PART 1

INFORMATION ON ICCAT COMPLIANCE WITH ARTICLE 10 OF UNFSA

One of the objectives of the International Convention for the Conservation of Atlantic Tunas, which was established in 1966, is to establish cooperation among those countries that have a mutual interest in the populations of tuna and tuna-like species found in the Atlantic. This Convention, which is aimed at maintaining the populations of Atlantic tunas and tuna-like species at levels of maximum sustainable catches, entered into force in 1969. The Convention was later amended in 1984 and in 1992 to permit, respectively, the adherence of intergovernmental economic integration organizations and to change the method of calculating the financial contributions of the Contracting Parties.

The Convention applies to more than 30 species of tunas and tuna-like species, including small tunas, billfishes and sharks in the Convention area, which corresponds to the Atlantic Ocean and its adjacent seas.

Although the ICCAT Convention was in existence for some decades before the *United Nations Convention on the Law of the Sea* and the *UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks*, it seems to have anticipated the concerns that are outlined in the provisions of these afore-mentioned agreements.

As of today´s date, the ICCAT Convention has been ratified by 42 Contracting Parties and three non-contracting Parties have been granted Cooperating Status. It is also noted, however, that several non-contracting Parties have expressed the desire to learn more about our organization and are interested in its activities. I would also like to point out that a third of the ICCAT Contracting Parties have ratified the United Nations Agreement of 1995.

Article 10(a) of the UN Agreement stipulates that RFMOs should agree on conservation and management measures and comply with them in order to assure the long-term sustainability of straddling fish stocks and highly migratory fish stocks. The binding measures taken by ICCAT which are currently in force are contained in more than 70 Recommendations These measures are in conformity with the provisions of Article 10 of the UN Agreement relative to the obligations of the regional and sub-regional fishery management organizations or arrangements. These measures have been adopted by the Commission in virtue of Articles VIII and IX of its Convention.

The Conservation and Management Measures Compliance Committee, established by the Commission, oversees the monitoring of the implementation of the measures adopted. The Secretariat has the mandate to prepare annual Compliance Tables which include annual reports and the status of compliance with the measures by Contracting Parties as well as by other parties. These concern compliance with the catch quotas/limits and minimum sizes, which are the subject of lengthy discussions during the Commission meetings. The Contracting Parties are also obliged to transmit information on their list of fishing vessels over 24 meters, lists of vessels that take part in tuna farming operations, lists of vessels involved in the transshipment of tunas from large tuna longliners, lists of vessels fishing for northern albacore, as well as information on vessel chartering arrangements.

All the Contracting Parties or Cooperating non-Contracting Parties, Entities and Fishing Entities that receive imports of certain Atlantic tunas must require that these be accompanied by a Statistical Document from the exporting party. This document includes information on the vessel, the amount transported, the place of capture, as well as the seal of the organization authorized to validate the fishing operations. There is also a limit on the capacity of the fleets fishing bigeye tuna and northern albacore.

All Contracting Parties and non-contracting Parties, Entities or Fishing that seriously undermine the ICCAT conservation and management measures are subject to non-discriminatory trade sanctions.

As concerns Article 10(b) of the UN Agreement, total allowable catches (TACs) and quotas are agreed upon at regular intervals and are based on scientific advice. The *ICCAT Criteria for the Allocation of Fishing Possibilities* [Ref. 01-25] were adopted in 2001 to serve as a guideline for the Commission regarding the allocation of TACs. The rights of participation are determined, among others, by the following criteria: present/past fishing activity, status of the participants, implementation of the ICCAT measures, and data submission requirements.

The provisions of Article 10(c) aimed at adopting and applying any generally recommended international minimum standards for the responsible conduct of fishing operations are covered by the *Recommendation by ICCAT Concerning the Establishment of an ICCAT Record of Vessels over 24 Meters Authorized to Operate in the Convention Area* [Rec. 02-22] and the *Recommendation by ICCAT Concerning the Duties of Contracting Parties, Entities or Fishing Entities in Relation to their Vessels in the ICCAT Convention Area* [Rec. 03-12].

Article 10(d) provides for obtaining and evaluating scientific advice and the review of status of the stocks and assessment of the impact of fishing on non-target and associated or dependent species. The advice formulated by the ICCAT Standing Committee on Research and Statistics (SCRS) is reviewed by each Panel when management measures are envisaged for the individual stocks. The Commission also takes into consideration the advice given by the scientific Committee on by-catches and, to date, measures have been taken for sharks, sea birds and marine turtles. ICCAT has carried out stock assessments on two shark species and maintains the most complete database that is currently available on shark statistics in the Convention area. In 2005, the Sub-Committee on Ecosystems was created, which will combine the activities carried out previously by the Commission´s Sub-Committee on Environment and Sub-Committee on By-catches.

The rules for the collection, transmission, verification and exchange of data on the exploitation of stocks foreseen under Article 10(e) of the UN Agreement are established by the scientific Committee. The submission of statistics, which includes data on nominal catch, catch and effort, size sampling, catch by size, fleet size, as well as other biological data (e.g. tagging data) is mandatory within the framework of the ICCAT Convention and this requirement has been reinforced by various conservation and management measures adopted by the Commission. The Sub-Committee on Statistics and the Compliance Committee monitor respect of the submission of scientific data. The Secretariat and the scientific Committee are in charge of quality control. ICCAT recently developed a relational database of fishing statistics and a data exchange protocol aimed at improving quality control and validation procedures.

The provisions relative to the compilation and dissemination of accurate and complete statistical data, as indicated in Annex I of the UN Agreement, as required under its Article 10(f), are implemented by the ICCAT Department of Statistics of the ICCAT Secretariat which collects and processes the data, in accordance with the rules established by the scientific Committee. Confidential data for use in the stock assessments, and which are not required in the standard data submission, are disseminated in an *ad hoc* manner. The request for confidentiality of the data is respected and the detailed information is never published in the usual data summaries.

The Secretariat publishes an annual *Statistical Bulletin*, which includes the total nominal catch, by species, gear, year and flag. These data are published on the ICCAT web page, as are the data on catch and effort and size. The working files from the ICCAT relational database are made available to the scientists who take part in the stock assessments. The Secretariat currently maintains more than 2 gigabytes of information including data on more than 35 species, more than 50 fishing gears, more than 80 sampling areas, and data from about 140 flags and more than 260 different fleets.

The promoting and conducting of scientific assessments of the stocks, relevant research and the dissemination of the results under Article 10(g) are carried out by the scientific Committee which meets annually and also holds inter-sessional meetings when necessary to conduct stock assessments and other research activities. The scientific Committee reviews and coordinates the results of the research programs presented in the scientific papers by the national scientists. Each year, more than 100 papers are presented and are published in the ICCAT *Collective Volume of Scientific Papers.*

ICCAT has research programs on bluefin tuna and billfish that are currently on-going. The scientific Committee regularly conducts assessments of the stocks of 13 targeted species or groups of targeted species. The reports of the meetings of the scientific Committee are published and transmitted to all the meeting participants each year. They are also published on the ICCAT web site.

ICCAT maintains close working relationships with several networks such as ASFA, FIRMS and CWP, whose Secretariats are assured by FAO.

Article 10(h) foresees the establishment of cooperative mechanisms for effective monitoring, control, surveillance and enforcement. Measures concerning monitoring, control and surveillance (MCS) as well as measures on enforcement are the object of various Recommendations adopted in 2002 by ICCAT: the *General Outline of Integrated Monitoring Measures Adopted* [Ref. 02-31] which led to the adoption in 2003 of the following three Recommendations which are binding: the *Recommendation by ICCAT Concerning the Duties of Contracting Parties and Cooperating Parties, Entities or Fishing Entities in Relation to Their Vessels in the ICCAT Convention Area* [Rec. 03-12]; the *Recommendation by ICCAT Concerning the Recording of Catch by Fishing Vessels in the ICCAT Convention Area* [Rec. 03-13]; and the *Recommendation by ICCAT Concerning Minimum Standards for the Establishment of a Vessel Fishing Monitoring System in the ICCAT Convention Area* [Rec. 03-14]. In 2005, the Commission also adopted a *Recommendation by ICCAT Establishing a Program of Transshipment by Large-scale Longline Fishing Vessels* [Rec. 05-06] which establishes a mandatory mechanism aimed at monitoring at-sea and at-port transshipments of tunas and tuna-like species.

ICCAT is one of the pioneer organizations in the fight against all forms of illegal, unreported and unregulated (IUU) fishing. Further, several Recommendations and Resolutions have been adopted aimed at eradicating IUU fishing. This process, which has resulted in reducing the number of vessels considered to be involved in IUU fishing from 135 in 1999 to 10 in 2005, still constitute an important task for our Commission. Even though this decrease is encouraging, it should be noted that in 2002 the Commission adopted other more stringent criteria to better encompass the inclusion of the vessels on the IUU list. Nevertheless, progress has been made, as attested by the reduction since 1999 in the catches of bigeye tuna from IUU activities.

Following the measures taken to combat IUU fishing, the trade sanctions imposed on eight Parties have been lifted from six of them.

The ICCAT Record of Vessels over 24 meters, also known as the "positive list", which was established in 2002, identifies the vessels that are authorized to fish. The activities of all vessels over 24 m that are not included on this list are likely to be considered as IUU activities. ICCAT has shown on several occasions it willingness to collaborate with other international and/or regional organizations to establish a worldwide registry of vessels in order to jointly fight against IUU fishing.

In virtue of Article 10(i), the means by which the fishing interests of new members of the organization or new participants in the arrangement will be accommodated, should be agreed upon. The requests for quotas presented by new members are reviewed case-by-case by the pertinent Panel, based on the *ICCAT Criteria for the Allocation of Fishing Possibilities*. It should be pointed out that all the members of the United Nations or its Specialized Agencies can become Contracting Parties to ICCAT.

Sub-section (j) of the same Article foresees the agreement of decision-making procedures that facilitate the adoption of conservation and management measures in a timely and effective manner. Although the Convention indicates holding a meeting every two years, the Commission actually meets every year. The Recommendations (measures that are binding) enter into force six months after their adoption. The ICCAT Convention foresees a voting procedure, but in practice, the majority of the decisions are taken by consensus. The number of Recommendations and Resolutions adopted by the Commission has considerably increased since the early 1990s, in part following the improvement of the stock assessment methods, and in response to the integration of international obligations for the Atlantic tuna fisheries.

