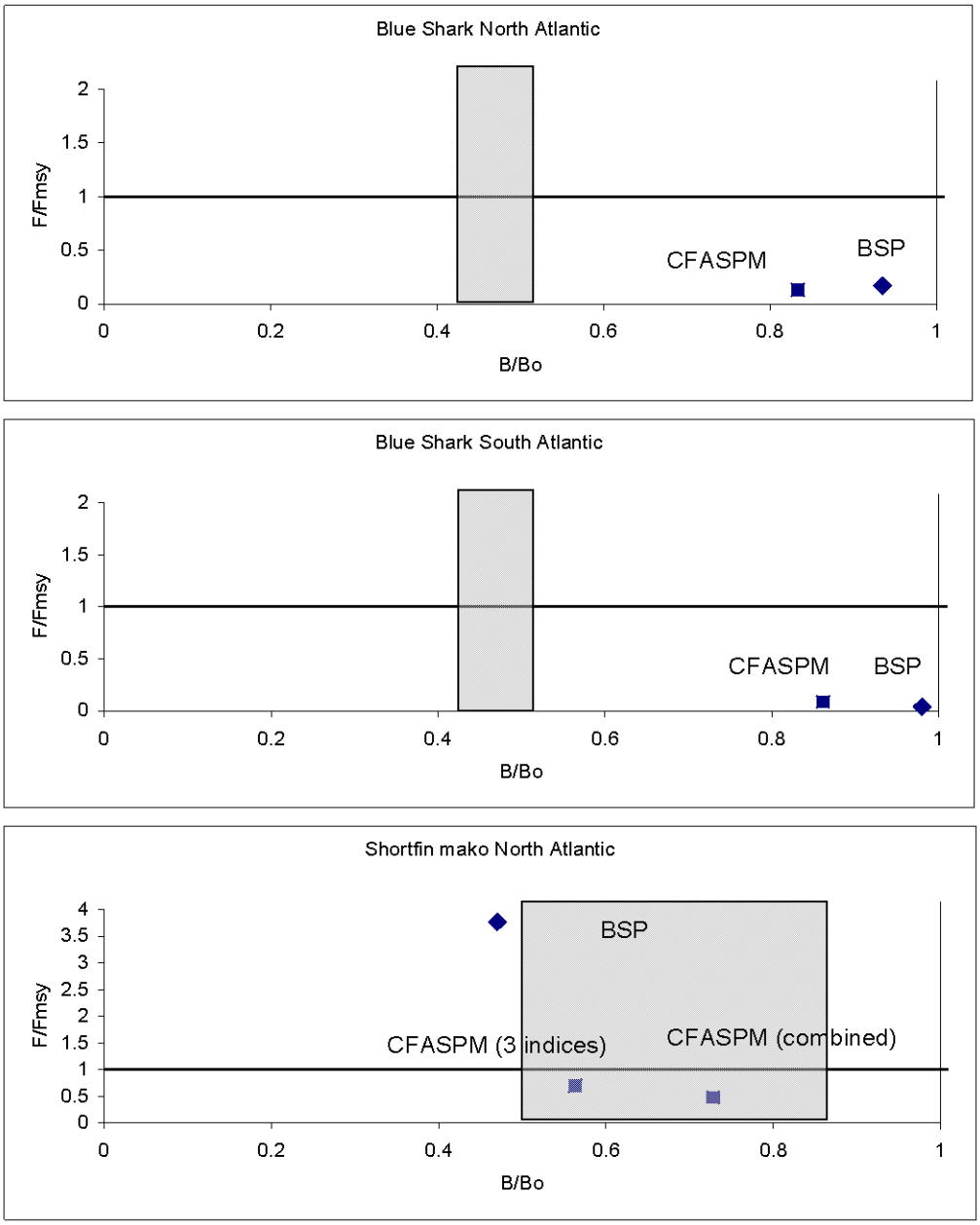
SHK Figure 4. Catch by flag of porbeagle sharks from the northeastern Atlantic used in the assessment. While these catches are considered the best available,, they are believed to underestimate the pelagic longline catches for this species.



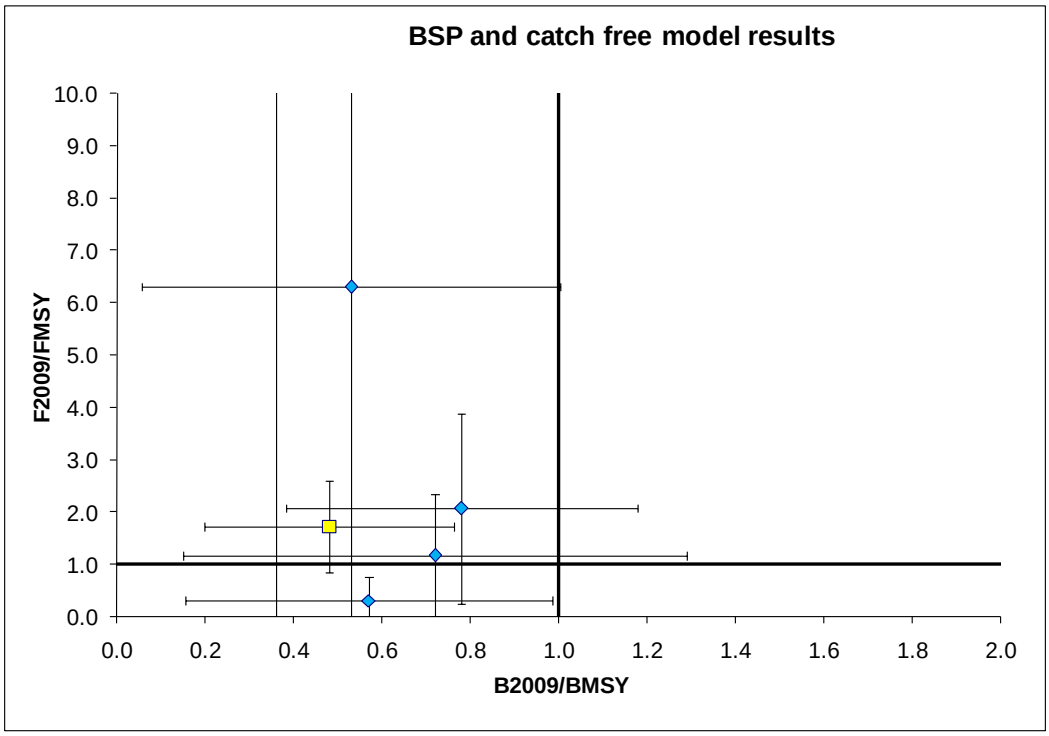
SHK-Figure 5. Average trends in the CPUE series used in the assessments of blue shark (BSH) and shortfin mako (SMA). The averages were calculated by weighting the available series either by their relative catch or by the relative spatial coverage of the respective fisheries.



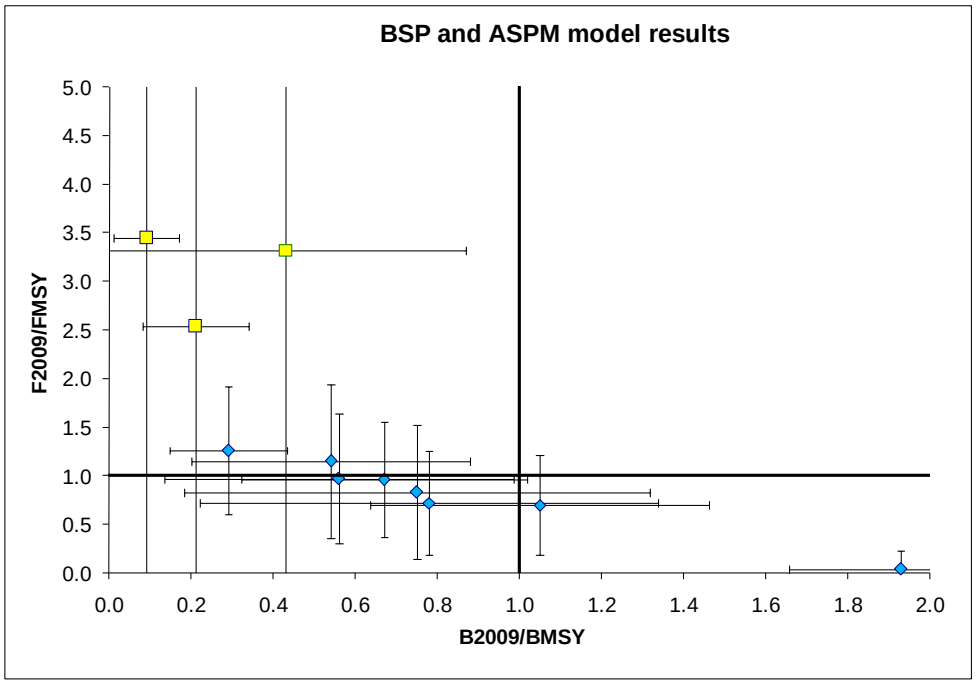
SHK-Figure 6. CPUE series for the porbeagle NW stock (upper figures), NE stock (lower left figures) and SW stock (lower right figure).



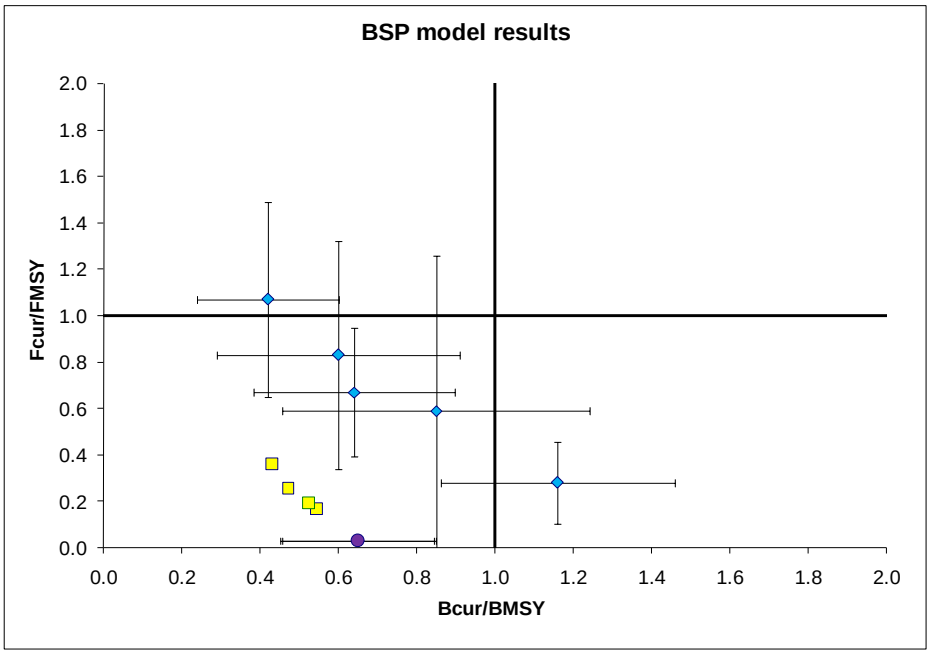
SHK-Figure 7. Phase plots summarizing base scenario outputs for the current stock status of blue shark (BSH) and shortfin mako (SMA). BSP=Bayesian surplus production model; CFASPM=catch-free, age-structured production model. The shaded box represents the area at which the biomass at MSY is estimated to be reached. Any points inside or to the left of the box indicate the stock is overfished (with respect to biomass). Any points above the horizontal line indicate overfishing (with respect to F) is occurring.



SHK-Figure 8. Phase plot for the southwest Atlantic porbeagle, showing status in 2009 from both the BSP model runs (diamonds) and the catch free age structured production model (square) results. Error bars are plus and minus one standard deviation.



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



SHK-Figure 10. Phase plot showing the northwest Atlantic porbeagle expected value of B/B_{MSY} and F/F_{MSY} in the current year, which is either 2005 (diamonds) or 2009 (circles), as well as approximate values from SCRS/2009/095 (squares). B/B_{MSY} was approximated from SCRS/2009/095 as N2009/N1961 times 2. Error bars are plus and minus one standard deviation.

9. Report of inter-sessional meetings

The reports of the inter-sessional meetings held in 2009 were presented, with special emphasis to those not directly related to the stock assessments because their results are not included and presented in the Executive Summaries. The following meetings were presented:

9.1 Working Group on Stock Assessment Methods

Dr. Victor Restrepo summarized the work and deliberations of the Methods Working Group meeting which took place March 11-14, 2009, in Madrid. The Working Group conducted work primarily on three areas: (1) advance the draft Manual for CPUE standardization; (2) testing of standardization methods that account for species targeting; and, (3) characterizing the influence of life history characteristics, environmental variability and gear selectivity on Status Determination with respect to the Convention objectives.

The Committee was satisfied that progress was being made with the two CPUE issues studied by the Working Group and encouraged National Scientists to continue to work on the completion of the Manual and in conducting simulation testing and contribute to the Working Group's work.

In terms of future work of the Working Group, the Committee also discussed a recommendation made by the Working Group on the Future of ICCAT that the SCRS look into how the Precautionary Approach (PA) would best be expressed in the ICCAT Convention. The Committee decided that the Methods Working Group should address the PA starting in 2010. The basis for this work should be the conclusions reached by the ad hoc Precautionary Approach which last met in 1999.

The detailed report of the meeting is presented as document SCRS/2009/010.

9.2 Inter-Sessional Meeting of the Tropical Species Group

Dr. Joao Pereira presented the report of the Tropicals inter-sessional meeting that took place in Madrid, April 20-25, 2009. The primary objective of the meeting was to evaluate the likely impact of alternative time/area closures in the Gulf of Guinea and to review sampling protocols used in the region, in response to Rec. [08-01]. The Committee's responses to these questions are given in Sections 16.2 and 16.3. The group also reviewed new information on biology, particularly about growth and natural mortality.

The detailed report of the meeting is presented as document SCRS/2009/011.

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

The meeting was held in Recife, Brazil, June 8-12, 2009. During the meeting, the seabird assessment was completed. This was composed of several sub-analyses, namely the overlap analysis between the species distribution and ICCAT longline fishing effort, the review of existing by-catch rates, the estimation of the total annual seabird by-catch in the ICCAT Convention area and the assessment of the likely impact of this by-catch on the seabird populations. Several documents were presented under the different sections of the assessment, although the available information about catch rates was rather poor, leading to uncertain estimates of number of birds caught. In spite of this, and based on information made available at the meeting, the Group was able to provide management recommendations.

Furthermore, some documents were presented aiming to use the ecological risk assessment approach in order to prioritize the species most at risk. The Group, although recognized the difficulty involved in establishing, on a scientific basis, a hierarchy of species caught as by-catch that are priority for the Sub-Committee, recommended to conduct further analyses on different fisheries.

The detailed report of the meeting is presented as document SCRS/2009/013.

9.4 Sailfish Stock Assessment Session

Dr. D. Die summarized the report of the sailfish stock assessment which took place in Recife, Brazil, June 1-5, 2009. The main objective of the meeting was to assess sailfish stocks. Considerable work was undertaken to separate historical data that were mixed between sailfish and spearfish, which was necessary to conduct the assessment.

The detailed report of the meeting is presented as document SCRS/2009/012.

9.5 North Atlantic Albacore Stock Assessment Session

The North Atlantic Albacore stock Assessment Session (Madrid, July 13-18, 2009) was held at the request of the Commission [Rec. 07-02]. The Group noted that majority of data was prepared in advance of the assessment by the Secretariat and National scientists that allowed to made the analyses on accomplishing the dateline. The analyses made in 2009 considered several different scenarios according to different hypothesis about biological parameters and fishing pattern across diverse fleets and fisheries units in the North Atlantic. The results show that a decrease in the spawning stock from the beginning of the 1970s and in 2007 was about one third of the peak levels estimated for the late 1940s. In 2007 the spawning stock was estimated at approximately 62% of SSB at MSY. Corresponding fishing mortality rates have been above F_{MSY} and the 2007 ratio F/F_{MSY} is only slightly higher than $F_{MSY.}$ Uncertainty on the time series of fishing mortality and spawning stock were not characterized. The selectivity pattern changing over time produces variability on MSY estimates accordingly. Based on the results the Northern albacore the stock could be overfished. The projections indicate that constant catches above 28,000 t will not result in stock rebuilding by 2020. The total allowable catch (TAC) of 34,500 t for this stock was extended to 2007.The Committee noted that the 2007 reported catch of 21,549 t was well below the TAC. In 2007, the Commission established a new TAC for 2008 and 2009 of 30,200 t [Rec. 07-02], but included several provisions that allow the catch to exceed this level. In 2008 reported catch was 20,359 t well below the TAC. In view of the 2009 assessment, the Committee recommends that in order to achieve the Commission management objective by 2020, a level of catch of no more than 28,000 t will be required.

The detailed report of the meeting is presented as document SCRS/2009/015.

9.6 Joint ICES-ICCAT Porbeagle Stock Assessment Session

The porbeagle stock assessment was carried out in Copenhagen, from June 22 to 27, 2009. The meeting was held jointly with ICES, in response to an ICCAT Recommendation [Rec. 08-09]. While there were some limitations in the data, three of the four stocks could be assessed (SW-NW-NE) with various degrees of uncertainty.

There was only one data series available for the southwest Atlantic which made it possible to carry out some runs but with major limits and uncertainties than for the other stocks assessed. All the models estimated that the biomass in 2008 was below B_{MSY} and that the fishing mortality rate in 2008 was above F_{MSY} in the majority of the scenarios investigated.

For the North Atlantic stocks, the data available permitted carrying out an assessment with more scenarios. As for the NW, while it was determined that the biomass was well below $B_{MSY,}$ it was possible to observe that fishing mortality in recent years is below $F_{MSY.}$ Therefore, it was recommended that measures be adopted that support the objectives of the Recovery Plan of the Canadian EEZ (TAC 185 t) and Recovery Plan of the USA (TAC 11.3 t) and that no high seas fisheries directed at this species be permitted.

In the NE the simulations of the various models indicated that the current biomass in also well below B_{MSY} and that recent fishing mortality is close to or above F_{MSY}. Catches close to the current TAC (e.g., 400 t) would result in a recovery of the stock in some scenarios, but with considerable uncertainty and would take between 40 and 124 years.

The detailed report of the meeting is presented as document SCRS/2009/014.

9.7 Atlantic Swordfish Assessment Session

The Swordfish Species Group met on September 7-11, 2009 at the ICCAT headquarters to conduct an assessment of North and South Atlantic stocks. The Group received contributions on swordfish genetics and migrations, as revealed from pop-up satellite archival tagging. In addition, participating national scientists contributed information on catch rates. The total Atlantic estimated catch (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2008 was 21,859 t and represented a significant decline from that in 2007 (27,941 t).The Group also considered trade statistics as an indicator of unreported catch. Although the process was complicated by factors such as conversion factors, the scope of unreported catch was considered potentially significant and worthy of further examination.

Based on production model results for the northern stock, the Group concluded that there is greater than 50% probability that the stock is at or above B_{MSY}, and thus the Commission's rebuilding objective [99-2] has been achieved. Similarly, the assessment of the southern stock (conditioned only on catches) indicated a probability of 0.78 that the stock is neither overfished or subject to overfishing in relation to MSY levels.

The Group noted that based on this assessment, MSY for northern Atlantic swordfish is 13,730 t and harvests in excess of this will cause the stock to decline. A TAC of 13,000 t would provide approximately a 75% probability of maintaining the stock at a level consistent with the Convention Objective over the next decade. For the South Atlantic stock, the Group recommended that given the unquantified uncertainties and the conflicting indications for the stock, catches should be limited to the recent average level (~15,000 t).

The Committee plans a data preparatory and methods inter-sessional meeting in 2011, in preparation for the next assessment, proposed for 2012.

The detailed report of the meeting is presented as document SCRS/2009/016.

10. Report of Special Research Programs

10.1 Bluefin Year Program (BYP)

Dr. Victor Restrepo presented the report on the Bluefin Year Program (BYP) activities carried out in 2008 and 2009.

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

With respect to future activities of this programme, the Committee considered that, bearing in mind that over the next years a wide ranging and well coordinated research programme for the entire Atlantic was going to be developed, to be carried out over six years at a total cost of around 19 million euro, research activities previously carried out within the framework of the BYP should be carried out in the framework of this new programme.

10.2 Enhanced Research Program for Billfish

The report of the Program for Enhanced Research on Billfish, together with the proposed budget for 2010, was presented by the Program Coordinator, Dr. D. Die.

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

11. Report of the Sub-Committee on Statistics

Dr. Mauricio Ortiz, presented the report (**Appendix 8**) of the Sub-Committee of Statistics which held its session during the two first days of the week prior to the plenary sessions of the SCRS. The Sub-Committee noted the record participation of scientists and rapporteurs at this meeting.

It was also noted that practically all the recommendations that were issued in 2008 had been implemented by the Secretariat, both strengthening human resources and regarding the purchase and improvement of computer equipment. The Committee recommended, however, that the Secretariat continue to make efforts to improve access for scientists to the local server and to the Internet by boosting the WiFi system.

In this regard the Executive Secretary informed the Group that this problem will not be fully resolved until the Secretariat moves to its new headquarters, taking into account that the building where the Secretariat is located does not belong to ICCAT and that this will complicate the development of extensive work with the use of the cable network.

The Secretariat presented the *Suggested rules and procedures for the protection, access to and dissemination of data compiled at ICCAT* **(Appendix 10)**. The Committee reviewed this document and emphasized that the considerations of rules of procedure for the management and dissemination of confidential data should not allow an excessively strict interpretation which would result in data currently available to the public being placed in a reserved domain. To avoid this risk, the document was revised to reorganize the classification of risks.

The Secretariat also presented the project for small tuna identification sheets developed by Dr. Taib Diouf from Senegal. The Small Tunas Species Group had previously reviewed the document and had requested improvements in its presentation by reducing the amount of information it contained.

Given the availability of many new compliance-related datasets that could be used by SCRS, the Committee recommends an ad hoc Advisory Group, comprising the SCRS Chair, the Chair of Sub-Committee of Statistics, and the Bluefin Rapporteurs, be established to offer advice to the Secretariat on improvement of its data-management and organizational structure, with a view towards how to best achieve an integrated approach to manage the Secretariat databases.

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

12. Report of the Sub-Committee on Ecosystems

Dr. H. Arrizabalaga, the convener of the Sub-Committee on Ecosystems chaired the meeting Sub-Committee on Ecosystems presented the report of the meeting held in Recife, Brazil, June 8 to 12, 2009 (**Appendix 9**).

The Delegates congratulated the Sub-Committee and the convener in particular for the important work that they have done. The Convener noted that the Sub-Committee's work had been enriched by the active presence by scientists from other organizations who have an expertise that complements that of the ICCAT scientists. During the meeting, the seabird assessment was completed. The importance of scientific observer and logbook programs for quantifying by-catch was noted and it was recommended to the Commission that an ICCAT scientific observer program similar to those operated by other tuna RFMOs be instigated.

13. Consideration of implications of the Working Group on the Future of ICCAT and 2nd Joint Tuna RFMOs meetings

13.1 Second Joint Tuna RFMO Meeting

The Second Joint T-RFMO meeting took place in San Sebastian, Spain, June 29 – July 3, 2009. Dr. Victor Restrepo presented an overview of the main scientific items from the report. These are summarized below, together with the Committee's conclusions.

Data collection and reporting. The joint meeting agreed to provide accurate, timely and complete data, and adopt measures to address the current low rate of compliance by RFMO participants with the obligations for data provision under the rules of each RFMO and any other relevant international instrument. The Committee was encouraged by this commitment.

By-catch Workshop. The Joint meeting agreed to International Workshop on tuna RFMO management issues relating to by-catch in 2010. The Committee took note of the importance of this Workshop and expressed hope that it will lead to better coordination of by-catch research between RFMOs.

Best Scientific Practices. The joint meeting agreed to a meeting of experts to be held in 2010 to share best practices on the provision of scientific advice. The meeting objectives include various tasks of harmonization, development of common standards, common assessment methods, etc. The Committee expressed the opinion that this would be a very interesting exercise that everyone stood to learn from, given that the different RFMOs are structured in different ways, in terms of their scientific committees and staffing.

Strategy Matrix. The joint meeting proposed that the RFMOs scientific bodies use decision tables to better characterize the likely consequences of alternative management actions for a given stock. The Committee welcomed this initiative, which is further discussed in Section 16.9.2.

13.2 Working Group on the Future of ICCAT

The Working Group meeting took place in Sapporo, Japan – August 31 to September 3, 2009. Dr. Victor Restrepo presented an overview of the main scientific items from the report. The Committee provides comments and responses in Section 16.9.

14. Consideration of plans for future activities

14.1 Inter-sessional meetings proposed for 2010

Taking into account the assessments mandated by the Commission and the Committee's recommendations for research coordination, data preparation, stock monitoring and advice related to bluefin, the proposed inter-sessional meetings for 2010 are as in **Table 14.1**. The Committee notes that the schedule is ambitious and that there is a need to maintain some flexibility in order to account for any changes that may result from the deliberations held by the Commission in November 2009 and meetings scheduled by other RFMOs.

14.2 Annual Work Plans for 2010

The rapporteurs presented the 2010 Work Plans for the various Species Groups. These Plans were adopted and are attached as **Appendix 5.**

Depending upon the decision of the Commission intersessional meetings next year will be data preparation meeting for Mediterranean Albacore; Methods Working Group; Bigeye data preparation and assessment meetings; blue marlin data preparatory meeting; Sub-Committee on ecosystems; bluefin data preparation and assessment meetings; The meeting timetable is attached as **Table 14.1**.

14.3 Date and place of the next meeting of the SCRS

The next meeting of the SCRS will be held in Madrid at the ICCAT Secretariat from the October 4--8; the Species Groups will meet from the September 27 until October 1, 2010.

Table 14.1. Proposed calendar of ICCAT scientific meetings for 2010.

ICCAT MEETINGS 2010

	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Jan							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Feb			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28								
Mar				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
																									ALB MED PREP*							ALB R. P.					
Apr							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
																											METHODS					BET-DATA_PREP					
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					
																		BUM-ASSESS/PREP																			
Jun					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
					SC-ECO													BFT DATA PREP																				
Jul							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
											BET-ASSESS																										
Aug			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Sep						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
											BFT-ASSESS																						SPECIES -					
Oct								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
								GROUP			SCRS																										
Nov			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				
Dec						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

Possible ICCAT Holid Scientific meeting * Tentative dates for a possible ALB MED meeting

15. General recommendations to the Commission

The Committee expressed concern that ICCAT stocks are being subjected to high exploitation rates, that have not been accompanied by the types of enhanced research and data collection activities that are necessary in order to ensure resource conservation. This view is also held in the independent review of ICCAT's performance (ICCAT, 2009).

The high exploitation rates on most ICCAT stocks has produced severe declines of some stocks that may hamper their conservation. Comprehensive research is thus needed to enhance the advice on the state of the stocks of high concern to the Commission, especially those which are currently estimated to be below the Convention objectives. These include northern albacore, bluefin, marlins and Mediterranean swordfish. In the view of the Committee, these increasing conservation concerns should oblige the Commission to take action.

The SCRS identified below high priority recommendations to the Commission which carry with them a need for increased financial support to address the issues.

The SCRS noted that most of the species groups need to develop fisheries independent experiments or surveys to improve its scientific advice. Therefore, it could be timely to develop large-scale plans, such as large-scale tagging programs, that would not only target a species or a group of species but the largest number of species of interest for ICCAT. An example of a large-scale tagging program is included in the Tropicals work plan. Such programs have proven to be successful in the Pacific and Indian Oceans and, if conducted in the Atlantic, would greatly improve the precision of the Committee's advice.

Albacore

Research on North Atlantic albacore depends on available funds supported annually by Contracting Parties individually involved in the albacore fisheries. Thus, it is recommended to implement a coordinated comprehensive research program to advance knowledge of this stock and therefore provide more accurate scientific advice to the Commission. Allocation of funds should be planned to better describe the status of the stock and consequently improve management recommendations. The cost of this research program needs still further planning among national scientists and corresponding statement of costs. A two to three-day meeting is planned in 2010 (in conjunction with the Mediterranean albacore data preparatory meeting) to develop a specific proposal to be presented to the Commission as early as October 2010.

Tropical Tunas

The Committee congratulates the ICCAT Secretariat and the JDIP for the implementation of the pilot project to improve the statistics of Ghanaian vessels unloading in Abidjan with the CRO of Abidjan (Côte d'Ivoire). The preliminary results presented by the scientist from CRO and IRD (France) are very encouraging. The Committee recommends that an additional contribution be made to cover the project activities in December 2009, since current funding lapses at the end of November 2009. Given the importance of the estimation of quantities of landings by the Ghanaian and other tropical purse seine fleets, it is highly recommended that the project be extended to cover the entire 2010 year.

The Committee considers it critical to continue to improve the data used to characterize the species composition, distribution, and total catch of tropical tunas and especially those of Ghanaian flagged vessels. The Committee recommended that the Commission consider means to permanently increase the staffing and support level for these functions of monitoring and reporting on the catch level, species and size composition. The Committee recommends that the principals involved, including the industry, be consulted on the most appropriate means by which these infrastructure improvements could be instituted permanently. Collecting data directly from the canneries should be encouraged. In addition, observers need to be placed on the Ghanaian vessels landing in Abidjan in order to provide verification of logbooks and to sample catches at sea.

Sub-Committee on Statistics

The Committee strongly recommends that the Commission adopt rules for the protection and dissemination of data as given in **Appendix 10**.

Bluefin tuna

The Committee welcomes the voluntary Contracting Party contributions that will make it possible to initiate the GBYP. At the same time, the Committee notes that for the research program to be successful, it is necessary to ensure that funding will be at a sufficient level and last for the entire planned (6-year) duration of the program. The SCRS also notes that some stakeholders have indicated willingness to make their own voluntary contributions. The Commission should consider this as a possible complement to the program's budget.

Small tunas

Taking into account the socio-economic relevance of the small tuna fisheries, scientific collaboration among ICCAT, RFOs and countries in the various regions is imperative to advance understanding of the distribution, biology and fishery of these species. Hence, it is recommended that ICCAT will further develop joint meetings and actions with the RFMOs active in the Convention area with the purpose to improve the ICCAT data base and the knowledge of the several fisheries and species. The Committee noted that such collaboration could be nurtured by means of a web-based strategy, at least in the short term. Furthermore, the Committee recommended a joint GFCM/ICCAT meeting on small tunas species in the Mediterranean and Black Sea be held in 2011.

Sharks

The development of an improved and larger data base would allow the Evaluation of Risk Assessment (ERA) carried out in 2008 to be updated. In this sense scientists are urged to carry out work in relation to the life cycles of shark species and to make all the information which currently exists in their countries available to the Species Group so that this can be incorporated into future assessments. Information on fishing operations and on the condition, availability and size of individuals caught (compiled under observer programmes) is needed to estimate susceptibility and so produce specific ERAs for each fleet. The possibility of generating a Shark Year Programme, such as those which exist for other species, would allow access to funds to facilitate research into this diverse group.