The promotion of peaceful settlement of disputes envisaged in Article 10(k) is not strictly applied in ICCAT, taking into account the fact that there has never been any disagreement with legal repercussions within the framework of ICCAT. All measures are adopted by consensus. In the case of serious differences, the Contracting Parties have recourse to an objection procedure stipulated under Article VIII of the Convention. In the course of ICCAT's 40 years of existence, six Contracting Parties have presented and confirmed objections to three Recommendations.

Under Article 10(l), aimed at ensuring that the competent national agencies fully cooperate in implementing the recommendations and decisions of the organization or arrangement, the ICCAT Recommendations are binding for all the Contracting Parties, and the Cooperating non-Contracting Parties, Entities or Fishing Entities that wish to maintain such status are also obliged to comply with the ICCAT measures. Non-contracting Parties are not bound by the ICCAT Recommendations, but in case of their implication in activities that undermine ICCAT, non-discriminatory trade restrictive measures can be applied.

Sub-section (m) which stipulates that the RFMOs give due publicity to the conservation and management measures established by the organization or arrangement is very well observed by ICCAT. In this respect, ICCAT transmits the Recommendations, upon their entry into force, to the delegates, to the Ministers of Foreign Affairs, to the Ministers of Agriculture and/or Fisheries, and to the Embassies of the Contracting Parties and to non-contracting Parties, Entities or Fishing Entities, as well as to all the inter-governmental organizations. All the ICCAT measures are also published on the ICCAT web site, including a database that can be consulted. A Compendium of the ICCAT Recommendations and Resolutions is currently being finalized and it is aimed at simplifying the presentation of the regulatory measures in force.

In conclusion, the ICCAT mandate is in conformity with the provisions of Article 10 of the United Nations Agreement, with the exception of the clause relative to the settlement of disputes which, thanks to the commitment of the ICCAT Contracting Parties to management by consensus, has not been necessary up to now. Achieving the sustainability of the tuna fisheries continues to be the objective of ICCAT and any initiative towards that objective is favorably welcome.

PART 2

STOCK STATUS INFORMATION FOR MAJOR STOCKS ASSESSED BY ICCAT

The following information has been extracted from the Executive Summaries produced by ICCAT's Standing Committee on Research and Statistics. The full text of the Executive Summaries can be obtained from the ICCAT Biennial Reports, available from the Internet (http://www.iccat.int/pubs_biennial.htm) or upond request from the ICCAT Secretariat.

1. ATLANTIC ALBACORE TUNA (*Thunnus alalunga*)

1.1 State of stocks

The Committee noted the considerable uncertainty that continues to remain in the catch-at-size data for the North and South stocks, and the profound impact this has had on attempts to complete a satisfactory assessment of northern albacore. The Committee assessed the status of the South Atlantic albacore stock after a review of the Task I and Task II data available. In respect of the North Atlantic, however, the Committee concluded that it was not appropriate to proceed with a VPA assessment based on the 2003 catch-at-age until the catch-at-size to catch-at-age transformation is reviewed and validated. No attempt was made to analyze the status of the Mediterranean stock.

North Atlantic

The Committee carried out an initial analysis of the state of the northern stock using a model (VPA) essentially the same as that used in previous assessments. However revisions to catch-at-size data, provided to the Secretariat during and shortly before the assessment, altered the historical data series. The impacts of these revisions are such that the Committee concluded that it was not appropriate to proceed with an assessment based on the 2003 catch-at-age. Consequently, the Committee's opinion of the current state of the northern albacore stock is based primarily on the last assessment conducted in 2000 together with observations of CPUE and catch data provided to the Committee since then. The results, obtained in 2000, showed consistency with those from previous assessments.

The Committee noted that CPUE trends have varied since the last (2000) assessment, and in particular differed between those representative of the surface fleets (Spain Troll age 2 and Spain Troll age 3) and those of the longline fleets of Japan, Chinese Taipei and the United States. The Spanish age 2 troll series, while displaying an upward trend since the last assessment, none the less declines over the last 10 years. For the Spanish age 3 troll series the trend in the years since the last assessment is down, however, the trend for the remainder of the last decade is generally unchanged. For the longline fleets, the trend in CPUE indices is either upwards (Chinese Taipei and US) or unchanged (Japan) in the period since the last assessment. However, variability associated with all of these catch rate estimates prevented definitive conclusions about recent trends of albacore catch rates.

Equilibrium yield analyses, carried out in 2000 and made on the basis of an estimated relationship between stock size and recruitment, indicate that spawning stock biomass was about 30% below that associated with MSY. However, the Committee noted considerable uncertainties in these estimates of current biomass relative to the biomass associated with MSY (B_{MSY}), owing to the difficulty of estimating how recruitment might decline below historical levels of stock biomass. Thus, the Committee concluded that the northern stock is probably below B_{MSY}, but the possibility that it is above it should not be dismissed. However, equilibrium yield- per-recruit analyses made by the Committee in 2000 indicate that the northern stock is not being growth-over fished ($F < F_{max}$).

South Atlantic

In 2003, an age-structured production model (ASPM), using the same specifications as in 2000, was used to provide a Base Case assessment for South Atlantic albacore. Results were similar to those obtained in 2000, but the confidence intervals were substantially narrower in 2003 than in 2000. In part this may be a consequence of additional data now available, but the underlying causes need to be investigated further. The estimated MSY and replacement yield from the 2003 Base Case (30,915 t and 29,256 t, respectively) were similar to those estimated in 2000 (30,274 t and 29,165 t). In both 2003 and 2000 the fishing mortality rate was estimated to be about 60% of F_{MSY}. Spawning stock biomass has declined substantially relative to the late 1980s, but the decline appears to have leveled off in recent years and the estimate for 2002 remains well above the spawning stock biomass corresponding to MSY. A statistical (Bayesian) age-structured production model was used for the first time in 2003. The results from this model were qualitatively similar to those from the ASPM. Projections were carried out using this alternate model.

1.2 Outlook

North Atlantic

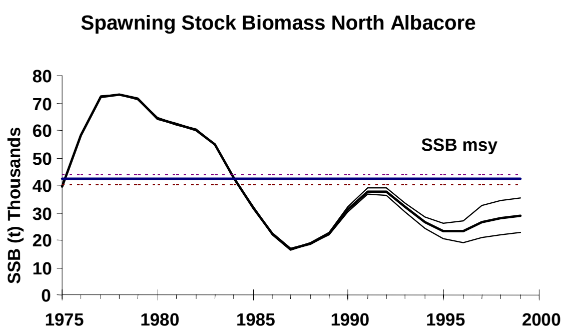
In terms of yield per recruit, the VPA assessment carried out in 2000 indicates that the fishing intensity is at, or below, the fully exploited level. Concerning MSY-related quantities, the Committee recalls that they are highly dependent on the specific choice of stock-recruitment relationship. The Committee believed that using a particular form of stock-recruitment relationship that allows recruitment to increase with spawning stock size provided a reasonable view of reality. This hypothesis together with the results of the VPA assessment conducted in 2000 indicate that the spawning stock biomass (B_{1999}) for the northern stock (29,000 t) was about 30% below the biomass associated with MSY (42,300 t) and that current F (2000) was about 10% above F_{MSY}. However, an alternative model allowing for more stable recruitment values in the range of observed SSB values would provide a lower estimate of SSB at MSY, below the current value.

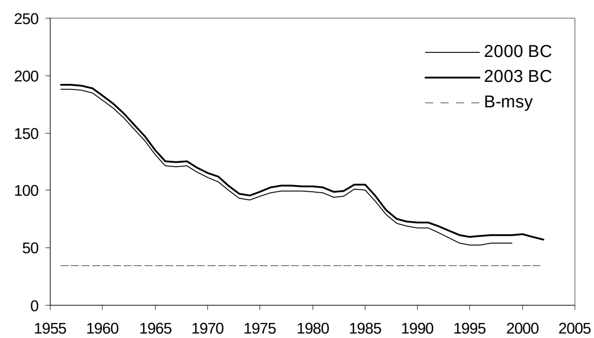
South Atlantic

Catches of albacore in the South Atlantic in 2001 and 2002 were above replacement yield, and were below estimates of MSY in 2003. Nevertheless, both the 2000 and 2003 albacore assessments estimated that the stock is above B_{MSY}. There is now greater confidence in these estimates of MSY and therefore there is justification to base a TAC recommendation on MSY instead of replacement yield estimates from the ASPM as in 2000. This results from the Committee's view that current stock status is somewhat above B_{MSY} and catch of this level, on average, would be expected to reduce the stock further towards B_{MSY}. Recent estimates of high recruitment could allow for some temporary increase in adult stock abundance under a 31,000 t catch, but this result is uncertain.

ATLANTIC AND ALBACORE SUMMARY		
	North Atlantic[1]	**South Atlantic**[2]
Current (2004) Yield	25,460 t[5]	22,468 t
Maximum Sustainable Yield	32,600 t (32,400-33,100)	30,915 t (26,333-30,915)
Replacement Yield (2004)	Not estimated	29,256 t (24,530-32,277)
Relative Biomass[3]		
$B_{current}/B_{MSY}$	0.68 (0.52-0.86)	1.66 (0.74-1.81)
Relative Fishing Mortality[3,4]		
$F_{current}/F_{MSY}$	1.10 (0.99 - 1.30)	0.62 (0.46-1.48)
$F_{current}/F_{MAX}$	0.71 (0.66 - 0.78)	--
$F_{current}/F_{0.1}$	1.25 (1.14 - 1.39)	--
Management measures in Effect	[Rec. 98-08]: Limit number of vessels to 1993-1995 average. TAC: 34,500 t [Rec. 03-06]	[Rec. 03-07]: Limit catches to 29,200 t.

1 VPA results based on catch data (1975-1999). 80% confidence intervals from bootstrap.
2 ASPM results based on catch data (1956-2002). 80% confidence intervals from bootstrap.
3 F_{1999} = North Atlantic, Geometric Mean 1996-1998.
4 North "current" is from 2000 assessment F_{1999}); South "current" is from 2003 assessment (F_{2002}).
5 This figure includes reported catch, provisional catch reported to the Committee.