Billfish

Contracting Parties must report Task I and Task II data by species. It is now evident that roundscale spearfish have been historically reported as white marlin, and it is now feasible to distinguish between the two species. Contracting Parties should consider ways of reporting roundscale spearfish catches separate from those of white marlin. This will require training of observers and samplers in the identification of marlin and spearfish species and development of protocols to check on reliability of landing reports with genetic analyses.

The commission should consider investing additional funds, beyond those requested by the IERPB, to support expanded sampling of billfish landings and collection of biological statistics on selected marlin species. Essentially, a doubling of the budget would be ideal. Such additional funds should be directed towards strengthening existing IERPB activities in West Africa, Latin America and the Caribbean. Activities of the IERPB have shown to be critical to support the goal of having the highest quality information to assess billfish stocks.

Scientific Observer and Logbook Programs

The Committee recommends that scientific observer and logbook programs, in combination, be used to collect data useful for quantifying total catch (including by-catch) composition and disposition by the tuna fleets and report these data to ICCAT. The Committee further recommends that Contracting Partiers adequately fund such programs in order to meet data reporting obligations. Further, the Commission should consider the merits of instituting an ICCAT scientific observer program similar to those operated by other tuna RFMOs to collect and make available the needed scientific data. The Committee believes that using observer programs to collect scientific information is an important complement to regular logbook collection and other sampling activities that ICCAT typically uses to estimate Task I and II data, and should be more broadly implemented by CPCs. Observers can also help cross-check logbook data and collect information on dead discards, non-target species, size composition, etc.

Capacity Building

Capacity building funds have successfully been used to improve data collection and for training and assisting scientists from developing Contracting Parties to more actively participate in the scientific work of the SCRS. The Committee recommends that donor Contracting Parties continue contributing to these funds.

Support for SCRS Chair

The Committee supports the recommendation made last year by the Commission to consider supporting the participation of the Chair of the SCRS to meetings. In the case of the SCRS Chair, travel is very substantial. This support would make it easier for scientists from developing Contracting Parties to aspire to hold this position.

Working Group Participation

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

16. Responses to Commission's requests

16.1 Continuation of the evaluation of data elements pursuant to the Recommendation by ICCAT on Compliance with Statistical Reporting Obligations [Rec.05-09]

Recommendation [05-09] calls for the SCRS to provide an evaluation of data deficiencies at ICCAT with emphasis on how such deficiencies may affect management advice. The Secretariat Report on Research and Statistics and the Report of the Sub-Committee on Statistics contain information about the data submitted by Contracting Parties for 2008.

The Committee notes that this year the situation has not changed substantially with respect to last year, with some exceptions. Notably, the eastern bluefin management plan, Rec. [08-05] is generating important information such as VMS positions and weekly catch reports, which have good potential to be used for scientific purposes. In this regard, the Committee recommends that the Secretariat seek ways to use this information to cross-check and complement the Task I and Task II statistics.

It was also noted that some of the capacity-building activities are generating data that can be very useful. For example, the logbook recovery, and the observer and port-sampling programs in Ghana that have been funded by JDIP and the Data Fund have generated data that can be used to complement Ghanaian statistics and estimates of species composition and catch distribution. The Committee recommends that the Secretariat develop databases to store the information collected under the various capacity-building activities.

Given the priority that the Commission is placing on non-target species, the Committee recommends that broader estimates of by-catch be made and stored in the ICCAT databases. In this sense, the short-term by-catch contract is expected to make progress.

The Sharks Species Group indicated that the porbeagle assessment also had problems with limited data, particularly in the southeastern Atlantic region. Contracting Parties should make every effort possible to recover and report historical series of fisheries data for the major shark species.

16.2 Evaluation of the existing port sampling programs aimed at collecting fishery data for tropical tunas in the Gulf of Guinea [Rec. 08-01]

In 2008, the Commission requested the SCRS to evaluate the existing port sampling programmes aimed at collecting fishery data for bigeye, yellowfin, and skipjack tuna that are caught by purse seine and baitboat fisheries in the Gulf of Guinea, and make appropriate recommendations to improve the sampling programme.

The Tropicals Group met in 2009 to consider this issue, and the Committee provides the advice below based on those analyses. In addition, the Committee took into consideration the report of the International Working Group on Tuna Purse Seine and Baitboat Catch Species Composition Derived from Observer and Port Sampler Data (SCRS/2009/131) which was attended by scientists from ICCAT and from other RFMOs.

The Committee reviewed the existing sampling programs for the following fleets: European and associated flags (both purse seine and baitboat fleets); Ghanaian surface (purse seine and baitboat) fleets; Cape Verde's artisanal and industrial (baitboat, handline and purse seine) fleets; and, Côte d'Ivoire's artisanal fleet. The Committee also reviewed the system used to estimate the catches of "*faux poisson*", or fish of different species that do not enter into the cannery market.

The International Working Group (SCRS/2009/131) identified sources of potential bias in the current sampling and estimation protocols for size and species composition. Although there was no analysis to confirm that such bias currently exists, the International Working Group made several recommendations for future statistical analyses that can help improve the sampling program for European and associated fleets and avoid such potential bias, which the Committee endorses. In particular, the Committee recommends the following changes to the sampling scheme:

– Revisions of the raising process of samples in the Atlantic Ocean should be considered, in particular exploring the possibility of replacing the set by the well as the sampling unit. In addition, the information obtained from the well map data should be better incorporated into the data processing (e.g. to validate and, if necessary, to correct the logbook information). In addition, the current time and area stratification used in the data processing should be reanalyzed using recent data and potentially revised.

– To avoid the possible bias or error in the species composition due to conversions (dorsal length to fork length and/or length to weight) applied in the estimation process, either weight data should be collected (when possible), or the current relationships should be improved by collecting a larger number of measurements.

– As feasible, data from at-sea sampling should be collected and compared to in-port sampling in the Atlantic. Alternative methodologies such as 'spill sampling' should be investigated in order to avoid bias (Lawson, T. WCPFC-2009/ST-WP-3, 45p).

Like the European fleets, the Ghanaian surface fleets also catch very large quantities of tropical tunas but they use different fishing strategies, including an intense use of FADs within narrow strips off the East Central Atlantic. Ghanaian catches are now equivalent or greater than EU purse seine catches. It is difficult to design a well sampling scheme that can produce accurate estimates of total catch and species composition given the peculiarities of the fisheries. In addition, it is unlikely that using the preliminary sorting data that is currently collected from the canneries to correct species composition will work adequately, because the price differential by species is minimal. However some improvements may be realized if additional data is collected from the canneries after processing because of more precise species sorting. Furthermore, the Committee recommends that Ghanaian scientists:

– Based on log-book data recently recovered, revise the species composition of Task I and Task II data for the period 1989-2008 with the assistance of the ICCAT Secretariat;

– Continue to collect data by observers on board purse seiners and use the data collected to verify the species and the sizes of fish caught by the fleet. Ghana should seek means by which vessel operators cannot avoid accepting observers on board if those vessels are selected.

– Continue collaboration with other scientists to continue to improve the sampling programs, especially in terms of species composition.

– Increase collaboration with other National scientists (particularly with scientists from CRO, Côte d'Ivoire) to ensure sampling coverage of Ghanaian catches offloaded in those countries.

In addition, it is evident that the Ghanaian infrastructure for data collection, quality control, validation, and processing is far below that required to monitor catch and size composition of such an important fishery with sufficient precision. The Committee recommends that Ghana and the Commission consider means to

permanently increase the staffing and support level in Ghana for these functions of monitoring and reporting on the catch level, species and size composition. The government and industry officials involved should collaborate on identifying the most appropriate means by which these infrastructure improvements could be instituted permanently. Collecting detailed data directly from the canneries should be encouraged.

For all tropical surface fleets, the estimation of catches, size and species composition of "*faux poisson*" should continue on a regular basis, as appropriate. Estimation methods should be further refined.

16.3 Evaluation of the effect of the closure contained in* [Rec. 08-01] *and alternative closure**s

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

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

Nevertheless, and based on the analysis carried out by the Tropical group meeting, the Committee provides the advice below.

The Committee had to make a number of assumptions in order to develop a spatially-structured time series of catch and effort data for the major fleets (EU and Ghana). These data show clearly that the major catches on FADs that were observed in the moratorium area before its 1999 implementation have not been observed during recent years due mainly to overall effort reduction **(Figure 1)**.

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

The Committee also conducted per-recruit analyses to address the potential effects of changes in relative effort among gears including changes in FAD effort. The Committee notes that the results of these analyses rely heavily upon the assumed value of natural mortality for small fish, which is highly uncertain.

The results of these analyses confirm previous conclusion that modest gains in YPR for yellowfin and bigeye can be obtained by simultaneously considerably decreasing the FAD fishing mortality and noticeably increasing the fishing mortality exerted by the other fleets. The results also show that increases in effective effort levels, particularly that of the FAD fleets, would likely result in substantial reductions in SPR. One implication of these results is that it would be more difficult to maintain spawning stock biomass at high levels under scenarios such as a reallocation of surface fleet effort from other oceans toward the tropical Atlantic. The Committee did not conduct similar analyses for skipjack. However, taking into account the biological characteristics of this species, it was considered that the application of measures such as time-area closure should not produce gains in YPR but should result in foregone skipjack catches that would be proportional to the size of the area closed and the period of closure.

In short, the Committee is unable to provide a comprehensive and quantitative evaluation of the proposed closure described in Annex 1 of Rec. 08-01 due to the limitations described previously. However, there is a general agreement that larger time/area moratoria are likely to be more precautionary than a smaller moratoria, providing that reductions in juvenile mortality are necessary to achieve management objectives.

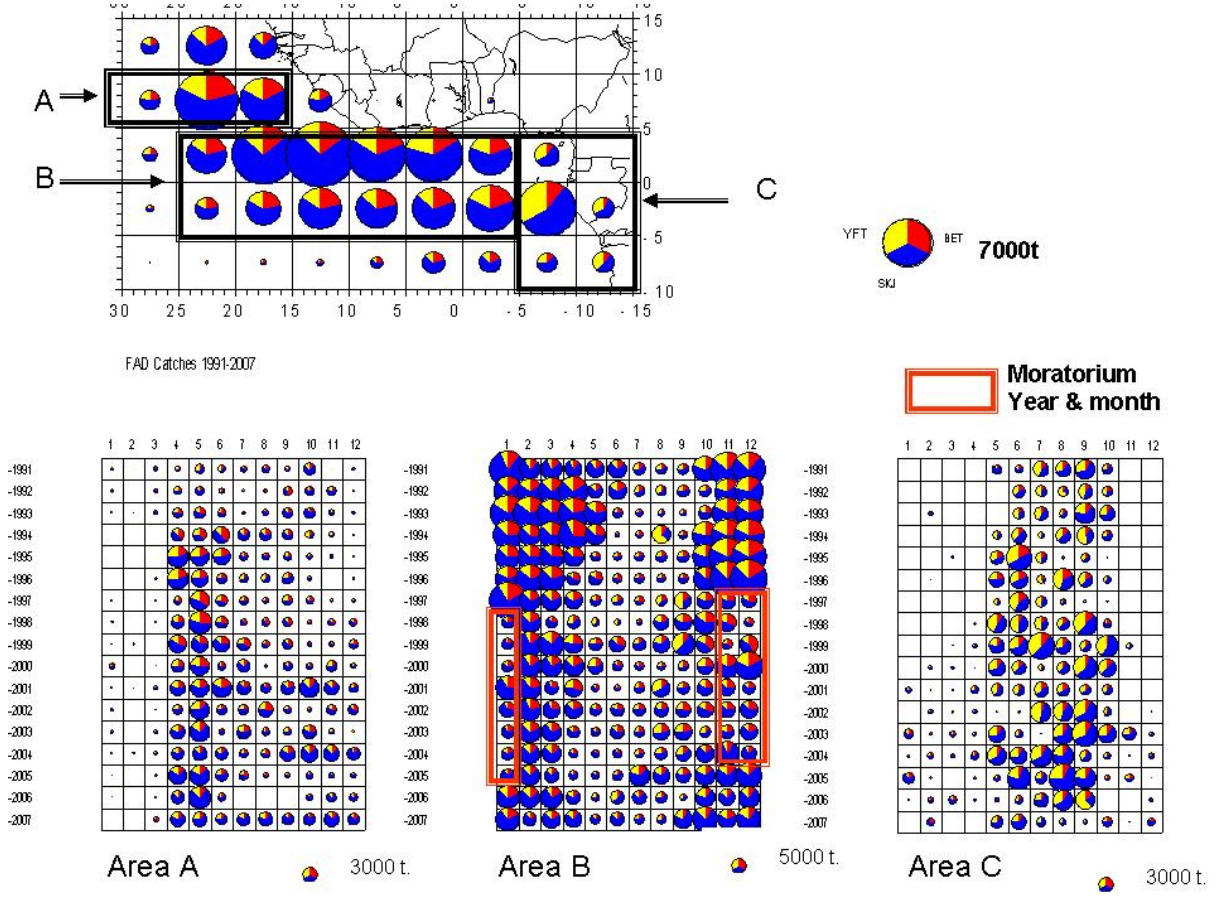


Figure 1. Total monthly catches on FADs taken by EU PS and Ghana (estimated) in three regions. Catches during the FAD moratorium period are indicated by the box outlined.

16.4 Elaboration of a Bluefin Tuna Research Program

The Committee reviewed the research program proposal submitted by the SCRS Chairman, after consulting with attending SCRS scientists, to the Commission at its meeting in 2008 (Appendix 10 to Annex 9 of the 2008 Commission Biennial Report (2009)). This research proposal built upon those first developed by SCRS in 2002 and subsequently revised in 2005, but for which no positive indications of joint support by the Contracting Parties had been received yet, although some research elements in those proposals had been initiated through National funding. Although these research elements have contributed to our knowledge base for bluefin, they have not yet been of sufficient scale and degree of coordination to substantially improve the scientific advice SCRS provides the Commission. In view of this, the Commission was further advised that a comprehensive and well coordinated Atlantic-wide research program, with an expected cost of ~ €19 m and six year duration, was required to:

A) **Improve basic data collection** through data mining (including information from farms, observers, and VMS), developing methods to estimate sizes of fish caged, elaborating accurate CPUE indices for Mediterranean purse seine fleets, development of fisheries-independent information surveys, and implementing a large scale well planned conventional and genetic tagging experiment;

B) **Improve understanding of key biological and ecological processes** through electronic tagging experiments to determine habitat and migration routes, broad-scale biological sampling on live fish to be tagged and dead fish being landed (e.g. gonad, liver, otolith, spines, etc.), histological analyses to determine bluefin tuna reproductive state and potential, and biochemical and genetics analyses to investigate mixing and population structure; ecological processes, including predator-prey relationships; and,

C) **Improve assessment models and provision of scientific advice** on stock status through improved modelling of key biological processes (including growth and stock-recruitment), further developing stock assessment models including mixing between various areas, and developing and use of biologically realistic operating models for more rigorous management option testing.

A number of Contracting Parties expressed willingness to make extra-budgetary contributions to such a program with a view towards initiation of activities in 2009 related to program coordination, data mining, aerial surveys, and tagging design studies, with additional research activities to be undertaken in subsequent years. The first-year costs for initiating these activities are anticipated at €750,000 and following on from a solicitation for extra-budgetary contributions for the program, circulated to Contracting Parties in March 2009, as of October 1, 2009, voluntary contributions sufficient to initiate the year 1 activities have been jointly committed from the EC, United States, Japan, Canada, Norway, Croatia, Turkey, and Chinese Taipei while several Morocco has indicated interest in future contributions (both direct funding and in-kind) to the program. In further support for this research initiative, stakeholders can contribute in different ways such as providing in-kind support or perhaps even financial contributions if the Commission deems it appropriate. In-kind contributions that are already ongoing or have been offered include: obtaining biological samples (tissue, gonads, muscle, liver, hard parts), aerial surveys, acoustic surveys, and vessel time and crew to assist scientific campaigns. Several stakeholders have already made initial contacts with SCRS scientists about this (e.g., Balfegó Group, Mitsubishi Corp., Federation of Maltese Aquaculture Producers, and others).

The Committee enthusiastically endorsed the framework of the research program plan and recommended quickly proceeding with an open advertisement to fill the critical leadership role of Program Coordination, as soon as possible, with an eye to filling the position in early 2010 (February).

The Committee considers it imperative to quickly fill this critical position to facilitate successful implementation of the research program and recommends the successful candidate possess the qualifications detailed in the attached position profile **(Appendix 11)**. The Working Group further recommended forming a Steering Committee comprised of the SCRS Chair, Executive Secretary and/or his Assistant, bluefin tuna rapporteurs, and an outside expert with substantial experience in similar research undertakings for other tuna RFMOs to guide and refine the Program, as necessary.

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

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

The Recommendation states that the Commission will develop in 2009 a set of requirements and procedures that, taking into account Contracting Party confidentiality requirements, will allow the data collected under these programs to be provided to the SCRS. Furthermore, for the scientific aspects of the program, the Recommendation asks the SCRS to report on the coverage level achieved by each Contracting Party, to summarize the data collected, and to make recommendations for improvement.

While it is expected that most of the activities outlined above will take place in 2010, the section provides a summary of the situation as of October 2009.

16.5.1 Regional Observer Program (ROP-BFT)

– Vessels

Target observer coverage is 100% on purse seine vessels over 24 m during all the annual fishing season and on all purse seiners involved in joint fishing operations. In addition, observers shall be present during all transfer of

bluefin tuna to the cages. The Recommendation was to enter into force essentially after the purse seine fishing season was over, and therefore Contracting Parties were asked to use their own Contracting Party observer programs if they wished to fully implement the provisions of this recommendation even before it was officially in force. A call for tenders has been issued with a view to award the contract before next year's fishing season.

– Farms

Rec. [08-05] also calls for the ROP to have observers in farms during all harvests. The Secretariat planned the implementation this part of the ROP with assistance from the same consortium that operates the observer program for transhipments at sea. After the Secretariat circulated relevant information about costs and logistics, several Contracting Parties expressed opinions, primarily about the high cost of the program or about the need to phase out their own programs before phasing-in the ROP. To-date, only Turkey has requested the deployment of ROP observers to its farm harvesting operations. These deployments started in late September 2009, so it is too early to report any results to the 2009 SCRS. It is uncertain at this point if other Contracting Parties will request ROP observer deployments.

16.5.2 Contracting Party Observer Program

The National Observer Program requires the following coverage levels:

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

By the 2009 SCRS meeting, information was available from Contracting Parties about their target coverage levels in 2009, but not about the actual coverage achieved.

Recommendations

In order to facilitate the reporting of observer coverage achieved by Contracting Parties, the Committee recommends that the Secretariat develop appropriate reporting forms, and that it requests CPCs to provide the information using those forms before the 2010 SCRS.

The Committee also believes that it may be useful for the Commission to consider the *Suggested rules and procedures for the protection, access to, and dissemination of data compiled by ICCAT* **(Appendix 10)**, as these may assist the Commission in its development of requirements and procedures for the submission of observer data.

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

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

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

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

96. *"Each CPC shall define growth factors to be applied to bluefin tuna farmed in its cages. It shall notify to ICCAT Secretariat and to the SCRS the factors and methodology used. The SCRS shall review this information*

at its annual meetings in 2009 and 2010 and shall report to the Commission. The SCRS shall further study the estimated growth factors and provide advice to the Commission for its annual meeting in 2010."

By the time of the 2009 SCRS meeting, Contracting Parties had not notified the ICCAT Secretariat or the SCRS the growth factors or methodology used for tuna kept in their farms. Nevertheless, the Committee reviewed several industry-sponsored studies conducted in Croatia, Greece, Malta and Spain, and concluded that the gain in weight of bluefin tuna in farms can be significantly higher than the value which has been used to-date (see SCRS/2009/192).

The weight gain obtained during fattening/farming is a combined effect of (a) an increase in the condition of the fish and (b) structural somatic growth. An improvement in the fish condition can result in a weight gain from 5 to 38% for fish between 100cm and 300cm FL within the first six months of farming. Together with structural somatic growth, a total gain in weight of between 140% (for 30 kg bluefin) and 41% (for large bluefin) per year can be achieved. For smaller fish, weight gains can be much larger. **Table 16.6** provide gain estimates (as percentages) based on studies presented to the Committee, for fish starting at 30 kg and kept for up to one year. These growth factors can be used to estimate the maximum gain in weight for bluefin of a given size at caging, depending on the duration of the caging operation. It is important to note that these growth factors do not take into account any of the losses that are known to occur (e.g., due to mortality, escapees and other sources of loss). Therefore, applying these factors to an amount of harvested bluefin in order to estimate the initial caged amount will likely result of an underestimate of the input to the cages.

The Committee noted, however, that the apparent gain in both length and weight of individual fish held in farms is much higher than observed for wild fish over a wide range of sizes. It is critical to obtain measurements of fish sizes as they enter cages, rather than after the fact, since use of length frequencies from the farmed fish at the time of harvest would introduce a significant bias in stock assessments.

The Committee recommends that Contracting Parties tentatively adopt growth factors that are consistent with those in **Table 16.6**.

The Committee also recommends that Contracting Parties continue to conduct studies that can lead to a better quantification of the inputs into cages. This includes average growth factors that take losses into account. However, more importantly, it is necessary to develop methods to measure the size of the fish entering the cages. Technological applications such as stereoscopic video cameras are under development and should be tested and pursued for operational applications.

Table 16.6. Expected weight gain over a period of a year for farmed bluefin tuna expressed as a percentage of weights (RWT) at caging over a period of a year (lower table). The number below the months of the year represent the cumulative number of months in captivity. (NOTE: SCRS/2009/192 also contains a similar table with final weights after caging).

			% weight gain of farmed BFT (without taking into account mortality)											
		June Caging	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
START AGE	START FL	START WT	1	2	3	4	5	6	7	8	9	10	11	12
1	55	4	27	63	99	135	162	180	191	202	213	224	240	256
2	77	9	17	40	63	85	103	114	125	135	146	156	172	188
3	97	17	13	29	46	63	76	84	94	104	115	125	140	155
4	116	29	12	27	43	59	70	78	88	98	109	120	131	142
5	133	42	11	25	40	54	65	72	81	90	99	108	122	136
6	148	56	10	23	36	50	59	66	74	83	91	100	112	124
7	162	72	9	22	35	47	57	63	71	78	86	93	105	117
8	176	90	9	21	33	45	54	60	67	73	80	87	97	107
9	187	106	9	20	31	43	51	57	63	69	76	82	91	100
10	198	124	8	19	30	41	49	54	59	65	70	76	84	92
11	208	142	8	19	29	40	48	53	58	62	67	71	78	85
12	217	160	8	18	29	39	47	52	56	60	63	67	73	79
13	226	179	8	18	28	38	46	51	54	57	60	63	67	71
14	233	195	8	18	28	38	45	50	52	55	57	59	63	67
15	240	211	7	17	27	37	44	49	51	52	54	55	58	61
16	247	228	7	17	26	36	43	48	49	50	51	52	53	54
17	252	241	7	16	26	35	42	47	47	48	48	49	49	50
18	258	258	7	16	25	35	41	46	46	47	47	47	48	48
19	262	269	8	16	25	34	41	45	45	46	46	46	47	47
20	267	283	7	15	24	33	40	44	44	45	45	45	46	46
21	271	295	6	15	24	32	39	43	43	44	44	44	45	45
22	275	307	6	15	23	32	38	42	42	43	43	43	44	44
23	278	316	6	14	23	31	37	41	41	42	42	42	43	43
24	281	326	6	14	22	30	36	40	40	41	41	41	42	42
25	284	335	6	14	21	29	35	39	39	40	40	40	41	41

Conversion factors

The Committee also examined information available on conversion factors for fillet and loin yields obtained from various farms. These are significantly different from those currently being used and it is recommended that a clear differentiation be made between fillets/loins originating from wild caught fish and those from farme***d*** fish. For farmed fish, the Committee recommends the following average relationships be tentatively adopted (for individual fillets or loins):

RWT = 2.81 * FIL
RWT = 5.61 * VLWT
RWT = 5.90 * ULWT

where RWT = Round weight, FIL = Filet weight, VLWT = Lower Loin Belly weight, and ULWT = Upper loin weight.

16.7 Advice on reducing incidental by-catch of seabirds in longline fisheries **[Rec. 07-07]**

The likely impacts of ICCAT fisheries on seabird populations of particular concern were evaluated through various means over a three year period. The results of this evaluation are held in the Report of the 2009 Inter-sessional Meeting of the Sub-Committee on Ecosystems (Recife, Brazil, June 8-12, 2009).

Among other elements, the *Recommendation by ICCAT on Reducing Incidental By-Catch of Seabirds in Longline Fisheries* [Rec. 07-07] requires Contracting Parties to collect and provide all available information to the Secretariat on interactions with seabirds, including incidental catches by their fishing vessels. With only a few exceptions, very limited information on interactions with seabirds have been made available to the

Secretariat and subsequently, SCRS. Because of this, the assessment is limited and based on broad-ranging assumptions which, with the addition of new information may prove to be incorrect.

It is noteworthy that [Rec. 07-07] came into effect mid-way through 2008. During the Sub-Committee Inter-sessional, no information was available from longline vessels targeting swordfish using monofilament longline gear which opted to be exempted from the requirements of paragraph 4 of [Rec. 07-07]. In view of the requirement that Contracting Parties applying this derogation inform SCRS of their scientific findings resulting from their observer coverage of these vessels, information may become available at some future time.

The seabird assessments conducted indicate that ICCAT fisheries have measurable impacts on populations of seabirds which can be found in the Convention area, including some species of seabirds that are threatened with extinction. Assessments conducted also indicate that minimizing seabird mortality due to ICCAT fisheries can result in improvement in future seabird population status, potentially leading to lessened conservation concerns for those populations, in some cases.

Lessons from ICCAT areas where seabird by-catch was formerly high but has been reduced show clearly that there is no single measure that can sufficiently reduce seabird by-catch. It is important to employ, simultaneously, a suite of measures.

Rec. [07-07] incorporates some measures intended to reduce seabird by-catch, focused on the southern hemisphere. It is of particular concern regarding [Rec. 07-07] that no tori lines are required for swordfish effort using night setting as an alternative. This concern is because there is clear empirical evidence from night-time fishing operations that a number of seabird species are very vulnerable to by-catch during periods around full moon and still others have high vulnerability during dark nights.

Considering the wide-ranging interactions between seabirds and pelagic longline fisheries in the Convention Area, including species of critical conservation concern in areas north of 20ºS latitude, and in the absence of information showing that there is no significant seabird interactions with Contracting Parties' national pelagic longline fisheries, the Commission should, at a minimum, require Contracting Parties to use tori lines in combination with at least one other effective mitigation measure throughout the Convention area, until such time that it can be demonstrated through direct observation of the longline fisheries, that by-catch levels are of insignificant magnitude for seabird populations. The Commission should also encourage research into increasing the efficacy of existing mitigation measures and development of additional measures, which, upon demonstrating proof of concept, should be adopted by Contracting Parties. The Commission should also work towards harmonizing these measures with the other tuna RFMOs to the degree possible.

16.8 Review of the harvest levels in the recreational and sport fisheries **[Res. 06-17]**

In 2006, the Commission established a Working Group on Sport and Recreational Fisheries [Res. 06-17]. The activities of this Group rely on relevant information provided by the SCRS. In 2007 the Secretariat reported on available information on sport and recreational fisheries at the ICCAT databases (Ref). As noted in the 2007 report, prior to 2006, ICCAT did not have formal definitions for the Sport or Recreational fisheries and their corresponding catch was usually reported under different gear categories such "Rod & Reel", "Sport", and few as "Hand line". Distinction between sport and recreational fisheries was given at least for bluefin tuna in the Commission recommendation [Rec. 06-05]; where "Sport fishery" means a non-commercial fishery whose members adheres to a national sport organization or is issued with a national sport license. "Recreational fishery" means non-commercial fisheries whose members do not adhere to a national sport organization or have a national sport license. In the prior response to the Commission it was noted that with the available data, it is not possible to partition the catches according to whether or not they were made by individuals who had national sport licenses or who adhered to national sport organizations, prior to 2006 and this is still the case in 2009. Considering the classification commercial versus non-commercial, it was also noted in 2007 that not all catch reported by Contracting Parties fisheries of Rod & Reel exclusively represent non-commercial catch, in some cases catch caught by anglers in the Rod & Reel category was sold, for example the case of western bluefin tuna. Consequently, catches reported with this gear may not accurately reflect the definitions of sport and recreational fisheries as being exclusively non-commercial.

In 2007 the SCRS conducted an informal survey among Contracting Party scientist regarding the type and species likely involved in recreational or sport fisheries in their respective countries. The results of these enquiries are shown summarized in **Table 16.8.1**. Additional information on recreational and sport fisheries was also extracted from the Secretariat survey of Fisheries Profiles for all the flag fishing in the ICCAT Convention areas. This survey summarizes in more detail the status of recreational and sport fisheries by each country-flag, since 2007 few updates were received from Contracting Parties, and none included recreational or sport fishery activities. The Secretariat presented an update of catch (Task I) reported under the Sport and Rod & Reel gears for all species and flags. Total catch (all species combined) has decreased in recent years from a peak of 17,430 t in 2004, to 6,002 t in 2008. However, catch in 2008 should be considered provisional. A summary of the available catch at size and size information associated with the Sport and Rod & Reel gear categories revealed that since 2006, there have been relatively limited reports of new recreational or sport fisheries. This can be explained in part because most of the countries have limited or just started programs for collecting recreational and sport fishing information particularly for large pelagic tuna and tuna-like species.

Table 16.8.1 Summary of type and species involved in recreational or sport fisheries.

Country	*Gear*	*Recreat./ Sport*	*Species*	*Catch\Landings*	*CPUE*	*Size*	*Remarks*
Brasil	RR	Sport	BIL	YES	YES	YES	Partially monitored.
Canada	RR	Sport	BFT Sharks	YES 100%	Partial	Partial	The latest catch of BFT from RR was commercial. There is no mechanism to separate sport vs. commercial.
Cap-Vert		Recreational		None	None	None	Sport catch is increasing but no data.
Cote d'Ivoire		Sport	Billfish	None	None	None	Sport fishery stopped since 2000 due to civil war.
EC-France	RR	Sport	BFT	YES 100% coverage	Could be obtained from fishing tournaments.		In Martinique & Guadeloupe there are recreational fisheries but data are not available.
TROL	Sport	BFT	YES 100%				
EC-Spain		Recreational	BFT	YES			7.8 t of BFT caught in Mediterranean during 2006. In Bay of Biscay there is a recreational fishery targeting ALB and in the Canary Is. for Bill. ALL sport fisheries catching BFT should be reported.
ALB							
BILL							
EC-Italy	LL GILL HL HL RR	All Sport	SWO SMT BFT SMT BFT	Partial	Poor - None Occasional	Poor - Partial	
Maroc	RR	Sport	BILL	None	None	None	
Senegal	RR	Sport Sport	SAI, BON LTA, BON	YES	YES	YES	
UK-Bermuda	RR	Sport Sport	BUM WHM	YES YES	YES YES	Estimates	Occasional survey of recreational fishery.
USA	RR	Sport	Main tunas + BILL KGM SSM SWO WAH SKJ BON BLT SMT Sharks	YES All	YES All	YES All	Various degrees of precision, but all species monitored.
Venezuela		Sport	Bill.	YES	YES	YES	Exist catches on billfishes
Antigua	TR, RR	sport	Tunas+BILL	YES	YES	YES	Where data availability is indicated, these data reflect catches taken only during tournaments
Barbados	TR, RR	Sport	Tunas+BILL	YES	YES	YES	
Belize	TR, RR	Sport	Tunas				
Dominica	TR, RR	Sport	Tunas+BILL				
Grenada	TR, RR	Sport	Tunas+BILL	YES		Yes (BIL)	
Jamaica	TR, RR	Sport	Tunas+BILL	YES		Yes (BIL)	
St. Kitts	TR, RR	Sport	Tunas+BILL				
St. Lucia	TR, RR	Sport	Tunas+BILL	YES			
Trinidad	HL, TR, RR	Sport	Tunas+BILL	YES			

16.9 Response to the Working Group on the Future of ICCAT

The first meeting of the Working Group on the Future of ICCAT (FUT, Japan, August 31 to September 3, 2009) requested the SCRS to consider several issues. The Committee provides the responses herein.

16.9.1 Precautionary Approach (PA)

FUT discussed soliciting advice from the SCRS on how the PA could be best expressed in the Convention. The Committee will task the Methods Working Group with considering this issue, starting in 2010. The Committee also reaffirms its view, in the work expressed in 1999 and 2000, that implementation of the PA requires significant feedback between scientists and policy-makers, such that progress on this issue will depend on the understanding that management objectives and tolerable risk levels must be defined by managers.

16.9.2 Kobe II Strategy Matrix

FUT considered establishing a pilot project for using the Kobe II Strategy Matrix, which is a way to present the scientific stock assessment results, including uncertainty, for different management options. FUT recommended that SCRS identify the stocks and management measures (TAC, minimum size, closed areas, etc) for which sufficient information exists to enable analysis of timelines and probability levels.

The Committee considers the Kobe II Strategy Matrix to be one example of a decision table, a way of summarizing information that is useful in many management situations (not only fisheries). The advice that the SCRS provides for all of the stocks that it assesses quantitatively could potentially be expressed in decision tables. What is needed from the Commission is a definition of the management alternatives that it wishes to include in the matrix. The SCRS is accustomed to providing advice about different TAC levels, but it also provides advice on other types of measures (alternative minimum sizes, closed areas/seasons, etc) when so requested. Therefore, practically all assessed stocks and all types of management measures can be considered for the Strategy Matrix.

The Committee also notes that the probabilities that it estimates are often of the type "event B takes place with x% probability if condition A applies". That is, they are conditional on a number of assumptions. In recent years, the Committee has increasingly used methodologies that can better quantify uncertainty. This is work in progress.

16.9.3 Socioeconomics

FUT noted that there was a role for more socioeconomic analysis to inform ICCAT's decision-making. The Committee notes that it can incorporate socioeconomic considerations into its work if the Commission so desires. This would also require that Contracting Parties enhance their scientific delegations to include socioeconomics experts to participate in the SCRS. However, it is also important to note that the Committee's current workload is already quite taxing and that incorporating new elements will make it more so. In addition, there is a risk that focusing on new requirements for socio-economic data could dilute efforts to obtain the basic Task I and Task II data that are already required and continue to be incomplete.

There was no consensus on how to formally incorporate socioeconomic considerations. One possibility could be to establish a Sub-Committee on Socioeconomics in SCRS. An alternative would be for the Commission to establish a Socioeconomics Committee that could advise it in parallel to the SCRS. The Executive Secretary noted that it was important to seek mechanisms to act in the short-term, without having to wait for changes to the Convention which could take many years.

16.9.4 Responses to the Independent Performance Review

FUT encouraged the SCRS to consider the recommendations of the Performance Review Panel that FUT considered relevant to the work of SCRS. The Committee provides its comments in **Table 16.9.4**, noting that they are of a preliminary nature because there was not enough time to consider these matters fully during the meeting.

Table 16.9.4. Indicative list of performance review panel findings and recommendations to be considered by SCRS, according to the Working Group on the Future of ICCAT.

Review Panel Rec.	***SCRS Response***
19. For albacore tuna, the Panel recommends that catches for the northern stock be decreased such that fishing mortality is consistent with FMSY. The Panel also recommends that more information be collected for Mediterranean albacore and that an assessment be conducted at the earliest possible date.	a) The setting of TACs and catch limits is not a function of SCRS, since it is considered a policy function of the Commission. SCRS shall continue to advise the Commission on the risks related to achieving its management goals under different management options, considering uncertainty in estimates of stock status and productivity, to the degree than uncertainty can be characterized. b) If the Commission requests an assessment of Mediterranean albacore, it will probably take two years given the amount of data-preparatory work required.
26. Given the steady decline in catches of yellowfin tuna, the Panel is surprised that stock assessments are not conducted more frequently.	Yellowfin was last assessed in 2008 and will be assessed again when the Commission requests.
28. The Panel urges CPCs to make data and scientific expertise available to the SCRS so that progress can be achieved in short order on evaluating the effect the fisheries under the purview of ICCAT have on seabirds and turtles.	The Committee agrees that the collection and reporting of relevant information and the availability of experts are essential if the Commission wishes to evaluate fishery impacts on seabirds and turtles. Furthermore, assessments of several seabird populations were conducted by SCRS in 2009. Increased observer coverage of all major fishing fleets is an essential element for this task.
29. The Panel recommends that CPCs ensure that scientists participating in SCRS activities have a good balance between quantitative skills and knowledge of the fisheries and of tuna biology.	The Committee agrees with this recommendation. The needs of developing CPCs in terms of capacity-building in this regard need to be addressed.
30. The Panel recommends that CPCs send trained and knowledgeable scientists to the SCRS meetings for all fisheries in which they have substantial involvement.	The Committee agrees with this recommendation. The needs of developing CPCs in terms of capacity-building in this regard need to be addressed.
31. The Panel recommends that CPCs collect accurate Task I and Task II data from all their fisheries according to ICCAT protocols and report them in a timely fashion to the ICCAT Secretariat. The Panel further recommends that consideration be given to modify the ICCAT observer program to collect such data.	a) The Committee agrees that it is essential that CPCs collect and report accurate fishery statistics. b) The Committee believes that using observer programs to collect scientific information is an important complement to regular logbook collection and other sampling activities that ICCAT typically uses to estimate Task I and II data, and should be more broadly implemented by CPCs. Observers can also help cross-check logbook data and collect information on dead discards, non-target species, size composition, etc. Modification of the ICCAT observer program could be a reasonable option, especially for CPCs for which national programs could not be implemented.
32. The Panel recommends that the provision of Rec. 07-08 preventing access to VMS data less than three years old by SCRS scientists be removed at the next Commission meeting and that SCRS scientists be immediately given access to current VMS data.	The 3-year provision was removed in [Rec. 08-05]. In 2009 the Committee was able to obtain summary VMS information for 2008 and 2009. The Committee notes that if the Commission adopts confidentiality rules for data protection and sharing, then more detailed VMS information could become available in the future.
33. The Panel recommends that ICCAT identifies three or four priority knowledge gaps that need to be resolved and that scientific programs be developed to resolve those issues in a timely manner.	a) General recommendations are given in Section 15. b) Bluefin tuna research to better understand mixing, to recover basic data, and to improve management advice is of very high priority (see GBYP, SCI-054). c) There are activities that, if funded, could help fill data gaps for more than one species at a time. For

	example, large-scale tagging programs for tropical tunas, or scientific observer programs in major fisheries. d) There is a need to obtain fishery-independent data, including tagging e) Progress should be made on the collection of fishery statistics and the improvement on the knowledge of the population dynamics of small tunas
34. The Panel recommends that for stocks where fishing mortality is estimated to be close to FMSY or biomass is expected to be less than or close to BMSY, comprehensive conventional tagging programs be developed and carried out to estimate fishing mortality and biomass more reliably.	The Committee agrees with this recommendation.
40. In addition the Panel recommends that the extent and consequences of mixing of the East and West Atlantic stocks be fully evaluated as a matter of priority, including, if necessary through further field studies and research program to better understand migratory and spawning patterns. The basis for management should be made consistent with the results of those investigations as soon as the results are available. This recommendation is not to be used in any way as an excuse for inaction on the first recommendation; it is supplementary research.	a) The Committee is hopeful that the new Bluefin Research Program (see Section 16.4), if funded at a sufficient level for 5-6 years, will provide critical information about the extent and consequences of mixing. b) The Committee will continue to endeavor to provide scientific advice for management that is consistent with its findings.
49. Given the numerous references and recommendations and resolutions in the ICCAT Compendium relating to improvements in data collection, the Panel finds it difficult to formulate a recommendation that might make a difference. The Panel strongly believes that: misreporting must stop immediately; CPCs must collect and report Task I and Task II data in a timely manner within the agreed time limits; effort should be continued to build capacity in developing CPCs and improve reporting by developed CPCs and CPCs who continually fail to comply should be subject to an appropriate penalties regime. Such a regime should be severe and be enforceable.	The Committee believes that a response to this recommendation could be best handled by the Compliance Committee and the Commission as a whole.
51. The Panel recommends that the SCRS endeavour to provide simple, succinct and user-friendly advice to fisheries managers and Commissioners on the status of ICCAT stocks and the expected effects of potential management measures; that ICCAT Contracting Parties review their current management recommendations to ensure that they align with the current scientific assessment of the status of the stocks; and that ICCAT consider seriously the structure and basis of its decision making framework particularly in relation to fisheries management. A decision making framework should be adopted that guides the outcome of decisions and forces discipline consistent with the objectives of ICCAT on CPCs.	a) The Committee endeavors to provide simple, succinct and user-friendly advice, although it may not always achieve it. The Committee welcomes suggestions for improvement such as the Kobe II Strategy Matrix. b) The Committee believes that the other sentences in this recommendation would be best handled by the CPCs and by the Commission as a whole.

17. Other Matters

17.1 Capacity building and training

The Secretariat presented a report on capacity building activities during 2009, and a proposal for better organizing training courses given by ICCAT (**Appendix 15).**

SCRS delegates were very satisfied with the activities undertaken in capacity-building, which have helped improve data collection and reporting, participation in ICCAT meetings, and improvement of scientific skills in developing Contracting Parties.

The Committee welcomed the Secretariat's initiative to better harmonize and organize the training courses, including the possibility of coordinating courses with other RFMOs such as ICES. It was suggested that perhaps some courses could be given in sequential weeks so as to minimize travel expenses. In addition, course material should be accessible through the ICCAT Web Site.

17.2 Extension of the 2009 SCRS Meeting to Consider the Status of Atlantic Bluefin Tuna Populations with Respect to CITES Biological Listing Criteria

The SCRS Chairman noted that on occasion of a Commission Officers meeting that took place in September (Sapporo, Japan), it had been suggested that the SCRS develop, as far as possible, a consensus view of how the CITES listing Criteria could apply given the SCRS estimate of stock status for the two Atlantic Bluefin stocks. Dr. Scott mentioned that terms of reference for a special meeting had been drafted during the Species Group meeting the previous week (**Appendix 12**), together with some details about the interpretation about CITES listing criteria and various related definitions (**Appendix 13**).

The Committee endorsed the Terms of Reference for the Meeting and instructed the Secretariat to announce the details about October 21-23, 2009 meeting as soon as possible. The meeting will be chaired by the bluefin tuna overall coordinator, Dr. J.E. Powers and the report will be included in **Appendix 17**.

17.3 FIRMS Standard Terms and Executive Summaries

The Committee reviewed, modified and approved a proposal from the Secretariat to adapt the status determinations for ICCAT stocks to the standard terminology used by FIRMS (**Appendix 14**). The Secretariat noted that it hopes to contribute summaries for sharks to FIRMS.

17.4 Officers meeting

The SCRS Chairman explained that a meeting of the SCRS Officers took place on October 3, 2009, to plan for the SCRS meeting. A report of that meeting is included in **Appendix 16**.

17.5 Retirements

The Chairman announced that Mr. Papa Kebe was retiring at the end of the year, after twenty-five years of extraordinary service to the Commission and full dedication to support the work of the SCRS in statistics. Mr. Kebe was congratulated by all delegations with a standing ovation.

The Chairman also announced that Dr. Alain Fonteneau would be retiring after many years of research on tunas world-wide. He noted that his expert input would be missed. Delegations joined in wishing Dr. Fonteneau an enjoyable retirement.

18. Election of the Chairman

Dr. Scott asked delegates if there were any nominations for the next SCRS Chairman. There were no responses.

The delegate from the EC asked Dr. Scott if he would be willing to continue to serve as SCRS Chairman. The EC delegate mentioned Dr. Scott's exemplary service and highlighted the trying times that the Commission is currently undergoing.

Dr. Scott replied that if there were no candidates interested in the position he would be willing to serve under the conditions that (a) it would be for not more than one year, and (b) the Commission would provide travel assistance for his participation in meetings.

Dr. Scott was re-elected unanimously as SCRS Chairman by acclamation.

During adoption of the Report, Dr. Scott mentioned that it was his intention to explain to the Commission that it should consider supporting the next Chairman of the SCRS not only with travel expenses, but also with compensation for their time. He explained that otherwise it is very difficult for an institute to allow one of their scientists to devote the time necessary to chair all SCRS activities.

19. Adoption and closure

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

After congratulating the Committee for its work, the Executive Secretary acknowledged the excellent work carried out by Mr. Papa Kebe and Dr. Alain Fonteneau within ICCAT. Furthermore, the Executive Secretary valued the professional nature and efficiency of the Secretariat staff and the interpreters who work for ICCAT.

The Report of the 2009 SCRS meeting was adopted.

It was decided that the Report of October 21-23, 2009 meeting dealing with bluefin tuna and CITES would be annexed to this Report.

Appendix 1

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

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of Contracting Party delegations*
4. Introduction and admission of observers*
5. Admission of scientific documents
6. Report of Secretariat activities in research and statistics
7. Review of national fisheries and research programs**
8. Executive Summaries on species:

   YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack, ALB-Albacore, BFT-Bluefin, BIL-Billfishes, SWO-Atl. Swordfish, SWO-Med. Swordfish, SBF-Southern Bluefin, SMT-Small Tunas, SHK-Sharks
9. Report of inter-sessional meetings
   - 9.1 Working Group on Stock assessment methods
   - 9.2 Inter-Sessional Meeting of the Tropical Species Group
   - 9.3 Sailfish Stock Assessment
   - 9.4 ICES-ICCAT Porbeagle shark stock assessment
   - 9.5 Atlantic albacore Stock Assessment
   - 9.6 Atlantic swordfish Stock Assessment
   - 9.7 Inter-Sessional Meeting of the Sub-Committee on Ecosystems
10. Report of Special Research Programs
    - 10.1 Bluefin Year Program (BYP)
    - 10.2 Enhanced Research Program for Billfish
11. Report of the Sub-Committee on Statistics
12. Report of the Sub-Committee on Ecosystems
13 A Consideration of Implications of the "Future of ICCAT" meeting in Sapporo this August.
14. Consideration of plans for future activities
    - 14.1 Inter-sessional meetings proposed for 2010
    - 14.2 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 Continuation of the evaluation of data elements pursuant to [Rec. 05-09]
    - 16.2 Evaluation of the existing port sampling programs aimed at collecting fishery data for tropical tunas in the Gulf of Guinea, [Rec. 08-01]
    - 16.3 Evaluation of the effect of the closure contained in the [Rec. 08-01] and alternative closures
    - 16.4 Elaboration of a Bluefin Tuna Research Program
    - 16.5 Reporting on the bluefin scientific data coverage level achieved by each CPC observer program [Rec. 08-05]
    - 16.6 Review of information on farmed bluefin tuna growth rates [Rec. 06-07]

16.7 Further advice on reducing incidental by-catch of seabirds in longline fisheries [Rec. 07-07]

16.8 Update on the harvest levels in the recreational and sport fisheries for the most recent years to the Working Group on Recreational Fisheries [Res. 06-17]

16.9 Response to the Working Group on the Future of ICCAT

17. Other matters****

17.1 Capacity building, training and web based tools for inter-sessional work

17.2 Extension of the 2009 SCRS Meeting to Consider the Status of Atlantic Bluefin Tuna Populations with Respect to CITES Biological Listing Criteria

17.3 FIRMS Standard Terms and Executive Summaries

17.4 Officers meeting

17.5 Retirements

18. Election of the Chairman

19. Adoption of report and closure

Appendix 2

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Appendix 3

LIST OF 2009 SCRS DOCUMENTS

Number	*Title*	*Author(s)*
SCRS/2009/010	Report of the 2009 Meeting of the ICCAT Working Group on Stock Assessment Methods (Madrid, Spain, March 11-14, 2009)	Anonymous
SCRS/2009/011	Report of the 2009 inter-sessional meeting of the Tropical Tunas Species Group (Madrid, Spain – April-25, 2009)	Anonymous
SCRS/2009/012	Report of the 2009 ICCAT Sailfish Stock Assessment Session (Recife, Brazil, June 1-5, 2009)	Anonymous
SCRS/2009/013	Report of the 2009 Inter-sessional Meeting of the Sub-Committee on Ecosystems (Recife, Brazil, June 8-12, 2009)	Anonymous
SCRS/2009/014	Report of the 2009 ICCAT-ICES Porbeagle Stock Assessments Meeting (Copenhagen, Denmark, June 22-27, 2009)	Anonymous
SCRS/2009/015	Report of the 2009 ICCAT Albacore Stock Assessment Session (Madrid, Spain, July 13-18, 2009)	Anonymous
SCRS/2009/016	Report of the 2009 ICCAT Atlantic Swordfish Stock Assessment Session (Madrid, Spain, September 7-11, 2009)	Anonymous
SCRS/2009/023	Report of the Training Workshop on Data Collection and Improvement in the Caribbean Region	Anonymous
SCRS/2009/024	Length-weight Relationships for Bigeye Tuna (*Thunnus obesus*), Yellowfin tuna (*Thunnus albacares*) and Albacore (*Thunnus alalunga*) (*perciformes: scombrinae*) in the Atlantic, Indian and Eastern Pacific Oceans	Zhu, G, Xu , L., Zhou, Y., Song, L. and Dai, X
SCRS/2009/025	Sex ratio at size of sailfish (*Istiophorus albicans*) from the Venezuelan fishery off the Caribbean Sea and adjacent areas	Arocha, F. and Marcano, J.
SCRS/2009/026	Preliminary note on tuna larvae in samples from the coasts of the Southern-Central Mediterranean Sea collected by the MV Arctic Sunrise in June/July 2008	Giovanardi, O. and M. Romanelli
SCRS/2009/027	Conveying the overall situation of the ICCAT stocks through the use of face plots	Schirripa, M.J. and V.R. Restrepo
SCRS/2009/028	CPUE standardizations of species targeting in longline fisheries: initial investigations of the utility of simulated data for method verification	Schirripa, M.J. and C.P. Goodyear
SCRS/2009/029	Evaluating the efficacy of minimum stock size thresholds in the presence of natural variability and parameter uncertainty: an application to northern albacore tuna (*Thunnus alalunga*)	Ortiz, M., S.L. Cass-Calay and G. P. Scott
SCRS/2009/030	Common trends model in catch per unit of effort for the tropical tunas	Gaertner, D.

SCRS/2009/031	An exploration of targeting variables in the Canadian swordfish longline CPUE	Stacey D. Paul and John D. Neilson
SCRS/2009/032	Exploitation des poissons porte-épées par la pêcherie artisanale maritime en Côte d'Ivoire I: CPUE standardisée des voiliers de l'Atlantique *Istiophorus albicans*	N'da K ., G.R. Dedo
SCRS/2009/033	Standardized catch rates for sailfish (*Istiophorus albicans*) from the Venezuelan pelagic longline fishery off the Caribbean Sea and adjacent areas: An update for 1991-2007	Arocha, F. and M. Ortiz
SCRS/2009/034	Preliminary review of tropical species information held in ICCAT tagging data base	Kebe, P.
SCRS/2009/035	Preliminary analysis of the bigeye tuna (*Thunnus obesus)* caught incidentally by the Moroccan longline fleet targeting swordfish in the Atlantic during the period 2003-2007	Abid, N., Idrissi, M. and El Omrani, F.
SCRS/2009/036	Review of sampling methodology for tunas in Ghana	Bannerman, P.
SCRS/2009/037	A proposal for examination of yellowfin tuna growth using statistical catch-at-age model diagnostics	M. Schirripa
SCRS/2009/038	Evaluating the impact of time-area closures on the YPR and SPR of Atlantic tropical tunas under various assumptions regarding natural mortality	S.L. Cass-Calay
SCRS/2009/039	Simulating movement to evaluate the abundance indices of Atlantic bigeye and yellowfin tuna	T. Carruthers and M. McAllister
SCRS/2009/040	On the sensitivity of virtual population analysis results for Atlantic yellowfin tuna (*Thunnus albacares*) to an alternative growth model assumption	C.A. Brown and S.L. Cass-Calay
SCRS/2009/041	An overview of fishery data in relation with the implementation of the seasonal moratorium on FAD fisheries in the Atlantic	Fonteneau, A.
SCRS/2009/042	Estimate of the non-linear growth rate of yellowfin tuna (*Thunnus albacares*) in the Atlantic and in the Indian Ocean from tagging data	Gaertner, D.
SCRS/2009/043	Manual de muestreo en puerto de túnidos tropicales en los océanos Atlántico e Indico	Sarralde, R., Pianet, R., Delgado de Molina, A., Dewals, P., Ariz, J., Herve, A., Santana, J.C., Pallarés, P., Dedo, R. and Areso J.J.
SCRS/2009/044	A potential framework for investigating the effects of moratoriums in the ICCAT region using standardized EU Purse Seine CPUE	De Bruyn, P.
SCRS/2009/045	Updated sailfish (*Istiophorus platypterus*) catch rates from the U.S. pelagic longline fishery in the Northwest Atlantic and Gulf of Mexico 1986-2008	Ortiz, M., Diaz, G.A., and Hoolihan, J. P.

SCRS/2009/048	Sailfish (*Istiophorus platypterus*) habitat utilization in the southern Gulf of Mexico and Florida Straits, with implications on vulnerability to shallow-set pelagic longline gear.	Kerstetter, D.W., Bayse, S.M. and Graves, J.E.
SCRS/2009/049	CPUE Standardization of the US Longline Observer Data Using StatHBS C.	Goodyear, P.
SCRS/2009/050	Relationships between size, body weights and fin weight of the blue shark (*Prionace glauca*) caught as by-catch in the Spanish surface longline fishery in the Indian Ocean	Espino, D., García-Cortés, B. and Mejuto, J.
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SCRS/2009/053	Historical data and standardized catch rates of porbeagle (*Lamna nasus*) caught as bycatch of the Spanish surface longline fishery targeting swordfish (*Xiphias gladius*) in the Atlantic Ocean	Mejuto, J., Ortiz, J., García-Cortés, B., Ortiz de Urbina, J. and Ramos-Cartelle, A. M.
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SCRS/2009/055	A summary on the activity of the Spanish surface longline fleet catching swordfish (*Xiphias gladius*) during the years 2006-2007	García-Cortés, B., Mejuto, J., de la Serna, J.M. and Ramos-Cartelle, A.
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SCRS/2009/057	Modelling the impact of fishery by catch on albatross populations: model specification	Thomson, R.B. and Tuck, G.N.
SCRS/2009/058	Ecological Risk Assessment for species caught in ICCAT fisheries.	H. Arrizabalaga, P. de Bruyn, H. Murua, *et al.*
SCRS/2009/059	Non-target by-catch in the Maltese bluefin tuna (*Thunnus thynnus*) longline fishery (central Mediterranean)	Burgess, E., Dimech, M., Caruana, R., Darmanin, M., Raine, H. and Schembri, P.J.
SCRS/2009/060	Update of seabird by-catch and the effect of light toriline on seabird by-catch and fish catch rates in the pelagic longline fishery off southern Brazil	Mancini, P.L., Neves, T.S. and Nascimento, L.A.
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SCRS/2009/062	A short note on the f.a.o. statistics for the porbeagle shark (*Lamna nasus*) in the Atlantic and its relation to other lamnid	Fernández-Costa, J. and Mejuto, J.
SCRS/2009/063	First observations of migratory movements and habitat preference of Atlantic sailfish, *Istiophorus platypterus*, in the southwestern Atlantic Ocean	Mourato, B.L., Carvalho, F.C., Hazin, F.H.V., Pacheco, J.C., Hazin, H.G., Travassos, T. and Amorim, A.F.
SCRS/2009/064	Estimating the sailfish and spearfish catch ratios based on Brazilian longline observer data in the equatorial and south Atlantic Ocean	Wor, C., Mourato, B.L., Hazin, F.H.V., Hazin, H.G. and Travassos, P.
SCRS/2009/065	Ratios of Sailfish and Spearfish in longline observer data	Die, D.
SCRS/2009/066	Standardized catch rate of sailfish (*Istiophorus platypterus*) caught by Brazilian longliners in the Atlantic Ocean (1978-2008)	Wor, C., Mourato, B.L., Hazin, H.G., Hazin, F.H.V., Travassos, P. and Andrade, H.
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SCRS/2009/069	Standardized catch rates for porbeagle sharks from the U.S. pelagic longline logbook program	Cortés, E.
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SCRS/2009/073	Summary of fishery effort statistics, observed by-catch and super-fleet description for the ICCAT seabird assessments	G.N. Tuck and R.B. Thomson
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SCRS/2009/077	Modelling the impact of fishery by catch on the black-browed albatross at South Georgia	Thomson, R.B., Phillips, R.A. and Tuck, G.N.
SCRS/2009/078	Modelling the impact of fishery by catch on the Tristan albatross of Gough Island	Thomson, R.B., Wanless, R.M. and Tuck, G.N.

SCRS/2009/079	Modelling the impact of fishery by catch on the Yellow-nosed albatross from Gough Island	Tuck, G.N., Thomson, R.B., Ryan, P. and Cuthbert, R.
SCRS/2009/080	Spatio temporal variability of daily CPUE for Basque albacore trollers and baitboats	Arrizabalaga, H., Santiago, J. Sagarminaga, J. and Artetxe, I.
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SCRS/2009/086	Seabird by-catch on pelagic long-lines in the ICCAT area off South Africa in 2007 and 2008: the effect of individual vessel limits on by-catch rates	Ryan, P.G., Goren, M., Petersen, S.L. and Smith, C.
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SCRS/2009/092	National Report EC-Spain, Atlantic *Lamna nasus*, ICES+ICCAT meeting 2009	Mejuto, J., Punzón, A. and González, F.
SCRS/2009/093	Standardized CPUE of porbeagle shark (*Lamna nasus*) caught by Uruguayan pelagic longline fleet (1982-2008)	Pons, M. and Domingo, A.
SCRS/2009/094	Habitat Utilization and Movement Patterns of Porbeagle Sharks (*Lamna nasus)* in the Western North Atlantic	Skomal, G., Marshall, H., Chisholm, J., Natanson, L. and Bernal, D.

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SCRS/2009/135	Weight growth of Atlantic bluefin tuna (*Thunnus thynnus,* L. 1758) as a result of a 6-7 months fattening process in central Mediterranean	Tzoumas A., Ramfos A, De Metrio G., Corriero A., Spinos E., Vavassis C. and Katselis G.
SCRS/2009/136	Seabird by-catch in Spanish Mediterranean large pelagic logline fisheries, 1998-2008	García-Barcelona, S., Ortiz de Urbina, J.M., de la Serna, J.M., Alot, E. and Macías, D.
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SCRS/2009/140	Estadísticas españolas de la pesquería atunera tropical, en el océano Atlántico, hasta 2009	Delgado de Molina, A., Santana, J.C., Ariz, J. and Sabaté, I.

SCRS/2009/141	Datos estadísticos de la pesquería de túnidos de las Islas Canarias durante el periodo 1975 a 2008	Delgado de Molina, A., Delgado de Molina, R., Santana, J.C. and Ariz, J.
SCRS/2009/142	Aerial surveys of bluefin tuna in the western Mediterranean sea: retrospective, prospective, perspective	Sylvain Bonhommeau, S., Farrugio, H. and Fromentin, J.M.
SCRS/2009/143	Tagging bluefin tuna in the Mediterranean Sea: Challenge or Mission: Impossible?	Fromentin, J.M.
SCRS/2009/144	Differences in the selection pattern of drifting longlines used in the Greek swordfish fishery	Tserpes and P. Peristeraki
SCRS/2009/145	Decision tables to guide quota setting for northern Atlantic albacore in 2009	Schirripa, M.J.
SCRS/2009/146	By-catch and discards of the European purse seine tuna fishery in the Atlantic ocean. Estimation and characteristics for the 2003-2007 period	Amande, J.M., Ariz, J., Chassot, E., Chavance, P., Delgado de Molina, A., Gaertner, D., Murua, H., Pianet, R. and Ruiz, J.
SCRS/2009/147	Note sur la valorisation des prises accessoires de la pêche thoniere de surface sur le marche informel du faux poisson en Cote d'Ivoire	Chavance, P., Amon Kothias, J.B., Dewals, P., Pianet, R., Amande, J. and Delgado de Molina, A.
SCRS/2009/148	Construction and Evaluation of a two-sex stock assessment model for North Atlantic Albacore	Schirripa, M.J.
SCRS/2009/150	Preliminary results on the reproductive status of Atlantic bluefin tuna sampled in the Gulf of Mexico during spawning season, 2007-2008	Knapp, J.M., Heinisch, G. and Lutcavage, M.E.
SCRS/2009/151	First results from juvenile Atlantic bluefin tuna tracked with mini PSAT tags	Galuardi, B., Knapp, J.M, Logan, J.M. and Lutcavage, M.E.
SCRS/2009/153	On the use of the De Finetti ternary diagrams to show the sampled species composition of FAD and free schools tuna schools sampled in the Atlantic and Indian Oceans	Fonteneau *et al.*
SCRS/2009/154	Developing regional length-weight models for albacore tuna	K. Erickson, T. Gedamke, S. Turner, M. Maiello, and K. Keene
SCRS/2009/155	Análisis biométrico de la tortuga boba, *Caretta caretta* (Linnaeus 1758), en el Mediterráneo occidental	Báez, J.C., Macías, D., Puerto, M.A, Camiñas, J.A. and Urbina, J.M.
SCRS/2009/156	Temporal pattern of daily CPUE on the bluefin tuna (*Thunnus thynnus*) in the western Mediterranean spawning area	Gordoa, A.
SCRS/2009/157	The Atlantic Bluefin Tuna: Study of the Temporal Pattern of Spawning in the Western Mediterranean Region and Reproductive Capacity in Captivity	Gordoa, A.