2. MEDITERRANEAN ALBACORE TUNA (*Thunnus alalunga*)

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

3. ATLANTIC BIGEYE TUNA (*Thunnus obesus*)

3.1 State of the stocks

The 2004 stock assessment was conducted by various types of models. However, there were considerable sources of uncertainty arising from the lack of information regarding (a) reliable indices of abundance for small bigeye from surface fisheries, (b) the species composition of Ghanaian fisheries that target tropical tunas, and (c) details on the historical catch and fishing activities of IUU fleets (e.g., size and location).

Three indices of relative abundance were available to assess the status of the stock. All were from longline fisheries conducted by Japan, Chinese Taipei and U.S. While the Japanese indices have the longest duration since 1961 and represent roughly 20-40% of the total catch, the other two indices are shorter and generally account for a smaller fraction of the catch than the Japanese fishery does. These three indices primarily relate to medium and large-size fish.

Various types of production models were applied to the available data. It should be noted that this year's model fits to the data were better than in past assessments, although they required similar assumptions regarding stock productivity. The point estimates of MSY obtained from different production models ranged from 93,000 t to 113,000 t. The lower limit of this range is higher than the one estimated in the 2002 assessment, probably due to the revised indices and the addition of new index. An estimate obtained from another age-aggregated model was 114,000 t. The inclusion of estimation uncertainty would broaden this range considerably.

These analyses estimate that the total catch was larger than the upper limit of MSY estimates for most years between 1993 and 1999, causing the stock to decline considerably, leveling off thereafter as total catches decreased. These results also indicate that the current biomass is slightly below or above (85%-107%) the biomass at MSY, and that current fishing mortality is also in the range of 73% to 101% of the level that would produce MSY (see **Summary Table**).

Several types of age-structured analyses were conducted using the above-mentioned longline indices from the central fishing grounds and catch-at-age data converted from the available catch-at-size data. In general, the trajectories of biomass and fishing mortality rates are in accordance with the production model analyses. Model fits appeared improved over those of past assessments, apparently as a result of using a new growth curve for the calculation of catch at age. However, time constraints did not permit a full and detailed exploration of these analyses.

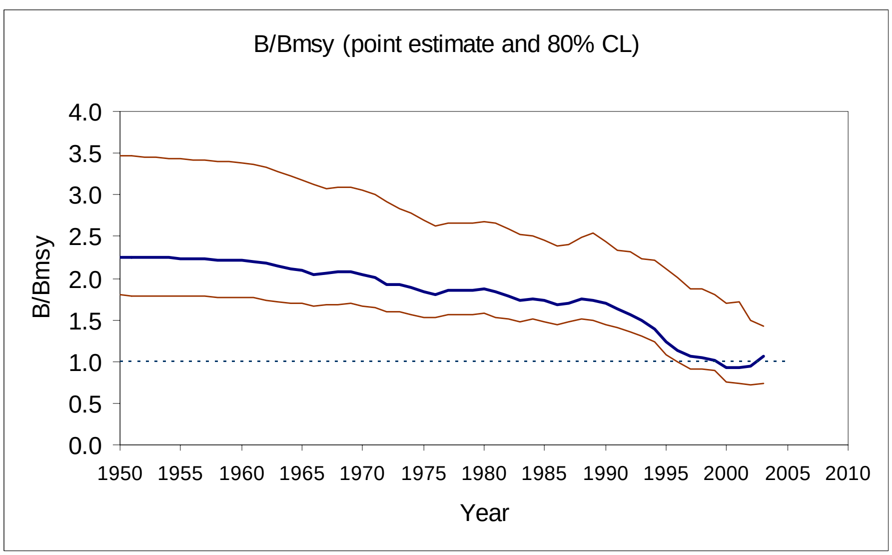
The application of a statistical integrated model was attempted on bigeye stock for the first time. This model is able to more directly account for the statistical properties of the various data types used and is useful for testing alternative hypotheses on the population dynamics. Further development and refinement of this model application should be encouraged so that better scientific advice can be provided to the Commission.

3.2 Outlook

Stock projections were conducted based on the production model results, assuming a catch of 75,480[1] t in 2003 and varying levels of constant catch thereafter. The projection results suggest that the biomass of the stock will likely decline further with constant catches of 100,000 t or more. On average, increases in biomass are expected with catches of 90,000 t or less. However, due to uncertainty, there is a probability of further decline of the stock with a constant future catch of 100,000 t or less.

ATLANTIC BIGEYE TUNA SUMMARY	
Maximum Sustainable Yield (likely range[1])	93,000 t - 114,000 t
Current (2004) Yield [2]	72,000 t
Replacement Yield 2003 [1]	89,000 - 103,000 t
Relative Biomass (B_{2003}/B_{MSY}) [1]	0.85 - 1.07
Relative Fishing Mortality (F_{2002}/F_{MSY}) [1]	0.73 - 1.01
Conservation & management measures in effect:	- Limits on numbers of vessels [Recs. 98-03, 02-01, 03-01]. - Catch limits for those who reported 1999 catch in 2000 was larger than 2,100 t [Rec. 02-01]. - Moratorium on FAD fishing for all surface fleets, Nov 1 to Jan 31, in eastern tropical area. Observers on board are required during the moratorium [Rec. 99-01]. - No purse seine and baitboat fishing during November in the area encompassed by 0°-5°N and 10°W-20°W. [Rec. 04-01]. This recommendation will replace [79-01 and 99-01] after June, 2005.

[1]Range based on point estimates from various production models and including a delay-difference model. Other models applied during the assessment resulted in estimates outside this range.
[2]Provisional figure, subject to change in the future.
[1] Available at the time of the assessment.



4. ATLANTIC SWORDFISH (*Xiphias gladius*)

4.1 State of the Stocks

No new assessment was conducted in 2003; the most recent assessment of North and South Atlantic swordfish stocks was conducted in 2002. In that assessment, updated CPUE and catch data through 2001 were examined. Sex and age-specific (North Atlantic) and biomass standardized catch rates (North and South Atlantic) from the various fleets were updated. The updated North Atlantic CPUE data showed similar trends to previous years, and also showed signs of improvement in stock status since 1998. In particular, the recruitment index (1997-2001) and the catch at age used in the 2002 North Atlantic assessment showed signs of substantially improved recruitment (age 1), which has manifested in several age classes and the biomass index. The updated recruitment index also showed a high value in 1999 and 2000. These improvements in recruitment already manifested in several age classes and in the biomass index of some fisheries, and have allowed for increases in spawning biomass and a more optimistic outlook. The CPUE patterns in the South Atlantic by fleet showed contradictory patterns. Lack of important CPUE information from some fleets fishing in the South Atlantic prevented the Committee from reconciling these conflicts.

North Atlantic

In 2002, the status of the North Atlantic swordfish resource was again assessed using both non-equilibrium stock production models and sequential population analyses (SPA) based on catch and CPUE data through 2001. The current Base Case assessment indicated that the North Atlantic swordfish biomass had improved due to strong recruitment since 1997 (1996 year-class), combined with recent reductions in reported catch, especially compared to the peak catch values of 1987**.** In particular, strong recruitment since 1997 manifested in several age classes and was evident in the catch rates from several fleets. The strong recruitments of the late 1990s promoted improvement in spawning stock biomass and should result in further improvement, if these year-classes are not heavily harvested. The pattern of decline in stock size followed by stabilization and rebuilding was reflected in the CPUEs for several fisheries. An updated estimate of maximum sustainable yield from production model analyses is 14,340 t (with estimates ranging from 11,500 to 15,500 t). Since 1997, North Atlantic swordfish catches have been below 14,340 t; preliminary estimates (reported plus carried over) of catches in 2001, 2002, and 2003 were about 9,980 9,550, and 11,020 t, but the most recent years are provisional and probably underestimates.

The biomass at the beginning of 2002 was estimated to be 94% (range: 75 to 124%) of the biomass needed to produce MSY. The 2001 fishing mortality rate was estimated to be 0.75 times the fishing mortality rate at MSY (range: 0.54 to 1.06). The replacement yield for the year 2003 was estimated to be about the MSY level. As the TAC for North Atlantic swordfish for 2002 was 10,400 t, it was considered likely that biomass would increase further under those catch levels. The TAC set for 2003-2005 is 14,000 t [Ref. 02-02].

Overall, the sequential population analysis conducted for North Atlantic swordfish in 2002 was consistent with the stock production model results, particularly in terms of the trends in population trajectories. The SPA point estimates for age 1 gradually increased in the early 1980s, shifting to a somewhat higher level from 1985 to 1989. Subsequently, the abundance of age 1 shifted back to a lower level between 1990 and 1996 and then increased to the highest levels of the time series in 1999 and 2000. The trends for ages 2, 3 and 4 are similar with the appropriate time lags, but the pattern is less pronounced. The estimated abundance of older (5+) fish declined to about one-third of the numbers in 1978, but increased somewhat after 1998. The estimated fishing mortality rate generally increased for all ages until 1996, after which they decreased sharply. The fishing mortality rate during the last three years averaged about 0.38/year for age 5+. Given this fishing mortality pattern, the spawning biomass likely will increase to a level exceeding 30% of the maximum at equilibrium, largely owing to the very large recruitments estimated for 1997-2000.

South Atlantic

The Committee noted that reported total catches have been reduced since 1995, as was recommended by the SCRS. Previously the Committee expressed serious concern about the trends in stock biomass of South Atlantic swordfish based on the pattern of rapid increases in catch before 1995 that could result in rapid stock depletion, and in declining CPUE trends of some by-catch fisheries.

Standardized CPUE series were available for three fleets, the targeted fishery of EC-Spain, and the by-catch fisheries of Chinese Taipei and Japan. There was considerable conflict in trends among the three CPUE series and it is unclear which, if any, of the series tracks total biomass. It was noted that there was little overlap in fishing area among the three fleets, and that the three CPUE trends could track different components (or cohorts) of the population. To address this possibility, an age-structured production model was run as a sensitivity test. For the base case production model, the Committee selected the by-catch CPUE series combined using a simple unweighted mean and the targeted CPUE series.

Due to some inconsistencies in the available CPUE trends reliable stock assessment results could not be obtained.