SCRS/2009/158	An indirect Approach to estimate the Fattening Factor of Atlantic Bluefin Tuna *(Thunnus thynnus)* on Tuna Farms: Ametlla de Mar Facility as a Case Study	Gordoa, A.
SCRS/2009/159	Preliminary review of historical billfish catch data reported by Trinidad and Tobago	Martin , L. and Die, D.
SCRS/2009/160	Updated estimate of the growth of western Atlantic bluefin tuna	Restrepo, V. R., Diaz, G. A., Walter, J. F., Nielson, J., Campana, S., Secor, D. and Wingate, R. L.
SCRS/2009/161	Report on meeting in Abidjan in relation to tuna fishing activities	Bannerman, P. and Anaba, V.
SCRS/2009/162	2009 Update on Canada's Bluefin Tuna Fisheries	Paul, S, Smith and Neilson, J
SCRS/2009/163	Reproducing the Atlantic bluefin tuna in captivity: the Italian experience	De Metrio, G., Caggiano, M., Deflorio, M., Mylonas, C.C., Bridges, C.R., Santamaria, N., Caprioli, R., Zupa, R., Pousis, C., Vassallo-Agius, R., Gordin, H. And Corriero, A.
SCRS/2009/164	Evaluation of Management Advice for North Atlantic Albacore; Linking MultiFan-CL and FLR	Kell, L.T., De Bryun, P., Soto, M. and Arrizabalaga, H.
SCRS/2009/165	Statistiques de la pêcherie thonière européenne et assimilée durant la période 1991 – 2008	Pianet R., Norström, V.,Damiano, A., Delgado, A., Ariz, J., Sabate, I., Kouassi Y. and N'Gom Sow, F.
SCRS/2009/166	Statistiques de la pêcherie thonière française durant la période 1991-2008	Pianet R., Norström, V., Damiano, A., Kouassi Y. and N'Gom Sow, F.
SCRS/2009/167	Posibles efectos del Plan de recuperación del atún rojo (*Thunnus thynnus*) en algunas pesquerías españolas	Cort, J.L. and Martinez, D.
SCRS/2009/168	Task I gaps analysis: completing Task I catch series using information from Task II catch and effort	Palma, C.
SCRS/2009/169	Analysis of purse seine set times for FAD and free school associations in the Atlantic and Indian Ocean	Fonteneau, A., Ariz, J., Damiano, A. and Delgado, A.
SCRS/2009/170	Technical Report on Aerial Surveys of the West Mediterranean Bluefin Tuna during spawning season when fishery is already closed	Grup Balfegó, y Juan M. Sorell Baron

SCRS/2009/171	Evaluation of effects of current TAC on Eastern Atlantic bluefin tuna by future projection	Kazuhiro Oshima, Masayuki Abe, Hiroyuki Kurota, Hideki Nakano and Yukio Takeuchi
SCRS/2009/173	Diet of the white marlin (*Tetrapturus albidus*) from the southwestern equatorial Atlantic Ocean	Pinheiro, P.B., Vaske Júnior, T., Hazin, F.H.V., Travassos, P., Tolotti, M.T., and Barbosa, T.M.
SCRS/2009/174	Determination of fillet yield in cultured bluefin tuna, *Thunnus thynnus* (linnaeus 1758) in Turkey	Öksüz, A.
SCRS/2009/175	Decision tables to guide quota setting for northern Atlantic albacore in 2009	Schirripa, M.J.
SCRS/2009/176	Preliminary analysis of the size data of bluefin tuna (*Thunnus thynnus*) caught by the Moroccan Atlantic traps during the year 2009	Idrissi, M. and Abid, N.
SCRS/2009/177	Updated analysis of the size data of swordfish targeted by the Moroccan driftnet fishery operating in the Mediterranean sea for the 1999-2008 period	Abid, N. and Idrissi, M.
SCRS/2009/178	Quantifying tag reporting rates using coincidental tag recaptures	Carruthers, T. and McAllister, M.
SCRS/2009/179	Actividades de marcado de atún rojo (*Thunnus thynnus)* y atún blanco (*Thunnus alalunga*) realizadas por la Confederación Española de Pesca de Recreo Responsable con la coordinación científica del Instituto Español de Oceanografía (IEO) durante 2009	Godoy, M.D., De la Serna, J.M. and Abascal, F.
SCRS/2009/180	The first certification of bluefin tuna issued in the Mediterranean sea: the ECOCREST© label provided for the 2009 productions of two traditional tuna traps in Sardinia	Dinatale, A. and Abbis, P.
SCRS/2009/181	Descripción del sistema de información de la pesquería del atún con palangre en el golfo de México (SIA)	Ramírez-López, K., Wakida Kusunoki, A., Beléndez Moreno, L. and Cisneros Mata, M.
SCRS/2009/182	Review and refinement of the multistock age-structured assessment tag integrated model for Atlantic bluefin tuna	Taylor, N., McAllister, M., Lawson, G. and Block, B.
SCRS/2009/183	Taiwanese Observer Program for Large Scale Tuna Longline Fisheries in Atlantic Ocean in 2007	Huang, H.
SCRS/2009/184	A morphometric approach for the analysis of body shape in bluefin tuna: preliminary results	Addis, P., Melis, P., Cannas, R., Secci, M., Tinti, F., Piccinetti, C. and Cau, A.
SCRS/2009/185	Fishery genetics of Mediterranean bluefin tuna: reviewing of existing data, ongoing studies and perspectives	Ferrara, G., Cannas, R., Stagioni, M., Riccioni, G., Addis, P., Cau' A., Piccinetti, C. and Tinti, F.

SCRS/2009/186	Spatio-temporal genetic patterns in Mediterranean bluefin tuna: population structuring and retention of genetic diversity	Riccioni, G., Ferrara, G., Landi, M., Sella, M., Piccinetti, C., Barbujani, G. And Tinti,F.
SCRS/2009/187	An Example of the use of Management Strategy Evaluation for North Atlantic Albacore, using Multifan-CL and FLR	Kell, L.T., De Bryun, P., Soto, M. and Arrizabalaga, H.
SCRS/2009/188	Data on French Targeted Porbeagle (*Lamna Nasus*) Fishery In The Northeast Atlantic Ocean: Captures And Biological Parameters	Jung, A., Lorrain,A., Cherel,Y., Priac,A., Baillon ,S. and Campana, S.
SCRS/2009/189	The eastern Atlantic bluefin tuna: Entangled in a big mess possibly far from a conservation red alert. Some comments after the proposal to include the bluefin tuna in CITES Appendix 1.	Dinatale, A. and Abbis, P.
SCRS/2009/190	Growth performances of the bluefin tuna (*Thunnus thynnus)* farmed in the Croatian waters of eastern Adriatic	Katavić, I., Grubišić, L., Tičina, V., Mišlov-Jelavić, K., Franičević, V. and Skakelja, N.
SCRS/2009/191	Estimation of size composition of tunas caught by the Azores baitboat fishery from 1963 to 1985	Pereira, J. and Ortiz, M.
SCRS/2009/192	Record of the 2009 Species Group Discussions on Atlantic Bluefin Tuna	Anonymous

Appendix 4

OPENING ADDRESS OF DRISS MESKI, ICCAT EXECUTIVE SECRETARY

As is customary at this time each year, you all return here to review the status of the tuna resources in the Convention area of our Commission. I would like to welcome you to this beautiful city of Madrid and to thank, on your behalf, the Kingdom of Spain for all the facilities that it grants us to carry out our work in the best conditions.

Every year, the meeting of the ICCAT Scientific Committee takes place in special conditions. The work of our Committee is followed very closely by fishery specialists throughout the world. Its results are determinant for our Commission to take decisions at its annual meeting to be held in Recife this coming November.

Due to the quality of your work and the importance of your discussions, ICCAT is considered among the best Regional Fisheries Management Organizations of the world.

The recommendations which your Committee makes will make it possible for the Commission to take pertinent decisions leading to the rebuilding of the stocks of many species.

However, we cannot fail to express the concern of our Commission over many years concerning the status of the stock of bluefin tuna. This concern becomes more worrisome from one year to another. This year, more than ever, our Commission is being called upon to remedy this situation.

I am sure that the work of our Committee, and its results, will allow the Commission to take the appropriate decisions so that ICCAT continues to maintain its good reputation at the international level.

In the hopes that despite your very full timetable, you will have some time to enjoy the beautiful city of Madrid, I would like to wish you success in the work of your Committee and I thank you for your attention.

Appendix 5

2010 WORK PLANS OF SPECIES GROUPS FOR 2010

Tropical Tunas Species Work Plan and Recommendations for 2010

The new assessment for Atlantic bigeye tuna is scheduled for 2010. Prior to the assessment meeting, a separate inter-sessional session is necessary for data preparation, since one of the models that will be applied is Multifan-CL, and setting up the model runs takes considerable time and coordination, and model testing should be initiated months before the assessment. Also, there will likely be important revisions to the historical catch and size data series, due to the incorporation of new estimations of "*faux poisson*", discards and expected revisions for some fleets based on new information recovered (i.e., from logbooks), which can be addressed during the inter-sessional meeting. Parties should submit relevant information such as catch (including estimates of "*faux poisson*" and discards), size and index of abundance information through at least 2008, prior to the 2010 data preparatory inter-sessional meeting.

Recommendations

The Committee congratulates the ICCAT Secretariat and the JDIP for the implementation of the pilot project to improve the statistics of Ghanaian vessels unloading in Abidjan with the CRO of Abidjan (Côte d'Ivoire). The preliminary results presented by the scientist from CRO and IRD (France) are very encouraging. The Tropical Tunas Species Group recommends that an additional contribution be made to cover the project activities in December 2009, since current funding lapses at the end of November 2009. Given the importance of the estimation of quantities of landings by the Ghanaian and other tropical purse seine fleets, it is highly recommended that the project be extended to cover the entire 2010 year.

The Committee endorses the recommendations made by the International Working Group (SCRS/2009/131) for future statistical analyses that can help improve the sampling program for European and associated fleets and avoid such potential bias. In particular, the Committee recommends the following changes to the sampling scheme:

- Revisions of the raising process of samples in the Atlantic Ocean should be considered, in particular, exploring the possibility of replacing the set by the well as the sampling unit. In addition, the information obtained from the well map data should be better incorporated into the data processing (e.g. to validate and, if necessary, to correct the logbook information). In addition, the current time and area stratification used in the data processing should be reanalyzed using recent data and potentially revised.

- As feasible, data from at-sea sampling should be collected and compared to in-port sampling in the Atlantic. Alternative methodologies such as 'spill sampling' should be investigated in order to avoid bias.

- To avoid the possible bias or error in the species composition due to conversions (dorsal length to fork length and/or length to weight) applied in the estimation process, either weight data should be collected (when possible), or the current relationships should be improved by collecting a larger number of measurements.

It is also recommended:

- That a training workshop be organized for CPC within West Africa to improve tuna sampling and other aspects of tuna statistics.

- To encourage National scientists to carry out new studies on biological parameters for tropical tuna. Current estimates on reproduction, maturity, sex ratio and the biological parameters are based on studies carried out many years ago. Changes might have occurred in the population during this period that should be considered. Also, new techniques have been developed that might improve the current estimates.

- A suggestion is made to increase size sampling on the longline fleets. Sampling sizes have been decreasing for a number of years, and the importance of these fleets make gathering of these data an essential task.

The Committee also endorses the recommendations made by the 2009 Inter-Sessional Meeting of the Tropical Tunas Species Group and, in particular, reiterates the following:

- It was recommended that a methodological workshop on estimation of growth for tropical tunas, making use of information available, be held at a future date. Scientists from other tuna RFMOs should be encouraged to attend, as the same issues are important in all oceans. For the Atlantic, there is a need to elevate the number of observations of size and sex at age for yellowfin (and bigeye) <40cm and >140 cm. Efforts should be made to obtain otolith ages from a representative sample of fish in this size range.

- There is a lack of information about total releases in available tagging databases which impedes use of the tagging data for estimating harvest rates. The Group recommended that national scientists and the Secretariat work diligently and in concert to recover these historical tagging data.

- The Group considers it critical to continue to improve the data used to characterize the species composition, distribution, and total catch of tropical tunas and especially those of Ghanaian flagged vessels. The Group recommended that the Commission consider means to permanently increase the staffing and support level for these functions of monitoring and reporting on the catch level, species and size composition. The Group recommends that the principals involved, including the industry, be consulted on the most appropriate means by which these infrastructure improvements could be instituted permanently. Collecting data directly from the canneries should be encouraged.

- Observers need to be placed on the Ghanaian vessels landing in Abidjan in order to provide verification of logbooks and to sample catches at sea.

Proposal for a large tagging program devoted to tropical tunas in the Atlantic Ocean

Stock assessments of Atlantic tropical tunas are hampered due to uncertainties in several population, life history and behavioral parameters. These include such important considerations as stock structure, natural mortality, sex-specific growth (which may be particularly important for yellowfin tuna), migratory patterns and residence times, and the influence of FADs and oceanographic features on behavior and productivity. Assessments are also hampered because of an almost absolute reliance on fishery-dependent data (in contrast to many other fisheries where direct estimates from fishery-independent sources, such as surveys, can be combined with fishery data). Tagging information (from both conventional and electronic tags) are very relevant (1) in not only stock status diagnosis but also (2) in evaluating fisheries management options. The results from such program would significantly improve future assessments and the knowledge on tropical tunas.

Conventional and electronic tag information can be used to address many of the data needs for tropical tuna stock assessments. Conventional tag-recovery studies facilitate the collection of a variety of types of information on the species under study, such as stock structure (e.g., viscosity, metapopulation), growth rate by sex, gear selectivity, migrations, survival/mortality, immediate mortality due to tagging, etc. used independently or in combination with other type of information in integrated assessment models. Electronic tags can be combined with conventional tags to provide valuable information useful in habitat based model studies. Both conventional and electronic tags can be used in combination to evaluate residence times for different species/size in potential areas useful for monitoring multi-species fisheries (moratorium area, quotas of catch by time-area strata, etc), as well as with seamounts or with FADs networks (the ecological trap concept).

In the past, different tagging programs have been conducted in the Atlantic tropical Ocean. However, these programs were realized during specific and discontinuous periods of time, in specific areas (i.e., with few exceptions, mainly in the Eastern Atlantic), in general within a monospecific assessment approach and, even under the ICCAT coordination, by different national tagging teams.

The Committee proposes that a more comprehensive, coordinated tagging program covering the entire distribution of the tropical tuna stocks be initiated. In light of the success showed by the massive tagging program recently conducted by the IOTC in the Indian Ocean, similar organization in term of coordination of the tagging program, constitution of a specific tagging team (in charge of the tagging operations, the publicity, the data base, etc) should be explored.

As part of this process, simulation modeling of tagging operations should be conducted in order to analyze how to reduce uncertainties in parameter estimates and to elaborate efficient designs in operational tagging surveys in order to achieve the objectives.

Albacore Work Plan for 2010

Overview

The 2007 Commission meeting resumed in Recommendation 07-02 to conduct an assessment of the North stock in 2009. Accordingly, in July 2009 the assessment of North Atlantic albacore stocks was carried out by means of applying statistical modeling to the available data.

The results of the analyses could indicate that the stock is being overfished. Analyses of the catch rates (standardized CPUEs) for all the major fleets exploiting this stock: surface and longline fleets should be continued. Moreover, uncertainty on some biological parameters (length-weight relationship, growth and reproductive biology) needs further research.

For the South Atlantic stock, the results from the July 2007 assessment are still considered to adequately characterize the status of this stock. Analyses of the catch rates (standardized CPUEs) for all the major fleets exploiting this stock: baitboat and longline fleets should be continued. Also, uncertainty on some biological parameters (length-weight relationship, growth and reproductive biology) needs further research.

Moreover, environmental and oceanographic variables affecting the distribution of immature and adult albacore in the North and South Atlantic shall be investigated.

As for the Mediterranean stock, information of Task I and Task II data from the fisheries is incomplete and biological information to describe the population parameter of the stock is still poor, therefore no attempt to assess the status of the stock has ever been done.

General tasks and ongoing research activities for Northern and Southern albacore stocks in 2010

Increase the coverage of Task II data for major fleets in the Atlantic and Mediterranean. Especially for longline fisheries of the Northern and Southern stocks.

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

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

Studies to validate the growth model for both North and South Atlantic stock and Mediterranean stock should be developed.

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

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

Continue to explore the two-sex model with Stock Synthesis for the Northern Atlantic stock.

Mediterranean Albacore stock Assessment

In the case of the Mediterranean the stock, a “Performance Review Panel” recommends that more information be collected for this stock and that an assessment be conducted at the earliest possible date.

In order to achieve this goal a thorough provision and revision of Task I and Task II data shall be developed.

Along those activities, effort is required to characterize the life-history parameters of albacore in the Mediterranean.

In view of the available data, a choice of model method could be suitable if substantial data is made available to the Group.

Considering all the above limitations, a preparatory meeting is proposed tentatively in 2010 before attempting to conduct a stock assessment for Mediterranean albacore.

Bluefin Tuna Work Plan

1. Overview

The last bluefin tuna stock assessment (East and West) was conducted in 2008 and the next has been scheduled by the Commission for 2010. The Bluefin Species Group reiterates that a three to four year period between assessments would be more appropriate because bluefin tuna is a long-lived species and it takes several years to detect changes in bluefin biomass in response to changes in exploitation or management. A longer period would allow scientists more time for inter-sessional work, especially to investigate important issues regarding the data and models, which will ultimately lead to better assessments.

Regarding the 2010 session, a data preparatory meeting should be scheduled prior to the stock assessment session. This meeting could be planned five to six days in late June and will aim at synthesizing the large amount of new data, preparing the catch statistics and reviewing new biological information. More work will be probably needed to achieve this task in near future owing to increases in the quantity and types of data (including compliance-related data that have not been analyzed before) and in the complexity of the models being applied. Eight days in September are deemed to be sufficient for the quantitative assessment work and report writing.

2. Data submission

Data for the eastern and western stock through 2009 should be submitted to the Secretariat at least two weeks before the June data preparatory meeting so that the Secretariat can incorporate the statistics into the database. ***Action National Scientists.***

Estimates of unreported landings for the eastern unit should be investigated prior to the meeting and completed during the assessment meeting. ***Action National Scientists and Secretariat.***

All national scientists should provide catch, catch-at-size, tagging and CPUE data up to and including 2009 where available (East and West). Assessment software should be adapted to accommodate the possibility of incomplete data for 2009 and earlier. ***Action National Scientists and Secretariat.***

The SCRS also recommended that efforts be made to share novel biological information during the preparatory meeting. ***Action National Scientists and Secretariat.***

3. Catch and VMS summaries

The Secretariat should prepare summaries of the available catch data, catch-at-size and VMS data (i.e. effort by gear/year/month/area) by the start of the preparatory meeting. ***Action Secretariat***.

4. Assessment

The stock assessment work should update the 2008 stock assessments. In the case of the West stock, mainline advice should be based on results from validated and documented software retained in the ICCAT catalog. These catalog entries need to be completed by April 2010. ***Action National Scientists***.

In the case of the East stock, it is still recommended that the Bluefin Tuna Species Group should investigate various assessment methods that may be robust to or that can take into account the large uncertainties in the total

catch and catch-at-size data. It is also expected that the Group investigates more deeply the effects on stock status of the management measures that were adopted in November 2008 in Marrakech. ***Action National Scientists***.

Billfish Work Plan

Summary

During 2009 the Working Group conducted the first successful assessment of Atlantic sailfish stocks. However, it has now been confirmed that historical catches and information on white marlin may also inadvertently reflect by significant numbers of roundscale spearfish.

The Working Group proposed to conduct the next assessment of blue and white marlin through a three stage process:

1) Hold a data preparatory meeting for blue marlin in the first half of 2010 to produce catch estimates, update biological parameters and estimate relative abundance indices for blue marlin.

2) Conduct an assessment of blue marlin in 2011. At the same meeting, produce white marlin catch estimates, including separating catches of roundscale spearfish. Update biological parameters and estimate relative abundance indices for white marlin.

3) Conduct an assessment of white marlin stocks in 2012.

Background

The last stock assessments for blue marlin and white marlin were conducted in 2006. No assessments have ever been conducted on spearfishes (*Tetrapturus spp.*). The last attempted assessment for sailfish (2001) was unable to estimate biological reference points such as maximum sustainable yield or the current state of the stock, mainly because of the uncertainty in the basic data required in the assessment. The ICCAT Commission recommended an assessment of white marlin and blue marlin in 2010 with a data preparatory meeting in 2009.

Work completed in 2009

- The first successful assessment for sailfish was conducted in 2009. In it the group estimated stock status and reference points for both stocks of sailfish. The group also separated the catch of spearfishes and sailfish from longline fleets that reported them together. Because of the work done on sailfish the group was unable to prepare for the marlin assessments.
- Genetic studies conducted in 2009 have shown that historical information on white marlin (including catch statistics, relative abundance indices and biological parameters) may also inadvertently reflect have been contaminated by unknown but significant numbers of roundscale spearfish.
- Progress on the age and growth of blue marlin, sailfish and longbill spearfish continues to be made.
- Work on sailfish reproduction in West Africa and South America has continued.
- Research on vertical habitat of sailfish and white marlin expanded in 2009.

Proposed work for 2010

Work can be separated into three major programs, the first and second are aimed at preparing the next blue marlin and white marlin assessments and the third at continued improvement on the information of all billfish.

In preparation for the 2011 blue marlin assessment and the data preparatory meeting in 2010 the following analyses are required:

- Review of catch estimates of blue marlin, especially those for artisanal fleets that are known to land billfish but do not report them to ICCAT like many of the FAD fleets from the Caribbean
- developing methods and data analyses that can facilitate the interpretation of historical longline CPUE indices

- review methods for accounting of under-reporting in the fleets that have been required to release marlins
- post-release survival of marlins
    - contribute to the international circle hook conference
- Update the blue marlin relative abundance indices
    - for all previously provided (TAI, JAP, CI, SEN, GHA, US, VE, BR)
    - develop new indices for (Sao Tomé, Uruguay)
    - develop a common data set of observer longline sets for blue marlin,
        - analyze the common coverage of set data by all fleets
        - develop a common index for all longliners at the data preparatory meeting
- Provide updates on age and growth of blue marlin

In order to prepare for a white marlin assessment in 2012:

- expand sampling program for the collection of tissues of spearfish and white marlin in:
    - West Africa (Senegal, Ghana, Côte d'Ivoire, Sao Tomé and possibly Gabon
    - Chinese Taipei vessels landing in Trinidad and Tobago (Port of Spain), Uruguay (Montevideo) and possibly South Africa (Cape Town)
    - continue sampling in longline vessels from United States, Venezuela, Brazil, Uruguay and Spain
- use genetic analyses to review the reliability of species identification for marlins and spearfish, as reported by the various fleets and observer programs:

In order to continue to improve the information on all billfish:

- continue the efforts of reviewing catch estimates, especially for those countries that are known to land billfish but do not report it to ICCAT.

Atlantic Swordfish Work Plan

Background

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

Proposed work

North and South Atlantic

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

Data Preparatory and Methods Meeting. Due to time constraints, recent sessions of the swordfish Working Group have provided assessments that have updated past results using methods and approaches available at the time. The Group recognizes that newer stock assessment approaches are now available which more fully incorporate biological data and provide more complete representations of uncertainties in stock status. To allow the Group time to explore the new approaches and to assemble the data in advance of the stock assessment session, it is recommended that a working session of five days duration be convened prior to the next assessment. The meeting should be convened in the year before the next assessment (possibly 2011).

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

CPUE Series. It is recommended that given the similarity between part of the Brazilian and Uruguayan swordfish fishing fleets and taking into account that the CPUE standardization studies of both fleets submitted at the meeting differ in their methods and results it would be desirable that scientists from Brazil and Uruguay held

inter-sessional meetings to deal with the standardization of CPUE series and processing of data from their respective fleets.

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

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

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

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

Mediterranean Swordfish Work Plan

Assessment. The latest assessment, conducted in 2007 using data up to 2005, indicated that the stock is overexploited. Taking into account that there are not any particularly worrying signals from the fishery (catches remain stable in the last decade) and Mediterranean-wide management measures were very recently adopted (since 2008), the Group recommends the accomplishment of an assessment not before 2011, using data at least up to 2009. This could also provide some chance to trace impacts of the recently employed management measures.

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

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

Gear selectivity studies. 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. Action: ***National Scientists***.

Management. The Working Group recommends that future work should consider a broader set of management scenarios including, apart from seasonal fishery closures, modifications of the fishing gears, fishing capacity

reductions, minimum landing size regulations (MLS) and quota limitations. Economic aspects should be also considered. Action: ***National Scientists***.

Small Tunas Work Plan

Complete the small tunas identification sheets.

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

Continue studies on stock structure and species distribution.

Review the spatial and temporal distribution of length for *Euthynnus alletteratus* in order to develop hypothesis about migration and stock structure of this species.

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

Sharks Work Plan

General comments

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

Work Plan

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

A more extensive and improved database should be developed to update the Ecological Risk Assessment (ERA). In this sense, the scientists are urged to carry out work on the life history of the shark species and to provide the Sharks Species Group with all the available information in their respective countries to be incorporated in future assessments. The information on fishing operations and on the status, disposition and size of the individuals caught (collected from the observer programs) is essential to estimate vulnerability and to thus generate a specific ERA for each fleet. In this respect, the possibility of developing a program for sharks such as those that exist for other species, would allow using funds that facilitate research on such a diverse group of species.

During the meeting of the Species Group the general structure and design of the shark identification guide was presented and approved. The finalization of this guide is expected in early 2010.

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

It is expected that the Group will collaborate with the Sub-Committee on Ecosystems to determine and validate the coverage of the Observer Programs in relation to obtaining data on sharks and will actively participate in the inter-sessional meetings of this Sub-Committee.

Appendix 6

BLUEFIN YEAR PROGRAM (BYP) ACTIVITIES

Introduction

The Committee reviewed the progress made under this Program during 2009 (this report is incomplete, as some of the scientists involved in BYP activities were not present at the meeting). In terms of future plans, the Committee was of the opinion that the BYP should be assimilated by the larger GBYP (Section 16.4) in the future. The GBYP should establish priorities and coordinate all research activities.

1. Financial report

The financial status of the BYP funds through October 1, 2009 was reviewed **(Table 1)**. A total of €9,645 remain in the program which should be transferred to the GBYP. Requests for additional future funding were made during the SCRS meeting by Spain (Item 2.3) and Croatia (Item 3.1). It is recommended that GBYP take these into consideration. The Committee believes that no BYP contributions will be necessary in 2010 from the regular Commission budget now that GBYP will be in place.

2. Progress made in the framework of the BYP Research Program

2.1 Tagging Activities in Spain

In 2008 y 2009 various bluefin tagging programs have been carried out in the eastern Atlantic and Mediterranean. Eight electronic pop-up satellite tags were placed on adult bluefin tuna (with the cooperation of the Mediterranean Confederation for Responsible Recreational Fishing (*Confederación Española de Pesca Marítima de Recreo Responsable*). In the framework of the MIGRATUN project 39 internal tags were placed on bluefin tunas whose weights ranged between 7-25 kg in the western Mediterranean and 76 internal tags were placed in the Cantabrian Sea.

Using standardized methods, together with the Spanish Institute of Oceanography (IEO) and the University of Cadiz and with the cooperation of the Mediterranean Confederation for Responsible Recreational Fishing, the WWF conducted electronic tagging in which 23 internal tags and 15 pop-up tags were placed.

With regard to conventional tagging, the Mediterranean Confederation for Responsible Recreational Fishing, with IEO's scientific coordination, tagged 508 bluefin tuna, 205 albacore and 11 tuna or tuna-like species.

2.2 Research on tuna in captivity and aquaculture

The SELFDOTT (from capture based to self sustained aquaculture and domestication of bluefin tuna, *Thunnus thynnus*) project is implementing the knowledge on the reproduction of bluefin tuna in captivity. It aims to establish the knowledge-base required for controlled development of eggs, larvae and suitable and environmentally performing feeds. Wild juveniles (Nutrition studies) and mature (Broodstock) bluefin tuna are being reared in floating cages at El Gorguel (Spain) and Marxaslokk Bay (Malta). A third broodstock is situated in Vibo Marina (Italy). All three broodstocks have been used to study gametogenesis, and the influence of diet on reproductive maturation and gamete quality. Mature fish have been induced to spawn, when the correct environmental temperature was reached by using hormone implants. Preliminary results show that the fish spawned daily, producing a total of 140 million eggs, with a daily maximum of 34 million eggs. The eggs produced were sent to research hatcheries to commence research on the larval rearing of this species.

2.3 Research on growth

An international cooperative research project in marine science between Canada and Spain was approved. The Fisheries and Oceans of Canada and the Spanish Institute of Oceanography (IEO) participate in the project entitled "Validated age and growth analysis of Atlantic bluefin tuna (*Thunnus thynnus*)" (BLUEAGE). This project will try to determine the viability of the use of the first radius of the first dorsal fin to validate age by using radiocarbon bomb. The project will also review the methodology and compare estimates of age by

different structures. Reference collections of otoliths and spines validated on the web and the analysis of temporal variability of growth rates of this species will be established.

2.4 Historical CPUE data mining

Norway provided detailed catch per unit effort (CPUE) data on bluefin tuna from 1946 to 1986 based on the Norwegian purse seine fleet. New and valuable data include numerous diaries and logbooks collected and used to calculate fishing effort. In this way a more realistic fishing effort could be used when calculating CPUE at different levels from individual vessels to the entire fleet. Efficiency values for individual purse seiners were calculated based on a range of collected variables, in order to obtain more realistic and reliable CPUE values for the historic Atlantic bluefin tuna catches off Norway. The changes in the geographical extend (distribution area) of bluefin tuna along the coast of Norway were also calculated annually for the entire time period. A range collapse of bluefin tuna appeared more or less during the same periods as we experienced a collapse in the abundance of bluefin tuna off Norway, suggesting that overall distribution area may be a useful indicator for the health and status of the stock. Calculated CPUE values based on bluefin tuna caught in Norway from 1946 to 1986 suggest that it may be wrong and dangerous to infer that high CPUE values provide high abundances of bluefin tuna.

3. BYP Research Plan for 2009-2010

3.1 Larval surveys

The Southeast Fisheries Center of Miami (NOAA) has proposed a joint workshop on bluefin larval habitat based on the results from their on-going research project and the TUNIBAL bluefin tuna larval surveys carried out from 2001-2005. Within the scope of the meeting, it is intended to analyze the results from these surveys and initiate collaborative efforts in the application individual based models, as well as, developing real time predictive models of bluefin larval distribution. The meeting will also contemplate the planning of a forthcoming bluefin larval survey off the Gulf of Mexico contemplating the participation of an expert from the TUNIBAL project. The meeting is intended to take place in Miami during December 2009 with the participation of two scientists from the TUNIBAL research team. Due to the meeting dates and funding for travel restrictions, extra funding as the ICCAT-BYP program is requested ($6,000).

3.2 A proposal from Croatia to study growth performances of the BFT juveniles (2+, 3+) as related to different temperatures

Background Observations made on growth rate of bluefin tuna provide an indication of the levels of growth which can be expected under farming conditions in Croatian waters of the Adriatic (Katavić *et al*., 2002; Katavić *et al*., 2003; Katavić *et al*., 2009). Due to the lack of finance the level of growth estimates were solely based on the sampling at the time of stocking and harvesting respectively, without any relations to the variety of environmental conditions (i.e. temperature).

Aim To better elaborate the growth rate of bluefin tuna juveniles reared in the cages in relations to different temperature conditions over the year as to improve general husbandry. Results of the trial will enable to carry out more accurate updated stock assessment as well as gaining further input to the conversion of product weight to RWT.

Materials and methods Approximately 500 bluefin tuna juveniles (2+, 3+ year class) caught by commercial purse-seiners will be stocked in a 50 m diameter and 20 m deep cage. At the beginning of the experiment 30 fish will be sacrificed and individually measured. Gilled and gutted weight (GG) and dressed weight (DD) will be also recorded. Further sampling will be conducted twice a month. The temperature in the entire water column will be monitored by means of data logger.

Financial means Financial support is asked from the BYP (seed money) to cover part of the costs related to regular sampling. With the seed money and the encouragement provided by BYP it is believed that other donors and bluefin tuna farmers themselves will cover the remaining costs of this trial.

30 spec. x 6 sampling = 180 spec. x approx 20kg = 3600 kg x €10
Total costs of biological sampling = €36,000

Twenty-five percent of the cost (€9,000) is requested from BYP.

Table 1. BYP budget as of October 6, 2009.

Bluefin Year Program	*Amount (€)*	
Balance at December 31, 2008		14,565.76
Income		**15,084.61**
Allocation from the Commission's Expense Budget	15,084.61	
Expenses		**20,005.32**
Data mining for BFT catch and effort data in Norway during 1950-1970	15,000.00	
Biological sampling in Morocco[1]	5,000.00	
Bank charges	5.32	
Balance at October 6, 2009		**9,645.05**

[1] Pending approval from BYP Coordinators.

Appendix 7

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH
(Expenditures/Contributions 2009 & Program Plan for 2010)

Summary and Program objectives

The ICCAT Enhanced Research Program for Billfish, which began in 1987, continued in 2009. The Secretariat coordinates the transfer of funds and the distribution of tags, information, and data. The General Coordinator of the Program is Dr. David Die (USA); the East Atlantic co-coordinators were Mr. Paul Bannerman (Ghana) and Mr. T. Diouf (Senegal), while the West Atlantic coordinator is Dr. Eric Prince (USA).

The original plan for the ICCAT Enhanced Research Program for Billfish (IERPB, SCRS 1986) included the following specific objectives: (1) to provide more detailed catch and effort statistics, particularly for size frequency data; (2) to initiate the ICCAT tagging program for billfish; and (3) to assist in collecting data for age and growth studies. During 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 2009 and are highlighted below.

The program depends on financial contributions, including in-kind support, to reach its objectives. This support is especially critical because the largest portion of billfish catches is, in recent years, coming from countries that depend on the support of the program to collect fishery data and biological samples. In recent years most of the financial support came from ICCAT funds but in 2009 there was also a contribution from Chinese Taipei.

2009 Activities

The following is a summary of the activities of the program; more details of activities conducted in the western Atlantic can be found in SCRS/2009/149. Four observer trips onboard Venezuelan longline vessels were completed between August 2008 and July 2009. Sampling of Venezuelan artisanal catches also continued in the central coast of Venezuela. Biological sampling from both the pelagic longline and artisanal Venezuelan fisheries has provided large numbers of spines and gonads for age, growth and reproductive studies of blue marlin and white marlin. Notably, this program recovered 30 tagged billfish between October 2008 and August 2009.

Brazil continued the collaborative program with United States institutions that started in 2005 and focused during 2008 on testing the performance of circle hooks on board commercial vessels, deploying pop-up satellite tags, tissue sampling for genetic analyses, gonads and stomach contents sampling and fin spine sampling for age and growth studies. Bermuda continued to collect biological materials during billfish tournaments. With IERPB support, Uruguay started collecting samples this year for age, growth and genetic analysis of billfish onboard longline vessels.

In West Africa the program continued to support a review of billfish statistics in Ghana, Senegal and Cote d'Ivoire. Improvements of catch records from these countries are reflected in the Task I tables for billfish, and were obvious during the 2009 sailfish assessment meeting. Support of this program facilitated the estimation of relative abundance indices for Cote d'Ivoire, Ghana and Senegal during 2009, and studies of spawning of billfish in Cote d'Ivoire. The program also profited from the cooperation with Spanish scientists that collected biological samples of billfish on-board purse seiners.

Documents that were produced in 2009 with the benefit of direct support of the IERPB were SCI/2009/023, SCI/2009/024, SCI/2009/030, SCRS/2009/032, SCRS/2009/033, SCRS/2009/047, SCRS/2009/054, SCRS/2009/064, SCRS/2009/066, SCRS/2009/123 and SCRS/2009/149.

2010 Plan and activities

The highest priorities are to support improvement in the statistics of artisanal fisheries Atlantic-wide and estimation of relative abundance indices for sailfish from these fisheries. Other important activities include the support for the continuation of the monitoring of the Uruguayan, Venezuelan and Brazilian longline fleets

through onboard observers, reporting of conventional tags, and biological sampling. All these activities depend on successful coordination sufficient financial resources and adequate in-kind support. Details of IERPB activities for 2010 are provided below. Many of these will complement general improvements in data collection made with the support of the ICCAT data improvement program.

Shore-based sampling

Sampling of artisanal and small scale fisheries to support the estimation of catch and effort statistics will be focused on fleets contributing the largest parts of the catch and/or those having traditionally provided the higher quality data in the past, to ensure the preservation of an uninterrupted time series of catch and relative abundance indices.

West Atlantic

Sampling at landing sites will be conducted for the following fleets: billfish tournaments in Venezuela, southeastern Brazil, Fernando de Noronha Island, and other locations off northeastern Brazil; longline landings in Venezuela, Uruguay and Brazil; gillnet landings in central Venezuela and landings of Chinese Taipei vessels in Port of Spain, Trinidad.

Eastern Atlantic

Monitoring and sample collection will be supported for the artisanal fisheries of Ghana, Cote d'Ivoire, Sao Tome and Senegal. The program will support efforts to recover data on billfish catch and effort from other contracting parties in the western Atlantic (Gabon, and Angola).

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.

Critical habitat of billfish using pop-up satellite archival tags

Several on-going projects are evaluating habitat use and critical habitat needs of blue and white marlin using pop-up satellite archival tag technology. These projects are independently funded but will require the support of the program to facilitate coordination.

Tagging

The program will need to continue to support conventional tagging and recapture reporting conducted by program partners.

Biological studies

Efforts to collect biological samples for genetics, reproduction, age and growth studies requires IERPB support to facilitate cooperation from fleets that are monitored with IERPB funds. The emphasis of biological sampling for age, growth, and reproductive studies will now be directed at sailfish and longbill spearfish. In addition, a biological sampling program for collecting genetic samples from billfish, particularly white marlin and spearfish, will be expanded in 2010. This program will address the critical research question to determine the ocean-wide ratio of white marlin to roundscale spearfish. Participants include Venezuela, Uruguay, Brazil, Spain, and the United States. Expansion of collections to other Atlantic areas will continue in 2010.

Coordination

Training and sample collection

Program coordinators need to travel to locations not directly accessible to promote IERPB and its data requirements. This includes travel to West African countries, as well as the Caribbean and South America by the

general coordinator and the coordinator from the west. Strong coordination between activities of the IERPB and the ICCAT data improvement project will continue to be required.

Program management

Management of the IERPB budget is assumed by the program coordinators, with the support of the Secretariat. Reporting 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 ICCAT to obtain reimbursement of funds.

2010 Budget and Expenditures

This section presents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 2009. The 2009 budget recommended by the Billfish Working Group for IERPB was €42,350.00. The only contributions made to the IERPB during 2009 were an allocation of €30,000.00 from the regular ICCAT budget and a contribution of €5,000 from Chinese Taipei. Carryover funds remaining from previous years were €457.80, thus total funds available for 2009 were €35,457.80 **(Table 1)**. As a consequence some planned activities of the program were not carried out. 2009 expenditures to date 2009 were €15,159.00, but an additional €19,800.00 are already committed to other activities that have either taken place in 2009 or will take place between October and December. The estimated balance of the program at the end of 2009 is €498.80 **(Table 2)**.

In-kind contributions to the program continued to be made during 2009. INIA and the University of Oriente (Venezuela) have provided personnel and other resources as in-kind contributions to the at-sea sampling program, thereby reducing the amount of funds needed for this activity from the ICCAT billfish funds. Also, the western program coordinator and overall coordinator traveled to through the region to oversee IERPB work. Travel expenditures for these trips were absorbed by the U.S. National Marine Fisheries Service, the University of Miami and, as such, represented in-kind contributions to IERPB for 2009. Ghana and Senegal provided in-kind contributions by supporting the time spent in the program by Mr. Bannerman and Mr. T. Diouf (Senegal) co-coordinators for the Eastern Atlantic.

2010 Budget and requested contributions

The summary of the 2010 proposed budget, totaling €39,850.00 is attached as **Table 3**. The Working Group requests that the Commission continues its contribution of €30,000.00 for 2010 to cover the most critical parts of the 2010 IERPB program (see **Table 4**). This includes funding for monitoring catches of longliners in Venezuela, Brazil, Uruguay, and the artisanal fleets of the Caribbean and West Africa. The requested contribution from ICCAT and voluntary contributions of €10,000.00 from other sources, are necessary to fully implement the IERPB 2010 program plan.

The consequence of the Commission failing to provide the requested contribution of €30,000 will be to stop or reduce program activities for 2010 including: (1) important at-sea observer trips in Venezuela, Uruguay and Brazil; (2) coordination travel for eastern coordinators; (3) sampling of artisanal fleets in the western and eastern Atlantic (4) sampling necessary for age, growth and genetic analyses; (6) promotion of conventional tagging activities, including distribution of tag recovery incentive rewards.

Conclusion

The IERPB has been credited for major improvements in the data supporting the last ICCAT billfish assessments, and more specifically supported improvements in catch data and biological parameters used during the 2009 sailfish assessment. If the IERPB program were to be terminated due to lack of funds, essential research and monitoring activities that are now supported by the program will suffer and the Working Group will be in a difficult position to address the needs of the Commission, including the upcoming assessment meetings for blue marlin and white marlin. Although considerable benefits will accrue from various outputs of the ICCAT data improvement program, the IERPB is the only program that exclusively focuses on billfish. By having this focus it is in the best position to ensure that the research and monitoring activities not covered by the ICCAT data improvement program are given some minimal resources. The IERPB is an important mechanism towards completing the goal of having the highest quality information to assess billfish stocks.

Table 1. Summary budget for 2009 for the Billfish Program.

Source	*Euros (€)*
Balance at start of Fiscal Year 2009	457.80
Budget recommended by the Working Group	42,350.00
Income (Allocation from ICCAT Regular Budget)	35,000.00
Expenditures and obligations (for details see **Table 2)**	-34,759.00
Estimated BALANCE	**698.80**

Table 2. Detailed 2009 Budget & Expenditures (as of September 25, 2009).

		Euros (€)
Balance transferred from 2008		**457.80**
Income	**Total**	**35,000.00**
	ICCAT Commission	30,000.00
	Chinese Taipei	5,000.00
Expenditures	**Total**	**-15,159.00**
	Venezuela	-12,105.00
	Côte d'Ivoire	-3,000.00
	Bank charges	54.00
Balance (as of September 25, 2009)		**20,298.80**
Funds obligated until end of 2009		**-19,600.00**
	Uruguay	-4,000.00
	Brazil	-5,000.00
	Ghana	-2,000.00
	Sao Tomé	-2,000.00
	Senegal	-3,000.00
	Coordination East	-2,000.00
	Tag reward	-500.00
	Bank charges	-100.00
Total estimated expenditures		**-34,759.00**
Estimated balance December 31, 2009		**698.80**

Table 3. Summary budget of the ICCAT Enhanced Research Program for Billfish for 2010.

Source	*Euros (€)*
Balance at start of Fiscal Year 2010	698.80
Income (Requested from ICCAT Regular Budget)	30,000.00
Other contributions	10,000.00
Expenditures (see **Table 4)**	39,850.00
BALANCE	**849.80**

Table 4. Detail of expenditures planned for 2010.

Source	*Amount (€)*
STATISTICS & SAMPLING	
West Atlantic shore-based sampling:	
Venezuela	5,000.00 *
Brazil	2,000.00
Uruguay	2,000.00
Trinidad & Tobago	4,000.00
West Atlantic at-sea sampling:	
Venezuela	6,000.00 *
Uruguay	2,000.00 *
Brazil	5,000.00 *
East Atlantic shore-based sampling:	
Senegal	3,000.00 *
Ghana	3,000.00 *
Sao Tome	2,000.00 *
Côte d'Ivoire	3,000.00 *
TAGGING	
Lottery rewards	500.00 *
COORDINATION	
Coordination travel East Atlantic	2,000.00 *
Mailing & miscellaneous	100.00 *
Bank charges	250.00 *
GRAND TOTAL	**39,850.00**

Authorization of all these expenditures depends, on sufficient funds being available by ICCAT and from other contributions.

* Highest priority to be funded mainly by requested ICCAT contribution. Total budget for these activities is €31,850.00.

Appendix 8

REPORT OF THE 2009 MEETING OF THE SUB-COMMITTEE ON STATISTICS
(Madrid, Spain - September 28-29, 2009)

1. Opening, adoption of Agenda and meeting arrangements

The Sub-Committee on Statistics met on September 28 and 29, 2009 at the offices of the ICCAT Secretariat. The meeting was chaired by Dr. Mauricio Ortiz (United States); Dr. Guillermo Diaz (Unites States) served as Rapporteur. The Agenda **(Addendum 1 to Appendix 8)** was adopted with changes. The meeting was attended by almost all the Species Working Groups Sub-Committee Chairs and a substantial number of scientists from different Contracting Parties.

2. Data Confidentiality Proposal for ICCAT

Document SCRS/122/2009 describes a proposal for implementing Data Confidentiality protocols for the ICCAT Secretariat databases. This proposal **(Appendix 10)** is similar to the one adopted by the WCPFC organization, and addressed the recommendations regarding data confidentiality by the Second Joint Tuna RFMOs meetings in 2009. Data confidentiality is not only for fisheries data but encompasses all information available at the Secretariat. Moreover, it is recognized by the International Standards Organization (ISO) as a requirement for most international organizations. This proposal will provide a protocol for which the Contracting Parties and the Commission can classify the available and future information based on a common risk evaluation and provide the Secretariat with the process to properly distribute and compile information for compliance, scientific and public distribution of information. Furthermore, the Sub-Committee briefly discussed several aspects of the document, particularly with regard to fisheries data. The Sub-Committee recommends adopting the Data Confidentiality protocols as described in Addendum 2**,** to be implemented as soon as possible by the Secretariat.

3. Issues regarding statistical and biological data submitted in 2009

3.1 Task I and Task II

The meeting started with the presentation of the Secretariat's Report on Statistics and Coordination of Research that summarized the submission of data from the last SCRS meeting up to September 2009. There has been a substantial improvement in the reporting of catch and effort data (Task I) by Contracting Parties, with most of the information being received before the deadline of July 31. It was noted however, that stock assessments that took place in the first semester of 2009 (albacore, porbeagle and sailfish), did have limited catch data for the last year (2008), and only the swordfish assessment conducted during September 2009 incorporated 2008 catches. The Secretariat also reported an increase in the submission of data using the ICCAT electronic forms in 2009. This has greatly accelerated the incorporation of data into the electronic database. Finally, the Secretariat summarized the Task I and II submissions by Contracting Parties in Tables 1, 2, 3 and 4 presented in the Secretariat Report on Statistics and Coordination of Research 2009. The Sub-Committee noted that there is a compromise between required data submission deadlines and the quality of data. Requiring early data submissions are likely to result in the submission of highly provisional data, which will require several later updates.

It was also reported that during the Caribbean Tropical Fisheries Workshop (SCRS/2009/023) held in Guyana, several countries submitted updated reports of their respective fleet characteristics. It was recommended that the information be added into the fleet characteristics database. The Chairs of the Species Groups that conducted assessments during 2009 reported on the data availability, data preparation and specific recommendations from the Working Groups to the Secretariat in order to improve their analyses. The Albacore Working Group acknowledged the excellent work of the Secretariat on preparing the data for the assessment analyses, and reported on the useful and efficient distribution of data prior to the meeting through the ICCAT website. The Sub-Committee on Ecosystems indicated that fishing effort data was readily available for the Seabirds assessment, however it noted that few Contracting Parties had presented documents on seabird by-catch rates. The Secretariat responded that it received seabird by-catch from South Africa, but that currently there is no formal mechanism (e.g. electronic forms, species codes) for Contracting Parties to report by-catch information of

species such as seabirds, sea turtles, etc. The Sub-Committee noted that this is part of the objective for the By-catch Coordinator position recommended by the SCRS in the past, and recommended that the Sub-Committee on Ecosystems and the Sharks Species Group coordinate with the Secretariat on a mechanism to incorporate this information into the ICCAT database. The Sub-Committee also discussed whether by-catch should be reported as collected, or if estimates of total removals be submitted (i.e. expanded to the total fleet). Given the priority the Commission is placing on non-target species, the Sub-Committee recommends that expanded estimates of by-catch, the observed by-catch and sampling levels be recorded in the ICCAT databases. The Sub-Committee recommended that, at the least, experts within the Species Groups need to review the methods used for expanding observations, particularly for by-catch species. It was also noted that current observer programs may lack the expertise or training to properly identify by-catch to the species level. The SCRS has taken on the task of preparing identification guides to aid in species identification. In view of the continuous need for improving training, two options were proposed. The first, to provide supplementary training to observers, and second, to search for alternative methodologies to identify by-catch composition: such as digital photos and/or collection of tissue samples for genetic identification of specimens caught by the ICCAT fisheries. It was also recommended, that the Secretariat adopt the species codes used by the FAO for seabirds and other by-catch species.

The Sharks Species Group indicated that the porbeagle assessment also had problems with limited data, particularly in the southeastern Atlantic region. The Sailfish assessment reported on the excellent support from the Secretariat during the workshop. It also reported on the diminishing participation of scientists from Contracting Parties with major billfish fisheries which resulted in the loss of valuable information for the assessment process. The Sub-Committee noted this trend not only in the Sailfish assessment but also in the Seabird and Swordfish assessments, and recommended that Contracting Parties ensure full participation of National scientists during assessment and inter-sessional meetings. This is especially important since the time-series history of catch/effort information used in assessments is frequently only available to National scientists attending the assessment, since the data are considered confidential. The Swordfish Species Group reported that a large proportion of the 2008 catch was available and was used during the assessment meeting. The swordfish Working Group also noted the absence of scientists from major fishery Contracting Parties.

3.2 Tagging data

The Secretariat reported on the update of tagging data from several Contracting Parties, distribution of conventional tags for tagging experiments and the distribution of revised tagging data to the different stock assessment Working Groups during 2009 (Secretariat Report, Table 5). It was noted that considerable improvement in the tagging database has been achieved in the most recent years due to the collaboration between the Chairs of Working Groups and National scientists. In the tagging database, for tropical species, in particular, reports of the total number of released fish are not recorded, although this data may be available to National scientists. For stock assessment evaluations, it is critical to know the total number of released fish and the proportion of those that are recaptured. The Sub-Committee recommended that Contracting Parties recover and submit complete tag release and recapture information, in conformity with data reporting obligations.

3.3 Revisions to historical data

EC-France (SCRS/2009/146) presented estimates of "*faux poissons*" estimates by fleet-nation of the West Africa Gulf of Guinea fisheries during 1982-2008. The Sub-Committee recommended that each Species Group revise and evaluate the information presented and report back to the Secretariat their decisions.

3.4 Bluefin, Swordfish and Bigeye Statistical Documents and other trade information

The Secretariat reported on updates to the trade statistics for bluefin tuna, swordfish and bigeye tuna (Secretariat Report, Table 13).

4. Updated report on a relational database system

The Secretariat reported that databases related to compliance are managed separately from fishery statistics data. The Commission's Recommendation [Rec. 08-05] made these databases available to the SCRS. However, the Secretariat requested advice from the Sub-Committee and Species Groups regarding the best format for presentation of this information while still maintaining the confidentiality requirements. The Secretariat presented document SCRS/122/2009 which describes the available compliance information and level of aggregation likely useful for the different SCRS working Species Groups.

With respect to the VMS data, although the commission recommended that the Secretariat make the data available to the SCRS, there are confidentiality restrictions that need to be followed. It was discussed that these rules might affect the use of the data and/or analyses that might be conducted by the SCRS. At the present VMS data is exclusively for EBFT and potentially tuna and tuna-like species associated with fisheries of the Mediterranean and Black Sea. The Secretariat Report provided summary tables (Tables 9 to 11) of potentially useful information for the Eastern bluefin tuna that can be used to validate Task I and effort distribution with higher spatial and temporal resolution. The Secretariat also noted that the Commission's Recommendation [Rec. 06-11] to monitor at-sea transshipment by large scale longliners, provides an alternative source of information to validate catch, and catch composition for several tunas species, and tuna like species (the Secretariat Report Table 14). However, it was noted that several of the types of products reported lack appropriate conversion factors to convert information into total round weight. The Sub-Committee recommended that each Species Group revise Table 14b in the Secretariat Report and initiate research to complete the conversion factors required.

The Secretariat reported that progress on the full documentation of the ICCAT database has been made. The Sub-Committee reiterates the importance of this task, and recommended it again as a priority task for the Secretariat in the work plan for the upcoming year.

The Secretariat reported an increase in the number of Contracting Parties submitting data using the available electronic forms, compared to 2008. Regarding electronic forms, during the 2009 Inter-sessional meeting of the Conservation and Management Measures Compliance Committee (COC) in Barcelona it was recommended to modify the e-forms for reporting size sampling of bluefin tuna at farms. The Secretariat took note, and already has provided updated electronic forms with appropriate instructions that will be distributed immediately to interested Contracting Parties.

5. Evaluation of data deficiencies pursuant to [Rec. 05-09]. Analysis and presentation materials

5.1 Data report cards

The Secretariat presented a report of the data submitted during 2009 in the Secretariat Report on Statistics and Coordination of Research 2009. Table 1 and 2 of the Secretariat's Report presents a summary by Contracting Party of the Task I data submitted either before (green) or after the deadline(s) (red) to the Secretariat. The Secretariat's Report (Tables 3 and 4) presented a similar summary of Task II, and size data submitted in 2008/09.

6. National and international statistical activities

6.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)

Section 6 of the 2009 Secretariat Report on Statistics and Coordination of Research reported on the participation and work of the Secretariat with international and inter-agency coordination activities. The Secretariat was unable to participate in the 2009 FIRMS Steering Committee meeting. In that meeting, the Steering Committee approved the proposals of the technical working group on equivalences between stock state descriptors, used by RFMO members and the descriptors defined by FIRMS. In the case of ICCAT these equivalences should be established manually. Table 15 of the Secretariat Report shows a proposal of equivalences based on the Kobe plots on stock status used by the SCRS. The Sub-Committee recommended that each Species working group review the table definitions and provide a response to the Secretariat regarding each stock status descriptor. The Secretariat also informed on the collaboration with the ASFA and the CWP. Following a presentation from the FAO on the CWP activities, the Sub-Committee recommended that the Secretariat participate actively in the upcoming CWP meetings regarding capture and aquaculture matters.

7. Report on data improvement activities

The Coordinator's Report on Activities of the Japan Data Improvement Project (JDIP), October 2008 to September 2009, discussed the activities and projects supported by the JDIP (SCI-009/2009). Section 2.5 of the

Secretariat Report reports on other data improvement activities carried out by the Secretariat during 2009 and supported financially from other funds.

7.1 Data recovery activities

EC-France scientists and the Secretariat recovered albacore catch data for 1967-1993, these data will soon be incorporated into the ICCAT database (SCRS/2009/104). The Secretariat also reported on collaborative work by scientists from Ghana to update estimates of catch (Task I) and size frequency distribution of the catch from the Ghanaian fleet for 2006 and 2007. Data from the Uruguay longline fishery 1981-2004 was recovered and provided to the Secretariat. EC-Portugal also provided recovered size data from the Azorean bait-boat fisheries for the period 1963-1985. The Sub-Committee recognized the effort made by the Secretariat to recover valuable data. The Sub-Committee was informed that scientists from IRD are working on the recovery of historical data (catch, effort and sizes) of Ghanaian fleet landing in Abidjan. The Sub-Committee encourages scientists to go on with this task and submit data to the next SCRS.

8. Review of publications and data dissemination

Section 5 of the Secretariat Report on Statistics and Coordination of Research 2009 described the publications provided by the Secretariat during 2009. Detailed presentations were deferred to the SCRS Plenary when all official scientific delegates will be present.

The Secretariat also reported on the agreement between ICCAT and *Aquatic Living Resources* (ALR) scientific journal. Following suggestions from CPC scientists, the Secretariat provided a list of expert tuna scientists to the ALR editorial office and agreed with ALR that for documents submitted through the SCRS, at least one of the reviewers will be chosen from this list. The Sub-Committee also recommended expanding this list by including expert scientists for the by-catch species.

The Secretariat noted that SCRS documents had not conformed to the Secretariat's format standards. The Secretariat has already provided an electronic form-template for the SCRS scientific collection documents, and the Sub-Committee encourages that these be used by national scientists.

The Secretariat has collaborated in the preparation of an Atlas of Atlantic tunas. This Atlas will show graphically the changes in the large tuna fisheries since the 1950s. The Atlas will be published by IRD in 2009.

8.1 Review of progress made for a revised ICCAT Manual

The completion of Chapter 3 is pending completion of the description of the longline gear which is ongoing. Troll, harpoon, and rod and reel gears are also pending description, scientists from Canada and EC-Spain will collaborate to complete the descriptions for these gears in a near future. The Secretariat informed that in the near future, a bound hard copy of the Chapter 2 Manual will be published.

9. Future plans and recommendations

1. The Sub-Committee recommends that the Commission adopt the Data Confidentiality proposal detailed in **Appendix 10** and instruct the Secretariat to implement these protocols immediately. Given the availability of many new compliance-related datasets that could be used by SCRS, it is recommended the creation of an advisory group that can assist the Secretariat in improving the data-management and organizational structure, with a view towards how to best achieve an integrated approach to manage the Secretariat databases.

2. The Sub-Committee also recommends that the Secretariat purchase and upgrade wireless hardware, access points and software to improve WiFi network access during meetings, particularly if the move to the new Secretariat Headquarters is further delayed.

3. The Sub-Committee recommends that Contracting Parties provide detailed information on live discards for all ICCAT fisheries using the available electronic forms, and promote research on post-release mortality.

4. The Sub-Committee recommends that each species Sub-Committee update and complete conversion factors for several of the tuna product types to facilitate the use of the compliance databases.

5. The Sub-Committee recommends that the full documentation of the ICCAT database continue as a priority task.

6. The Sub-Committee reiterates that the Chairs of the Species Working Sub-Committees (or a representative) must be present at the meeting of the Sub-Committee on Statistics, and continues to recommend that the Sub-Committee on Statistics meeting be scheduled on the first day of the SCRS species group meetings.

7. The Sub-Committee recommends that scientists use the form-template provided on the ICCAT website when submitting SCRS documents.

10. Other matters

No other matters were discussed during the meeting.

11. Adoption of the report and closure

The report was adopted during the meeting, and the meeting was adjourned.

Addendum 1 to Appendix 8

Agenda of the Sub-Committee on Statistics

1. Opening, adoption of Agenda and meeting arrangements
2. Data Confidentiality Proposal for ICCAT
3. Issues regarding statistical and biological data submitted in 2009
   - 3.1 Task I and Task II
   - 3.2 Tagging data
   - 3.3 Revisions to historical data
   - 3.4 BFT, SWO, BET Statistical Documents and other trade information
4. Updated report on a relational database system
5. Evaluation of data deficiencies pursuant to [Rec. 05-09]. Analysis and presentation materials
   - 5.1 Data report cards
6. National and international statistical activities
   - 6.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)
7. Report on data improvement activities
   - 7.1 Data recovery activities
8. Review of publications and data dissemination
   - 8.1 Review of progress made for a revised *ICCAT Manual*
9. Future plans and recommendations
10. Other matters
11. Adoption of the report and closure

Appendix 9

REPORT OF THE SUB-COMMITTEE ON ECOSYSTEMS
(Madrid, Spain – September 30, 2009)

The Sub-Committee on Ecosystems met at the Secretariat on September 30, 2009. The meeting was chaired by Dr. Haritz Arrizabalaga (EC-Spain). The Chair opened the meeting and welcomed the participants. The Agenda was revised and adopted **(Addendum 1 to Appendix 9)**.

1. Review of new scientific information

Four new SCRS documents and one additional powerpoint presentation were made available at the meeting. Their summaries are provided below.

The powerpoint presentation dealed with ocean scale hypoxia based habitat compression of Atlantic istiophorid billfishes. Oxygen minimum zones have been reported to occur as distinct strata in large areas of the eastern tropical Pacific and Atlantic Oceans. In the eastern tropical Pacific (ETP), this stratum restricts the depth distribution of high oxygen demand tropical pelagic marlins, sailfish, and tunas by compressing the suitable physical habitat into a narrow layer at the surface of the ocean (i.e. habitat compression). This surface mixed layer is defined by a shallow thermocline, above a barrier of cold hypoxic water (>3.5 ml/l). The cold hypoxic environment below the thermocline constitutes a lower habitat boundary for tropical pelagic fishes in the eastern tropical Pacific, often at 25-50 m. However, hypoxia based habitat compression has not been demonstrated in the eastern tropical Atlantic Ocean (ETA), which has similar oceanographically characteristics to the ETP. In this study, the authors compared vertical habitat use of eastern and western Atlantic sailfish and blue marlin monitored via popup satellite archival tags. Evident highly significant differences, with shallowest vertical habitat use occurring in the eastern Atlantic where DO is limited with depth, and much greater vertical habitat use for both species in the western Atlantic where DO is not limited with depth. Given these results, the authors offer a mechanistic approach for incorporating compression impacts directly into stock assessments of tropical pelagic species that utilize the ETA. Application of a statistical habitat standardization approach would, in theory, adjust catch rate data according to the increased vulnerability of these fish to surface gears created by the compression phenomenon.