4.2 Outlook

North Atlantic

For the North Atlantic swordfish stock, the Base Case surplus production model showed that the swordfish biomass had increased from the 1997 low and the 2002 biomass is estimated to be near the level that would produce maximum sustainable yield due to strong recruitment and lower catches during this period. If total catch from 2003 and beyond, including discards and overages, was less than MSY, there would be a greater than 50% chance that the population would reach B_{MSY} within the recovery program plan time-frame agreed by the Commission. Lower catches or high recruitments would both enhance the probability of achieving the recovery plan goal.

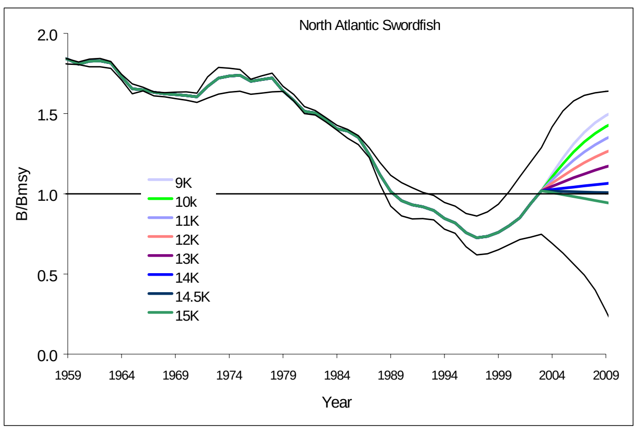
The high recruitment levels observed in recent years (age 1 in 1997-2001) have resulted in a more optimistic outlook than previous projections since the recent year-classes were not heavily harvested. The updated indices examined in 2002 and 2003 confirmed that a positive effect of this strong recruitment has manifested in older ages and in the biomass indices of several fisheries. Given that recent (2002-2003) reported catch has been below estimated replacement yield, the north Atlantic swordfish biomass may have already achieved the B_{MSY} level.

South Atlantic

Given the history of expansion of the longline fisheries, and the apparent stability in at least one target fishery, the Committee recommends that catch should remain at about the same level of the past few years before the assessment to maintain the stock at about the then current abundance.

ATLANTIC SWORDFISH SUMMARY		
	North Atlantic	**South Atlantic**
Maximum Sustainable Yield[1]	14,340 t (11,580-15,530)[4]	Not estimated
Current (2004) Yield[2]	12,283 t	12,779 t
Current (2002) Replacement Yield[3]	about MSY	Not estimated
Relative Biomass (B_{2002}/B_{MSY})	0.94 (0.75 - 1.24)	Not estimated
Relative Fishing Mortality		
F_{2001}/F_{MSY}[1]	0.75 (0.54 - 1.06)	Not estimated
F_{2000}/F_{max}	1.08	Not estimated
$F_{2000}/F_{0.1}$	2.05	Not estimated
$F_{2000}/F_{30\%SPR}$	2.01	Not estimated
Management Measures in Effect:	Country-specific TACs [Rec. 02-02]; 125/119 cm LJFL minimum size.	TAC target [Ref. 02-03]; 125/119 cm LJFL minimum size [Rec. 02-02].

1 Base Case production model results based on catch data 1950-2001.
2 Provisional and subject to revision.
3 For next fishing year.
4 80% confidence intervals are shown.



5. MEDITERRANEAN SWORDFISH (*Xiphias gladius*)

5.1 State of the stock

Both production modeling and age-based VPA indicated the presence of a stable situation in terms of recruitment, and total and spawning biomass. These findings suggest that the current exploitation pattern and level of exploitation are sustainable, in the short-term. However, the lack of sufficient historical data did not allow the determination of stock status relative to MSY benchmarks. The VPA analysis suggested that recent F estimates were higher than the calculated Y/R and SPR benchmarks.

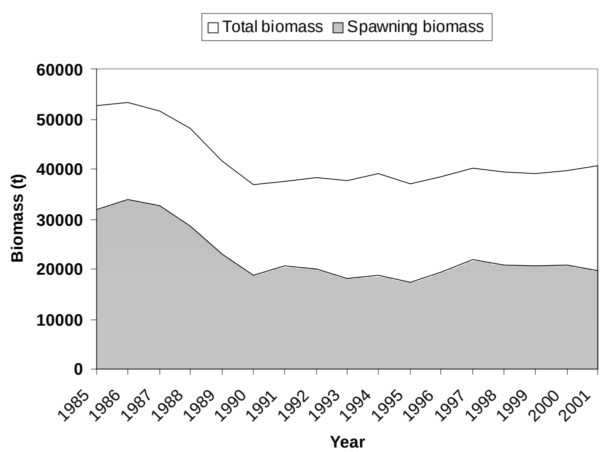
The Committee noted the large catches of small size swordfish, i.e., less than 3 years old (many of which have probably never spawned) and the relatively low number of large individuals in the catches. Fish less than 3 years old represent 50-70% of the total yearly catches.

5.2 Outlook

Assessment results indicated the presence of a stable recruitment pattern and suggested that the current exploitation pattern and level of exploitation are sustainable, at least in the short-term. Average catch over the past decade has been about to 14,000 t per year. The Committee expects that annual catches of about this magnitude will keep the stock at about the present level, at least over the short-term.

MEDITERRANEAN SWORDFISH SUMMARY	
Maximum Sustainable Yield	Not estimated
Current (2004) Yield[1]	13,222 t
Current (2002) Replacement Yield	~15,000 t
Relative Biomass (B_{2002}/B_{MSY})	Not estimated
Relative Fishing Mortality	
F_{2001}/F_{MSY}	Not estimated
F_{2001}/F_{max}	2.7
$F_{2001}/F_{0.1}$	4.7
$F_{2001}/F_{30\%SPR}$	3.3
Management measures in effect:	No ICCAT regulations; national closed areas, minimum size and effort controls.

[1] Provisional, and subject to revision.



6. ATLANTIC YELLOWFIN TUNA (*Thunnus albacares*)

6.1 State of the stock

A full assessment was conducted for yellowfin tuna in 2003 applying various age-structured and production models to the available catch data through 2001. Unfortunately, at the time of the assessment meeting, only 19% of the 2002 catch had been reported (calculated relative to the catch reports available at the time of the SCRS Plenary). The results from all models were considered in the formulation of the Committee's advice.

Overall trends in the catch at age available at the time of the assessment are shown in. 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 1998-2001).

Both equilibrium and non-equilibrium production models were examined in 2003. The effective effort used for the production models was calculated by first creating a combined index from the available abundance indices by fleet and gear, and weighting each index by the catch of that fishery. One of the non-equilibrium models applied estimated the annual effective fishing effort internally, allowing the fishing power trends by fleet to vary.

The estimate of MSY based upon the equilibrium models ranged from 151,300 to 161,300 t; the estimates of F_{2001}/F_{MSY} ranged from 0.87 to 1.29. The point estimate of MSY based upon the non-equilibrium models ranged from 147,200-148,300 t. The point estimates for F_{2001}/F_{MSY} ranged from 1.02 to 1.46; the main differences in the results were related to the assumptions of each model. The Committee was unable to estimate the level of uncertainty associated with these point estimates.

An age-structured virtual population analysis (VPA) was made using eight indices of abundance. The results from this model were more comparable to production model results than in previous assessments, owing in part to a greater consistency between several of the indices used. The VPA results compare well to the trends in fishing mortality and biomass estimated from production models. The VPA 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 148,200 t.

In summary, the age-structured and production model analyses implied that although the 2001 catches of 159,000 t were slightly higher than MSY levels, effective effort may have been either slightly below or above (up to 46%) the MSY level, depending on the assumptions. Consistent with these model results, yield-per-recruit analyses also indicated that 2001 fishing mortality rates could have been either above or about the level which could produce MSY. Yield-per-recruit analyses further indicated that an increase in effort is likely to decrease the yield-per-recruit, while reductions in fishing mortality on fish less than 3.2 kg could result in substantial gains in yield-per-recruit and modest gains in spawning biomass-per-recruit.

6.2 Outlook

Since reported yellowfin landings in 2001 appeared to be somewhat above the MSY level estimated during the 2003 assessment and fishing effort and fishing mortality may have been in excess of the levels associated with MSY, it is important to ensure that effective effort does not increase beyond the 2001 level. Projections indicate that stock biomass is likely to decrease if fishing mortality increases to the level estimated for 1992, which is currently being approached or exceeded. Thus the possibility that the fishing power of the purse seiners and other fleets may further increase, even if the total capacity of the fleet were to remain constant, is also cause for concern. It should be noted that the current estimates of total yellowfin landings in 2002 and 2003, which were not available at the time of the assessment, are 139,000 t and 124,000 t, respectively.

ATLANTIC YELLOWFIN TUNA SUMMARY

Maximum Sustainable Yield (MSY)[1]	~148,000 t
Current Yield [2]	
(2001)	159,000 t
(2004)	116,000 t
Replacement Yield (2001)	May be somewhat below the 2001 yield
Relative Biomass B_{2001}/B_{MSY}[3]	0.73 - 1.10
Relative Fishing Mortality: F_{2001}/F_{MSY}[3]	0.87-1.46
F_{99-01}/F_{MSY}[4]	1.13 (80% confidence limits 0.94 to 1.38)
$F_{0.1}$[4]	0.55
F_{MSY}[4]	0.72

Management measures in effect:

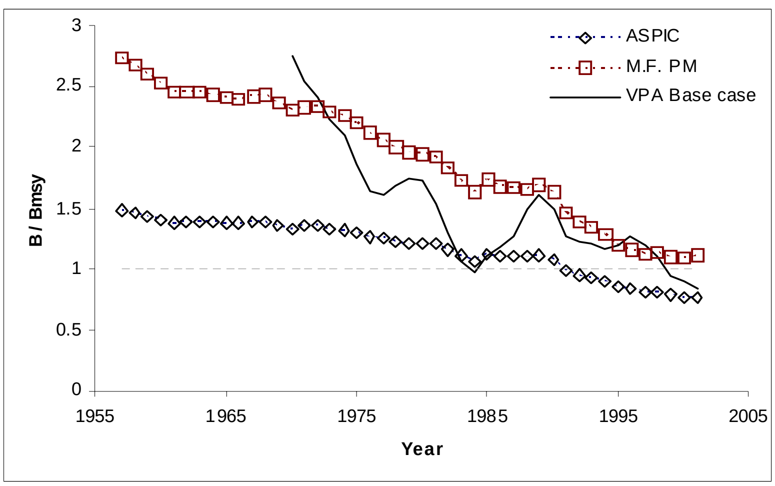
- 3.2 kg minimum size [Rec. 72-01].
- Effective fishing effort not to exceed 1992 level [Rec. 93-04].
- Closed area/season for fishing on FADs [Rec. 99-01].