Document SCRS/2009/146 presented by-catch and discards estimations as well as characteristics for several species groups for the European purse seine tuna fishery operating in the Atlantic Ocean for the period 2003-2007. Data were collected through French and Spanish observer programs and represented a total of 598 observed fishing sets. Total by-catch and tuna discard estimations were derived from a stratification based on fishing mode (free school vs log-school), season (quarters) and spatial area. Different raising factors were compared and estimations relative to the landings of major commercial tunas were considered the most appropriate. Mean annual total tuna discards and by-catch were estimated to be about 6 000 t corresponding to a mean annual value of 76.3 t per 1000 t of tuna landed. Tuna discards represents 83 % (63.5 t/1000 t) of the total amount, followed by finfishes (10 %, 7.8 t/1000 t), billfishes (4 %, 3.2 t/1000 t) and sharks (1 %, 0.9 t/1000 t). By-catch species composition, main species length, sex ratio and utilization for the most common species were presented. Total discard and by-catch estimates for the period 2003-2007 were compared with estimates of the European tuna purse seine fishery in the late 1990s. A preliminary comparison with results obtained in the Indian Ocean was also presented. Discussions after this presentation suggested that the high level of tuna discards that seems to be occurring in the European purse seine fleet compared to previous period may be related to a saturation of the "*faux poisson*" local market of Abidjan. As illustrated in document SCRS/2009/147, a recent and sharp increase of the amount of tuna products unloaded by Ghanaian fisheries is taking place on this local market.

Document SCRS/2009/130 presented an information system being developed by IRD for the observer program in the tropical tuna fishery. The system integrates several types of data (catches, effort, length measurements, etc.), and is intended to computerize data collection as close as possible to the source, to increase observer program data quality and to simplify observers' work. The main work has been focused on, shortening the information route between the observer and the central data depository, assisting the observer and verifying the observer's entries, developing a carefully prepared program on the ergonomics, and relying on available and durable computer technologies.

Document SCRS/09/155 reported several length relationships (between Minimum Straight Carapace Length, Standard Curved Carapace Length and Minimum Curved Carapace Length) for loggerhead turtle (*Caretta caretta*) from the by-catch of the Spanish surface longline in the Western Mediterranean Sea.

Finally, document SCRS/09/136 showed the data collected on seabird by-catch by the on board observers program of the IEO in the Western Mediterranean. Data were collected from 2000 to 2008. Six longline gears targeting large pelagic fish were identified operating in the study area, differences in CPUEs obtained by each gear and their incidence on certain seabird species are discussed in this paper.

2. Revision of the report of the inter-sessional meeting

The report of the inter-sessional meeting held in Recife in June was revisited by the group. The main goal of this meeting was to complete the three year, six stage seabird assessment. Apart from that, some discussions were held about ecological risk assessment as a tool to highlight the species or species groups most at risk and to prioritize future activities of the Sub-Committee. The meeting also made clear recommendations about by-catch data needs, observer programs, research on mitigation measures and development of ecosystem indicators.

The revision of the report allowed, among other things, to revisit the information that was available in Recife on which drafting of management recommendations was based. These management recommendations were very slightly modified by the group and are included in the section below.

2.1 Seabird management recommendations including potential modifications to Recommendation [07-07]

Advice on reducing incidental by-catch of seabirds in longline fisheries in reference to [Rec. 07-07] is presented in Section 16.7 of the SCRS Report.

3. Other matters

The group noted that during 2009, two meetings, the Second Joint Meeting of Tuna Regional Fisheries Management Organizations on one hand, and the Working Group on the Future of ICCAT, on the other, made some recommendations that were of concern for the Sub-Committee.

The Second Joint Meeting of Tuna Regional Fisheries Management Organizations, among the course of actions proposed for the near future, identified the need to organize a workshop on tuna RFMO management issues related to by-catch. The objective of this workshop would be to revise available information on by-catch, to provide advice to RFMOs on best practice, methods and techniques to assess and to reduce the incidental mortality of non-target species, to develop and coordinate relevant research programs and observer programs and find mechanisms to streamline the work of the tuna RFMO Working Groups in order to avoid duplication.

On the other hand, the Working Group on the Future of ICCAT considered amending the ICCAT Convention by including the ecosystem considerations, including by-catch. Would the Commission identify a wider range of goals for the Convention area ecosystem components, the SCRS should then use models which incorporate best knowledge of ecosystem dynamics and account for the identified goals to identify critical data gaps, and ecological processes, and guide research and data collection needed for testing and implementation of EBFM. It was acknowledged that this process might take several years and important investments in research and data collection will need to be done before even knowing what the optimal management tools and their data requirements will be for EBFM. However, at a minimum, it is critical to have a full accounting of the catch composition and disposition of the fleets impacting ICCAT species of concern as well ecologically related species. As such, it was recommended that the Commission should take steps designed to intensify and improve scientific observer programs, sampling programs, and research to support these requirements.

Work Plan for 2010

An inter-sessional meeting is envisaged for 2010 (not before May so as to allow enough time to complete the analyses).

The Sub-Committee on Ecosystems encourages scientists to continue providing available detailed information regarding interactions with by-catch species that may allow quantification of total removals. Besides this, it is requested that new analyses be conducted, based on extensive observer datasets or based on simulation, so as to be able to give advice on the optimum observer coverage that is needed to obtain precise and accurate estimates of by-catch, for different taxa. Finally, the group proposed, that instead of focusing on another group of by-catch species (such as seabirds), progress be made on the discussion/development/application of ecosystem indicators to assess the ecosystem impacts in ICCAT fisheries.

A tentative agenda for the 2010 inter-sessional meeting would be:

- Review of new information regarding ecosystems
- Optimum observer coverage for reliable estimates of by-catch
- Ecosystem indicators useful for the SCRS
- Other matters
- Recommendations

Addendum 1 to Appendix 9

Agenda of the Sub-Committee on Ecosystems

1. Examination of new information regarding ecosystems
2. Revision of the inter-sessional meeting report
   2.1 Management recommendations including potential modifications to *Recommendation by ICCAT on Reducing Incidental By-Catch of Seabirds in Longline Fisheries* [Rec. 07-07]
3. Other matters
4. Work Plan for 2010

Appendix 10

SUGGESTED RULES AND PROCEDURES FOR THE PROTECTION, ACCESS TO, AND DISSEMINATION OF DATA COMPILED BY ICCAT

1. Basic principles relating to the dissemination of data by the ICCAT

1. Data and information held by the ICCAT Commission or Secretariat, and by service providers or contractors acting on their behalf, shall only be released in accordance with these Rules and Procedures; which reflect the policies of confidentiality and security determined by the Commission.

2. Data may be disseminated if the CPC (Contracting Party or Cooperating non-Contracting Party, Entity or Fishing Entity) providing the data to the ICCAT authorizes its release.

3. Persons duly authorized by the Executive Secretary within the ICCAT Secretariat and service providers, who have read and signed the Commission's confidentiality protocol, shall have access to the data necessary to perform their ICCAT duties.

4. Officers of the Commission and its subsidiary bodies shall have access to the data necessary to perform their ICCAT duties.

5. CPCs shall have access to data to serve the purposes of the Convention, including data:
   (a) covering vessels flying their flag in the ICCAT Convention Area.
   (b) covering any vessels fishing in waters under their jurisdiction.
   (c) covering vessels applying to fish in their national waters, unloading in their ports or transshipping fish within waters under their jurisdiction.
   (d) for the purpose of compliance and enforcement activities on the high seas, consistent with the Convention and the Conservation and Management Measures and other relevant decisions adopted by the Commission, subject to the rules and procedures for access and dissemination of such data that the Commission will adopt under paragraph 23.
   (e) for the purpose of scientific and other research, if the CPC that originally provided that data authorizes the Commission to release them. In cases where a CPC elects to provide an ongoing authorization for the release of such data, the CPC may at any time cancel this authorization by notifying the Secretariat that it has revised its earlier decision.

6. To the greatest extent practical, the ICCAT Commission, Secretariat and their service providers, should disseminate data in a timely manner.

2. Risk classification and definition of confidentiality

7. Data covered by these Rules and Procedures will be classified in accordance with the risk classification methodology included in **Table 1**, which reflects *inter alia* the damage that would be done to the operations or creditability of the Commission as a consequence of the unauthorized disclosure or modification of such information.

8. Data covered by these Rules and Procedures were determined to be either public domain or non-public domain data in accordance with the definition of confidentiality established in **Table 1**.

3. Dissemination of Public Domain Data

9. Data in the public domain shall not reveal the individual activities of any vessel, company or person and shall not contain private information. Catch and Effort data in the public domain shall be aggregated by flag, gear, month and 1ºx1º grid (for surface fisheries) or 5ºx5º grid (for longline fisheries).

10. Annual catch estimates and aggregated catch and effort data that can be used to identify the activities of any vessel, company or person are not in the public domain.

11. Except for data as described in Paragraphs 9 and 10, the types of data listed in ***Addendum 1 to Appendix 10*** have been designated to be Public Domain data.

12. Public Domain data shall be available to any persons for (a) downloading from the Commission's website and/or (b) release by the Commission on request.

13. The website should contain a statement describing the conditions associated with the viewing or downloading of Public Domain data (for example, that the source of the data must be acknowledged), and should require the person requesting the data to "Accept" these conditions before viewing or downloading can begin.

4. Dissemination of Non-Public Domain Data

4.1 Definition of Non-Public Domain Data

14. Subject to the decisions of the Commission, all types of data not described in paragraph 11 shall be referred to as Non-Public Domain data.

15. A list of examples of Non-Public Domain data can be found in ***Addendum 2 to Appendix 10***.

4.2 General rules for dissemination of, and access to, Non-Public Domain data

16. Access to and dissemination of Non-Public Domain data shall be authorized in accordance with these Rules and Procedures and the policies of confidentiality and security established in the Commission's Information Security Policy (ISP).

17. The ICCAT Secretariat shall log and report to the Commission all access and dissemination of Non-Public Domain data, including the name and affiliation of the person, the type of data accessed or disseminated, the purpose for which the data were requested, the date when the data were requested, the date when the data were released and authorizations that may have been required.

4.3 Access to Non-Public Domain data by the Staff of the Secretariat, the ICCAT Service Providers, and Officers of the Commission and its Subsidiary Bodies

18. Persons duly authorized by the Executive Secretary, within the ICCAT Secretariat and service providers, including scientific experts within the SCRS, shall have access to the data necessary to perform their ICCAT duties. Officers of the Commission and its subsidiary bodies shall have access to the data necessary to perform their ICCAT duties. All such persons shall sign a Confidentiality Agreement with the Executive Secretary and maintain the data security standards of the Commission in respect of data to which they have access. The Executive Secretary shall maintain a Register of all such persons (including the purpose for which they require access to the data) and make the Register available to a CPC on written request.

4.4 Access to Non-Public Domain data by CPCs

19. CPCs shall have access to Non-Public Domain data to serve the purposes of the Convention, including data:
    (a) Covering vessels flying their flag in the ICCAT Convention Area
    (b) Covering any vessels fishing in waters under their jurisdiction
    (c) Covering vessels applying to fish in their national waters, unloading in their ports or transshipping fish within waters under their jurisdiction
    (d) For the purpose of scientific and other research, if the CPC that originally provided that data authorizes the Commission to release them. In cases where a CPC elects to provide an ongoing authorization for the release of such data, the CPC may at any time cancel this authorization by notifying the Secretariat that it has revised its earlier decision.

20. CPCs shall notify the Secretariat of a small number of representatives (preferably only 2) authorized to receive Non-Public Domain data. Such notification will include name, affiliation, and contact information (e.g. telephone, facsimile, email address). The ICCAT Secretariat will maintain a list of such authorized

representatives. CPCs and the Secretariat shall ensure the list of CPC representatives is kept up to date and made available.

21. The authorized representative(s) of the CPCs are responsible for ensuring the confidentiality and security of the Non-Public Domain data according to its risk classification and in a manner consistent with security standards established by the Commission for the ICCAT Secretariat.

22. The Non-Public Domain data described in paragraph 19 will be made available by the Secretariat to authorized representatives of the CPCs for release by the Commission on request and, where appropriate, downloading from the Commission's website in accordance with the Commission's ISP.

23. For the purpose of compliance and enforcement activities on the high seas, Non-Public Domain data will be made available subject to separate rules and procedures for the access and dissemination of such data, that the Commission will adopt for these purposes.

24. VMS data will be made available for scientific purposes, subject to the separate rules and procedures referred to in paragraph 23 above.

25. Access to Non-Public Domain data by CPCs shall be administered by the Executive Secretary on the basis of these Rules and Procedures and the Framework at ***Addendum 3 to Appendix 10***.

26. The Executive Secretary will implement the Framework and authorize access to and dissemination of Non-Public Domain data.

27. Unless otherwise decided by the Member or CPC responsible for its external affairs, Participating Territories shall have the same access rights to data as CPCs.

28. A CPC that has not fulfilled its obligations to provide data to the Commission for two consecutive years shall not be granted access to Non-Public Domain data until all such matters are rectified. A CPC whose representative, authorized in accordance with paragraphs 20 and 21 above, failed to observe the rules stipulated in these Rules and Procedures shall not be granted access to Non-Public Domain data until the appropriate actions have been taken.

4.5 Exchange of data with other regional fisheries management organizations

29. If the Commission enters into agreements for the exchange of data with other regional fisheries management organizations (RFMOs) or other organizations, such agreements must include requirements that the other RFMO provides equivalent data on a reciprocal basis and maintains the data provided to them in a manner consistent with the security standards established by the Commission. The data that may be exchanged is specified in ***Addendum 4 to Appendix 10***. At each annual session the Executive Secretary will provide copies of data exchange agreements that exist with other RFMOs and a summary of the data exchanges that occurred during the previous 12 months under such agreements.

4.6 Disseminations of Non-Public Domain data in other circumstances

30. Non-Public Domain data will be made available by the Secretariat to any persons if the CPC that originally provided that data authorizes the Commission to release them. In cases where a CPC elects to provide an ongoing authorization for the release of such data, the CPC may at any time cancel this authorization by notifying the Secretariat that it has revised its earlier decision. Unless otherwise requested by the provider of the data:

Including universities, researchers, NGOs, media, consultants, industry, federations, etc.

(a) Persons that request Non-Public Domain data shall complete and sign the Data Request Form and sign the Confidentiality Agreement and provide them to the Commission in advance of obtaining access to said data.

(b) The Data Request Form and Confidentiality Agreement shall then be forwarded to the CPC that originally provided the requested data and the provider shall be requested to authorize the Commission to release the data.

(c) Such persons shall also agree to maintain the data requested in a manner consistent with the security standards established by the Commission for the ICCAT Secretariat.

31. CPCs that have provided Non-Public Domain data to the Commission shall notify the Secretariat regarding their representatives with the authority to authorize the release of Non-Public Domain data by the Commission. Decisions whether to authorize the release of such data shall be made in a timely manner.

4.7 Force majeure

32. The Executive Secretary may authorize the release of Non-Public Domain data to rescue agencies in cases of *force majeure* in which the safety of life at sea is at risk.

5. Periodic Review

33. The Commission or its subsidiary bodies will periodically review these Rules and Procedures, and subsidiary documents, and the rules and procedures referred to in paragraphs 23 and 24 above, and amend these if necessary.

6. Final Clause

34. These Rules and Procedures do not prevent a CPC from authorizing the release of any data it has provided to the ICCAT.

Table 1. Types of information and confidentiality classification. Certain types of information such as Task I and Task II already have mandatory reporting and are publically available through the ICCAT Web Site and the *ICCAT Statistical Bulletin*.

Information Type	***Risk Classification***
Operational level Catch Effort data (e.g. set-by-set CPUE)	High
Annual catch estimates stratified by gear/flag and species for the ICCAT Statistical Areas (Task I)	mandatory reporting already in place
Aggregated catch and effort data stratified by gear/year/month, 5x5 (LL) or 1x1 (surface), and flag (Task II catch/effort)	mandatory reporting already in place
Records of vessel unloading and logbooks	Medium
Transshipment consignments by species	Medium
Biological data (if adequate time has passed to allow the scientists that organized the for collection of such data to publish a paper analyzing it)	mandatory reporting already in place
Conventional Tagging data	No risk
Detailed electronic tagging data	Medium
ICCAT Record of Fishing Vessels (vessels authorized to fish; vessels authorized to transport; support vessels; carrier vessels)	mandatory reporting already in
Vessel and gear attributes from other open sources	No risk
Oceanographic and meteorological data	No risk
Movements of fishing vessels recorded at a fine resolution/VMS Vessel position, direction and speed	High
Boarding and Inspection Reports	High
Certified observer personnel	Medium
Certified inspection personnel	High
Catch Documentation Scheme	Medium

Port State Inspection Reports	Medium
Violations and infringements, detailed	High
Annual number of active vessels, by gear type and flag	Mandatory reporting already in place
Economic data	[unassigned]
[Social data]	[unassigned]
Fisheries intelligence-sharing information	High
Weekly catch reports	High
Caging declarations	Medium

Table 2. Annotations on information types mentioned in **Table 1**.

Information Type	***Annotations***
Operational level Catch Effort data	Collected on fishing vessel logbooks and by observers.
Compliance-related observer data	Excludes operational catch and effort data, biological data and vessel and gear attributes.
Biological data	Biological data include size data, data on gender and maturity, genetic data, data on hard parts such as otoliths, stomach contents, and isotopic N15/C14 data collected by observers, port samplers and other sources. "Biological data" in this context does not include information identifying the fishing vessel, for example, which would otherwise alter its security classification.
Conventional Tagging data	Conventional Tagging data include species, release and recapture positions, lengths and dates. "Tagging data" in this context does not include information identifying the fishing vessel that recaptured the tagged tuna, for example, which would otherwise alter its security classification.
Electronic tagging data	Detailed electronic tagging data include detailed records from pop-up or archival tags such as date, time, depth, temperature, light intensity, etc.
ICCAT Record of Vessels	Covers vessels authorized to fish in the ICCAT Convention area Covers also records of transport and other types of vessels
Vessel and gear attributes from other sources	Includes data collected by observers and port inspectors. Covers all vessels (i.e. includes vessels restricted to national jurisdiction–domestic fleets). Includes electronic equipment.
Oceanographic and meteorological data	"Oceanographic and meteorological data" in this context does not include information identifying the fishing vessel that collected the information, for example, which would otherwise alter its security classification.
Certified observer personnel	If identified by individual then Risk Classification would be assigned to HIGH.
Certified inspection personnel	If identified by individual then Risk Classification would be assigned to HIGH.
Violations and infringements, detailed	May cover Individual Violations and infringements pending investigation and/or prosecution. Summarized information included in Biannual ICCAT Report from CPCs. Includes compliance information collected by observers.
Economic data	Insufficient information currently available to determine Risk Classification.

Addendum 1 to Appendix 10

Public Domain data

The following types of data are considered to be in the public domain:

1) Annual catch estimates (Task I) stratified by gear, flag and species for the ICCAT Statistical Area;
2) The annual numbers of vessels active in the ICCAT Convention Area stratified by gear type and flag;
3) Catch and effort data (Task II) aggregated by gear type, flag, year/month and, for longline, 5° latitude and 5° longitude, and, for surface gear types, 1° latitude and 1° longitude – and made up of observations from a minimum of three vessels;
4) Biological data (if adequate time has passed to allow the scientists that organized for the collection of such data to publish a paper analyzing it);
5) Conventional Tagging data;
6) The ICCAT Records of Fishing Vessels;
7) Information on vessel and gear attributes compiled from other sources;
8) Any vessel record established for the purpose of the Commission's VMS;
9) Oceanographic and meteorological data;
10) [Social data]; and

Addendum 2 to Appendix 10

Examples of Non-Public Domain Data

The following are examples of types of data considered to be Non-Public Domain:

1) Operational level Catch Effort data (detailed set-by-set information)
2) Records of vessel unloading
3) Transshipment consignments by species
4) Data describing (at a fine resolution) the movement of vessels including near- real time Commission VMS data (Vessel position, direction and speed)
5) Boarding and Inspection Reports
6) Regional Observer Programme observer reports, and lists of certified observer personnel
7) Certified inspection personnel
8) Raw data from any Catch Documentation Scheme or Trade Documentation Scheme
9) Port State Inspection Reports
10) Violations and infringements, detailed
11) Economic data
12) Fisheries intelligence-sharing information
13) Detailed electronic tagging data
14) Data that reveal the individual activities of any vessel, company or person, including caging declarations and weekly catch reports.

Addendum 3 to Appendix 10

Framework for Access to Non-Public Domain Data

1. In accordance with the policies for data protection, security and confidentiality established by the Commission's Information Security Policy (ISP), a Contracting Party or non-Contracting Cooperating Entity or Fishing Entity (CPC) shall have access to non-public domain data types covering describing the activities of any vessels:
   (a) covering vessels flying their flag in the ICCAT Convention Area or;
   (b) covering any vessels fishing in waters under their national jurisdiction or;
   (c) covering vessels applying to fish in their national waters, unloading in their ports or transshipping fish within waters under their national jurisdiction;
   (d) for the purpose of scientific and other research, if the CPC that originally provided that data authorizes the Commission to release them. In cases where a CPC elects to provide an ongoing authorization for the release of such data, the CPC may at any time cancel this authorization by notifying the Secretariat that it has revised its earlier decision.

2. For the purposes of compliance and enforcement activities on the high seas, non-public domain data will be made available subject to separate rules and procedures for the access and dissemination of such data, that the Commission will adopt for these purposes. VMS data will be made available for scientific purposes, subject to these same separate rules and procedures.

3. In regard to paragraph 1:
   (a) CPCs shall provide a written request for access to such data to the Executive Secretary, specifying the purpose of the Convention by reference to the relevant article(s). In so doing, CPCs shall use the Commission Data Request Form *(Attachment 1 to Addendum 3).*
   (b) The CPC shall undertake to only use such data for the purpose described in the written request. The CPC shall also complete and sign the Commission Confidentiality Agreement *(Attachment 2 Addendum 3).*
   (c) The Executive Secretary shall not authorize the release of more data than is necessary to achieve the purpose described in the written request.

4. The Executive Secretary shall not authorize access to non-public domain data by any CPC that has not fulfilled its obligations to provide data to the Commission for two consecutive years until all such matters are rectified. The Executive Secretary also shall not authorize access to a CPC whose authorized representative failed to observe the Rules and Procedures for the Protection, Access to and Dissemination of Data Compiled by the Commission until the CPC informs the Executive Secretary that appropriate actions have been taken.

5. The Executive Secretary may attach conditions appropriate for the access to such data (such as that the data be deleted upon achievement of the purpose for which it was released or by a pre-determined date, that a register of persons accessing the data be maintained and furnished to the Commission upon request, etc.)

6. Requests may be made for a standing authorization, such that CPCs may have multiple accesses to the requested data for the same purpose as of the original written request.

7. Dissatisfaction with the Executive Secretary's decisions in regard to access to non-public domain data by CPCs shall be resolved by the Chair of the Commission.

Attachment 1 of Addendum 3

Data Request Form

1. Data Requested

   The specification of data being requested should refer to the type of data and any parameters relevant to the type of data, which may include, *inter alia*, the gear types, time periods, geographic areas and fishing nations covered, and the level of stratification of each parameter.

   [Insert the list of data sets here]

2. Purpose

   If non-public domain data are being requested, the use of the data shall be authorized only for the purpose described below.

   [If non-public domain data are being requested, insert the description of the purpose for which the data is requested]

3. Persons for whom access to the data is requested if non-public domain data are being requested, the name(s), job title(s) and affiliation(s) of the authorized representative(s) for whom access to the data is being requested shall be listed below; the use of the non-public domain data shall be authorized only for the person(s) listed below.

   [Insert the list of persons here]

- Sign the Confidentiality Agreement.

Attachment 2 of Addendum 3

Confidentiality Agreement

Confidentiality Agreement for the Dissemination of Non-Public Domain Data by the International Commission for the Conservation of Atlantic Tunas (ICCAT).

Applicants name(s) and full contact details and signatures

Full name Institution, address and

Contact details

Signature and Date

I/we agree to the following:

- To abide by any conditions attached to use of the data by the Executive Secretary;
- That the data shall be used only for the purpose for which the data are being requested, be accessed only by the individuals listed in Item 3 of the Data Request Form, and be destroyed upon completion of the usage for which the data are being requested;
- To make no unauthorized copies of the data requested. If a copy of all, or part, of the data requested is made by the applicant, all copies, or part thereof, will be registered with the Executive Secretary and will be destroyed upon completion of purpose for which the data was requested;
- To abide by the Commission's data security standards as specified in the Commission's Information Security Policy and the Rules and Procedures for Protection, Access to, and Dissemination of, Data Compiled by the Commission;
- That prior to the publication of any report of an analysis for which the requested data will be used, the report shall be provided to, and cleared by, the Executive Secretary of the ICCAT, who shall ensure that no non-public domain data will be published;
- To provide copies of all published reports of the results of the work undertaken using the data released shall be provided to the ICCAT Secretariat and to the relevant subsidiary body of ICCAT;

- Applicant(s) will not disclose, divulge, or transfer, either directly or indirectly, the confidential information to any third party without the written consent of the Executive Secretary;
- Applicant(s) shall promptly notify the Executive Secretary, in writing, of any unauthorized, negligent or inadvertent disclosure of confidential information of the ICCAT.
- Applicant(s) assume all liability, if any, in respect of a breach of this Confidentiality Agreement, once the data requested is released to the applicant(s).
- Pursuant to paragraph 28 of the Rules and Procedures for the Protection, Access to, and Dissemination of, Data Compiled by the Commission, CPC(s) shall not be granted access to non-public domain data until the appropriate actions have been taken to account for any disclosure in violation of the Agreement by the applicant or, *inter alia*, its affiliates, employees, attorneys, accountants, consultants, contractors, or other advisers or agents; and.
- That this Agreement may be terminated by giving written notice to the other party.

Addendum 4 to Appendix 10

Data that may be disseminated to other
Regional Fisheries Management Organizations (RFMOs)

Operational level data

1. Operational-level tuna fisheries data may be disseminated to other Regional Fisheries Management Organizations (RFMOs), subject to the terms of the agreement specified in paragraph 29 of these Rules and Procedures. Such data includes catch and effort (including by-catch of mammals, turtles, sharks and billfish), observer, unloading, transshipment and port inspection data.

Aggregated data

2. Aggregated catch and effort data may be disseminated to other RFMOs. Such data includes:
    - Data for long line gear aggregated by flag State by 5º latitude and by 5º longitude by month
    - Data for surface gear (including purse seine) aggregated by flag State by 1º latitude and by 1º degree longitude by month
    - Aggregated observer data (made up of observations from a minimum of three vessels).

Other data

3. Monitoring, control, surveillance, inspection and enforcement data may be disseminated to other RFMOs. Such data includes:
    - The names and other markings of 'Vessels of Interest' to each organization;
    - Transshipment verification reports for vessels transshipping in the Convention Area of one RFMO but which have fished within the Convention Area of the other.

Appendix 11

POSITION ANNOUNCEMENT
ICCAT BLUEFIN RESEARCH PROGRAM (GBYP) COORDINATOR

The ICCAT Bluefin Research Program is an ambitious initiative to improve the Commission's knowledge of Atlantic bluefin tuna in order to better assess its status and therefore improve its management of this valuable resource. The program is financed with voluntary contributions and is intended to last for five or six years.

Program elements are contained in ICCAT, 2004, Col. Vol. Sci. Pap. ICCAT, 56(3): 987-1003 (although note that the priorities and level of funding will be adjusted as necessary). The first year elements include overall coordination for future years, aerial surveys in the Mediterranean, data mining and recovery, and a design study for a large-scale tagging program.

Duties and Responsibilities

The ICCAT Bluefin Research Program Coordinator position will be a fixed-term contract of one year, but it is anticipated that the contract will be extended for another five years by mutual agreements and depending on the availability of funding. The Coordinator will be under the supervision of the Executive Secretary. The Coordinator will work in close contact and in consultation with the ICCAT SCRS Chairman and the GBYP Committee. The Coordinator will implement, organize and coordinate the activities of the GBYP, particularly the following (not necessarily in order of priority):

– the drafting of manuals and the protocol for studies (sampling, tagging, etc);

– making the necessary arrangements to carry out the program's plans, including helping in the recruitment of experts as necessary, while ensuring that the data collected by the program are deposited with ICCAT;

– making the necessary international arrangements so that all the field activities can be carried out smoothly (including arranging permission for research vessels to enter national waters of foreign countries);

– ensuring that the data collected in the Program are assimilated into ICCAT databases and available to the ICCAT Bluefin Species Group;

– assist in managing the accounts of the GBYP funds and preparing the financial reports, for the Commission and the specific funding partners, on the status and use of the special GBYP funds;

– organizing an international Symposium to culminate the GBYP. The work of the Coordinator will require extensive travel, mainly to those areas where GBYP activities take place;

– coordinating preparation of annual progress reports to the SCRS and Commission on Program research activities.

– ordering the materials required for all the activities;

– preparing and promoting extensive publicity for the GBYP, such as a web page, posters, etc.;

Qualifications and Experience - Essential

– A high degree of experience in fisheries or a closely related field, which could be demonstrated by a Ph.D. in those fields.

– At least five years of experience in conduct/coordination/supervision of large-scale research programs on tunas, particularly bluefin

– High degree of knowledge of tuna fisheries (preferably Atlantic bluefin fisheries) and tuna biology demonstrated by publications in peer-reviewed literature

– Demonstrated leadership skills in dealing with international scientific working groups. Ability to work well under pressure and to work effectively and harmoniously with people of different national and cultural backgrounds.

– Advanced population dynamics modeling skills demonstrated by publications in peer-reviewed literature (e.g., age-structured stock assessment models, tag-recapture models, etc.) and participation in stock assessments.

– Applicants should be in good health. Applicants should have a willingness to travel frequently to countries, entities and fishing entities, including remote areas.

Desirable Qualifications

– Fluency in at least two of the ICCAT official languages (English, French and Spanish)
– Experience in ICCAT stock assessments
– Data management skills
– Budget management experience
– Practical experience in one or more of the following for tunas: biological sampling, conventional and electronic tagging, data mining, aerial surveys, management strategy evaluations, larval surveys.

Salary and remunerations

The position will be classified according to the United Nations Scheme at the Professional Level (P-4), Step 1 (details to be provided by the Secretariat).

Application for the position

Candidates should submit a *Curriculum Vitae*, to be received at the Secretariat by [December 20, 2009 *** 30 days after announcement ***]. The CV should include documented educational background, professional experience, a list of relative published works, as well as three references (two professional and one character reference are preferred). Please indicate the earliest time you can start working with the Commission. The position is expected to be filled as early as January 2010. The GBYP Steering Committee will review all the applications and report to the Executive Secretary. Final appointment will be made by the ICCAT Executive Secretary.

A personal interview may be required as well as a comprehensive medical examination.

The successful candidate will receive a notice of appointment from the Executive Secretary. The starting date of employment will be mutually agreed upon between the successful candidate and the Executive Secretary but should target March, 2010, at least one month before the 2010 bluefin fishing season starts.

Appendix 12

Terms of Reference for an Extension of the 2009 SCRS Meeting to Consider the Status of Atlantic Bluefin Tuna Populations with Respect to CITES Biological Listing Criteria

1. Date and Venue

ICCAT Secretariat, Madrid, Spain, October 21-23, 2009

2. Participation

The meeting is an extension of the 2009 SCRS and as such is open to scientists from Contracting Parties and observers accredited to attend the 2009 SCRS.

3. Objective

For the SCRS to develop, as far as possible, concise scientific advice on the condition of Atlantic bluefin tuna with respect to the biological criteria applied for listing commercially-exploited aquatic species under CITES Appendices I and II (annexed).

Qualifications about the objective

- The objective is not to evaluate the strengths and weaknesses of a particular proposal for a CITES listing.
- The evaluation is limited to the biological criteria (not the trade, socioeconomic or management considerations).
- The meeting is intended for the SCRS to provide its input to the ICCAT Commission. It is not intended to circumvent any existing arrangements between CITES and other organizations such as FAO.
- The evaluation is to be conducted on the basis of the stock status information that the SCRS has from its 2008 assessments, as complemented by additional analyses (see Item 4 below).

4. Additional analyses

National Scientists, with assistance from the Secretariat, will update the stock projections based on the most recent (2007-2009) information available. The projected scenarios to be considered will be the same as in the 2008 stock assessment, modified to reflect scenarios specific to the *Recommendation Amending the Recommendation by ICCAT to Establish a Multiannual Recovery Plan for Bluefin Tuna in the Eastern Atlantic and Mediterranean* [Rec. 08-05], as appropriate. To the degree possible, the additional analyses will be conducted prior to the meeting. However, it may be necessary to conduct some analyses during the meeting.

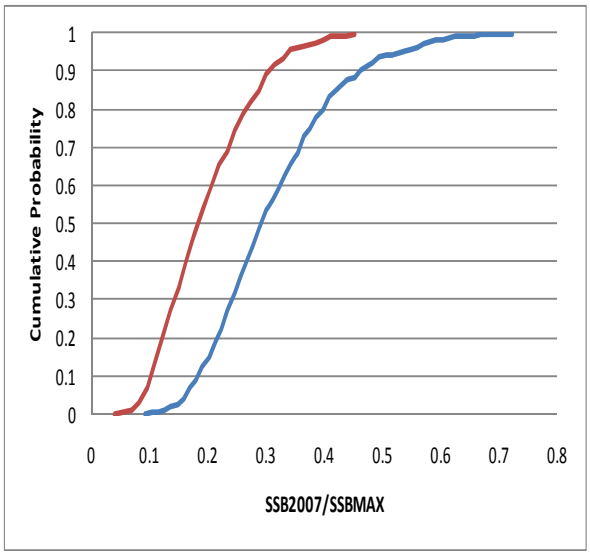
5. Tentative Agenda

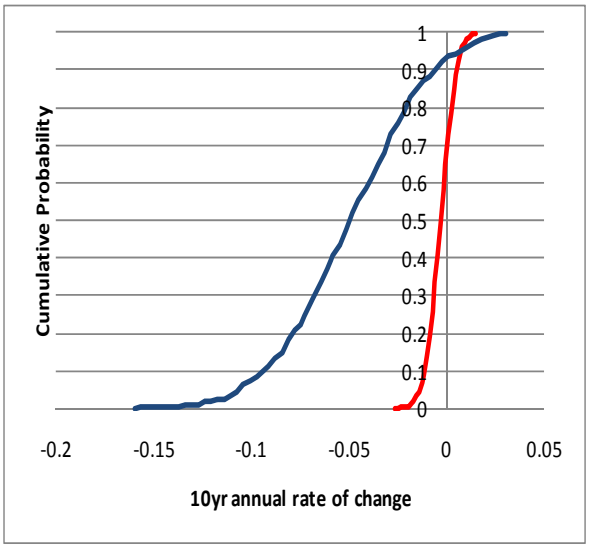
1. Opening of the meeting and arrangements
2. Discussion of CITES Criteria
   - 2.1 Concepts
   - 2.2 Examples
3. Evaluation of the status of bluefin with regards to CITES Appendix I
   - 3.1 Eastern Bluefin
   - 3.2 Western Bluefin
4. Evaluation of the status of bluefin with regards to CITES Appendix II
   - 4.1 Eastern Bluefin
   - 4.2 Western Bluefin
5. Other matters
6. Recommendations
7. Report adoption and closure

Addendum 1 to Appendix 12

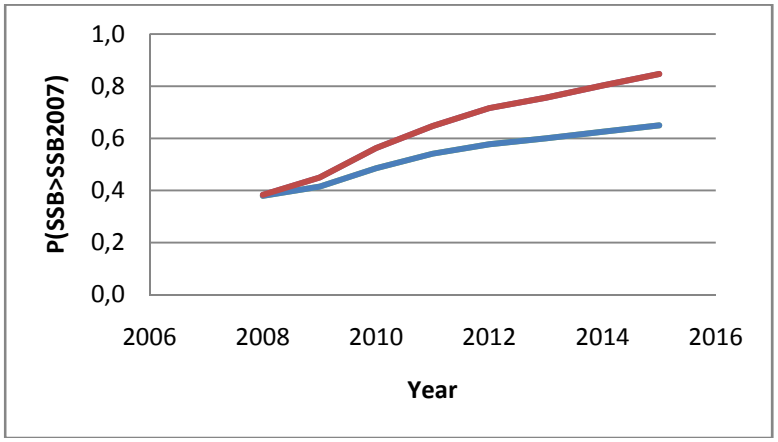
A Potential Framework for Characterizing the Available SCRS Information Relative to the CITES Criteria

It would be useful to provide information in a way that characterizes uncertainties about bluefin stock status and future prospects with respect to the CITES Criteria, to the degree possible based on the 2008 SCRS stock assessment. This could be done by displaying the estimated cumulative probability of current stock size relative to various baselines as well as the recent rate of change to advise the Commission (and possibly other processes underway or expected to take place) based on the 2008 stock assessments for E and W-BFT. Some imaginary examples follow:





In terms of future forecast, advice related to the odds of stock improvement under the current rebuilding plan for the range of plausible hypotheses SCRS used in 2008 could be structured for example, like the following.



Candidate summary presentations of stock status information **in view of the CITES Criteria should be discussed and agreed, if possible, in advance of the October 21-23, meeting.**

Annex 1

Criteria for Amendment of CITES Appendices I and II (CITES Conf. 9.24)

Biological Criteria for Appendix I

The following criteria must be read in conjunction with the definitions, explanations and guidelines listed in **Annex 5**, including the footnote with respect to application of the definition of 'decline' for commercially exploited aquatic species.

A species is considered to be threatened with extinction if it meets, or is likely to meet, **at least one** of the following criteria.

A) The wild population is small, and is characterized by **at least one** of the following:

i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or
ii) each subpopulation being very small; or
iii) a majority of individuals being concentrated geographically during one or more life-history phases; or
iv) large short-term fluctuations in population size; or
v) a high vulnerability to either intrinsic or extrinsic factors.

B) The wild population has a restricted area of distribution and is characterized by **at least one** of the following:

i) fragmentation or occurrence at very few locations; or
ii) large fluctuations in the area of distribution or the number of subpopulations; or
iii) a high vulnerability to either intrinsic or extrinsic factors; or
iv) an observed, inferred or projected decrease in any one of the following:
- the area of distribution; or
- the area of habitat; or
- the number of subpopulations; or
- the number of individuals; or
- the quality of habitat; or
- the recruitment.

C) A marked decline in the population size in the wild, which has been **either**:

i) observed as ongoing or as having occurred in the past (but with a potential to resume); or
ii) inferred or projected on the basis of any one of the following:
- a decrease in area of habitat; or
- a decrease in quality of habitat; or
- levels or patterns of exploitation; or
- a high vulnerability to either intrinsic or extrinsic factors; or
- a decreasing recruitment.

Annex 2(a)

Criteria for the Inclusion of Species in Appendix II in accordance with Article II, Paragraph 2 (a), of the Convention

The following criteria must be read in conjunction with the definitions, explanations and guidelines listed in **Annex 5**, including the footnote with respect to application of the definition of 'decline' for commercially exploited aquatic species.

A species should be included in Appendix II when, on the basis of available trade data and information on the status and trends of the wild population(s), **at least one** of the following criteria is met:

A. It is known, or can be inferred or projected, that the regulation of trade in the species is necessary to avoid it becoming eligible for inclusion in Appendix I in the near future; or

B. It is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences.

Annex 2(b)

Criteria for the Inclusion of Species in Appendix II
in accordance with Article II, Paragraph 2 (b), of the Convention

Species may be included in Appendix II in accordance with Article II, paragraph 2 (b), if **either one** of the following criteria is met:

A. The specimens of the species in the form in which they are traded resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2 (a), or in Appendix I, such that enforcement officers who encounter specimens of CITES-listed species, are unlikely to be able to distinguish between them; or

B. There are compelling reasons other than those given in criterion A above to ensure that effective control of trade in currently listed species is achieved.

Annex 3

Special cases

Split-listing

Listing of a species in more than one Appendix should be avoided in general in view of the enforcement problems it creates.

When split-listing does occur, this should generally be on the basis of national or regional populations, rather than subspecies. Split-listings that place some populations of a species in the Appendices, and the rest outside the Appendices, should normally not be permitted.

For species outside the jurisdiction of any State, listing in the Appendices should use the terms used in other relevant international agreements, if any, to define the population. If no such international agreement exists, then the Appendices should define the population by region or by geographic coordinates.

Taxonomic names below the species level should not be used in the Appendices unless the taxon in question is highly distinctive and the use of the name would not give rise to enforcement problems.

Higher taxa

If all species of a higher taxon are included in Appendix I or II, they should be included under the name of the higher taxon. If some species in a higher taxon are included in Appendix I or II and all the rest in the other Appendix, the latter species should be included under the name of the higher taxon, with an appropriate annotation made in accordance with the provisions of the relevant Resolutions on the use of annotations in the Appendices.

Parties contemplating preparing a proposal to transfer an individual plant species from a higher-taxon listing in Appendix II to a separate listing in Appendix I should consider:

i) the ease with which it can be propagated artificially;
ii) the extent to which it is currently available in cultivation from artificially propagated specimens; and
iii) any practical problems in identifying the species, particularly in the form in which it may be traded.

Annex 4

Precautionary Measures

When considering proposals to amend Appendix I or II, the Parties shall, by virtue of the recautionary approach and in case of uncertainty either as regards the status of a species or the impact of trade on the conservation of a species, act in the best interest of the conservation of the species concerned and adopt measures that are proportionate to the anticipated risks to the species.

A.

1. No species listed in Appendix I shall be removed from the Appendices unless it has been first transferred to Appendix II, with monitoring of any impact of trade on the species for at least two intervals between meetings of the Conference of the Parties.

2. Species included in Appendix I should only be transferred to Appendix II if they do not satisfy the relevant criteria in Annex 1 and only when one of the following precautionary safeguards is met:

   a) the species is not in demand for international trade, nor is its transfer to Appendix II likely to stimulate trade in, or cause enforcement problems for, any other species included in Appendix I; or

   b) the species is likely to be in demand for trade, but its management is such that the Conference of the Parties is satisfied with:

      i) implementation by the range States of the requirements of the Convention, in particular Article IV; and
      ii) appropriate enforcement controls and compliance with the requirements of the Convention; or

   c) an integral part of the amendment proposal is an export quota or other special measure approved by the Conference of the Parties, based on management measures described in the supporting statement of the amendment proposal, provided that effective enforcement controls are in place; or

   d) a ranching proposal is submitted consistent with the applicable Resolutions of the Conference of the Parties and is approved.

3. No proposal for transfer of a species from Appendix I to Appendix II shall be considered from a Party that has entered a reservation for the species in question, unless that Party agrees to remove the reservation within 90 days of the adoption of the amendment.

4. No species should be deleted from Appendix II if such deletion would be likely to result in it qualifying for inclusion in the Appendices in the near future.

5. No species should be deleted from Appendix II if, within the last two intervals between meetings of the Conference of the Parties, it has been subject to a recommendation under the provisions of the Review of Significant Trade to improve its conservation status.

B. The following review procedures shall apply when a species is transferred to Appendix II pursuant to paragraph A. 2 (c) above.

1. Where the Plants Committee, the Animals Committee or a Party becomes aware of problems in compliance with the management measures and export quotas of another Party, the Secretariat shall be informed and, if the Secretariat fails to resolve the matter satisfactorily, it shall inform the Standing Committee which may, after consultation with the Party concerned, recommend to all Parties that they suspend trade with that Party in specimens of CITES-listed species, and/or request the Depositary Government to prepare a proposal to transfer the population back to Appendix I.

2. If, on review of a quota and its supporting management measures, the Animals or Plants Committee encounters any problems with compliance or potential detriment to a species, the relevant Committee shall request the Depositary Government to prepare a proposal for appropriate remedial action.

C. With regard to quotas established pursuant to paragraph A. 2(c) above.

1. If a Party wishes to renew, amend or delete such a quota, it shall submit an appropriate proposal for consideration at the next meeting of the Conference of the Parties.

2. When a quota has been established for a limited period of time, after that period the quota will become zero until a new quota has been established.

D. Species that are regarded as possibly extinct should not be deleted from Appendix I if they may be affected by trade in the event of their rediscovery; these species should be annotated in the Appendices as 'possibly extinct'.

Annex 5

Definitions, Explanations and Guidelines*

Species

In Article I of the Convention, the term 'species' is defined as "any species, subspecies or geographically separate population thereof".

'Species' and 'subspecies' refer to the biological concept of a species, and do not require any further definition.

The two terms also cover varieties.

'Geographically separate population' refers to parts of a species or a subspecies within particular geographical boundaries. This can also refer to populations or subpopulations, or, for the sake of convenience in certain cases, to 'stocks' as the term is understood in fisheries management.

Until now, the Conference of the Parties has interpreted 'geographically separate populations' as populations delimited by geopolitical boundaries, whereas they have rarely used the other option of geographical boundaries.

Affected by trade

A species "is or may be affected by trade" if:

i) it is known to be in trade (using the definition of 'trade' in Article I of the Convention), and that trade has or may have a detrimental impact on the status of the species; or
ii) it is suspected to be in trade, or there is demonstrable potential international demand for the species, that may be detrimental to its survival in the wild.

Area of distribution

The 'area of distribution' of a species is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of occurrence, excluding cases of vagrancy and introductions outside its natural range (though inferring and projecting area of occurrence should be undertaken carefully, and in a precautionary manner). The area within the imaginary boundary should, however, exclude significant areas where the species does not occur, and so, in defining an area of distribution, account should be taken of discontinuities or disjunctions in the spatial distribution of species. This encompasses the concept of area of occupancy. For migratory species, the area of distribution is the smallest area essential at any stage for the survival of that species (e.g. colonial nesting sites, feeding sites for migratory taxa, etc.). The determination that a species has a restricted area of distribution is taxon-specific and should take into account considerations such as habitat specificity, population density and endemism.

*** NOTE: Where numerical guidelines are cited in this Annex, they are presented only as examples, since it is impossible to give numerical values that are applicable to all taxa because of differences in their biology.**

Decline

A 'decline' is a reduction in the abundance, or area of distribution, or area of habitat of a species. The assessment of decline by reference to area of habitat may be more appropriate where there are intrinsic difficulties in measuring the number of individuals.

Decline can be expressed in two different ways: (i) the overall long-term extent of decline; or (ii) the recent rate of decline. The long-term extent of decline is the total estimated or inferred percentage reduction from a baseline level of abundance or area of distribution. The recent rate of decline is the percentage change in abundance or area of distribution over a recent time period. The data used to estimate or infer a baseline for extent of decline should extend as far back into the past as possible.

The judgement that a decline is marked is taxon-specific and can be justified by a number of considerations for example, the population dynamics of a related taxonomic group. A general guideline for a marked historical extent of decline is a percentage decline to 5%-30% of the baseline, depending on the biology and productivity of the species. Productivity is the maximum percentage growth rate of a population. It is a complex function of reproductive biology, fecundity, individual growth rates, natural mortality, age at maturity and longevity. More-productive species tend to have high fecundity, rapid individual growth rates and high turnover of generations.

The extremes of 5% and 30% will be applicable to only a relatively small number of species, but some species may even fall outside of these extremes. However, both these figures are presented only as examples, since it is impossible to give numerical values that are applicable to all taxa because of differences in their biology (see footnote[2] with respect to application of decline to commercially exploited aquatic species).

A general guideline for a marked recent rate of decline is a percentage decline of 50% or more in the last 10 years or three generations, whichever is the longer. If the population is small, a percentage decline of 20% or more in the last 5 years or 2 generations (whichever is the longer) may be more appropriate. However, these figures are presented only as examples, since it is impossible to give numerical values that are applicable to all taxa because of differences in their biology.

The historical extent of decline and the recent rate of decline should be considered in conjunction with one another. In general, the higher the historical extent of decline, and the lower the productivity of the species, the more important a given recent rate of decline is.

In estimating or inferring the historical extent of decline or the recent rate of decline, all relevant data should be taken into account. A decline need not necessarily be ongoing. If data are available only for a short period and the extent or rate of decline based on these data are cause for concern, the guidelines above (extrapolated as necessary or relevant) should still apply. However, natural fluctuations should not normally count as part of a decline, but an observed decline should not necessarily be considered part of a natural fluctuation unless there is evidence for this. A decline that is the result of legal activities carried out pursuant to a scientifically based harvesting programme that reduces the population to a planned level, not detrimental to the survival of the species, would not normally be covered by the term 'decline'.

Fluctuations

Fluctuations in population size or area of distribution are considered large when the population size or area in question varies widely, rapidly or frequently. The judgement that there are large short-term fluctuations in the number of individuals is taxon-specific. For instance, it depends on the generation length of the taxon.

Fragmentation

'Fragmentation' refers to the case where most individuals within a taxon are found in small and relatively isolated subpopulations, which increases the probability that these small subpopulations will become extinct and the opportunities for re-establishment are limited.

Generation length

'Generation length' is the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population.

Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once. Where generation length varies under threat, the more natural (i.e. pre-disturbance) generation length should be used.

Inferred or projected

This refers to estimations using indirect or direct methods. Inferences may be made on the basis either of direct measurements or from indirect evidence. Projection involves extrapolation to infer likely future values.

Near future

This refers to a time period in which it can be projected or inferred that a species would satisfy one (or more) of the criteria in Annex I unless it is included in Appendix II. This will be taxon- and case-specific but should be greater than 5 years and less than 10 years.

Population issues

Population

'Population' refers to the total number of individuals of the species (as 'species' is defined in Article I of the Convention and in this Annex).

Wild population

'Wild population' refers to the total number of free-living individuals of the species within its area of distribution, as defined in this Annex.

Subpopulation

'Subpopulations' are defined as geographically or otherwise distinct groups in the population between which there is limited genetic exchange.

Population size

When providing details on the size of a population or subpopulation, it should be made clear whether the information presented relates to an estimate of the total number of individuals or to the effective population size (i.e. individuals capable of reproduction, excluding individuals that are environmentally and behaviourally or otherwise reproductively suppressed in the wild) or to another appropriate measure, index or component of the population.

In the case of species biologically dependent on other species for all or part of their life cycles, biologically appropriate values for the host or co-dependent species should be chosen.

Small wild population

The judgement that a wild population is small is taxon-specific and can be justified by a number of considerations. For example, the population of a related taxonomic group. For some low-productivity species where data exist to make an estimate, a figure of less than 5,000 individuals has been found to be an appropriate guideline (not a threshold) of what constitutes a small wild population but the number could be higher for higher productivity species. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Very small wild subpopulation

The judgement that a wild subpopulation is very small is taxon-specific. For some species where data exist to make an estimate, a figure of less than 500 individuals has been found to be an appropriate guideline (not a threshold) of what constitutes a very small wild subpopulation. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Possibly extinct

A species is 'possibly extinct' when exhaustive surveys in known and/or suspected habitat, and at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Before a species can be declared possibly extinct, surveys should take place over a time-frame appropriate to the species' life cycle and life form.

Recruitment

'Recruitment' is the total number of individuals added to any particular demographic class of a population by either sexual or asexual reproduction.

Threatened with extinction

'Threatened with extinction' is defined by **Annex 1**. The vulnerability of a species to threats of extinction depends on its population demographics, biological characteristics (such as body size, trophic level, life cycle, breeding structure or social structure requirements for successful reproduction), and vulnerability due to aggregating habits, natural fluctuations in population size, and/or residency/migratory patterns. This makes it impossible to give numerical threshold values for population size or area of distribution that are applicable to all taxa.

Vulnerability

'Vulnerability' can be defined as the susceptibility to intrinsic or external effects which increase the risk of extinction (even when mitigating factors are taken into account). There are a number of taxon- or case-specific biological and other factors that may affect the extinction risk associated with a given percentage decline, small population size or restricted area of distribution. These can be, but are not limited to, aspects of any of the following:

Intrinsic factors

- Life history (e.g. low fecundity, slow growth rate of the individual, high age at first maturity, long generation time)
- Low absolute numbers or biomass or restricted area of distribution
- Population structure (age/size structure, sex ratio)
- Behavioural factors (e.g. social structure, migration, aggregating behaviour)
- Density (for sessile or semi-sessile species)
- Specialized niche requirements (e.g. diet, habitat)
- Species associations such as symbiosis and other forms of co-dependency
- Reduced genetic diversity
- Depensation (prone to continuing decline even in the absence of exploitation)
- Endemism
- Seed dispersal mechanism
- Specialized pollinators

Extrinsic factors

- Selectivity of removals (that may compromise recruitment)
- Threats from alien invasive species (hybridization, disease transmission, depredation, etc.)
- Habitat degradation (contamination, soil erosion, alteration by alien invasive species, etc.)
- Habitat loss/destruction
- Habitat fragmentation
- Harsh environmental conditions
- Threats from disease
- Rapid environmental change (e.g. climate regime shifts)
- Stochastic events.

****

[2] Application of decline for commercially exploited aquatic species in marine and large freshwater bodies, a narrower range of 5-20% is deemed to be more appropriate in most cases, with a range of 5-10% being applicable for species with high productivity, 10-15% for species with medium productivity and 15-20% for species with low productivity. Nevertheless some species may fall outside this range. Low productivity is correlated with low mortality rate and high productivity with high mortality. One possible guideline for indexing productivity is the natural mortality rate, with the range 0.2-0.5 per year indicating medium productivity.

In general, historical extent of decline should be the primary criterion for consideration of listing in Appendix I. However, in circumstances where information to estimate extent-of-decline is limited, rate-of-decline over a recent period could itself still provide some information on extent-of-decline.

For listing in Appendix II, the historical extent of decline and the recent rate of decline should be considered in conjunction with one another. The higher the historical extent of decline, and the lower the productivity of the species, the more important a given recent rate of decline is.

A general guideline for a marked recent rate of decline is the rate of decline that would drive a population down within approximately a 10-year period from the current population level to the historical extent of decline guideline (i.e. 5-20% of baseline for exploited fish species). There should rarely be a need for concern for populations that have exhibited an historical extent of decline of less than 50%, unless the recent rate of decline has been extremely high.

Even if a population is not declining appreciably, it could be considered for listing in Appendix II if it is near the extent-of-decline guidelines recommended above for consideration for Appendix-I-listing. A range of between 5% and 10% above the relevant extent-of-decline might be considered as a definition of ‘near’, taking due account of the productivity of the species.

A recent rate-of-decline is important only if it is still occurring, or may resume, and is projected to lead to the species reaching the applicable point for that species in the Appendix-I extent-of-decline guidelines within approximately a 10-year period. Otherwise the overall extent-of-decline is what is important. When sufficient data are available, the recent rate-of-decline should be calculated over approximately a 10-year period. If fewer data are available, annual rates over a shorter period could be used. If there is evidence of a change in the trend, greater weight should be given to the more recent consistent trend. In most cases, listing would only be considered if the decline were projected to continue.

In considering the percentages indicated above, account needs to be taken of taxon- and case-specific biological and other factors that are likely to affect extinction risk. Depending on the biology, patterns of exploitation and area of distribution of the taxon, vulnerability factors (as listed in this Annex) may increase this risk, whereas mitigating factors (e.g. large absolute numbers or refugia) may reduce it.

Appendix 13

Report of the Planning Meeting for the Extension of the 2009 SCRS Meeting to Consider the Status of Atlantic Bluefin Tuna Populations with Respect to CITES Biological Listing Criteria

A group of concerned scientists met at the Secretariat on October 3, 2009, to plan for the extraordinary meeting for the evaluation of the status of Atlantic bluefin stocks with regards to CITES biological listing criteria. This report summarizes the main points agreed to by participants.

1. Terms of reference

The terms of reference for the extraordinary meeting were agreed to **(Appendix 12)**. They will be circulated after the SCRS approves them.

The meeting will be chaired by the bluefin tuna overall coordinator, Dr. J.E. Powers.

2. Criteria

The group reviewed the biological criteria for listing species under CITES Appendices 1 and 2. It was recognized that even though CITES has a number of explanatory notes and definitions to guide discussions about commercially-exploited species, there are a number of issues that will require subjective expert reasoning. The group agreed on the following:

Decline and productivity

The listing criteria and definitions provide guidance on the application of decline to commercially-exploited marine species (footnote 2 in CITES Conf 9.24) and suggest that the natural mortality rate can be used as a proxy for productivity. While the group agreed that this may be a reasonable default in data-poor situations, it was decided that the extraordinary meeting should use the information from the assessment and projections that have implicit or explicit information about productivity. For example, the western stock included "high-recruitment" and "low recruitment" scenarios that have different implications about long-term productivity. Similarly, the eastern stock projections considered three different stock-recruitment relationships.

As the evaluation will be conducted on the basis of the 2008 assessment, and considering that the 2008 SCRS did not view some of the productivity assumptions as being more likely than the others, the group agreed that the extraordinary meeting should make its deliberations based on all of the productivity scenarios considered (as opposed to a "more likely" subset).

Generation time

Generation time will be computed as

$$G = \frac{\sum_{a=1}^{A} a E_a N_a}{\sum_{a=1}^{A} E_a N_a}$$

where a denotes age, A=40 (the oldest age expected in an unfished condition), E the mean fecundity at age of females, and N is the average number of females per recruit alive at age in the absence of fishing, i.e.,

$$N_a = N_1 exp\left[-\sum_{j=1}^{a-1} M_j\right]$$

where M is the natural mortality rate. These expressions should be computed on an equilibrium per-recruit basis, i.e., setting $N_1 = 1$. E is the age-specific vector of maturity fractions times body weight used to compute spawning biomass. Biological parameters will be the same as used in the 2008 assessments.

Baseline

Where the criteria refer to the "baseline" this will generally refer to the unfished condition (e.g., "virgin" population, B_0, SSB_{max}, etc.). Computations will also be made for the highest value in the estimated time series (i.e., the largest population size estimated for the time period that the assessment covers).

Population

Population will generally refer to spawning stock biomass (SSB). Computations will also be made for total biomass.

Rate of change

Rate of change will generally be calculated for 10-year periods (both forward and backwards). Annual rates of change will also be calculated for graphical display.

Display

Example graphics prepared by the friend of the Chair are appended to this report. The group agreed that it was important to conduct the evaluations taking into account the uncertainties estimated in the 2008 stock assessment, as these graphs do.

3. Projections

Logistics

To the degree possible, all calculations will be conducted prior to the October 21-23 meeting.

Projections will be made by three groups of people in order to cross-check results: (a) The BFT-E Rapporteur assisted by the Secretariat, (b) the BFT-W rapporteur assisted by United States scientists, and (c) Japanese scientists.

As soon as feasible, the Secretariat will make available in the ICCAT Web Page the 2008 assessment results that will form the basis for the projections.

The Secretariat will also create a password-protected web page where the new projection results and software used will be made available. This password will be given to ICCAT Head Delegates and all of the participants in this (October 3) meeting.

Calculations

As agreed in the Terms of Reference, the spirit of the new projections is to repeat the scenarios considered by SCRS in 2008, but taking into account: (1) Changes to the then-assumed/estimated catches for 2007 and/or 2008 in light of new available information; and (2) changes to the scenarios to reflect the objectives of Recs. [08-05] and [08-04]. Everything else should remain the same as in the projections made in 2008 (e.g. the different assumptions about productivity, the different levels of implementation error examined, etc.).

Details for the western stock

- Set the 2008 catch to 2,015t.
- To project the population after 2008 under Rec. [08-04] management, the TACs in the recommendation will be used.

Details for the eastern stock

- For the scenarios that reflect the assessments that use reported catch: Replace the 2007 and 2008 catches with 34,500t and 23,850t, respectively.
- For the scenarios that use inflated catches, continue to use 61,000t for 2007 and use 34,120t for 2008.
- To project the population after 2008 under Rec. [08-05] management, the TACs in the recommendation will be used.

Addendum 1 to Appendix 13

Some example figures that should be used to characterize uncertainty in the evaluations.

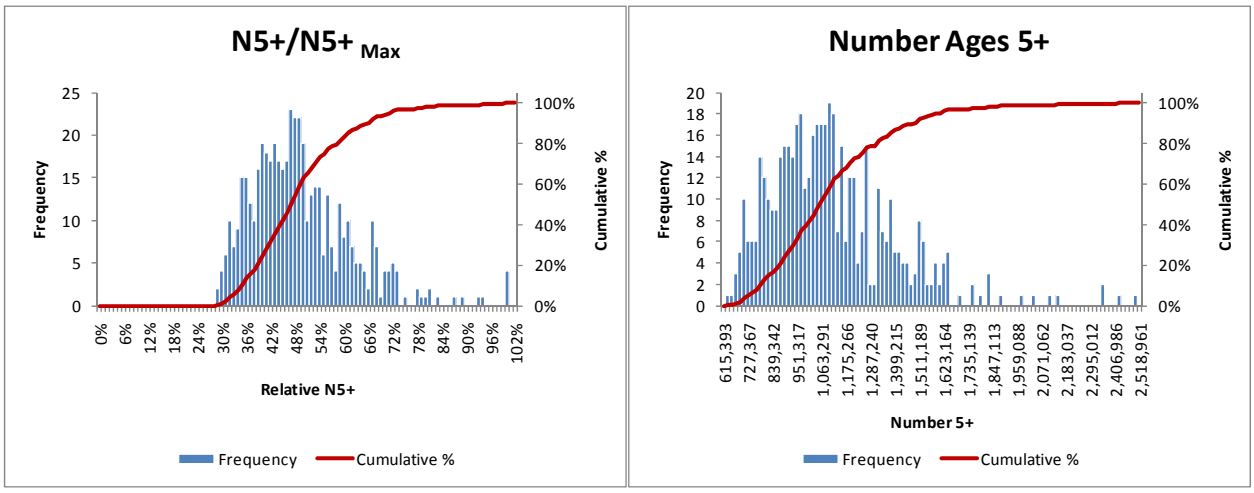


Figure 1. ***Left panel***: Cumulative frequency and histogram of the number at Ages 5+ (2007) divided by the maximum number at Ages 5+ (1970-2007). ***Right panel***: Cumulative frequency and histogram of the absolute number at Ages 5+ (2007).