[1] MSY estimates based upon results of age-structured and non-equilibrium production models, and VPA. The complete range of results from all models is 147,200-161,300 t.

[2] The assessment was conducted using the available catch data through 2001. Reports for 2004 should be considered provisional.

[3] These are ranges of point estimates; no estimates of uncertainty were calculated around these point estimates during the assessment.

[4] Result exclusively from VPA and yield-per-recruit analyses.



7. ATLANTIC BLUE MARLIN (*Makaira nigricans*)

7.1 State of the stock

The 1996 blue marlin assessment indicated that in the mid-1990s biomass was about 25% of B_{MSY}, that fishing mortality was about three times F_{MSY}, and that over-fishing had been occurring for about three decades. MSY was estimated to be near 4,500 t.

An assessment was carried out in 2000 using similar methods to the previous assessment, but with data sets that had been revised extensively in response to concerns raised since the 1996 assessment. The assessment might reflect a retrospective pattern wherein improvement in estimated biomass ratios result in estimated lower productivity. The results from the 2000 assessment were not adjusted for retrospective patterns and were slightly more optimistic than the 1996 assessment; These results suggest that the total Atlantic stock is approximately 40% of B_{MSY} and that over-fishing has taken place in the last 10-15 years. But this assessment also suggests a less productive stock than previously estimated, with an MSY of about 2,000 t, and a current fishing mortality that is about four times higher than F_{MSY}.

For the assessment, the Committee considered a range of models and data sets, including cases in which much of the historical data were disregarded or down-weighted. While the sensitivity analyses were not meant to quantify possible biases, the Committee notes that many of the sensitivity runs provided more optimistic results than those reported above, with stock estimates somewhat closer to B_{MSY} levels. However, most of the sensitivity results were within the range of uncertainty reported for the assessment. Thus, there is uncertainty in the assessment related to the historical data that is not well quantified. The Committee notes that the historical catch and effective fishing effort data must be validated and focused research be conducted before such uncertainties can be reduced. To address these uncertainties would require a substantial research investment in historical data validation efforts and in biological investigations of the habitat requirements of blue marlin.

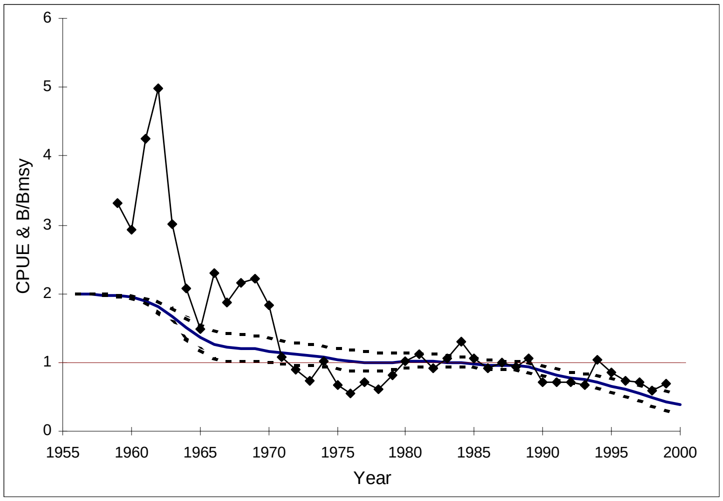
7.2 Outlook

As noted, there is uncertainty in the assessment related to the historical data that is not well quantified. However, given that the 2000 assessment estimated that over-fishing was still occurring and that productivity (MSY and a stock's capacity to replenish) was lower than previously estimated, it is expected that landings in excess of estimated replacement yield would result in further stock decline.

ATLANTIC BLUE MARLIN SUMMARY[1]

	Total Atlantic
Maximum Sustainable Yield (MSY)	~ 2,000 t (~ 1,000 ~ 2,400 t)[2]
2002 Yield	2,626 t
2003 Yield	2,713 t
2004 Yield[4]	2,076 t
1999 Replacement Yield	~ 1,200 t (~ 840 - 1,600 t)[2]
Relative Biomass (B_{2000}/B_{MSY})	~ 0.4 (~ 0.25 - 0.6)[2]
Relative Fishing Mortality (F_{1999}/F_{MSY})	4.0 (~ 2.5 - 6.0)[2]
Management Measures in Effect:	Reduced pelagic longline and purse seine landings to 50% of 1996 or 1999 levels, whichever is greater [Recs. 00-13[3], 01-10[3] and 02-13].

[1] Assessment results are uncertain. Uncertainty in these estimates is not fully quantified by bootstrapping.
[2] Approximate 80% CI from bootstrap for ASPIC model.
[3] These measures did not take effect until mid-2001.
[4] Reported Task I value, which is likely to be a substantial underestimate of the total catch.



8. ATLANTIC WHITE MARLIN (*Tetrapturus albidus*)

8.1 State of the stock

The data available for white marlin, in spite of significant improvements in the relative abundance estimates made available during the last two assessments and the current assessment, is not informative enough to provide an estimate of stock status with high certainty. For consistency with the last assessment, the results presented in 2002 (continuity case) are largely based on treatment of data and assumptions that closely resemble the analyses made in 2000. The previous two white marlin assessments, made in 1996 and 2000, indicated that biomass of white marlin has been below B_{MSY} for more than two decades, thus that the stock has been over-fished for many years. The 2000 assessment estimated that biomass in the late 1990s was about 15% of B_{MSY}, and that fishing mortality was increasing and reaching more than five times F_{MSY}. The MSY estimates of 2,200 t made in 1996 were reduced to 1,300 t in the 2000 assessment. The assessment results presented are similar to those obtained in 2000; they suggest that the total Atlantic stock in 2000 remains over-fished and continues to suffer over-fishing.

Available relative abundance indices suggest similar trends in abundance in the last twenty years, however, the abundance trends for the early part of the fishery are more uncertain and reflect changes that cannot be easily explained by the available population models. To evaluate the uncertainty and sensitivity of the assessment to data and model inputs, the Committee considered alternative models and data set combinations. While the range of sensitivity analyses were not meant to quantify possible biases, the Committee used them to qualitatively characterize the range of uncertainty in the estimates of stock status. Many of the sensitivity results were within the range of uncertainty estimated for the assessment presented but some produced more optimistic views of the status of the stock. The uncertainty in the estimates of population parameters remains large and not well quantified; the calculated uncertainty underestimates the real uncertainty on these parameters.

The Committee notes that in order to properly quantify and reduce this uncertainty improvements must be made in the estimates of historical and recent catch, abundance indices and on the biology of white marlin. Such improvements will require a substantial research investment in estimating effective fishing effort, historical data validation, and biological investigations of the age, growth, reproduction and habitat requirements of white marlin.

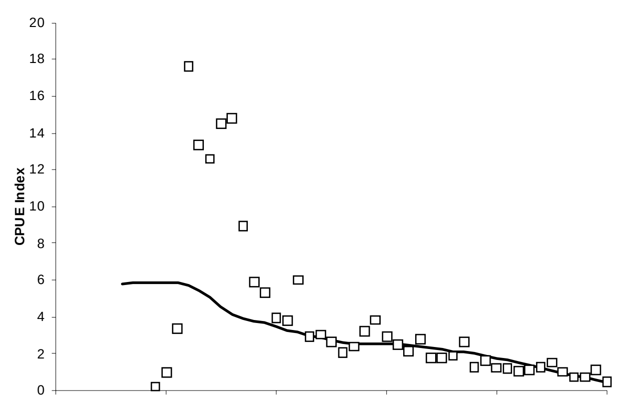
8.2 Outlook

In 2000 and 2001 [Ref. 00-13] and [Ref. 01-10], the Commission recommended that purse seine and longline fisheries limit landings of white marlins to 33% of the larger of either 1996 or 1999 levels. The Committee has interpreted these Recommendations as a maximum limit for landings for 2002 and beyond at 600 t based on the landings estimates used in the current assessment. While the stock status evaluations are uncertain, projections indicated that the apparent intent of the Recommendations has, in the short term, some potential for stabilizing the stock biomass near current levels. The projections also indicated that lower catch levels would provide greater potential for increasing stock biomass.

ATLANTIC WHITE MARLIN SUMMARY[1]

	Likely value	*Continuity case*[2] *estimate (80% conf. limit)*	*Retrospective adjusted estimate*[3]	*Range of sensitivity*[4] *estimates*
Maximum Sustainable Yield	Below 2000 Yield	964 t (849-1070)		323-1,320 t
2002 Yield	822 t	--		--
2003 Yield	615 t	--		--
2004 Yield[5]	532 t			
2001 Replacement Yield	Below 2000 Yield	222 t (101-416)	371 t	102-602 t
Relative Biomass (B_{2001}/B_{MSY})	<1 (Over-fished)	0.12 (0.06-0.25)	0.22	0.12-1.76
Relative Fishing Mortality (F_{2000}/F_{MSY})	>1 (Over-fishing)	8.28 (4.5-15.8)	5.05	0.80-10.30
Management Measures in Effect:	In 2001 and 2002, PS and LL fisheries limit landings to 33% of max (1996, 1999) level. [Rec. 00-13], [Rec. 01-10] and [Rec. 02-13].			

1 Assessment results are highly uncertain.
2 The data used are not sufficiently informative to choose a "best case". For consistency, the continuity case presented here is based on data and assumptions that closely resemble the analyses made in 2000. Confidence limits from bootstrapping are conditional on this model-data set and thus may underestimate the real uncertainty.
3 These results are for the continuity case except that they were adjusted for retrospective biases.
4 The sensitivity analyses made were not chosen in a systematic way; the range is presented only for qualitative guidance.
5 Reported Task I value for 2004, which is likely an underestimate of total catch.



9. ATLANTIC NOTHERN BLUEFIN TUNA (*Thunnus thynnus*)

9.1 EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA

9.1.1 State of the stock

The Committee notes that basic catch statistics are still undergoing revisions by the reporting agencies and, also, the Committee suspects that there was over-reporting between 1993 and 1997 and that there has been increased under reporting in the last few years, especially since 1998. Additionally, although there have been improvements to most of the available CPUE indices, the CPUE and size data are not available for important Mediterranean fisheries. Thus, the Committee does not have confidence in assessments based upon these data. Nevertheless, the Committee's best determination of the state of the stock is that which was developed in the 2002 assessment at the Commission's request.

An assessment was done in 2002 with similar specifications to those used in the previous assessment in 1998, but using alternative scenarios. The scenarios included two trials using catches as reported to ICCAT (but using two alternative modelling constraints). These were trials 5 and 9. A third trial was also tested in which catches were assumed to be over-reported in 1994-1997, and under-reported, subsequently (Trial 12). The Committee evaluated these different analyses but, due to the low quality of the data used, it had no basis to assign preference to any one of the sets of outputs. Therefore, no "Base Case" assessment was defined for the eastern stock. Results of this assessment are similar to the results obtained in 1998 in terms of trends, but are more optimistic in terms of current depletion. The new assessment indicates that the SSB in 2000 was about 86% of the 1970 level (first year of data in the assessment), while the ratio of the 1997/1970 SSB estimated in the 1998 assessment was 47%. This difference is due primarily to the new and updated CPUE indices used in the 2002 assessment, as well as recent increased recruitment (1995-1996).

The assessment indicates two peaks in spawning biomass and an increase in fishing mortality rates, especially for older fish after 1993. There appears to have been a general trend of increasing recruitment in the early 1980s followed by a period without trend.

The 2000 level of fishing mortality was almost 2.5 times higher than that which maximizes yield per recruit. Estimates in recent years should be judged with caution since such VPA estimates are generally imprecise.

The Committee recognizes that many of the inputs to the assessment are uncertain. These include doubts about the historical catches (mainly in recent years), the absences of size composition for many fisheries, and the unknown adequacy of available CPUE indices as measures of overall stock abundance. These uncertainties make it easier to interpret trends in relative abundance rather than absolute levels of the stock.

9.1.2 Outlook

Since the Committee was unable to identify adequate assumptions about the relationship between stock size and recruitment, projections were made assuming that future recruitment would vary around recent (1980-1997) levels without a trend. This was the same option used in the 1998 stock assessment. It should be noted that incomplete catch data from the period prior to 1970 might indicate that there have been periods in the past with very different levels of recruitment from that at present. Therefore, one should be cautious when making long-term projections, especially if spawning stock biomass falls below historically observed levels.

Long-term projections were made for the East Atlantic at levels of fishing mortality approximately equal to the value estimated for 2000. The Committee conducted projections using the three trial assessment scenarios presented above. The table below summarizes projection results for the three trials that use the current selection pattern and current fishing mortality rate.

	Trial 5	*Trial 9*	*Trial 12*
$Yield_{long\text{-}term}$	24,649	23,543	24,294
$Yield_{long\text{-}term}/Yield_{2000}$	0.69	0.66	0.59
$SSB_{long\text{-}term}/SSB_{2000}$	0.43	0.38	0.36

The results of these projections were similar to those obtained in the 1996 and 1998 assessments. These results suggest that current catch levels cannot be sustained in the long-term under the current selectivity pattern and current fishing mortality rate for the stock. The Committee recognizes that zero fishing mortality on juvenile bluefin is an impracticable objective. If either total fishing mortality or the mortality of small fish could be reduced substantially, then projections by the Committee indicated that current or even higher yields (perhaps more than 50,000 t) could be sustained.

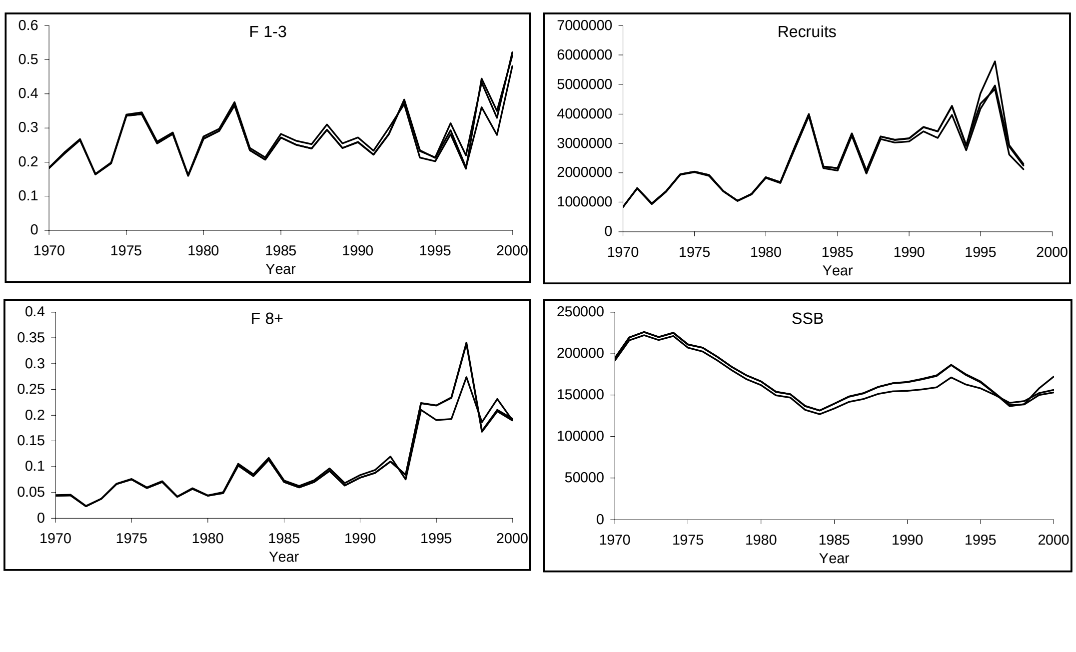
The Committee continues to be concerned about the intensity of fishing pressure on small fish. This contributes substantially to growth over-fishing, and it seriously reduces the long-term potential yield from the resource. Additionally, the recent abrupt increase of catches of large fish since 1994 is of grave concern.

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY[1]

Current (2004) Yield [2]	26,961 t
2001 Replacement Yield	Not estimated
Maximum Sustainable Yield	Not estimated
Relative biomass SSB_{2000}/SSB_{1970}	0.86
Relative numbers $N_{8+,2000}/N_{8+,1970}$	0.70
Relative fishing mortality F_{2000}/F_{max}	2.4
TAC (annually, 2003-2006)	32,000 t

[1]Summary statistics are based on three runs (Trials 5, 9 and 12 in the 2002 Detailed Report (Anon 2003a)) that represent alternative model formulations.

[2]2004 reported yields are incomplete and are further suspected to be strongly under-reported.



9.2 WEST ATLANTIC BLUEFIN TUNA

9.2.1 State of the stock

The assessment results are similar to those from previous assessments. They indicate that the spawning stock biomass (SSB) declined steadily from 1970 (the first year in the assessment time series) through the late 1980s, before leveling off at about 20% of the level in 1975 (which has been a reference year used in previous assessments). A steady decline in SSB since 1997 is estimated and leaves SSB in 2001 at 13% of the 1975 level. The assessment also indicates that the fishing mortality rate during 2001 on the spawning stock biomass (SSB) is the highest level in the series. Estimates of recruitment of age 1 fish have been generally lower since 1976. However, recruitment of age 1 fish in two recent years (1995 and 1998) is estimated to be comparable in size to some of the year-classes produced in the first half of the 1970s.

While the large decline in SSB since the early 1970s is clear from the assessment, the potential for rebuilding is less clear. Key issues are the reasons for relatively poor recruitment since 1976, and the outlook for recruitment in the future. One school of thought is that recruitment has been poor because the SSB has been low. If so, recruitment should improve to historical levels if SSB is rebuilt. Another school of thought is that the ecosystem changed such that it is less favorable for recruitment. If so, recruitment may not improve even if SSB increases. Therefore, the Committee considered two recruitment scenarios as described below (BFTW-4. Outlook). For both scenarios, the assessment indicates that the fishing mortality on the western Atlantic bluefin resource exceeds F_{MSY} and the SSB is below B_{MSY} (thus over-fished according to the Convention's objective of maintaining stocks at the MSY-biomass level) (See Summary Table).

9.2.2 Outlook

In general, the outlook for bluefin tuna in the West Atlantic is similar to the outlook reported based on the 2000 western Atlantic bluefin tuna assessment session. The assessment and projection results for the present assessment are somewhat less optimistic than in 2000 but the confidence in the strength of the 1994 year-class has increased. Therefore, the increases associated with different levels of future catch projected for the short-term are smaller but are estimated more confidently. It should be noted that the 1995 year-class was estimated to be strong in 2000 but it is now estimated to only of average strength.

As noted by the previous assessment session, western Atlantic bluefin tuna catches have not varied very much since 1983 (the range over this period is 2,106 to 3,011 t), and the estimated spawning stock size (SSB measured as the biomass of fish age 8+) has been relatively stable, notwithstanding the indication of a decline in the most recent years. Thus, over an extended period of time, catches around recent levels have maintained stock size at about the same level, in spite of several past assessments that predicted the stock would either decline or grow if the current catch was maintained. This observation highlights the challenge of predicting the outlook for this stock.

In order to provide advice relative to rebuilding the western Atlantic bluefin resource, the Committee conducted projections for two scenarios about future recruitment, which reflect the two schools of thought discussed in Section BFTW-3. One scenario assumed that future average recruitment will approximate the average estimated recruitment (at age 1) since 1976, unless spawning stock size declines to low levels (such as the current level estimated in the assessment, but generally lower than estimates during most of the assessment history). The second scenario allowed average recruitment to increase with spawning stock size up to a maximum level no greater than the average estimated recruitment for 1970 to 1974. These scenarios are referred to as the low recruitment and high recruitment scenarios, respectively. The low and high recruitment scenarios implied that the B_{MSY} (expressed in SSB) is 42% and 183% of the biomass in 1975, respectively. With the current information the Committee could not determine which recruitment scenario is more likely, but both are plausible. Therefore, management strategies should be chosen to be reasonably robust to this uncertainty.