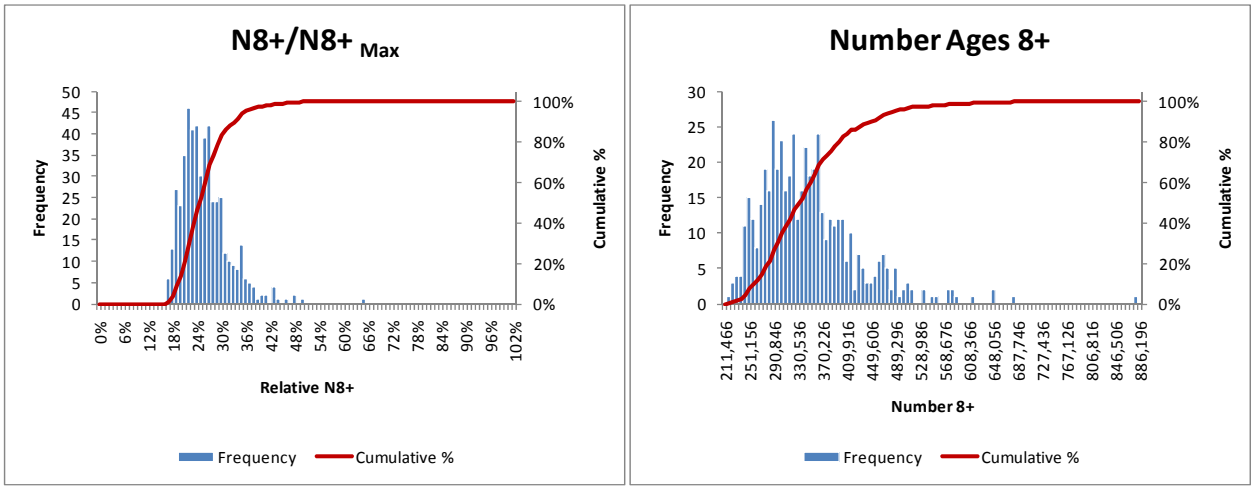


Figure 2. ***Left panel***: Cumulative frequency and histogram of the number at Ages 8+ (2007) divided by the maximum number at Ages 8+ (1970-2007). ***Right panel***: Cumulative frequency and histogram of the absolute number at Ages 8+ (2007).

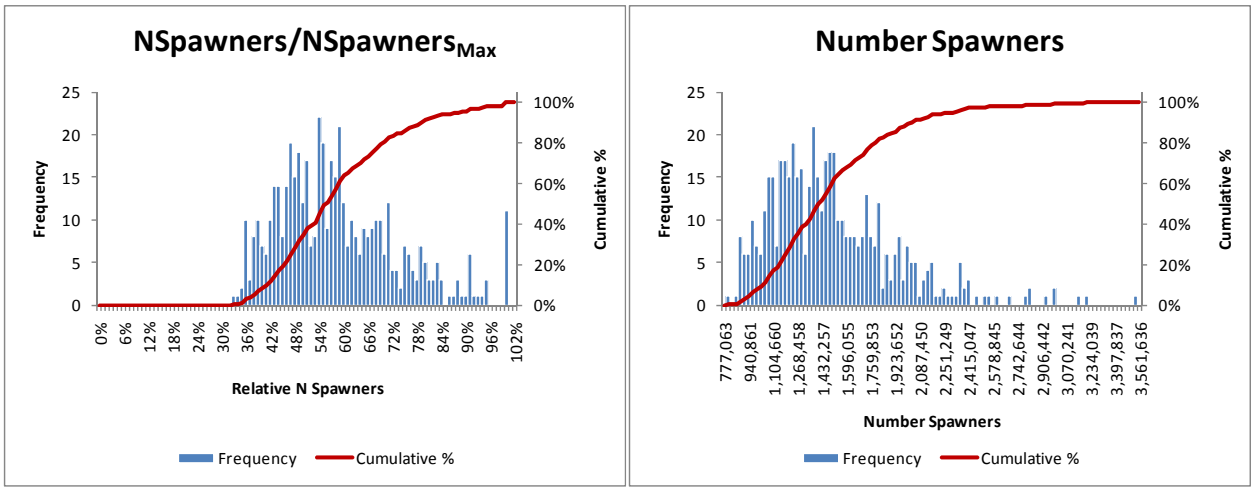


Figure 3. ***Left panel***: Cumulative frequency and histogram of the number of spawners (2007) divided by the maximum number of spawners (1970-2007). ***Right panel***: Cumulative frequency and histogram of the absolute number of spawners (2007).

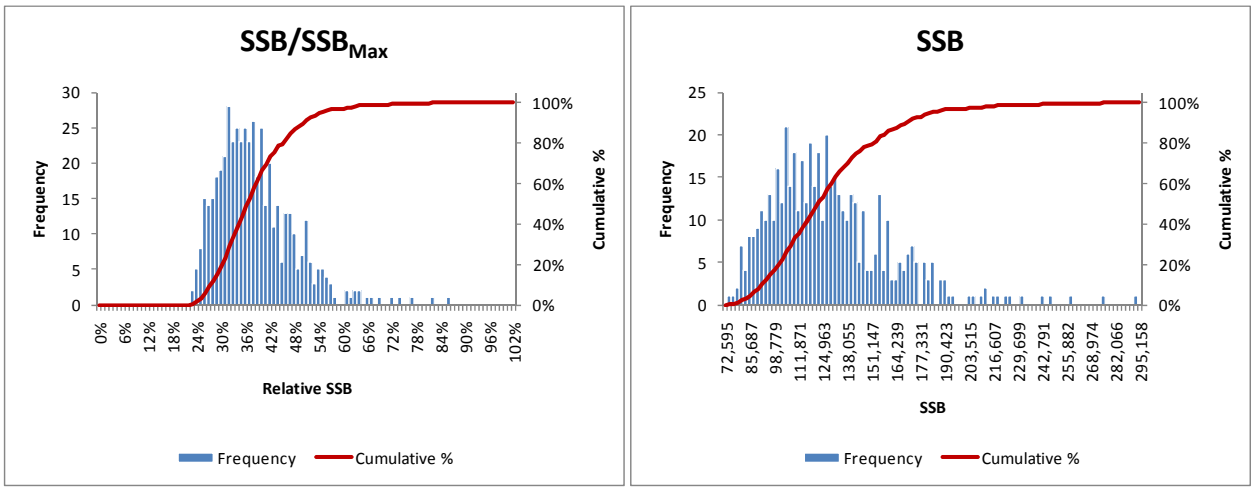


Figure 4. ***Left panel***: Cumulative frequency and histogram of the spawning stock biomass (SSB; 2007) divided by the maximum spawning stock biomass (1970-2007). ***Right panel***: Cumulative frequency and histogram of the absolute spawning stock biomass (2007).

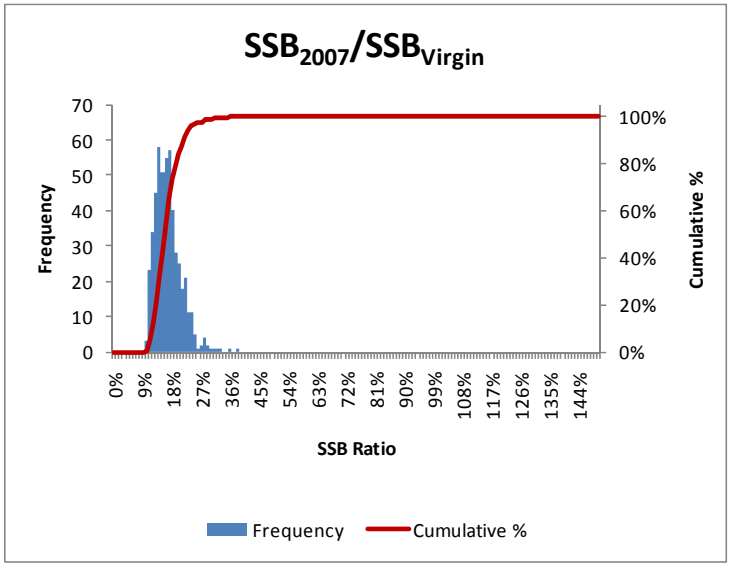


Figure 5. Cumulative frequency and histogram of the spawning stock biomass (SSB_{2007}) divided by the spawning stock biomass at unfished condition (SSB_{virgin}).

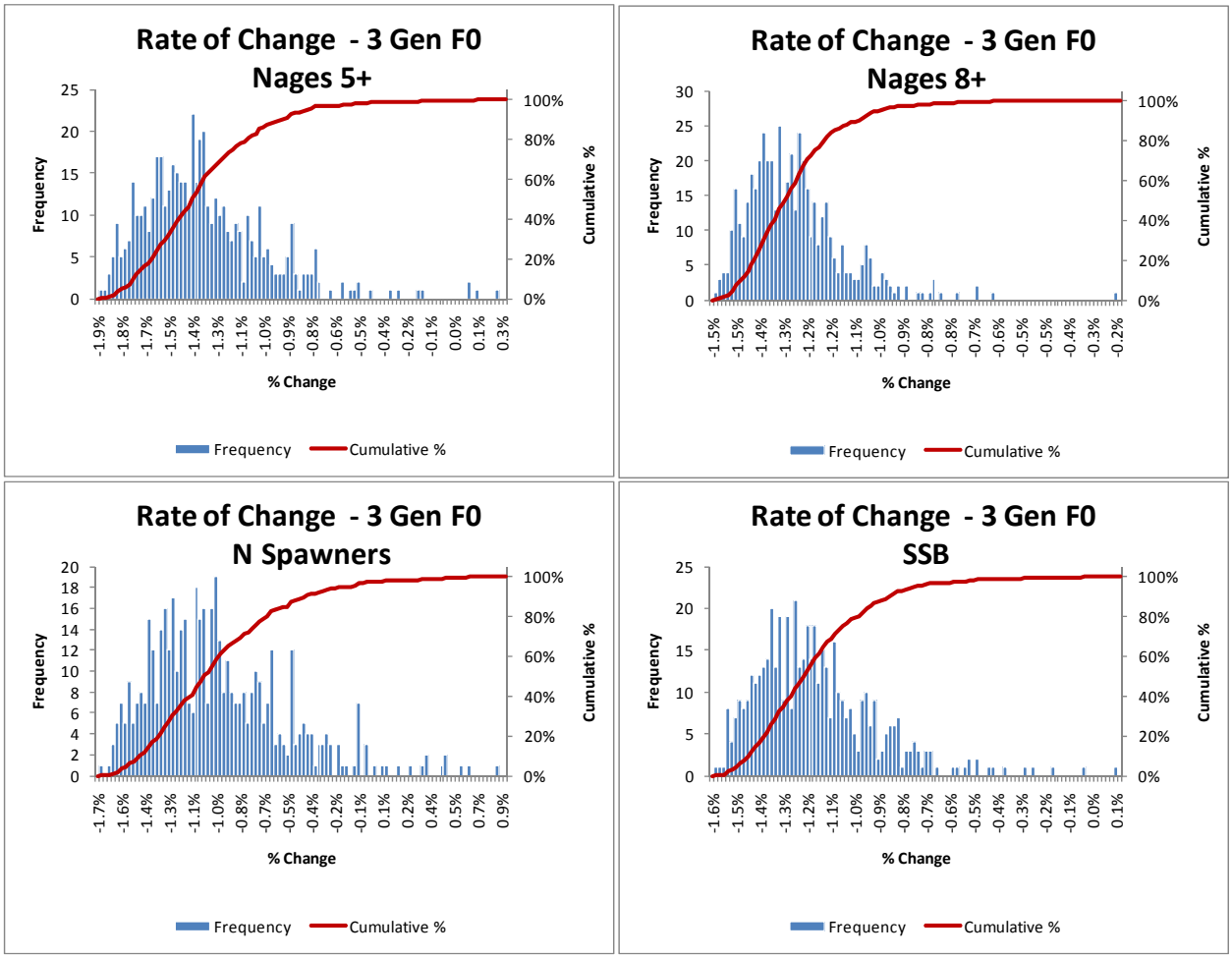


Figure 6. Cumulative frequency and histogram of the ***ANNUAL*** rate of change in the number of animals at Ages 5+, Ages 8+, the number of spawners and the spawning stock biomass during three generation times. In this case, the generation time was calculated at the unfished condition (F = 0, generation time = 19 years). Rate of change was estimated using a linear function. Negative values indicate a decline.

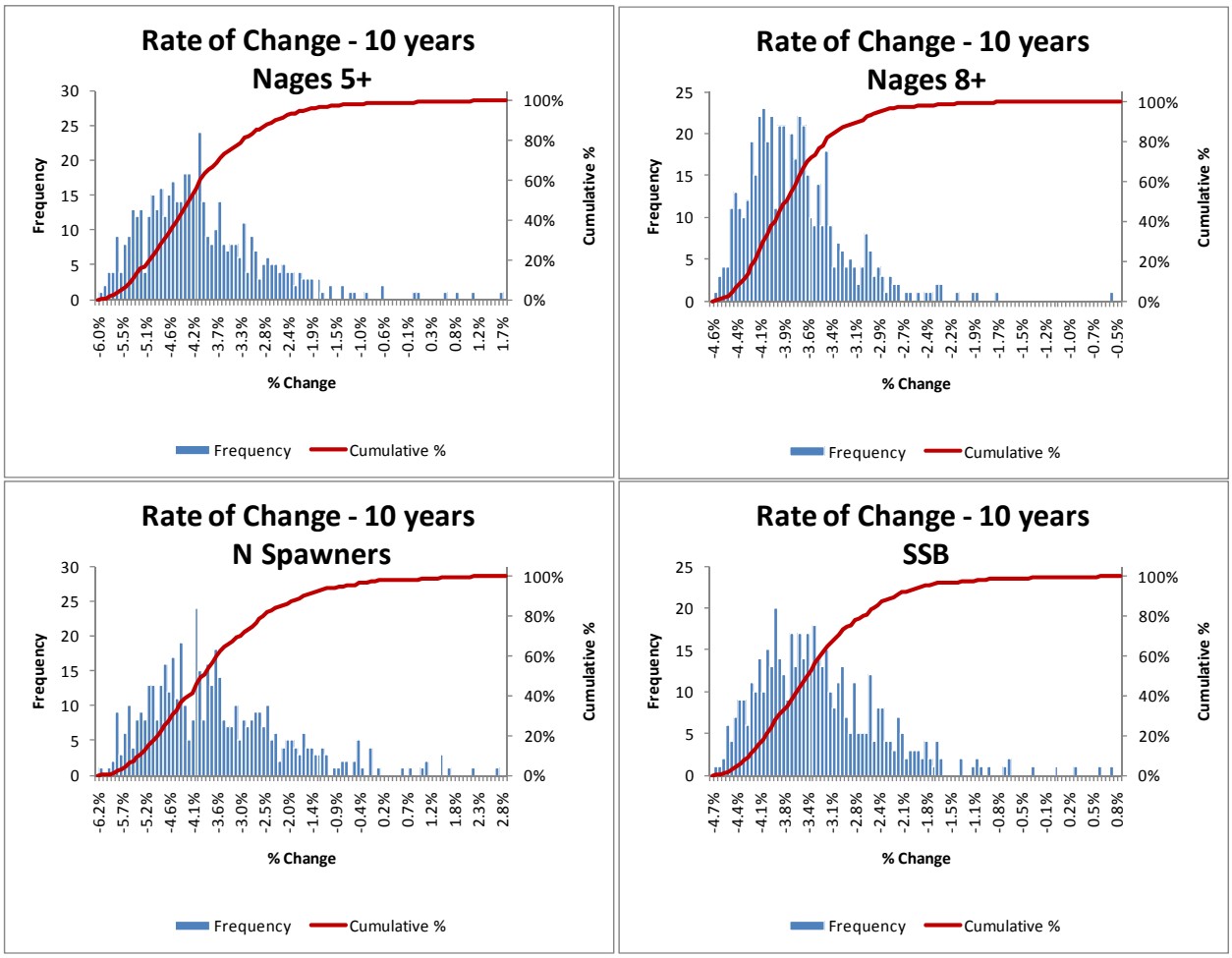


Figure 7. Cumulative frequency and histogram of the ***ANNUAL*** rate of change in the number of animals at Ages 5+, Ages 8+, the number of spawners and the spawning stock biomass during ten years (1998-2007). Rate of change was estimated using a linear function. Negative values indicate a decline.

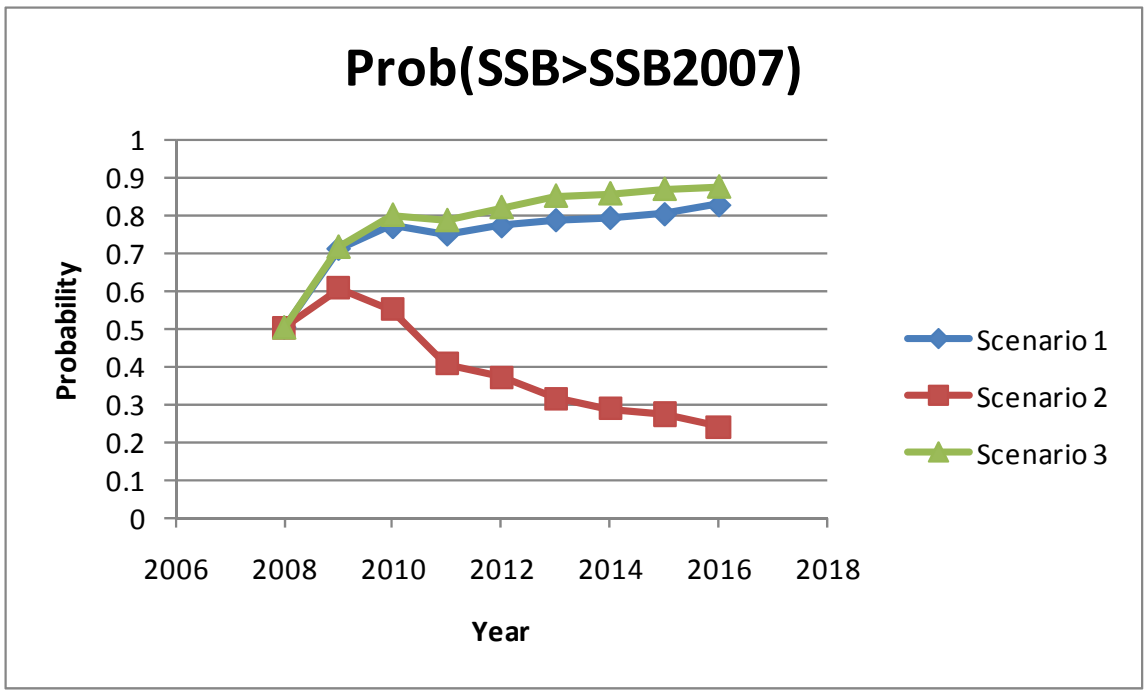


Figure 8. The annual probability the SSB_{YEAR} is greater than SSB_{2007}. The scenarios shown here are hypothetical examples only.

Appendix 14

Table: Firms Descriptors (Note: The Secretariat will add summaries for oceanic sharks in 2010).

Title	*ICCAT Exploit Rate*	*ICCAT Abundance Level*	*FIRMS[1] Standard Exploit Rate*	*FIRMS Standard Abundance Level*
Albacore - North Atlantic	F_{2007}/F_{MSY} = 1.04 (0.85-1.23)	B_{2007}/B_{MSY} = 0.62 (0.45-0.79)	High	Low
Albacore - Mediterranean Sea	Not assessed	Not assessed	Uncertain/Not assessed	Uncertain/Not assessed
Albacore - South Atlantic	F_{2005}/F_{MSY} = 0.63 (0.47-0.9)	B_{2005}/B_{MSY} = 0.91 (0.71-1.16)	Moderate	Intermediate
Bigeye tuna - Atlantic	F_{2005}/F_{MSY} = 0.87 (0.70-1.24)	B_{2006}/B_{MSY} = 0.92 (0.85-1.07)	Moderate	Intermediate
Yellowfin tuna - Atlantic	F_{2006}/F_{MSY} = 0.86 (0.71-1.05)	B_{2006}/B_{MSY} = 0.96 (0.72-1.22)	Moderate	Intermediate
Skipjack tuna - East Atlantic	F_{2006}/F_{MSY} = Most likely<1	B_{2006}/B_{MSY} = Most likely >1	Low	Intermediate
Skipjack tuna - West Atlantic	F_{2006}/F_{MSY} = Most likely<1	B_{2006}/B_{MSY} = Most likely >1	Low	Intermediate
Northern Bluefin tuna - East Atlantic and Mediterranean Sea	F_{2007}/F_{Max}= 3.04-3.42	B_{2007}/B_{FMax} = 0.35-0.14	High	Depleted
Northern Bluefin tuna - Western Atlantic	$F_{2004-2006}/F_{MSY\|R}$ = 1.27 (1.04-1.53)	$B_{2007}/B_{MSY\|R}$ = 0.57 (0.46-0.70)	High	Depleted
Sailfish - East Atlantic	F_{2007}/F_{MSY} = Likely>1	B_{2006}/B_{MSY} = Likely <1	High	Depleted
Sailfish - West Atlantic	F_{2007}/F_{MSY} = Possibly>1	B_{2006}/B_{MSY} = Possibly <1	Moderate	Intermediate
Swordfish - North Atlantic	F_{2005}/F_{MSY} = 0.86 (0.65 - 1.04)	B_{2006}/B_{MSY} = 0.99 (0.87 - 1.27)	Moderate	Intermediate
Swordfish - South Atlantic	F_{2005}/F_{MSY} = Likely <1	B_{2006}/B_{MSY} = Likely >1	Moderate	Intermediate
Swordfish - Mediterranean Sea	F_{2005}/F_{MSY} = 1.3 (0.6-2.5)	B_{2005}/B_{MSY} = 0.26-0.87	High	Depleted
Blue marlin_Atlantic	$F_{2004}>F_{MSY}$ = Yes	$B_{2004}<B_{MSY}$ = Yes	High	Depleted
White marlin Atlantic	$F_{2004}>F_{MSY}$ = Possibly	$B_{2004}<B_{MSY}$ = Yes	High	Depleted

[1] The standard FIRMS descriptors include the following categories:

- 4 categories for biomass levels: Pre-exploitation, Intermediate, Low and Depleted
- 3 categories for exploitation rate levels: Low, Moderate and High

Appendix 15

Capacity Building Activities

The Secretariat manages funds that are made up of voluntary contributions from several Contracting Parties that are intended to assist developing coastal Contracting Parties to improve their data collection and reporting responsibilities. This document summarizes the activities funded during 2009 (up to October 6). In addition, the document outlines a plan to consolidate and harmonize the various training courses that are offered, as well as to better coordinate those courses with other RFOs.

1. Activities in 2009

Funds spent in 2009 exceed €160,000 **(Table 1)**. More than one-half of the amount was spent on training courses. Twenty-two Contracting Parties received funding assistance **(Table 2)**.

Table 1. Amount spent form various capacity-building funds (€).

Item	*JDIP*	*Data Fund*	*EC Fund*	*Total (€)*
Assistance for travel	22,007.86	14,764.15	16,689.61	53,461.62
Data collection	23,734.00			23,734.00
Training course 1/	70,561.96		13,000.97	83,562.93
Operations Manual				0.00
Total	**116,303.82**	**14,764.15**	**29,690.58**	**160,758.55**

Table 2. Contracting Parties that received financial assistance for either data collection activities, training or travel to participate in meetings.

Party	*Data Collection*	*Training*	*Funds for Travel*
Albania		X	X
Algeria		X	X
Barbados		X	X
Belize		X	X
Brazil			X
Cape Verde			X
Côte d'Ivoire	X		X
Dominica		X	X
Egypt		X	X
Ghana	X		X
Grenada		X	X
Equatorial Guinea			X
M0rocco		X	X
St. Vincent		X	X
Sao Tomé & Príncipe			X
Senegal			X
Syria		X	X
St. Lucia		X	X
Trinidad & Tobago		X	X
Tunisia		X	X
Uruguay			X
Venezuela			X

2. A Proposal for Improving the Coordination of Training Courses

One of the activities funded by the capacity-building funds is training of scientists. Participants in Workshop 1 of the Second Joint Meeting of Tuna RFMOs (San Sebastian, 2009) stressed that "*Assistance for participation in scientific meetings is useful, but it is also important to train scientists from developing countries so that they can take part in the processing and analysis of data for stock assessment*."

The ICCAT area includes a diverse range of countries and fisheries and a major challenge is to build capacity and a better understanding of scientific issues in all countries so they can enter the debates on science and fisheries management on an equal footing. Another challenge for the SCRS is to develop methods to implement the precautionary approach, include ecosystem considerations and to provide socio-economic advice while clearly articulating risk and uncertainty to decision makers (SCRS/2009/035).

This year workshops have been held on data collection in Guyana (SCRS/2009/023) and an introduction to stock assessment methods in Morocco. As well as courses recommended developed by ICCAT, other organizations have also designed courses that the SCRS could take advantage of. For example ICES have implemented a series of courses on stock assessment, management strategy evaluation (MSE) and ecosystem modeling for fisheries management (http://www.ices.dk/iceswork/training/training.asp). The MSE course is being developed jointly with ICCAT, and course material from this and other courses could be used to develop courses for scientists from ICCAT and other RFMOs.

It is proposed that the Secretariat, together with National Scientists who have been given courses in the past, and in collaboration with ICES, develop a curriculum of courses as follows (including the preparation of manuals):

Course	*Target/Content*	*Content*	*Comments*
1. Introduction to Basic Fishery Data Collection and Analysis	Scientists and technicians in charge of data collection	Basic sampling statistics; use of logbook data; port sampling; observer data; raising to Task I and Task II	To be given by ICCAT
2. ICCAT Reporting Requirements	Scientists and other statistical correspondents	All reporting requirements of ICCAT: who has to report what, and when	To be given by ICCAT
3. R, basic statistics, and CPUE Standardization	Intermediate level course for scientists who participate in SCRS	Use of R for statistical analyses. ANOVA, regression, GLM, GAM, advanced CPUE standardization	To be given by ICCAT
4. Parameter estimation and basic stock assessment	Intermediate level course for scientists who participate in assessments	Maximum likelihood estimation. Estimation of uncertainty with different methods. Cohort analysis. Nonlinear regression. Growth, maturity and other life history characteristics. Stock recruitment relationships. Production modeling	To be given by ICCAT
5. Advanced stock assessment methods	Advanced-level scientists participating in assessments	Basic concepts in AD-Model Builder. Age-structured production models. VPA. Introduction to Integrated assessment approaches	To be given by ICCAT
6. Specialized assessment topics	Advanced-level scientists participating in assessments	Miscellaneous courses: FLR; Stock Synthesis 3; Management Strategy Evaluation	To be given by ICES. Participation by a limited number of ICCAT scientists to be financed by ICCAT

7. Analysis of tagging data	Intermediate and advanced scientists participating in assessments	Design of tagging programs; implementation; estimation of reporting rates; estimation of mortality rates and abundance; movement; growth	To be given by ICCAT with assistance from outside experts (e.g. from SPC)
8. Scientific Observer Programs	Technicians and scientists interested in observer programs to collect specialized data	Design of observer programs; species identification; size measurement; collection and storage of biological samples; estimation of catch rates; contrasting logbook information; safety	To be given by ICCAT scientists with appropriate expertise

The courses should be prepared such that different people (e.g. Secretariat staff or National Scientists or outside experts) could teach the same course. Course materials will be posted on the ICCAT Web Site.

Appendix 16

REPORT OF THE 2009 MEETING OF SCRS OFFICERS

The SCRS Officers met on Sunday, October 3, 2009. The following were present at the meeting: G. Scott, M. Ortiz, J. Neilson, J.M. Fromentin, D. Gaertner, G. Tserpes, C. Porch, C. Brown, H. Arrizabalaga, J. Pereira, D. Die, M. Idrissi, and V. Ortiz. P. Pallares and Victor Restrepo from the Secretariat also attended the meeting. The following matters were discussed:

Dr. Scott, SCRS Chairman, reviewed the Agenda and Timetable for the 2009 SCRS Plenary sessions:

- The special meeting to evaluate the status of bluefin tuna with regard to CITES will be discussed early on Monday, October 4.
- The Rapporteurs of the various Species Groups and Sub-Committees summarized their Work Plans and the level of completion of the 2009 Executive Summaries.
- The Tropical Tunas Species Group (TROP) will recommend a bigeye data preparatory meeting and an assessment meeting in 2010. The Group will also propose a large-scale tagging program for tropical species. There are potential sponsors.
- The Billfish Species Group (BILL) will recommend a data preparatory meeting for blue marlin in 2010. It may be possible to carry out the assessment during the same year.
- The Small Tunas Species Group (SMT) will recommend a meeting in 2010 involving ICCAT, CRFM, CECAFC, and GFCM. It may be better to hold this meeting in 2011.
- The East Bluefin Tuna Species Group (BFT-E) will meet Sunday, October 4, to finalize the Executive Summary.
- The Mediterranean Swordfish Species Group (SWO-Med) will propose a meeting in 2011 to evaluate the current closure
- The Sub-Committee on Ecosystems (SC-ECO) will propose a meeting in 2010 to analyze minimum observer coverage needed for the different Species Groups, as well as to consider ecosystem indicators.
- The Working Group on Stock Assessment Methods should focus on Precautionary Approach issues in response to the recommendations by the Working Group on the Future of ICCAT. This Group should meet for three days in 2010 (back to back with one of the assessment meetings) to develop appropriate terms of reference.
- A Mediterranean albacore (ALB-Med) assessment could take place in the future as recommended by the Working Group on the Future of ICCAT. However, it does not seem feasible to assess this species in 2010; however, a data-preparatory meeting could be held.
- The Sub-Committee on Statistics (SC-STAT) will propose that the Commission adopt rules on confidentiality so that more detailed data can be used in the assessments.

Given the availability of many new compliance-related datasets that could be used by SCRS, Dr. Scott will recommend the creation of an advisory group that can assist the Secretariat in improving the data-management and organizational structure, with a view towards how to best achieve an integrated approach to manage the Secretariat databases. The Officers supported this.

The Officers also reviewed the status of the various responses to the Commission.

The presentation of the Executive Summaries at the SCRS Plenary will start first with the stocks that were assessed in 2009.

The Officers Meeting was adjourned.