The results of projections for both recruitment scenarios are given infor several catch levels, and for 2,500 t only. The results are summarized in the table below.

The projections for the low recruitment scenario estimated that a constant catch of 3,000 t per year has an 83% probability of allowing rebuilding to the associated SSB_{MSY} by 2018. A constant catch of 2,500 t per year has a 35% probability of allowing rebuilding to the 1975 SSB by 2018.

The results of projections based on the high recruitment scenario estimated that a constant catch of 2,500 t per year has a 60% probability of allowing rebuilding to the 1975 level of SSB, and there is a 20% chance of rebuilding SSB to SSB_{MSY} by 2018. If the low recruitment scenario is valid, the TAC could be increased to at least 3000 t without violating the Commission's rebuilding plan. If the high recruitment scenario is valid, the TAC should be decreased to less than 1,500 t to comply with the plan.

Probability of achieving target biomass in 2018

	Low Recruitment Scenario		*High Recruitment Scenario*	
Catch (t)	SSB_{1975}	SSB_{MSY}	SSB_{1975}	SSB_{MSY}
500 t	95%	100%	98%	73%
1000 t	89%	100%	96%	62%
1500 t	77%	100%	87%	47%
2000 t	60%	99%	75%	30%
2300 t	45%	98%	66%	24%
2500 t	35%	97%	60%	20%
2700 t	26%	95%	52%	17%
3000 t	14%	83%	38%	11%
5000 t	0%	1%	2%	0%

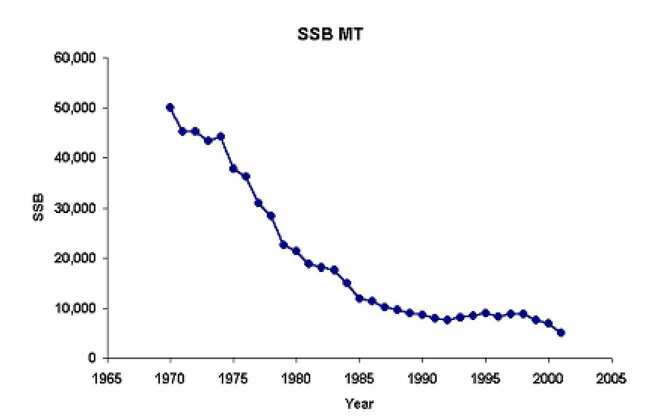
The estimate of SSB_{MSY} for the high recruitment scenario is critical to inferences regarding the probability of achieving rebuilding under different future levels of catch, and also less well determined by the data than SSB_{MSY} for the low recruitment scenario. In particular, the estimates of SSB_{MSY} based on the high recruitment scenario are substantially larger than the largest spawning stock size included in the assessment. This extrapolation considerably increases the uncertainty associated with these estimates of SSB_{MSY}. Previous meetings have used SSB_{1975} as a rebuilding target in the context of interpreting projections. Arguably SSB_{1975} is appropriate as a target level for interpreting the implications of projections based on the high recruitment scenario. Under such a target level for the high recruitment scenario, a TAC of 2,700 t has an estimated probability of reaching the rebuilding level of about 50%.

The Committee cautioned that these conclusions 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 (this factor is considered further in Section Responses to Commission in 2002 SCRS Report). Furthermore, the projected increases in stock size are strongly dependent on estimates of recent recruitment, which are a particularly uncertain part of the assessment. A sensitivity test in which the estimates of the below average1996 and the strong 1997 year-classes were excluded from the analysis gave somewhat less optimistic results in terms of the estimated probabilities of recovery by 2018. However, these projections still predicted increases in spawning biomass for both recruitment scenarios, except for extreme increases in catch.

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

Current (2004) Catch[1] (including discards)	~2,000 t	
Short-term Sustainable Yield	Probably >3,000 t	
Maximum Sustainable Yield (MSY)	3,500 (3,300-3,700)[2]	7,200 (5,900-9,500)[3]
Relative Spawning Stock Biomass		
$B_{2001}B_{1975}$	0.13 (0.07-0.20)[2]	0.13 (0.07-0.20)[3]
$B_{2001}B_{MSY}$	0.31 (0.20-0.47)[2]	0.06 (0.03-0.10)[3]
Relative Fishing Mortality		
F_{2001}/F_{MSY}	2.35 (1.72-3.24)[2]	4.64 (3.63-6.00)[3]
$F_{2001}/F_{0.1}$	4.87	
F_{2001}/F_{max}	2.35	
Management Measures:	TAC of 2,700 t from 2003 including dead discards [Rec. 02-07].	

1 These estimates do not include any unreported catches that might have occurred.
2 Median and approximate 80% confidence interval from bootstrapping from the 2002 assessment; assumes a "low recruitment" scenario at high spawning levels.
3 Median and approximate 80% confidence interval from bootstrapping from the 2002 assessment; assumes a "high recruitment" scenario at high spawning levels.



10. ATLANTIC SKIPJACK (*Katsuwonus pelamis*)

10.1 State of the stocks

The last assessment on Atlantic skipjack tuna was carried out in 1999.

The state of the Atlantic skipjack stock(s), as well as the stocks of this species in other oceans, show a series of characteristics that make it extremely difficult to conduct an assessment using current models. Among these characteristics, the most noteworthy are:

– the continuous recruitment throughout the year, but heterogeneous in time and area, making it impossible to identify and monitor the individual cohorts;

– apparent variable growth between areas, which makes it difficult to interpret the size distributions and their conversion to ages;

– exploitation by many and diverse fishing fleets (baitboat, purse seine), having distinct and changing catchabilities, which makes it difficult to estimate the effective effort exerted on the stock in the East Atlantic.

For these reasons, no standardized assessments have been able to be carried out on the Atlantic skipjack stocks. Notwithstanding, some estimates were made, by means of different indices of the fishery and some exploratory runs were conducted using a new development of the generalized production model.

Eastern stock

Standardized catch rates are not available. However, an analysis was made, for the 1969-2002 period, of the different indices of the purse seine fishery that could provide valuable information on the state of the stock. The indices analyzed were: catches, catch per day fishing, number of sets per fishing day, positive sets, catch by $1^{o}x1^{o}$ squares exploited, average weight, Grainger and Garcia index (annual growth rate of catches with respect to the average catch of the previous three years). For the majority of the indices, the trends were divergent, depending on the area, which may indicate the viscosity of the skipjack stock, with limited mixing rates between areas. In general, the development of the catches (with stable nominal effort), the average weights, and the catch per positive set showed a possible scenario of local over-fishing in the Equatorial area of maximum fishing concentration on FADs, even though the last index could be biased due to an increase in purse seine catchability. Other indices, such as the number of sets per fishing day or the catch by area fished, could also show similar biases. In other areas, particularly in the Senegalese area where there is a predominance of fishing on free schools, the indices showed, on the contrary, a different development (no trend, and by inference, a stable stock status).

The Grainger and García index is a gross indicator of stock status under the hypothesis that the skipjack fisheries in the East Atlantic have supported increasing effort over time. When this index shows negative values it can be interpreted as a sign that catches are too high. However, the Group expressed doubts about the validity of applying this conclusion to the entire eastern stock. The Committee was informed that since the Madeira Working Group carried out the stock assessment of skipjack, a scientific paper has been published on this topic. Because this method presupposes that fishing effort increased during this period, the changes over time in the relative rate of catch increase (RRCI) was broken down into two historical periods (data before 1984 in one hand and data from 1990 to 1999, on the other hand (see Grainger and García index, revised); the period from 1985 to 1989 was not used in the analysis because fishing effort decreased due to the partial shift of European Community purse seiners to the Indian Ocean in the second half of the 1980s. Notice that the last period began in the early 1990s with the massive use of FADs fishing operations. In keeping to the spirit of reserve expressed by the Committee concerning the total eastern stock, the state of potential over-exploitation occurred in 1994-1995.

A new, non-equilibrium production model was presented based on a generalized model. A run of the fit of this model showed a possible decline in the yield of the stock following the introduction of FADs. However, the MSY estimates are not considered robust enough to be utilized as a measure of the state of the stock. In the same way, the model estimated a possible generalized increase in the efficiency of the fishing gears of about 5% annually for this species.
Because of the difficulties to assign ages to the skipjack catches, the estimates of the values of natural mortality by age and obtaining indices of abundance (especially for the eastern stock), no catch-by-age matrices were developed and, consequently, no analytical assessment methods (VPA type) were applied.

Western stock

Standardized abundance indices up to 1998 were available from the Brazilian baitboat fishery and the Venezuelan purse seine fishery, and in both cases the indices seem to show a stable stock status.

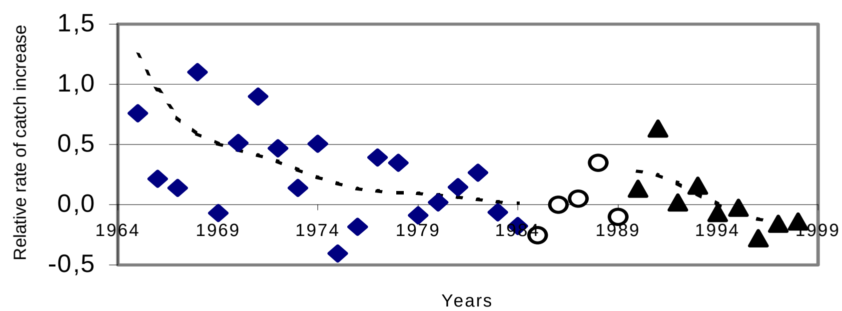
10.2 Outlook

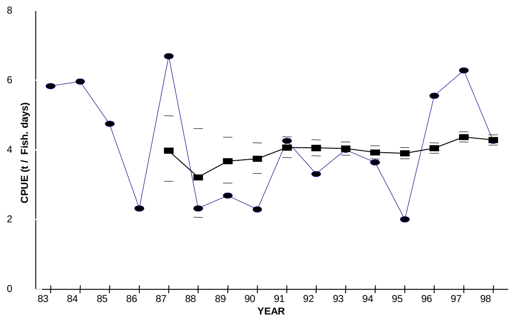
Uncertainties in the underlying assumptions for the analyses prevent the extracting of definitive conclusions regarding the state of the stock. However, the results suggest that there may be over-exploitation within the FAD fisheries, although it was not clear to what extent this applies to the entire stock.

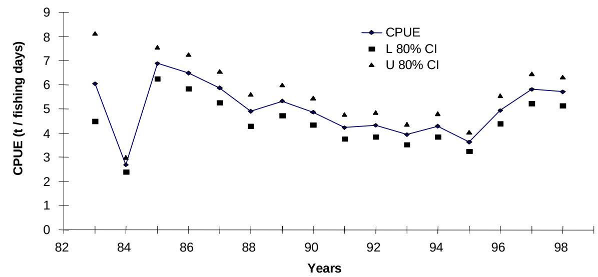
The Committee could not determine if the effect of the FADs on the resource is only at the local level or if it had a broader impact, affecting the biology and behavior of the species. Under this supposition, maintaining high concentrations of FADs would reduce the productivity of the overall stock. However, since 1997, and due to the implementation of a voluntary Protection Plan for Atlantic tunas, agreed upon by the Spanish and French boat owners in the usual areas of fishing with objects, which later resulted in a Commission regulation on the surface fleets that practice this type of fishing, there has been a reduction in the skipjack catches associated with FADs. Maintaining this closure could have a positive effect on the resource.

ATLANTIC SKIPJACK TUNA SUMMARY

	East Atlantic	**West Atlantic**
Maximum Sustainable Yield	Not estimated	Not estimated
Current (2004) Yield	134,274 t	26,910 t
Current Replacement Yield	Not estimated	Not estimated
Relative Biomass (B_{2004}/B_{MSY})	Not estimated	Not estimated
Relative Fishing Mortality: F_{2004}/F_{MSY}	Not estimated	Not estimated
Management measures in effect	None	None







11. ATLANTIC SAILFISH/SPEARFISH (*Istiophorus platypterus/ Tetrapturus pfluegeri*)

11.1 State of the stocks

All initial assessments of Atlantic sailfish were done on aggregate data on sailfish and spearfish obtained from the offshore longline fleets. The 1991 assessment for western Atlantic sailfish/spearfish (1992 SCRS) concluded that the composite stock was at least fully exploited and that fishing mortality had stabilized since the 1980s at around the level that would produce MSY. The 1994 assessment for the eastern Atlantic sailfish/spearfish stock (1995 SCRS) concluded that there were signs of over-fishing for this composite stock because estimated biomass was below the level that would produce MSY and estimated fishing mortality was greater than the level that would produce MSY. Both of these assessments had considerable uncertainties especially because of the inability of separating spearfish and sailfish catches from the offshore longline fleets and because of the limited number of reliable abundance indices for the early part of the history of the fishery and for the coastal eastern Atlantic fisheries.

The last assessments were conducted in 2001 for the eastern and western Atlantic sailfish stocks based on sailfish/spearfish composite catches and sailfish “only” catches for the period 1956-2000. The assessments tried to address the shortcomings of the previous assessments by improving the list of abundance indices and by separating the catch of sailfish from that of spearfish in the offshore longline fleets. Considerable progress was made on obtaining new, or more reliable abundance indices. The new separation of sailfish/spearfish allowed assessments to be attempted on sailfish “only” data. However, considerable uncertainties remain relating to both catches and catch rates that can only be addressed by substantial research investment in historical data validation and in investigations of the habitat requirements of sailfish.

All quantitative assessment models used in 2001 produced unsatisfactory fits. The biomass dynamic models were unable to satisfactorily explain the observed patterns in the abundance indices and catch. It will be necessary to apply population models that can better account for these dynamics in order to provide improved assessment advice.

At present, abundance indices represent the most reliable information and indication of changes in biomass for the stocks of sailfish “only” or sailfish/spearfish. Abundance indices for the eastern stock may be less reliable than those for the western stock. The differences in the indices between the early and later part of the fishery should not be ignored and should be considered to represent an indication of a decrease in the size of these stocks.

For the western Atlantic stock recent catch levels for sailfish/spearfish combined seem sustainable because over the last two decades both CPUE and catch have remained relatively constant. For the combined sailfish/spearfish western stock, it is not known whether the current catch level is below, or at maximum sustainable yield. For this same stock, tentative catches of sailfish “only” have averaged about 700 t over the past two decades and the abundance indices have remained relatively stable for the same period. New analyses do not provide any information on the MSY or other stock benchmarks for the western Atlantic composite or sailfish "only" stock.

In the eastern Atlantic, abundance indices for sailfish "only" from coastal fisheries have decreased over recent times and so have total estimated tentative catches of sailfish "only". In contrast, abundance indices for the Japanese longline fishery have been rather constant since the mid-1970s but there is concern on the status of this stock, because of the decreases in abundance indices and estimated catches from coastal fisheries.

In summary, although the 2001 attempts at quantitatively assessing the status of these two stocks (eastern and western sailfish) proved to be unsatisfactory, there are early decreases in biomass for these two stocks. These decreases probably lowered the biomass of the stocks to levels that may be producing sustainable catches, but it is unknown whether biomass levels are below those that could produce MSY.

No assessments have ever been conducted on longbill or Mediterranean spearfish because of the lack of reliable catch or abundance index data.

11.2 Outlook

The SCRS noted that the methods for splitting sailfish/spearfish in the offshore longline catches are tentative and are subject to other possible methods in future analyses. Therefore, the results could change in the future. Based on the methods applied and considering these limitations, it is unknown if the western or eastern sailfish stocks are undergoing over-fishing ($F>F_{MSY}$) or if the stocks are currently over-fished ($B<B_{MSY}$) and for these reasons the outlook for future conditions of the stocks are best interpreted based on the recent trends of CPUE and catch.

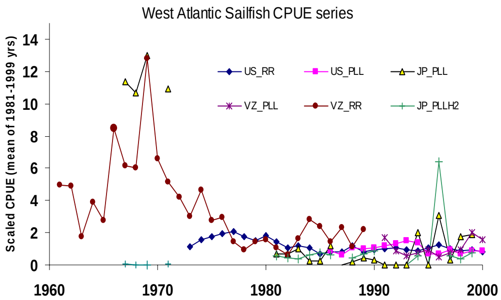
For the western sailfish stock, CPUE was highest in the late 1960s and decreased to lower levels by about 1980, after which CPUE remained relatively stable. Over the past two decades, the estimated catch of western sailfish has averaged about 700 t per year. From these observations, the Committee considers that the current catch level is sustainable.

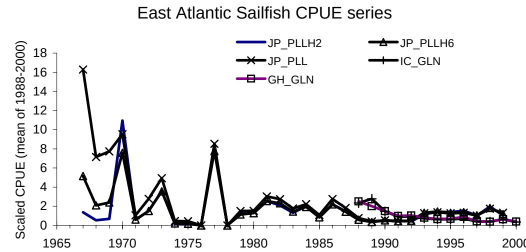
For the eastern Atlantic sailfish, recent reported catches have been in decline, as have the available coastal abundance indices. These patterns could suggest possible further decreases in biomass that, if unchecked, could result in the need for increasingly stringent management actions in the future.

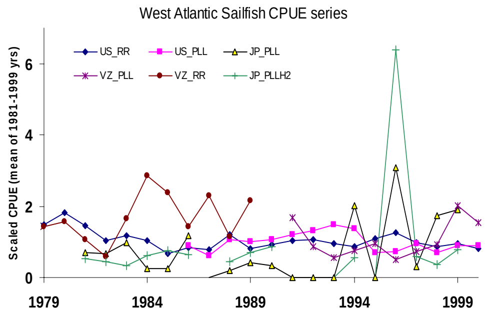
ATLANTIC SAILFISH "ONLY" SUMMARY

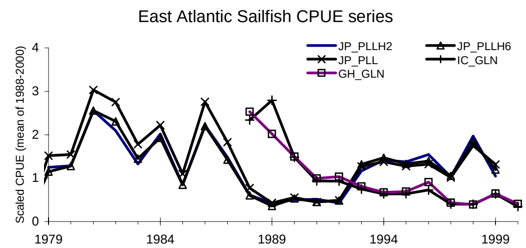
	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	Not estimated	Not estimated
Recent Yield (2000)[1]	506 t[2]	969 t[2]
2000 Replacement Yield	~ 600 t	Not estimated
Management Measures in Effect	None	None

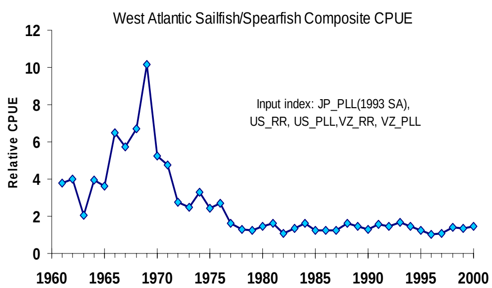
1 Estimated yield includes that carried over from previous years.
2 Recent yield (2000) was estimated during the 2001 sailfish assessment. To estimate the 2001-2004 yield, catches of sailfish and spearfish would have to be separated. A separation similar to the one conducted in the 2001 assessment has not yet been conducted.


West Atlantic Sailfish CPUE series
Scaled CPUE (mean of 1981-1999 yrs)
US_RR
US_PLL
JP_PLL
VZ_PLL
VZ_RR
JP_PLLH2


East Atlantic Sailfish CPUE series
Scaled CPUE (mean of 1988-2000)
JP_PLLH2
JP_PLLH6
JP_PLL
IC_GLN
GH_GLN


West Atlantic Sailfish CPUE series
Scaled CPUE (mean of 1981-1999 yrs)
US_RR
US_PLL
JP_PLL
VZ_PLL
VZ_RR
JP_PLLH2


East Atlantic Sailfish CPUE series
Scaled CPUE (mean of 1988-2000)
JP_PLLH2
JP_PLLH6
JP_PLL
IC_GLN
GH_GLN


West Atlantic Sailfish/Spearfish Composite CPUE
Relative CPUE
Input index: JP_PLL(1993 SA),
US_RR, US_PLL,VZ_RR, VZ_PLL